



ANTHROPOMETRIC AND MORTALITY SMART SURVEY

AKOBO EAST COUNTY, JONGLEI STATE, SOUTH SUDAN

5th-14th December, 2015

FUNDED BY:



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ABBREVIATIONS

CI: Confidence Interval

CHD: County Health Department

UNICEF: United Nation International Children’s Emergency Fund

CMR: Crude Mortality Rate

DEFF: Design Effect

ENA: Emergency Nutrition Assessment

GAM: Global Acute Malnutrition

HAZ: Weight-for-Age Z score

HH: Household

IMC: International Medical Corps

MAM: Moderate Acute Malnutrition

MoH: Ministry of Health

MUAC: Mid Upper Arm Circumference

OTP: Outpatient Therapeutic Program

PHCC: Primary Health Care Center

PHCU: Primary Health Care Units

PPS: Probability Proportional to Population Size

RRC: Relief and Rehabilitation Commission

SAM: Severe Acute Malnutrition

SMART: Standardized Monitoring and Assessment in Relief and Transition

SSP: South Sudan Pound

TSFP: Targeted Supplementary Feeding Program

WHO: World Health Organization

WAZ: Weight-for-Age Z score

IYCF: Infant and Young Child Feeding

WHZ: Weight-for-Height Z score

U5MR: Under-Five Mortality Rate

EXECUTIVE SUMMARY

Akobo County is one of the eleven Counties that make up Jonglei state. It is located in the north-eastern part of the state. The area is within the Eastern Flood Plain Zone and characterized by black cotton soil. The soil is fertile for cultivation and receives rainfall from May to November in normal year. Akobo is one of the counties within Jonglei State that has been hit severely by insecurity as a result of the attempted coup in December 2013.

Further, Akobo is divided into two counties namely, Akobo East and Akobo West. Akobo East has 4 Payams namely; Alali, Bilkey, Nyandit and Dengjok. The area's population, according to 2008 former united Sudan household census, was estimated to be 140,455 with children below five contributing an estimated population of 25,282. The current estimated figures of Akobo East is 79,160, however the population has increased due to internally displaced people that are estimated to be 32,733 according to UNOCHA report.

IMC currently implements Nutrition, health and GBV programmes in Akobo East. IMC runs Community based Management of Acute Malnutrition with 10 OTP/TSFP sites (3 are integrated at the health facility while 7 community outreach program) and Infant and Young child feeding IMC also support and run the Akobo county hospital, providing in-patient, out-patient services , surgical interventions, reproductive health and mental health interventions.

The nutrition survey was conducted during the post-harvest period as part of the ongoing nutrition surveillance to determine nutrition situation of the population to obtain progress update on the current health and nutrition situation to better inform nutrition programming Findings for 2015 post-harvest survey conducted in December indicated high GAM prevalence of 18.6% (14.5 ↔ 23.6, 95% C.I.) and SAM prevalence of 4.4% (2.4 ↔ 8.0, 95%) indicating a critical nutrition situation in the area.

Overall the key underlying factors of nutrition status in Akobo East are morbidity, IYCF practices- poor breastfeeding, food frequency and dietary diversity as indicated by IYCF assessment conducted in October; poor hygiene and safe drinking water, poor health coverage and continued insecurity which continue to impact on household food security and livelihoods resulting to inadequate food consumption. Integrated approaches should be undertaken to address the nutrition situation in Akobo East County.

The nutrition situation in Akobo East County is classified as critical based on the WHO classification of malnutrition and the situation is likely to deteriorate as the dry season starting picking in January through April and this will be worsened by the fact there will be limited food at the household level as most households will either have finished the harvested food or will be reduced.

Intervention efforts that address both immediate needs for the acute malnutrition cases and chronic malnutrition in the vulnerable population should be mobilized. Sustainable strategies for livelihood support and social protection mechanisms are recommended. Specific recommendations include;

The table below presents the summary of the indicators assessed by this survey:

Children 6-59 months Anthropometric results(WHO 2006 Standards)			
INDEX	INDICATOR	DECEMBER 2014	DECEMBER 2015
WHZ- scores	Prevalence of global malnutrition (<-2 z-score and/or oedema)	18.6% (14.5↔23.6 95% CI)	16.9 % (13.7 - 20.7 95% C.I.)
	Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	14.2% (11.1↔18.1 95% CI)	14.3 % (11.2 - 18.1 95% C.I.)
	Prevalence of severe malnutrition (<-3 z-score and/ or no oedema)	4.4% (2.4↔ 8.0 95%CI)	2.6 % (1.4 - 4.7 95% C.I.)
HAZ- scores	Prevalence of stunting (<-2 z-score)	15.7% (11.3↔21.3 95% CI)	9.9 % (6.9 - 14.0 95% C.I.)
	Prevalence of Moderate stunting (<- z-scores and >=-3 z-score)	11.7 % (8.6 - 15.7 95%C.I.)	7.6 % (5.3 - 11.0 95% C.I.)
	Prevalence of Severe stunting (<-3 z-score)	4.0 % (2.2 - 7.1 95% C.I.)	2.2 % (1.2 - 4.0 95% C.I.)
WAZ- scores	Prevalence of underweight (<-2 z-score)	17.6% (13.3↔22.9 95% CI)	18.0 % (14.3 - 22.3 95% C.I.)
	Prevalence of Moderate underweight (<- z-scores and >=-3 z-score)	14.9 % (11.1 - 19.7 95%C.I.)	15.2 % (11.9 - 19.2 95%C.I.)
	Prevalence of severe underweight (<-3 z-score)	2.7 % (1.4 - 5.0 95% C.I.)	2.8 % (1.6 - 4.7 95% C.I.)
MUAC	Prevalence of global malnutrition (< 125 mm and/or oedema)	16.3% (12.2↔21.6 95% CI)	6.4 % (4.5 - 9.0 95% C.I.)
	Prevalence of global malnutrition (< 125 mm and >=115mm and/or oedema)	13.2% (10.2↔18.4 95% CI)	5.1 % (3.5 - 7.4 95% C.I.)
	Prevalence of global malnutrition (< 125 mm and/or oedema)	3.1% (1.7↔5.7 95% CI)	1.3 % (0.6 - 2.8 95% C.I.)
Mortality (retrospective over 87 days prior to interview)			
Mortality results	Crude mortality rate(CMR) (total deaths/10,000 people / day)	0.89 (0.58-1.37, 95% CI)	0.56 (0.31-1.01, 95% CI)
	Under-five mortality rate(U5MR) (deaths in children under five/10,000 children under five / day)	1.04 (0.44-2.41,95% CI)	0.38 (0.09-1.58,95% CI)
Health and Immunization Coverage Indicators			
Measles immunization, Vitamin A supplementation & Deworming		DECEMBER 2014	DECEMBER 2015

Measles coverage \geq 9 months	Card Mothers recall	35.1% 42.3%	28.5% 48.3%
Vitamin A overall coverage (6-59) Last 12 months	Yes No	77.4% 22.6%	70.4% 29.6%
Vitamin A coverage (6-11) (last 12 months)	Once Twice More than Twice	- - -	57.9% 36.8% 5.3%
Vitamin A coverage (12-59) Last 12 months	Once Twice More than Twice	- - -	40.9% 31.1% 28.0%
Vitamin A coverage (6-59) Last 12 months	Once Twice More than Twice	- - -	42.6% 31.7% 25.7%
Deworming (12-59) Last 12 months	Once Twice More than Twice	- - -	64.4% 31.5% 4.0%
Morbidity for the last 2 weeks			
Child Illness in the last 2 weeks	Yes No	76.2% 23.8%	62.5% 37.5%
Proportion of children by type of sickness	Fever Cough Diarrhea Skin Infection Eye infections Other Sickness	55.6% 40.8% 43.0% 13.7% 18.6% 0%	53.2% 18.7% 25.7% 5.6% 5.8% 3.8%
Treatment seeking behavior			
Treatment sought	Nothing done Hospital PHCC Pharmacy Private physician Traditional practitioner	8.5% 56.2% 30.4% 4.1% 0% 0.3%	6.1% 57.7% 35.7% 5.0% 0.6% 0.9%
Slept under mosquito net last night			
Children who slept under mosquito net	Yes No	86.8% 13.2%	66.4% 33.6%

1.0 INTRODUCTION

1.1 Background Information

Akobo County is one of the eleven Counties that make up Jonglei state. It is located in the north-eastern part of the state. The area is within the Eastern Flood Plain Zone and characterized by black cotton soil. The soil is fertile for cultivation and receives rainfall from May to November in normal year. It is sub divided into 8 Payams, however Akobo County is divided into two, Akobo west and Akobo East. Akobo East has 4 Payams namely; Alali, Bilkey, Nyandit and Dengjok. The area's population, according to 2008 former united Sudan household census, was estimated to be 140,455 with children below five contributing an estimated population of 25,282. The current estimated figures of Akobo East is 79,160, however the population has increased due to internally displaced people that are estimated to be 32,733 according to UNOCHA report¹.

IMC currently implements Nutrition, health and GBV programmes in Akobo East County. IMC runs Community based Management of Acute Malnutrition with 10 OTP/TSFP sites (3 are integrated at the health facility while 7 community outreach program) and Infant and Young child feeding IMC also support and run the Akobo county hospital, providing in-patient, out-patient services , surgical interventions, reproductive health and mental health interventions.

The nutrition survey was conducted during the post-harvest period as part of the ongoing nutrition surveillance to determine nutrition situation of the population to obtain progress update on the current health and nutrition situation to better inform nutrition programming Findings for 2015 post-harvest survey conducted in December indicated high GAM prevalence of 18.6% (14.5 ↔ 23.6, 95% C.I.) and SAM prevalence of 4.4% (2.4 ↔ 8.0, 95%) indicating a critical nutrition situation in the area

According to the September IPC report, an estimated 3.9 million people in south sudan are severely food insecure and are unable to meet their food needs(3.1 million in Crisis and 800,000 in Emergency and 30,000 catastrophe) which is an 80% increase compared to the same period last year. The report showed that the overall nutrition situation in August-September remained Critical with GAM prevalence above the Emergency threshold (GAM >15%) in the conflict affected states of the Greater Upper Nile region (Jonglei, Unity and Upper Nile States) and the perennially high malnutrition prevalence in the states of Northern Bahr el-Ghazal and Warrap with the high prevalence of acute malnutrition attributed to inadequate food consumption, poor maternal and child feeding practices, morbidity (Malaria, diarrhoea, Pneumonia/ARI, and constrained health and nutrition service delivery².

Approximately 545,000 people were estimated to be facing acute food insecurity (Crisis (Phase 3) and Emergency (Phase 4)) in Jonglei State in September. This was however expected to reduce to 400,000 during the post-harvest period of October to December 2015 as most households will have access to sorghum harvests.

This Nutrition was conducted between 5th and 14th December 2015 with funding from UNICEF.

¹ Akobo SMART Survey June 2015

² IPC September 2015 report-South Sudan

1.2 Objectives of the survey

1. To estimate the prevalence of malnutrition among children aged 6-59 months in Akobo East County.
2. To estimate retrospective crude and under five mortality rates in Akobo East County
3. To estimate the coverage of vitamin A supplementation, Deworming and measles immunization amongst children 6-59months in Akobo East county.
4. To estimate the prevalence of morbidity among children 6-59 months in the last two weeks prior to the survey dates.

2.0 SURVEY METHODOLOGY

The Standardized Monitoring and Assessment of Relief and Transition (SMART) methodology was used for this survey. This methodology provides a basic integrated method for assessing nutritional status and mortality rate.

2.1 Geographic target and population

The nutrition survey was carried out in Akobo East County, Jonglei State. The study population for the anthropometric measurement and health (morbidity and immunization) were children from the age of 6 to 59 months; whereas all households formed the population for retrospective mortality.

2.2 Survey design

The survey was a cross sectional study with two-stage cluster sampling using SMART methodology. Anthropometric data, two-week retrospective morbidity data and retrospective mortality data was collected.

2.3 Sampling Methodology

A two-stage cluster sampling with probability proportional to size (PPS) design was employed for the survey. Villages were considered the smallest geographical units.

2.3.1 Sample Size Determination

Sample size for anthropometry and retrospective mortality has been determined using Emergency Nutrition Assessment (ENA) for SMART software version 2011 (July 9th, 2015 update)

For anthropometry, a total of **497** children in **440** households was calculated and for mortality a total of **2567** persons and **429** households was calculated as a representative sample size using the parameters summarized in the table below.

Table 1: Estimated sample sizes for Anthropometry and retrospective mortality:

Parameter	Anthropometry	Retrospective mortality
Estimated prevalence % ³	18.6	
Estimated death rate per 10000/day ⁴		0.89
±desired precision % ⁵	4.5	0.5
Design effect ⁶	1.59	1.5
Recall period in days ⁷		87
Average household size ⁸	6.3	6.3
% of children under-five ⁹	21	
% of non-response households	5	5
Children to be included	497	
Population to be included		2567
Households to be included	440	429

As the two indicators always produce different household samples, the larger of the two calculations (440) will be used for both mortality and anthropometric surveys.

Based on issues that impact on the total number of households that could be done in a day i.e. travel hours, introduction and household listing ,lunch breaks and time taken to administer a questionnaire in a household, it was estimated that 13 households could be visited by one team in a day. The total number of clusters obtained after dividing the total number of households (440/13) was 33.7 (when rounded up gives 34 clusters). All the 34 clusters were covered during the survey exercise.

2.3.2 Sampling procedure

The Nutrition survey employed two-stage cluster sampling methodology.

First stage sampling (selection of clusters)

The first stage was selection of clusters based on probability proportional to population size (PPS). Each village was considered as a smallest geographical unit. The population data used was compiled in Akobo East together with the local authorities .All villages and their total population was entered in the ENA for SMART software (July 9th , 2015 update version), and the software randomly assigned the clusters to the villages, based on their respective populations.

Second stage sampling (Selection of households)

Selection of households was done in every sampled cluster using simple random sampling .On arrival at the village, the survey team introduced themselves and the objectives of the survey

³ Akobo East Post Harvest SMART survey Dec-2014

⁴ Akobo East Post Harvest SMART survey Dec-2014

⁵ SMART recommendations

⁶ Akobo East Post Harvest SMART survey Dec-2014

⁷ Calculated from 16th September,2015(lieutenant was killed)

⁸ Akobo East Post Harvest SMART survey Dec-2014

⁹ South Sudan 2008 census

to the village leader and in collaboration with the village leaders, the team prepared a list of all households in the village/unit. Abandoned households were not listed. From the list of households created the survey teams would select households to be surveyed by simple random sampling using a table of random numbers.

SMART random number of table was used to select the households.

The survey team started the survey from any convenient household of the randomly selected households (13 households) to carry out anthropometric and mortality questionnaires. Revisits were done to households in which eligible children (under five) or entire family was found to be absent at first attempt. Households were not be substituted.

A household was defined as consisting of all persons with family or other social relationships among themselves eating from the same cooking pot and sharing a common resource base.

3.0 SURVEY ORGANIZATION

3.1 Coordination /collaboration

Survey details (methodology) was discussed with the Nutrition Information Working Group for validation. Relevant information on security and access was obtained prior from the county authorities. Meetings were held with the respective administrative authorities on arrival by the survey team to brief them on the survey objective, methodology and procedures as well as get relevant updated information on security, access and village level population.

3.2 Survey Period

The survey was conducted for a period 12 days from 5th December -14th December 2015 (to include enumerators training and data collection).

3.3 Survey training

The teams were intensively trained for 4 days. The training focused on survey objectives, methodology, anthropometric measurements, field procedures, interviewing techniques, administration of the survey tools. Standardization test and field test was conducted as part of the training. Standardization test was done to evaluate accuracy and precision of the survey enumerator's measurements, each enumerator took measurements of 10 children (aged 6-59 months) twice. However very young children were avoided as they tend to be restless. The standardization test was done in phases with enumerators measuring 5 children on the third day of the training and the other 5 children measured on the fourth day of training.

3.4 Survey team

The survey was conducted using 6 teams; each team comprising of 4 members (1 survey supervisor, 1 team leader and 2 enumerators). The survey supervisors were International Medical Corps surveillance officers. The other member of the data collection team were largely drawn from nutrition program staff from other agencies operating in the area, and with prior experience in nutrition surveys. The survey supervisors were in charge of the data quality control in the teams.

Each team was assisted by a village guide (recruited at the village level) to lead and guide the survey team within the village in locating the selected households.

3.5 Data Collection

3.5.1 Data collection tools

Structured questionnaires were used to collect anthropometric & health data (anthropometric questionnaire) from all children within the eligible age range (6-59 months) & for mortality data (individual mortality questionnaire) in households regardless of whether they have children or not.

3.5.2 Survey Variables

a. Anthropometrics

- Age: was determined using birth/health cards/ records if available and local calendar of events which was jointly developed by county leader and survey enumerators.
- Sex: Male or female
- Weight: Children's weights was taken without clothes using mother and child weighing (SECA scales, 100g precision).
- Height/length: Children were measured using wooden UNICEF measuring boards (precision of 0.1cm). Children less than 87 cm were measured lying down, while those greater than or equal to 87 cm were measured standing up.
- Mid-upper arm circumference: MUAC measurements were taken at the mid-point of the left upper arm using child tapes (precision of 0.1cm).
- Bilateral pitting oedema: Was assessed by the application of normal thumb pressure on both feet for 3 seconds. Occurrence of pitting oedema on both feet upon release of the fingers indicated nutritional oedema classified as severely malnourished.
- Referral: All the survey teams were given referral forms and all children found acutely malnourished and not in a nutrition program were referred to IMC nutrition program for interventions. Among thirty five acutely malnourished children identified during the survey by MUAC, 20 children were referred for treatment and fifteen reported already being enrolled in treatment.

b. Vitamin A supplementation, Deworming and Measles immunization

Data on measles and Vitamin A supplementation were collected to estimate their coverage.

- Measles: Assessed by checking for measles vaccination on EPI cards or by recall and was only done for eligible children (≥ 9 months)
- Vitamin A: Mothers/caretakers were asked whether the child received Vitamin A in the last 12 months. Vitamin A capsule was shown to caregivers to aid in recall, EPI cards were also used.
- Deworming: Mothers/caretakers were asked whether the child has dewormed in the last 12 months. Deworming tablets was shown to caregivers to aid in recall.

c) Morbidity

Two-weeks retrospective morbidity data was collected from mothers/caregivers of all children (6-59 months) included in the anthropometric survey. The mother/caregiver were asked if the child had been ill in the past two weeks and if so, and then asked type of illness and treatment sought.

d) Mortality

Retrospective mortality data was collected in all the visited households, including those with no children aged 6-59 months.

Information was collected on the age and sex of the household members, the number of household members present within the recall period, the number of persons who arrived or left within the recall period, the number of births and deaths over the recall period and pregnancies during the recall period. The cause and location of death was also captured. Individual Mortality questionnaire was used to collect data.

3.6 Data Quality Control and Assurance

Data quality was ensured through;

- Intensive training coupled with standardization test and practical field test.
- Close supportive supervision from the team leaders/supervisors.
- Daily meetings during data collection to address challenges
- Daily data entry and regular plausibility checks

3.7 Data Entry and Analysis

ENA for SMART software 2011 version (April 21st 2015 update) was used to enter and analyse anthropometric and mortality data. Data analysis for morbidity was done using Microsoft Excel.

3.8 Survey Limitations

1. Population figures were based on projections and estimations from local authorities and probably had some errors (over-estimated)
2. Determining the exact age of some children even with the use of local calendar of events) was a major challenge as some health cards were not clearly updated, no exact dates of birth.

4. RESULTS

4.1 Demographic Characteristics

A total of 432 households were visited for mortality survey. Total population sample was 3067.5 as summarized in the table below.

Table 2: Demographic characteristics

Demographic characteristics	N
Total number of households	432
Total population sampled	3067.5
Males	1468.5
Females	1599
Sex ratio	0.95
Average household size	7.1
Total population for under-fives	599.5
Number of children under-five years per HH	1.3 [599.5/432]
Percentage of children under five	19.5

4.2 Anthropometric Results (Based on WHO Standards 2006)

A total of 547 children (278 boys, 269 girls) were assessed for their nutritional status through anthropometric measurements from 432 households out of the 442 planned to be included in the survey. 55 households had no eligible children 6-59 months. The survey achieved >100% of the sample size.

The overall quality of the survey was 0% which was considered excellent by the SMART classification (see annex on the plausibility results)

a) Distribution by age and sex

The ages of the children were determined by cards and recall. Majority, 59.0% of the under-five ages were determined by recall (calendar of local events), 37.8% of the ages were determined by health cards and a small proportion (3.1%) by use of birth notification card

Table 3 Distribution of Age and Sex of Sample

AGE (mo)	Boys		Girls		Total		Ratio
	no.	%	no.	%	no.	%	Boy:girl
6-17	76	55.9	60	44.1	136	24.9	1.3
18-29	57	44.2	72	55.8	129	23.6	0.8
30-41	60	48.0	65	52.0	125	22.9	0.9
42-53	69	56.1	54	43.9	123	22.5	1.3
54-59	16	47.1	18	52.9	34	6.2	0.9
Total	278	50.8	269	49.2	547	100.0	1.0

As shown in the above table, the overall sex ratio was found to be 1.0 which falls within the acceptable range between 0.8 and 1.2 and implies that the survey was unbiased for gender. The sex ratio was also as expected in all the age groups besides the 42 - 53 where the sex ratio

was 1.3. The proportion of young children (6-29months) as compared to that of 30-59months old were well represented (0.94), p-value=0.241(as expected).The number of children aged 6 to 29 months was 265 while those aged 30 to 59 months was 282 months.

b) Prevalence of Acute Malnutrition (wasting) based on Weight-for-Height Z-Scores (or oedema) and by Sex

The prevalence of global acute malnutrition in Akobo East County based on the weight-for-height and/or edema was 16.9% [13.7↔20.7 95% CI] (n=91) and the prevalence of Severe Acute Malnutrition (SAM) was found to be 2.6% [1.4↔ 4.7 95% CI] (n=14).The overall GAM prevalence is indicative of critical nutrition situation based on WHO standards.¹⁰ Comparing malnutrition by gender, the results showed that a slightly higher proportion of boys 17.3 % (13.4-22.1 95 % C.I) are malnourished than girls 16.5 % (12.2-21.9 95%C.I) .However there was no significant difference in malnutrition between boys and girls (overlapping confidence interval) and hence gender was not a risk factor for malnutrition

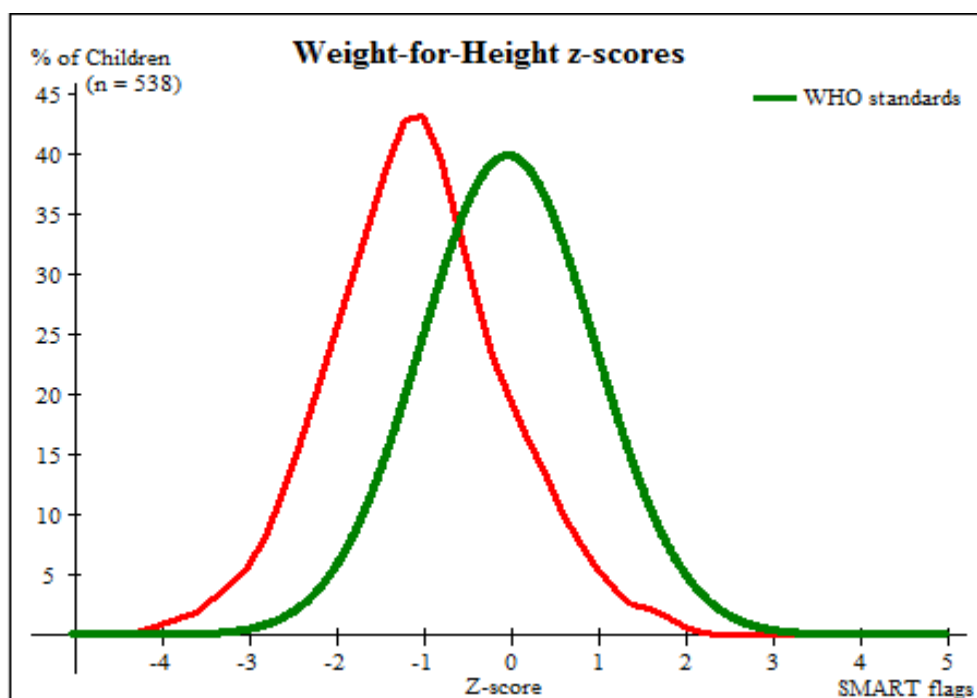
Table 4 : Prevalence of Acute Malnutrition (wasting) based on Weight-for-Height Z-Scores (or oedema) and by Sex

	All n = 538	Boys n = 271	Girls n = 267
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(91) 16.9 % (13.7 - 20.7 95% C.I.)	(47) 17.3 % (13.4 - 22.1 95% C.I.)	(44) 16.5 % (12.2 - 21.9 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(77) 14.3 % (11.2 - 18.1 95% C.I.)	(39) 14.4 % (10.8 - 18.9 95% C.I.)	(38) 14.2 % (9.9 - 20.0 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(14) 2.6 % (1.4 - 4.7 95% C.I.)	(8) 3.0 % (1.4 - 6.0 95% C.I.)	(6) 2.2 % (1.1 - 4.7 95% C.I.)

The comparison of the GAM and SAM prevalence between December 2014 survey and December 2015 surveys indicates no significant difference (P=0.05682) and (P=0.1741) respectively.

¹⁰ WHO cut off points for wasting using Z scores (<-2 Z scores in populations: <5% acceptable; 5-9% poor; 10-14% serious; >15% critical

Figure 1: Weight-for-Height Distribution



The above figure depicts the WFH-z-score distribution curve of the survey sample relative to the WHO GS curve. The findings indicate a shift to the left of the sample curve which indicates poor nutrition status of the sampled population in comparison to the reference population. The standard deviation (SD) for WHZ was 0.99 (which lies within the acceptable range of 0.8-1.2), indicating representativeness in the sample selection.

The prevalence of global acute malnutrition based on MUAC was 6.4% [4.5↔9.0 95% CI] (n=35) with the prevalence of severe acute malnutrition being 1.3% [0.6↔2.8 95% CI] (n=7). There was no case of oedema diagnosed during the survey period.

c) Prevalence of underweight based on weight-for-age z-scores by sex

The prevalence of underweight was 18.0% [14.3↔22.3 95% CI] (n=98) with prevalence of severe underweight being 2.8% [1.6↔4.7 95% CI] (n=15).

Higher prevalence of underweight was observed among boys (19.5 %) than girls (16.4 %), however, this difference was not statistically significant (p=0.280). Table 5 shows the distribution of underweight by age.

Table 5 : Prevalence of Acute Malnutrition (wasting) based on Weight-for-Height Z-Scores (or oedema) and by Sex

	All n = 545	Boys n = 277	Girls n = 268
Prevalence of underweight (<-2 z-score)	(98) 18.0 % (14.3 - 22.3 95% C.I.)	(54) 19.5 % (15.0 - 25.0 95% C.I.)	(44) 16.4 % (12.2 - 21.7 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(83) 15.2 % (11.9 - 19.2 95% C.I.)	(45) 16.2 % (12.0 - 21.7 95% C.I.)	(38) 14.2 % (10.4 - 19.0 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(15) 2.8 % (1.6 - 4.7 95% C.I.)	(9) 3.2 % (1.7 - 6.1 95% C.I.)	(6) 2.2 % (0.9 - 5.4 95% C.I.)

d) Prevalence of stunting based on height-for-age z-scores and by sex

Overall stunting prevalence of 9.9 % (6.9 - 14.0 95% C.I.) and 2.2 % (1.2 - 4.0 95% C.I.) for severe stunting. Slightly higher prevalence was reported among boys (10.0%) than girls (9.8%), however there is no significant difference (overlapping confidence intervals). High stunting prevalence was reported in the 18-29 age group (14.3%)

Table 6: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 537	Boys n = 271	Girls n = 266
Prevalence of stunting (<-2 z-score)	(53) 9.9 % (6.9 - 14.0 95% C.I.)	(27) 10.0 % (6.4 - 15.2 95% C.I.)	(26) 9.8 % (6.0 - 15.4 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(41) 7.6 % (5.3 - 11.0 95% C.I.)	(22) 8.1 % (5.2 - 12.4 95% C.I.)	(19) 7.1 % (4.2 - 12.0 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(12) 2.2 % (1.2 - 4.0 95% C.I.)	(5) 1.8 % (0.7 - 5.0 95% C.I.)	(7) 2.6 % (1.2 - 5.7 95% C.I.)

Table 7: Mean z-scores, Design Effects and excluded subjects, Akobo East Dec-2015

Indicator	n	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	538	-1.06±0.99	1.13	0	9
Weight-for-Age	545	-1.07±0.97	1.40	0	2
Height-for-Age	537	-0.58±1.12	1.79	0	10

4.3 Mortality

The retrospective mortality rate was calculated based on data collected on the 87 day recall. Out of 442 households planned to be sampled for mortality data, data was collected in 432 households

There were 3067.5 individuals recorded as present during the recall period, 599.5 of whom were children under-five. Among all deaths recorded 13 occurred in persons older than 5years and 2 in children less than 5 years of age.

The crude death rate was found to be 0.56 deaths per 10,000 per day [0.31↔1.01, 95% C.I] while the under-five mortality rate was 0.38 deaths per 10,000 per day [0.09↔1.58] which is below the WHO threshold¹¹. The results further showed that the male crude death rate was 0.70 deaths per 10000 per day [0.35-1.40, 95% C.I] which is slightly higher than the female crude death rate of 0.43deaths per 10,000 per day [0.18-1.05, 95% C.I].

Most deaths occurred among adults between 65-120 years 2.55 deaths per 10,000 per day (0.43-13.80 95% C.I)

Of the deaths that occurred during the recall period, 66.7% were caused by illness and (33.3%) by injury .The location of most deaths were in current location 73.3% and 26.7% in place of last. The design effect for crude was 1.27 which is indicative of a homogenous population in relation to death rates.

Table 8: Retrospective mortality results, Akobo East County Dec- 2015

Parameters	Results
Number of current HH residents	3067.5
Number of people who joined HH	496
Number of births during recall	41
Number of deaths during recall	15
Number of current HH residents <5years old	599.5
Recall period (days)	87
CMR(deaths/10,000/day)	0.56 [0.31-1.01, 95% CI] DEFF 1.27
U5MR(deaths in children <5/10,000/day)	0.38 [0.09-1.58, 95% CI] DEFF 1.00

4.4 Children Morbidity and Health Seeking behavior

Retrospective morbidity data (two-week recall) was collected to assess the occurrence of common illnesses among children 6-59months. The survey established that 62.5 % (n=342) had been sick two weeks prior to survey period (Table 9). Among children reported sick, 53.2% (182cases) had episodes of fever, 25.7% (88 cases) of diarrhea, 18.7% (64 cases) cough, 5.8% (20 cases) of eye infection, 5.6% (19 cases) of skin infection, and 3.8% (13 cases) other illnesses

¹¹ WHO emergency threshold of <2deaths/10000/day(U5MR) mortality rate and <1 death/10000/day Crude Mortality Rate(CMR)

Table 9: Prevalence of reported illness in children in the two weeks prior to interview and health seeking behavior

Parameters	N	N	Proportion
Morbidity	342	547	62.5%
Fever	182	342	53.2%
Diarrhea	88		25.7%
Cough	64		18.7%
Eye Infection	20		5.8%
Skin Infection	19		5.6%
Other Sickness	13		3.8%
Treatment sought	319	342	93.9%
Hospital	184	319	57.7%
PHCC	114		35.7%
Pharmacy	16		5.0%
Traditional Practitioner	3		0.9%
Private physician	2		0.6%
Mosquito Net Usage	363	547	66.4%
Proportion of Children who Slept under the Mosquito Net			

An assessment of health seeking behavior of caregivers of the sick children showed relatively good health seeking behavior by caregivers of the sick children with 93.3% (319 cases) of children taken for treatment. Only 6.7% (n=23) of the caregivers reported having not sought any medical treatment when their children fell ill. The results showed that majority of the caregivers sought assistance from the hospital (57.7%, n=184), followed by PHCC/PHCU (35.7%, n=114). Given that most of population in the county resides around Akobo settlement where Akobo County Hospital is located may explain why most.

On mosquito net usage, 66.4% (n=363) of the sampled children had slept under a mosquito net the previous night of the survey date.

4.5 Vitamin A supplementation, Deworming and Measles Vaccination

WHO recommends that Vitamin A supplementation starts at 6 months and subsequently at 6 months interval until a child reaches age of 5 years. Caregivers were shown vitamin A capsules and asked whether their children had taken a similar one in the preceding 12 months of the survey.

Survey findings indicate that an overall 70.4% (n=385) of children 6-59months had received at least once vitamin A supplementation within the last 12 months prior to the survey, which is below the recommended coverage of 80%. About 50.6% of children aged 6-11months and 26.2% of children 12-59 months had not taken any vitamin A supplementation while only 31.1% of 12-59 had completed the required twice Vitamin A supplementation.

Deworming coverage for children 12-59months was relatively low (31.7%,n=149 cases) with 67.7 % ,n=318 cases) reported having not received any deworming tablet 12 months preceding the survey period.

Table 10: Vitamin A supplementation, Akobo County, Dec 2015

Age group	6-11months(N=77)		12-59months(N=477)		6-59months(N=547)	
	N	%	N	%	n	%
Received	38	49.4%	347	73.8%	385	70.4%
Not received	39	50.6%	123	26.2%	162	29.6%
Number of times						
Once	22	57.9%	142	40.9%	164	42.6%
Twice	14	36.8%	108	31.1%	122	31.7%
>Twice	2	5.3%	97	28.0%	99	25.7%

The source of information on measles immunization was either the child's health card or mother's recall. The proportion of children 9-59months vaccinated against measles as verified by card was found to be 28.8 % (n=143) and according to the mothers recall, 48.3 % (n=224). A total of 76.8% of children in the surveyed population were found to have been vaccinated against measles. These coverage rates are below the recommended WHO EPI coverage cut off points of 80%.

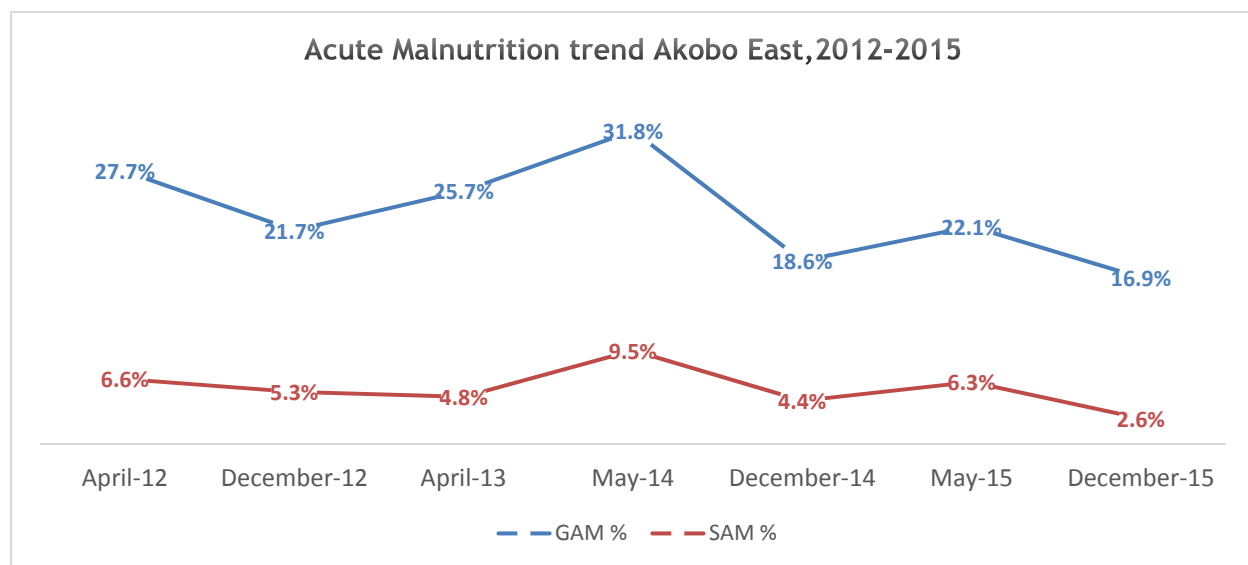
Table 11: Measles vaccination coverage Akobo East County, Dec, 2015

Measles immunization ≥9months		
	N	%
Yes [card]	143	28.5
Yes [Mothers recall]	242	48.3
Not immunized	108	21.6
Not known	8	1.6
Overall coverage		76.8

5.0 DISCUSSION

The survey results indicate global acute malnutrition prevalence of 16.9% which indicates critical nutrition situation based WHO standards. Prevalence of SAM is below the emergency levels of >4 %. The prevalence of underweight was found to be 18.0% [14.3↔22.3 95% CI] and stunting 9.9% [6.9↔14.0 95% CI] which was classified as medium according to the WHO classification¹².

Figure 2: Trend of Acute Malnutrition in Akobo East County 2012-2015

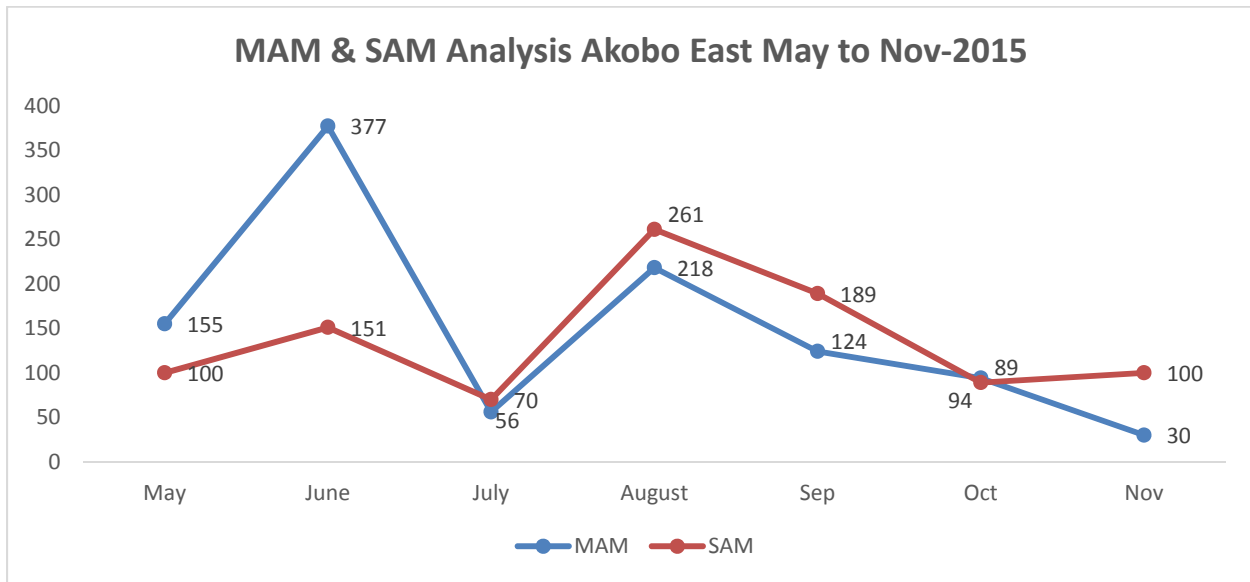


The survey results are lower than what was detected last year during the same season though there is no significant difference in the results using the CDC calculator (p-value=0.5483). The survey done the same period last year had a GAM of 18.6% and SAM of 4.4% compared to 16.9% and 2.6% GAM and SAM respectively detected in the this year. Malnutrition in the county has been high over years and this could be probably explained by the continued conflict which has had great impact on livelihoods

The results are however lower compared to May 2015 survey that reported Global acute malnutrition prevalence of and severe acute malnutrition prevalence of, though there is no significant difference in the results (p-value=0.633). This survey coincided with the post-harvest season when the nutrition situation is expected to have improved due to improved food security as households have access to own production and sale of harvests

¹² WHO Cut Off Points using Z-Score ((-2 Z scores in populations: <5% - Acceptable; 5-9% - Poor; 10-14% - Serious; >15% - Critical)

Figure 3: SAM and MAM admission trend analysis, Akobo East May-Nov 2015



The trends of admission in the figure above show high admissions for both SAM and MAM in June that dropped in July and again increase in August with significant decrease from the months of September to November. The high cases in June coincide with the pre-harvest period and could have been increased by the deteriorating food insecurity at the household level as well as access issues (rainy season) which limit access to services.

Though the nutrition situation is considered similar compared with similar seasons, the situation is likely to deteriorate in the next quarter (January-March, 2016)

Mortality

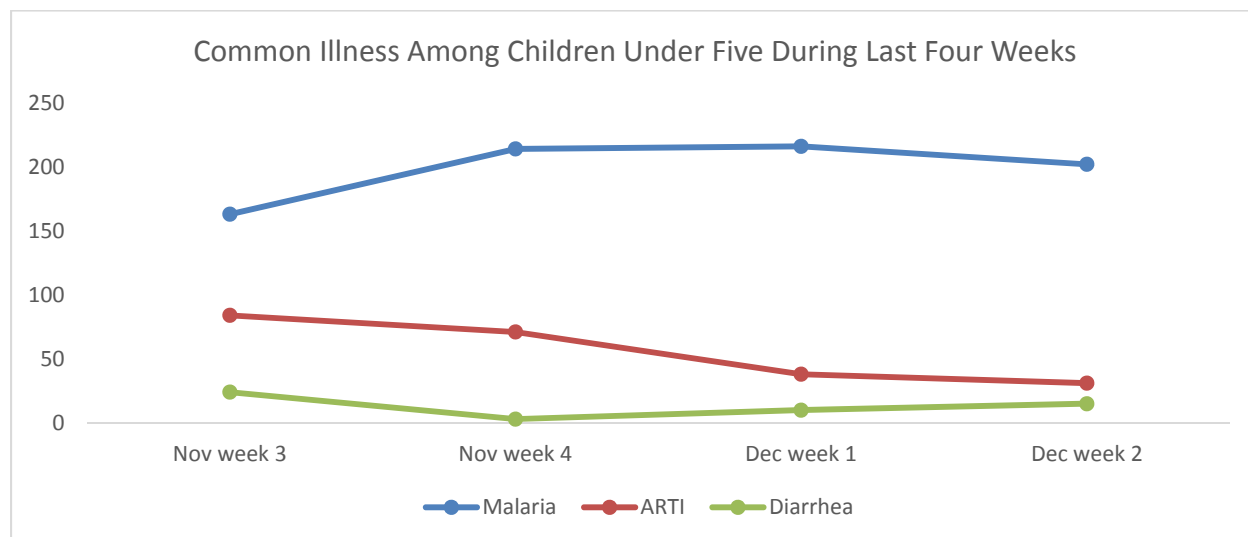
The survey reported an under-five mortality rate of 0.38/10,000/day and crude mortality rate of 0.56/10,000/day. Both the mortality rates are within the acceptable levels for emergency situations¹³. The under-five mortality rate reported is lower than the rate reported in 2014 post-harvest survey (0.899/10,000/day) in December 2014. Though mortality rates reported in this survey are at acceptable levels and do not predict future mortality.

Morbidity

High morbidity rates (62.5%) were reported in Akobo East in the two weeks prior to the survey. These levels were consistent with seasonal morbidity patterns recorded from the Akobo hospital OPD. In addition, acute malaria was endemic during this time of year (figure 4) Despite the high morbidity in the county which could have a negative impact on the levels of malnutrition, the survey found that there was good health seeking behavior and service utilization with preference to the hospitals and PHCC/PHCU.

¹³ WHO emergency threshold of <2deaths/10000/day(U5MR) mortality rate and <1 death/10000/day Crude Mortality Rate(CMR)

Figure 4: Common Illness among under five children, Akobo East County Dec-2015



Vitamin A supplementation and Immunization Coverage.

Immunization and vitamin A/deworming coverage are basic health services and are a reflection of how the population accesses and utilizes health services. Poor coverage for health and nutrition programmes are important risk factors to poor nutrition situation. Immunization and micronutrient supplementation are among the most effective ways to prevent malnutrition among children. However, this survey established that immunization and vitamin A supplementation coverage is below the WHO cut off of 80%.The survey findings indicate low deworming coverage (31.7%). Parasitic infections contribute to and exacerbate protein-energy malnutrition and micronutrient deficiencies. Vitamin A supplementation is lower than the cut off at .Similarly, only 76.8 % children were reported to have received measles immunization which are below the recommended WHO threshold.

6.0 CONCLUSION

Overall the key underlying factors of nutrition status in Akobo East are morbidity, IYCF practices- poor breastfeeding, food frequency and dietary diversity as indicated by IYCF assessment conducted in October; poor hygiene and safe drinking water, poor health coverage and continued insecurity which continue to impact on household food security and livelihoods resulting to inadequate food consumption. Integrated approaches should be undertaken to address the nutrition situation in Akobo East County.

The nutrition situation in Akobo East County is classified as critical based on the WHO classification of malnutrition and the situation is likely to deteriorate as the dry season starting picking in January through April and this will be worsened by the fact there will be limited food at the household level as most households will either have finished the harvested food or will be reduced.

In spite of the current situation, it is important to note the role of continued conflict which has effects on food security. Food insecurity remains a big challenge that cannot be ignored and is likely the direct cause of inadequate food intake in the households.

7.0 RECOMMENDATION

Intervention efforts that address both immediate needs for the acute malnutrition cases and chronic malnutrition in the vulnerable population should be mobilized. Sustainable strategies for livelihood support and social protection mechanisms are recommended. Specific recommendations include;

- Continued implementation of targeted SFP and OTP for children age 6 to 59 months to address the micro-nutrient and macronutrient food gap, justified by the critical GAM prevalence.
- Strengthen community mobilization aspect through recruitment of more CNVs targeting the far villages.
- Stronger linkages between OTP and SFP sites are necessary so that significant number of the severely malnourished children discharged from OTP would be followed up for treatment in SFP to prevent relapse.
- Effective programs that promote prevention of acute malnutrition among the households should be strengthened.
- Due to the low coverage of Vitamin A Supplementation and deworming and the significant drop in the measles vaccination coverage, then there is need to scale up the EPI Program in order to reach the un-reached children.
- A coordinated multi-sectoral approach to tackle underlying causes. This can be enhanced through regular coordination meetings and feedback to enhance harmonization humanitarian responses.
- The nutrition situation in Akobo has remained above 15% which is the threshold for nutrition emergency in the past 3 years, there is need to undertake an in-depth study such as the Nutrition Causal Analysis (NCA) which would help to determine the factors leading to malnutrition in the area.
- There is need of expand WASH activities in the county, as poor hygiene practices, lack of sanitation facilities and un-availability of safe drinking water is a predisposing factor to diarrhea and other diseases which leads to malnutrition among children under five.
- Quarterly mass screening should be enhanced as there has been high increase in population in the area especially those who return from Ethiopia and Northern Jonglei state (Canal- Pigi County) and Malakal- Upper Nile state as the result of displacement since last year's conflict.
- Establish regular nutrition surveillance through nutrition surveys-at both short and long rain periods.

8.0 Annexes

Annexes 1: Plausibility Results

Overall data quality

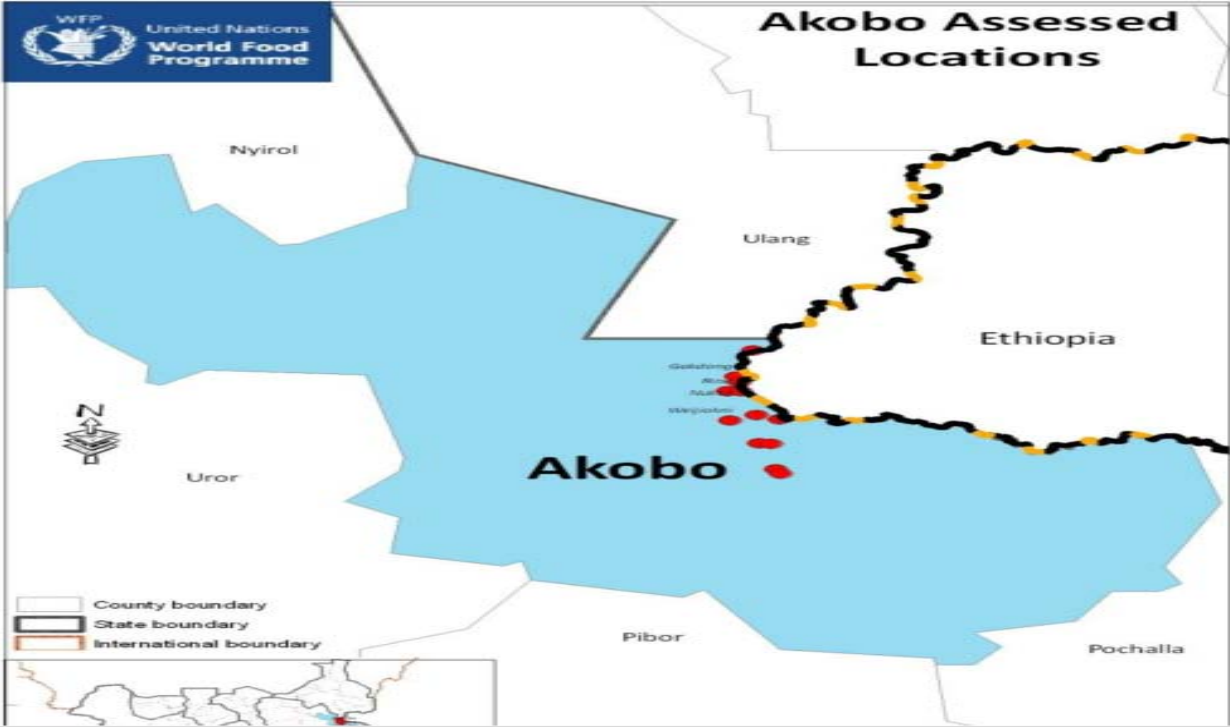
Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	Score
Flagged data (% of out of range subjects)	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	0 (1.6 %)
Overall Sex ratio (Significant chi square)	Incl	p	>0.1	>0.05	>0.001	<=0.001	0 (p=0.700)
Age ratio(6-29 vs 30-59) (Significant chi square)	Incl	p	>0.1	>0.05	>0.001	<=0.001	0 (p=0.241)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	0 (4)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	0 (7)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	0 (3)
Standard Dev WHZ .	Excl	SD	<1.1 and >0.9	<1.15 and >0.85	<1.20 or >0.80	>=1.20 <=0.80	0 (0.99)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	0 (0.10)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	0 (0.14)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	0 (p=0.596)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	0 %

The overall score of this survey is 0 %, this is excellent.

Annexes II: Selected Clusters

Geographical unit	Population	Cluster
Kueryaakni	474	1
Wechthore Jany	1360	RC
Nyijule Gatluak Onoth	960	2
Pack	1670	3
Markas	2438	4,5
Rotjiop	644	6
Market	2208	7
School	2728	8,9
Haisan	1228	10
Mission 1	2530	11,12
Mission 2	2254	13
Chan	1564	14,15
Nyikhaan	2300	16
Okhau	2100	17,18
Bhore	2351	19
Tungdol	2038	20,21
Gerawer	1780	22
Dibole	1569	RC
Liblow	1440	23
Wechkuach	432	24
Lol thayiah	552	25
Weiy Boi	483	26
Wech Miny Kuany	690	27
Wech Miem	396	28
Wech Both	1150	29
Wech Omah	1380	30
Wech Chiethiep	460	31
Wech Puri	736	32
Nukta	1380	33
wun buot	1150	34
Wech Nyikuay	966	RC
Wiy Deng	782	RC

Annexes III: MAP of Akobo County



Annexes IV: Local Event Calander

Local Events Calander for Akobo East 2015

Months English and Local	Season (Dry, Rainy, harvest, Cultivation)	2011		2012		2013		2014		2015	
January (Pay Kei)	New Year , Dry Season, CPA,, Jiom/Hoth hook	CPA / Happy New Year / Refrendom	59	CPA / Happy New Year	47	Murle Attack Deng Jok	35	Khor Gut Makuur, Capture of Bor	23	CPA/ Happy New Year	11
February (Pay Riew)	Dry Season , Jiom/Hoth hook		58		46	Murle Attack Akobo West	34	20 Death Murle / Lou	22		10
March (Pay Dhiok)	Dry Season, Kuey Kaakni		57	Murle attacked Lou Nuer in Rumuieri Wanding payam	45	Kampmeyni Jabe	33	GFD Reg	21		9
April (Pay Ngion)	Easter , Dry Season , Kuey Kaakni	Easter Holidays	56	Easter Holidays	44	Easter Holidays	32	Khor Gatdiang, First Air Drop WFP / Easter	20	Easter Holidays / Polio Vaccine	8
May (Pay Dhiech)	Rainy Season, Pieth Bel		55		43		31		19	Addis Ababa peace agreement between Kiir and Riek	7
June (Pay Bakel)	Rainy Season , Pieth Bel		54		42	Abduction of children	30	Attack in Ayod	18	New commissioner was elected	6
July (Pay borow)	Independence Day, Puor Kakni	Independence Day	53	Independence Day	41	Cabinet dissolved / Independence Day	29	Independence Day	17	Independence Day	5
August (Pay Badak)	Rainy Season , Ciek Beel	Murle attacked Lou Nuer in Pieri county	52		40	Flood in Akobo East	28	Flood in Akobo East	16		4
September (Pay Banguan)	Rainy / Harvest, Nger Beel		51		39		27		15	Lieutenant killed in Nyandit	3
October (Pay Wal)	Nger Beel		50		38		26		14		2
November (Pay Wal Kel)	Roth Doori Beel		49		37		25	Anyak were killed in Akobo Market	13		1
December (Pay war rao)	Christmis Celebration, Koam Beel	Christmas Celebration	48	Christmas Celebration	36	Fighting In Juba/ Christmas Celebration,	24	Christmas Celebration	12		0

Annexes V: Data Collection Tools.

ANTHROPOMETRIC & HEALTH QUESTIONNAIRE																	
(To be conducted in EVERY HH with children 6-59)																	
Date (D/M/Y):/...../..... Cluster No: Team No: State:																	
County: Payam: Boma: Village:.....																	
1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1	1.12	1.13	1.14	1.15	1.16	1.17	1.18
Child no.	HH ref. no.*	Sex ----- ---- M = Male F = Female	Age in months (use local calendar of events, health card, birth certificate/notification)	Source of Age information 1. Birth certificate/notification 2. Health card 3. Mothers recall/calendar of events	Weight in Kg (ex 12.4)	Height in cm (ex 78.1)	Oedema ----- n = No y = Yes	MUAC in cm (ex 11.3)	Has child received measles vaccination? 0= No 1 = Yes (by card) 2 = Yes (by recall) 8 = Do not Know	Vit. A in last year 0 = No 1 = Yes	How many times has child received VIT A in the past year? Show sample capsules	In the last one year, how many times has the child been dewormed (Show the mother the tablet so that she recalls or understands). 0 = No 1 = Once 2 = Twice 3 = > 2 times 8 = Don't know	Illnesses in past 2 weeks? 0 = No 1 = Yes	Type of Illness 1 = Fever* 2 = Cough** 3 = Diarrhoea*** 4 = Skin Infections 5 = Eye infections 66 = Other (specify)	Treatment sought 0=None sought 1=Hospital 2=PHCC/PHCU 3=Mobile /outreach clinic 4=Village health care worker 5=Private physician 6=Relative/ friend 7=Shop 8=Traditional practitioner 9=Pharmacy 66=Other (specify)	Did the child sleep under a mosquito net (LLITN) last night? 0 = No 1 = Yes	If malnourished, is child enrolled in treatment programme? 0 = No 1 = yes, in TFP 2 = yes, in SFP 99 = n/a
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
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13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		

HH definition: Group of people living under same roof & sharing food from the same pot for a period of at least 6 months. In home with multiple wives, those living and eating in different houses are considered as separate HHs. Wives living in different houses and eating from same pot are considered as one HH. Fever: elevated body temperature and CHILLS. ** Cough-fever and difficulty in breathing - just mild coughs shouldn't be captured, remember here we are looking at URTs ie pneumonia like etc.. *Diarrhea-three or more loose stools/day -one loose stool shouldn't be captured as diarrhea**

DEMOGRAPHY & MORTALITY QUESTIONNAIRE

DATE OF INTERVIEW: [D][D]/[M][M]/[Y][Y]

01	02	03	04	05	06	07	08	09	10	
No.	Name	Sex (M/F)	Age (years)	Joined on or after:	Left on or after:	Born on or after:	Died on or after:	Cause of death 1=unknown 2=injury 3= illness	Location of death 1=current location 2=during migration 3=in place of last residence 4=other	
				[][]		HOUSEHOLD ¹⁴ NO.				
				(Start date of the recall period - ex. Jan. 1, 1900)			WRITE 'Y' for YES. Leave BLANK if NO.			

a) List all the people that slept in this household last night.

1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									

b) List all the people that slept in this household on the **first night of the recall period (FILL IN DATE/EVENT)** but did **NOT sleep** in the **household last night**.

1					Y				
2					Y				
3					Y				
4					Y				
5					Y				
6					Y				
7					Y				

c) List all the people that slept in this household on the **first night of the recall period but have since died**

1							Y		
2							Y		
3							Y		
4							Y		
5							Y		

Was anyone in the household pregnant at the start of the recall period? No [] Yes [] If yes, how many? _____

¹⁴ HH definition: Group of people living under same roof & sharing food from the same pot for a period of at least 6 months. In home with multiple wives, those living and eating in different houses are considered as separate HHs. Wives living in different houses and eating from same pot are considered as one HH.

