INTEGRATED CONTROL OF NEGLECTED TROPICAL DISEASES

NATIONAL STRATEGIC PLAN

2008 - 2011

June 2008

Ministry of Health, Government of Southern Sudan

FOREWORD

Over the last year, the Ministry of Health (MoH) of the Government of Southern Sudan (GoSS) has laid the foundations to scale up the fight against Neglected Tropical Diseases (NTDs). Together with our implementing partners we conducted a comprehensive situation analysis on NTDs and formed a National Integrated NTD Control Program Technical Committee to oversee the control and elimination of those diseases that can be controlled through mass administration of preventive chemotherapy – onchocerciasis, lymphatic filariasis, soil-transmitted helminthiasis, schistosomiasis and trachoma. Development of the present strategy document was led by the technical committee and incorporates the experiences and advice of a large number of NTD experts. It outlines the path that Southern Sudan will be taking to reduce the burden of some key NTDs over the coming three years.

Our experience with preventive chemotherapy largely comes from years of successful onchocerciasis control using annual administration of ivermectin delivered through community-based structures. More recently we have also started with large-scale administration of azithromycin as part of the SAFE strategy aimed at eliminating blinding trachoma. Azithromycin has been delivered through community-based structures for Guinea worm eradication, thus taking the first step towards integrated delivery of NTD control. We aim to build on these experiences and those of other countries to expand both the number of interventions delivered through single structures and the geographical coverage of packages of NTD interventions. By pooling resources we envisage that effectiveness will be maximised while costs will be lower than for vertical programmes.

We are aware that the path that lies ahead will lead through unknown territory and that no single institution will succeed in travelling it on its own. Little is known about how best to integrate the various components of NTD control, and we will therefore ensure that the necessary experience and evidence is acquired along the way. Using existing structures to deliver more interventions, as we propose to do, could overload the current systems and undermine our achievements to date. To avoid such outcome we will work with our implementing partners in strengthening delivery systems in preparation for their expanded scope. Scaling up of integrated NTD control will be a gradual process, starting in areas where delivery systems are in place, namely onchocerciasis endemic areas, and strengthening these to deliver additional drugs. Based on the experience gained we will then improve our strategy, if necessary, and expand coverage of integrated NTD control to all endemic areas of Southern Sudan.

In our fight against NTDs we already have a number of strong and committed partners, ranging from UN agencies and health sector donors to non-governmental and faith-based organizations. However, to succeed in our endeavour to control or eliminate key NTDs in the whole of Southern Sudan we will need more support to fund and implement our plans. I hope that this document will stimulate new partners to channel their resources into Southern Sudan's fight against NTDs, hence expanding our productive NTD partnership and allowing us to share the successes that will be achieved with many more individuals and institutions.

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ACRONYMS

APOC	-	African Programme for Onchocerciasis Control
CBM	-	Christoffel Blindenmission
CDC	-	Centers for Disease Control and Prevention
CDD	-	Community Drug Distributor
CDTI	-	Community-Directed Treatment with Ivermectin
CO	-	Corneal Opacity
COSV	-	Coordinating Committee of the Organization for Voluntary Services
CPA	-	Comprehensive Peace Agreement
DALY	-	Disability-Adjusted Life Year
DEC	-	Diethylcarbamazine
EMRO	-	East Mediterranean Regional Office (WHO)
FMoH	-	Federal Ministry of Health (Government of Sudan, Khartoum)
GIS	-	Geographical Information Systems
GPS	-	Global Positioning System
GoSS	-	Government of Southern Sudan
HNI	-	Health Net International
ICT	-	Immuno-Chromatographic Test
IDP	-	Internally Displaced Person
IEC	-	Information, Education, Communication
IMC	-	International Medical Corps (NGO)
ITI	-	International Trachoma Initiative
IU	-	Implementation Unit
KEMRI	-	Kenya Medical Research Institute
LSHTM 2	-	London School of Hygiene & Tropical Medicine
LLIN	-	Long-Lasting Insecticidal Net
LF	-	Lymphatic Filariasis
MC	-	Malaria Consortium
MDA	-	Mass Drug Administration
MDG	-	Millennium Development Goal
MDP	-	Mectizan Donation Program
MoH-GoSS	-	Ministry of Health, Government of Southern Sudan
NGO	-	Non-Governmental Organization
NOTF	-	National Onchocerciasis Task Force
NTD	-	Neglected Tropical Disease
OCP	-	Onchocerciasis Control Programme
PDA	-	Personal Digital Assistant
PCT	-	Preventive Chemotherapy
PHC	-	Primary Health Care Centre
PHU	-	Primary Health Care Unit
RAPLOA	-	Rapid Assessment Procedure for *Loa loa*
RDT	-	Rapid Diagnostic Test
REMO	-	Rapid Epidemiological Mapping of Onchocerciasis
SAE	-	Serious Adverse Event
SSGWEP	-	Southern Sudan Guinea Worm Eradication Programme
SSOCP	-	Southern Sudan Onchocerciasis Control Programme
SSOTF	-	Southern Sudan Onchocerciasis Task Force
STH	-	Soil-Transmitted Helminths
TCC	-	The Carter Center
TI	-	Trachomatous Inflammation Intense
TS	-	Trachomatous Scarring
TT	-	Trachomatous Trichiasis
UNICEF	-	United Nations Children's Fund
USAID	-	US Agency for International Development
WHO	-	World Health Organization

GLOSSARY

Definitions provided below apply to the terms as used in this manual and may have different meanings in other contexts.

Adverse Reaction (to a drug)
Noxious and unintended reaction occurring at doses normally used in humans for the prophylaxis, diagnosis or treatment of disease, or for the modification of physiological function.

Drug Distribution Channel
The mechanism through which anthelminthic drugs are provided to target communities or population groups.

Eligible population
Group of individuals qualified or entitled to receive anthelminthic treatment in preventive chemotherapy interventions. Eligible populations may vary from high-risk groups in targeted treatment interventions to the entire population living in endemic areas in mass drug administration (MDA) interventions. See also ineligible population.

Haematuria
Presence of red blood cells in the urine.

Helminthiasis
A general term for any form of disease that accompanies a helminth infection. In most cases the onset and severity of detectable morbidity in a person are related to the number of worms present.

Hydrocele
Collection of fluid in the scrotal sac around the testicles. Usually painless, it is a common chronic manifestation of lymphatic filariasis.

Ineligible Population
Group of individuals not qualified or entitled to receive anthelminthic treatment in preventive chemotherapy interventions. Ineligibility is usually determined by exclusion criteria based on drug safety.

Implementation Unit (IU)
The smallest (lowest-level) administrative unit that will be responsible for implementing MDA (county, district, town, city block), within which the entire eligible population will be treated.

Lot Quality Assurance Sampling (LQAS)
LQAS was originally developed and used in industry for product quality control. To minimize the cost of quality control, a sample of "lots" of goods are inspected; those lots with less than a pre-determined number of defective pieces are considered of acceptable quality, and those lots with more than the number of defective pieces are "rejected". LQAS can thus be used to accurately detect the extremes of performance; those which are exceeding an "upper threshold" of performance and those fail to meet a "lower threshold" of performance. It cannot detect performance levels between those arbitrarily set upper and lower thresholds. The sample size and decision values for LQAS are based on the risks that the investigators are willing to take. The sample size is the number of units that are selected from each lot. The decision value is the number of “defective” items that need to found before the lot is deemed unacceptable. There are two types of risk that need to be considered: (i) the risk of accepting a “bad” lot, referred to as Type I Error, and (ii) the risk of not accepting a “good” lot, referred to as Type II Error. Based on the risks and the hypothesized proportion of defects in the lot, the sample size and decision value can be obtained. The advantage of LQAS over a stratified sampling design is that the response for each lot is binary (acceptable or not), and

therefore smaller sample sizes can be used.

Lymphoedema
Swelling of a body part (usually limbs, breast or genitals) caused by blockage of, or damage to, the drainage of the lymphatic system. It is a chronic manifestation of lymphatic filariasis.

Mass Drug Administration (MDA)
Distribution of drugs to the entire population of a given administrative setting (state, county, payam, boma, village); however, exclusion criteria may apply (see ineligible population). MDA entails close collaboration between the organization responsible for drug distribution (usually the Ministry of Health) and target communities: if MDA is undertaken under the direction of the community itself, the term community-directed treatment (ComDT) may also be used. The main application of the ComDT approach has been to onchocerciasis control, and community-directed treatment with ivermectin (CDTI) is the principal strategy adopted by the African Programme for Onchocerciasis Control (APOC). MDA is a public health intervention that can be implemented through a number of different approaches:

House-to-house administration (mobile teams): The drug distributor collects the drug from a designated centre and goes from house to house to administer it. This approach ensures coverage of all households but is labour-intensive, especially in areas where population density is low and household members may be away from home during the time of drug distribution.

Booth distribution (fixed teams): Drug distribution booths are set up at sites selected to be accessible to the community. Drug distributors administer the drugs to the beneficiaries who come to the booth. This approach is suitable in urban situations, but coverage depends on the motivation of the beneficiaries. Supplying the booths with drugs and potable water for swallowing the drugs is logistically demanding.

Administering drugs in special population groups: Certain population groups can easily be reached at particular locations: students in schools, patients in hospitals, workers at commercial establishments, major building sites and industrial sites, inmates in prisons, and displaced persons in refugee camps.

Areas of community gatherings: Marketplaces, bus and railway stations, fairs and festivals, places of worship, and other sites where people congregate can also be used to reach the community.

With an intensive campaign approach: MDA may be organized as a national day or over a week. However, if logistics constraints make such a focused approach impracticable, the distribution could be staggered over a period of 3–4 weeks.

Morbidity
Detectable and measurable consequences of a disease. Evidence of morbidity due to helminthic diseases may be overt (such as the presence of blood in the urine, anaemia, chronic pain or fatigue) or subtle (such as stunted growth, impeded school or work performance or increased susceptibility to other diseases).

Preschool Children
All children between the ages of 1 and 5 years who are not yet attending (primary) school.

Prevalence of Infection
The proportion of individuals in a population infected with a specified agent.

Prevalence of Any Infection
The proportion of individuals in a population infected with at least one agent. The concept is used for appropriate community diagnosis in soil-transmitted helminthiasis: Proportion of individuals in a population infected with at least one soil-transmitted helminth species (*Ascaris lumbricoides, Trichuris trichiura, Ancylostoma duodenale*).

Preventive (anthelminthic) Chemotherapy
Use of anthelminthic drugs, either alone or in combination, as a public health tool against helminth infections.

RAPLOA
A rapid assessment procedure for *Loa loa*, which uses a simple questionnaire on the history of eye worm (i.e. by showing a photograph of an adult *L. loa* worm in the eye and confirming episode lasted less than 7 days) to predict whether or not loiasis is present in a community at a high level of endemicity.

SAFE
A strategy that consists of lid surgery (S), antibiotics to treat the community pool of infection (A), facial cleanliness (F), and environmental changes (E).

School-Age Children
All children between the ages of 6 and 15 years (usually), regardless of whether they attend school. In some countries, a primary school's enrolment may include individuals older than 15 years.

Serious Adverse Event (SAE)
An event that is fatal, life-threatening, disabling, or incapacitating or that results in hospitalization after drug intake. Any experience that the investigator regards as serious or that would suggest any significant hazard, contraindication, side-effect, or precaution that may be associated with the use of the drug should be reported.

Targeted Treatment
Group-level application of anthelminthic drugs where the group eligible for treatment may be defined by age, sex, or other social characteristics irrespective of infection status (exclusion criteria may apply).

EXECUTIVE SUMMARY

The multiple burden of different Neglected Tropical Diseases (NTDs) in Southern Sudan is thought to be among the greatest in Africa. A total of 12 NTDs are endemic, many of whom have only benefit from intermittent control in response to reported outbreaks, supported by short-term donor funding. The need to implement and scale-up appropriate, cost-effective interventions is nowhere as apparent as in this post-conflict setting. The Government of Southern Sudan (GoSS) immediately recognized NTDs as a major obstacle to be overcome to improve the health of its people. The Ministry of Health (MoH) has thus prioritized the control, eradication or elimination of some diseases (onchocerciasis, Guinea worm and trachoma, respectively), while expanding its resources to lead the control of human African trypanosomiasis and visceral leishmaniasis. Most recently, the MoH-GoSS has committed to the integrated control of NTDs using preventive chemotherapy (PCT) and complementary approaches, as recommended by the World Health Organization (WHO). This approach targets soil-transmitted helminths (causing ascariasis, trichuriasis and hookworm disease), schistosomiasis, lymphatic filariasis (LF), trachoma and onchocerciasis through mass drug administration (MDA). A National Integrated NTD Control Programme Technical Committee was established in April 2008 to coordinate this new approach.

The concept of integrated NTD control is intuitively appealing, because it could provide a highly cost-effective means to control or eliminate seven diseases by building on existing delivery mechanisms, particularly community-based networks. To maximise the potential for integrated control, however, close coordination of existing and new stakeholders will be required, and mechanisms need to be in place to provide the necessary strengthening of existing drug distribution networks, allowing them to take on additional tasks without undermining their current efficiencies. Furthermore, monitoring and evaluation, as well as operational research, will be needed to be able to take account of lessons learned, gradually building an evidence-base for integrated NTD control in this challenging setting.

To provide the required guidance on the envisaged scale-up of integrated NTD control, MoH-GoSS has worked with key national and international stakeholders to develop this strategic plan for 2008 to 2011. It is the first attempt to outline the key strategies involved in reaching high coverage of all endemic communities with MDA and complementary interventions. Developed in the absence of substantial national or international evidence on integrated NTD control, it is anticipated that this strategy will need regular revision to incorporate lessons learned and to keep it consistent with the overall development context. While, for example, community-based delivery or campaigns are currently the only options to reach a large number of beneficiaries, delivery through health facilities and schools is anticipated to become a viable alternative once infrastructure reconstruction has further progresses.

Delivery of integrated MDA packages to communities at risk will need to be preceded by disease mapping in each county, to determine which of the target diseases exceed the threshold for intervention. Survey results will generate a map showing the overlapping distribution of target NTDs, which will be used to select the appropriated drugs and other interventions. Mapping will start in August/September 2008; MDA will start in January 2009, initially targeting areas where community-directed treatment with ivermectin (CDTI) is already being implemented for onchocerciasis control. Mapping will be completed in 2011. By 2011, most counties endemic for both onchocerciasis and LF will be targeted with integrated MDA.

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1. INTRODUCTION

With the signing of the Comprehensive Peace Agreement (CPA) in January 2005, the stage has been set for comprehensive reconstruction after decades of conflict in Southern Sudan. An Interim National Constitution has been developed highlighting that promotion of public health and equal, free access to primary health care require urgent attention. Strategies to do so are outlined in the Southern Sudan Interim Health Policy 2006-2011. Among its proposed outcomes, the health policy aims to increase health service coverage, reduce malnutrition and establish a more effective and efficient health system. To achieve these outcomes, the health policy prioritizes activities that ensure equity, community participation, improved delivery of interventions, and institutional and human resource development.

Priorities also had to be set regarding the diseases to target, so that rapid impact on the population's health can be achieved. Neglected Tropical Diseases (NTDs) are among the priorities, as they are highly endemic while being readily preventable and/or treatable. The majority cause chronic disability and morbidity, while some, namely visceral leishmaniasis (VL) and human African trypanosomiasis (HAT), are major causes of death in endemic areas. Afflicted populations are largely poor and marginalized with limited access to health care. There is a need therefore for sustainable and effective interventions to combat the human suffering caused by NTDs. One method, applicable to the control or elimination of seven NTDs – lymphatic filariasis, onchocerciasis, schistosomiasis, soil-transmitted helminths (i.e. ascariasis, trichuriasis and hookworm disease) and trachoma – is MDA of PCT through an integrated approach (WHO, 2006a).

The purpose of the National Strategic Plan for Integrated NTD Control is to describe how integrated NTD control or elimination will be established and scaled-up in Southern Sudan. It provides a common vision, goal, and objectives for all partners and sectors of society. This framework allows implementing partners to contribute to the national goal in a standardised way and the GoSS and health sector donors to allocate the required funds. Given the cross-border transmission of most NTDs, the strategic plan is also meant to provide a mechanism by which to engage with neighbouring countries in a joint fight against NTDs. Only through regional collaboration can investments into reducing or eliminating NTDs in Southern Sudan be sustained over time.

2. COUNTRY PROFILE AND SITUATION ANALYSIS

2.1 COUNTRY PROFILE

2.1.1 Geography, Climate and Administrative Structure

Southern Sudan lies within the Nile basin and shares borders with six countries (Ethiopia, Kenya, Uganda, the Democratic Republic of Congo, the Central African Republic and North Sudan) and covers an area of 640,000 km^2. The territory is dominated by savannah. The climate is tropical with temperatures ranging from 20 to 37°C and relative humidity of 26% to 88%. Annual rainfall ranges from 1,000 mm in the South to 400 mm in the northern areas. Similarly, the duration of the rainy season is longest in the South (seven to eight months) and reduces to between five and six months towards the northern areas. During the rainy season flooding is common in most areas making access to large parts of the country very difficult.

After independence in 1956, the country has seen a series of internal conflicts that ended in 2005 with the signing of the CPA. The country has national administration boundaries divided into ten states, 50 counties and over 200 payams[1]. Payams are made up of bomas – a collection of villages, considered the smallest administrative division. Their number changes

[1] While the number of states in the country is believed to be stable, the number of counties and payams has changed several times. The number of counties and payams used as baseline in this strategy is that used by the United Nations maps.

constantly as new settlements are created by the large numbers of returning refugees and by internally displaced persons (IDPs).

2.1.2 Demography

While a national census was conducted in April 2008, results are not yet available. Meanwhile, the population has been estimated at c. 13 million based on data from National Immunization Days (NIDs) conducted in 2007. This population is expected to grow further, resulting from the return of refugees and IDPs and from the high natural population growth of about 3% (NSCSE, 2004). The population is the youngest in the world, with an estimated 21% of persons less than 5 years old and 49% below the age of 15. Only 1.6% of the population are above the age of 65.

2.1.3 Economic and General Development

The longest civil war in African history has destroyed most of the infrastructure, prevented market development and inhibited economic activity. Southern Sudan thus has some of the lowest socio-economic indicators in the world, high unemployment, poor education, and post-conflict trauma, which affect the overall health of its population. About 71% of the 650,000 square kilometres of Southern Sudan are suitable for agriculture with another 24% being forest. Accordingly, agriculture is the main source of income for more than 85% of the population. Over 90% of the population live on less than US $1 per day and the poverty rate lies between 40% and 50%.[2] Life expectancy at birth is 42 years, while infant and under-five mortality is high at 150 deaths/1000 live births and 250 deaths/1,000 live births, respectively. Under-five mortality makes up 57% of the total deaths.

2.1.4 Education System and Education Status

Southern Sudan's education system has always been under-resourced. Immediately prior to the civil war there was a shortage of qualified teachers and a lack of school equipment. Between 1985 and 1990 the breakdown in education accelerated as teachers and pupils were recruited into the different armies and militias. However, since the early 1990s significant progress has been made, though it would be unrealistic to suggest that the Education for All objectives will be met by 2015 (Brophy 2003).

The School Baseline Assessment (SBA) has provided estimates for key education sector indicators. In 2003/04 there were an estimated 1,600 schools attended by an estimated 400,000 children, equivalent to a gross enrolment of 25.3%. This rate has been rather consistent and it is thought that improvements will be difficult to achieve because population growth and the flow of returnees constantly increase the school-age population (NSCSE 2004). By 2002, the overall ratio of females to males in primary education was 37.3%, meaning that for every one girl there were almost three boys in school. The primary completion rate was only 1.9%, compared to 19% in Chad, 24% in Ethiopia, and 63% in Kenya and Uganda. For Southern Sudan, this translates to about 500 girls finishing primary education each year. In 2002, only 10% of classrooms were permanent buildings made of brick or concrete. Most classes meet in grass-thatched structures or under trees. Most teachers have had little to no formal pre-service training. Private schooling is available, especially from faith-based organizations, but only available to those who can afford to pay the fees.

2.1.5 Health System and Health Status

A first health policy for Southern Sudan was released in 1998, but due to the severe damage

[2] Poverty rate defined as the proportion below 40% of an economic status index based on asset ownership: Joint Assessment Mission, Economic Policy Cluster Report, March 2005

caused by the war the plans could not be realized. A new Interim Health Policy has now been formulated, building on the long tradition of primary health care in the region (MoH GoSS 2005). The goal of the Southern Sudan Interim Health Policy (2006-2011) is to improve the health of the people of Southern Sudan through strengthening of the health system at all levels and in particular increasing and strengthening the coverage of the primary health care system, including referral services.

Health services are delivered through a three-tier system comprised of hospitals, primary health care centres (PHCCs) and primary health care units (PHCUs). At the periphery, community-based networks have been established in some regions, to deliver disease specific programmes for onchocerciasis control or Guinea worm eradication. Campaigns for other interventions, such as vaccination and distribution of long-lasting insecticidal nets (LLINs) are being conducted to complement the weak routine services and rapidly boost protection from major diseases.

During the war, faith-based and non-governmental organizations (NGOs) took leading roles in the delivery of health care and some agencies continue to do so while local capacity and infrastructure are being rebuilt. However, the MoH GoSS has taken on the coordination of these agencies and is progressively taking over areas of service delivery. To ensure a gradual, smooth transition from emergency/post-emergency service delivery to a sustainable, government led approach, most agencies are engaging closely with the MoH GoSS, including secondment of staff. Despite enormous efforts from all stakeholders, health service coverage continues to be low, with only 25% of the population having access to facilities.

As Southern Sudan moves from a post-emergency setting to one of development, donors and NGOs have the opportunity to play a major role in increasing access to and quality of health care. With the long-term goal of ensuring access of the majority of the population to basic health care, the Health Sector Recovery Strategy has set the following targets for 2010: one hospital per 300,000 people, one PHCC per 50,000 people, and one PHCU per 15,000 people. These targets represent a substantial expansion of the present health care infrastructure, corresponding to increases of 100% for the number of hospitals, of 133% for PHCC and of 45% for PHCU.

Meanwhile, in the absence of access to routine services, the overall health of the Southern Sudanese population is poor. Life expectancy at birth is 42 years. Infant and under-five mortality lie at 150 death/1000 live births and 250/1,000 live births, respectively. Under-five mortality makes up 57% of the total deaths (NSCSE, 2004).

2.2 NEGLECTED TROPICAL DISEASES: EPIDEMIOLOGY AND CONTROL

The MoH GoSS has recently published a detailed situation analysis on NTDs (MoH GoSS 2008). This reports a total of 12 diseases as endemic (table 1). Information on those diseases targeted by integrated MDA – onchocerciasis, LF, schistosomiasis, STH and trachoma – is summarised below. Included in the summary on epidemiology is loiasis, a disease caused by the filarial parasite *Loa loa,* which complicates the control of onchocerciasis and LF in areas where they are coendemic with *L. loa*. Due to the risk of severe adverse events (SAEs) after ivermectin treatment in individuals with a high load of *L. loa*, MDA for onchocerciasis in areas co-endemic for *L. loa* has to be carried out using specific SAE monitoring procedures[3]. Ivermectin plus albendazole administration for LF elimination is prohibited in areas where LF and loiasis are co-endemic except in areas where ivermectin has been previously administered with high coverage. The section on control

[3] Mectizan Expert Committee & Technical Consultative Committee (2004) Recommendations for the treatment of Onchocerciais with Mectizan in areas co-endemic for onchocerciasis and loiasis. [Available from URL: http://www.mectizan.org/library/EnglishMECTCCLoaRecs-June04.pdf]

includes Guinea worm since, apart from onchocerciasis, this is the only disease that has benefited from large-scale interventions.

Table 1: Neglected Tropical Diseases endemic to Southern Sudan

Parasite	Disease (Common Name)	Etiologic Agent	Burden
Protozoan	Visceral Leishmaniasis (Kala-Azar)	*Leishmania donovani*	Cyclic (500 - 9000 cases/year)
	Human African Trypanosomiasis	*Trypanosoma brucei gambiense* *T. b. rhodesiense*	1 – 2 million people at risk No recent reports
Bacterial	Trachoma	*Chlamydia trachomatis*	3.9 million at risk in surveyed areas
	Buruli Ulcer	*Mycobacterium ulcerans*	1000 (+) cases
	Leprosy	*Mycobacterium leprae*	
Helminth (Worms)	Soil Transmitted Helminths (Common Intestinal Worms)	*Ascaris lumbricoides* (Roundworm) *Trichuris trichiura* (Whipworm) Hookworm (Species unconfirmed)	
	Lymphatic filariasis (Elephantiasis)	*Wuchereria bancrofti*	
	Loiasis	*Loa loa*	
	Onchocerciasis (River Blindness)	*Onchocerca volvulus*	4.1 million at risk, of which 3.6 million eligible for treatment
	Dracunculiasis (Guinea Worm)	*Dracunculus medinensis*	Approx 20,000 cases in 2006
	Schistosomiasis (Bilharziasis)	*Schistosoma haematobium* *S. mansoni*	
Unknown	Nodding Syndrome	Unknown	

2.2.1 Epidemiology

In 2003, the Southern Sudan Onchocerciasis Task Force (SSOTF) started Rapid Epidemiological Mapping of Onchocerciasis (REMO) to estimate onchocerciasis distribution. Mapping is now almost complete and shows that most states are endemic, though there is considerable variation in endemicity between areas. The main endemic foci are located in Western Equatoria, Northern Bahr el Ghazal, and Western Bahr el Ghazal. In some villages >80% of individuals have palpable nodules and >12% are blind (Mukhtar *et al.* 1998). The total estimated population at risk is 4.1 million, which may have to be adjusted because of rapid population movements. The estimated ultimate treatment goal, which is the population that is eligible to receive ivermectin, is 3.6 million.

Historical data indicates that *Schistosoma mansoni* is very common south of the 9th degree latitude whereas the largest endemic area of *S. haematobium* is to be found between the 9th and 16th degree latitude (WHO 1987). This includes the states of Unity and Upper Nile in Southern Sudan. Hospital data from 1949 indicated a prevalence of *S. mansoni* of 44.3% in Eastern, Central and Western Equatoria as well as Jonglei state, while prevalence in Bahr el Ghazal was 1%-5%. From 2002 to 2007, WHO carried out four surveys, all of which were consistent with the findings of the historical data; the exact geographical distribution and present burden are unknown.

Data collected by the FMoH (Khartoum) in the 1990s showed that STH were prevalent in the South, especially in Central and Eastern Equatoria. Data collated during the war by UNICEF also consistently indicated that 8%-10% of outpatient visits were for treatment of intestinal worms. Population-based estimates of STH prevalence are limited and indicate that in Central and Eastern Equatoria states the cumulative prevalence (prevalence of infection with

at least one STH) ranges from 10% to 35%. The most widespread STH appears to be hookworm. These observations are consistent with STH prevalence predicted using geographic information systems (GIS).

Trachoma has long been known to be prevalent in parts of Sudan (Majcuk 1966), but data on the distribution and burden continues to be limited. Unpublished, population-based trachoma surveys conducted by the FMoH (Khartoum) in 1999 found a high prevalence of trachoma in Southern Sudan. The Carter Center (TCC) has since conducted further prevalence surveys (Amann 2002, Ngondi *et al.* 2005, King 2008). In all locations surveyed the average prevalence of active trachoma (TF in children 1-9 years) was 47% (range 15%-87%), which is well above the 10% threshold recommended for interventions. It has been estimated that overall 3.9 million people need antibiotic treatment and 206,000 people need immediate trichiasis surgery (Ngondi *et al.* 2005).

LF has been known to be endemic over large parts of Sudan (Kirk 1957, Satti & Abdel Nur 1974, El Setouhy & Ramzy 2003). In 2003, the Federal Ministry of Health (FMoH), Khartoum, started LF mapping in the North (El Setouhy & Ramzy 2003) and in some locations in the South. Data from these surveys and from screening activities by NGOs indicate that LF is hyperendemic in Upper Nile, Western Equatoria, Central Equatoria and parts of Eastern Equatoria. Anecdotal reports on clinical manifestations received by WHO showed that LF also occurs in Jonglei, Lakes and Warrab. No surveys have been conducted in the remaining three states.

A number of studies on *L. loa* have been conducted in Sudan (Woodman & Bokhari 1941). To date it seems that the geographical distribution based on these still applies. At the time, loiasis was found to occur between latitude 4º to 6º North, did not occur east of longitude 30º East and was not reported in Uganda. This endemic region corresponds to the present day Western Equatoria. In the 1950s, about 20% of the population in this area was infected with *L. loa*. The limited data collected over the last few years indicate that prevalence remains high (APOC 2005).

2.2.2 Control

Only two of the endemic NTDs have benefited from continued large-scale control – onchocerciasis and guinea worm. For both, national programmes are in place, overseen by the SSOTF and the Southern Sudan Guinea Worm Eradication Program (SSGWEP), respectively. Control of other NTDs, to date, has been small-scale and limited in geographical coverage.

Onchocerciasis control using MDA with ivermectin started in 1995 and was implemented through NGOs in hyper- and meso-endemic areas. Initially the programme distributed just 31,500 treatments, increasing to 437,773 treatments by 2003. Following the ceasefire, REMO was conducted in much of Southern Sudan and five projects for onchocerciasis control were developed with the African Programme for Onchocerciasis Control (APOC). Christoffel Blindenmission (CBM) was selected as lead implementing NGO and based their office at the Health Secretariat in Rumbek. They procured ivermectin and gave financial, logistical and technical support to the SSOTF. This intervention is now led by the MoH GoSS in partnership with CBM and local NGOs. In 2006, 26% of the eligible population received treatment, representing 89% of the annual treatment goal as foreseen in the scaling up plan.

The SSGWEP is under the Directorate of Preventive Medicine and receives support from TCC, UNICEF, WHO and numerous NGOs. A combination of interventions is being deployed: i) provision of a safe water supply, ii) filtration of drinking water to remove copepods, iii) searching for active cases and proper management of them, iv) ensuring that patients avoid contact with open water sources, and v) killing or removing copepods in ponds. These are implemented by the SSGWEP network of 13,637 trained village volunteers, supported by 896 area supervisors, 82 county field officers, 7 state field coordinators, and 19 technical advisors. By 2008, active surveillance is carried out in seven of the ten states. The aim is to have trained volunteers in all endemic villages to ensure full

coverage of health education, surveillance and case containment. Since the signing of the CPA, considerable improvements have been made; 47.9% cases have been contained in 2006, compared to 3.5% in 2005. Still, only 15.9% of the endemic villages have safe water sources and many have not received filter cloths and pipe filters. Regular treatment of water sources with temephos insecticide to kill copepods is also progressing slowly. In Jonglei and Eastern Equatoria, guinea worm eradication had progressed to a level in 2007 where village volunteers had spare capacity, allowing for integration of trachoma control and, in some areas, distribution of (LLINs). As guinea worm is being brought under control in other states it is envisaged that integrated disease control delivered through the volunteer network can be further expanded, both geographically and in scope.

Trachoma control projects were started in 2000 by CBM and TCC, and are now implemented in close collaboration with the MoH GoSS and a number of NGOs. Initially, villages around Malakal were targeted with the WHO-recommended SAFE strategy (Gambhir *et al.* 2007), but this has since been extended to cover most of Eastern Equatoria and Jonglei. Azithromycin is donated by Pfizer to Southern Sudan through TCC and is distributed to the at-risk population annually. In 2001, during the first year of MDA, about 60,000 doses were distributed, which increased to 84,096 doses in 2005, covering 34% of the population in the targeted areas. Treatment with topical tetracycline reached 23,035 people, covering 57.6% of the individuals with active disease in the identified endemic areas. CBM and TCC have carried out trachoma trichiasis surgeries and training of Sudanese staff in the surgical procedures. A total of 32 local Sudanese trichiasis surgeons have been trained since 1998, but none remain active because the conflict caused staff to relocate and made regular supplies and supervision impossible. In 2005 and 2006, CBM performed Trachomatous trichiasis (TT) surgery for 497 and 916 patients, respectively. Future programmes intend to continue training trichiasis surgeons in PHCCs, which are more accessible, have better facilities and can receive regular supplies and supervision. In September 2007, a MoH GoSS facility for trichiasis surgery training was established in Jonglei, and two trichiasis surgeons were trained. A total of 369 patients were operated for TT through October 2007.

MDA of albendazole for STH control was first piloted in 2006 as a component of National Immunization Days (NIDs) in all ten states. A total of 2,5 million doses were distributed, reaching an estimated 87% (1,9 million) of the targeted 1-5 year old children, with the remainder being used to treat siblings above 5 years of age. A second round of albendazole MDA alongside NIDs was conducted in December 2007. Delivery of STH control to children over the age of five is meant to provide an interim solution, while school infrastructure is being rebuilt. Once school coverage and attendance has increased, routine MDA through schools is likely to take the place of annual campaigns, as used successfully elsewhere in the region (Kabatereine *et al.* 2006).

3. INTEGRATED CONTROL OF NTDs IN SOUTHERN SUDAN

The concept of integration can be applied to a broad range of activities:

- Integration of disease surveillance systems and monitoring and evaluation systems (i.e. monitoring more than one disease using the same monitoring mechanism)
- Integration of human and physical resources (i.e. using the same people and transport to deliver mass treatment)
- Integration with other health and education programs (i.e. Child Health Days, vitamin A distribution, mosquito net distribution)
- Integration of IEC and social mobilization strategies for NTD control (i.e. delivering messages about integrated NTD control)
- Integration of training activities in support of MDA
- Integration of drug distribution, logistics, management, supply facilities and transportation

The aim of integration is to reduce duplication of efforts, thus improving efficiency and reducing costs compared to when activities are implemented separately for each disease. For the control, elimination or eradication of NTDs, two overarching aspects are crucial: i) Combining vertical NTDs programs into integrated, cost-effective packages, and ii) Linking these packages with ongoing local health and education programs, and health services. The forthcoming sections will describe how this approach will be applied in Southern Sudan and what its expected outcomes are.

3.1 VISION

Trachoma and LF will be eliminated as public health problems from Southern Sudan, while onchocerciasis, STH and schistosomiasis will be effectively controlled through preventive chemotherapy. The people of Southern Sudan will have access to appropriate and high quality preventive and treatment services under the leadership and coordination of national and state governments in partnership with civil society and the private sector.

3.3 GOAL

The goal of the integrated NTD control strategy is:

- To markedly reduce NTD related morbidity in Southern Sudan and minimize the socio-economic impact of these diseases

This will directly contribute to the goal of the health sector as formulated in the Interim Health Policy:

- To improve the health of the people of Southern Sudan through strengthening the health system at all levels and in particular increasing and strengthening the coverage of the primary health care system and services, including the referral system

3.4 OBJECTIVES

1. To develop a comprehensive map of the geographical distributions of the NTDs targeted through an integrated control approach
2. To increase the geographical coverage of the eligible population with PCT to 50% by combining delivery of PCTs under one structure
3. To ensure integrated NTD control results in health sector strengthening by providing the necessary support to existing and new NTD delivery structures at all levels
4. To ensure evidence-based integrated NTD control, through monitoring and evaluation, as well as operational research

4. CORE STRATEGIES

4.1 MAPPING

Objective 1: To develop a comprehensive map of the geographical distributions of NTDs targeted through an integrated control approach

Core Indicator: Number of counties mapped

Proportion of counties mapped (out of the total number of counties that will need to be surveyed to develop a comprehensive map showing the overlapping distribution of target NTDs)

Key Targets: Protocol for integrated mapping of NTDs completed by June 2008

Mapping of half the counties (25) in Southern Sudan completed by December 2009

Mapping of all counties (50) in Southern Sudan completed by September 2011

National map showing the overlapping distribution of target NTDs developed by December 2011

4.1.1 The Strategy

Appropriate targeting of PCT requires information on the geographical distribution of infection prevalence in order to identify high-risk areas that might benefit most from integrated control. Targeting by locality not only maximizes the health impact and cost-effectiveness of intervention, but also minimizes the risk of treating uninfected individuals. In Southern Sudan, however, relevant information is not currently available because no systematic surveys have been carried out and previous surveys have been limited in scope and in geographical coverage.

For this reason, the MoH GoSS plans to undertake comprehensive mapping of the geographical distribution of four of the five target diseases: LF, trachoma, schistosomiasis, and soil-transmitted helminths. Onchocerciasis mapping is ongoing and expected to be completed by the SSOTF before the end of 2008.

Since population-based surveys throughout the country would be time-consuming and prohibitively expensive, it was decided to use a rapid mapping approach in order to identify priority areas where PCT is needed. Operational guidelines for rapid mapping of both onchocerciasis and Bancroftian LF are available from WHO (Ngoumou & Walsh 1993, WHO 2000, Noma *et al.* 2002). For both diseases, generalised ecological and hydrological features are used to identify areas where transmission is unlikely to occur or where only sporadic infections occur and are unlikely to be significant for control. In known or suspected endemic areas, individuals are screened using REMO or rapid geographical assessment of Bancroftian filariasis (RAGFIL) for onchocerciasis and filariasis, respectively. REMO is based on a simple examination for palpable onchocerciasis nodules in selected communities whereas RAGFIL is based on examination for hydrocele or on antigen screening using immunochromatographic card tests (ICT). Results are then extrapolated to an epidemiological map of a broader region.

More recent guidelines for filariasis mapping recommend conducting school surveys using lot quality assurance sampling (LQAS) (WHO 2005). The objective of LQAS is not to precisely determine infection prevalence, but rather to determine if infection prevalence is high enough

to warrant MDA of PCT. In this approach, a specified number of individuals are randomly selected to provide finger-prick blood samples that are examined until either a predetermined number of infected individuals is identified, or the specified number of individuals is sampled without the threshold being reached. To interrupt filariasis transmission, WHO recommends MDA in areas where prevalence is 1% or above, and therefore it is estimated that at least 250 individuals in each intervention area need to be examined before it is statistically valid to say that prevalence is less than 1%. If one or more of the first 100 individuals tested are found to be infected, then no further testing is required; otherwise testing continues until 250 persons are examined.

The potential of LQAS has also been investigated for trachoma (Myatt et al., 2003) and intestinal schistosomiasis caused by *S. mansoni* (Brooker *et al.* 2005). Because the infection prevalence thresholds for MDA are higher for trachoma (10%) and schistosomiasis (50% for high-risk communities), the number of individuals requiring testing is less. For trachoma, operational research has found that communities could be reliably categorized as prevalent on the basis of testing 50 children (Myatt et al. 2003). For intestinal schistosomiasis, testing just 15 children and seeing whether 7 children are infected was found to correctly classify 90% of schools (Brooker et al. 2005). However, before LQAS can be used for mapping of schistosomiasis in Southern Sudan, a larger sample will be required to generate estimates of prevalence. Sixty children (30 male and 30 female) per study site will be tested for both *S. mansoni* and *S. haematobium*. This opportunity will be taken to also study STH, which, like the examination for *S. mansoni* infection, also requires the Kato-Katz method. A protocol for studying the prevalence of trachoma, utilizing population-based surveys, has already been developed and will be used for future surveys. It is estimated that 50 children 1-9 years of age will be examined for active trachoma and 50 adults (>15 years old) will be tested for TT per site. Due to the presence of *Loa loa* in parts of Southern Sudan, rapid assessments of *L. loa* will need to be conducted alongside other NTD mapping activities in areas where LF is endemic and that have not been surveyed by the onchocerciasis control programme. Standard WHO guidelines will be used for this purpose (TDR 2002).

Because access to most communities is only possible during the dry season (approx. September to March), always logistically difficult and sometimes associated with security implications (e.g. requiring armed escorts), mapping will need to generate the required data in a single visit to a particular community. Ideally the same locality should be sampled for as many targeted diseases as possible. The definition of locality is based on the designated level of the administrative unit for which the decision to administer PCT is taken, commonly referred to as the implementation unit (IU). Initially, payams will be the IU for mapping of LF, schistosomiasis and STH, until enough evidence is gathered to allow analysis as to whether diseases are widely spread and not focal. If that is proven, the county will become the IU, except for schistosomiasis.

Therefore, the overall goal of the mapping component of the national strategy will be:

- To develop an integrated rapid mapping protocol to determine which counties exceed the threshold for intervention for each of the target NTDs.
- Based on survey results for each NTD, develop a map showing the overlapping distribution of target NTDs. This will subsequently be used to assign intervention packages to each IU.

4.1.2 Operational Approach

In order to reach the mapping strategic goal, a number of sequential activities will be undertaken:

1. ***Background review***. Literature review of alternative mapping approaches and prevalence thresholds for MDA for each target NTD. This review will form the basis of

discussions with programme staff in Southern Sudan and key individuals involved in rapid mapping of NTDs in other countries.

2. ***Determining sample sizes***. Computer-based sample size simulations will be carried out to determine optimal sample size to reliably classify IUs (counties) according to treatment strategy. Possible sample sizes include:

    a. LF: 100-250 individuals above age 10 years
    b. Schistosomiasis and STH infections: 60 children age 10-15 years
    c. Trachoma: 50 children aged 1-9 years for active trachoma; 50 adults for trachoma trichiasis (TT)
    d. Loiasis: 80 adults

3. ***Protocol development***. Based on the two previous activities, a protocol for rapid mapping will be developed.

4. ***Training***. To implement rapid mapping, certain expertise on diagnostic methods and data collection will be required. Currently this expertise is rare or not available in Southern Sudan, particularly at state level. A team of experienced Uganda laboratory technicians, previously involved in the mapping of NTDs in their own country, will therefore be used for training of trainers in Southern Sudan, both at central level and in a number of states. Initial mapping will then be carried out jointly by Ugandan and Southern Sudanese technicians until teams of national trainers are experienced in the methods and practicalities of implementing surveys. WHO laboratory technicians will also provide technical expertise in the training and supervision of nationals, and organizations such as CBM who specialize in eye care will train surveyors in WHO guidelines for mapping trachoma. Once local capacity grows and national trainers can be identified, they will be used to expand the capacity for rapid mapping to all states and, with additional manpower from each of the states, to map the target diseases.

5. ***Selecting the communities***. A multi-stage cluster sampling design with stratification by county will be used. Mapping will take place, on average, in four payams per county, and at least one community per payam. Communities will be selected based on a) accessibility and security; b) anecdotal reports of the occurrence of disease, particularly LF and hydrocele, rather than randomly; and c) environmental characteristics, especially for schistosomiasis and onchocerciasis. If no cases of LF have been found at the first site in a county, the mapping team will conduct an additional survey in a different community within the same IU. This procedure has been suggested by the Mectizan Donation Program to confirm the absence of LF from IUs.

6. ***Selecting the individuals***. Once the communities have been selected, individuals will be selected using the random walk method. Other sampling strategies will also be explored during initial surveys, to determine which method is most appropriate in the given context.

7. ***Testing the individuals***. Individuals will be tested for each of the diseases to be mapped, until either the threshold for intervention is exceeded or it can be assumed that the disease is either not endemic in the area or not sufficiently prevalent to warrant intervention. Pots for stool and urine samples will be distributed to individuals and

samples will be assessed for the presence and intensity of schistosomiasis[4] and STH. A small drop of blood will be collected for the diagnosis of LF using the NOW® Filariasis ICT, which detects circulating antigen of adult filarial worms. Individuals will be clinically examined for trachoma using the simplified WHO grading system.

8. ***Developing disease maps***. Survey data will be collected using handheld personal digital assistants (PDA) with an inbuilt global positioning system (GPS). Data will be transferred to a central server in Juba once all counties in a state have been surveyed. Using GIS, the data will be overlaid with administrative boundaries of Southern Sudan to illustrate which of the target NTDs exceed the infection prevalence threshold for MDA in each of the counties.

[4] While questionnaires on the presence of blood in urine are also used for prevalence of *S. haematobium*, these will not yield information on the intensity of infection and will need to be validated before use. Mapping for NTDs is a valuable opportunity to conduct thorough urine tests through filtration.

4.2 INTEGRATED INTERVENTION PACKAGES AND DELIVERY

Objective 2: To increase the geographical coverage of the eligible population with PCT to 50% by combining delivery of PCTs under one structure

Core Indicator: Number of individuals reported to have ingested NTD treatment within the reporting year (by drug package, disease and county)

Percent change in therapeutic drug coverage rate with an integrated approach after each round of MDA (by drug package, county and integration model; in areas endemic for onchocerciasis, drug coverage will be compared to the previous vertical approach)

Percent change in geographical coverage rate with an integrated versus vertical approach after each round of MDA (by drug, county and integration model)

Percent increase of people reached with surgery, antibiotics, face washing, and environmental change of SAFE strategy

Additional Indicators: Percent of at-risk and eligible population observed to have ingested treatment within the reporting year (by drug package, disease and county)

Percent of at risk and targeted IUs treated, within the reporting year (by drug package, disease and state)

Proportion of counties that required establishment of new delivery structures

Key Targets: Integrated MDA packages formulated and delivered to all eligible counties in at least two states by April 2009

Delivery of integrated MDA continued in counties targeted during 1st round and expanded to eligible counties in at least two additional states by March 2010

First round of integrated MDA delivered to 50% of counties endemic for both onchocerciasis and LF by September 2011

TT surgeries increased 100% by September 2010

80% of children 1-9 years in target areas have clean faces by September 2011

60% of households in target areas to use latrines or improved sanitary practices by September 2011

4.2.1 The Strategy

Results from rapid mapping will show where interventions will need to be delivered. Intervention packages will combine PCT with complementary methods such as:

- Integrated delivery of MDA and SAFE strategy
- Disability management
- Vector control

- Social sensitization and mobilization

Existing distribution mechanisms will be used where feasible. These are:
- Community-based networks for onchocerciasis control or for Guinea worm elimination
- Campaigns for distribution of LLINs or for vaccination

The aim is to reach 80% drug coverage of the eligible population in an IU during the first MDA round and to sustain this level over time. Additional training and support will be needed to ensure that this target can be achieved safely and without negative impact on interventions already delivered through community-based structures.

4.2.2 Operational Approaches

4.2.2.1 Mass Drug Administration Packages

MDA packages will contain any of five drugs – ivermectin, praziquantel, albendazole (or mebendazole), azithromycin, tetracycline – depending on the co-endemicity of diseases and whether the intervention threshold is exceeded (table 2). For areas where helminth diseases – onchocerciasis, LF, schistosomiasis, and STH – are coendemic, administration of a MDA package will be relatively straightforward, because all of the required drugs have been cleared for co-administration, though praziquantel should only be administered alongside other anthelminthics after at least one separate round of MDA, to avoid adverse events in individuals with high worm loads. Where trachoma is endemic, a minimum of one week has to elapse between administration of anthelminthics and azithromycin, because there is insufficient information to guarantee the safe co-administration of these drugs. Areas endemic for LF and highly endemic for *L. loa*, but not onchocerciasis, will be excluded from MDA as the risk of adverse events is thought to outweigh the advantages of treatment.

In IUs where the intervention threshold for a particular disease or combination of diseases has been exceeded, presumptive treatment will be delivered. This means that no diagnostic tool will be used and that a large number of infected and uninfected people will be treated. In areas where only helminth diseases are being treated this is feasible because anthelminthics have an excellent safety record, adverse reactions are minimal and transient, and SAEs are extremely infrequent. Nevertheless, precautionary measures listed in box 1 will be implemented in accordance with WHO recommendations to ensure safe implementation of MDA (WHO 2006a). International research on co-administration of anthelminthics and azithromycin is ongoing and findings will be used to amend the current strategy in accordance with WHO recommendations.

To monitor the occurrence of adverse reactions to any of the drugs administered, surveillance and monitoring will take place actively, by having community drug distributors monitor for mild and severe adverse events and referring the latter cases to the appropriate health facilities. Health workers at these facilities will have been previously trained in the detection and management of adverse events, will refer cases they cannot treat at lower levels to the closest hospitals, whose health workers will also be trained in the management of these events. Surveillance by medical personnel (health workers) at facilities will be in place for days 3 to 5 post-treatment, while in the community, monitoring by drug distributors will last from days 2 to 8 post-treatment. All personnel will be

Albendazole, ivermectin and azithromycin are available free of charge through the Mectizan Donation Program and the International Trachoma Initiative (ITI). Application for drug donations are being prepared by MoH GoSS with assistance from implementing partner(s) for submission to both drug donation programmes.

The only drugs not available for free are praziquantel and albendazole for young children not eligible for MDA under the LF programme. Procurement of these drugs shall be done directly through the MoH GoSS, with the help of the implementing partner in the state. Procurement

shall be done six months before MDA activities commence, and shall be appropriately budgeted.

Whenever possible, the MoH at state level and other existing programs, such as SSOTF, will provide the space for storage of drugs for each annual distribution. If space is not available at the state-level MoH, the implementing partner together with the MoH will assess the possibility of constructing adequate storage space.

Table 2: Therapeutic drugs, drug packages and eligible populations

Drug(s)	Target disease(s)	Eligible Population	Implementation Threshold
Praziquantel	Schistosomiasis	School age children >4yr/ 94cms in height Adults considered at risk, from special groups to entire communities in endemic areas.	(i) Prevalence of infection ≥ 50% (by parasitological methods)→ school age children and high risk groups treated every year (ii) Prevalence of infection ≥ 10% and <50% → school age children treated ever two years (iii) Prevalence of infection < 10% → chemotherapy available at health facilities
Ivermectin	Onchocerciasis	The entire population except pregnant women, lactating women in the first week after birth, children <90 cm in height (approximately equivalent to 15 kg/body weight), and the severely ill	Prevalence of infection ≥ 40% or prevalence of palpable nodules ≥ 20%
Albendazole or Mebendazole	STH	Pre-school and school-age children >1 year, women of childbearing age (except pregnant women in first trimester), adults in high risk occupations	(i) Prevalence of infection ≥ 50% → treatment twice yearly, if feasible (ii) Prevalence of infection ≥ 20% and ≤ 50% → annual treatment (iii) Prevalence of infection < 20% → chemotherapy available at health facilities
Azithromycin	Trachoma	Entire population > 6 months of age	Active trachoma (TF) prevalence > 5% in 1-9 year olds
Tetracycline ointment	Trachoma	Children < 6 months	
Ivermectin + Albendazole	LF Onchocerciasis STH	All except pregnant women, lactating women in first week after birth, children under 90cm in height/90 kg body weight/ <5yrs, and severely ill.	As above
Praziquantel + Albendazole	Schistosomiasis Soil-transmitted helminthiasis	School age children >4yr/ 94cms in height. Adults considered at risk, from special groups to entire communities in endemic areas, except women in first trimester of pregnancy.	
Ivermectin + Albendazole + Praziquantel	LF Onchocerciasis Soil-transmitted helminthiasis Schistosomiasis	The entire population at risk of LF transmission except pregnant women, lactating women in the first week after birth, children <90 cm in height (approximately equivalent to 15 kg/body weight), and the severely ill	
Above anthelminthic packages + Azithromycin & Tetracycline	LF Onchocerciasis Soil-transmitted helminthiasis Schistosomiasis Trachoma	***Caution:*** The safety of large-scale co-administration of azithromycin and anthelminthic drugs cannot be guaranteed by current knowledge. The available information indicates that a sufficient clearing time (≥ 1 week) must be respected when azithromycin and anthelminthic drugs are administered to the same population	

Adapted from: Monitoring and Evaluation Plan; Neglected Tropical Disease Control Program; RTI International, Washington, D.C., July 2007, and WHO 2006a

Box 1: Precautionary measures that will be implemented as part of MDA

- Seriously ill individuals (people unable to engage in the normal activities of daily living without assistance because of illnesses) will be excluded from MDA
- People who are about to receive drugs will be adequately informed about possible adverse reactions and about what they should do in the event of such a reaction
- People who have previously suffered one of the rare SAEs caused by reaction to the drugs (e.g. Stevens–Johnson syndrome) will be excluded from treatment
- Care and support will be available for individuals who experience adverse reactions. Medical or community health personnel will be available throughout each MDA
- Any SAE will be carefully recorded on standard forms and the relevant authorities will be informed.
- Forcing very small children to swallow large tablets may cause choking or asphyxiation. Scored tablets will thus be crushed for administration to young children; older children will be encouraged to chew tablets of albendazole (or mebendazole).
- To minimize the risk of individuals suffering from adverse reactions due to interactions between drugs distributed by different programmes, the National Integrated NTD Control Programme Technical Committee will be kept informed of any other public health intervention distributing drugs in the same area and of its timing, and avoid MDA near or at the same time

4.2.2.2 Integrated Delivery

Integrated MDA will be scaled-up in stages. The first round, scheduled to start in January 2009, will target areas endemic for onchocerciasis and with an existing CDTI structure. In those counties that are co-endemic for onchocerciasis and LF, albendazole will be added to the annual distribution of ivermectin. During the 2009/2010 dry season a second round of MDA will be delivered in the initial target areas and the intervention will be rolled out to two additional states. The following dry season (2010/2011), all areas mapped and endemic for LF[5] will be covered with one round of integrated MDA.

In preparation for delivery of integrated NTD control, the inventory of stakeholders involved in health care, hygiene promotion, water, sanitation and education will be updated. This is particularly important for trachoma control, where integrated MDA will form only one component of the SAFE strategy that encompasses surgery, antibiotics, face washing, and environmental improvement. For trachoma control, and eventual elimination, to succeed and to be eligible for donation of azithromycin by ITI, all of the components of SAFE will need to be addressed. New cross-sectoral links will be established for this purpose through active partnership building (section 4.2)

Coordinated by the National Integrated NTD Control Programme Technical Committee (section 5.2), MDA will explore a number of delivery approaches as of year two of the programme (2009/2010 dry season). These will vary between IUs, depending on the co-endemicity of NTDs and on the presence or absence of community-based structures for MDA delivery. Possible scenarios are outlined in table 3:

Table 3: Delivery structures to be used for delivery of PCT for integrated NTD control

County with	**Delivery structure**
Onchocerciasis	CDTI network
No onchocerciasis but Guinea worm	Community-based Guinea worm network
No onchocerciasis or Guinea worm	Alternative community-based network, such as the one used for EPI
No onchocerciasis, Guinea worm or other community-based network	Campaigns and/or establishment of a community-based structure

The evidence generated during each round of integrated MDA will be used to modify delivery strategies where necessary. Rigorous M&E, as well as operational research, will therefore form important components of the integrated NTD programme. While generating the

[5] Except those areas where only *L. loa* and LF, but not onchocerciasis, are co-endemic

essential evidence to allow programme improvements and timely reporting, this will also provide an opportunity for capacity building of Southern Sudanese programme managers and researchers, and to strengthen the link with NTD specialists in the region (e.g. Uganda, Kenya).

4.2.2.3 Disability Management

While preventing infection with NTDs is important, it is often the management of disease consequences that is of greatest concern to those already affected by the disease. Effective chemotherapy will in most cases prevent further parasite induced damage, but will not cure existing damage, such as blindness or painful secondary infections caused by damaged lymph vessels. To reduce the current backlog of permanent damage caused by NTD infection, palliative care will need to form an important component of comprehensive control, though integration with MDA will only be possible where no specialized services are needed to improve the patients' condition.

In areas where LF is endemic, education on hygiene and limb care, activities that will reduce the frequency of bacterial infections in people with damaged lymphatics, will be incorporated into IEC materials to provide the general population with this background information. For affected individuals, more detailed information will be made available on washing and care of the limbs, prompt recognition and treatment of minor injuries, wearing of shoes or other foot protection, limb elevation, exercise and judicious use of antibiotics (Ottesen 2006). Such home-based management of the disease can reduce the size of the affected limbs and return the ability to work and perform daily activities to patients. Community health workers will be equipped with IEC materials, cleaning kits, and antibiotics for lesions, and will be trained in showing patients the basics of home-based management. Clinical workers based in hospitals and PHCCs, with training in basic surgical procedures will be trained to perform hydrocele surgery. Patients can then be referred to the nearest health facility with trained staff, where they can receive this service. Health facilities will be equipped with the necessary supplies to perform such surgery.

Trachoma surgery to correct trichiasis, a condition of eyelashes rubbing on the eyeball that will result in blindness unless treated, is already being carried out by specially trained surgeons as part of the SAFE strategy. Further expansion of access to trachoma surgery is planned by the MoH, CBM and TCC through training of staff at PHCCs on trichiasis surgery. The management of eye complications as a result of NTDs should be carried out through the existing health services. However, there is a need for staff to be better trained and equipped to manage these conditions. For those who seek treatment too late and are already blind by the time they present to the health care facility, rehabilitation programmes will be established that enable them to be orientated in mobility, activities of daily living and income generating skills. Blind children will be assisted to attend a specialised school for the blind or integrated into a standard school.

4.2.2.4 Vector Control

In areas where LF is transmitted by night-biting *Anopheles* mosquitoes, mosquito nets can provide protection from *W. bancrofti* infection (Bogh *et al.* 1998, Pedersen & Mukoko 2002, Brockarie *et al.* 2002). Though entomological studies in relation to LF have not been carried out yet, it is assumed that the same vector as that incriminated in Uganda is responsible for transmission in Southern Sudan. In Uganda, *W. bancrofti* is mainly transmitted by *An. gambiae* and *An. funestus* mosquitoes, both species appearing to be of equal importance (Onapa *et al.* 2001). While entomological surveys will certainly be required to confirm the vector(s) of LF in Southern Sudan, targeting of LLINs to areas where LF and malaria are co-endemic will be promoted on the assumption that sleeping under a LLIN will provide protection from both diseases.

4.2.2.5 Social Sensitization and Mobilization

Achieving and maintaining high treatment coverage will depend on effective social mobilization and sensitization strategies. Information, education and communication (IEC) are vital to win community support for MDA and to ensure compliance. Being aware of the benefits of treatment also encourages communities to actively participate in and contribute to MDA, for example by becoming a volunteer. IEC materials for the integrated NTD programme will be developed based on experiences elsewhere (e.g. Uganda) and an understanding of the local culture and language. Qualitative research methods will be used where necessary to inform the design of IEC materials. Where possible, written communication will be avoided since it may be of limited use because of the high rate of illiteracy. Radio announcements, loudspeakers, and alternative methods such as drama groups or films will be used where feasible and appropriate as part of the sensitization campaign.

At every state where implementation of MDA will take place, state coordination or technical committees will be established to mobilize efforts and identify needs for advocacy at the county level. State coordination committees, in communication with county health departments, the South Sudan Relief and Rehabilitation Commission (SSRRC), and other MoH partners in the field will mobilize support for MDA with local administrators at payam and boma levels and community leaders.

4.2.2.6 Training and Capacity Building

To ensure that integrated NTD control packages, particularly the MDA component, are being implemented safely and effectively it is essential that all staff have received appropriate training and that existing staff receive annual refresher training. At present, training activities are implemented separately by NTD programmes (onchocerciasis, trachoma and Guinea worm). To improve on (cost-) effectiveness, a range of integrated curricula will be developed to address the training needs in the different co-endemicity settings. Coordination of trainings will be ensured through the development of a national training plan, which will be revised annually to account for the geographical expansion of interventions over time. Curricula will be reviewed if results from M&E activities indicate training gaps or if new evidence regarding the safety of MDA becomes available.

4.3 DELIVERY SUPPORT

Objective 3: To ensure integrated NTD control results in health sector strengthening by providing the necessary support to existing and new NTD delivery structures at all levels

Core Indicators: Percent change in therapeutic drug coverage rate with an integrated versus vertical approach after each round of mass drug administration (by drug package, county and integration model)[6]

Additional Indicators: Number of personnel trained on the integrated MDA curriculum

Attrition rate of community health workers prior to and during each round of MDA

Timely and safe delivery of drugs to the IUs

Percentage of drug loss per year

States with successful partnerships in the delivering of F and E of the SAFE strategy

Key Targets: Integrated training curricula and guidelines developed to address different intervention scenarios (determined by the overlapping distribution of target NTDs) by September 2008

Integrated support/supervision guidelines and methods developed by September 2008

First round of training for existing and new community health workers and, potentially, campaign staff conducted in target counties using integrated training curricula and guidelines by December 2008

Annual training sessions conducted prior to MDA, to refresh/update knowledge of existing staff and train new ones to compensate for attrition and geographical expansion

Two advocacy and consultation meetings conducted with partners and stakeholders at state level every year regarding MDA

4.3.1 The Strategy

Integrated NTD control will build on the experiences of existing disease-specific programmes and their community-based structures, by expanding training curricula and guidelines to meet the needs posed by treatment of multiple diseases. Resources will be made available to provide the required training and support/supervision, using existing structures where feasible. Once established, this model will be expanded to areas where community-based structures are absent.

[6] This is the same indicator as that for objective 2, though here it will be used to monitor whether existing intervention programmes can maintain or exceed previous coverage rates once additional interventions are delivered through the existing distribution system

4.3.2 Operational Approaches

The programmes for onchocerciasis control and Guinea worm eradication have invested considerable resources into the establishment and maintenance of community-based networks. During the transition from emergency to development, maintenance of community-based networks has become particularly challenging, because employment opportunities have arisen and community members demand compensation for their work on disease control. If demands are not met, a considerable proportion of workers choose to end their involvement in the programme. To compensate for attrition, regular training of new community members is required. Adding components to the existing work associated with disease-specific programmes has the potential to increase attrition, because delivery of an integrated package will require more time and may thus raise expectations for remuneration.

The integrated NTD control programme aims to avoid undermining existing structures by overloading them with additional work in the absence of additional support. Instead, resources will be made available to review the existing delivery structures and their associated training components. Based on this information, integrated training curricula and guidelines will be developed to deliver the relevant information to health workers in different intervention scenarios. Basic scenarios will be the treatment of up to three diseases (e.g. onchocerciasis, LF and STH). The most complex scenarios will be delivery of anthelminthics plus, at least one week before or after, antibiotics for treatment of trachoma (see table 2). With increasing complexity, training workshops will be extended in length and support/supervision structures will be further enforced.

Provision of this additional support is one strategy aimed at maintaining attrition at current rates or decreasing it. Well-designed IEC activities (section 4.1) are expected to encourage communities to contribute to the control or elimination of NTDs. Raised awareness on the debilitating effects caused by the target NTDs and on the simple but effective methods to prevent or treat them will stimulate community participation and is expected to reduce attrition rates. Where attrition is a problem, new methods for recruitment of community members will be explored, ensuring full involvement of the community and aiming at increasing women's participation. Training of new recruits and refresher training of existing volunteers will be conducted on an annual basis prior to MDA.

Strengthening of the drug supply chain will be another important element in supporting the health system. Some of the drugs used in MDA are available through donation programs that require a sometimes lengthy application and delivery process. Therefore, careful planning is necessary in order to receive these drugs on time and to secure their delivery to the IU prior to MDA (Table 4). The MoH GoSS will ensure the clearance of all customs in order for drugs to reach the country.

Table 4. Application deadlines and time required for delivery of drugs

Drug	**Donation Program**	**Application Deadline**	**Time required from approval to delivery**
Ivermectin	Mectizan Donation Program	Twice a year, February and August	Two months
Albendazole (only for LF elimination, not for STH)	Mectizan Donation Program	Twice a year, February and August	Four to six months
Zithromax	International Trachoma Initiative	September 2008	Six months

Praziquantel is the only drug not available for donation and therefore requires a procurement plan.

4.4 PROVIDING AN EVIDENCE-BASE

Objective 4: To ensure evidence-based integrated NTD control, through monitoring and evaluation, as well as operational research

Core Indicators: Percentage of IUs submitting complete MDA record on time (by MDA round)

Additional Indicators: Number of post-MDA evaluations conducted (by county) by 2011

Proportion of identified research questions addressed by 2011

Key Targets: LF sentinel sites established in every endemic state before MDA implementation

MDA data collected, collated, analyzed, summarised and disseminated to stakeholders within three months after each MDA round

MDA coverage, as reported through routine data collection, validated by post-MDA surveys every two years

Cost of integrated MDA compared to disease-specific interventions established by the end of 2010

Effectiveness of different MDA delivery models evaluated and most appropriate one(s) determined by mid 2010 (after second MDA round)

4.4.1 The Strategy

Most routine monitoring and evaluation activities will be conducted through existing structures at central, state, county and community level. For LF, sentinel sites will be established to monitor progress towards elimination. These sites may provide further opportunity to monitor progress in control/elimination of the other target diseases. Data from routine monitoring will flow from community volunteers to the National Integrated NTD Control Programme Technical Committee at the MoH GoSS in Juba *via* Village Health Committees, County Medical Officers and the Department of Integrated NTD Control at state level. As the Health Management Information System (HMIS) develops, routine reporting for NTDs will be incorporated. Evaluations in the form of post-MDA survey and as part of supervisory visits will be conducted every two years to determine if activities are achieving or have achieved the outputs and whether these outputs are likely to achieve or have achieved the programme objectives (see logframe, section 5.4). To complement data generated by M&E activities, specific operational research studies will be conducted to address issues of programme cost and effectiveness.

4.4.2 Operational Approaches

Sound monitoring and evaluation, complemented by operational research, are crucial to enable the MoH GoSS to identify gaps and maximise opportunities for improving NTD control. During the establishment of a national programme for integrated NTD control these components are particularly important to generate additional support from government, donors and other stakeholders, allowing for (cost)-effective expansion of an integrated package to all endemic areas.

4.4.2.1 Monitoring & Evaluation

The following principles will be followed for M&E:

- There will be regular monitoring activities throughout the year, particularly during and shortly after MDA delivery
- Standardised M&E tools[7] will be used where feasible
- Sentinel sites will be established for monitoring of progress towards LF elimination and the potential for using these to monitor control of the other target NTDs will be evaluated
- Regular evaluations will be conducted to assess progress towards the specified objectives
- Results will be made available promptly and be widely disseminated

Southern Sudan's Integrated NTD Control Programme will conduct M&E activities in accordance with the national M&E policy. In addition, the programme will generate data to measure the indicators suggested in the M&E procedures developed by the RTI Neglected Tropical Disease Control Program.[8] The following data will thus be collected on standardised templates during MDAs:

- Where MDA was implemented
- What therapeutic drugs were distributed
- Number of tablets distributed
- Number of persons treated
- Eligible population

To capture this and additional information, records of each round of MDA will contain the following: Name of state, county, payam, boma and village, household number (each house will be marked), name of household head, sex and ages of residents in household, which residents are present or absent, whether they are eligible to receive drugs (see table 2), and which residents participated in the MDA. If distributors encounter people who are not permanent residents of the village, this information and their usual place of residence will also be recorded. If eligible, non-residents will be included in the MDA. Date of administration and number of tablets distributed to each individual will also be recorded.

Standard post-MDA coverage surveys will generate data on:

- Age- and gender-specific coverage
- Actual drug coverage rates (which will be used to validate coverage reported through the routine system)
- Why people do or do not take part in MDA
- Whether there are many systematic defaulters

While WHO guidelines suggest that at least two sentinel sites must be established per implementing unit of 1 million people, this would be difficult to implement in Southern Sudan at the moment. Instead, one sentinel site will be established per state endemic with LF to monitor progress towards elimination. LF sentinel sites need to be established prior to the first MDA in states mapped as endemic for this disease, to find out whether prevalence and intensity of infection have decreased after MDA. Testing at sentinel sites will then take place before the 3rd and 5th rounds of MDA, and before the 7th and 9th rounds if MDA needs to continue. While sentinel sites are static, spot check sites where blood tests will also be

[7] Standardised M&E guidelines for NTDs are being developed by WHO and will be released in 2008

[8] RTI International. Neglected Tropical Disease Control Program. Monitoring and Evaluation Plan. July 2007, Washington, D.C.

required starting before the 3rd round of MDA and with the same periodicity thereafter, will vary every time.

Disease surveillance for the other diseases will also take place after the life of this strategic plan as follows:

- For trachoma, every three years
- For schistosomiasis and STH, every two to three years
- For onchocerciasis every four to five years

Table 5 : Key indicators used to measure programme impact

Disease	Indicator	Measurement	Frequency	Reference
LF	Microfilaraemia prevalence rate	Night blood surveys at sentinel sites and, after four MDA rounds, at randomly chosen spot check sites [at least 500 individual per site]	Prior to 1st MDA, then before 3rd, and 5th rounds (if necessary, before 7th and 9th rounds)	WHO 2005
	Mean microfilaraemia density			
	Prevalence of lymphoedema	Clinical examination		
	Prevalence of hydrocele			
	Proportion of vector(s) infected with third-stage filaria larvae (to assess impact on transmission)	CDC light traps and/or pyrethrum spray catches at sentinel sites, followed by dissection [≥ 1000 mosquitoes during baseline, subsequently increasing to ≈10,000]	Prior to 1st MDA, then before 3rd, and 5th rounds (if necessary, before 7th and 9th rounds)	WHO 2002
Onchocerciasis	Microfilaria load	Microscopic examination of skin snips to count microfilariae	Every 4-5 years	
Soil-transmitted helminth & Schistosomiasis	Prevalence of each STH and schistosomiasis infection	Microscopy for detection of eggs in faeces or urine.	Before start of intervenion and every 2-3 years thereafter; before MDA round	Montresor *et al.* 2002
	Intensity of infection			Brooker *et al.* 2004
	Percentage of children with anaemia and severe anaemia	Haemoglobin < 11g/dl or < 7g/dl to indicate anaemia or severe anaemia, respectively	2-3 year after intervention; before MDA round	
Trachoma	Prevalence of active trachoma in children 1-9 years old	Categorized according to WHO simplified grading scheme	3 years after intervention and subsequently at 3-year intervals	Thylefors et al. 1987 WHO 2006b, Ngondi *et al.* 2006
	Prevalence of trachomatous inflammation-follicular (TF) in children 1-9 years old			
	Prevalence of trachomatous inflamation-intense (TI) in children 1-9 years old			
	Percentage of children 1-9 years old with unclean faces	Face defined as unclean if nasal or ocular discharge present		

4.4.2.2 Operational research

In the absence of much data and experience related to integrated NTD control, operational research will be crucial to build an evidence-base for implementation in Southern Sudan. The first step will be rapid mapping of the target diseases as outlined under objective 1. Once operational research has determined which counties need to be targeted with which interventions, integrated NTD control/elimination packages will initially be delivered to a selection of states. During the first MDA round, delivery has to be largely based on existing experience from delivery of disease-specific control/elimination in Southern Sudan (e.g. onchocerciasis or guinea worm). Numerous questions associated with integrated delivery will not yet have been answered (table 6). However, each delivery round will provide ample opportunity to conduct work that will generate answers necessary to modify the strategy so that it meet the needs and overcomes the challenges of NTD control/elimination in Southern Sudan.

An initial list of operational research questions has been drawn up by stakeholders prior to the first round of MDA (table 6). Some of these will be answered as part of post-MDA surveys whereas for other studies will be designed by the National Integrated NTD Control Programme Technical Committee, the Department of Research, Planning and Health System Development, collaborating research institutions (e.g. CDC, KEMRI, LSHTM, etc.) and implementing partners. Where necessary, funds will be mobilized from sources such as MoH GoSS funds or the UNDP/World Bank/WHO Special Programme for Research & Training in Tropical Disease.

Table 6: Interventions and their corresponding operational research questions in Southern Sudan

Intervention	Operational Research Questions
Mass Drug Administration	What are the knowledge, attitude and practices of community members and health workers related to NTDs? How compliant are eligible populations to integrated MDA?
Disability Management	How can hydrocele surgery be best integrated into health care delivery at the PHCC and hospital level?
LLINs and Vector Control	Which vector(s) is/are responsible for LF transmission? What are the knowledge, attitude and practices of community members and health workers related to LLINs? How effective are LLINs in reducing LF transmission?
Social Mobilization	What methods are most effective in generating an understanding of NTDs and the benefits of annual MDA in the target communities? How has IEC changed behaviour regarding F and E of SAFE?

4.4.2.3 Economic Evaluation

Resources are limited and policymakers will need to decide whether to prioritize scaling-up of integrated NTD control in preference to other health interventions. Accurate financial and economic information is therefore needed to inform such decision. There are no cost estimates for delivering integrated NTD control for the five target diseases in Southern Sudan or in a similarly challenging environment. Furthermore, estimates published in the scientific literature do not account for the full economic costs of integrated NTD control and are thus not comparable to cost estimates for other interventions (e.g. malaria, tuberculosis, immunization).

It is generally expected that integration will reduce the overall cost per person treated and it is on this assumption that USAID is providing support for integrated NTD control to Southern Sudan and a number of other countries. Demonstrating whether integration results in an overall reduction in costs per beneficiary will therefore be important not just for policymakers, but also for donors. Costing will be performed to determine the true cost and cost-effectiveness of the integrated program and identify whether an integrated approach is more efficient than separate vertical programs. This work will be largely overseen by RTI International in collaboration with other organizations and be based on a standardized costing protocol for application in all countries that currently receive USAID funding for NTDs.

5. SUPPORTIVE STRATEGIES

5.1 INFORMATION, EDUCATION AND COMMUNICATION

The MoH GoSS recognises the importance of IEC in ensuring the successful implementation of the National Strategic Plan for Integrated NTD Control. In particular, it is anticipated that high MDA coverage rates can only be achieved and maintained if drug distribution is supported by appropriate IEC activities, using context-specific materials and communication strategies. Furthermore it is anticipated that well-designed and delivered IEC will have a positive impact on the retention of community volunteers, which will be more motivated and inclined to contribute to the community's well-being once they are fully aware of the programmes health benefits. Formative and operational researches will be carried out to assess community perceptions and misconceptions on NTDs. This will reveal key information to be used to develop a communication strategy and allow for messages to be tailored to different ethnic groups and their beliefs.

Key objectives of the communication strategy will be:

- To increase communities' understanding on the target NTDs, their causes, recognition of signs and symptoms, treatment, prevention, and disability management
- To ensure that the majority of individuals in each target community adhere to MDA
- To increase the proportion of people that know how to care for limbs affected by LF and how to prevent and manage acute attacks
- To increase the proportion of households that are aware of the need to use LLINs for prevention of LF and that use a net correctly

A mix of communication channels will be used to deliver key messages on behaviour change. These channels include: i) mass media (principally newspapers, radio and television), ii) IEC materials deployed through health facilities and points where communities congregate, and iii) inter-personal channels such as head of villages, religious leaders, community-based drug distributors, women and youth groups, and schools. The National Integrated NTD Control Programme Technical Committee will regularly review the communication strategy, so as to ensure that communities receive correct information through the most effective channel/method at the appropriate time, and to update messages if necessary.

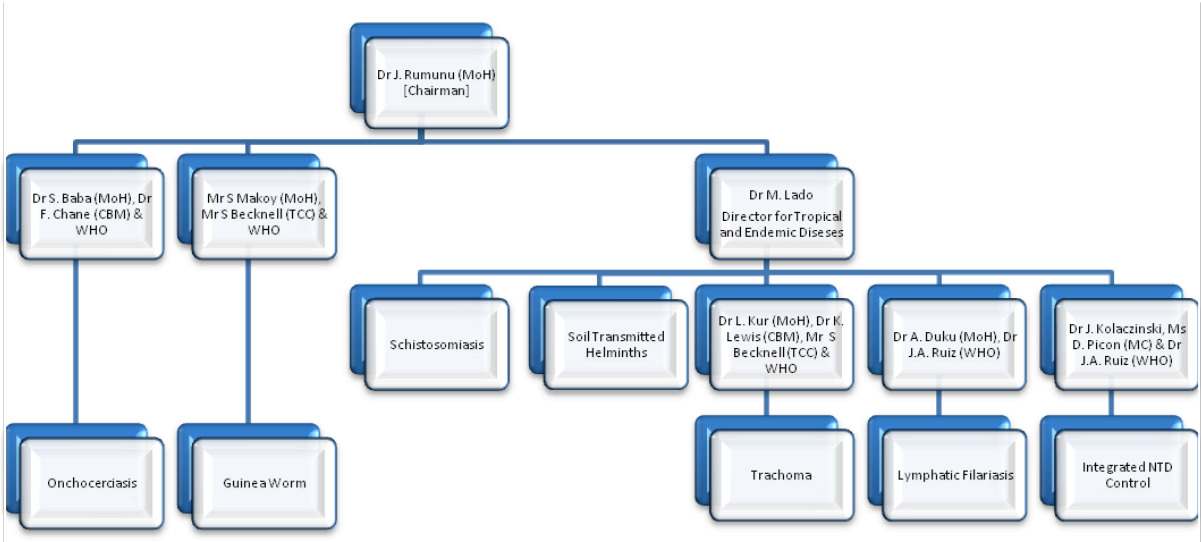
IEC campaigns covering all aspects of NTD control/elimination (from signs and symptoms to the benefits of regular MDA, prevention and palliative care) will be undertaken in all endemic areas. The health education package will focus on all NTDs targeted under the integrated programme, and hence will be modified depending on which diseases are endemic in particular IUs. The same considerations apply for training of individuals responsible for MDA. As described above, initial target area for LF elimination and integrated control will be limited to two states of Southern Sudan. Based on experience gained during the first year of MDA in these areas, IEC materials and approaches for their delivery to affected communities and implementation staff may need to be modified. The integrated NTD control programme aims to establish an evidence-based implementation approach and will ensure that important lessons learned during each round of MDA will be used to improve subsequent delivery, including health education. IEC campaigns will be coordinated through the National Integrated NTD Control Technical Committee and State Coordinating Committees and involve the network of GoSS structures, NGOs and faith-based organizations active in the different IUs. Community health workers and drug distributors that are or have been involved in MDA activities in the past, starting with those involved in the onchocerciasis control program, will be provided with refresher training to highlight the differences in the delivery of an integrated MDA package, particularly with regards to mild and potential SAEs and reporting of such events.

5.2 PARTNERSHIP DEVELOPMENT AND COORDINATION

Scaling-up delivery of integrated NTD control to all endemic counties of Southern Sudan and maintaining high coverage over time is an extremely challenging task. It can only succeed if the number of stakeholders and their contributions continue to grow beyond the current core. Partnership development, including fund raising and coordination of a growing programme, will be one of the key tasks of the National Integrated NTD Control Programme Technical Committee, chaired by the MoH GoSS (figure 1). The Technical Committee has been composed based on existing expertise and contributions towards NTD control. Its composition will be regularly reviewed to ensure that partnership developments are reflected, without compromising the efficiency of this mechanism for decision-making and coordination.

The National Technical Committee will use its existing links with partners in the health- and other sectors to raise awareness of NTDs and integrated activities to control them. Annual advocacy meetings will be one of the activities used to update existing and potential new stakeholders on programme activities, achievements and plans. It is anticipated that raised awareness and visible outputs will stimulate new partnerships, from both within and outside the health sector.

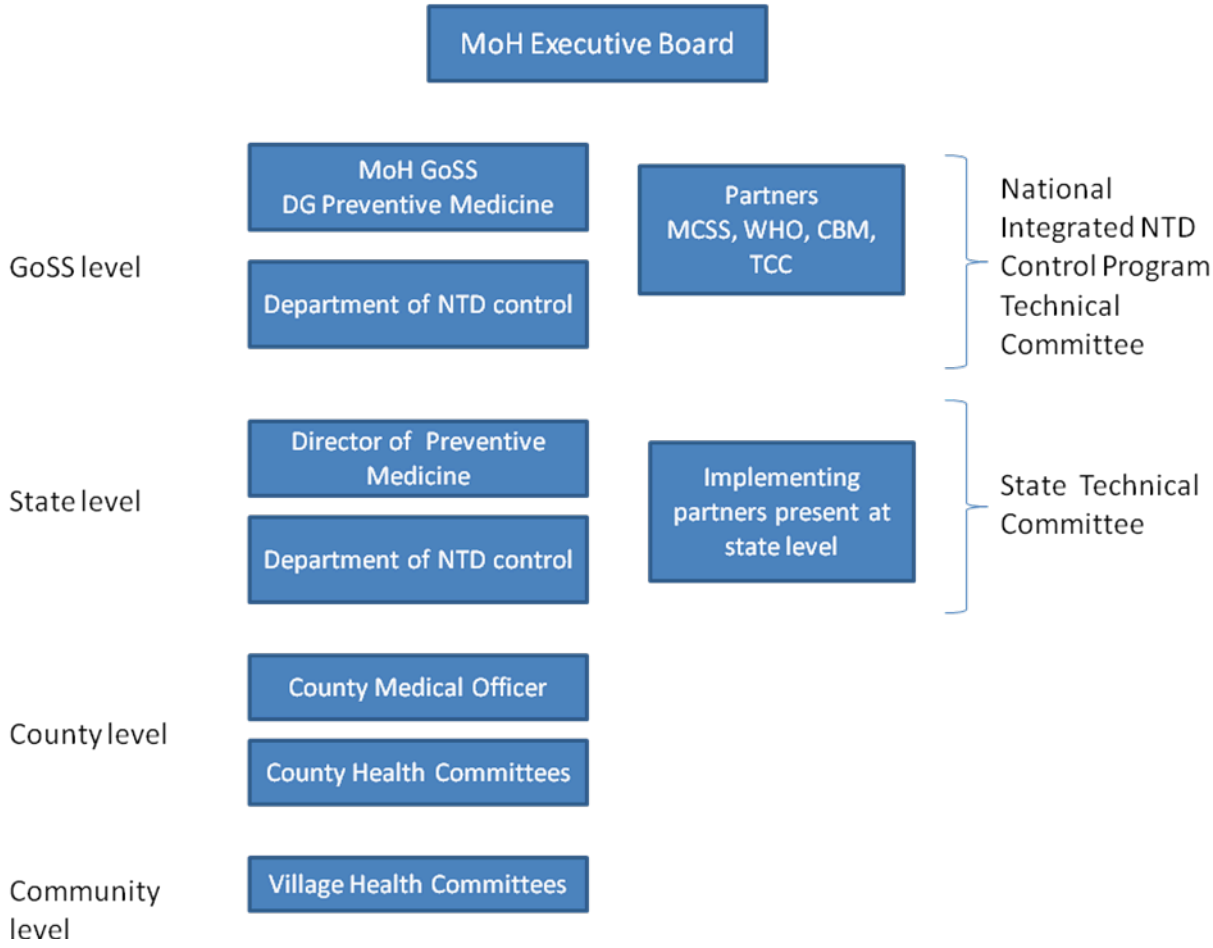
Figure 1. Organogram, National Integrated NTD Control Program Technical Committee



CBM = Christoffel Blindenmission
TCC = The Carter Center
MC = Malaria Consortium

At the state level and below, coordination and partnership building will be overseen by State Technical or Coordination Committees (figure 2), in close collaboration with the National Technical Committee. Partnership building and coordination at this level will be mostly concerned with the implementation of integrated NTD control rather than raising funds to do so, which mainly happens in Juba. Mobilization of other resources will, however, be a key component of the State Technical Committees' responsibilities. Support from central to state level and beyond will be provided, particularly when integrated NTD control is newly established in a state. Terms of Reference for committees at each level will help to clarify roles and responsibilities.

Figure 2. Coordination of integrated NTD control from central to peripheral level



5.3 STRENGTHENING HUMAN RESOURCES FOR HEALTH

The aim of Human Resources (HR) for Health is to develop, manage and sustain an appropriate multi-disciplinary health work force that is well-trained, motivated and equitably distributed. This role is under the responsibility of the Directorate of Human Resource and Development of the MoH GoSS. The National Integrated NTD Control Programme Technical Committee will liaise with the Directorate for Human Resources to determine the HR needs associated with the delivery of integrated NTD control packages.

As discussed in previous sections, intervention package and associated IEC will vary between counties. In some, only one disease may need to be addressed, whereas in others interventions may need to be as complex as having to cover five. In turn, this will determine HR needs, such as the number of staff required for delivery, the content of training materials and the time required for training. During the first year of MDA, teams of trainers will be established in each of the target states. The initial training of trainers will be conducted by Malaria Consortium in collaboration with the MoH GoSS and other key stakeholders. Pre- and post-training tests will be carried out to evaluate whether trainers have acquired the necessary knowledge. Only those with sufficiently high scores will be used for further training. Trainers will be deployed to train health educators and drug distributors at the IU level.

In the start-up states, SSOTF trainers and drug distributors will be utilized for the integrated MDA. As activities are scaled up in areas where SSOTF is not present or has a reduced workforce, the Guinea worm eradication workers and staff of other distribution programs will be provided with the necessary training. Other alternatives for trainers will be assessed on a state by state basis by the State Technical Committee. Trainees will include local health workers and other volunteers who may or may not be experienced in CDTI, such as volunteers working on NIDs or the distribution of food and non-food items for returnees. Prior to the first round of MDA all drug distributors and other staff, such as supervisors, will be given a pre-test, to establish their level of knowledge of NTDs, before being provided with a full training course on MDA for the diseases endemic in their IU. Training materials will be based on the WHO manual 'Preventive Chemotherapy in Human Helminthiasis' (WHO, 2006a). During subsequent rounds, attrition of previously trained drug distributors will be assessed. Previously trained individuals will be grouped together for refresher training, whereas newly recruited drug distributors will be provided with the full training course. Materials and methods for the trainings will be updated based on implementation experience and/or if WHO guidelines for MDA have been revised in the interim. When WHO guidelines for monitoring and evaluation become available in late 2008, training manuals will be updated to include the relevant information.

6. IMPLEMENTATION ARRANGEMENTS

6.1 MANAGEMENT AND COORDINATION

To manage the implementation of the integrated NTD control programme, annual implementation plans will be developed. The coordination of NTD related activities and their integration into the overall health activities will largely be the responsibility of the MoH Directorate of Preventive Medicine. At national level there will be one mechanism of coordination, the National Integrated NTD Control Programme Technical Committee (section 4.2). The Committee will meet at least once a quarter and be comprised of key staff of the MoH and its implementing partners. This forum will discuss issues regarding policy and implementation guidelines of all aspects of integrated NTD control, review emerging new evidence, develop annual work plans and make recommendations to the MoH. At state level, NTD control will be managed by State Technical Committees, which will coordinate with the county health departments and village health committees. This will ensure maximum integration into the overall health coordination at each administrative level. At community level, the Village Health Committee will be used to relay NTD activities to the community and to any other community health related groups, which in turn communicate with households

Table 7: Implementation arrangements at different levels of the health system

Level	Functions
National/Central	• Formulation of policies and development of guidelines • Partnership development • Resource mobilisation • M&E • Training of trainers • Developing IEC materials • Support and supervision, including State Technical Committees and laboratories services • Ensuring tax exemptions for delivery of drugs • Defining operational research need and organizing its implementation • Surveillance • Reporting to MoH Executive Board and donors
State and County	• Disseminating guidelines • Providing training and support/supervision (incl. M&E) to counties, communities and health facilities • Training health workers and volunteers • Supporting community mobilisation and sensitization of local leaders • Conducting surveillance/reporting • Maintaining and distributing drug supply. Reporting losses and current stock to central/national level • Providing health services, including disability management in the form of TT and hydrocele surgeries and check-ups to people affected by NTDs • Reporting to central/national level
Community	• Choose community health workers or village volunteers to be trained in drug distribution and monitoring of adverse events • Provide community volunteers a place to work, sleep and eat if necessary • Provide home-based management and care of disabilities related to target NTDs • Reporting to county/state level

6.2 STAKEHOLDERS AND THEIR ROLES AND RESPONSIBILITIES

The following sections give an overview over the key roles and responsibilities of the various stakeholders in the context of this strategic plan.

6.2.1 Government

The major role of government is to provide an enabling environment for all stakeholders. Within the government the MoH and the National Integrated NTD Control Programme Technical Committee will play the key role in implementing NTD control/elimination with the following responsibilities:

- Provision of leadership
- Supervision and coordination
- Development of policies and guidelines
- Provision of health services
- Mobilization of resources
- Monitoring & Evaluation
- Identifying research needs
- Provision of commodities and supplies
- Quality control and assurance
- Human Resource Development

Since there are many crosscutting issues, other ministries and departments of government will also need to be involved:

Ministry of Education:
- Include NTD education in the school curriculum
- Provision of school health (de-worming, LLINs)
- Include special education curriculum for the blind

Ministry of Irrigation and Water Resources:
- Ensuring access to water and appropriate management of water systems

Ministries of Roads and Ministry of Housing:
- Sanitary engineering
- Improving access to health facilities

Ministry of Information
- Dissemination of NTD related information

6.2.2 Civil Society

Civil society organizations comprise international and national NGOs, community and faith-based organizations. They provide curative and preventive health services through hospitals and health facilities or work directly with communities. Their responsibility is to:
- Follow government guidance
- Provide advocacy and community mobilization
- Sensitize communities
- Provide health services

6.2.3 Private Sector

The private sector can be divided into two groups; the first comprising the for-profit health care providers and the second the manufacturers and distributors of health related products. Their responsibilities are to:
- Supply appropriate, affordable and high quality health products and services
- Follow government guidance
- Contribute to positive behaviour change by advertising

6.3.4 International Partners

Multi-lateral UN-organizations such as WHO and UNICEF, and international finance institutions (e.g. World Bank, GFATM) together with organizations of bi-lateral cooperation (e.g. USAID, DfID) form the group of development partners. Their responsibility is to:

- Provide funding
- Provide technical assistance
- Support capacity building

6.3.5 Communities

Communities, their leaders (political and religious) and their community health workers are a crucial partner in the implementation of this strategic plan. Their responsibility is to:

- Advocate and mobilize
- Actively participate in and contribute to NTD control/elimination activities
- Adhere to MDA guidelines

6.3.6 Academia

Currently, academia in Southern Sudan is weak but collaborations with international research institutes do exist and it is expected that national capacity to undertake operational research will be built-up through these collaborations. The responsibility of academia is to:

- Undertake research approved by the MoH
- Built research capacity
- Analyze, interpret and disseminate research results jointly with Southern Sudanese collaborators
- Provide training on research related methods

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ANNEX 1: LOGICAL FRAMEWORK

Integrated Control of Neglected Tropical Diseases (NTDs) Program in Southern Sudan, 2008-2011

Goal: To reduce NTD-related morbidity in Southern Sudan and minimize the socio-economic impact of lymphatic filariasis(LF), onchocerciasis, schistosomiasis, soil-transmitted helminths (STH), and trachoma

Indicators:

1. Coverage of mass drug administration for target diseases per implementation unit.
2. Reduction of microfilariae loads for LF observed by surveillance of sentinel sites and spot check sites
3. Reduction of intensity of infection for schistosomiasis and STH
4. Observed reduction of TF and TT for trachoma
5. Observed reduction in skin nodules for onchocerciasis

Objectives:

1. To develop a comprehensive map of the geographical distributions of the NTDs targeted through an integrated control approach
2. To increase the geographical coverage of the eligible population with preventive chemotherapy (PCT) to 50% by combining PCT under one structure
3. To ensure integrated NTD control results in health sector strengthening by providing the necessary support to existing and new NTD delivery structures at all levels
4. To ensure evidence-based integrated NTD control, through monitoring and evaluation, as well as operational research.

Objective 1: To develop a comprehensive map of the geographical distributions of the NTDs targeted through an integrated control approach			
Indicators	**Means of verification**	**Outputs**	**Assumptions**
1. Number of counties mapped for each disease 2. Proportion of counties mapped out of the total number of counties that will need to be surveyed	1. Survey results for counties mapped	1. Protocol for integrated mapping of NTDs completed by June 2008 2. Mapping 50% of counties in Southern Sudan by December 2009 3. Mapping of 100% of counties by September 2011 4. Comprehensive map showing overlapping distribution of NTDs developed by December 2011	1. Survey areas are accessible and enjoy a calm security situation 2. National surveyors are apt and capable of conducting study and writing reports after being trained by WHO and counterparts from Uganda 3. Ethical clearance for surveys approved by the Ministry of Health 4. Procurement of mapping commodities is timely

Objective 2: To increase the geographical coverage of the eligible population with preventive chemotherapy (PCT) to 50% by combining PCT under one structure			
Indicators	**Means of verification**	**Outputs**	**Assumptions**
1. Number of individuals reported to have ingested NTD treatment within the reporting year (by drug package, disease, and county) 2. Percent of at-risk and eligible population observed to have ingested treatment within the reporting year (by drug package, disease, and county) 3. Percent change in therapeutic drug coverage rate after each round of mass drug administration 4. Percent change in geographical coverage rate with an integrated versus vertical approach after each round of mass drug administration 5. Percent of at risk and targeted IUs treated within the reporting year (by drug package and disease) 6. Percent increase of people reached with surgery, antibiotics, face washing, and environmental change of SAFE strategy 7. Proportion of counties that required establishment of new delivery structures	1. Reports from community drug distributors 2. MDA coverage surveys 3. Reports from state and county NTD coordination committees on drug distributions and their delivery mechanisms	1. Integrated MDA packages formulated and delivered to all eligible counties in at least two states by March 2009 2. Delivery of integrated MDA continued in counties targeted during first round and expanded to eligible counties in at least three additional states by March 2010 3. First round of integrated MDA delivered to all areas endemic for both onchocerciasis and LF by September 2011 4. TT surgeries increased 100% by September 2010 5. 80% of children 1-9 years in target areas have clean faces by September 2011 6. 60% of households in target areas to use latrines or improved sanitary practices by September 2011	1. NTD coordination committees at state and county level established and functioning 2. CDTI and other networks available for integration of MDA 3. Sensitization and mobilization of community leaders and members before MDA starts. 4. Managers of vertical programs sensitized about the opportunities of integration

Objective 3: To ensure integrated NTD control results in health sector strengthening by providing the necessary support to existing and new NTD delivery structures at all levels.			
Indicators	**Means of verification**	**Outputs**	**Assumptions**
1. Percent change in therapeutic drug coverage with an integrated versus vertical approach after each round of MDA (by drug package, county and integration model) 2. Number of personnel (CHWs and volunteers) trained on the integrated MDA curriculum; and on survey methodology 3. Attrition rate of community health 'volunteers' or workers prior to and during each round of MDA 4. Timely and safe delivery of drugs to the IUs 5. Percentage of drug loss per year 6. States with successful partnerships in the delivering of F and E of the SAFE strategy	1. Drug distribution records 2. Post-MDA evaluation tool 3. Training reports 4. Staff registry 5. Drug delivery records, supply reports from storekeepers 6. Number of partnerships for F and E of SAFE per state with regular meetings or coordination mechanisms	1. Integrated training curricula and guidelines developed to address different intervention scenarios (determined by the overlapping distribution of target NTDs) by September 2008 2. Integrated support/ supervision guidelines and methods developed by September 2008 3. First round of training existing and new community health workers and, potentially, campaign staff conducted in target counties using integrated training curricula and guidelines by December 2008. 4. Annual training sessions conducted prior to each MDA round to refresh knowledge and to train new staff to compensate for attrition and geographical expansion. 5. Two advocacy and consultation meetings conducted with partners and stakeholders at state level every year regarding MDA	1. Supply chain in place before drugs arrive into the country 2. Ministry of Health to ensure customs-free delivery of drugs 3. Applications for drug donation programs and procurement of Praziquantel to be submitted timely 4. Personnel chosen for training is apt and able to comprehend training materials

Objective 4: To ensure evidence-based integrated NTD control through monitoring and evaluation, as well as operational research			
Indicators	**Means of verification**	**Outputs**	**Assumptions**
1. Percentage of implementing units submitting complete MDA record on time 2. Number of post-MDA evaluations conducted by county by 2011 3. Proportion of identified research questions addressed by 2011	1. MDA records from the field 2. Post-MDA evaluation records 3. Cost analysis of integrated NTD program and vertical programs 4. Publications and reports answering research questions	1. MDA data collected, collated, analyzed, summarized and disseminated to stakeholders within three months after each MDA round 2. MDA coverage, as reported through routine data collection, validated by post-MDA surveys every two years 3. Cost of integrated MDA compared to vertical interventions established by the end of 2010 4. Effectiveness of different MDA delivery models evaluated by mid-2010 (or after second MDA round) 5. LF sentinel sites established in every endemic state before MDA implementation 6. Surveys for surveillance of LF, onchocerciasis, schistosomiasis, STH, and trachoma implemented as scheduled.	1. Monitoring and evaluation tools for NTDs published by WHO (2008) 2. MDA reports submitted and analyzed timely 3. Post-MDA surveys take place in a timely manner, results are collected and analyzed 4. Cost estimates are available for vertical and integrated intervention

ANNEX 2: WORKPLAN

Strategic Plan Activities	2008				2009				2010				2011			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1. Mapping																
1.1 Background review and situation analysis																
1.2 Determining sample size to study each of the diseases																
1.3 Submission of a study protocol for ethical clearance by the MoH GoSS; approval																
1.4 Dialogue with State and County level authorities for mobilization and support of surveys																
1.5 Procurement and distribution of commodities																
1.6 Training of trainers (Uganda VCD, WHO, MoH)																
1.7 Training of surveyors (State and Central level)																
1.8 Selecting communities to be surveyed																
1.9 Survey implementation																
1.10 Survey analysis and reporting																
1.11 Development of a co-endemicity map for all Southern Sudan																
2. Mass Drug Administration																
2.1 Development of training curriculum and supervision system																
2.2 Drug applications and procurement																
2.3 Training of trainers and community health workers																
2.4 Sensitization of community leaders																

Strategic Plan Activities	2008				2009				2010				2011			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
2.5 Selection and training of community drug distributors																
2.6 Development and reproduction of IEC materials for endemic diseases in the IU																
2.7 Village census by drug distributors (volunteers)																
2.8 Delivery and distribution of drugs																
2.9 Drug distribution implementation																
2.10 Collection of reports and data analysis																
3. Integrated Interventions																
3.1 Development and reproduction of IEC materials for face washing and environmental improvement																
3.2 Training of trachoma surgeons																
3.3 Development of guidelines for hydrocele surgeons																
3.4 Procurement and distribution of essential equipment for trachoma surgeries																
3.5 Training of CHWs on disability management																
3.6 Vector studies per state where LF is present																
3.7 Training of hydrocele surgeons																
3.8 Trachoma surgery camps																
3.9 Procurement and distribution of essential equipment to health facilities for hydrocele surgeons																
3.10 Sensitization of communities in improved hygiene practices																

Strategic Plan Activities	2008				2009				2010				2011			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
4. Surveillance, Monitoring and Evaluation																
4.1 Procurement of commodities for surveillance																
4.2 Selection of sentinel sites for LF																
4.3 Training of surveillance staff for each site (LF)																
4.4 LF surveillance																
4.5 Onchocerciasis surveillance																
4.6 Post-MDA coverage surveys																
4.7 Costing evaluation																
4.8 Selection of spot check sites for LF																
4.9 Schistosomiasis and STH surveillance																
4.10 Trachoma surveillance																
5. In-Country Coordination																
5.1 Establishment of a National Technical Committee																
5.2 National Technical Committee Meetings																
5.3 Establishment of State-level Coordination Committees																
5.4 State Coordination meetings																
5.5 Advocacy Meetings																

ANNEX 3: STAKEHOLDERS

Integrated activities

In order to succeed in the integrated control of NTDs, other sectors and interventions must be convened in partnership. Water, sanitation, and other environmental activities are key components of the trachoma SAFE strategy (surgery, antibiotics, face washing, environmental upgrade) for the control of this disease, for example. In addition, activities such as NIDs and long-lasting insecticide-treated net distribution can be combined with the annual MDA for NTDs. Partners and MoH sectors participating in these activities should join the efforts of NTD control and combine interventions for the efficient use of human and financial resources. The education and information/communications sectors should also be involved, as they will be key partners in the dissemination of campaign and mobilization materials for mapping and MDA.

Partners and stakeholders

A diverse group of NGOs works in each state on the different sectors to partner with NTD integrated control. Table A shows the operational international, indigenous, and community-based organizations and the areas (both geographic and by sector) in which they work.

Table A. International and indigenous organizations working in Southern Sudan by geographic location and sector

State	Health care delivery	Water, sanitation, & hygiene	Distribution of food/non-food items	Education and vocational training
CE	AAH, ADRA, ACORD, AMREF, ARC, DED, GLRA, HAI, ICRC, IFRC, HIV/AIDS Alliance, IR, IMC, Malteser, PSI, SFM, SP, War Child, ZOA	ADRA, ACORD, AMREF, ARC, CRS, IAS, IFRC, IR, IRWW, OXFAM, RDA	CRS, GTZ	ADRA, AET, ACROSS, CRS, GTZ, IAS, ICRC, IFRC, IR, IRWW, JRS, NPA, OXFAM, SFM, Windle Trust
	AORDA, ASTAD, HASS, KDI, Labena Organization, Mubadiroon, NAD, Sudan Aid, SCC, SMC, SSWC, SUHA, USTRATUNA	ASTAD, HASS, KDI, SCC, SSDO, SUHA	Mubadiroon	AORDA, ASTAD, ELPWCE, HASS, Labena Organization, Mubadiroon, Sudan Aid, SCC, SHS, SSI
	UNAIDS, UNHCR, UNICEF, WHO	UNHCR, UNICEF	UNHCR, UNJLC, UNOCHA	UNHCR, UNICEF
EE	ACF, ADRA, AIC, AVSI, CRS, HAI, Merlin, NCA, NPA	ACF, ADRA, ARC, AVSI, CRS, HAI, NCA, PACT, SNV Netherlands	AVSI, CARE, CRS, JRS, NCA	AET, AIC, AVSI, CRS, JRS, NCA, SNV Netherlands
	DOT, IRAD, NSCC, Operation Nehemiah, SCC, SMC	HASS, LRDA, Operation Nehemiah	LRDA, TDA	CWAPS, FSOF, HASS, IRAD, LRDA, M-SIP, MANNA SUDAN, SCC, TDA
	UNHCR, UNICEF, WHO	UNHCR, UNICEF	UNOCHA	UNHCR, UNICEF
Jonglei	ACROSS, TCC, CARE, CMA, COSV, IMC, MEDAIR, Merlin, MSF-B, MSF-H, Tearfund, WR	C&D, CRS, IAS, INTERSOS, MEDAIR, MEDIC, OXFAM, PACT, SC-UK	CARE, SC-UK, WVI	ACROSS, AET, CRS, INTERSOS, MSF-H, NRC, SC-UK, SC-S, WR
	CEAS, DEFROSS, GARDO, LCDO, NHDF, NSCC, PRDA, PCOS, schRiP-world wide, SMC, SUHA	CEAS, GARDO, LCDO, NHDF, ARRAD, NCDS, PARAD, SALT, SRRC, SUHA, SWIDAP, SYCP		CCRI, Dawa, DEFROSS, GARDO, LCDO, LUADA, MDT, NHDF, schiRiP-world wide, UNNWA, WODRANS
	UNICEF, WHO	UNICEF	UNOCHA	UNICEF, WFP

State	Health care delivery	Water, sanitation, & hygiene	Distribution of food/non-food items	Education and vocational training
Lakes	ARC, Baptist mission, CCM, DEA, DWA, HIV/AIDS Alliance, ICRC, IRC, Malteser, MCDI, OXFAM, PSI, SC-S	ACROSS, ARC, Concern, IRC, MEDIC, OXFAM, PACT, RDF, SC-S	SC-S	AET, ACROSS, NRC, SC-S
	DOR, SRRC, VMI	CEAS, DOR, SRRC,	SRRC	ANV, BYDA, CEAS, DOR
	UNFPA, UNICEF, WHO	UNICEF	UNOCHA	UNICEF
NBeG	AMURT International, Concern, Cordaid, ICRC, IRC, MSF-F, Medair, NCA, VSF-CH, Tearfund	ACF-USA, AMURT International, AMURT-S, Concern, Cordaid, IAS, ICRC, INTERMON OXFAM, IRC, Medic, MSF-B, OXFAM, PACT, SC-UK, WVI	CSI, Concern, Cordaid, INTERMON OXFAM, MEDAIR, SC-UK, Sign of hope, Tearfund, WVI	AET, AMURT, International, AMURT-S, IAS, IRC, NRC, SC-S, SC-UK, SCLS
	AORDA, ACWO, AWDA, AWARD, DOR, HARD, WAARD	ACAD, AWARD, BYDA, SRRC	HARD	ACWO, AORDA, AWARD, DOR, HARD, WAARD
	UNICEF, WHO	UNICEF	UNOCHA	UNICEF
Unity	CARE, COSV, IRC, Medair, MSF-F, MSF-H, MC, WR	AMA, MEDIC, OXFAM, PACT, SCA	SC-UK, WVI	AET, AMA,
	LHDS, SSOM, SCA	SRRC		LDHS, SSDPA, SSOM, SCA, UNNWA
	UNICEF, WHO	UNICEF	UNOCHA	UNICEF
Upper Nile	ADRA, CARE, Goal, IRC, Medair, Merlin, MDM, MSF-H, NIP, OXFAM, TCC, Tearfund, WVI	ADRA, CARE, Goal, IR, IRWW, Medair, Medic, Oxfam, Pact, Solidarites, WVI	ACF, ADRA, CARE, Goal, Medair, RI, WVI	ACHA, AET, IR, IRWW, NPA, War Child, Windle Trust, WVI,
	GARDO, GRADS, NSCC, SARDO, SDA	GARDO, GARDOS, SAFORD		Dawa, GARDO, GESO, GRADS, LRDO, NCDA, NIP, SARDO, SCC, SDA, SIDO, YARRDSS
	UNICEF, WFP, WHO			UNICEF, WFP

State	Health care delivery	Water, sanitation, & hygiene	Distribution of food/non-food items	Education and vocational training
Warrab	ACROSS, ADRA, CCM, GOAL, IR, MSF-CH, NCA, TCC, WR, WVI	IR, GOAL, PACT, SC-UK, Sign of hope, TCC, WVI	CARE, SC-UK	CRS, IR, MC, NCA, SC-UK, WC, WVI
	CDAS, GRDF, KODRA, RPDP, SORD	GRDF		CDAS, GRDF,KODRA, SORD
	UNICEF, WHO	UNICEF	UNOCHA	UNICEF
WBeG	DRC, GRC, IRC, MDM CANADA, MSF-B	INTERMON OXFAM, DRC, IR, MEDIC, SC-UK	INTERMON OXFAM, SC-UK	IR, SC-UK, Windle Trust
	HARD, SRCS, WAARD, WORD	HARD,SRCS, WORD		HARD, WAARD, WORD
	WHO		UNOCHA	UNICEF
WE	AAH, ACF-USA, AMREF, ARC, Comboni sisters, HIV/AIDS Alliance, IMC, MSF-F, MSFCH, MSF-SP, Oxfam, PSI, SP, WVI	AMREF, ARC, IAS, OCKENDEN INTERNATIONAL, OXFAM, PACT, WVI	CRS, GTZ	ADRA, AET, CRS, CARE, GTZ, IAS, WVI
	DOTY, ECS, MCRDA, MRDA, NSCC, SARDO, SRRC, WECRADA	SSCA, SRRC		MCRDA, MRDA, SARDO, SSCA, SSI, WECRADA
	UNICEF, UNHCR, WHO	UNHCR, UNICEF	UNHCR, UNICEF	UNHCR, UNICEF

CE=Central Equatoria; EE=Eastern Equatoria; NBeG=Northern Bahr-el-Ghazal; WBeG=Western Bahr-el-Ghazal; WE=Western Equatoria.

International Organizations: AAH=Aktion AFrika Hilfe; ACF=Action Contra la Faim; ACHA=Africa Centre for Human Advocacy; ACORD=Agency for Cooperation and Research in Development; ACROSS=Association of Christian Resource Organisations Serving Sudan; ADRA=Adventist Development and Relief Agency; AET=Africa Educational Trust; AIC=African Inland Church; AMA=Assistance Mission for Africa; AMREF=African Medical Research Foundation; AMURT-S=Ananda Marga Universal Relief Team - Switzerland; ARC= American Refugee Committee; AVSI=Association of Volunteers in International Service; C&D=Church and Development; CARE=Cooperation for Assistance and Relief Everywhere; CCM=Comitato Collaborazione Medica; CMA=Christian Mission Aid; COSV=Coordination Committee for Voluntary Service; CRS= Catholic Relief Services; CSI=Christian Solidarity International; DEA=Diakonie Emergency Aid; DED=German Development Service; DRC=Danish Red Cross Society; DWA=Doctors with Africa-CUAMM; GLRA=German Leprosy Relief Association; GRC=Germany Red Cross; GTZ=German Organisation for Technical Cooperation; HAI=Help Age International; HIV/AIDS

Alliance=International HIV/AIDS Alliance; IAS=International Aid Services; ICRC=International Committee of the Red Cross; IMC=International Medical Corps; IR=Islamic Relief; IRC=International Rescue Committee; IRWW=Islamic relief world wide; JRS=Jesuit Relief Services; MC=Mercy Corps; MCDI=Medical Care Development International; MDM=Medicins du Monde; MSF=Medicins sans Frontieres (SP=Spain, B=Belgium; CH=Switzerland; F=France, H=Holland); MEDIC=Medical Emergency Development International Committee; MERLIN=Medical Emergency Relief International; MSF=Medicins sans Frontieres; NCA=Norwegian Church Aid; NPA=Norwegian Peoples' Aid; NRC=Norwegian Refugee Council; PACT=Partnership Agencies Collaborating Together; PRDA=Presbyterian Relief and Development Agency; PSI=Population Services International; RDA=Royal Dutch Aid; RDF=Resource Development Foundation; RI=Reconcile International; SC=Save the Children (S=Sweden, UK=United Kingdom); SCLS=Save the Children Lives Sudan; SFM=Swedish Free Mission; SNV=Netherlands Development Organisation; SP=Samaritan's Purse; TCC=The Carter Center; VSF=Veterinaires sans Frontieres; WC= World Concern; WR=World Relief; WVI=World Vision International; ZOA=ZOA Refugee Care.

Indigenous Organizations and Community-Based organizations: ACAD=Abyei Community Action for Development; ACWO=Aweil Community Women Organisation; ANV=Association of Napata Volunteers; AORDA=African Organization for Relief and Development; ASTAD=Agency for Social Transformation and Development; AWARD=Aweil West Relief and Development; AWDA=Aweil West Development Association; BYDA=Bahr el Ghazal Youth Development Agency; CCRI=Cush Community Relief International; CDAS=Christian Development Agency South Sudan; CEAS=Church Ecumenical Action in Sudan; CWAPS=Concern Women Action Peace Sudan; DEFROSS=Development Frontiers for Southern Sudan; DOR=Diocese of Rumbek; DOT=Diocese of Torit; DOTY=Diocese of Tambura and Yambio; ECS=Episcopal Church of Sudan; ELPWCE=Equatoria Literacy Program for Women and Children; FSOF=Fr. Saturnino Ohure Foundation; GARDO=Gajaak Relief and Development Organization; GARDOS=Global Relief and Development Organisation for Sudan; GESO=Gender Empowerment for Sudan; GRADS=Global Relief and Development Services; GRDF=Gogrial Relief and Rehabilitation Development Foundation; HARD=Hope Agency for Relief and Development; HASS=Humanitarian Assistance for South Sudan; IRAD=Imotong Ranges Association for Development; JARRAD=Jonglei Association for Relief, Rehabilitation and Development; KDI=Korobe Development Initiative; KODRA=Kuei Operational Development and Relief Assistance; LCDO=Llolia Community Development Organization; LHDS=Liech Holistic Development Service; LRDA=Losolia Rehabilitation and Development Association; LUADA=Luladit Development Agency; MCRDA=Masumbu Christian Relief and Development Association; MDT=Mak-Deel for Development; MRDA=Mundri Rehabilitation and Development Association; M-SIP=Mazzoldi-Sudan Initiative Program; NAD=Nile Assistance of the Disabled; NCDA=Nasir Community Development Agency; NCDS=Naath Community Development Services; NHDF=Nile Hope Development Forum; NIP=Nile Inter-development Programme; NSCC=New Sudan Council of Churches; PARAD=Penkou Agency for Relief and Development; PCOS=Presbyterian Church of Sudan; RPDP=Rehabilitation Program for Disabled Persons South Sudan; SAFORD=Sunrise agency for Development; SALT=Serving and Learning Together; SARDO=Sudan Aid for Relief and Development Organization; SCA=Sudan Christian Organization; SCC=Sudan Council of Churches; schRiP-World Wide=Sudan Child Rights and Protection World Wide; SDA=Sudan Development Agency; SDA=Sobat Development Agency; SHS=Sudan Humanitarian Services; SIDO=Sub-Saharan International Development Organization; SMC=Sudan Medical Care; SORD=Sudan Organization for Rehabilitation and Development; SRCS=Sudan Red Crescent Society; SRRC=Sudan Relief and Rehabilitation Commission; SSCA=South Sudan Community Association; SSDO=South Sudanese Development Organisation; SSDPA=South Sudan Disabled Persons Association; SSI=Sudan Service International; SSOM=South Sudan Operation Mercy; SSWC=South Sudan Women Concern; SUHA=Sudan Health Association; SWIDAP=Sudan Women in Development and Peace; SYCP=Sudanese Youth Consolidation Program; TDA=Toposa Development Association; UNNWA=Upper Nile Women Welfare Association; USTRATUNA=Sudanese Association for Disabled Children; VMI=Voice of Martyrs Incorporated; WAARD=Wagen Agency for Rehabilitation and Development; WECRADA=Western Equatoria Christian Rehabilitation and Development Organization; WOODRANS=Widows Orphans Disabled Rehabilitation and Development Organization; WORD=Wau Organization for Relief and Development; YARRDSS=Youth Agency for Relief, Rehabiliation and Development for South Sudan

UN Agencies: UNAIDS=United Nations Joint Programme on HIV/AIDS; UNFPA=United Nations Population Fund; UNHCR=High Commission for Refugees; UNICEF=United Nations Children's Fund; UNJLC=United Nations Joint Logistics Centre; UNOCHA=Office for the Coordination of Humanitarian Affairs; WFP=World Food Programme; WHO=World Health Organization

Source: Southern Sudan 3W - Who is Doing What Where Database. UNOCHA Information Management Unit, South Sudan. June 2007