

Republic of the Sudan
Federal Ministry of Health
National Malaria Control Programme



National Strategic Plan for RBM
2007-2012

Khartoum, 2006
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List of Acronyms

ACT	Artemisinin-based Combination Therapy
ANC	Antenatal Care
BCC	Behavioural Change Communication
CBO	Community Based Organization
CQ	Chloroquine
EPI	Extended Programme of Immunisation
GDP	Gross Domestic Product
GFATM	Global Fund to Fight AIDS, Tuberculosis & Malaria
HIS	Health Information System
HMM	Home Based Management of Malaria
IDP	Internally Displaced Persons
IEC	Information, Education and Communication
IMCI	Integrated Management of Childhood Illness
IPT	Intermittent Preventive Treatment
IRS	Indoor Residual Spraying
ITN	Insecticide Treated Net
IVM	Integrated Vector Management
LLINs	Long Lasting Insecticidal Net
NMCP	National Malaria Control Programme
SMCP	State Malaria Control Programme
MOH	Ministry of Health
NGOs	Non Governmental Organizations
RBM	Roll Back Malaria
RDT	Rapid Diagnostic Test
SP	Sulphadoxine-Pyrimethamine
UNICEF	United Nations Children's Fund
WHO	World Health Organization
WHOPES	WHO-Pesticide Evaluation Scheme

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1 Situation analysis

1.1 Country profile

1.1.1 Geography and Climate

Sudan is situated in northern Africa, bordering the Red Sea and it has a coastline of 853km along the Red Sea. With an area of 2,505,810 square kilometres (967,499 sq mi), it is the largest country in the continent. It borders the countries of Central African Republic, Chad, Democratic Republic of the Congo, Egypt, Eritrea, Ethiopia, Kenya, Libya and Uganda. It is dominated by the River Nile and its tributaries.

The terrain is generally flat plains, broken by several mountain ranges; in the west the Jebel Marra is the highest range; in the south is the highest mountain Mount Kinyeti Imatong, near the border with Uganda; in the east are the Red Sea Hills. The Blue and White Niles meet in Khartoum to form the River Nile, which flows northwards through Egypt to the Mediterranean Sea. Blue Nile's course through Sudan is nearly 500 miles long and is joined by the rivers Dinder and Rahad between Sennar and Khartoum. The White Nile within Sudan has no significant tributaries.

The amount of rainfall increases towards the south. In the north there is the very dry Nubian desert; in the south there are swamps and rain forest. Sudan's rainy season lasts for about three months (July to September) in the north, and up to six months (June to November) in the south. The dry regions are plagued by sand storms, known as haboob.

1.1.2 Demography

In Sudan's 1993 census, the population was calculated at 25 million. No comprehensive census has been carried out since that time due to the continuation

of the civil war. Current estimates from the United Nations as of 2006 estimate the population to be about 37 million, of which 6 millions are in the south . The population of metropolitan Khartoum (including Khartoum, Omdurman, and Khartoum North) is growing rapidly and is estimated at about 5-6 million, including around 2.3 million displaced persons from the southern war zone as well as western and eastern drought-affected areas.

In the northern and western semi-desert areas, people rely on the scant rainfall for basic agriculture and many are nomadic, traveling with their herds of sheep and camels. Nearer the River Nile, there are well-irrigated farms growing cash crops.

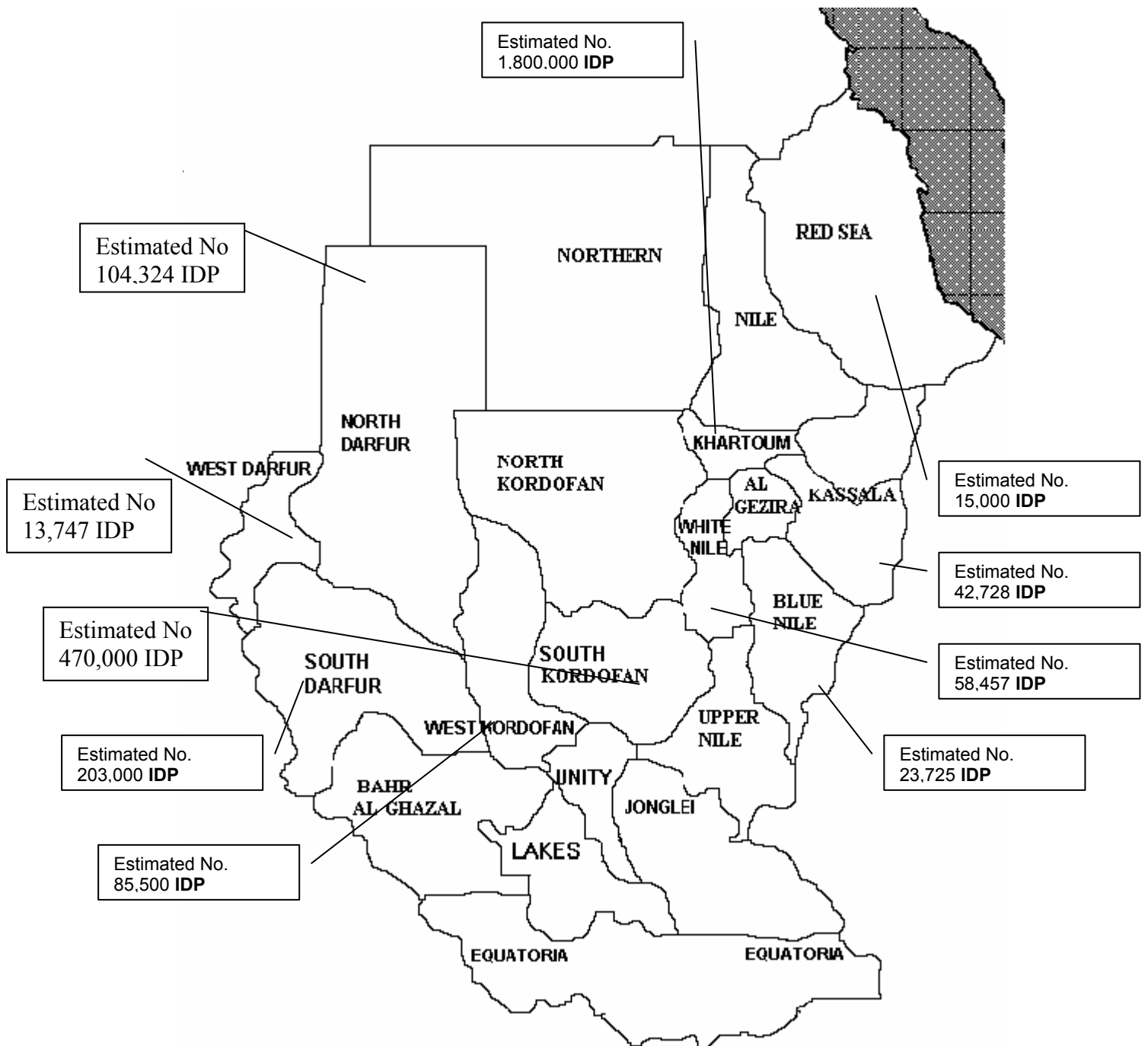
Sudan has the greatest number of displaced persons (IDPs and Refugees) of any single country in the world, estimated at over 3.5 million. With advancement in peace negotiations, it is envisaged that good number of IDPs and refugees will return back to their places of origin or choice.

Internal Displaced Populations:

The displacement phenomenon could be categorized as follows:

- IDPs displaced by the 84-85 and 89 droughts (from Dar Fur and Kordofan – North to North IDPs who have mainly settled in shanty towns in Khartoum).
- IDPs displaced by the war in the South, sub-divided into three:
 - Those who remained in the South, such as those in garrison towns.
 - Those who moved to the North, particularly Khartoum and other towns
 - IDPs that remained in the transition zone, including large numbers of Dinka from Bahr el Ghazal now in Dar Fur.
- IDPs displaced by the war in the Nuba Mountains
- IDPs displaced by insecurity in the Eritrean boarder
- IDPs displaced by militia and other South on South conflict (such as the Bor Dinka and the Nuer of the Unity State)

Map shows IDPs Presence by State
(OCHA, August 02)

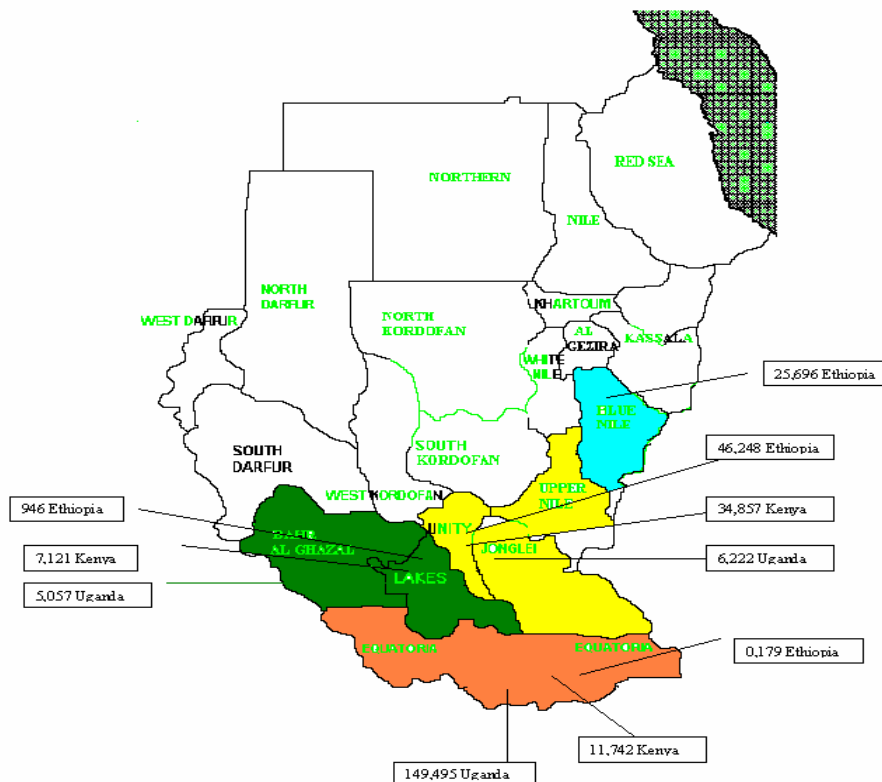


The refugee population present in Eastern Sudan is mainly from Eritrea. Some of them came to Sudan more than two decades ago. However there are few Ethiopians and Somali who started arriving in Eastern Sudan in 2006. The camp population as of March 2007 according to the Health Information system (HIS) report is as follows:

Table1: Camp population as of March, 2007

S/N	Camp	Male	Female	Total camp population	Estimate of surrounding population
1.	Wad Sherifey	12,440	20,930	33,370	23,000
2.	Shagarab I, II, III	10,429	10,970	21,999	3,000
3.	Kilo 26	4,285	5,434	11,423	4,000
4.	Girba	4,450	4,546	8,996	6,000
5.	Um Gargour	4,975	4,914	9,889	4,000
6.	Abuda	1,992	1,937	3,929	5,000
7.	Fau 5	631	760	1,391	2,000
8.	Suki I,II,III	1,561	1,530	3,091	4,000
Total Population camp-based 2007 estimate				94,088	51,000
Under five population				18,503	
Women of reproductive age				41,632	

Map showing refugees in Sudan, 2006



1.1.3 Economic and General Development

Despite new economic policies and infrastructure investments, Sudan still faces formidable economic problems. Since 1997 Sudan has been implementing the macroeconomic reforms recommended by the IMF. In 1999, Sudan began exporting crude oil and in the last quarter of 1999 recorded its first trade surplus. Increased oil production (the current production is about 520,000 barrels per day) revived light industry, and expanded export processing zones helped sustain GDP growth at 6.1% in 2003. These gains, along with improvements to monetary policy, have stabilized the exchange rate. Agriculture production remains Sudan's most important sector, employing 80% of the work force and contributing 39% of GDP, but most farms remain rain-fed and susceptible to drought.

The Merowe High Dam, also known as Merowe Multi-Purpose Hydro Project or Hamdab Dam, is a large construction project in northern Sudan, about 350 km north of the capital Khartoum. The main purpose of the dam will be the generation

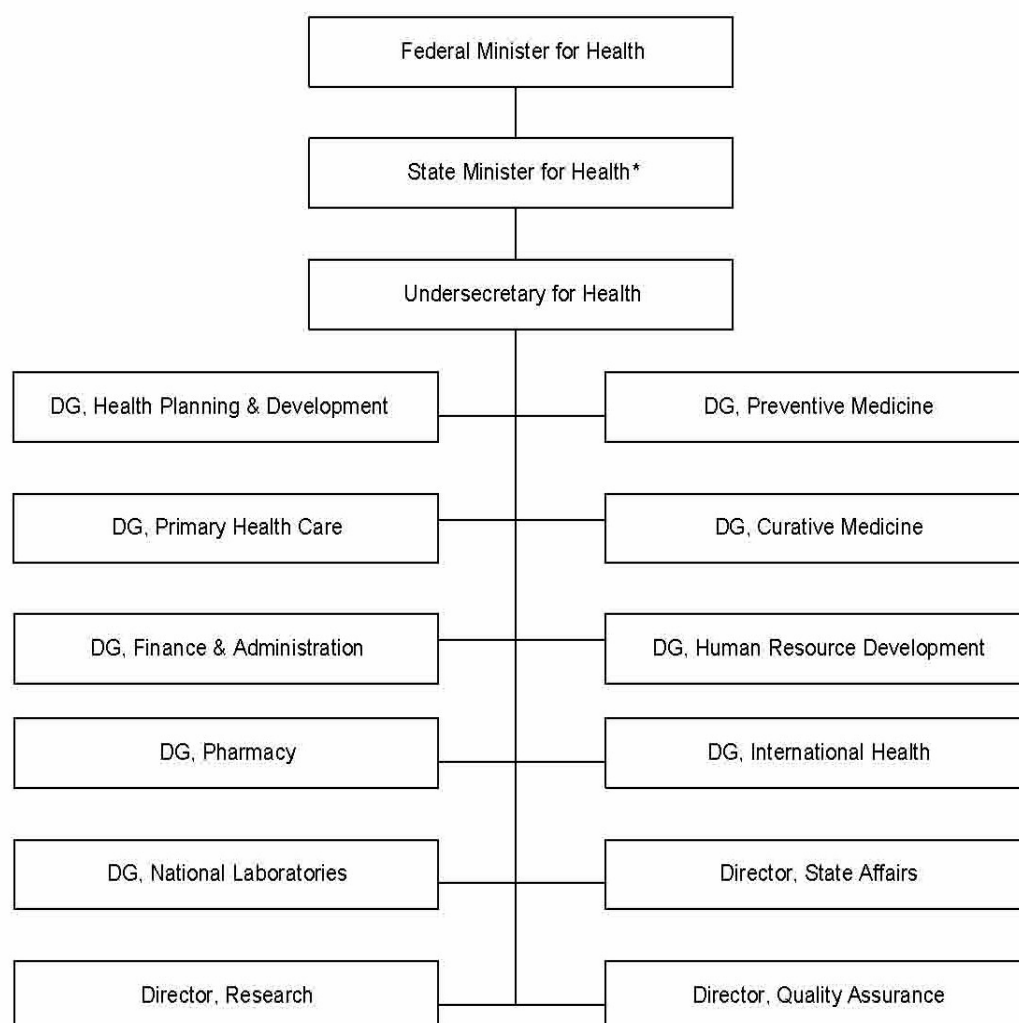
of electricity. Its dimensions make it the largest contemporary hydro power project in Africa. The construction of the dam will be finished by mid 2008, supplying more than 90% of the population with electricity. Other gas powered electricity station are under construction in Khartoum state, these are also due to be completed by 2008.

1.1.4 Health System and Health Status

A decentralization process since the mid-1990s has devolved much responsibility for government health system financing and management to the States and localities. The Federal Ministry of Health (FMOH) is joined by 26 State Ministries of Health (15 of which are in the geographic north of the country). The FMOH is responsible for national policies and legislation, overall supervision and evaluation of the health system, international relations, management of skilled cadres, and quarantine and control of epidemics. The State Ministries are responsible for administration and financing of the health system in each state, and management of higher-level facilities (health centers and hospitals). Within each State there are a number of localities (134 in total) where Health Area Systems are responsible for management of lower-level facilities. Local councils are also responsible for water and sanitation services. In addition to the Ministry of Health structure, some hospitals are managed by the Ministry of Higher Education and the military. Outside the governmental system are privately-run clinics and hospitals. (the organograms below showing the structure at the FMOH and the NMCP structure at national and state level). The curative health services in Sudan are provided through 8,828 health facilities comprising 2,679 primary health care units, 771 dressing stations, 1,423 dispensaries and 1,008 health centres. In addition there are 351 hospitals, 88 tertiary level teaching hospitals, 28 universities with medical and health science facilities, and 239 health schools and institutes. There are 172 private hospitals and health centres, 739 specialized private clinics, 531 general practitioner private clinics and 799 private laboratories. Concerning health manpower, there are 1,124 specialists and physicians, 1,862 housemen, 2,936 general practitioners, 682 registrars, 1,247 pharmacists and assistant pharmacists, 2,558 laboratory personnel, 2,483 general medical assistants, 16,826 nurses, and 15,052 midwives (FMOH 2004 annual statistical report). Despite all of these,

accessibility still is a problem in all states. With the peace agreement more areas became accessible and health service delivery is expected to be improved. The civil conflicts in Darfour greatly impacted the health system in these states.

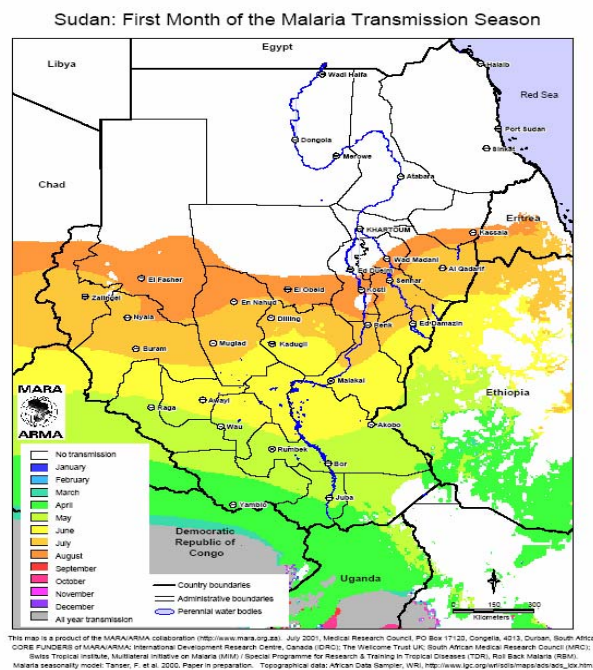
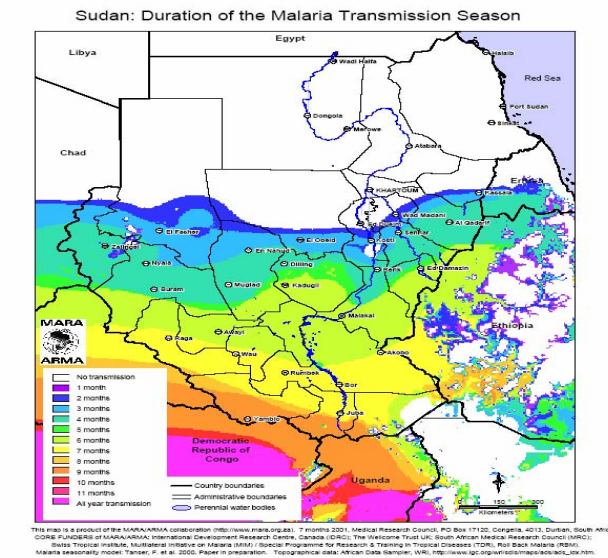
Federal Ministry of Health Organogram



1.2 Malaria Situation

1.2.1 Epidemiology

Based on climate models, it is estimated that 75% of the population (37 millions) are at risk of endemic malaria, while 25% are at risk of epidemic malaria. Most of the country below north latitude 15° is endemic zone with high transmission in southern states, while parts of the north are exposed to epidemics following the heavy rains or floods from River Nile.



Transmission of malaria in north Sudan south to Khartoum is seasonal and depends on the rains except in urban cities and irrigated schemes. Sudan's rainy season lasts for about three months (July to September) in the north, and up to six months (June to November) in the south. Hence, the duration of the transmission varies from 3-6 months with an average of 4 months, longer season is noticed on the southern areas. The

transmission season may lasts from July/August to November/December, with earlier beginning of in June in the southern areas (e.g., Kadugli, El Damazin) and

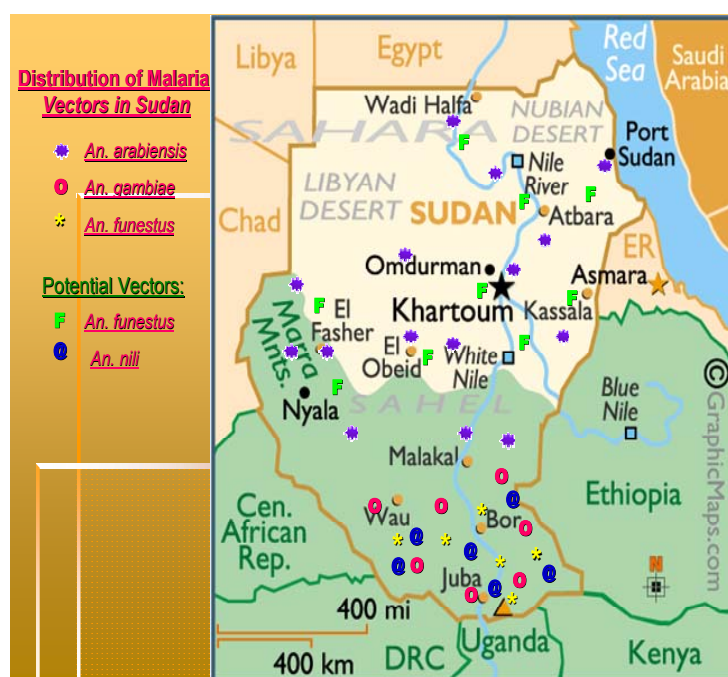
later start in August in northern areas - (Wad Medai, Kosti, Kassala, El Obeid) (see the map)

Longer transmission up to 9 months may occur in certain agriculture schemes areas. Urban cities may have another transmission during winter season (December- February) due to broken water pipes.

Plasmodium falciparum is responsible for more than 95% of malaria cases in Sudan. However, an increase is being reported in malaria cases caused by *P. vivax* (mainly in the eastern part of Sudan bordering Ethiopia and Eritrea).

Anopheles arabiensis is the principal vector all over Sudan besides *An.gambiae*, *An.funestus* which mainly distributed in the south part of Sudan. The breeding requirement is as follows for the different vectors (*An.arabiensis*: small pool breeder ,*An.gambiae* & *An.funestus*: more humid & forested habitats)

Distribution of major malaria vector in Sudan:



Malaria causes an enormous burden of morbidity in North Sudan. Reported cases of 2.8 million in 2006 are likely a fraction of total cases. In north Sudan, malaria represents around 21% of the outpatient consultations and around 30% of inpatient admissions and the estimated malaria episodes 7.5 mil. The

prevalence of malaria among 2-10 years old children ranged between 0.7 to 20.9%. The prevalence among >5 years children ranged between 0.4 -15.5% and among the pregnant ranged between 3.7%-10.3%. The rates are significantly higher in rural compared to urban population. Malaria causes considerable mortality in Sudan,

especially among young children and pregnant women. In northern Sudan, 16% of hospital deaths are attributed to the disease. The case fatality rate of inpatient malaria cases is reported to be 2.5%. Studies of individual hospitals in northern Sudan have found case fatality rates of between 5% and 12%, with under-3 children four times more likely to die than others. Maternal malaria is a serious problem in Sudan, associated with maternal anemia and mortality, and with low birth weight newborns and perinatal mortality. Intermittent preventive treatment (IPT) was available in limited scale with a reported coverage of 22% in pregnant women.

1.2.2 Malaria Control Program

Sudan has a long history of malaria control activities, dating as far back as the beginning of the 20th century, when very successful interventions based on trained volunteers (the “mosquito men”) and simple vector control strategies led to the near elimination of malaria from many parts of northern Sudan. In contrast, the attempt at malaria eradication in the 1950-60s had very limited success due to managerial, technical and financial constraints. In 1998, Sudan endorsed the international Roll Back Malaria initiative as the organizing principle for its own activities, placing more attention on early diagnosis and prompt treatment and multiple prevention measures.

The National Malaria Control Programme is under the department of the preventive medicine in the organogram of the FMOH and it consist from five main departments Headed by the National malaria control programme coordinator. The NMCP has developed state malaria control programme in 15 states and each SMCP consist from three department (see organogram)

The responsibilities of the national and the states programme are as follows:

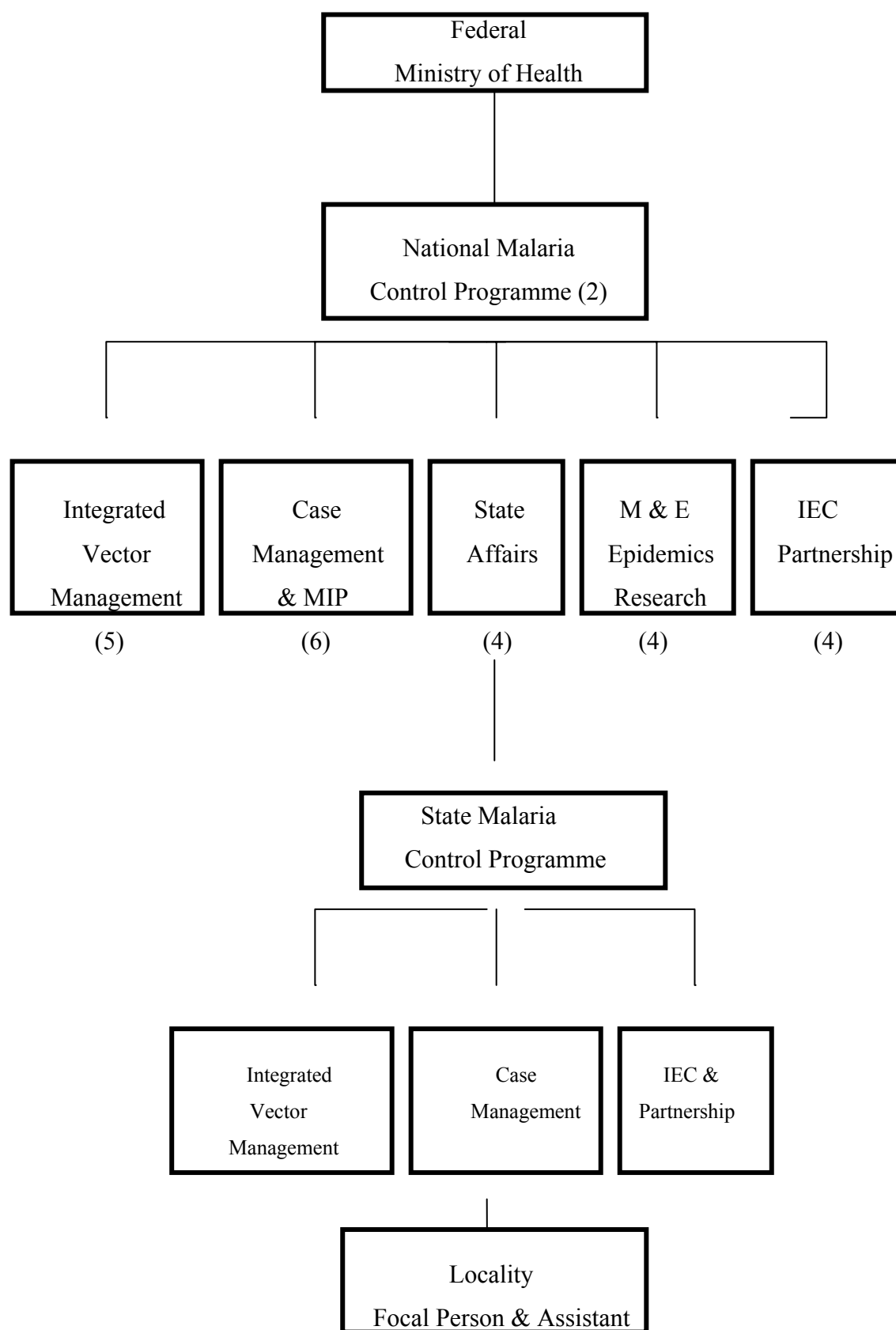
- Setting national policies and strategies and plans for malaria control
- Setting standards, develop guidelines , and quality assurance
- Establishing states malaria control units
- Conduct human resouce needs assessment and develop capacity building plans for all levels

- Overall supervision & monitoring and evaluating malaria control activities and preparation of national reports .
- Resource mobilization, , partnership and intersectoral collaboration
- Control of epidemics
- Develop and implement research activities.

The responsibilities of the national and the states programme are as follows:

- Setting plan for malaria control at state level
- Establishing localities malaria control units and strengthen malaria control capacity building at state & localities
- Supervise & monitoring and evaluating malaria control activities at state and localities.
- Strengthen malaria partnership, intersectoral collaboration, and community involvement at state and locality level.

Organogram of the National Malaria Control Programme of Sudan



1.2.3 Current malaria control interventions

1.2.3.1 Malaria vector control and prevention

Malaria vector control in Sudan has a long history. The main vector control interventions include indoor residual house spraying, the use of insecticide-treated bednets (now long lasting insecticidal nets), chemical larviciding, environmental management and limited biological control. The implementation of these interventions is in line with the epidemiological stratification of the disease in the country (see the Table of stratification for details). Moreover, they are implemented in the context of the integrated vector management (IVM) approach which is based on strengthened inter and intra-sectoral coordination as well as capitalizing on the synergy of the different interventions. A national IVM plan is in place and is being implemented.

1.2.3.1.1 Indoor residual spraying;

This intervention is targeted in the following areas of Sudan (Gezira.elrahad, New halfa, Suki, Zeidab, Sugar cane projects,) for both control of irrigated schemes and epidemic malaria. Although this strategy has been in place for many years, the need for regular training/re-training of spray teams and the need for improved supervision is necessary.

1.2.3.1.2 Insecticide-treated nets (ITNs) – including long lasting insecticidal nets (LLINs):

Following the demonstration that ITNs are both for personal protection as well as for community-wide protection, Sudan developed a national strategic plan on ITNs to be implemented in the following strata (Seasonal malaria, irrigated scheme and emergency and complex situation).. Various financing and distribution channels were tested only to result in low coverage of the targeted populations. Currently the approach has shifted towards free distribution – targeting full

population coverage in targeted areas to achieve transmission control. Long lasting insecticidal nets are recommended as it has not been possible to set up viable re-treatment strategies for conventional nets. Because polyethylene LLINs are being used, these need to be replaced after 5 years.

1.2.3.1.3 Larval control

The main method of larval control is the use of chemicals – usually Temephos EC 50%. Areas targeted are mostly in urban areas in the in the big cities and riverine areas as appropriate. Environmental management is limited to agriculture irrigated areas through drainage as well as intermittent irrigation. Biological control using larvivorous fish is also implemented on a small scale in the irrigated agricultural areas.

1.2.3.1.4 Fogging

Although not a priority method for malaria control, in Sudan this method is being used in urban areas as well as in complex emergency areas. It may not necessarily impact on transmission control but may be useful to advocate for political commitment and for addressing urban biting nuisance.

1.2.3.1.5 Entomological surveillance

Since a lot of the vector control interventions rely on the use of insecticides, entomological monitoring – including monitoring for insecticide resistance is important. Over the years, these activities have been implemented in several states with evidence of resistance to organophosphates, DDT and recently to pyrethroids. The latter report is worrying as this is the group of insecticides used for treating nets as well as for house spraying.

1.2.3.2 Case Management

1.2.3.2.1 Malaria diagnosis

currently in the main urban centers there are many laboratories performing blood slide examination, while in rural areas diagnosis is presumptive based on IMCI

guidelines (syndromic approach). There is ongoing functional quality assurance program but the coverage is very low (3*3 methodology). However, over the last 3-4 years more than 90% of laboratories use Giemsa- stained thick smears for malaria diagnosis. Almost all laboratories use the semi-quantitative method (the plus system) to quantify parasitaemia. As a result of long and continued efforts, the quality of laboratory service and diagnosis had improved to some extent still the percent of false positive rather high (about 48% in Khartoum in 2005). Rapid diagnostic tests (RDTs) are available only in big cities (by the private) and conflict areas (by NGOs). In general their sensitivity and specificity are above 95%. Preliminary study results in Sudan showed that it is stable in field conditions.

About 50% of the malaria cases in the urban areas are seen at private clinics and laboratories. There are a number of private laboratories that participate in the quality assurance program.

1.2.3.2.2 Treatment

The national drug policy for malaria was changed in 2004 from mono-therapy to Artemisinin-based Combination Therapy (ACT). This change was based on evidence as studies showed >43% CQ resistance, and high efficacy of ACTs (AS+SP and artemether-lumefantrine).

In 2005, the MIS survey showed that ACTs used by 10.5% of the population and still chloroquine (CQ) is used by 65.6% of the population. Recently, ACTs drugs have been availed by GFR2 and UNICEF covering 15 states as well as the drugs for severe malaria have been distributed free of charge for 36 hospitals covering all the patients with severe malaria and there will be gradual expansion to cover all the hospitals.

A sentinel surveillance system has been established since 2002 with WHO support involving 8 sites in different parts of Sudan for continuous monitoring of the efficacy of anti-malaria drugs.

Table showing the result of drug efficacy studies

Drug tested	Year	Region	Total failure rate
CQ			
	1978	Central	00.8%
	1989	Eastern	43.0%
	1979-01	Central	49.0%
	2001	Southern	11.5%
	2002-03	All over	32.0-70.0%
AQ			
	2001	Southern	05.9%
	2001	Southern	25.2%
AS+AQ			
	2003	Western	07.3%
	2003	Southern	01.0%
	2003	Western	07.3%
AS+SP			
	2003-04	central	00.0%
	2003	Western	08.8%
	2003	Southern	00.9%
	2004	Eastern	00.0%
	2004	All over	0.0% -0.7%
ART+LUM			
	2004	Central	00.0%
	2004	Southern	00.0%

Despite of the evidence to support the promotion of home-based management in some parts of Sudan based on epidemiological stratification, there is no such a programme currently in place. Referral system is poor and pre-referral treatment is not a common practice

Home-based management will be introduced in areas with high transmission and low coverage of health facilities since the situation analysis and the KAP survey were successfully completed. Pilot projects are running now in the country to assess feasibility and acceptability of the policy.

1.2.3.2.3 Malaria in Pregnancy:

Three interventions are recommended for controlling malaria in pregnancy: appropriate case management, LLINs and intermittent preventive treatment (IPT). Pregnant mothers are treated as part of the general health system (PHC units) according to the "National Protocol for Treatment of Malaria". The strategy is to provide LLINs for any pregnant women in the target areas. IPT using SP is recommended in irrigated schemes in northern Sudan. So far and with support from GF round 2 grant, 22% of pregnant women have received SP for IPT in the last year.

1.2.3.3 Malaria epidemics

Most areas of North Sudan are prone to malaria epidemics. Frequent epidemic were reported in Khartoum state, Gazira, Sinnar, White Nile, Blue Nile, Al-Gadarif, kassala, Red sea, Northern, River Nile, N. Darfour, W. Darfour, N. Kordfan stats. The main determinants of epidemics are : climatic factors, rains, floods, .drought famine, spread of resistance of *P. falciparum* to chloroquine, increasing resistance of vectors to insecticides, migration of population from hypo to hyper endemic, instability in the bordering countries and refugees influx, establishment of large agricultural projects. Serious malaria epidemics affected the Gazira area in 1974 -1975 in the central region. The out cry of the epidemics lead to establishment of the Blue Nile Health Project (BNHP) in 1975 with contribution of Sudan government and WHO, World Bank, Kuwait, Japan and USA. The project includes malaria control as one of its main component. Malaria was successful controlled for 10 years. The prevalence of the disease was reduce from 25% to < 1% but due to discontinuation of the external fund, control operations were stopped on 1989. Abrupt cessation of control interventions led to malaria

epidemic due to reduction of local population immunity, the incidence of the disease built up to appear in dramatic epidemic in 1993 - 1994.

Urban epidemics are well documented in Khartoum State in the years 1981, 1988, 1994, 1998. A number of factors played role in them: increased rainfall, spread of irrigated agriculture within the city limits, construction of new urban colonies without proper facilities for drainage, influx of refugees, insufficient supply of drugs.

In Al- Gedarif State epidemic years usually follow heavy seasonal rains, 1993, 1998. An epidemic occurred in (1978) in this state following the war in Ethiopia and internally displaced people (IDPs) across the border to Kassala and Al - Gedarif states. Epidemics in River Nile State coincided with the heavy floods in 1974, 1988, 1989, 1994. In the western part of the country, N. Kordofan two epidemics had been reported 1999 due to poor storage of water.

1.2.3.4 RBM Partnership, Coordination and Management

Sudan as one of the first countries adopted RBM initiative through the NMCP has given much attention to partnership. The NMCP has already lined up with an impressive array of partners. As the scale of RBM activities grows, RBM partners will need to be differentiated into distinct partner communities, which are led and co-ordinated through a top level, board or task force chaired and convened by NMCP. The list of RBM partners include:

- **UN agencies:** WHO, UNICEF, UNDP.
- **NGOs:** over 40 NGOs were part of malaria control programme. Plan Sudan, Malaria Consortium, Development Action Now are NGOs that have a written agreement with the NMCP.
- **Private sector:** Saving and Development Bank initiated investment in ITNs early. The idea now is carried over by the Financial and Investment Bank. Recently Canar, a telecommunication company, contributed considerably in malaria control based on agreed-upon 2 years plan of action. Other private

sector include: DETASI, Coca Cola, Kenana Sugar Cane, Gazera Scheme Board ... ect.

- **Universities:** Blue Nile Research and Training Institutes (Gazera University), Tropical Medicine Institute (Ministry of Science and Technology), Endemic Disease Institute (University of Khartoum)
- **Egypt** as part of Gambia Control Project.

1.2.3.5 M&E and research

A comprehensive malaria survey to assess the impact of selected interventions and to identify the missing base-line data has been conducted in 2005. M&E focal point appointed at federal and states level and trained locally and at the regional level. Reporting forms and charts revised, simplified, standardized and distributed to the selected sentinel sites and the training on database planned.

There is a research department at national level. The department facilitates the collaboration with research institutes and researchers in addition to monitoring of the researches carried out by the NMCP staff. During the period 2001-2005, 20 operational researches were carried out by the NMCP staff. Seven of these were published in local, regional and international journals. The results of these researches were utilized for improvement of the ongoing practice, e.g. changing the drug policy to ACTs .

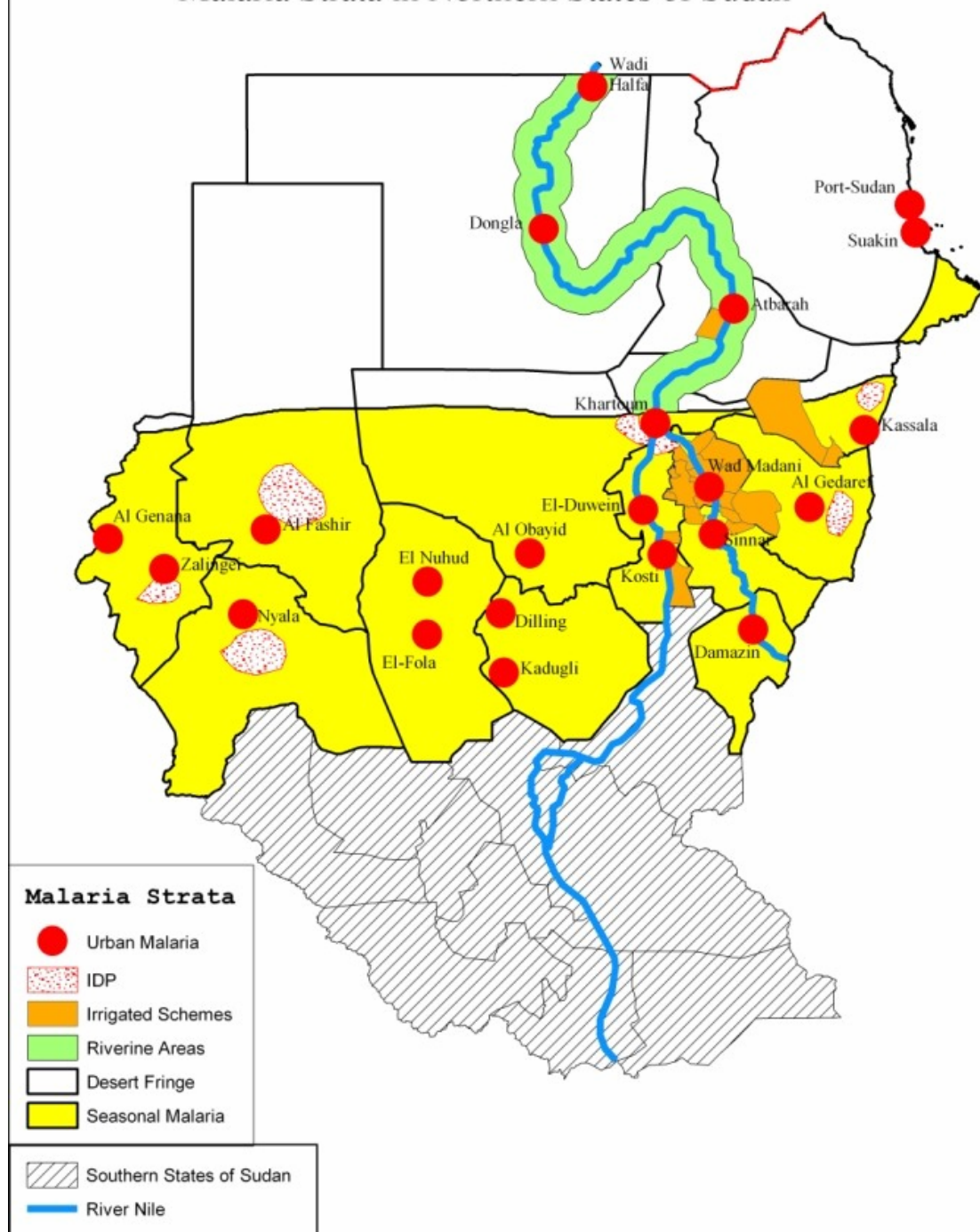
2 Stratification

Operation stratification of malaria in northern Sudan was based on climatic condition (mainly rainfall), Hydrologic condition related to River Nile, Population displacement, movement and activity. Based on that 6 Strata were developed as follows:

Six main epidemiological strata can be identified in northern Sudan. Endemicity, population, states and the suitable interventions for each of the 6 main strata are seen in the table below:

Strata	Transmission/ Risk	Population	Areas	Main Technical Interventions
Desert fringe	No transmission, malaria free	500,000	Desert fringe area in the north above Latitude 15 ⁰ except cities, Riverine areas, irrigated scheme in River Nile State and delta Tokar in Red Sea	Case management, entomological/ parasitological surveillance
Riverine areas north of Khartoum	Epidemic prone seasonal unstable related to floods , dams	1,500,000	Area about 20 Km on both sides of River Nile above Latitude of 15 ⁰	Epidemic Early warning, early detection and rapid response. Case management, entomological monitoring, Larviciding as appropriate
Seasonal malaria	Seasonal , low to moderate risk	14,000,000	Rural areas other than irrigated schemes in Greater Darfour, Kordofan, Blue Nile, White Nile, Sinnar, Gezira, Gedarif, Kassala and Khartoum	Case management, LLINs
Urban malaria	Seasonal transmission with low risk	9,000,000	Khartoum and all large cities e.g. Port Sudan, Wad Medani....	Case management, environmental management, Larviciding and Epidemic Early warning, early detection and rapid response .
Irrigated Schemes	Seasonal transmission from 6-9 months with low to moderate risk	3,500,000	All large- scale irrigated schemes (Gezira, Elrahad, Kinana, Asalia, West Sinnar, New Halafa and Elzidab,Suki,Khashm Elgerba)	Case management, IPT, IRS and LLINs
Emergency and complex situation	Epidemic prone or seasonal transmission	3,000,000	IDP and refuges (the number is as per 2007 and is subject to change)	Case management, LLINs

Malaria Strata in Northern States of Sudan



3 Malaria control strategies

The National Malaria Strategic Plan(2007-2012) is aiming to provide a common platform and description of interventions for all RBM partners. It also encourages all partners to be engaged in malaria control with common strategies and objectives, i.e. one plan, one implementation and coordination mechanism and one M&E plan.

3.1 *Vision:*

The vision of NMCP is the reduction of malaria-related morbidity and mortality in a way that Malaria is no longer a major cause of working days loss, school absenteeism and not the leading cause of outpatient attendance and hospital admission.

3.2 *Mission:*

Our mission is to sustain a partnership at all level that enables delivery and use of cost effective and evidence-based malaria control interventions.

3.3 *Goal:*

To contribute to the improvement of the health status in northern part of Sudan through reduction and prevention of morbidity and mortality associated with malaria

3.4 *Objective:*

The objective of RBM Strategic Plan is ***to reduce the morbidity and mortality of malaria by 50% by 2012 all over the northern Sudan (compared to reported cases in 2005).***

Due to the success story in Khartoum this updated Strategic Plan envisages certain areas aiming malaria free status where the overall commitment, financing and health system potential indicate higher potential for significant reduction of local malaria transmission with ultimate goal of malaria elimination: the objective for such selected areas will be:

By 2010 reported malaria incidence, with 100% laboratory confirmation of malaria diagnosis, will be reduced by at least 80% as compared to 2006 and will reach the level of 10 cases per 1 000

3.5 Strategic Directions

3.5.1 Prompt and reliable diagnosis and effective treatment:

Prompt and effective treatment of malaria remains a key intervention in reducing the burden of disease and death from malaria. The challenge to providing adequate treatment is weak health systems that are unable to deliver timely diagnosis and treatment, especially to remote and underserved populations.

Sudan will ensure availability of quality artemisinin-based combination antimalarial medicines in public health care facilities. Malaria control programme partners at country level. MCP will work with private practitioners to ensure comply with national medicine policies.

Sudan is a member of Horn of Africa Network for Monitoring Antimalarial Treatment (HANMAT). Sudan will maintain the sentinel surveillance system to monitor parasite resistance to first-line and second-line drugs as well as testing potential new malaria treatments, using in-vivo methods , and will introduce the use other methods as relevant (in-vitro and molecular markers)

The strategy Home management will be introduced to improve the practice of home and community-based malaria care by training and providing medicines to mothers, caregivers at the home, village or community health workers and medicine vendors and shopkeepers

Confirmation of malaria diagnosis will be expanded to reduce unnecessary use of antimalarial medicines. All efforts will be made to increase access to laboratory-based diagnosis, primarily microscopy. Rapid diagnostic tests will be deployed wherever diagnosis by reliable microscopy is not possible, for outbreak

investigation. Quality assurance of both microscopy and RDTs will be promoted at all levels of the health sector.

Outcome targets:

- By 2012, 80% of malaria patients will receive prompt and effective treatment
- By 2012, 85% of patients with uncomplicated malaria will be correctly managed at health facilities
- 60% of women received IPT for malaria during their last pregnancy in targeted areas
- By 2012, 90% patients hospitalized with a diagnosis of severe malaria will be managed according to the national guidelines

Output targets:

- By 2012 , 60% of laboratories functioning according to national guideline
- By 2012, 70% of health facilities able to confirm malaria diagnosis according to the national policy (microscopy, rapid test)
- By 2012 70% of health facilities will report no stock outs of recommended anti-malarial drugs continuously for one week during the last 3 months
- By 2012, 95% of health facilities will provide free antimalarial drugs according to national drug policy
- By 2012, all targeted communities for HMM will have access to reliable diagnosis and effective treatment

- By 2012, every year at least 2 studies on antimalarial drug efficacy will be conducted
- By 2012, 80% of health facilities in targeted areas will provide IPT in their catchments areas

3.5.2 Effective prevention measures in the framework of IVM

The strategy will focus on the scaling up of the main vector control interventions within the IVM framework. Areas targeted for indoor residual spraying the emphasis will be to make sure that spraying teams are well trained to timely apply the insecticides. Supervision will also be strengthened for record keeping and reporting. The implementation of LLINs on the other hand will aim at population coverage of targeted areas for community-wide protection. The MOH will also provide an enabling environment for private sector involvement in distributing LLINs especially in urban areas. Where it is feasible, larval control using chemicals (Temephos), environmental management and biological control agents will be promoted. Entomological surveillance – including monitoring of insecticide resistance will form part of the monitoring

Outcomes targets:

- To provide appropriate prevention measure for at least 80% of targeted population in at risk areas by 2012

Output targets:

- By 2012, 85% of target households in at risk areas will have at least one LLINs
- By 2012, malaria control programme will be able to provide quality approved IRS with at least 80% coverage for at 85% of targeted localities

- By 2012, all will have at least one trained and well-equipped team for 10 entomological surveillance
- By 2012, 75% of targeted breeding sites for larval control will be treated

3.5.3 Detection and control of malaria epidemics

The MCP established a unit for malaria surveillance, epidemics prevention and control at central level. A contingency plan for epidemic response and rapid response team are established in each of epidemic states including staff from all relevant sectors. The activities for epidemic prevention and control include the followings: intersectoral coordination to reduce major water collections through mechanical interventions, and raise community awareness for immediate support and participation, sentinel surveillance sites for early detection and preparedness to monitor indicators to epidemic on weekly basis (number of malaria cases, deaths, cases with fever in areas that lab not available), availing adequate buffer stocks of drugs, laboratory reagents insecticides and vector control equipment to the epidemics prone state, improve malaria diagnostic and treatment facilities in the epidemic prone areas.

Outcome target:

- By 2012, 75% malaria epidemics will be detected and properly responded within 2 weeks of onset

Output target:

- By 2012, all states will have updated epidemics control plan and epidemics stocks
- By 2012 all epidemic detection sentinel sites will have trained staff for detection, reporting and control of epidemics

- By 2012, 80% of health facilities at the locality levels in epidemic prone areas will have epidemics detection charts and weekly reporting during transmission season
- By 2012, 80% of malaria control programme at the states level will have functional malaria early warning system

3.5.4 Strengthening of the malaria control programme

- Provide and create supportive environment for malaria control at all level
- Improve the quality and quantity of malaria control staff
- Strengthen the existing procurement and delivery system
- secure the necessary S&E and budget for malaria control
- strengthening capabilities of community, private sector and NGOs
- strengthening the district level malaria control as part of the integrated control of communicable diseases.

Output target:

- By 2012, 70% of the annually allocated budget for malaria control received by NMCP and SMCP
- By 2012, 80% of States Malaria Control Programmes will have at least 3 trained personnel
- By 2012, all malaria programmes at locality level will have at least 3 trained staff on different aspects of malaria control (planning and management and M&E, diagnosis and treatment, vector control and)

- By 2012, 90% of public health facilities will have at least one personnel trained for malaria case management and prevention measures
- By 2012, all localities will have adequate warehouses with appropriate storage condition for malaria commodities

3.5.5 Malaria surveillance and M&E and Operational research

Special priority will be given to strengthening the malaria information system, as part of integrated disease surveillance to provide the information necessary for planning and management of control activities.. Sentinel surveillance systems will be supported for monitoring resistance of malaria parasites to antimalarial drugs, resistance of malaria vectors to various insecticides and malaria mortality and for epidemic detection. Design of a national malaria database with geo-referenced information using simple GIS application is foreseen.

Monitoring and evaluation system will be strengthened to measure availability and distribution of antimalarial medicines and LLINs, coverage of key interventions for malaria prevention and management and trends in malaria morbidity and mortality. Periodic prevalence and coverage surveys will be conducted for measuring outcome indicators and estimating impact, and health facility surveys for measuring output and process indicators.

Output target:

- By 2012, 80% of localities will provide monthly quality report and feedback using standardized system
- By 2012, national malaria database will be implemented in all states and localities
- By 2012, all states will have a functional M&E unit with regularly updated M&E plan

- By 2009 and 2012 information on malaria burden and coverage of interventions will be updated using a national malaria parasite prevalence survey and coverage indicator survey
- By 2009 and 2012, a joint review mission will be conducted
- By 2008, national malaria programme will have a national strategy for conduction of operational research on identified priorities
- By 2012, 80% of the approved research proposals by the malaria programme will be funded by domestic resources

3.5.6 Partnership and private sector

The MCP will strengthen and develop innovative mechanisms to ensure intersectoral and intrasectoral coordination, and community participation. The MCP will increasingly emphasize cooperation with other health programmes such as EPI and IMCI, antenatal care services, laboratory services and health information systems. The programme will maintain its partnership and strengthen its cooperation with all national and international partners such as WHO, UNICEF, UNHCR, and other United Nations agencies, nongovernmental organizations and other technical and implementation partners. Maintaining cross-border coordination with Egypt and expansion to other relevant countries is crucial. Partnerships between the public and private sectors, such as mobile telephone companies, factories, etc., will be emphasized as an important vehicle for achieving the stated malaria goal and objectives. Research and academic institutions, the media, and the schools always have an important role to play in rolling back malaria in Sudan

- By 2007, the RBM network at national level will be established at the national level.
- By 2012, the RBM network members other than public sector will implement 40% of malaria control activities

4 Programme management

4.1 Creation of awareness, demand and appropriate use:

Advocacy efforts are needed at national, state and locality levels to ensure:

- Financial and programmatic support for RBM interventions.
- Appropriate health –seeking behaviours.
- Demands for services and products.
- Utilization of services.

The advocacy activities will be part of any intervention. There is a need to develop advocacy products and messages. The delivery methods also need to be considered carefully. A suitable methodology need to be selected from the following: COMBI, conventional IEC, Radio, inclusion on consumer-good packaging, curricula....ect.

4.2 Delivery system:

The NMCP will work through the state malaria control programmes (SMCP) to deliver services to beneficiaries. So delivery of services will be solely the responsibility of the state level.

The case management related activities are and will continue to be part and parcel of the primary health care. The drug will be distributed through the ongoing system. This based on Central Medical Drug Supply and the Revolving Drug Fund. Quality will be ensured through the General Directorate of Pharmacy System. Chargeable drugs will be availed and distributed through the private mechanism.

Vector control activities will be delivered as part of the integrated control of communicable disease which is part of the district health system. Mosquito nets for free distribution will be distributed mainly through campaign. Other distribution outlets include distribution through the EPI & RH channels.

There is a need always for the advocacy activities to be community-based, involvement of community-based organization, school children, and the like.

4.3 *Financing:*

The annual cost of a package of interventions necessary to achieve the MDGs requires approximately US\$ 34 per capita. The NMCP will work to mobilize adequate financing of malaria control. Sustainable financing requires guaranteed funds from all sources combining local with external financing which include: GFATM, World Bank, Bilateral agencies, UN, NGOs private companies, Islamic Development Bank , Export Development Bank of Iran through MOF, Sudan ... etc

The over all estimated budget for this strategic plan is US\$ 256,947,142 .The budget is expected to be covered from different sources including GFATM (Round 2) expected, WHO, UNICEF, Canar Company, MC in addition to government funding

The Table below provide crude estimation per intervention area for the whole period

Strategic intervention	2007	2008	2009	2010	2011	2012	Total
Effective case management	20,833,000	25,656,654	28,872,738	36,430,693	22,883,638	22,781,271	157,457,994
Integrated vector	18,135,900	8,364,154	10,960,088	8,101,543	11,441,819	11,390,635	68,394,139
Epidemic containment	114,000	4,076,000	40,009	38,000	183,053	223,631	4,674,693
Capacity building	606,300	8,502,272	6,753,142	2,943,758	3,815,953	3,798,891	26,420,316
Total	39,689,200	46,599,080	46,625,977	47,513,994	38,324,463	38,194,428	256,947,142