Nutrition Survey Report

Ikotos County, Eastern Equatoria State, Southern Sudan

Survey Team

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List of abbreviations

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal Care
AVSI	Association of Volunteers in International Service
C.I.	Confidence Interval
CDoT	Catholic Diocese of Torit
CMR	Crude Mortality Rate
CRS	Catholic Relief Services
ENA	Emergency Nutrition Assessment
EPI	Extended Program of Immunization
GAM	Global Acute Malnutrition
HHP	Health and Hygiene Promotion
HIV	Human Immunodeficiency Virus
MAG	Mine Action Group
MAM	Moderate Acute Malnutrition
MUAC	Mid-Upper Arm Circumference
NGO	Non-Governmental Organization
OR	Odds Ratio
OTP	Outpatient Therapeutic Program
p	Probability
PHCC	Primary Health Care Centre
PHCU	Primary Health Care Unit
PSI	Population Services International
SAM	Severe Acute Malnutrition
SD	Standard Deviation
SDG	Sudanese Pound
SFP	Supplementary Feeding Program
SMART	Standardized Monitoring Assessment of Relief and Transitions
SMoH	State Ministry of Health
SPLA	Sudan People Liberation Army
SSRRC	Southern Sudan Relief and Rehabilitation Commission
TB	Tuberculosis
TFC	Therapeutic Feeding Centre
U5MR	Under-5 Mortality Rate
UNMIS	United Nation Mission in Sudan
UXO	Unexploded Ordinance
Watsan	Water and Sanitation
WFH	Weight for Height
WFP	World Food Program
WHO	World Health Organization

Executive summary

Background
Ikotos County has been identified as an area of high concern regarding food security and child malnutrition. The food security outlook for 2010 is poor, with a below average harvest for the second year in a row and people relying on various coping strategies already. Different nutritional assessments have been carried out in parts of the County by different organizations with widely varying results. A full anthropometric survey was therefore carried out to assess severity of the acute nutritional status of children under five years of age and decide on appropriate responses.

Survey objectives
- To quantify the nutritional status of children from 6-59 months of age
- To estimate the retrospective crude and under 5 mortality rates of the survey population
- To estimate the coverage of measles vaccination among targeted children
- To assess access and usage of primary health care services by the survey population
- To collect the baseline information needed to make informed recommendations for future programming / possible interventions in the area

Methodology
The survey was conducted in the second half of November 2009, which corresponded to the early dry season and the middle of the delayed harvest. Two stage random cluster sampling was used to select the children and households that would represent the community. 32 clusters of 21 children were assigned using ENA (Emergency Nutrition Assessment) software[1]. Anthropometric data was analyzed for 670 children aged 6-59 months. A health questionnaire was administered in each household where children were measured. A retrospective mortality survey was conducted that included a minimum of 60 individuals per cluster, with a total sample size of 1941, and a recall period of 115 days. The anthropometric measurements and the mortality data were analyzed using ENA for SMART (Standardized Monitoring Assessment of Relief and Transitions) software[2]. The second part of the anthropometric data sheet and the health questionnaire were analyzed using EPI Info Version 3.5.1 software[3].

Summary of major findings

Results anthropometry and mortality (For NCHS 1977 reference results, see Appendix G)

Indicator			Findings
WHO 2006	Z-scores	Global Acute Malnutrition WFH < -2 z-score and/or oedema	15.2 % n=102 (12.5 - 18.0 95% C.I.)
		Severe Acute Malnutrition WFH < -3 z-score and/or oedema	3.6 % n=24 (2.1 - 5.1 95% C.I.)
	% Median	Global Acute Malnutrition WFH < 80% and/or oedema	4.6 % n=31 (3.0 – 6.2 95% C.I.)
		Severe Acute Malnutrition WFH < 70% and/or oedema	0.9 % n=6 (0.2 – 1.6 95% C.I.)
MUAC		Global Acute Malnutrition MUAC < 12.5 cm and/or oedema	13.6 % n=91 (10.6 – 16.7 95% C.I.)
		Severe Acute Malnutrition MUAC < 11.5 cm and/or oedema	2.8 % n=19 (1.6 – 4.1 95% C.I.)
CMR (total deaths/10,000 people / day)			0.54 (0.16-0.92 95% C.I.)
U5MR (deaths in children under five/10,000 children under five / day)			1.19 (0.28-2.11 95% C.I.)

Other findings

Indicator	Findings
% of children 9 – 59 months with measles vaccine, card	13.3 % (5.7 – 21.0 95% C.I.)
% of children 9 – 59 months with measles vaccine, recall	25.3 % (16.5 – 34.1 95% C.I.)
% of children 9 – 59 months with measles vaccine, card & recall	38.6 % (27.4 – 49.9 95% C.I.)
% of children 6 – 59 months with Vitamin A in the last 6 months	31 % (18.1 – 44.0 95% C.I.)
% of children 6 – 59 months currently admitted to a feeding program	3.4 % (0.69 – 6.18 95% C.I.)
% of children 6 – 59 months with illness reported during the 2 preceding weeks	63.3 % (51.6 – 74.9 95% C.I.)
% of caretakers that report using clinics for all health problems	74.6 % (65.9 – 83.3 95% C.I.)
% of caretakers that report only using clinics for serious health problems due to distance to closest functioning clinic	5.4 % (-0.407 – 11.2 95% C.I.)
% of caretakers with reportedly no access to clinics or choosing not to visit a functioning clinic	20.0 % (13.4 – 26.6 95% C.I.)

Conclusion

The findings of the survey show that the GAM at 15.2% (12.5 - 18.0 95% C.I.) is just over the "critical" classification of malnutrition severity as defined by WHO[4]. The CMR and the U5MR although not at critical threshold levels for an emergency should be monitored along with SAM as they could potentially increase. The measles vaccination and vitamin A coverage County wide is very low. Effort needs to be given to improve this. Childhood illness is associated with poor nutritional status, but attendance at health clinics showed no significant impact on GAM rates. The survey revealed a high percentage of preceding morbidity during the dry season (63%) and a fairly high percentage of self reported clinic usage (75%).

The data from the survey indicates that the smallest children are most affected with acute malnutrition, and poor nutritional status was highly associated with recent illness.. Since reported access and usage of health care facilities was not found to correlate well with the malnutrition rates, other factors involved could be poor weaning practices and food shortages. Food insecurity is well documented in the region. At the time of the survey the last of the harvest was being collected so it is reasonable to assume that this is the most food secure time of the year. The food security outlook for Ikotos County is poor. Therefore the nutritional status of the population can be expected to deteriorate further in the future.

Recommendations

- Hold a coordination meeting in January for all actors involved in nutrition in Ikotos County.
- Roll out the new MoH Integrated Management of Severe Acute Malnutrition guidelines and use them for uniform and consistent admission, treatment, discharge and referral criteria.
- Introduce routine screening of children < 5 by MUAC in all health facilities. Equip more health facilities to provide growth monitoring. Provide training on referral criteria and procedures.
- Increase access to SFPs, OTPs and Stabilization centres. Identify and set up one or two more SFP and OTP sites in areas that don't have access to the existing nutrition programs.
- Improve and standardize the referral system between the programmes (from SC to OTP to SFP, within and between clinics) so that children are not dropped from the programme prematurely.
- Improve vaccination and vitamin A coverage through outreaches to prevent outbreaks, such as measles, which would result in a rapid deterioration of the nutritional situation. Provide health education on the importance of immunization, good hygiene and appropriate feeding and child care practices.

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1. Introduction

1.1 Background

Ikotos County has been identified as an area of high concern regarding food security and child malnutrition. The food security outlook for the coming year is poor, with a below average harvest for the second year in a row and people relying on various coping strategies already. Different nutritional assessments have been carried out in parts of the County by different organisations with widely varying results. A full anthropometric survey was therefore carried out to determine the extent of child malnutrition and decide on appropriate programmes.

1.2 Survey objectives

- To quantify the nutritional status of children from 6-59 months
- To estimate the retrospective crude and under 5 mortality rates of the survey population
- To estimate the coverage of measles vaccination among targeted children
- To assess access and usage of primary health care services by the survey population
- To collect the baseline information needed to make informed recommendations for future programming / possible interventions in the area

1.3 Geography

Ikotos County has 6 Payams: Ikotos, Imatong, Lomohidang north, Lomohidang south, Losite and Katire. Ikotos borders Torit County to the north, Budi County to the east, Magwi County to the west, and Uganda to the south. The area is part of the Hills and Mountains livelihood zone. The County itself is again divided into 5 different zones: The mountainous area in the western part of the County, the Imatong Mountains, the flat plains between the Imatong Mountains and the Lomohidang mountains, the Lomohidang mountains, and the Kidepo valley stretching from the Lomohidang Mountains to the border with Uganda.

Ikotos town lies on the road going from Torit to Kitgum in Uganda, and is therefore a strategic place for trading. It can be reached by road from Torit in about 3 hours. From there it takes 2 hours to reach Imatong, 1 hour to reach Isoke, 1 hour to reach Tsertenya and 3 hours to reach Bira. Both Tsertenya and Bira are situated on the Ugandan border. From Bira, the most south-eastern point of the County to Katire centre, the most western point, it takes about 8 hours by car. For more information on geography see appendix C – map of Ikotos County.

1.4 Population composition

The total population of Ikotos County is 244,915 people according to SSRRC, and 84,649 people according to the 2008 census figures. The table below shows the population distribution.

Table 1.1 Population figures Ikotos County

Payam	Bomas	Population (SSRRC)	Population (Census)
Ikotos	6	53,719	21,626
Losite	5	11,391	16,022
Imatong	6	42,916	11,370
Katire	5	7,113	5,789
Lomohidang south	6	70,509	15,132
Lomohidang north	6	40,538	14,710
Total		**226,186**	**84,649**
Returnees		18,729	-
Grand total	**34**	**244,915**	**84,649**

The population is divided into 7 ethnic groups, all with their own languages: Lokwa in Ikotos, Katire and parts of Imatong Payams; Imatong in parts of Imatong Payam; Logir in parts of Lomohidang north and south Payams; Dongotono in the other parts of Lomohidang north and south Payams; Lotuko in Lobira Boma in the most northern part of Lomohidang north Payam; and Lorwama and

Ketebo in Losite Payam.

1.5 Food security

The inhabitants of Ikotos County are mainly agro-pastoralists. According to a baseline livelihood and food security assessment done by Caritas in May 2009[5] crop sales are the most important source of income, and people's own harvest is their primary source for staple foods. This shows the high dependency of livelihoods on their own agricultural production. The most common staple crop is sorghum. Other crops planted are maize, millet and cassava. Different varieties of sorghum are planted which differ in size and duration until harvest. The first harvest is due around July, while the slow-maturing varieties take until November / December. In some areas sorghum can be planted twice a year.

2008 was a bad year for crops, with a harvest below average due to insufficient rains. The hunger gap in 2009 therefore started early, and so the government brought in some subsidized food for the markets to bridge the gap until July when the next harvest was expected. 2009 has been another bad year for crops. The first season crops failed widely due to drought. Replanting has been done by many farmers, but the outlook is poor since the rains started too late for the crops to mature. At the time of the survey the community has been harvesting what survived of the grains and ground nuts. But the harvest was very small, and many fields have been observed abandoned and dried up with no yield at all. Others, at various stages of maturity, seem to be low yielding. The Imatong mountain range (Katire and Imatong Payams) are more fertile, with all-season streams and springs coming from the mountains.

There are markets in Ikotos centre, Isoke and Lobira. There was food for sale, mainly coming from Uganda, but the prices are high. Despite the small harvest that just took place in some areas the community has started employing coping strategies which include selling of firewood, poles, grass, charcoal, milk and livestock to buy food in the market. During interviews in October key informants (NGOs, local officials, local residents) reported that people have switched to less preferred / wild foods, and started reducing adult consumption. Some people reportedly migrated to the towns, and some of the returnees have started going back to where they came from. WFP has distributed food to 12,500 people in August. The County has applied for food aid, and several of the NGOs on ground have jointly applied for funding for food security projects in Eastern Equatoria State.

1.6 Primary health care / nutrition

Ikotos County has 3 PHCCs and 23 PHCUs. For a detailed list see appendix B – Health facilities in Ikotos County. There are 2 therapeutic feeding programs in the County, one in Ikotos and one in Isoke PHCC. Both of them have opened just recently and systems are still being put in place. Plumpy nut is supplied by the SMoH. The SMoH has trained nutrition outreach workers for the different Payams and equipped them with height boards and weighing scales. Isoke PHCC also has an SFP; the food is supplied by CRS. There is one feeding program in Karenga, Uganda, across the border from Bira. Apparently the community in the most southern part of Losite Payam in Ikotos County is using the health facility and nutrition program there. AVSI is planning on opening SFPs in the health units they are supporting, and are currently applying for funding. The different actors involved in the nutrition sector in Ikotos County have made first attempts at coordinating their activities.

1.7 Security

There is a long history of intertribal conflicts in Ikotos County between different tribes. During the time of the survey there were tensions between the Dongotono and Logir tribes in Lomohidang south Payam. Cattle were raided and several men have been killed. The local authorities were involved, meetings were held and the SPLA deployed soldiers to stabilize the area. The situation remained tense, but it was possible for the survey teams to move in that area. According to UNMIS all roads in Ikotos County are level 2. The road between Hiyala and Kapoeta remains level 3. According to MAG (Mine Action Group) there are UXOs in the area. Beside the road stretches between Torit and Hiyala, and between Torit and Imatong there are still some landmines that need to be recovered.

1.8 Past and current interventions of NGOs

There are several NGOs operating in Ikotos County. The following table shows some of the key partners working in the area.

Table 1.2 NGOs in Ikotos County

Agency	Activity
CDoT (Catholic Diocese of Torit)	PHCC in Isoke (in- and outpatient, EPI, ANC, TB, SFP, TFC, leprosy treatment). Agricultural projects.
AVSI (Association of Volunteers in International Service)	5 PHCUs in Lomohidang north and south Payams, outreach preventive medicine (growth monitoring, ANC, EPI). Support of the PHCC in Isoke. Watsan and HHP. Plan: SFPs in PHCUs. Food security and agriculture project proposed in collaboration with other agencies.
Caritas	Food security and water and sanitation (village water scheme). Food security and agriculture project proposed in collaboration with other agencies.
CRS (Catholic Relief Services)	School feeding, support of the PHCC in Isoke (food for SFP, TB and inpatients), Food for work programs. Agricultural activities in the past. Farmers training. Education (teachers training, supply of school materials). Peace building programs. Election / registration awareness.
Merlin	Supported Ikotos PHCC in the past. Support of Imatong PHCC.
MAG (Mine Action Group)	Community awareness training for UXOs.
NCA (Norwegian Church Aid)	PHCUs and immunization in Katire, Losite, Ikotos and Imatong Payams.
LWF (Lutheran World Federation)	HIV / AIDS awareness. Watsan (boreholes) and HHP. Education. Peace building. Food security (farmers training, seeds and tool distribution).
PSI	Mosquito net distribution
Manna Sudan	Peace building, food security, school construction, education, NFI.

1.9 Surveyed area

The survey was carried out in all 6 Payams of Ikotos County. 156 villages from all but one Boma have been included in the sample frame. Isuak Boma in Katire Payam has been excluded since it can only be reached from Magwi County by footing for 1 day. 28 villages from different Payams have also been excluded because they were too far up the mountain and could not be reached by a survey team within a reasonable time. 18 villages in Lomohidang south Payam have been excluded for security reasons. These villages are up on the mountain and it was advised by the local authorities to not go to these areas because of the current tensions. A list of villages for the sampling frame can be found in Appendix A.

2. Methodology

2.1 General approach and sampling procedures

The survey has been conducted in the second half of November 2009. This corresponds to the early dry season and this year to the middle of the delayed harvest.

SMART methodology[2] and EPI info Version 3.5.1[3] were used in the planning, collection and analysis of the data. A 2-stage cluster sampling method was chosen, the clusters randomly selected proportional to population distribution. Alongside the anthropometric data, retrospective mortality and information about access to health care was collected through household interviews.
A map has been made using information from counterpart, local authorities and key informants (see appendix C). In a first step, each Payam has been visited, a list of all the Bomas and villages compiled, then ranked by the community leaders according to size. All accessible villages were added to the sampling frame. In a second step, clusters have been assigned to each Payam proportionate to the given population figures which were adjusted to account for the excluded villages. Finally, the clusters within each Payam were assigned randomly proportionate to village size. In total 32 clusters of 21 children have been selected from the area. 2 of the original clusters had to be excluded during the survey due to inaccessibility. These clusters were removed and the computer reselected two clusters to ensure randomness. A list of villages included in the final sampling frame (with cluster selection) can be found in appendix A.

Anthropometric data was collected and analyzed for 670 children aged 6 – 59 months. For the mortality survey 1941 individuals have been included, regardless of whether or not there were children in the household. A questionnaire asking about access to health care has been administered in each household where anthropometric data has been collected.

2.2 Sampling procedure and sample size for the anthropometric data

The sample size has been calculated using ENA "nutrisurvey" software[1] for SMART methodology[2], based on an under 5 population of 15,000, assuming a 20% prevalence of malnutrition, precision of 4.5%, and a design effect of 2. The sample size needed (595) was then increased by 10% and rounded up to cater for any unforeseen problems. 32 clusters were randomly selected by "nutrisurvey" proportional to the estimated population size. In each of the selected clusters, a minimum of 21 children were to be measured.

2.3 Sampling procedure and sample size for the mortality data

The sample size has been calculated based on a population size of 80,000, estimating a prevalence rate of 0.7/10,000/day, precision of +/- 0.5 and a design effect of 2 using a recall period of 115 days. The total population to be included was 1834, which has been rounded up to 1920. This resulted in a minimum of 60 people per cluster. The design was for a 115 day recall period, and the intention was to use the John Garang memorial holiday (August 1) as the start of the recall period. After numerous discussions with the teams and local key informants, it was evident that there were no other common holidays or events in Ikotos County that could be used as the start of the recall period. Even the John Garang Memorial Day is not celebrated in all parts of the County and may not be known to some of the respondents. It has been agreed then that in those areas August 1 will be the beginning of the recall period, which, at the time of the survey, made a recall period of close to 4 months.
The questionnaire was administered in all households irrespective of whether it had eligible children for the anthropometric measurements or not. In the last household all the members were included in the survey, even if the number exceeded 60.

2.4 Sampling procedure and sample size for the health data

The questionnaire asking about access to and usage of health care has been asked in each household with children eligible for the measurements.

2.5 Selection of households and children / respondents

The EPI method was used in the random selection of households. The centre of the village or section was identified and a pen spun to determine a starting direction. The team then moved along in that direction to the periphery of the village, counting all the houses along the way.

A random number table was used to determine the first house for measurements and health questionnaire and/or mortality questionnaire. Subsequently the next nearest household was chosen until the cluster was filled. A household was defined as all the people who cook and eat together. In the selected household all the children aged 6 – 59 months were measured. If the age was unknown the "ear-reach-test" was done. Every child that could not reach the tip of his ear has been thought to be under 5 years of age and was therefore measured. If a child happened to be absent, the teams were instructed to return to the house one more time after the cluster is completed to measure that child. In the last household all eligible children were measured even if they were not all needed to complete the cluster size. For the health questionnaire the mother of the children measured was interviewed. If the mother was absent, the teams were instructed to interview another adult member of the household. For the mortality questionnaire every household was considered and any adult member chosen as the respondent. In the last house every member of the household was included in the mortality survey, even if they were not all needed to complete the number needed for that cluster.

2.6 Development of the questionnaires

The primary goal of this survey has been to quantify the nutritional status of children 6 – 59 months and to estimate the death-rate. To complement the measurements some basic questions about measles vaccine, vitamin A and child morbidity have been included in the anthropometric data sheet. Since this was an emergency survey the health questionnaire has been kept to a minimum to avoid long days for the survey teams and the risk of taking shortcuts when collecting the data. The initial draft questionnaire has been shared for comments and feedback and was slightly adjusted. It has then been translated into the most common languages of the region, but after discussing with the supervisors and surveyors the decision was made to leave them in English. The surveyors and supervisors were unaccustomed to reading in their tribal language and preferred to have them in English. Time was taken to make sure that all the teams understood exactly what was being asked and that they were interpreting correctly.

2.7 Training and supervision

4 teams have been trained for the data collection. Each team consisted of a team supervisor, 2 interviewers and 1 measuring assistant. Three of the supervisors were trained employees of the SMoH nutrition department for Eastern Equatoria State. The 4th supervisor was an employee of the PHCC in Ikotos centre, responsible for the nutrition program there. All four were previously trained and familiar with measuring weight and height of children. This reduced training time considerably, since the supervisors were the ones responsible for measuring and recording the anthropometric data. To complete the teams, 12 interviewers have been chosen from 4 different Payams. All but one female participant spoke English and all of them spoke multiple tribal languages. The training was therefore held in English. The female participant who did not read and speak English later assisted the team supervisor with handling the children when taking measurements. She did not conduct any interviews.

The first day of the training focused on anthropometric measurements (demonstration and reading practice), the remaining questions on the anthropometric data sheet, some basic facts about malnutrition, and the mortality and health questionnaires. On the second day the anthropometric measurements were practiced on 4 children at the Ikotos PHCC. The children rotated through the 4 teams. Later the results were compared and discussed. The rest of training day 2 focused on the proper selection of households and respondents, and a review of the mortality and health questionnaire. On the 3rd day a pilot survey was carried out. During that day each of the 4 teams were closely supervised by one Medair staff. The results were reviewed and feedback was given. During the actual survey two teams of Medair staff rotated between the different teams for supervision and support. The Medair teams included one nutritionist, two health managers, one community liaison officer and one logistician.

2.8 Steps to minimize error and bias

- Using trained SMoH nutrition workers as team supervisors to ensure accurate anthropometric measurements.
- Close supervision for the pilot survey to ensure random selection of households, ensure that the questions were being asked appropriately, that the respondents were not being coached and to ensure consistency between interviewers.
- Constant zeroing of the weighing scales throughout the day.

- Some spot checks and verification of extreme values, and exclusion if errors were found. Far locations were included in the survey, which made it impossible to verify every extreme value. However most of those cases have been discussed with the supervisor and verification done by having them describe the case. If the supervisor described a child that fit the measurements, then the data was included.
- Daily entering of data into computer whenever possible to detect problems early.
- Frequent contact (at least every second day) with each team supervisor.

2.9 Data collected

Data was collected through anthropometric measurements and through mortality and health questionnaires. For the anthropometric data children from 6 – 59 months were measured. For the mortality questionnaire an adult member of the household was interviewed. For the health questionnaire the mother of the measured children in each household was interviewed. See appendices D, E and F for complete questionnaires.

2.9.1. Anthropometric data

- Gender: Male or female
- Age: Recorded as <9 months or >9 months. This was used to determine whether the child is old enough to have received the measles vaccine or not.
- Weight: Measured without clothes. In kilograms, to a precision of 0.1 kg using 25 kg hanging scales (Salter type).
- Height: Measured on a wooden height board. In centimetres, to the nearest 0.1 cm. Children <85 cm were measured lying down, children >85 cm were measured standing up.
- Mid-Upper Arm Circumference (MUAC): In centimetres. Measured at the mid-point of the left upper arm, to a precision of 0.1 cm.
- Bilateral oedema: Assessed by the application of thumb pressure for at least 3 seconds to both feet.
- Feeding program: Information on whether or not the child is admitted to a feeding program in the area
- Measles vaccination: Assessed by checking for measles vaccination on EPI cards and probing caretakers.
- Vitamin A: Information on whether or not the child has received Vitamin A in the last half year.
- Illness in the last 2 weeks / Type of illness / Treatment: Assessed to see whether or not the child was recently suffering from common childhood diseases and what treatment it received if applicable.

Children with a red MUAC, bilateral oedema or severe visible wasting were referred and whenever possible transported to Isoke PHCC for therapeutic feeding. A total of 10 children were referred during the survey, 1 of them for reasons other than malnutrition.

2.9.2. Mortality data

- Total number of people in the household
- Number of children under 5 years
- Number of people who left the household within the recall period (total and under 5 years)
- Number of people who joined the household within the recall period (total and under 5 years)
- Number of births in the household within the recall period
- Number of deaths in the household within the recall period (total and under 5 years)
- Causes of death (self-diagnosed)

2.9.3. Health data

- Information on whether or not the members of the household visit a health clinic when they are ill
- The name of the clinic visited
- Information on the availability of drugs at the last visit
- Information on whether or not staff has been working at the clinic at the last visit
- Information on whether the household members use the clinic for all health problems or only serious problems
- Information on why the household members do not visit the clinic

2.10 Analysis

Anthropometric measurements were analyzed using ENA for SMART[1] software and compared to the 2006 WHO reference tables. Two measurements were excluded because of mistakes in recording.

Mortality was analyzed using ENA for SMART[1] software.

The second part of the anthropometric data sheet and the health questionnaire was analyzed using EPI Info Version 3.5.1 software[3].

Tests of statistical significance were performed taking into consideration the cluster sample methodology. Tests of significance for difference in means were performed with T-tests, and test of significance for two-outcome-variable data used the Rao-Scott correction of Chi^2 test. A p-value of <0.05 is considered to be statistically significant, and 95% confidence intervals are used to judge the statistical precision of point estimates.

3. Results

3.1 Results for anthropometry (based on WHO reference 2006)

Weight for height index is the most appropriate index to quantify wasting in a population in emergency situations where acute forms of malnutrition are common. Acute malnutrition rates were estimated from the weight for height (WFH) index values combined with the presence of oedema and compared to the WHO 2006 reference values. The indices are expressed in both z-score and percentage of the median. The expression in z-score standardizes weight deficiency by taking into account the standard deviation of the distribution of weight for corresponding height. This allows for inter study comparisons. The percentage of the median links better than z-scores to mortality risks, estimates weight deficiency more accurately and aids in determining eligibility for child feeding programmes. MUAC is a useful tool for rapid screening at field level and identifying children at a higher risk of mortality.

3.2 Definition of Acute Malnutrition

Table 3.1: Definition of Acute Malnutrition

	Results expressed in z-scores	Results expressed in percentage of median	Results expressed in MUAC
Severe acute malnutrition (GAM)	WFH <-3 SD and/or bilateral oedema	WFH < 70% and/or bilateral oedema	MUAC < 11.5 cm and/or bilateral oedema
Moderate acute malnutrition (MAM)	WFH <-2 SD and ≥ -3 SD and no oedema	WFH < 80% and ≥ 70% and no oedema	MUAC ≥ 11.5 and < 12.5 cm and no oedema
Global acute malnutrition (GAM)	WFH <-2 SD and/or bilateral oedema	WFH <80% and/or bilateral oedema	MUAC < 12.5 cm and/or bilateral oedema

3.3 Findings

3.3.1. Anthropometric measurements

Table 3.2: Prevalence of acute malnutrition based on WFH z-scores (and/or oedema) and by sex – WHO 2006 reference

	All n = 670	Boys n = 327	Girls n = 343
Prevalence of global malnutrition	15.2 % n=102 (12.5 - 18.0 95% C.I.)	15.9 % n=52 (11.8 - 20.0 95% C.I.)	14.6 % n=50 (10.4 - 18.8 95% C.I.)
Prevalence of moderate malnutrition	11.6 % n=78 (9.4 - 13.9 95% C.I.)	12.2 % n=40 (8.8 - 15.6 95% C.I.)	11.1 % n=38 (7.4 - 14.7 95% C.I.)
Prevalence of severe malnutrition	3.6 % n=24 (2.1 - 5.1 95% C.I.)	3.7 % n=12 (1.6 - 5.7 95% C.I.)	3.5 % n=12 (1.6 - 5.4 95% C.I.)

The prevalence of oedema is 0.6 %
For NCHS 1977 reference results, see Appendix G

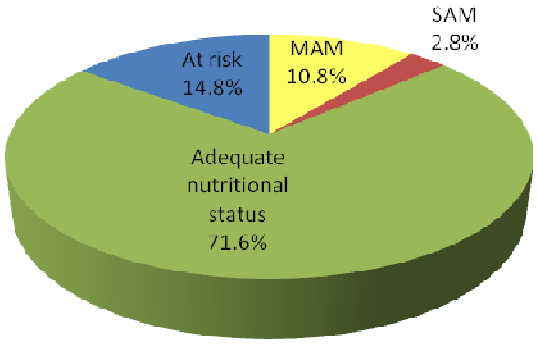
Table 3.3: Distribution of acute malnutrition and oedema based on WFH z-scores

	< -3 z-score	**≥ -3 z-score**
Oedema present	Marasmic kwashiorkor n=2 (0.3%)	Kwashiorkor n=2 (0.3%)
Oedema absent	Marasmic n=20 (3.0%)	Normal n=646 (96.4%)

Table 3.4: Prevalence of acute malnutrition based on the percentage of the median and/or oedema (n=670)

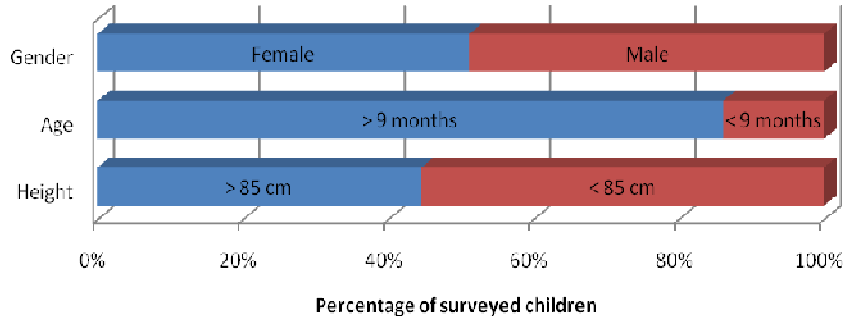
Prevalence of global acute malnutrition (<80% and/or oedema)	4.6 % n=31 (3.0 – 6.2 95% C.I.)
Prevalence of moderate acute malnutrition (<80% and >= 70%, no oedema)	3.7 % n=25 (2.4 – 5.0 95% C.I.)
Prevalence of severe acute malnutrition (<70% and/or oedema)	0.9 % n=6 (0.2 – 1.6 95% C.I.)

Figure 3.1: Distribution of MUAC categories SAM, MAM, at risk and adequate nutritional status (n=670)



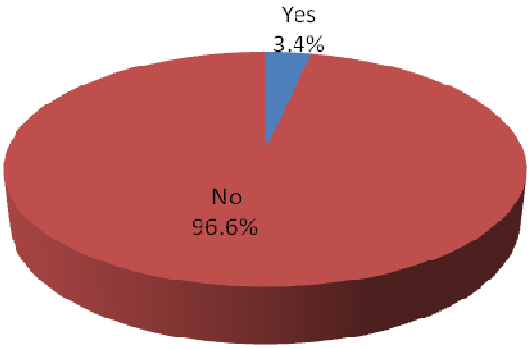
95% Confidence Limits
SAM - MUAC < 115: 2.8% (1.6 – 4.1%)
MAM - MUAC 115 – 124: 10.8% (8.0 – 13.5%)
At risk - MUAC 125 – 134: 14.8% (11.7 – 17.8%)
Adequate nutritional status - MUAC ≥ 135: 71.6% (66.9 – 76.3%)

Figure 3.2 Gender, age and height breakdown of the surveyed children (n=670)



95% Confidence Limits
Gender: Female 51.2% (47.4 – 55.1%), Male 48.8% (45.0 – 52.6%),
Age: > 9 months 86.1% (82.4 – 89.9%), < 9 months 13.9% (10.1 – 17.6%),
Height: ≥ 85 cm 44.6% (40.6 – 48.7%), < 85cm 55.4% (51.3 – 59.4%)

Figure 3.3 Children currently admitted to a feeding program (n=670)

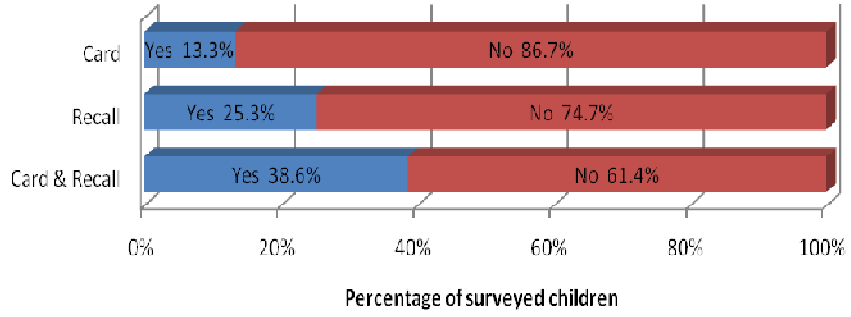


95% Confidence Limits
Yes 3.4% (0.69 – 6.18%)
No 96.6% (93.8 – 99.3%)

Note: All children that were admitted to a feeding program at the time of the survey (n=23) were admitted to either Isoke OTP or SFP, Ikotos OTP, or a feeding program in Karenga, Uganda (used by the population of the most southern part of Losite Payam).

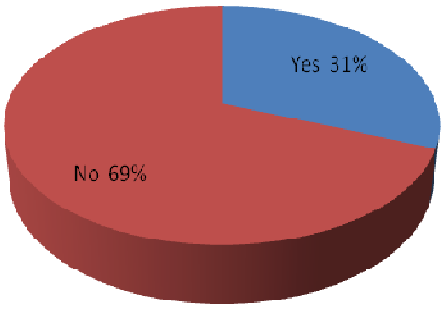
3.3.2. Immunization

Figure 3.4 Measles coverage by card and/or recall (for children over 9 months, n=577)



95% Confidence Limits
Card: Yes 13.3% (5.7 – 21.0%), No 86.7% (79.0 – 94.3%),
Recall: Yes 25.3% (16.5 – 34.1%), No 74.7% (65.9 – 83.5%),
Card & Recall: Yes 38.6% (27.4 – 49.9%), No 61.4% (50.1 – 72.6%)

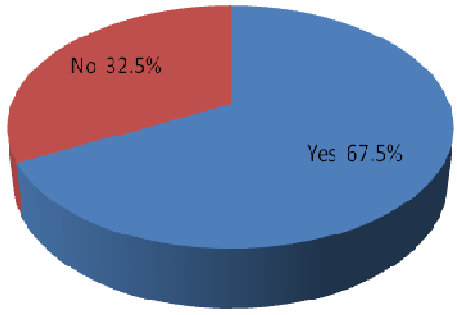
Figure 3.5 Vitamin A in the last 6 months (n=670)



95% Confidence Limits
Yes 31.0% (18.1 – 44.0%)
No 69.0% (56.0 – 81.9%)

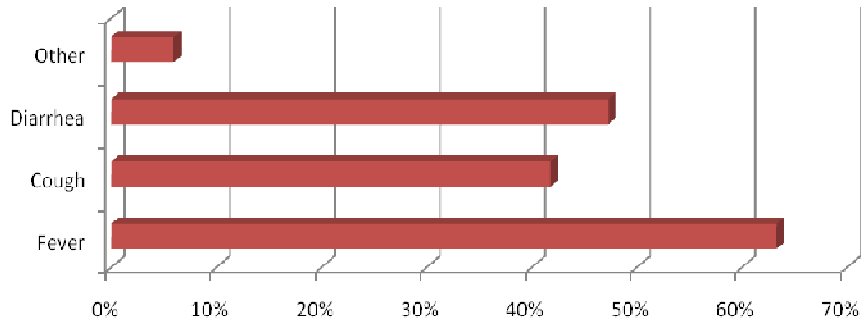
3.3.3. Child morbidity

Figure 3.6 Prevalence of reported illness in children 6 – 59 months in the 2 weeks prior to the interview (n=670)



95% Confidence Limits
Yes 67.5% (60.0 – 74.9%)
No 32.5% (25.1 – 40.0%)

Figure 3.7 Symptom breakdown in the children from 6 – 59 months who reported an illness in the two weeks prior to the interview (n=452)

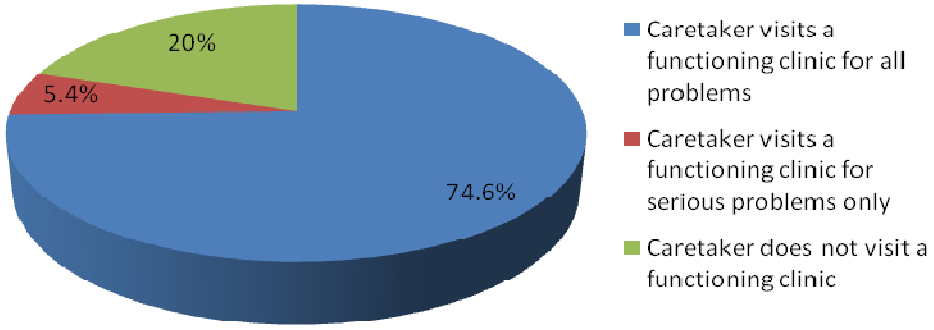


Percentage of children (from the population who reported and illness)

95% Confidence Limits
Fever / Malaria 63.3% (51.6 – 74.9%),
Cough 41.8% (28.9 – 54.7%),
Diarrhoea 47.3% (41.7 – 53.0%),
Other / Don't know 6.0% (90.5 – 97.6%)

3.3.4. Access and usage of health clinics

Figure 3.8 Reported access and usage of clinics for health problems (n=670)



95% Confidence Limits
Caretaker visits a functioning clinic for all problems 74.6% (65.9 – 83.3%),
Caretaker visits a functioning clinic for serious problems only 5.4% (-0.407 – 11.2%),
Caretaker does not visit a functioning clinic 20.0% (13.4 – 26.6%)

Note: A functioning clinic is defined as having drugs available and staff working. Caretakers that visit a clinic for serious problems only do so because the clinic is far away. Included in the households that do not visit a functioning clinic are those that reported the clinic is too far away, not functioning (inconsistent drug supply or staffing) and those who choose not to use a clinic for different reasons.

3.3.5. Results mortality (retrospective over 115 days prior to the interview)

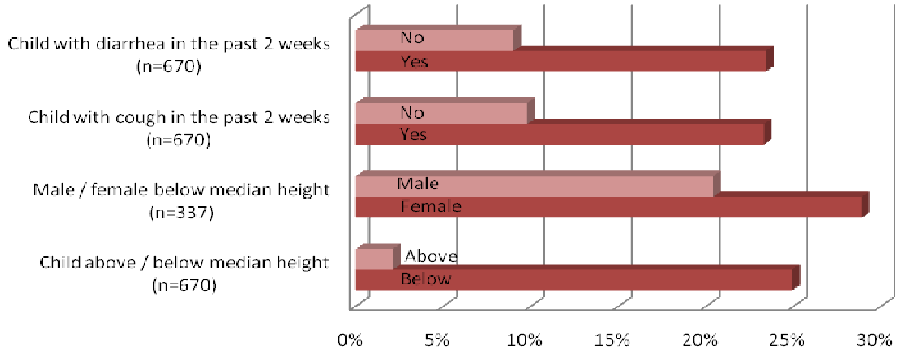
Table 3.5 Mortality rates (n=1941)

CMR (total deaths/10,000 people / day)	**0.54 (0.16-0.92 95% C.I.)**
U5MR (deaths in children under five/10,000 children under five / day)	1.19 (0.28-2.11 95% C.I.)

The causes of death as reported by the families (self-diagnosed) are the following:
≥ 5 years: 2 shot, 1 old age, 1 malaria
< 5 years: 1 burned in a fire, 2 diarrhoea and vomiting, 1 diarrhoea and rib pain, 1 cough, 1 swollen body and cough, 1 bloody diarrhoea, 1 meningitis

3.3.6. Comparisons

Figure 3.9 Percentage of children with MUAC < 12.5 cm and / or oedema and separated by reported illness, gender of those below median height and those above/below median height.



95% Confidence Limits

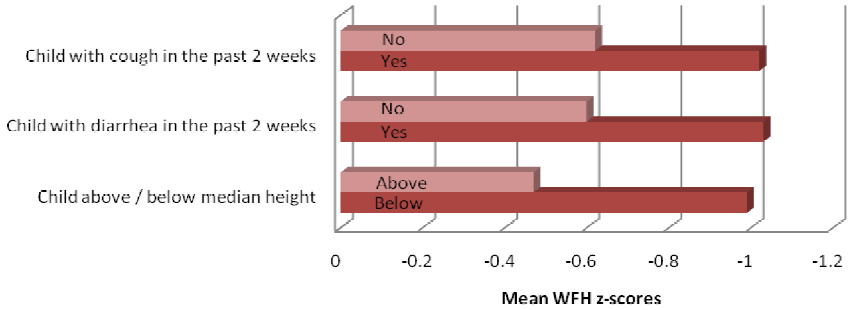
Low MUAC with/without diarrhoea in the past 2 weeks: With diarrhoea 23.4% (16.5 – 30.3%), Without diarrhoea 9.0% (5.6 – 12.4%), Difference is statistically significant (p<0.05).

Low MUAC with/without cough in the past 2 weeks: With cough 23.3% (16.3 – 30.3%), Without cough 9.8% (6.7 – 12.8%), Difference is statistically significant (p<0.05).

Low MUAC: Male 20.4% (12.7 – 28.0%), Female 28.9% (21.1 – 36.6%), Difference is not statistically significant (p=0.19).

Low MUAC: Above median height 2.1% (0.67 – 3.5%), Below median height 24.9% (19.1 – 30.8%), Difference is statistically significant (p<0.05).

Figure 3.10 Mean WFH Z-scores (n=670)



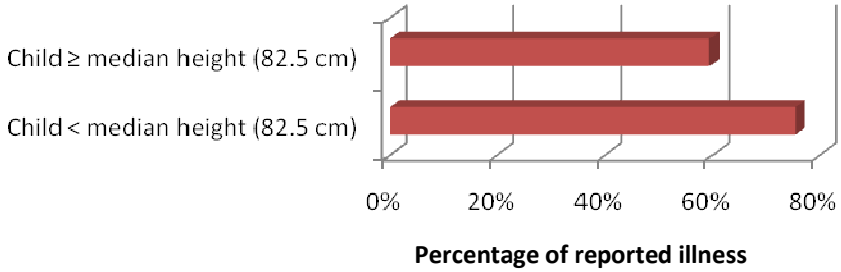
95% Confidence Limits

Mean WFH Z-score for child with/without cough in the past 2 weeks: With cough-1.02 (-1.25 to -0.79), Without -0.62 (-0.73 to -0.51), Difference of means is statistically significant (p<0.05, T=-3.05, D.f.=32).

Mean WFH Z-score for child with/without diarrhoea in the past 2 weeks: With diarrhoea-1.03 (-1.21 to -0.84), Without -0.6 (-0.70 to -0.49), Difference of means is statistically significant (p<0.05, T=-15.25, D.f.=32).

Mean WFH Z-score for child < 82.5 cm (median height): -0.99 (-1.13 to -0.847), for child ≥ 82.5 cm -0.47 (-0.61 to -0.34), Difference of means is statistically significant (p<0.05, T=-5.79, D.f.=32).

Figure 3.11 Percentage of reported illness in the 2 weeks prior to the interview for children < / ≥ median height 82.5 cm (n=670)



95% Confidence Limits
Reported illness in children < median height (82.5 cm) 75.4% (69.1 – 81.7%),
Reported illness in children ≥ median height (82.5 cm) 59.5% (49.6 – 69.3%),
Difference is statistically significant (p<0.05).

4. Discussion

4.1 Nutrition

The findings of the survey revealed a GAM of 15.2% (12.5 – 18.0 95% C.I., WHO 2006) and a SAM of 3.6% (2.1 – 5.1 95% C.I., WHO 2006). The GAM rate is slightly above WHO's "critical" threshold for acute malnutrition[4] of 15 with no aggravating factors. No previous nutritional surveys have been conducted in the region that can be compared; however nutritional data has been collected at times at the PHCCs and through outreach clinics. That data was collected at the peak of the hunger gap of 2009 and shows wide variations in malnutrition rates, with some reports reaching 25% GAM and others reporting as low as 9%. With this survey covering almost the entire County, the results can be used as a baseline from which to measure and compare throughout the next year.

MUAC results were collected and grouped into categories which correspond to WHO's new cut-off[s] as well as the new MoH Integrated Management of Severe Acute Malnutrition guidelines. Admission to a therapeutic programme will be offered to children with a MUAC less than 11.5cm and/or with nutritional oedemas. The findings show that 2.8% (1.6 – 4.1 95% C.I.) of the children between 6 and 59 months currently qualify for admission. If the MUAC criteria were extended to the supplemental programme, including children with MUACs between 11.5 and 12.5 cm, then an additional 10.9% (8.2-13.6 95% C.I.) would qualify. It should be noted that 14.8% (11.7 – 17.8 95% C.I.) of the measured children are considered to be at risk for becoming malnourished (MUAC 12.5 -13.4 cm).

3.4% (n=23) of the surveyed children are already admitted to a feeding program. At the time of the survey 14 of them (61%) were no longer considered acutely malnourished based on WFH z-scores, however the effects of malnutrition were still visible (skin and hair changes). Analysis of both WFH and MUAC results showed an association between length of the child in cm and nutritional status. Age of the child was not recorded during the survey as it is a time consuming process to work with the calendar of events, and often gives unreliable results. But separating the children into two groups using the median height of 82.5 cm as the dividing point would allow inferences to be made about the age. Children in the lower 50th percentile have a GAM rate of 22.8% (17.8 – 27.9 95% C.I.) using WFH z-scores, and a GAM rate of 24.9% (19.1 – 30.8 95% C.I.) using MUAC, while the upper 50th percentile have a GAM rate of 7.2% (4.5 – 10.0 95% C.I.) using WFH z-scores and a GAM rate of 2.1% (0.67 – 3.5 95% C.I.) using MUAC. Children in the lower group are almost 4 times more likely to be malnourished based on WFH z-scores (OR = 3.8, 2.38 – 6.1 95% C.I., p = 0.0001), and 15 times more likely to have a low MUAC (OR = 15.5, 7.6 – 31.2 95% C.I., p = 0.0001). Any nutrition activity that will be undertaken should keep the most affected population in mind, targeting weaning practices, child spacing and hygiene.

Food security assessments have continuously taken place over the last couple of years and have documented 2 successive poor cropping seasons. This year has had another sub par harvest and many parts of the County have already started transitioning to traditional coping mechanisms. Although this survey did not collect food security data that could be correlated to the malnutrition, it is reasonable to believe that this current report represents the best level of child nutrition that will be attained in the County until the next harvest.

4.2 Mortality

The survey has found the retrospective CMR to be 0.54 (0.16 - 0.92 95% C.I.)/10'000/day and the U5MR to be 1.19 (0.28 - 2.11)/10'000/day. Both findings are below the alert and emergency thresholds for mortality according to Sphere[7].

By conducting the survey it was uncovered that there were 5 under five deaths in one village in August / September that were described to be meningitis (only one was selected for inclusion in the survey). The County and State MoH were not aware of this. This highlights the low level of reporting and poor ability to communicate within the County. The recent donation of a motorcycle by AVSI to the County Assistant Commissioner of Health will now allow for closer surveillance of outbreak diseases.

4.3 Immunization

Measles immunization coverage is poor, with only 13.3% (5.7 – 21.0 95% C.I.) of the surveyed children having vaccination cards, 25.3% (16.5 – 34.1 95% C.I.) reported immunization verbally by recall, leaving 61.4% (50.1 – 72.6 95% C.I.) with no immunization. For Vitamin A, the survey revealed that 31.0% (18.1 – 44.0 95% C.I.) of the sampled caretakers for children aged 6 – 59 months recalled receiving vitamin A in the 6 months prior the survey. While these coverage rates are valid for the County, they do not show the large variability by region. The design effect for measles coverage is 7.4 and for Vitamin A it is 12.6. These design effects would indicate that vaccination coverage is highly variable depending on region. However, the differences between vaccination coverage were not statistically significant for those who were classified as accessing a functional clinic for all health problems and those who do not have access to health care or choose not to go. This is the result of EPI outreach programmes to areas that do not have health units. So although the County has a long way to go to attain vaccination coverage goals, the areas currently reached may have basic levels of coverage. Effort must be made to reach those not attending clinics / outreaches and to expand EPI programmes into regions not currently covered.

4.4 Child morbidity

The common childhood illnesses reported by the caretakers included fever / malaria, cough and diarrhea. There was a significant relationship between recent illness and low nutritional status of the children surveyed. Those with an illness in the 2 weeks prior to the survey had a GAM of 19.7% (15.4 – 24.0 95% C.I.) based on WFH z-scores, while those without an illness had a GAM of 5.5% (2.8 – 8.2 95% C.I.). The results of the GAM based on MUAC were similar. Those with cough and or diarrhea were almost 3 times more likely to have a low MUAC than those who did not (OR = 2.99, 1.6 - 5.6 95% C.I.). The findings are the same for GAM as measured by WFH z-score. The survey did not test for the direction of the relationship, so it is not possible to say if the malnutrition is leading to increased morbidity or if morbidity is leading to increased malnutrition, but does show that the association is very strong ($p = 0.001$).

4.5 Access to health care

74.6% (65.9 – 83.3 95% C.I.), a good percentage of the assessed households, had reported that they access and utilize clinics for all health problems. Some of the respondents would have to walk many hours to reach the clinic, but this shows their belief in the health system and a willingness to use it. There was however no significant difference in the nutritional status between those who use the health facilities (GAM 13.6%, 10.5 – 16.7 95% C.I.) and those who don't (GAM 19.4%, 13.5 – 25.3 95% C.I., $p = 0.078$).

5. Conclusions

The findings of the survey show that the GAM at 15.2% (12.5 - 18.0 95% C.I.) is just over the "critical" classification of malnutrition severity as defined by WHO. The CMR and the U5MR although not at critical threshold levels for an emergency should be monitored along with SAM as they could potentially increase. The measles vaccination and vitamin A coverage County wide is very low. Effort needs to be given to improve this. Childhood illness is associated with poor nutritional status, but attendance at health showed no significant impact on GAM rates. The survey revealed a high percentage of preceding morbidity during the dry season (63%) and a fairly high percentage of self reported clinic usage (75%).

The data from the survey indicates that the smallest children are most affected with acute malnutrition, and poor nutritional status was highly associated with poor health. Since reported access and usage of health care facilities was not found to correlate well with the malnutrition rates, other factors involved could be poor weaning practices and food shortages. Food insecurity is well documented in the region. At the time of the survey the last of the harvest was being collected so it is reasonable to assume that this is the most food secure time of the year. The food security outlook for Ikotos County is poor. Therefore the nutritional status of the population can be expected to deteriorate.

6. Recommendations

- Hold a coordination meeting in January for all actors involved in nutrition in Ikotos County.
- Roll out the new MoH Integrated Management of Severe Acute Malnutrition guidelines and use them for uniform and consistent admission, treatment, discharge and referral criteria.
- Introduce routine screening of children < 5 by MUAC in all health facilities. Equip more health facilities to provide growth monitoring. Provide training on referral criteria and procedures.
- Increase access to SFPs, OTPs and Stabilization centres. Identify and set up one or two more SFP and OTP sites in areas that don't have access to the existing nutrition programs.
- Improve and standardize the referral system between the programmes (from SC to OTP to SFP, within and between clinics) so that children are not dropped from the programme prematurely.
- Improve vaccination and vitamin A coverage through outreaches to prevent outbreaks, such as measles, which would result in a rapid deterioration of the nutritional situation. Provide health education on the importance of immunization, good hygiene and appropriate feeding and child care practices.

7. References

[1] Erhardt, J & Golden, M. 2007. ENA for SMART: Emergency Nutrition Assessment
[2] Measuring mortality, nutritional status and food security in crisis situations: SMART methodology (Standardized monitoring & assessment of relief and transitions), M. Golden et al, 2006.
[3] EPI info version 3.5.1, 2008
[4] World Health Organization. Management of Nutrition in Major Emergencies. Geneva: World Health Organization; 2000
[5] Caritas food security and livelihood assessment Ikotos County May 2009
[6] WHO and UNICEF. 2009. WHO child growth standards and the identification of severe acute malnutrition in infants and children: A Joint Statement by the World Health Organization and the United Nations Children's Fund. Geneva: WHO.
[7] The Sphere project: Humanitarian charter and minimal standards in disaster response; Geneva 2004

Appendix A – List of villages and clusters selected

Note: Bomas / Villages with an asterisk have been excluded for cluster selection

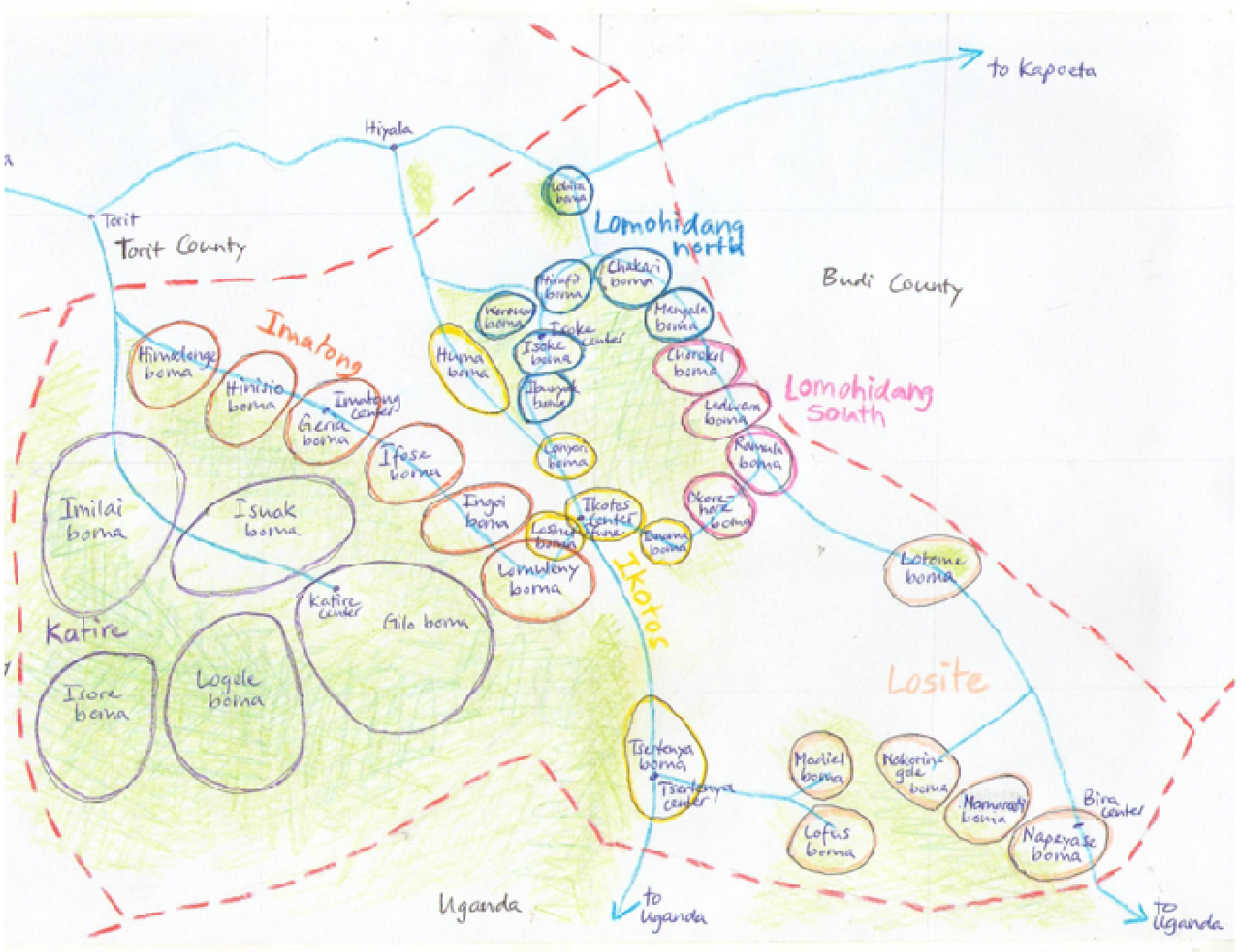
Payam	Boma	Village	Cluster
Ikotos	Ifune	Lalanga	
		Lolongi	5
		Sikali	
		Idimele	
		Ifune town	
	Lonyori	Momoria	1
		Koko	
		Lobile	
		Kekere	
		Lofayo	
		Nyakitalak	
	Huma / Lotada	Bolie	
		Huma	3
		Lofi	
		Fatongo	
		Machat	
	Tanama	Lorima	2
		Iyak	
		Wukwuk	
	Losihet	Iteuso	
		Lokoro	4
		Ngutube	
	Tsertenya	Tsertenya centre	
		Lofusa	
		Mosingo	
		Lohila	6
		Lotuhoyaha	
Imatong	Himodonge	Logoyoha*	
		Lotese	
		Keberek	
		Logire HH	10
		Lobicang	
		Loilok	
		Suhuru	
	Hinisio	Lokailaru	
		Lomode	
		Tolok	14
		Sariang	
		Lofiri*	
		Lofong*	
	Geria	Hede*	
		Lotodo*	
		Lafi	
		Tarafafa	
		Locomo	13
		Lenyleny	
	Ifose	Lomwo	
		Hibielo	
		Lomogoro	
		Lofulung	
		Lokwaya	15
	Ingoi	Longairo	
		Logoro	
		Lobwoye	11
		Lomarati*	
		Ichata	
	Lomuleny	Sami*	
		Lohayim*	
		Ngaluma	
		Chilok	
		Logire Kakak	12
		Lomule	
Lomohidang north	Isoke	Isoke centre	
		Iketeke	20
		Olufe*	
		Kuruma / Imme	
		Motoyo	
		Dito	
		Loronyo	
	Mangala	Mangala centre	18
		Moruka	
		Lokwamoru	
		Loriama	
		Lobalwa	
		Lobok	
		Moruhuron	
	Chakari	Chakari centre / Momoria	
		Lotira	21
		Orissa	
		Ipida	
		Lohiliak	
		Juba	22
	Lobira	Kolera	
		Afule	
		Abaklimo	
		Imatong	23
		Akara	
	Ibunyak	Inbunyak centre	19
		Lohirafa	
		Ikinok	
		Ikudang*	
		Nimiratisa	
		Loriok	
	Woroworo	Konyokonyo	
		Mairo / Yeryer	
		Lokara	
		Haboliere	
		Ihina	24
		Ngalangala	
	Hirafit	Mahatak	
		Loyoro	
		Lomini	
		Lobuto	
		Nahicood	25
		Lobule	
Lomohidang south	Lodwara	Mohina	26

		Nagicoot*	
		Moroto*	
		Logwana	
		Talla	
		Lodik	
		Kidimakuch	
		Lodwara-Mura	27
		Lodwara-Ingorore	
		Miyang	
		Awari	
		Ojori	
		Foira	
		Nyebera	
		Napwajore	
	Chorokol	Chorokol centre	
		Mak	28
		Omengiria*	
		Ihoria*	
		Morungole*	
		Medei*	
		Rukunga*	
		Ingorore*	
		Italeu*	
		Omunaro*	
		Sigeli*	
	Ramula	Loudoti	
		Okofiari	
		Madany	31
		Lohila	
		Kubaya	
		Kawanga	
		Tuduha	
		Longweny	
		Ipalak	
		Lofirika	29
		Lomus	
	Okorehore	Sadit*	
		Tawon	
		Lolemu*	
		Ewaraga*	
		Odorihala*	
		Okwamoru*	
		Labalang	32
		Lohihe*	
		Lodwa*	
		Laharanya	
		Okorehore	30
Losite	Napeyase	Boliak	7
		Akotos	
		Narengepwa	
	Namarati	Kator	
		Longairo	
		Namarati	
	Nakoringole	Miling	9
		Nangara	
		Masaka	
		Atera*	
	Lotome	Konyokonyo	8
		Gum	
	Madiel	Loito	
		Loronyo	
	Lofus	Konyokonyo	
		Lorum	
		Beleki	
Katire	Gilo	Konoro*	
		Lokidong*	
		Iboda*	
		Lomoya*	
		Lobohore*	
		Isio*	
		Ibahany*	
		Omeo	
		Ipalak*	
		Katire centre	16
		Lokutulo*	
		Idohi	
	Isore*	*Villages unknown*	
	Isuak	Loyere*	
		Iforo	
		Lotele	
		Rukube	
	Imilai	Hiba	
		Poli	
		Maji	
		Banano	17
		Mailang*	
		Lokwi	
		Nabara*	
		Lofihihos	
	Logele	Lomuene*	
		Madadi	
		Nyaragama*	
		Mogiri*	
		Larieko*	

Appendix B - Health facilities in Ikotos County

Payam	Boma	Health facility	Supported by
Ikotos	Ifune	1 PHCC	MoH
	Lonyori	1 PHCU	MoH / NCA
	Huma / Lotada	2 PHCUs	MoH / NCA
	Tanama	-	
	Losihet	-	
	Tsertenya	1 PHCU	MoH / NCA
Imatong	Himodonge	1 PHCU	MoH / NCA
	Hinisio	-	
	Geria	1 PHCC	Merlin
	Ifose	2 PHCUs	MoH / NCA
	Ingoi	1 PHCU	MoH / NCA
	Lomuleny	2 PHCUs	MoH / NCA
Lomohidang north	Isoke	1 PHCC	CDoT / AVSI / Caritas / CRS
	Mangala	1 PHCU	AVSI
	Chakari	1 PHCU	AVSI
	Lobira	1 PHCU	AVSI
	Ibunyak	-	
	Woroworo	-	
	Hirafit	1 PHCU proposed	
Lomohidang south	Lodwara	1 PHCU, 1 more proposed	AVSI
	Chorokol	1 PHCU	AVSI
	Ramula	-	
	Okorehore	1 PHCU proposed	
Losite	Napeyase	1 PHCU	MoH / NCA
	Namarati	-	
	Nakoringole	2 PHCUs	MoH / NCA
	Lotome	1 PHCU	MoH / NCA
	Madiel	-	
	Lofus	1 PHCU	MoH / NCA
Katire	Gilo	2 PHCUs, 1 more proposed	MoH / NCA
	Isore	-	
	Isuak	-	
	Imilai	1 PHCU	MoH / NCA
	Logele	-	

Appendix C – Map of Ikotos County



Appendix D - Anthropometric data and health questionnaire (one sheet per household)

Team number: _____ Cluster number: _____ Household number:_____

No	Name	Sex	Age in months <9 / >9	Weight in kg ± 100g	Height in cm ± 1mm	MUAC in cm	Oedema Y=Yes N=No	Currently in feeding program? Y=Yes N=No	Measles vaccine R=Yes Recall C=Yes with Card N=No	Vitamin A in last 6 months Y=Yes N=No	Illness in the past 2 weeks? Y=Yes N=No	Type of illness (see A)	Treat-ment (see B)
		M / F	<9 / >9				Y / N	Y / N	R / C / N	Y / N	Y / N		
		M / F	<9 / >9				Y / N	Y / N	R / C / N	Y / N	Y / N		
		M / F	<9 / >9				Y / N	Y / N	R / C / N	Y / N	Y / N		
		M / F	<9 / >9				Y / N	Y / N	R / C / N	Y / N	Y / N		
		M / F	<9 / >9				Y / N	Y / N	R / C / N	Y / N	Y / N		
		M / F	<9 / >9				Y / N	Y / N	R / C / N	Y / N	Y / N		

A) Type of illness: 1 = Malaria / Fever, 2 = Cough, 3 = Diarrhoea, 4 = Trauma, 5 = Don't know, 6 = Other

B) Treatment: 1 = No treatment, 2 = Traditional medicine, 3 = Buy drugs, 4 = PHCC / PHCU, 5 = Don't know, 6 = Other

Appendix E - Mortality questionnaire (one sheet per household)

Team number:_____ Cluster number: _____ Household number:_____

ID	Name of household member	Sex	Age < 5 / >5 years	Currently present?	Present at beginning of recall period?	Born during recall period?	Died during recall period?	Cause of death
1		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
2		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
3		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
4		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
5		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
6		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
7		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
8		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
9		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
10		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
11		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
12		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
13		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
14		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
15		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
16		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
17		M / F	< 5 / >5	Y / N	Y / N	Y / N	Y / N	
18								

Tally (data to be entered into Nutrisurvey):

Current HH members total	
Current HH members < 5	
Current HH members who arrived during recall (no births)	
Current HH members <5 who arrived during recall (no births)	
Past HH members who left during recall (no deaths)	
Past HH members <5 who left during recall (no deaths)	
Births during recall	
Deaths during recall	
Deaths <5 during recall	

Appendix F - Health questionnaire (one sheet per household)

Team number:_____ Cluster number:_____ Household number:_____

1.	Does your household visit a health clinic when a member is ill? No *(go to question 6)* Yes	 □ □	
2.	What is the name of the clinic? _____		
3.	Were drugs available at the clinic when you went there the last time? No Yes	 □ □	
4.	Was the staff working at the clinic when you went there the last time? No Yes	 □ □	
5.	Does your household go to the clinic for all health problems or only for serious problems? Only serious problems *(go to question 7)* All health problems	 □ □	
	END OF THE QUESTIONNAIRE		

6.	Why does your household not visit the health clinic? Clinic too far away No drugs available No staff working Too expensive Don't know Others *(specify)*_____	 □ □ □ □ □ □	
	END OF THE QUESTIONNAIRE		

7.	Why is your household visiting the clinic only for serious health problems? Clinic too far away No drugs available No staff working Too expensive Don't know Others *(specify)* _____	 □ □ □ □ □ □	
	END OF THE QUESTIONNAIRE		

Appendix G: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex (NCHS 1977 reference)

	All n = 670	Boys n = 327	Girls n = 343
Prevalence of global malnutrition	13.3 % n=89 (10.6 – 15.9 95% C.I.)	14.1 % n=46 (9.9 – 18.3 95% C.I.)	12.5 % n=43 (8.8 – 16.3 95% C.I.)
Prevalence of moderate malnutrition	10.7 % n=72 (8.1 – 13.4 95% C.I.)	11.3 % n=37 (7.3 – 15.3 95% C.I.)	10.2 % n=35 (6.7 – 13.7 95% C.I.)
Prevalence of severe malnutrition	2.5 % n=17 (1.0 – 4.1 95% C.I.)	2.8 % n=9 (0.8 – 4.7 95% C.I.)	2.3 % n=8 (0.3 – 4.3 95% C.I.)

The prevalence of oedema is 0.6 %