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## Evaluation of the nutritional situation in South Sudan in 2008

ACF- USA Surveillance team, South Sudan

## Acknowledgements

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## LIST OF ACRONYMS

ANLA	Annual Needs' and Livelihood Assessment
ACF-South Sudan	Member of ACF International Network-ACFIN
BEG	Bahr El Ghazal
CPA	Comprehensive Peace Agreement
CTC	Community Based Therapeutic Care
EBF	Exclusive Breast Feeding
ECHO	European Commission Humanitarian Aid Office
ENA	Emergency Nutrition Assessment
EPI	Expanded Programme of Immunisation
FEWSNET	Famine Early Warning System Network
GAM	Global Acute Malnutrition
GFD	Generalised Food Distribution
IDP	Internally Displaced Person
INGO	International Non-Governmental Organisation
JAM	Joint Assessment Mission
MOH	Ministry of Health
MUAC	Mid-Upper Arm Circumference
NBEG	Northern Bahr El Ghazal
NGO	Non-Governmental Organisation
NNGO	National Non-Governmental Organisation
RTI	Respiratory Tract Infection
SAM	Severe Acute Malnutrition
SMART	Standardized Monitoring and Assessment of Relief and Transitions
SMOH	State Ministry of Health
SPSS	Statistical Package for Social Sciences
SSCCSE	South Sudan Centre for Census, Statistics and Evaluation
SSRRC	South Sudan Relief and Rehabilitation Commission
UN	United Nations
UNHCR	United Nations High Commission for refugees
UNICEF	United Nations International Children's Emergency Fund
UNMIS	United Nations Mission in Sudan
USAID	United States Agency for International Development
WFH	Weight for Height
WFP	World Food Programme
WHO	World Health Organization



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## 1. INTRODUCTION

ACF-USA is part of the ACF-IN network which aims at fighting and preventing acute malnutrition wherever it appears. ACFIN is expert in the prevention, the monitoring and the treatment of acute malnutrition, but has also developed expertise in the domains of Water, Sanitation & Hygiene, as well as in Food Security & Livelihoods. ACFIN also works in the domain of advocacy to make sure that concerns are shared on the care provided to the most vulnerable.

As the monitoring of the nutritional situation is necessary for an adequate targeted design of relief and preventive interventions, ACF has developed integrated surveillance programs in several countries. The surveillance program in South Sudan focuses on the following:

- anthropometric and retrospective mortality surveys: Cross sectional surveys estimating the rates of global and severe acute malnutrition, the rates of mortality and the situation towards the root causes of acute malnutrition in all the most vulnerable areas;
- Sentinel site surveillance: Introduced in the September 2007 for the purpose of being an early warning system as well as, by providing trends of the rates of acute malnutrition and of its root causes, for the improvement of the analysis of the humanitarian situation on the ground.
- Rapid nutrition assessments: Targeting locations experiencing humanitarian crises with an objective of providing quick estimates of the nutritional situation of the population;
- Training and capacity building: Aiming at promoting standardized methodologies and increasing the technical capacity of other agencies and MoH personnel to implement nutritional surveys and sentinel sites surveillance; Advocacy: aiming at creating awareness on the situation of the most vulnerable people or the most neglected ones, in order to influence the stakeholders in their decision making.

The surveillance program is operational in all the states of Southern Sudan. Its team is mobile and able to conduct any activity in any area, depending on the needs and the feasibility of the deployment.

The main objective of this report is to evaluate the nutritional situation in South Sudan in 2008 and to evaluate the activities implemented by ACF in the domain of surveillance.

The report is divided in the following three main sections:

- Context, surveillance methodology and ACF surveillance activities;
- Capacity development for MoH and local communities;
- Analysis of the nutritional situation in southern Sudan in 2008.



## 2. CONTEXT, METHODOLOGY AND ACF SURVEILLANCE ACTIVITIES

### 2.1. Context

Sudan is a diverse developing country in North Eastern Africa. It is the largest country in Africa measuring approximately 2.5 million km<sup>2</sup>. The waters of the White Nile and its tributaries flow down from the highlands of Ethiopia, Uganda and the Central African Republic into the low clay basin that constitutes much of southern Sudan, forming the world's largest contiguous swamps. Despite the rich off-take possible from the Nile ecosystem, there are several disadvantages as well, including the widespread prevalence of diseases such as malaria, diarrhoea and respiratory tract infections. In the South Western agricultural belt, the humid environment is conducive to tsetse fly habitation, which causes trypanosomiasis (sleeping sickness), while the expansive acacia and savannah grasslands of the Eastern Flood Plains are home to infestations of the sand fly, which causes leishmaniasis<sup>1</sup>.

Sudan's population is one of the most varied on the African continent. There are two distinct major cultures, Arab and black African with hundreds of ethnic and tribal subdivisions and language groups, which make effective collaboration among them a major political challenge. Sudan's longest civil war began in 1983, largely pitting the Muslim North against the Christian South, and killing at least 2 million people and displacing a further 4 million. Twenty years of intense and often widespread conflict between North and South Sudan created a humanitarian crisis and disrupted livelihood systems.<sup>2</sup> The signing of the comprehensive peace agreement in January 2005 ended the civil war and saw the formation of a provisional government in South Sudan that provides for power sharing pending national elections. Based on the CPA timeframe, the first democratic elections (presidential, parliamentary and state/local levels) will need to take place by July 2009 in order for the CPA and Interim National Constitution not to be revisited. The results of a census conducted in April 2008 are yet to be released and even its acceptability remains contentious. Episodes of insecurity in the South are common in areas that experience cattle raiding and clan conflicts. Insecurity was also reported in Abyei and Malakal. The relative peace and Sudan's vast natural resource endowments and significant human capital now offer enormous development potential.<sup>3</sup>

South Sudan context is both emergency and early recovery. Disease outbreaks such as Acute Watery Diarrhoea (AWD) and meningitis require emergency external support. Pockets of food insecurity feature in Jonglei State and surrounding areas that are prone to cattle raiding and floods. UNHCR estimated a return of 102,000 organized refugees to the South and Blue Nile in 2007. Returnees and Internally Displaced Persons require rehabilitation and reintegration to minimise reduction of the host community resources.

Basic health service coverage is estimated at 30% of the population. Access to health care is quite low in rural areas. Provision of primary health care services is dependent on external agencies (NGOs) in the majority of locations across the country, whilst some areas still suffer from a complete lack of health care facilities. Detection and treatment of malnutrition is one of the priority areas in the basic primary health care package.

### 2.2. Surveillance Methodologies

#### 2.1. Anthropometric and retrospective mortality surveys:

The Standardized Monitoring and Assessment of Relief and Transitions (SMART) methodology is utilized in the training, planning, collection and analysis of both anthropometric and mortality data. The target sample is children aged 6-59 months. The anthropometric and mortality sample sizes are calculated using the Emergency Nutrition Assessment (ENA) software. The EPI method is used in the sampling of households in the selected clusters. In addition to the anthropometric and mortality data, qualitative ones are also investigated:

- Household health care practices,
- Water & sanitation & Hygiene,

<sup>1</sup> Southern Sudan Centre for Census, Statistics and Evaluation (2005): South Sudan Livelihood profile

<sup>2</sup> USAID Situation Report 2007

<sup>3</sup> JAM Sudan 2005



- Infant and Young Child Care practices,
- Food security and livelihoods status of the households

Interviews with key informants and direct observations also feed the analysis through the surveys conduction.

The following criteria are used in defining acute malnutrition in Z-score and percentage of the median.

Criteria for the results expressed in Z-scores:

- Severe malnutrition is defined by  $WFH^4 < -3 SD^5$  and/or existing bilateral oedema.
- Moderate malnutrition is defined by  $WFH < -2 SD$  and  $\geq -3 SD$  and no oedema.
- Global acute malnutrition is defined by  $WFH < -2 SD$  and/or existing bilateral oedema.

Criteria for the results expressed in percentage of median:

- Severe malnutrition is defined by  $WFH < 70\%$  and/or existing bilateral oedema.
- Moderate malnutrition is defined by  $WFH < 80\%$  and  $\geq 70\%$  and no oedema.
- Global acute malnutrition is defined by  $WFH < 80\%$  and/or existing bilateral oedema

A rate global acute malnutrition above 15% and a rate of severe acute malnutrition above 4%<sup>6</sup> are considered as emergency thresholds, according to the WHO recommendations.

## 2.2. Integrated sentinel survey system:

The sentinel survey system implemented by ACF-USA in South Sudan is based on, as for SMART surveys, a two stage cluster sampling. The sentinel survey system is however based on the use of much smaller samples.

The 33 x 6 sampling was selected within the Lot Quality Assurance Sampling (LQAS) frames developed by the FANTA Project team.

A random selection in respect with the PPS method is applied for the selection of the 33 clusters (being villages in the South Sudan setting) in each sentinel survey area. Among each cluster, 6 children and 6 households are randomly selected for the anthropometric and the non-nutritional questionnaires respectively.

Anthropometric data are analyzed using the ENA software and the LQAS decision rule system whereas the qualitative data are analyzed using the Statistical Package for Social Sciences (SPSS) software.

## 2.3. Coverage surveys:

The Centric Systematic Area Sampling (CSAS) methodology developed by Dr Mark Myatt has been used in South Sudan in 2008 to measure the coverage of ACF-USA treatment programs.

Point and period coverage estimates were calculated using the following formulas:

Point Coverage = covered cases/ total cases

Period Coverage = covered + in program ÷ [(cases - covered) + (covered + in program)]

The terms in the formula are define below:

CASES: The number of current cases (acutely severely malnourished children)

COVERED: The number of CASES in the treatment program.

IN PROGRAM: The number of cases and non cases<sup>7</sup> in the treatment program.

<sup>4</sup> Weight for Height

<sup>5</sup> Standard Deviation

<sup>6</sup> World Health Organization, 1995. Classification of wasting prevalence in under five's.

<sup>7</sup> Children in the OTP recovery phase ( $WFH > 70\%$ ,  $MUAC > 110\text{cm}$  and no oedema)



## 2.4. Rapid assessments:

The sampling methodology and sample size used for rapid assessments are not necessarily meant for being representative of the population status.

ACF-USA approach to rapid assessments is to show flexibility towards the objective of the assessment. In case the assessment is meant for a rapid measure of a potential caseload for treatment programs to be implemented, the active case finding approach would be recommended.

If the assessment aims at providing a first idea of the nutritional situation in one area, a small sample survey would be recommended. The respect of the two stage cluster methodology would then be recommended, and priority would be given to the number of clusters more than to the number of individuals to be measured, in order to ensure a minimum representativeness of the assessment.

The MUAC status and the presence of oedema are usually the recommended measures for rapid assessments.

## 2.5. Nutrition Surveillance Activities

### > Anthropometric and retrospective mortality surveys:

ACF implemented 5 surveys in Khorfulus, Melut, Malakal, Gogrial West and Gogrial East Counties. Three of these surveys were carried out in ACF-USA treatment program sites. The surveys were implemented in collaboration with MoH at both GoSS and State levels. 8 surveys were implemented by other INGOs. In total 13 surveys were achieved between January and December 2008 in South Sudan.

ACF surveys are conducted by the surveillance team. Fieldwork (collection of anthropometric, mortality and qualitative data) takes 3 to 4 weeks. Data processing, analysis and compilation of both executive summary and comprehensive reports take approximately 2 weeks. Validation at both mission and headquarter levels is done before disseminating the reports to MoH and other partners.

### > Sentinel survey system:

The sentinel survey system was implemented as a pilot project in 2007 in collaboration with MOH and other partners.

It aims at being both an early warning system and an analysis tool for trends of acute malnutrition and of its root causes.

Three sites were first opened in 2007; in the southern zone of Malakal (Upper Nile state) in September, Khorfulus County (Jonglei State) in October and Alek South Payam (Warrap State) in December 2007.

Two more sites were selected in Obel and Tonga, in Upper Nile district, in 2008. The Alek and Khorfulus sites were closed in March 2008 due to insecurity and MoH decision that the surveillance system should be piloted in Upper Nile State before expanding to other states.

The sentinel survey areas are selected purposefully taking into account MoH presence, livelihood zones, accessibility, security, vulnerability to food insecurity and health crisis. Anthropometric and qualitative data are collected on a quarterly basis. The reports are shared with both MoH and humanitarian organizations.

### > Rapid assessments

Two nutrition rapid assessments were achieved in Twic and Gogrial East Counties, Warrap State, in 2008. The assessments were carried out due to insecurity which had led to displacement of population. The Twic assessment was linked with fighting in Abyei in May 2008. The fighting between Dinka Apuk and Aguok necessitated the Gogrial assessment in August 2008. The assessments meant at gathering information on population movement e.g. the number of IDPs and their needs; assess the humanitarian situation, needs, gaps and status of ongoing assistance.

In order to provide concrete recommendations based on its findings, ACF critically analyses the causes of acute malnutrition in each of the specific regions where the surveys and sentinel surveillance are conducted and then proposes points of action. This analysis is based on the UNICEF conceptual framework of malnutrition.



In most cases, the causes are related to food insecurity, disease, unhygienic behavior and inadequate sanitary conditions, inadequate child care practices and lack of potable water.

Hence ACF advocates for a multi-sectoral approach for addressing the root causes of acute malnutrition.

### 3. CAPACITY DEVELOPMENT FOR MOH AND LOCAL COMMUNITIES

ACF capacity building strategy focuses on processes that enhance the skills of individuals, groups and communities.

South Sudan being in a very early recovery phase has inadequate human resource capacity which creates operational problems. The MoH among other ministries is often lacking the means to provide vital basic services to the population.

Since 2005, ACF has been focusing on collaborating with the MoH with the aim of building its capacity in nutritional surveillance and treatment of acute malnutrition.

Local communities are also provided with opportunities to participate in program activities. National and International NGOs are incorporated through partnerships in implementing activities and training of their staffs. The surveillance component seeks to train participants on survey preparation, enumerator training, data collection, analysis and reporting. The SMOH in Upper Nile, through its nutrition department, was active in sentinel site surveillance in 2008.

The tables below outline the trainings achieved:

Location(County)	Date	Nature of training	Number and type of trainees
Gogrial West	Feb 2008	Nutritional anthropometric survey (SMART methodology)	15 local enumerators
Gogrial East	Feb 2008	Nutritional anthropometric survey (SMART methodology)	13 World Vision International nutrition monitors inclusive of 2 seconded MOH staffs
Malakal sentinel site	March 2008	Sentinel site surveillance	7 MOH and 2 SSCCSE
Khorfulus/Atar	May 2008	Nutritional anthropometric survey (SMART methodology)	30 local enumerators
Obel	July 2008	Sentinel site surveillance	12 local enumerators
Tonga	Sep 2008	Sentinel site surveillance	12 local enumerators
Melut	Nov 2008	Nutritional anthropometric survey (SMART methodology)	13 local enumerators
Malakal	Nov 2008	Nutritional anthropometric survey (SMART methodology)	14 local enumerators
<b>Total</b>			<b>116</b>

*Table 1: Summary of nutrition surveillance trainings, 2008*

A total of 116 persons were trained on nutritional surveillance and participated in the data collection.

The MoH was active in Upper Nile State through its nutrition department. The state Nutritionist was additionally trained on data analysis using ENA for SMART and general reporting using Microsoft office packages.



The state has now about 5 staffs who can implement surveillance activities with minimal external support. There was no participation of MoH staffs in Warrap and Jonglei states due to inadequate staffing in the counties in which the surveillance activities were implemented.

The aforementioned states need to establish nutrition departments to facilitate collaboration and trainings. In 2008 there was a reduction in the number of active NNGOs, hence more local enumerators were involved instead.

However, ACF will continue to train both INGOs and NNGOs if they exist and are willing to participate in locations where surveillance activities are being implemented. There was an improvement in the educational level of enumerators trained in 2008. This is due to the presence of returnees who went to school in the neighboring countries.

Location (County)	Date	Nature of training	Number and type of trainees
Malakal	Sep 9-15, 2008	Training of trainers on management of severe acute malnutrition	14 Nurses, Nutritionists and Medical assistants ( 3 GOAL, 3 ACF, 2 SMOH, 6 Malakal teaching hospital)
Malakal	Nov 12-13, 2008	Short training on OTP and TFC	6 WVI Nurses and Medical assistants
Malakal	Nov 10, 2008- Jan 23, 2009	Basic training on SAM	10 Malakal teaching hospital nurses
<b>Total</b>			<b>30</b>

*Table 2: Summary of trainings on treatment of acute malnutrition, 2008*

These trainings equipped the participants with skills to manage severe acute malnutrition. The challenge faced during these trainings was language barrier as most nurses had low English proficiency.

## 4. ANALYSIS OF THE NUTRITION SITUATION IN SOUTH SUDAN IN 2008

### 4.1. Analysis framework

This analysis is mainly based on 13 nutritional anthropometric surveys implemented by ACF and other health and nutrition agencies. The SMART methodology was utilized in implementing 11 of these surveys. In addition ACF nutrition sentinel surveillance were also considered. The national average of rates of acute malnutrition is calculated and compared to previous years. Seasonal variations and causal factors are explored to provide in depth understanding of malnutrition.

### 4.2. Estimated Average of rates of acute malnutrition in South Sudan

The average rates of acute malnutrition calculated for the surveyed area showed GAM average at 19.6 % (18.8%-20.4%) and SAM at 2.2 % (1.9%-2.5%).

These rates are based on the 13 surveys conducted (n=9497, z-score using NCHS 1977 reference).

Figure 1 below illustrates the average trends of acute malnutrition for the northern states of South Sudan between 2003 and 2008.

GAM rates have consistently remained above the 15% WHO emergency level while SAM remained below the 4% emergency threshold.

For the last years, there has not been any significant improvement in the nutritional status of children less than 5 in South Sudan.



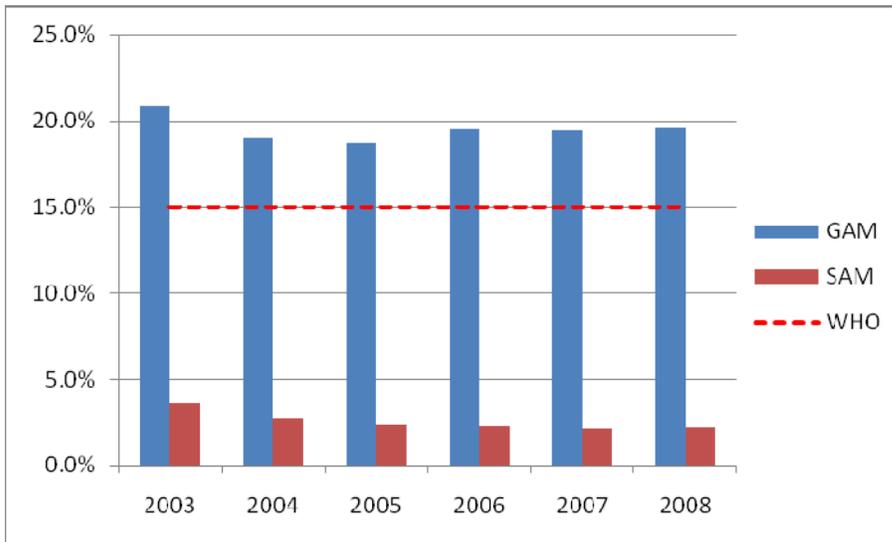


Table 3: trends of acute malnutrition in the northern states of Southern Sudan (2003-2008)

#### 4.3. Anthropometric and retrospective mortality surveys in 2008

The following factors are used in the selection of the locations to conduct anthropometric and retrospective mortality surveys:

- Recommendations formulated after rapid assessments that call for further assessment of the nutritional situation;
- Regular monitoring and evaluation of the nutritional situation in specific program locations;
- Lack of baseline information on nutrition in an area where intervention is proposed;
- Humanitarian crisis such as floods, drought and displacement of population that may have nutritional implications.

Table 4 below outlines the number and results of the surveys conducted in 2008.

13 nutrition surveys were implemented in 12 counties and five states in South Sudan in 2008.

These were distributed as follows: 3 in Warrap, 3 in Jonglei, 3 in Upper Nile, 1 in Unity and 3 in Northern Barh el Ghazal.

The number of surveys reduced again compared to the previous years. This could be explained by the introduction of other surveillance methodologies, limited funding and competing program priorities.



COUNTY	STATE	AGENCY	MONTH	METHODOLOGY	GAM IN Z-SCORES <sup>8</sup>	SAM IN Z-SCORES	0-5 DEATH RATE <sup>9</sup>
Gogrial West	Warrap	ACF and WVI	Feb	SMART	14.5 % ( 11.1%-17.8%)	1.7 % ( 0.5%-2.9%)	0.43(0.00-1.18)
Gogrial East	Warrap	ACF and WVI	Feb	SMART	13.5 % ( 10.5%-16.5%)	0.8 % ( 0.2%-1.5%)	0.37(0.00-0.84)
Twic	Warrap	GOAL	March	SMART	22.6 % ( 19.3%-25.9%)	1.6 % ( 0.7%-2.5%)	1.17(0.09-2.25)
Aweil West and North	NBEG	Concern	March	30 by 30	18.8 % ( 16.4%-21.5%)	1.8 % ( 1.1%-2.9%)	0.262
Wuror	Jonglei	Tearfund	April	30 by 30	21.3 % ( 17.7%-25.5%)	3.1 % ( 1.8%-5.3%)	0.74
Khorfulus- Atar	Jonglei	ACF	MAY	SMART	23.9 % ( 20.4%-27.4%)	1.9 % ( 0.9%-2.9%)	0.53(0.01-1.05)
Sobat	Jonglei	GOAL	May	SMART	29.1 % ( 24.3%-33.8%)	4.3 % ( 2.7%-5.8%)	1.52(0.55-2.5)
Maban	Upper Nile	Medair	May	SMART	11.7 % ( 9.3%-14.1%)	3.3 % ( 2.0%-4.6%)	2.21 (0.20-4.23)
Aweil East	NBEG	ACF-F	June	SMART	16.9 % ( 13.4% - 20.3%)	1.7 % ( 0.5% - 2.8%)	0.92 (0.10 - 1.94)
Rubkona	Unity	ACF-F	August	SMART	18.8 % ( 16.0%-21.5%)	2.3 % ( 1.1%-3.5%)	1.99 (0.69-3.29)
Malakal	Upper Nile	ACF	November	SMART	27.2 % ( 24.3%-30.1%)	3.1 % ( 1.7%-4.5%)	0.72(0.03-1.42)
Melut	Upper Nile	ACF	November	SMART	20.4 % ( 17.2%-23.6%)	1.8 % ( 0.7%-2.9%)	0.23(0.00-0.59)
Aweil East, North and South	NBEG	MSF-F	Dec	SMART	16.4 % ( 12.5%-21.3%)	0.7 % ( 0.3%-2.1%)	0.25 (0.03-1.92)

Table 4: Nutrition surveys in South Sudan, 2008

Note: This table includes only survey reports received from ACF, GOAL, Concern, Tearfund, Medair, ACF-F, and MSF-F.

<sup>8</sup> NCHS reference, with 95% confidence interval.

<sup>9</sup> Rates expressed in deaths / 10.000 children / day

County	State	Agency	Month	CMR	>=90% probability for true prevalence to exceed the value for GAM	>=90% probability for true prevalence to exceed the value for SAM
Gogrial West	Warrap	ACF and WVI	Feb	0.43 (0.00-1.18)	> 12%	> 0.75%
Gogrial East	Warrap	ACF and WVI	Feb	0.37 (0.00-0.84)	> 11%	> 0.25%
Twic	Warrap	GOAL	March	1.17 (0.09-2.25)	> 20%	> 0.75%
Aweil West and North	NBEG	Concern	March	0.262	> 17%	> 1%
Wuror	Jonglei	Tearfund	April	0.74	> 18%	> 1.75%
Khorfulus- Atar	Jonglei	ACF	May	0.53 (0.01-1.05)	> 21%	> 1%
Sobat	Jonglei	GOAL	May	1.52 (0.55-2.5)	> 26%	> 3%
Maban	Upper Nile	Medair	May	2.21 (0.20-4.23)	> 10%	> 2.25%
Aweil East	NBEG	ACF-F	June	0.92 (0.10 - 1.94)	> 14%	> 0.75%
Robkona	Unity	ACF-F	August	1.99 (0.69-3.29)	> 17%	> 1.25%
Malakal	Upper Nile	ACF	November	0.72 (0.03-1.42)	> 25%	> 2%
Melut	Upper Nile	ACF	November	0.23 (0.00-0.59)	> 18%	> 0.75%
Aweil East, North and South	NBEG	MSF-F	Dec	0.25 (0.03-1.92)	> 13%	> 0%

Table 5: Results of the nutrition surveys in South Sudan 2008 expressed in 90% probability of true prevalence exceeding specific rates

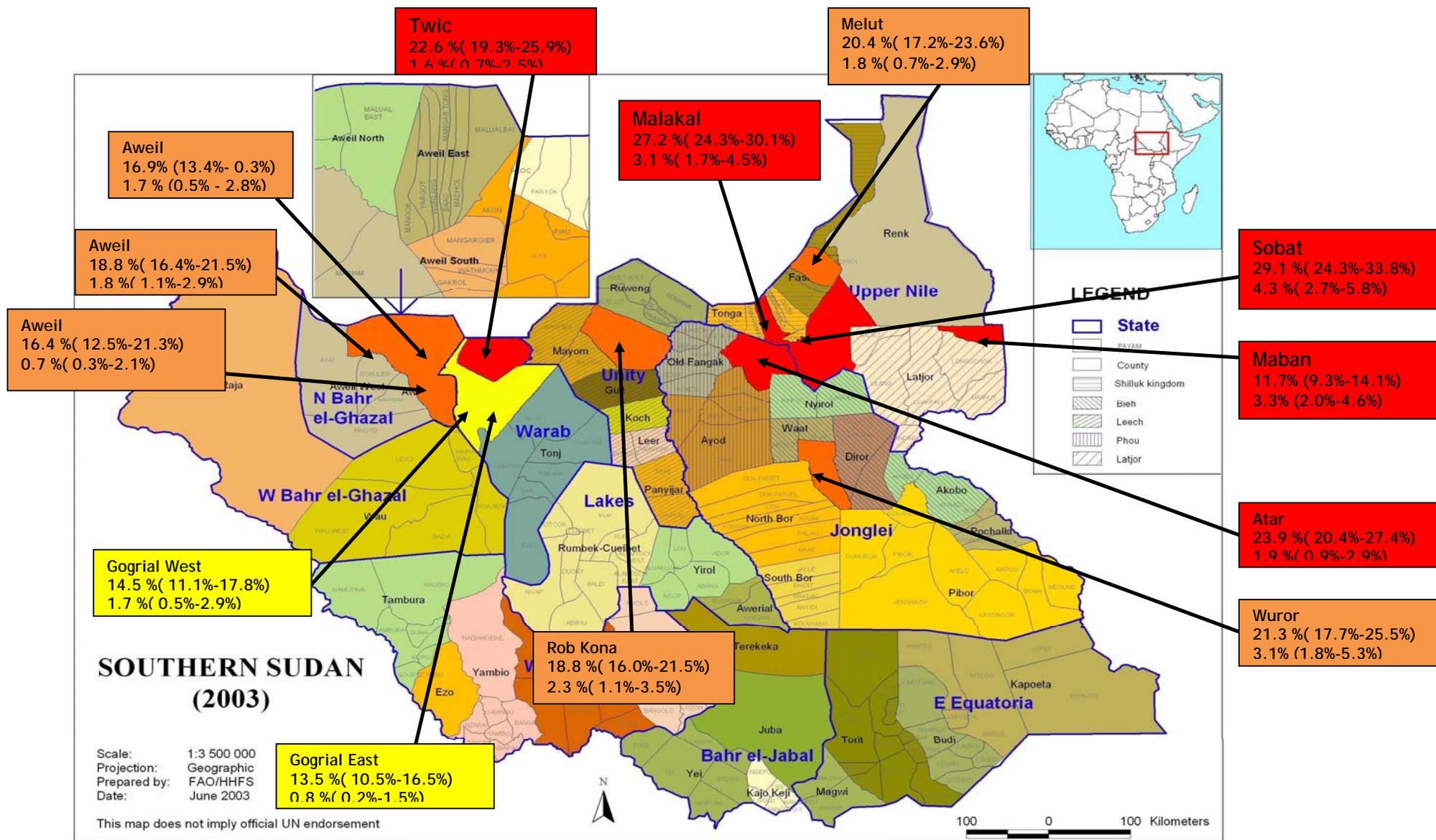


Table 6: Geographical distribution of nutrition surveys conducted in South Sudan in 2008

8 surveys on the 13 conducted in South Sudan in 2008 showed alarming rates of global acute malnutrition above the emergency threshold of 15%. 4 areas even showed rates of GAM above 20%, as highlighted by the table 4.

The calculator developed by the Centre for Disease Control (CDC) team in Atlanta, USA, links rates of acute malnutrition and their probability to represent the true prevalence. Compared to the usual 95% confidence interval expressing the results of nutrition surveys, the CDC calculators offers a higher level of precision and allows comparison between the survey results.

ACF considers the 90% probability threshold for estimating the true prevalence in each survey area, which provides with an individual figure allowing comparison in time for the same area or geographical comparisons.

The rates of severe acute malnutrition showed low in most areas, except in Malakal, Maban and Sobat counties, where these rates reached more than 2%.

#### 4.4. Nutrition Sentinel Site Surveillance in 2008

- Malakal

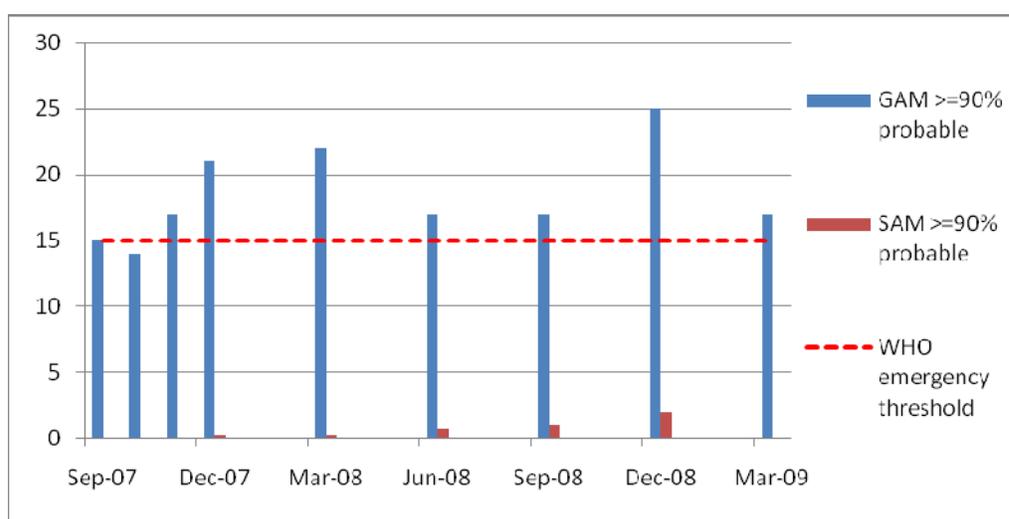


Table 7: Results of sentinel site surveillance in Malakal (Sept 2007-Nov 2008)

	LQAS decision rule		GAM >=90% probable	SAM >=90% probable
Sep-07			> 15%	> 0%
Oct-07			> 14%	> 0%
Nov-07			> 17%	> 0%
Dec-07			> 21%	> 0.25%
Mar-08	52	>15%	> 22%	> 0.25%
Jun-08	43	>15%	> 17%	> 0.75%
Sep-08	46	>15%	> 17%	> 1%
Dec-08			> 25%	> 2%
Mar-09	42	>15%	> 17%	> 0%

Table 8: thresholds indicators for Malakal sentinel survey system, 2008

In Malakal sentinel site, malnutrition starts to pick up in September and the highest prevalence rates are experienced between November and March. The peaks for these periods have been recorded by the surveillance system, which showed a good level of performance in terms of its specificity and sensitivity.

Food insecurity in the assessed zone is directly linked to urbanization and its resultant challenges including high costs of living, increased food market prices in comparison with low purchasing power,



high number of household members and lack of food production at household level due to cattle raiding and limited arable land because of landmines.

The most common causes of morbidity are the same and at the same level as in other locations in Southern Sudan: malaria, diarrhoea and respiratory tract infections are the top three prevalent diseases.

However, access to health care services is slightly better in malakal than in most other areas of the northern states of South Sudan. Access to water is made easier as well by the presence of taps in town, even if the prevalence of diarrhoea shows that tap water might not always mean safe water. Depending on where people are located in town, the access to water is from the river, definitely unsafe.

In addition, improper waste disposal, poor drainage systems and inadequate sanitation facilities is a public health concern all over Malakal.

Maternal and child care practices in this community are still not up to date and are apparently hindered by a number of factors such as demanding work load, marital problems and poor child spacing.

- Obelat

	LQAS decision rule		GAM >=90% probable	SAM >=90% probable
Jul-08	34	>15%	13	0.5
Oct-08	51	>15%	23	1.25

Table 9: Results of the sentinel survey system in Obelat (July-October 2008)

Implemented in July 2008, the Obelat surveillance system (Upper Nile) showed a high increase in the rates of acute malnutrition between July and October, whatever the indicator considered.

Two rounds are however not sufficient to provide the trends necessary for a proper analysis of the rates of acute malnutrition and its root causes.

- Tonga

	LQAS decision rule		GAM >=90% probable	SAM >=90% probable
Aug-08	38	>15%	16	0.5
Nov-08	45	>15%	17	0

Table 10: Results of the sentinel survey system in Tonga (Aug-Nov 2008)

Through the two rounds of data collection conducted in Tonga, Upper Nile, the rates of acute malnutrition remained steady but higher than the 15% emergency threshold. Both places, Tonga and Obelat, are isolated in Upper Nile, with an almost complete absence of infrastructure, a very limited access to health, and a poor level of food security.

Further data collection will be necessary to improve the analysis of the situation in both areas.

#### 4.5. Non nutritional data

The following tables and graphs highlight the high differences between areas in South Sudan. Access to water is seen as of better quality in urban settings, while most people drink from the river almost everywhere in South Sudan.



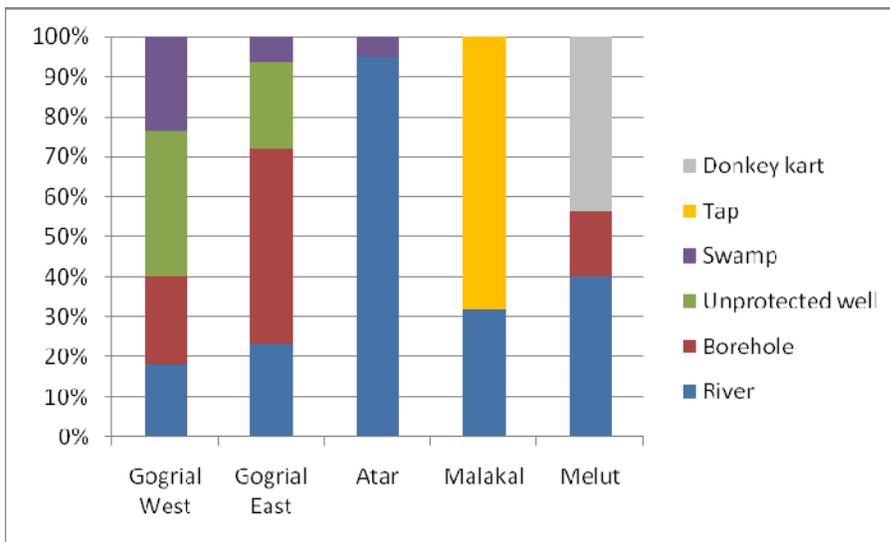


Table 11: Source of water at household level, South Sudan 2008

Another significant contributing factor to acute malnutrition is the adequacy of the care practices. Although high variations can also be seen between areas, all show concerning numbers of caretakers not respecting the need for exclusive breastfeeding before 6 months. Gogrial counties show the worst results in this domain with almost all mothers introducing complementary food in the child diet before 6 months of age.

Gogrial East	Gogrial West	Atar	Malakal	Melut
76%	84%	31%	27%	44%

Table 12: Frequency of households introducing complementary food before 6 months

Chosen as a third example, the sources of income are very different as well from one area to the other. Urban areas show highest levels of employment and casual labour, while others show a wide diversity of petty trades. Crops or livestock always represent very limited sources of incomes.

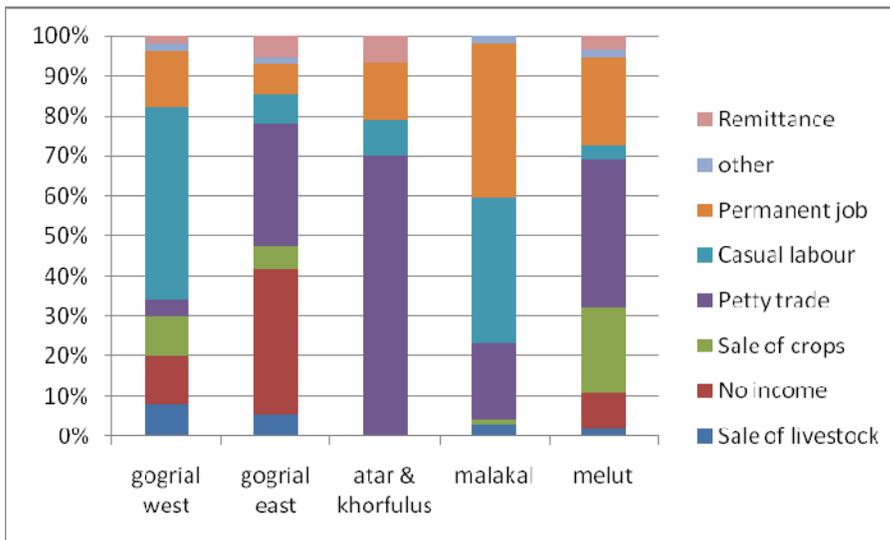


Table 13: Sources of income of the households, South Sudan 2008

Such variations from one area to the other one make it very difficult to identify the main root causes leading to acute malnutrition. Several underlying factors usually deteriorate together or can also fluctuate independently from each other; hence it remains difficult to identify key factors to serve as an anticipation tool for acute malnutrition.



#### 4.6. Nutrition situation and malnutrition trends in Upper Nile region

This region is geographically located in South West Sudan and borders the states of South Kordofan and West Kordofan in the North, Warap and Lakes in the East and Western Equatoria in the South. Administratively, the region is divided into three states namely Upper Nile, Jonglei and Unity which are further sub-divided into counties. Upper Nile state comprise of 13 counties; Renk, Melut, Manyo, Fashoda, Malakal, Panyikang, Maban, Maiwut, Baliet, Nasir, Longuchok and Akoka while Jonglei is made up of 12 counties namely Fangak, Atar, Ayod, Nyirol, Waat, Wuror, Diror, North Bor, South Bor, Pibor, Akobo and Pochalla. Unity (Liech) comprises of Mayom, Abiemnhom, Rubkona, Guit, Koch, Leer, Mayendit, Payinjar and Parieng counties.

The region is characterized by fertile low land and is rich in oil deposits. The Nile and numerous other rivers pass through the region and provide important sources of food and incomes as well as transport routes from and to many parts of Southern Sudan.

With so many rivers, seasonal flooding is common as recently witnessed in Renk, Nassir, Kiechkon, Bor and parts of Unity State.

The livelihood zones of the region mainly fall within the Nile Sobat, Eastern and arid pastoral ones.

In the Nile Sobat zone, in addition to crops and livestock, wild foods and fish are significant sources of nutrients. Similar livelihood sources are found in the Eastern flood plain though supplemented with game hunting. In the arid zone households practice a nearly pure form of pastoralism and there is almost exclusive reliance on livestock and livestock trade for food.

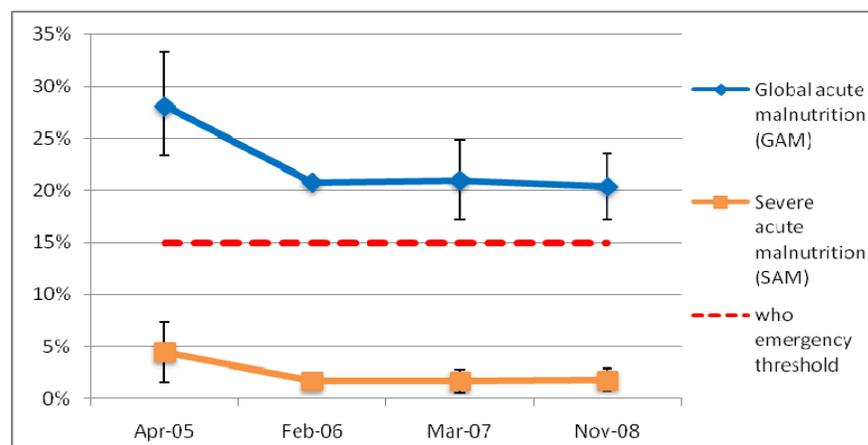
Seasonal migrations in search for both water and pasture provide there opportunities for substantial trade and exchange with neighboring communities. An issue of concern is the insecurity related to ethnic tensions and cattle raiding in Twic, Nyirol, Pibor and Bor counties, and the return of IDPs from northern Sudan.

UNMIS reported in January 2009 that, by end of 2008 a total of 81,432 IDPs were assisted home in southern Sudan and the Three Areas under the joint plan for organized return, signed on October 2006 between GoNU, GOSS and UN.

Also a total of 139,140 refugees were assisted to return home, since the start of repatriation by UNHCR in December 2005. In addition, by the end of year 2008, an estimated 1.9 million internally displaced persons and refugees had spontaneously returned to southern Sudan and the Three Areas since 2005. In December 2008, UNHCR repatriated 1,235 refugees from Kenya, Ethiopia and Uganda under the assisted self-repatriation mechanism, to Equatoria, Jonglei, Unity and Upper Nile States. UNHCR had plans to bring 2,000 refugees to Nassir and 1,500 refugees from Fugnido camp in Ethiopia to Upper Nile in early 2009.

In 2008, 7 nutrition surveys were conducted in Wuror, Khorfulus/Atar, Sobat, Maban, Rubkona, Malakal and Melut. The number of surveys reduced from 12 to 7 between 2007 and 2008. The average malnutrition rates in the region stood at 21.8% in 2008.

Figures 4 and 5 below illustrate malnutrition trends of two vulnerable areas in Upper Nile state. In the case of Melut the malnutrition rates decreased sharply between 2005 and 2006 but maintained a stable trend from 2006 to 2008. The GAM rates have always been above the emergency level



*Table 14: Results of nutrition surveys in Melut County since 2005*

The steady trend of malnutrition in Melut could be explained by several factors. Firstly the treatment centre in Melut PHCC run by Medair identifies and treats malnourished children. This access to health services might explain why the rates of mortality remained low.



Secondly in the past few years Melut has seen some changes that have led to an increase in employment opportunities contributing to more households having stable income. Although these factors could have prevented further deterioration, the food security situation is still wanting. Most households continue to rely on purchased food. In addition, floods still plague the region leading to disease outbreaks.

In Khorfulus / Atar regions the trends were a little different; the malnutrition rates have been fluctuating over the years. The lowest malnutrition rates were recorded in November 2003 after which there was a steady rise. The last survey done in 2008 suggests the malnutrition rates could be declining again.

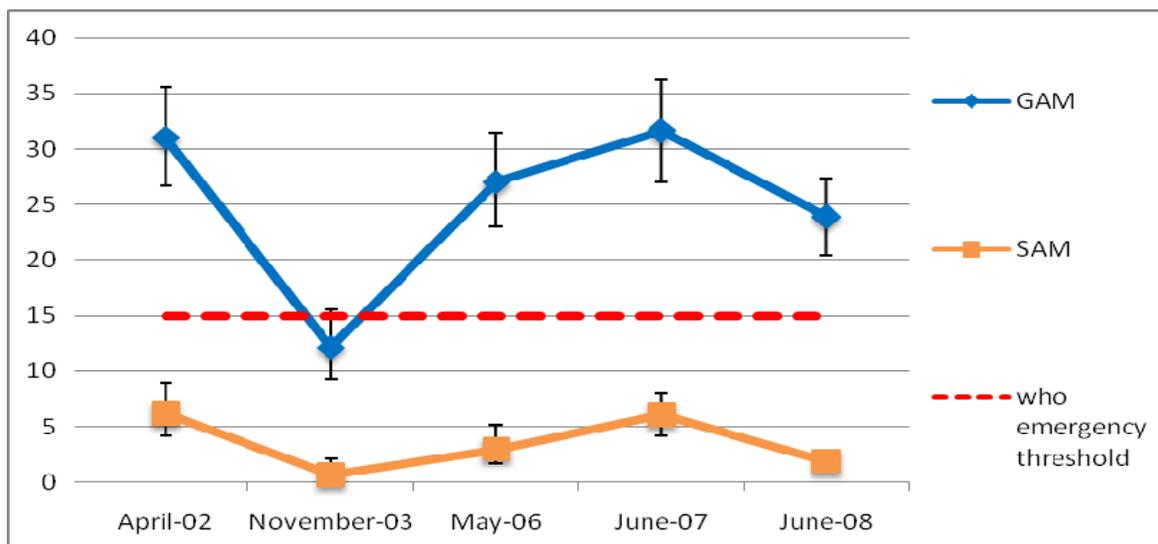


Table 15: Results of nutrition surveys in Khorfulus/Atar since 2002

Trends of acute malnutrition in Khorfulus are directly affected by food inaccessibility due to floods, insecurity and low purchasing power. People were displaced and property looted in February 2008 after the local security had differences. Insecurity continued through May in various villages due to cattle raids. There was improvement in the nutrition situation from 2007 to 2008 which could be attributed to intervention efforts by NGO's working in the area.

The current malnutrition rates in Upper Nile region are linked to the following factors:

- Disease prevalence

The common causes of morbidity in most surveyed locations included malaria, diarrhea and RTI's. A similar trend was observed in sentinel site data from Malakal, Tonga and Obelat. These diseases cause appetite loss, mal absorption of nutrients and muscle breakdown which are known to contribute to acute malnutrition. Occurrence of diarrheal diseases is exacerbated by the poor hygiene and sanitation conditions reported in most surveyed areas. Diarrhea cases can precede onset of acute malnutrition. Preventive practices such as use of mosquito nets, clearing bushes and use of soap are recommended.

Accessibility to health centres influences health seeking behaviors in most areas of Upper Nile. Populations located near health facilities are more likely to seek medical attention in those facilities. In some cases climatic conditions such as floods and cost of medical care dictate health seeking behavior. Traditional medicine continues to be popular partly because of traditional beliefs and partly because of easy accessibility.

- Food insecurity

Accessibility and availability of food remains a serious concern in most areas in the region. There was limited diversity in diets of the children under five and often the children ate two meals in a day. This has an impact on the children since during this age they require balanced and frequent meals to aid their growth and development. The predominant food eaten in the region is sorghum with wild vegetables, meat and fish as accompaniments. In Khorfulus, majority of the households had no food stocks in May 2008, something ascribed to inadequate harvests in the previous year, insecurity, large household sizes, cattle raids as well as lack of adequate and appropriate farming and fishing tools. As



such most of them greatly relied on purchasing food or fishing. Households adopted coping mechanisms such as borrowing and reduction in number of meals. The situation was similar in Melut where floods affected crop performance and households had to rely on purchases.

- **Limitations in maternal and child care practices**

The persistent trend of GAM rates being above emergency levels cannot be blamed entirely on food insecurity. The mothers in the entire region exhibit poor maternal and child care practices as shown in most surveys in 2008. Children below five years were hardly fed with special meals. A majority of the children in all surveyed areas were not exclusively breastfed; complementary food was introduced either too late or too early and lacked in variety. Sentinel sites data showed a similar trend in Malakal, Tonga and Obelat. Moreover, most mothers had heavy workload (collection of firewood, fetching water and gathering wild foods) which took most of their time and reduced their ability to care for children.

- **Unsatisfactory water, hygiene and sanitation situation**

Lack of clean drinking water was reported in most of the surveyed areas. A majority of surveyed households did nothing to their water before drinking. In Khorfulus (75.6%) of the households did not treat drinking water and hence were at risk of water borne diseases. The situation was almost the same in Melut and Malakal. In Bentiu, the water situation was relatively better due to presence of boreholes and treatment at the water plants. A considerable number of the households owned soap; however it was hardly used to wash hands before eating or after defecation. The prohibitive cost of soap prevented some households from owning it. The availability and use of latrines was another concern, human excreta was disposed off in the open fields and bushes. In Melut County, latrines were owned by 38.2% of the households implying that the rest of the populace used indiscriminate human waste disposal method. The effect of poor hygiene practices is evidenced by high prevalence of diarrhoea in all these areas.

#### **4.7. Nutrition situation and Malnutrition Trends in Bahr El Ghazal (BEG)**

Bahr El Ghazal (BEG) region consists of four states: Northern Bahr El Ghazal (Aweil Center, Ayat, Aweil West, Aweil North, Abiem Center, Abiem East, Abiem West and Aweil South Counties); Western Bahr El Ghazal (Wau, North Jur river, South Jur river, Naumtina, Duiem Zubeir, Raja and Marial Bai Counties); Warrap State (Tonj East, Tonj North, Tonj South, Gogrial East, Gogrial West, Twic Mayardit and Abyei Counties) and Lake state ( Rumbek Center, Rumbek East, Rumbek North, Wulu, Cueibet, Yirol East, Yirol West, and Awerial Counties).

BEG is one of the regions that were worst hit by two decades of civil war in Southern Sudan. Northern Bhar-el Ghazal (the Aweil Counties, bordering Western Twic) state was one of the most affected by the two decades of war and suffered a devastating famine in 1998. The area is occupied by predominantly agro-pastoralist Dinka groups, of whom the Rek and the Twic are the majority. Inter-clan/tribal conflicts between the Dinka and neighbouring Nuer along Unity State border over grazing land is a major challenge to livelihoods.

UNHCR report for August 2008 recorded 289,564 repatriations (organized and spontaneous) to Sudan, the majority from neighbouring countries. In early 2008, there was an increase in the number of returns preceding the Census that took place in April 2008. The northern parts of South Sudan, including ACF operational areas like Warrap and Northern Bahr el Ghazal, received the highest number of returnees. The returnees exert pressure on the host community limited resources thus causing tensions. Table 4 above gives a list of the surveys done in the region in 2008. Six surveys were implemented in Gogrial West, Gogrial East, Twic, Aweil West and North, Aweil East and Aweil North and South. Average GAM stood at 17.1%. There were no survey reports received on Western Bahr El Ghazal and Lake States. Figure 16 below illustrates the results of the nutrition surveys in Gogrial West County. This location has had regular surveys and interventions by various agencies and hence can give a fair representation of the region.



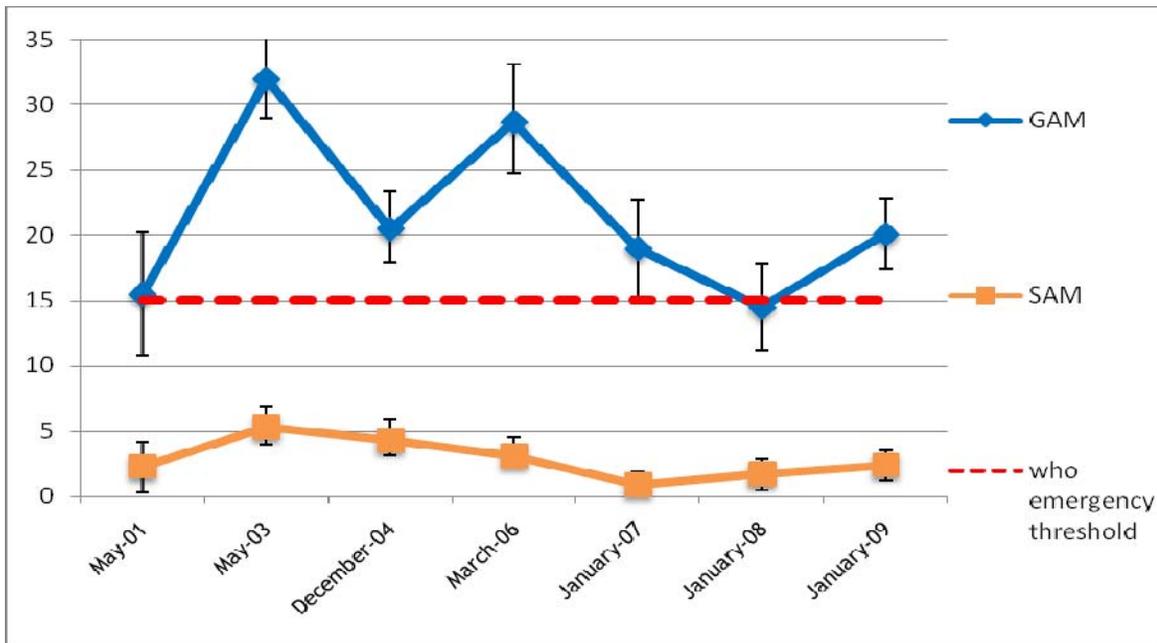


Table 16: Malnutrition rates in Gogrial West County Dec 2004-Jan 2009

ACF-USA has been carrying out nutritional anthropometric surveys and has been conducting relief interventions in Gogrial West County for the last years.

The rates of acute Malnutrition as measured for the last years have always shown lower in December and January compared with other periods of the year, and showed high levels of seasonal fluctuations. March to September was usually seen as the peak season.

The rates of acute malnutrition in Gogrial have always shown very high, even during the better season.

Regular clan fights, floods and Acute Watery Diarrhoea outbreaks have greatly increased the risk of food insecurity and health crises in the region and have consistently kept the region in a permanent emergency situation for years.

After the insecurity and the floods that occurred end of 2008, people in the affected areas did not farm, putting a strain on existing food stocks and creating the risk of a further deterioration in the first half of 2009.

The current acute malnutrition rates in the region are linked to the following factors:

- Food intake and food insecurity

Clan conflicts, floods and returnees increase the stress on the food security in the region.

The inter-clan fighting between Gogrial East and Gogrial West communities in the second quarter of 2008 greatly plagued the food security status in Gogrial West County. It occurred during the cultivation season thereby prevented many people from cultivating. In the last survey in early 2009, 70% of the interviewed households had depleted their food stocks. Furthermore, flooding occurred late last year resulting into more displacement, destruction of crops and depletion of food stocks. Crops were also frequently attacked by weeds and pests.

According to ACF-F survey conducted in June 2008, the previous harvest in Aweil East was reported to have been very poor and households lacked food stocks. MSF assessment in Malekalel, Mayen Ulem, Ariath and Warawar villages in November estimated that up to half the population was highly vulnerable and considered as very poor; of these about 70% were returnees who were even more vulnerable. WFP's GFD covered only 17% of them. Their capacity to cope with the poor 2008 harvest, due to flooding, was compounded by increasing sorghum prices. Simulations showed that with a 25% to 50% deficit of sorghum in 2008 harvest and the same inflation rates in 2009 as in 2008, a 60% deficit in food energy supply during the month of July 2009 was expected. Food deficits are more likely between May and September which is also the period in which malnutrition rates are expected to be high.



- **Short comings in child care and feeding patterns**

A review of data from surveyed locations reveals that less than 50% of the infants are exclusively breastfed. For example in Aweil West and North, only 37.5% of the children were exclusively breast fed during the first six months. Most infants are hence introduced to solid and liquid food before attaining six months of age. Analysis of the 24 hour food intake recall indicated that majority of the children are fed on two meals. Reduction of the quantities eaten and unavailability of milk in the dry season is what predisposes many children to acute malnutrition. Mothers on the other hand are overburdened by household chores such as food preparation, thatching of houses, collection of water and care to provide to the children. A lot of work and limited time compromises the ability of mothers to breastfeed on demand. Provision of water through hand pumps and access to grinding mills are means of reducing the burden on mothers and can contribute to better care of children.

- **Disease**

According to a survey by Concern in Aweil West and North, major causes of child morbidity were; RTI (19.1%), Malaria (13.5%) and diarrhea (9.3%). This result indicated a drop in the prevalence of RTI and Malaria while diarrhea was on the increase as compared with November 2006 results. It was also noticed an increased proportion (70.9%) of the households seeking health care from public clinics. On the other hand, because of large proportions of the households (97.8%) not treating their drinking water and (97.0%) not having toilets and waste disposal facilities, diarrhea cases logically increased. In Aweil East, the incidence of diarrhea was the leading cause of morbidity and it was associated with flooding in the area which increases chances of waterborne diseases. The situation was the same in Gogrial Counties due to inappropriate waste disposal methods such as open defecation. The presence of Measles was also reported in NBEG and Warrap though to a low magnitude. Effects of diarrhea, malaria, measles and lower respiratory infections such as appetite loss, mal absorption of nutrients and muscle breakdown lead to malnutrition<sup>10</sup>.

- **Inadequate water and sanitation practices:**

Unsafe water was consumed in locations with few functional boreholes. This limits the amount of water consumed per person per day and contributes to low sanitation levels and outbreaks of acute watery diarrhoea. According to ACF-F assessment in Aweil East, almost 50% of households use borehole water. The state authority acquired two drilling rigs in 2007 and had plans to drill 200 boreholes. It is therefore likely that more households will have improved access to safe water. Appropriate waste disposal facilities like latrines are limited and therefore waste is disposed off indiscriminately. An assessment by Concern in Aweil West and North revealed that households without toilets were (97.0%) while (97.8%) of the households were not treating drinking water from unsafe sources. The traditional belief surrounding the use of latrines (considered as a shame for many people) is a great hindrance to usage. Even worse are the unhygienic practices related to hand washing more so among young children which could lead to a high number of diarrhea cases.

## 5. CONCLUSION

The rates of global acute malnutrition remain unacceptably high in most of the 5 northern states of South Sudan, well above the 15% emergency benchmark, despite various interventions.

There is still little attention accorded to treatment of moderate acute malnutrition, mainly because of the failure of most programs using the traditional SFP protocols and the very heavy logistics and human resources constraints linked with SFP in South Sudan.

Severe Acute Malnutrition remained at a low level in 2008, but as noticed for the past years, rates of SAM can increase quickly and dramatically.

The deteriorated situation noticed once again in many areas at the end of 2008, with insecurity and floods spreading around, shows very little hope for an improved situation in 2009.

While South Sudan enters slowly in an early recovery phase, it is essential for humanitarian actors to balance between capacity building and relief interventions.

Long term interventions in Food security, water and sanitation, health, nutrition or promotion of healthy behaviors are of absolute necessity, but should not lead to a reduction of all the health and

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<sup>10</sup> SC-UK: Emergency Nutrition Assessment: Guideline for field workers (2004).



nutrition relief interventions that are currently taking place in the country and that can be considered, for an important part, as the reason for low rates of severe malnutrition and crude mortality rates.

While growing slowly, ministries in charge of infrastructures, health, food security will need more and more support from the humanitarian communities. Through capacity building approaches, positive sustainable results can be reached even in areas where the government presence is very limited.

2008 has seen, in addition, very promising efforts in the domain of standardization of the methodologies for surveys. Most organizations are now using the SMART methodology, which ensures higher quality of the data and of the analysis of the surveys than the traditional 30x30 approach. Indeed, thanks to a smaller sample and the assistance of user-friendly software, the SMART methodology has proved the best to tool, up to date, for an accurate measure of the nutritional status of a population.

In parallel, the sentinel survey system developed by ACF-USA in South Sudan and which started to use, in March 2008, a 33x6 sample, showed very promising results and will, in 2009, deepen the analysis of acute malnutrition and its root causes. Various ways of analyzing its results have already shown between the LQAS decision rules system developed by FANTA and the probability calculator implemented by the CDC team.

Most NGOs are now using SMART methodology to conduct nutritional anthropometric surveys which makes comparison of results possible. New surveillance methods like nutrition sentinel site and growth monitoring and promotion are currently in use. ACF started pilot sentinel site surveillance in Upper Nile in 2007 and it has proved to be a simpler and cost effective tool in monitoring malnutrition. Data on the number of NGOs and MOH that have integrated growth promotion and monitoring in primary health care centres is still lacking. Both tools will be studied further and will probably go on complementing each other towards more accurate statistically validated results.

In the domain of surveillance, which includes surveys and assessments, International NGO's, donors and UN agencies have a responsibility to ensure the respect of validated methodologies, scientifically calculated samples and representative data collections. Indeed, too many assessments and surveys conducted without the basic scientific requirements have lead to misinterpretation of the humanitarian situation and waste of funds.

From its analysis of the situation noticed in 2008, ACF makes the following recommendations to address malnutrition in South Sudan:

- > To increase the access to treatment in all vulnerable areas through the CMAM approach;
- > To develop national guidelines for standardized surveys and assessments methods in South Sudan;
- > To help building the capacity of the MoH in all the aspects of the management of acute malnutrition, at all possible levels.
- > To scale up longer term activities devoted to the prevention of acute malnutrition, as food security and livelihood programs, WASH program, health promotion and health programs.
- > To address child care and maternal practices through an holistic approach aiming at reducing the workload of mothers while providing them with the basic necessary knowledge.

