



**NUTRITIONAL ANTHROPOMETRIC SURVEY
CHILDREN UNDER FIVE YEARS OF AGE**

**MELUT, PALOCH, GALDORA, BEMICHUK, WUNAMOM AND PANAMDIT PAYAMS
MELUT COUNTY, UPPER NILE STATE**

24th OCTOBER – 13th NOVEMBER 2008

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.I. EXECUTIVE SUMMARY

Melut is one of the 13 counties¹ in Upper Nile state, South Sudan. It is bordered by four counties namely: Manyo in the South West, Malakal in the South East, Maaban in the East, and Renk County in the North. The county is situated in the Nile Sobat livelihood zone along the east of the Nile corridor.

Administratively the county has six Payams (administrative units defining a county) thus; Melut, Paloch, Galdora, Bemichuk, Wunamom and Panamdit. Melut Payam hosts the Government of South Sudan (GoSS) authority offices for the county comprising of Commissioner, Executive Director and SSRRC offices.

Currently the findings of the census have not been released; therefore, SSRRC office provided pre census information. The population information was triangulated from different sources (village elders, community persons, SSRRC office and secondary sources) to obtain a figure of 55,754.

Melut is characterised by flat, low lying plains with black cotton soil. Grasslands and acacia trees form primary vegetative cover. River Nile and its tributaries such as *Awil-wil* and *Thor Ager* largely determine the settlement patterns of the community and contribute significantly to their livelihoods. The main activities around the rivers are transportation, fishing and watering points. Besides being a border between states and counties, River Nile also, connects various counties in South Sudan to Port Sudan in the North.

Food security situation in Melut County is cushioned by proximity to large farms in the neighbouring Maaban and Renk counties which act as food baskets in the region. However, food prices have on some occasions increased limiting access especially in the hunger gap period. According to FEWSNET August 2008, food security conditions had remained normal especially near county headquarters (in Melut and Paloch Payam). Nevertheless, areas far from the market experienced high sorghum prices due to transportation problems associated with civil insecurity and wet road conditions. As such, these were bottlenecks in the food supply chain and negatively affected access to food.

Population movement of southerners returning from the North to Melut was reported in the month of August. UN weekly report (30th March to 4th April 2008) reported that 1,308 returnees (193 HH) were received in Melut county. Employment opportunities in the oil mining fields also attracted many people. High prevalence of diseases such as malaria, diarrhoea, RTI and Kalazaar were reported by Medair in the preceding months.

In view of uncertain food security in the short run, continued movement of returnees into the county and high prevalence of diseases like malaria and diarrhoea, ACF planned to implement a nutritional anthropometric survey to determine current malnutrition rates. There is also need for continued monitoring of nutrition situation in the area due to high malnutrition rates unveiled in the past surveys as tabulated below:

Table 1: GAM and SAM rates 2005-2007 in Melut County

Year	April 2005	February 2006	March 2007
Global Acute malnutrition ² (GAM)	28.1 % (23.4%-33.3%)	20.8%	21.0% (17.2%-24.9%)
Severe acute malnutrition(SAM)	4.5% (2.6%-7.4%)	1.7%	1.7% (0.5%-2.8%)

The Melut anthropometric nutrition survey which was done between 24th October and 13th November 2008 had the following specific objectives:

- To evaluate the nutritional status of children aged 6 to 59 months;
- To estimate the measles immunization coverage of children aged 9 to 59 months;
- To estimate the crude mortality rate through a retrospective survey;
- To determine immediate, underlying and basic causes of malnutrition;
- To identify priority areas for program implementation.

¹ Government proposed structures-www.cushcommunity.org

² NCHS references of 1977

METHODOLOGY

Standardized Monitoring and Assessment of Relief and Transitions (SMART) methodology was utilized in the implementation of the nutritional anthropometric survey. Children aged 6-59 months formed the target group. During the planning phase population figures of all accessible Melut Payams and prevalence of ACF 2007 nutrition anthropometric survey findings were employed to derive sample size as tabulated below. The total accessible population included in survey planning was 38,019³.

Table 2: Population Figure, Prevalence, Precision and Sample Sizes, Melut County

	Anthropometric survey	Mortality survey
Population	7604 ⁴	38019 ⁵
Estimated prevalence⁶	24.9	1.25
± desired precision %	5	0.45
Design effects	2	2
Sample sizes	554	4498 ⁷

The anthropometric sample size was increased by 10% to cater for unforeseen contingencies. The final sample size of 610 was divided by 20⁸ to obtain 31 clusters. In each selected cluster, teams moved somewhere near the centre of the village and spun a pen. This determined the starting direction upon which teams walked to the edge. At the village's periphery, the pen was re-spun. This time round; households at an arm's length along the pointed direction were counted till the end. Simple balloting was used in determining the starting point (household).

In every selected household, both the anthropometric and mortality questionnaires were administered accordingly. The subsequent households were determined through proximity. All eligible children were assessed till a target of 20 was obtained. Ages of the children were estimated through use of calendar of events. For mortality survey 145 persons present now were targeted per cluster. It is worth noting that one cluster (30) was not done because of border disagreement between Melut and Mabaan County. However, the planned sample size was still achieved and hence not necessary to substitute the cluster in view of the constraints.

Secondary data was gathered through structured questionnaire, interviews and observations. The structured questionnaire was systematically administered in every fifth household in 10 randomly selected clusters. Information on food security, utilization and access to health and water as well as maternal and child health services was collected.

³ Figure arrived through establishing accessibility as determined by factors such as presence of swamps, security situation, possible population movement

⁴ 20% of the total accessible population.

⁵ Total accessible population in Melut county

⁶ Highest GAM rate expected in Melut; based on ACF nutrition survey in 2007

⁷ Total 'present now' to be included in retrospective mortality survey

⁸ Minimum number of children aged 6-59 months measured per cluster.

SUMMARY OF FINDINGS

Nutrition and Mortality Survey Results

The final analysis included 617 children after exclusion of 10 children due to incoherency according NCHS 1977. Analysis in reference to WHO 2005 included 613 children.

Table 3: Results Summary

INDEX	INDICATOR		RESULTS ⁹
NCHS(1977)	Z- scores	Global Acute Malnutrition W/H < -2 z and/or oedema	20.4% [17.2% -23.6%]
		Severe Acute Malnutrition W/H < -3 z and/or oedema	1.8% [0.7% - 2.9%]
	% Median	Global Acute Malnutrition W/H < 80% and/or oedema	8.8 % [5.7% - 11.9%]
		Severe Acute Malnutrition W/H < 70% and/or oedema	0.6 % [0.0 – 1.4%]
WHO(2005)	Z-scores	Global Acute Malnutrition W/H < -2 z and/or oedema	18.8% [15.3% - 22.2%]
		Severe Acute Malnutrition W/H < -3 z and/or oedema	2.3% [1.2% - 3.4%]
	% Median	Global Acute Malnutrition W/H < 80% and/or oedema	3.9 % [2.4% -5.4%]
		Severe Acute Malnutrition W/H < 70% and/or oedema	0.0 % [0.0% - 0.0%]
MUAC	Height >65 cm	Global Acute Malnutrition (<120mm)	3.1% [1.7% - 4.5%]
		Severe Acute Malnutrition (<110mm)	1.0% [0.2% - 1.7%]
Total crude retrospective mortality (last 3 months) /10,000/day			0.80 [0.41 - 1.19]
Under five crude retrospective mortality /10,000/day			0.23 [0.00 - 0.59]
Measles immunization coverage (N= 595 children ≥ 9months old)	By card		33.3% [29.5% - 37.1%]
	According to caretaker ¹⁰		43.0% [38.9% - 46.9%]
	Not immunized		23.7% [20.3% - 27.2%]

⁹ Results in bracket are at 95% confidence intervals.

¹⁰ When no EPI card was available for the child at the household, measles vaccination information was collected according to the caretaker/ mother of child

.II. INTRODUCTION

Melut is one of the 13 counties¹¹ in Upper Nile state, South Sudan. It is bordered by four counties namely: Manyo in the South West, Malakal in the South East, Maaban in the East, and Renk County in the North. The county is situated in the Nile Sobat livelihood zone along the east of the Nile corridor.

Administratively the county has six Payams (administrative units defining a county) thus; Melut, Paloch, Galdora, Bemichuk, Wunamom and Panamdit. Melut Payam hosts the Government of South Sudan (GoSS) authority offices for the county comprising of Commissioner, Executive Director and SSRRC.

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Melut is characterised by flat, low lying plains with black cotton soil. Grasslands and acacia trees form primary vegetative cover. River Nile and its tributaries such as *Awil-wil* and *Thor Ager* largely determine the settlement patterns of the community and contribute significantly to their livelihoods. The main activities around the rivers are transportation, fishing and watering points. Besides being a border between states and counties, River Nile also, connects various counties in South Sudan to Port Sudan in the North.

Food security situation in Melut County is cushioned by proximity to large farms in the neighbouring Maaban and Renk counties which act as food baskets in the region. However, food prices have on some occasions increased limiting access especially in the hunger gap period. According to FEWSNET August 2008, food security conditions had remained normal especially near county headquarters (in Melut and Paloch Payam). Nevertheless, areas far from the market experienced high sorghum prices due to transportation problems associated with civil insecurity and wet road conditions. As such, these were bottlenecks in the food supply chain and negatively affected access to food.

Population movement of southerners returning from the North to Melut was reported in the month of August. UN weekly report (30th March to 4th April 2008) reported that 1,308 returnees (193 HH) were received in Melut County. Employment opportunities in the oil mining fields also attracted many people. High prevalence of diseases such as malaria, diarrhoea, RTI and Kalazaar were reported by Medair in the preceding months.

In view of uncertain food security in the short run, continued movement of returnees into the county and high prevalence of diseases like malaria and diarrhoea, ACF planned to implement a nutritional anthropometric survey to determine current malnutrition rates. There is also need for continued monitoring of nutrition situation in the area due to high malnutrition rates unveiled in the past surveys as tabulated below:

Table 4: GAM and SAM rates 2005-2007 in Melut County

Year	April 2005	February 2006	March 2007
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The Melut anthropometric nutrition survey was done between 24th October and 13th November 2008.

¹¹ Government proposed structures-www.cushcommunity.org

¹² NCHS references of 1977

.III. OBJECTIVES

- To evaluate the nutritional status of children aged 6 to 59 months;
- To estimate the measles immunization coverage of children aged 9 to 59 months;
- To estimate the crude mortality rate through a retrospective survey;
- To determine immediate, underlying and basic causes of malnutrition;
- To identify priority areas in program implementation.

.IV. METHODOLOGY

.IV.1. Type of Survey and Sample Size

Anthropometric nutrition survey was undertaken in Melut area using SMART methodology. During the nutrition survey, anthropometric and mortality data was simultaneously collected. Qualitative data was also gathered to supplement anthropometric survey findings.

During the survey exercise, children aged 6-59 months formed the target group. The local authorities provided the vital information needed. The total accessible population was estimated at 38,019 persons. .

.IV.2. Sampling Methodology

A two-stage cluster sampling method was used:

- Cluster selection: Anthropometric and mortality sample sizes were automatically calculated in ENA for SMART Software October 2007 version after inputting the necessary information. The prevalence rates from the last survey were utilized.

For the anthropometric survey: The sample size of 610 was obtained after inputting target population (7,604), prevalence (24.9%), precision (5%) and design effect (2); and providing 10% contingency allowance. The resultant figure was then divided by 20¹³ to obtain the total number of clusters required for the survey. 31 clusters were assigned randomly for assessment.

For the mortality survey: The total accessible population (38,019), estimated CDR prevalence (1.25), corresponding desired precision (0.45) and design effect of 2 were keyed into the mortality section of the planning template. The automatically calculated sample (4498) was then divided by the total number of clusters (31) to obtain the required number of persons present now per cluster. 145 persons present now were thus targeted per cluster.

- Selection of households and children

Within a cluster: Only the sampled villages were assessed during data collection. In the clustered village, the EPI method was followed effectively to determine the starting point. Somewhere near the centre of the village, a pen was spun to determine the starting direction. The team then moved to the periphery along the pointed direction. At the end of the village, the pen was re-spun and a direction obtained. Just like the first stage, the survey team moved along the pointed direction only this time counting all households at an arm's length in that direction to the edge. The first household was determined through simple balloting. In the household, mortality and anthropometric questionnaires were administered accordingly. Subsequent households were then determined through proximity or to the right principle.

Choosing children within the house: In every selected household, all children aged 6-59 months were assessed till a target of 20 was obtained. A local calendar of events was used to estimate the ages of children. In cases whereby the teams only needed one child to attain the target of 20, all eligible children in the last household were measured.

¹³ For ACF South Sudan: The number of children that can accurately be measured per day per team.

Additional qualitative data was gathered through formal and informal interviews, structured questionnaires and observations. This information was used to determine the immediate, underlying and basic causes of malnutrition within the location.

.IV.3. Data Collection

Training formed an important foundation of the data collection exercise. Standardization and pilot tests were utilized with lots of emphasis on practical sessions.

The anthropometric questionnaire was administered to all eligible households till a target of 20 children per cluster was obtained. Households without eligible children remained a part of the “sample” that contributed zero children to the nutritional part of the survey. Children with MUAC less than 120 were referred to the proximate Medair nutrition feeding program.

The mortality questionnaire was administered in all households irrespective of whether they had eligible children or not. 145 persons present per cluster were targeted.

An anthropometric questionnaire (*See appendix IX: 2*) was used to gather the following data:

- ☞ **Age:** Estimated with the help of a local calendar of events (*See appendix IX: 5*).
- ☞ **Gender:** Male or female
- ☞ **Weight:** Targeted children were weighed without clothes using a SALTER balance of 25kg (precision of 100g).
- ☞ **Height:** Children were measured on a measuring board (precision of 0.1cm). Children less than 85cm were measured lying down, while those greater than or equal to 85cm were measured standing up.
- ☞ **Mid-Upper Arm Circumference:** MUAC was measured at the mid-point of the left upper arm (precision of 0.1cm). UNICEF MUAC tapes were used.
- ☞ **Bilateral oedema:** Assessed by the application of normal thumb pressure for at least 3 seconds to both feet.
- ☞ **Measles vaccination:** Assessed by checking for measles vaccination on EPI cards and probing caretakers.
- ☞ **Household status:** Information was sought on the duration of stay in that area. This was used to determine whether households were residents, displaced, returnees or temporarily in the area. 6 months stay and reason for movement were used as criteria.

.IV.4. Indicators, Guidelines, and Formula's Used

.IV.4.1. Acute Malnutrition

➤ **Weight for Height Index**

Weight-for-height indicator identifies wasted children. It is normally very useful when exact ages of children are difficult to determine. This index is appropriate when examining short-term effects brought about by seasonal changes in food supply or short-term nutritional stress as a result of illness.

Acute malnutrition rates were estimated from the weight for height (W/H) index values as well as presence of bilateral oedema. Findings were then compared to the NCHS¹⁴ references and WHO¹⁵ standards 2005. The result was then expressed in both Z-scores and percentage of the median.

Other than having a true statistical meaning; expression in z- score conveys malnutrition rates more precisely and allows for inter-study comparison. The percentage of the median on the other hand, estimates weight deficits more accurately and is commonly used in determining eligible children for targeted feeding programs

The following guidelines were thus used in expression of results in Z-score and percentage of the median.

Guidelines for results expressed in Z-score:

- ☞ Severe malnutrition: - WFH < -3 SD and/or existing bilateral oedema on the child's lower limbs.

¹⁴ NCHS: National Center for Health Statistics (1977) NCHS growth curves for children birth-18 years. United States. Vital Health Statistics. 165, 11-74.

¹⁵ WHO Child Growth Standards: length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age. Methods and development. Geneva, Switzerland: World Health Organization, 2006.

- ↔ Moderate malnutrition: - WFH < -2 SD and ≥ -3 SD and no oedema.
- ↔ Global acute malnutrition: - WFH < -2 SD and/or existing bilateral oedema.

Guidelines for results expressed in percentage of median:

- ↔ Severe malnutrition: WFH < 70 % and/or existing bilateral oedema on the child’s lower limbs.
- ↔ Moderate malnutrition: WFH < 80 % and ≥ 70 % and no oedema.
- ↔ Global acute malnutrition: WFH <80% and/or existing bilateral oedema

➤ **Children’s Mid-Upper Arm Circumference (MUAC)**

MUAC is a good predictor of mortality. In ACF protocols it is a malnutrition indicator in children taller than 65 cm. As such, MUAC measurements of the assessed children were presented in various height groups of **<75cm, ≥75cm - < 90cm and ≥ 90 cm**.

MUAC Guidelines

MUAC < 110 mm and/or oedema	severe malnutrition and high risk of mortality
MUAC ≥ 110 mm and <120 mm	Moderate malnutrition and risk of mortality
MUAC ≥ 120 mm and <125 mm	High risk of malnutrition
MUAC ≥ 125 mm and <135 mm	Moderate risk of malnutrition
MUAC ≥ 135	Adequate’ nutritional status

.IV.4.2. Mortality

SMART methodology was utilized in mortality data collection over a 98 days recall period.

A common event was used to identify the beginning of the recall period. During 28th and 29th of July 2008 the communities in Melut and Paloch commemorated the death of Dr. John Garang (the former president of South Sudan) by conducting special ceremonies that were widely renowned. For effective estimation of recall period, another event that was more familiar to the communities of Galdora and Panamdit Payams was also, used. The event which also happened at the same time as Garang death commemoration involved destruction of sorghum and maize crop in severe flooding.

The data gathered was then used to calculate the crude mortality rate (**See Appendix .IX.3 and .IX.4 for mortality questionnaires**). ENA for SMART Software (October 2007 version) was used in these calculations. To obtain the CMR the formula below was applied.

Crude Mortality Rate (CMR) = 10,000/a*f/ (b+f/2-e/2+d/2-c/2), where:

- a** = Number of recall days (98)
- b** = Number of current household residents
- c** = Number of people who joined household
- d** = Number of people who left household
- e** = Number of births during recall
- f** = Number of deaths during recall period

The result is expressed per 10,000 people / day.

Thresholds are defined as follows¹⁶:

Total CMR:

- Alert level: 1/10,000 people/day
- Emergency level: 2/10,000 people/day

Under five CMR:

- Alert level: 2/10,000 people/day
- Emergency level: 4/10,000 people/day

¹⁶ Health and nutrition information systems among refugees and displaced persons, Workshop report on refugee’s nutrition, ACC / SCN, Nov 95.

.IV.5. Field Work

This was implemented in the entire Melut County encompassing 6 administrative Payams from 24th October to 13th November. Prior training of surveyors, standardization test and pilot survey were undertaken. 4 teams of three surveyors each were used to collect anthropometric and mortality data while qualitative data was collected by all the ACF team members with assistance of one trained surveyor. Data quality was ensured by regular inputting of data into ENA software after each data collection exercise to detect mistakes early for easy correction.

It is worth noting that one cluster (cluster number 30) was not done as initially planned because of border disagreement between Maban and Melut County. The planned sample size was still achievable and hence not necessary to substitute the cluster in view of the constraints. Therefore, a total of 30 clusters were implemented. The expected present now sample in mortality survey was also achieved.

.IV.6. Data Analysis

Anthropometric and mortality data collected from the field was inputted into ENA for SMART software (October 2007 version) for analysis. The qualitative data sets were analyzed in SPSS version 12.0. Microsoft Excel 2003 was used to carry out additional analysis on quantitative data.

.V. RESULTS OF THE QUALITATIVE ASSESSMENT

.V.1. Socio- demographic Characteristics of the Respondents

Melut is centrally located in Upper Nile state, and has road and river connections that make it favourable for trading activities and human settlement. The county is situated in the Nile Sobat livelihood zone along the east of the Nile corridor. The region has black cotton loam soil with acacia trees and elephant grass forming the predominant vegetative cover. Generally, the soil structure coupled with the areas' flat terrain predispose it to flooding more so during the wet season.

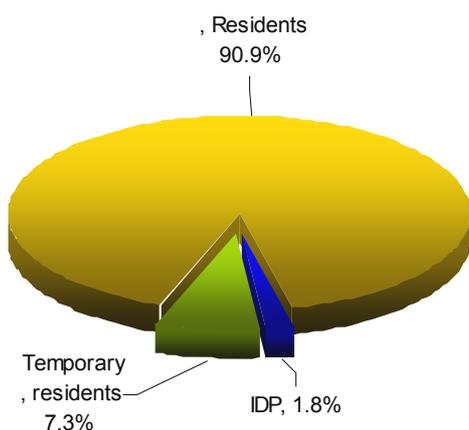
The administrative Paloch Payam is situated at an intersection of transit roads from Maaban and Melut to Khartoum city in the North. Melut town on the other hand is situated along river Nile and has a harbour as well as county administrative offices. The human settlements tend to be located along River Nile and roads due to accessibility to water and other resources. The oil processing plant owned by *Petro-dar* is located in Paloch and offers employment opportunities to denizens of Melut County. Due to its cosmopolitan nature Melut county is resided by Dinka, Shilluk, Burun Furs, Nubians and Nuers.

In the year 2008, the total number of registered IDPs and returnees was 5901 (1181 households)¹⁷. The people had mainly come from Senar, Umjer and Kenana among other areas in Sudan and the returnees were temporarily accommodated at school premises. They were also allocated land North-west of Melut hospital in an area known as *Hai Khartoum*. Many persons had integrated with the rest of the community.

Qualitative information was gathered in 55 households using structured questionnaires. Majority (90.9%) of the interviewees during the survey were residents while 7.3% and 1.8% represented the temporary residents and IDPs respectively. This is illustrated by **figure 1** below. Females formed the bulk of the respondents (89.1%) while male respondents were 10.9%.

The temporary residents had either come to the town areas to seek medical attention, settle near towns due to food accessibility, settle in their work places or had come to visit their kin.

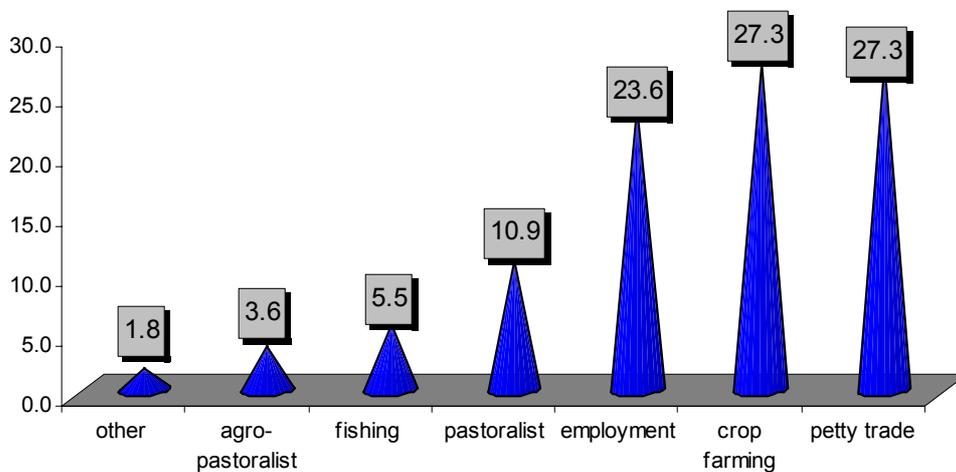
Figure 1: Status of households



¹⁷ Melut SSRRC office returnee/IDPs registrations

Crop farming was practiced by (27.3%) of the interviewed households. At the time of the assessment, they looked forward to harvest their crop in the following month of December 2008. Petty trade (27.3%) and employment (23.6%) were main livelihood sources. Agro-pastoralism was represented by 3.6% of the interviewed households. Trading and employment have gained more prominence compared to agro pastoralism. Cattle diseases forced households to venger into other sources of livelihood. Availability of markets have facilitated sale of livestock to earn cash to meet basic needs. The major forms of employment were found in government, UN agencies, and commercial farms located on the edges of Melut County near Maaban and Renk and to a large extent the oil company *Petro-Dar*. Major trading activities were selling food, non-food items, cutting and selling grass, charcoal and wood, local brewing, selling of livestock and livestock products. Fishing, just as had been unveiled in previous nutrition assessment, continued to be lowly exploited by the community. The livelihoods are clearly illustrated in figure 2 below.

Figure 2: Main livelihoods of households in percentages of the households answers



The major sources of income in the interviewed households were Petty trading, permanent jobs and sale of crops. Households that did not have an income source were (9.1%) and entirely depended on their previous crop harvests. Casual labor is available seasonally in commercial farms and is usually in the form of field preparation activities prior to harvest then followed by harvesting itself. At the time of the survey a few of the interviewed households were engaged in casual labour.

.V.2. Food Security

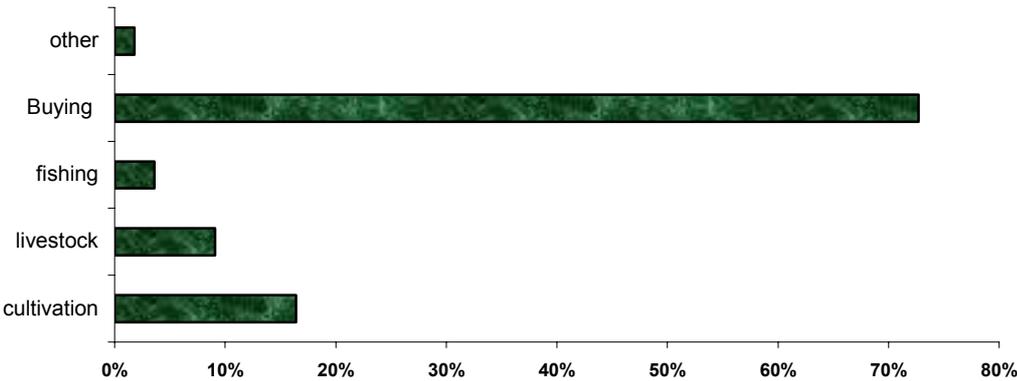
Melut County food security is derived from three main areas thus, cultivated food by the households, food purchases and to a lesser extent food aid by UN agencies or government of South Sudan. In the year 2008 a significant number of households cultivated sorghum, maize, groundnuts, Sim-sim and beans. The planting season was between May and June. Two varieties of sorghum were planted and harvested at slightly different times as part of a strategy to ensure food availability throughout the year. As such, the early maturing crop (white sorghum) harvests were expected in late November and early December 2008 while the earliest harvest of the late maturing variety (Red sorghum) was expected in January 2009. Cultivation was influenced by household capacity to manage land owned. It was also mainly practiced in areas away from the homesteads using traditional hoes. Few farmers who had large cultivation areas afforded mechanized farming using hired tractors which was arranged individually between a farmer and the office of Director of Agriculture at a cost. The cultivation areas of most households which were estimated in terms of *Feddans*¹⁸ were not sufficient to produce adequate harvests to last through the hunger gap period (traditionally between March and August). Discussions with key community leaders revealed that small land sizes of less than four *feddans* were cultivated by most households. Households were constrained by the 'difficult to dig terrain' that hindered expansion of the farm sizes, labour, flooding (Galdora and Panamdit payams), attacks by birds and inappropriate technology. The use of ox - assisted ploughing and mechanised cultivation is a

¹⁸ Unit of Land equivalent to 4,200 square metres

possible alternative for increasing production. Mechanised farming is available but at a cost not affordable by most community members. This year the department of agriculture has not been able to contain bird attacks as compared to last year.

The main sources of food for the households in Melut were largely dependent on livelihoods of the community. Given that the majority of the interviewed households depended on diverse forms of trade and employment, it explains why most households depended on purchased food. This is illustrated by **figure 3** below which shows that among the interviewed households 72.7% bought their current food supplies from the market, 16.4% from cultivated crop while 9.1% of the households obtained it from their livestock. Other sources of food were from relatives. Only 16.4% of the households were self-sufficient in terms of cultivation.

Figure 3: sources of Food in the household

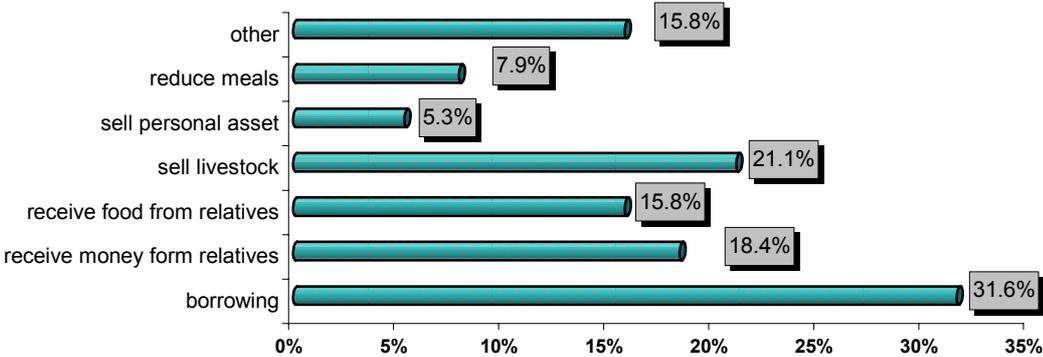


During the hunger gap period (March - August), most households had exhausted the harvested stocks and depended on buying from the market. However, increase in prices limited the access to food even if available on the market. The chronic food insecurity in the face of food availability on the main markets results from structural vulnerabilities such as poor road connectivity and conditions especially in the rainy season. According to FEWSNET August 2008, food security conditions remained normal especially near county headquarters (in Melut and Paloch Payam). Nevertheless, areas far from the market experienced high sorghum prices due to transportation problems associated with civil insecurity and wet road conditions.

Through the office of the SSRRC in Melut, Humanitarian commission under auspices of ministry of humanitarian Aid in Sudan, a total of 1500 bags of assorted sorghum, cow peas and sugar, 500 cartons of oil as well as 250 mosquito nets were distributed to all the administrative Payams of Melut County.

To mitigate the effects of inadequate food, households adopted coping strategies such as borrowing money to buy food (31.6%), sale of livestock (21.1%), remittance (18.4%). All the coping mechanisms are illustrated in **figure 4** below.

Figure 4: households' coping mechanisms



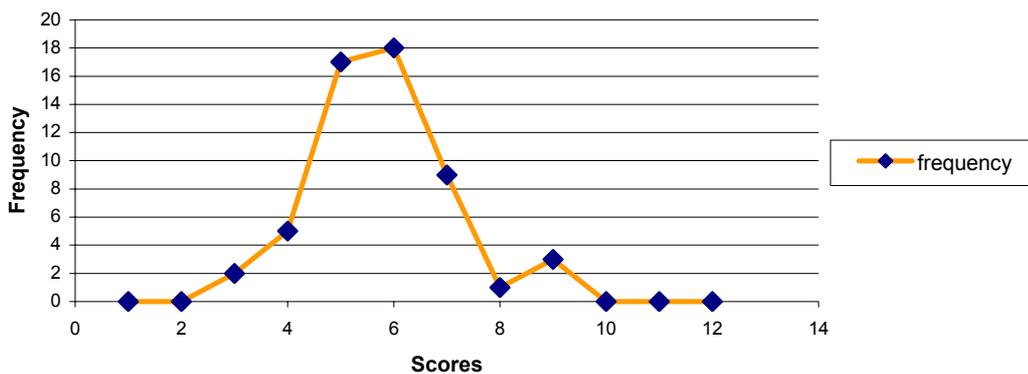
The consumption of green maize was a short term cushion against food insecurity. Households had not resorted to consumption of naturally occurring uncultivated foods (NOUFs) as a coping mechanism but rather consumed it as part of their diet.

Majority of the interviewed households had food stocks that would last less than a month (80.0%), while (10.9%) of the household's stocks would last between 1 and 3 months. Poor harvests were expected due to negative effects of flooding, bird attacks and other aggravating factors. FEWSNET September 2008, reported that the Crop Food Supply Assessment Mission (CFSAM) in October 2008 will help to analyze food situation.

Fishing activity was not fully exploited despite proximity to River Nile. Among the assessed households only 7.3% engaged in fishing. The reasons cited for not doing fishing were lack of fishing equipment (51.0%), lack of labour (49.0%) and lack of access to fishing point (2.0%). The equipment used for fishing included; fishing nets, canoes, spears and hooks. Most community members consumed fish sold in the market rather than their own fishing. Therefore, as a strategy for food diversity, the community needs support through training, provision of equipment and adherence to regulatory mechanisms put in place by the government to guide fishing

The community in Melut especially in rural areas reared livestock as part of their livelihood. At the time of assessment, there was no organization offering prevention or treatment of cattle diseases; however, most people utilize the government system set in place for provision of such services at a fee. There are approximately 12 animal community vaccinators in Melut County.

Figure 5: Food diversity score distribution



The household dietary diversity score is a measure of food access within the household. In **figure 5** most households interviewed had a dietary diversity score of 5 and 6 meaning that they were accessible to approximately half of the 12 food groups. Cereals -sorghum and maize were consumed by all households. Food consumption frequency showed that; 96.4%, 92.7%, 61.8%, 60.0%, 56.4%, 49.1%, 34.5% of the interviewed households consumed oils/fats, sugar, vegetables-mainly NOUFs¹⁹; spices, condiments and beverages; fish, milk and milk products, and meat within the previous 24 hours respectively.

The unveiled global acute malnutrition (GAM) can be described as critical and above the threshold of 15.0% for South Sudan. However, the severe acute malnutrition (SAM) rates were below the threshold of 4 %. There is no significant difference between the current results and March 2007.

Primary health care and water and sanitation programs run by Medair in various parts of Melut County have contributed to control of common diseases and access to safe water. Food distributions in the month of July and August by government office coupled with availability of green maize and sorghum in some pockets of Melut County, kinship ties and adoption of non destructive early coping strategies played a role in preventing malnutrition.

¹⁹ Naturally occurring uncultivated foods.

.V.3. Health and Nutrition

Health services in Melut County are mainly offered by Medair humanitarian organization, Melut county hospital as well as private practitioners. The county hospital is run under national health medical insurance.

Besides Melut Payam primary health care centre, Medair has out reach primary health units in Paloch, Pariak, Galdora, Panamdit and Wunamom Payams. In Galdora the PHCUs are located in Galdora centre, Thiangrial and Payuer (Malek). Each PHCC has 1 medical assistant, 1 certified nurse, 1 nurse assistant, 5 community health workers (CHWs), 1 pharmacy technician, 5 EPI workers and one Nutrition worker. Each PHCU has 2 CHWs and 3 EPI workers. They offer preventive services that include expanded program on immunization (EPI), growth monitoring for children below five years, ante-natal, post-natal, reproductive health and child delivery (maternity) services. Curative services involve minor surgeries and out-patient treatment. The nutrition treatment program has nutrition screening, as well as treatment of severely and moderately malnourished children. There is one nutrition feeding centre integrated within the Melut PHCC with an objective of treating medical complications of referred malnourished children. A health capacity building program is also implemented through training of CHWs.

Melut County hospital has 2 doctors, 2 medical assistants, 5 certified nurses (with 1 nurse in each of Paloch and Galdora clinics), 3 certified midwives, 2 laboratory technicians, 5 administrative assistants and 1 pharmacy assistant. The hospital also offers preventive and curative health services which include laboratory investigations, EPI services, and minor surgeries not requiring major anesthesia, reproductive health, maternity, ante-natal and growth monitoring services. The hospital does not have a blood bank. Melut County hospital serves as a referral hospital for its clinics in Paloch and Galdora. Health services at Melut hospital are offered at a fee except in extreme circumstances where patients cannot afford to pay. On the other hand Medair offers services at no cost.

The commonest causes of morbidity are respiratory tract infections, diarrheal diseases, Malaria, snake bites, malnutrition and to an extent, trauma. Other illnesses are skin and eye infections. These illnesses have also been cited to be major causes of mortality some of which result to sudden deaths²⁰. High prevalence of malaria amongst households could be linked to the settlement of populations near water bodies and bushes that provide favorable breeding grounds for mosquitoes. Nevertheless, observations revealed that most households had mosquito nets. It is paramount to sustain proper use and adequacy of the mosquito nets to ward off malaria attacks to vulnerable groups such as pregnant mothers and children under-five years, besides the general population. Diarrhea incidences on the other hand could be attributed to consumption of untreated water as well as open defecation near the river banks. The presence of eye diseases is closely linked to poor eye caring practices that enable houseflies to transmit eyes diseases.

The last immunization campaign was conducted in the month of October and November 2008. Coverage of 95% of the villages in Melut was attained²¹. The ACF nutrition survey which was completed in the same month showed measles immunization coverage of 76.3%. Though the immunization coverage falls below the sphere recommended standards of 90% the results indicated continued efforts by State Ministry of Health (SMoH) and Medair organization to widen coverage to rural villages. The measles immunization coverage in 2007 nutrition survey was 52.0%. Other immunizations given together with measles were Polio, DPT and BCG.

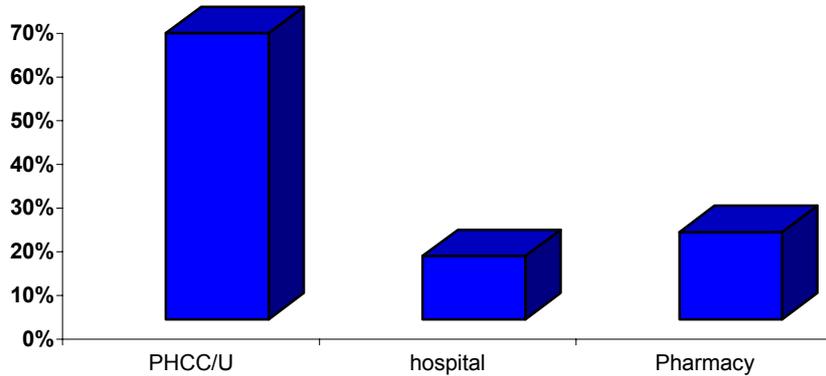
The mortality rates unveiled in the assessment are 0.80(0.41-1.19) and 0.23(0.00-0.59) deaths per 10000persons/day for crude death rate (CDR) and 0-5 death rate respectively. Both rates were below the alert levels of 1 and 2 deaths per 10000 persons per day for CDR and U5DR²² respectively. Majority of the community members were accessible to health services at Payam level. In addition, most households interviewed (65.5%) preferred to seek medical attention from the formal health services first when they fell sick. 20.0% and 14.5% sought medical attention from pharmacy and hospital respectively as illustrated in **figure 6** below.

²⁰ Medair PHCC and Melut county hospital, Melut Payam.

²¹ Medair PHCC and Melut county hospital, Melut Payam.

²² SPHERE project 2004

Figure 6: Primary location where medical attention is sought



Melut hospital experienced problems in record keeping, supply and expiry of drugs, and shortage of trained staff. Melut PHCC consultations per day were beyond the SPHERE standards of 50 consultations per day (out-patients) for one medical doctor. This meant that the health services were over utilized and this was also the case at Paloch PHCU²³. People preferred Medair PHCCs where services were offered free of charge compared to Melut hospital where patients were mostly expected to pay a fee to access services.

Half of the interviewed households (54.5%) were able to access the nearest health facility within 30 minutes walk, 25.5% accessed it within 30 minutes to 1 hour while 20% of the households spent more than one hour. Access is usually limited, during rainy season due to bad roads and sticky soil.

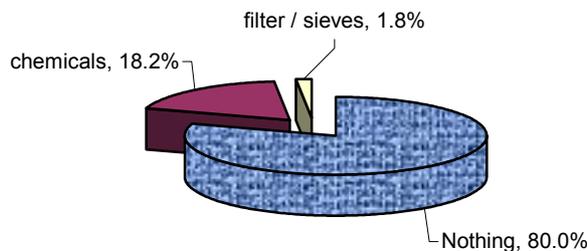
The conditions which contributed to malnutrition include prevalence of diseases, inability to access health care and late seeking of treatment.

.V.4. Water and Sanitation

The main objectives of water supply and sanitation programs are to reduce the transmission of faeco-oral diseases and exposure to disease-bearing vectors through promotion of good hygiene practices, provision of safe drinking water, reduction of environmental health risks and by establishing the conditions that allow people to live with good health, dignity, comfort and security²⁴.

The main water source in Melut is the river. Communities also rely on boreholes, water delivered by Oil Company Lorries and water peddled by donkey carts. 40.0 % of the interviewed households depended on river water, 16.4% on borehole water while 43.6% consumed water delivered by lorry trucks and donkey carts. Half of the households spent less than 30 minutes to and from the water point. 80.0% of all household interviewed did nothing to the water before consuming as illustrated in the **figure 7** below.

Figure 7: Method of water treatment of water before drinking



²³ Medair Melut PHCC Doctor in charge.

²⁴ Sphere project 2004

The risk of consuming untreated water includes gastro-intestinal infections that directly cause malnutrition. Water collection points were used by cattle besides human beings. Within cosmopolitan areas, it is at the water point that many activities such as docking of big and small boats, human bathing and washing of clothes occurred. Therefore, the water that was collected at these points and meant for the household use was polluted. This situation clearly explains prevalence of diarrheal diseases at most times of the year and increasingly during rainy season and, therefore, creates a need to ensure that people have the necessary information, knowledge and understanding to prevent water- and sanitation-related disease.

Households prefer to fetch untreated water directly from the river most of the time to avoid long waiting time²⁵. Long times to access clean water at the Melut water plant was estimated to exceed two hours. Queuing time at a water source should not be more than 15 minutes²⁶. Water delivered by the oil tracks was directly obtained from the river and emptied into water holding containers strategically placed in settlements particularly along the roads. Observation revealed high turbidity of the water in the state that it was consumed within the household. It is also worth noting that, analysis of accurate amounts of water consumed within the household was not plausible as most of the household members undertook household chores such as washing clothes near the river bank where they would access enough water to do so.

Appropriate human waste disposal is one of disease control measures. The practice was not satisfactory in Melut County as latrines were owned by 38.2% implying that the rest of the populace used indiscriminate disposal of human waste. Observation revealed open defecation near the river with the stool of young children either being left on the ground or loosely buried in the yard. This practice predisposed the community to water borne diseases more so during the rainy seasons when the waste flowed into the rivers; the community's main water source.

It was evident that the population recognized the importance of owning a latrine but faced a challenge of construction due to unstable soil structure. In some locations pit latrines with plastic slabs and elongated joined drums were used. However, the structures suffered from "sinking phenomenon" that led to collapsing of the latrines. In rural areas people still considered using a latrine a less culturally acceptable practice and only used it at night, while in the daytime the bush was often used²⁷.

Despite the fact that soap was available almost in half of the households assessed (47.3%) and households admitted that they used soap to wash hands after visiting the toilet or before feeding the children, it was not easily seen. Utensils used for preparation and service of food were rarely washed with soap. The utensils were allowed to dry on ground predisposing them to domestic pets like dogs. Households were implored to use ash from fire place to clean utensils beside the soap and also to construct simple raised racks that allow drying thoroughly in the strong sun.

.V.5. Maternal and Child care practices

In Melut just as in most parts of Southern Sudan females are responsible for fending of the children, running a number of errands such as cutting firewood, fetching water and preparing meals. "Out of home" chores greatly contributed to unsatisfactory maternal and child care practices as mothers engaged in early coping mechanisms to earn income so as to buy food for the family. Lack of adequate foods to meet increased physiological needs of the mothers especially during pregnancy predispose them to poor nutritional status.

Initiation of breastfeeding after delivery was timely. Most (78.2%) households reported to initiate breastfeeding within 30 minutes after delivery. 12.7% and 7.3% of the interviewed households did so after more than an hour and more than one day respectively. Mothers who were not able to breastfeed immediately cited inadequate breast milk production and delivery complications.

Among the interviewed households who were breastfeeding their children, 25.6% breastfed on demand while majority 74.4% breastfed on arranged times of the day. This statistic supports the fact that mothers were majorly involved in activities outside their homes which constrained breastfeeding on demand. This is because breastfeeding was dependent on the mother's workload and availability. There were also instances where children below 6 months were fed on cow's milk by their older siblings or caretakers.

²⁵ ACF, SSRRC and key community leaders' discussion.

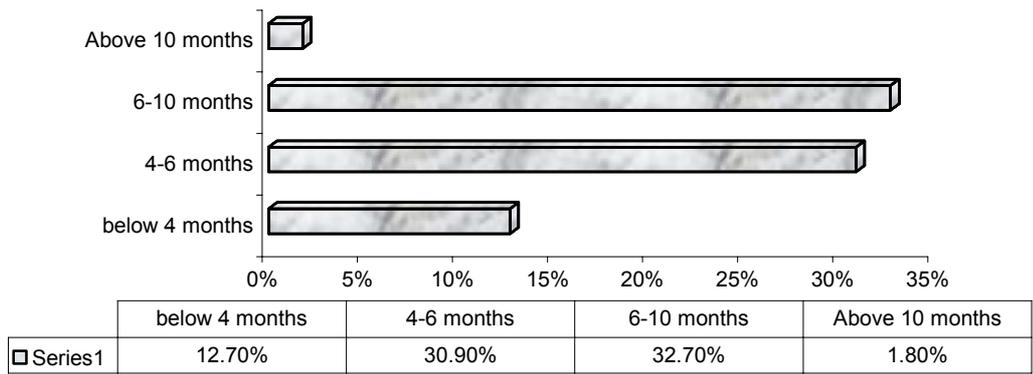
²⁶ Sphere project, 2004

²⁷ ACF, SSRRC and key community leaders' discussion.

WHO recommends introduction of complementary foods beginning 6 months after birth with continued breastfeeding up to 2 years of child’s age. Exclusive breastfeeding for the first six months of life is recognized as the optimal feeding practice to enhance child survival, growth and development. Exclusive breastfeeding for six months has a strong protective effect against diarrhea by eliminating an infant's exposure to waterborne pathogens. It also provides protective antibodies against diarrhea and other diseases.

Figure 8 below illustrates complementary feeding in the surveyed location. The figures reveal disparities in observing the WHO universal recommendations in introduction of complementary foods. Diluted cows and goat’s milk and water were introduced to children below 4 months of age.

Figure 8: Complimentary feeding in Melut County



In general, foods given to children aged 6-59 months included mother’s milk, cow/goat milk and porridge made from sorghum. The other meals made from sorghum and fed to children are *akop* (made from balls of sorghum), and *kisra* (pancakes made from sorghum).

Vulnerable groups such as children less than five years of age, expectant and lactating mothers have increased calorific demands to meet their recommended daily allowances. In the households that had children below five years, most were fed twice; 52.9%, thrice; 13.7% and more than three times; 27.5%. No specialized diets were fed to the expectant and lactating mothers.

Acceptable hygiene practices in food preparation within households were hardly observed. Food was exposed to houseflies, dust and pets. This was even worse when mothers left the care of young ones in the hands of the older children. The water used for preparation of households’ food and that of children in particular was not treated. Children were also observed to be eating with untidy hands, thus being put at risk of contracting diseases such as diarrhea. Though households indicated throwing or burying children’s stool outside the households’ yards, it was common to see young children defecating not very far from their homesteads and in areas used as play grounds.

.V.6. Education

Provision of formal and informal education is a long term objective that will ensure that necessary knowledge on livelihood skills, health and nutrition are imparted. Education in Melut is offered under South Sudan Ministry of Education. In Melut County there are 1 secondary school and 2 primary schools in Melut Payam, 1 primary school in Paloch, 2 primary schools in Wunamom, 3 primary schools in each Bemichuk, Panamdit and Galdora Payam. Good shepherd, Episcopal, Sido and Gaza Jokou Primary schools in Melut Payam are partly sponsored by government in provision of teachers while other sponsorship is from Church. Serving in Mission (SIM) sponsors a primary school in Thiagriial Boma of Panamdit Payam. UNICEF has supported some primary schools with stationary and WFP provides school feeding programs for some schools in the year 2008. Majority of the community are accessible to the schools and they recognize the importance of taking children through the education system. Northern Upper Nile consortium has enabled building of 3 schools in 2008 while *Petro-Dar*, the oil company has constructed primary school in Galdora in support of the Government of South Sudan in Melut.

.V.7. Actions Taken by NGO's and other partners

- **MEDAIR:** The Agency provides emergency medical and water assistance for outbreaks, large people movements, and nutritional emergencies in a number of locations across the region as well as improving access to primary health care and safe water sources in Melut, Upper Nile state. The organization has been operating its programs since year 2007
- **NORTHERN-UPPERNILE CONSORTIUM (NUNC):** The consortium which has collective objectives comprises of TEARFUND, FAR (Fellowship for African Relief), Stromme Foundation, Mercy corps, and ECS (Episcopal Church of Sudan) with each organization having different programs in Melut County and other Upper-Nile counties of Maaban and Renk. The agency is based in Renk. Their objectives are to initiate rehabilitation and recovery programs which are developmental in nature to cover education, health, food security, water and sanitation. They initiated the following programs in the year 2008.

Food security

The agency has a program on animal husbandry with an objective of increasing cattle yield and sustainability of resilient breeds of animals. The program also distributes seeds and traditional farming implements in all the three counties of its operation.

Education

In the month of January the agency began construction of 3 primary schools with a plan to hand them over to the government. These were in Melut, Panamdit and Bemichuk Payams. Currently the agency has sponsored ongoing computer training in Melut Payam.

UNIMIS: It is mandated to closely monitor and observe peace progress and any potential security events happening within Melut County.

MELUT HOSPITAL: The hospital has been run by the national health insurance since January 2006, and the insurance provides drugs and remunerates staff.

MINISTRY OF AGRICULTURE AND FORESTRY: The government of South Sudan has a department of farming stationed in Paloch and headed by Director of Agriculture. The objectives of this office are to allocate land for cultivation, offer agricultural extension services with a primary theme of advising farmers on best farming practices and reporting severe crop attacks.

MELUT WOMEN ASSOCIATION: It is an established informal group of women which has objective of running small income generating activities and amalgamating their returns to support each member. Some of the proposed new activities that need support are gardening, training in fishing and farming activities and supply of seeds and equipments.

.VI. RESULTS OF THE ANTHROPOMETRIC SURVEY

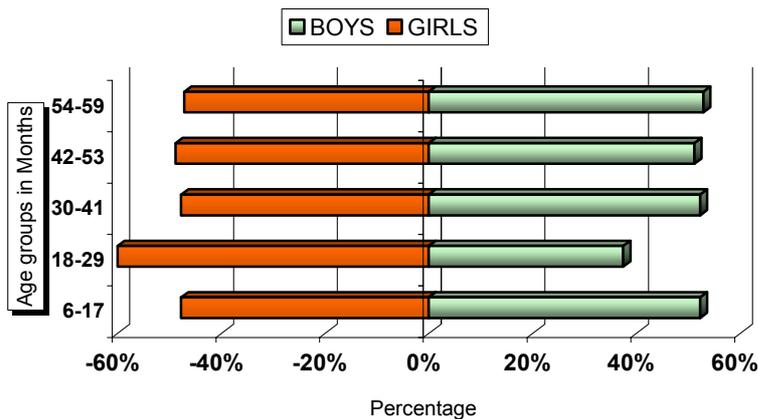
.VI.1. Distribution by Age and Sex

Table 5: Distribution by Age and Sex

AGE (In months)	BOYS		GIRLS		TOTAL		Sex Ratio
	N	%	N	%	N	%	
6-17	79	52.3	72	47.7	151	24.4	1.1
18-29	54	37.5	90	62.5	144	23.3	0.6
30-41	78	52.3	71	47.7	149	24.1	1.1
42-53	63	51.2	60	48.8	123	19.9	1.0
54-59	27	52.9	24	47.1	51	8.3	1.1
Total	301	48.7	317	51.3	618	100.0	0.9

An overall sex ratio of 0.9 falls within the acceptable ranges of ideally 0.8 – 1.2. Slight imbalances were noted in age group 18-29 months. This is attributed to use of a local calendar of events which is prone to recall bias.

Figure 9 : Distribution by Age and Sex



.VI.2. Anthropometrics Analysis

.VI.2.1. Acute Malnutrition defined in Weight for Height

➤ Distribution of Acute Malnutrition in Z-Scores

Table 6: Weight for Height Distribution by Z-scores and or Oedema (NCHS 1977 reference)

Age group (In months)	N	< -3 SD		≥ -3 SD & < -2 SD		≥ -2 SD		Oedema	
		N	%	N	%	N	%	N	%
6-17	151	4	2.6	29	19.2	118	78.1	0	0.0
18-29	144	2	1.4	34	23.6	108	75.0	0	0.0
30-41	148	4	2.7	24	16.2	120	81.1	0	0.0
42-53	123	1	0.8	20	16.3	102	82.9	0	0.0
54-59	51	0	0.0	8	15.7	43	84.3	0	0.0
Total	617	11	1.8	115	18.6	491	79.6	0	0.0

Table 7: Weight for Height vs. Oedema in Z-scores (NCHS 1977 reference)

WEIGHT FOR HEIGHT		< -3 SD	≥ -3 SD
OEDEMA	YES	Marasmus/Kwashiorkor 0 (0.0 %)	Kwashiorkor 0 (0.0%)
	NO	Marasmus 11 (1.8 %)	No malnutrition 606 (98.2 %)

A standard deviation of 0.81 was unveiled. This fell within the acceptable range of 0.80 and 1.20, indicating that the sample was representative.

The WHZ graph shows a left displacement of the sample curve. The mean of the sample population was -1.34, signaling critical nutritional status.

Figure 10: Weight-for-Height Z-scores distribution

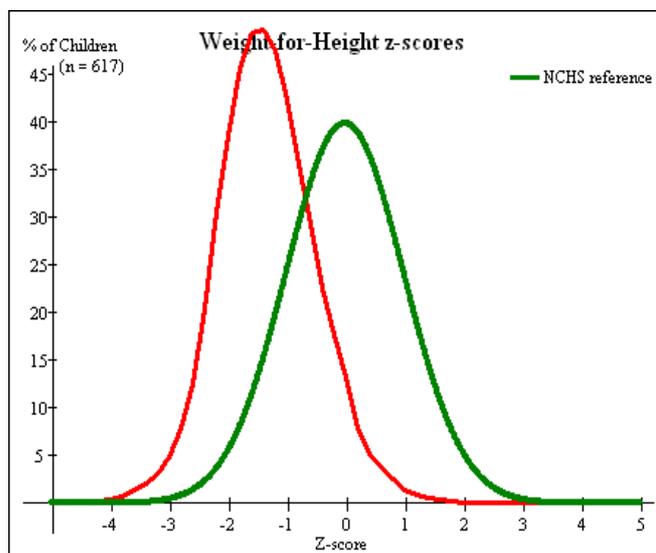


Table 8: GAM and SAM in Z-scores in NCHS AND WHO references

	NCHS Reference	WHO Reference
Global Acute Malnutrition	20.4% (17.2%-23.4%)	18.8% (15.3% - 22.2%)
Severe Acute Malnutrition	1.8% (0.7% - 2.9%)	2.3% (1.2% - 3.4%)

➤ **Distribution of Acute Malnutrition in Percentage of the Median**

Table 9: Distribution by Weight/Height by Age in percentage of the median and oedema (NCHS reference)

Age (in months)	N	< 70%		≥ 70% & < 80%		≥ 80%		Oedema	
		N	%	N	%	N	%	N	%
6-17	151	2	1.3	16	10.6	133	88.1	0	0.0
18-29	144	0	0.0	15	10.4	129	89.6	0	0.0
30-41	148	2	1.4	11	7.4	135	91.2	0	0.0
42-53	123	0	0.0	5	4.1	118	95.9	0	0.0
54-59	51	0	0.0	3	5.9	48	94.1	0	0.0
Total	617	4	0.6	50	8.1	563	91.2	0	0.0

Table 10: Weight for Height vs. Oedema in percentage of median (NCHS reference)

Weight for height		< 70%	≥ 70%
Oedema	YES	Marasmus/Kwashiorkor 0 (0.0%)	Kwashiorkor 0 (0.0%)
	NO	Marasmus 4 (0.6%)	No malnutrition 613 (99.4%)

Table 11: Global and Severe Acute Malnutrition in NCHS and WHO references in % of the median

	NCHS Reference	WHO Reference
Global Acute Malnutrition	8.8% (5.7%-11.9%)	3.9% (2.4% - 5.4%)
Severe Acute Malnutrition	0.6% (0.0% - 1.4%)	0.0% (0.0%-0.0%)

.VI.2.2. Risk of Mortality: Children's MUAC

Table 12: MUAC Distribution

MUAC (mm)	< 75 cm height		>=75 – < 90 cm Height		≥ 90 cm height		Total	
	N	%	N	%	N	%	N	%
< 110 or oedema	5	4.3	1	0.4	0	0	6	1
≥110 MUAC<120	11	9.6	2	0.9	1	0.4	14	2.3
≥120 MUAC<125	11	9.6	11	4.7	0	0	22	3.6
≥125 MUAC <135	35	30.4	63	27.2	17	5.5	115	18.6
MUAC ≥ 135	53	46.1	155	66.8	253	93.4	461	74.6
TOTAL	115	18.6	232	37.5	271	43.9	618	100

.VI.3. Measles Vaccination Coverage

Table 13: Measles Vaccination Coverage

Measles vaccination	N	%
Proved by Card	198	33.3
According to the mother/caretaker	256	43.0
Not immunized	141	23.7
Total	595	100.0

.VI.4. Household Status

Table 14: Household status

Status	N	%
Residents	366	94.6
Internally Displaced	1	0.3
Temporary Residents (on transit)	18	4.6
Returnee	2	0.5
Total	387	100.0

.VI.5. Composition of the households

A total of 582 households were assessed during the mortality survey

Table 15: Household Composition

Age group	N	%	Average per household
Under 5 years	892	19.6%	1.5
Adults	3670	80.4%	5.3
Total	4562	100.0%	6.3

.VII. RESULTS OF THE RETROSPECTIVE MORTALITY SURVEY

A 98 days recall period was utilized during data collection with the main recall events being 28th and 29th of July 2008. The communities in Melut and Paloch commemorated the death of Dr. John Garang (the former president of South Sudan) by conducting special ceremonies that were widely renowned. For effective estimation of recall period, another event that was more familiar to the communities of Galdora and Panamdit Payams was also, used. The event which also happened at the same time as Garang death was destruction of sorghum and maize crop by severe floods.

As at the time of the survey, a total of 4562 were present in the 582 households assessed; 892 of them being children under five years of age.

The demographic data below was also gathered from these households.

- 151 people had joined the households, 30 of them being children under five years of age
- 495 persons had left the households, 65 of them being children below 5 years of age
- 75 births
- 37 deaths were reported; 2 being children below five years of age

0.80 [0.41 – 1.19] /10,000/day and 0.23 [0.00 – 0.59] /10,000/day crude and under five mortality rates were unveiled respectively. Analytically, both findings fall below the mortality alert and emergency levels.

.VIII. CONCLUSION

The ACF nutritional anthropometric survey unveiled GAM findings of 20.4% (17.2%-23.6%) and SAM of 1.8% (0.7%-2.9%). There is no significant difference between the current results and those of March 2007. The GAM is above emergency threshold of 15.0%, and could be attributed to the following:

Disease prevalence and access to health facilities: Common causes of morbidity in the surveyed location are respiratory tract infections, diarrheal diseases, Malaria, snake bites, malnutrition and to an extent, trauma. Other illnesses are skin and eye infections. These illnesses have also been cited to be major causes of mortality. Synergistic cycle of malnutrition and disease explain how these conditions contribute directly to high malnutrition rates. The health facilities were relatively accessible to most of the population though limitations are usually experienced in the rain season. Late seeking of health care also compromises the health condition of the sick persons.

Food intake and food insecurity: Though food was available on the market, it was not affordable. Reduction of meals had affected the feeding patterns of children and ability to get the energy required. Most of the household's food stocks were likely to last for less than one month. Floods had severely damaged crops in the month of August. Good harvests were not expected and hence household food insecurity was to largely depend on income.

Unsatisfactory water and sanitation situation: Continued consumption of untreated water and indiscriminate human waste disposal put households' at risk of contracting water borne diseases. Even though it was evident that the community had realized the good hygiene practices, behavior change was limited by cultural practices.

Not up to date maternal and child care practices: Complementary feeds were either introduced early before 4 months or late by some households with most diets lacking in quality. The frequency of breast feeding was limited by availability of mothers. Most mothers spent a lot of time in carrying out laborious domestic chores; which compromised the quality of care accorded to the children.

.IX. RECOMMENDATIONS

Health and Nutrition

- Continued targeted feeding program aimed at keeping malnutrition rates low in these areas. Screening for malnourished children and monitoring of the program in TFP and SFP should be enhanced.
- Implementation of a coverage survey in the location to gauge how far the program has been able to target malnourished children.
- Continue EPI services and monitoring trends through appropriate assessment techniques to unveil specific areas requiring attention.
- Health education activities should be integrated and strengthened within other programs to sustain behavioral change in acceptable health care practices. The program should incorporate lasting strategies in knowledge, attitude and practices to address the wanting hygiene practices and late health care seeking within the community. Use of key community leaders to mobilize the community with messages on importance of early seeking of medical care to prevent deterioration of health status.

Food security

- Returnees, either planned or spontaneous exert pressure on available food resources. As such a strategy should be immediately put in place to address returnee food needs to forestall food shortage in the host community.
- Explore mechanisms for improving fishing activities such as provision of fishing tools, processing and marketing of fish
- There is need to support income generating activities initiated by local women groups by initiating micro finance program. The income derived from these activities is expected to improve the households' purchasing power of food and non food items.
- Given the importance of cattle to most communities in Melut, cattle vaccination services and improved extension services should be bolstered with an aim of increasing productivity.
- Address factors that affect harvests such as floods, bird attacks, pests, lack of appropriate tools and technology and crop diversity.

Water and sanitation

- To continue with construction of boreholes and expansion of water filtration systems in rural locations.
- Water and sanitation programme should strive to establish links among the population's knowledge, practices and resources. This can be done through mutual sharing of information and knowledge, mobilization of communities, and provision of essential materials and facilities. The point is to promote optimal use of boreholes and other installed water filtration systems.
- To explore methods for constructing durable latrines and build local capacity to access construction tools and skills. The use of latrines needs to be effective.

Maternal and child care

- There is need to promote good weaning and complementary feeding practices, demonstration on making different types of dishes and livelihood strategies that reduce women workload as well as increase their time to care for young ones.

.X. APPENDICES

.X.1. Sample Size and Cluster Determination

Administrative Unit (Payam)	Geographical unit	Population size	Assigned cluster
Melut	HAI MATAR A	1416	1,2
	HAYA MATAR B	1416	3
	HAYA MATAR C	1416	4
	HAYA SORA A	1236	5
	HAYA SORA B	1236	6
	HAYA SORA C	1236	7
	HAYA SORA D	1236	8
	HAYA CHENJERA A	1000	9
	HAYA CHENEJRA B	1000	10
	HAYA CHATHI	1074	
	HAI AGOOK A	963	11
	HAYA AGOOK B	963	12
	HAYA AGOOK C	963	13
	WUNTHON	1270	14
	DOT KUBAI	1896	15
	MOBEK	900	16
	POCH BEI	360	
	MOBILE	420	17
	HAI KHARTOUM	960	18
THARKUACH	1926	19	
Paloch	HAI NYANUON	620	20
	HAI WAI/AWEI	1500	21
	WUNAYUPDAU	820	
	BAIYUPDOU	840	22
	HAI TIEPJOK	750	23
	HAI ABROOL	300	
	GAK BANY	510	
	MOIRIOK	180	24
	PADIET	240	
Galdora	GOLDORA CENTRE	1920	25
	SHARIGA	420	26
	TANGRIAL A	504	
	THIANGRIAL B	504	27
	THIANGRIAL C	504	
	CHUEI	420	
Panamdit	NYANYOK 1,2	420	28
	BELGOW	300	
Wunamom	ATHIANG	420	
	AGORDIT	270	
	BALAGAT	120	29
	TWINGO	120	
	LEWENG	210	
	DONG 1	90	
	DONG 2	120	
	KILO ASHARA	750	30
Bemichuk	PARIAK/BAPING/BEMICHUK A	1800	31
	THAK	480	

NB: clusters were randomly assigned by ENA for SMART software.

.X.2. Anthropometric Survey Questionnaire

DATE:
VILLAGE:

CLUSTER No:
TEAM No:

N°.	Family N°.	Status (1)	Age (Mths)	Sex M/F	Weight Kg	Height Cm	Oedema Y/N	MUAC Cm	Measles C/M/N (3)
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
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28									
29									
30									

- 1. **Status:** 1=Resident, 2=Displaced (because of fighting, length < 6 months), 3=Family temporarily resident in village (cattle camp, water point, visiting family...), 4= Returnee.
- 2. **Measles*:** C=according to EPI card, M=according to mother, N=not immunized against measles.

.X.3. Household enumeration data collection form for a death rate calculation survey (one sheet/household)

Survey Payam: _____ Village: _____ Cluster number: _____

HH number: _____ Date: _____ Team number: _____

	1	2	3	4	5	6	7
ID	HH member	Present now	Present at beginning of recall (include those not present now and indicate which members were not present at the start of the recall period)	Sex	Date of birth/or age in years	Born during recall period?	Died during the recall period
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

Tally (these data are entered into Nutrisurvey for each household):

Current HH members – total		
Current HH members - < 5		
Current HH members who arrived during recall (exclude births)		
Current HH members who arrived during recall - <5		
Past HH members who left during recall (exclude deaths)		
Past HH members who left during recall - < 5		
Births during recall		
Total deaths		
Deaths < 5		

.X.4. Enumeration data collection form for a death rate calculation survey (one sheet/cluster)

Survey Payam: _____ Village: _____ Cluster number: _____

HH number: _____ Date: _____ Team number: _____

N	Current HH member		Current HH members who arrived during recall (exclude births)		Past HH members who left during recall (exclude deaths)		Births during recall	Deaths during recall	
	Total	< 5	Total	<5	Total	< 5		Total	< 5
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
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30									
31									
32									

.X.5. Calendar of events – Melut County; Upper-Nile State, November 2008

MONTHS	SEASONS	2003	2004	2005	2006	2007	2008
JANUARY SHA HAR – WAHID PAY - TOK	Cold season. Laying of sorghum plants to prevent bird attacks		58	46	34 New Sudan flag is raised CPA signed in Naivasha	22	10
FEBRUARY SHA HAR – ITNIN PAY - RUW	Harvesting of Rap(sorghum)		57	45	33	21 John Kudus Musician visits Melut	9
MARCH SHA HAR – TALATA PAY - DEOK	Keep sorghum in granaries(stores)		56	44	32 Cholera is reported in Melut	20 Medair began operations in Melut	8
APRIL SHA HAR – ARBA PAY - NGUAN	Movement of community to water points		55	43 Ador chief of staff dies.Also Senior SPLA army leader	31 SIM constructs a school in Thangrial	19 Mary Nyalang musician visits Melut	7
MAY SHA HAR – KHAMSA PAY - DHICH	Preparation of land for cultivation. Celebration of May 16 th across sudan		54	42 Vice president of GOSS comes to Melut	30 Road to Malakal is officially opened	18	6 SPLM secretary general (Pagan Amum) came to Melut to a big reception
JUNE SHA HAR – SITTA PAY - DHATEM	Maize is planted. Cattle put in Luacs		53	41 Un peace keeping force comes to Melut	29 Three SPLA soldiers kill a fisher man	17	5
JULY SHA HAR – SABA PAY - DHOROU	Weeding for crops		52	40 Dr John Garang dies	28 Mobutu Mahmur comes to Melut to a big reception.	16	4
AUGUST SHA HAR – TAMANIA PAY - BET	Panting of sorghum bgins		51	39 A man is burnt to death on suspicion of being a spy.	27	15	3
SEPTEMBER SHA HAR – TISA PAY - DHOGUAN	Continue planting sorghum and eating green maize		50	38	26	14	2
OCTOBER SHA HAR – ASHARA PAY - TIER	Harvesting of Simsim in big farms		49	37	25 SPLA boat and barge involved in accident near Kodok	13	1
NOVEMBER SHA HAR - IDASHARA PAY - THIERKUTOK	Preparation for Christmas		48	36	24	12	
DECEMBER SHA HAR – ITNASHARA PAY - THIERKURUW	Christmas celebration.	59	47	35	23	11	

**.X.6. Average food market prices for Melut, Paloch and Galdora central markets,
November 2008**

COMMOODITY	QUANTITY(Unit)	AVERAGE PRICES IN SDG
sorghum	100kg	120
Sugar	50 kg	125
Beans	100 kg	150
Oil	20 litres	100
groundnuts	100 kg	120
Salt	100 g	1
Onions	90 kg	200
Duck	1 medium size	15
Beef	1kg	8
Chicken	1 medium size	10
Charcoal	Sack of 50 kg	25
Goat	1 medium size	80
Cow	1 medium size	750

NB: The current exchange rate: 2.15 SDG equivalent to 1 USD