SMART NUTRITION SURVEY

Tonj East County

March 2017

Comitato Collaborazione Medica

CHF The Common Humanitarian Fund South Sudan

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About the SMART Survey and then Report

This nutrition SMART Survey was conducted by a consultant and six field teams.

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Acronyms

CCM	:	Comitato Collaborazione Medica
CHF	:	Common Humanitarian Fund
ENA	:	Emergency Nutrition Assessment
HH	:	Household
IFA	:	Iron Folic Acid
IMAM	:	Integrated Management of Acute Malnutrition
IYCF	:	Infant and young child feeding
LBW	:	Low birth weight
LLITNs	:	Long lasting insecticide treated nets
MUAC	:	Mid-upper arm circumference
NGO	:	Non-governmental organization
ORS	:	Oral rehydration salt
OTP	:	Outpatient Therapeutic Programme
PPS	:	Proportion to population size
PSU	:	Primary sampling unit
SFP	:	Supplementary Feeding Programme
SSU	:	Secondary sampling unit
SMART	:	Standardized Monitoring and Assessment of Relief and Transitions

Executive Summary

Introduction

Between March 09th through March 23rd 2017, CCM conducted a Standardized Monitoring and Assessment of Relief and Transitions (SMART) nutrition survey covering 6 Payams of Tonj East County. The principal objective of the SMART nutrition survey was to estimate prevalence of malnutrition among children 6 – 59 months and assess the mortality situation in Tonj East County, identify the contributing factors to malnutrition and to provide practical and sustainable recommendations based on the survey findings to improve the nutritional status of the surveyed population. The assessment was conducted in collaboration with South Sudanese Government Institution (County Department of Health, Ministry of Health) and partners.

Methodology

The survey was cross sectional based on two-stage cluster sampling using SMART methodology. The first stage of sampling was selection of clusters with Probability Proportional to Size (PPS) and the second stage was the selection of households within the clusters using simple random sampling approach. The assessment covered 782 Children (6-59 months) from 624 households. The sample size required was drawn using ENA_SMART calculator. Weight-for-Height Z-Score was measured for all the children to determine malnutrition status with the World Health Organization (WHO) growth standards (2006) used as a reference to classify malnourished children. The cut-off of <-2 SD was used to determine the Global Acute Malnutrition (GAM), stunting and underweight using weight-for-height, height-for-age or length-for-age and weight-for age, respectively. SMART flags were excluded (-3/+3 SD) from the observed survey mean. SMART flags are children whose measurement exceeds ±3SD from the observed mean. The Mid Upper Arm Circumference (MUAC) was used to assess the nutrition status of children, pregnant and lactating women. Data on mortality (Crude Death Rate – CDR and Under 5 Death Rate – U5DR), Infant and Young Child Feeding (IYCF) practices, morbidity, immunization and vitamin A supplementation, nutrition status of Pregnant and Lactating Women (PLW)and WASH variables were also collected.

Main Conclusions

- GAM rate was 13.1% which is classified as serious.
- Exclusive breastfeeding is a concept not well adapted in Tonj East County
- Very few children 6-23 months of age receive a minimum acceptable diet. Meal frequency is consistently low.
- Despite being suboptimal infant and young children feeding (IYCF) practices and limited coverage of important health services, the nutrition situation shows a promise for improvement especially with the increased cultivation of sorghum and cattle being brought home from the Touch.
- A number of households are affected by, human sickness, too expensive/ increased price of food, yet others are observed to adopt negative coping strategies such as sale of food aid including plumpy nut for the malnourished children.
- Food security need further support,
- Lack of a sanitary environment, mainly latrine facilities may be a contributing factor to high GAM. This together with poor diet leads to increased risk of infection, and infection has a profound effect on nutritional status. These factors are strongly related to each other and have a cyclical relationship with wasting.
- The support provided by agencies with access to water may have contributed to low incidences of diarrhoeal disease. However sanitisation is a sub-suboptimal, and diarrhoea has been identified as a particular culprit

Table 1: Key Findings of the SMART Survey

Anthropometry - Children 6-59 months based on WHO 2006 standard		
Index	Indicator	Percent
WHZ- scores	Prevalence of global malnutrition (<-2 z-score and/or oedema)	13.1% (10.4-16.5 95% CI)
	Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	10.7% (8.3-13.8 95% CI)
	Prevalence of severe malnutrition (<-3 z-score and/or oedema)	2.4% (1.4- 4.0 95% CI)
MUAC	Prevalence of global malnutrition (< 125 mm and/or oedema)	9.5 % (7.4 - 12.1 95% C.I.)
	Prevalence of moderate malnutrition (< 125 mm and >= 110 mm, no oedema)	8.8 % (6.8 - 11.4 95% C.I.)
	Prevalence of severe malnutrition (< 115 mm and/or oedema)	0.6 % (0.3 - 1.5 95% C.I.)
Retrospective Mortality - 90 days recall period		
Mortality	CMR Deaths/10,000 people/day	0.52 (0.27-0.98 95% CI
	U5 MR Deaths/10,000 children U5/day	0.44 (0.10-1.95 95% CI)
Other Child Variables		
Measles Vitamin A supplementation De-worming	Measles (N= 719) card + mother confirmation	62.31% (58.71-65.78 95%CI)
	Vitamin A (N=782)	75.85% (72.71-78.70 95% CI)
	De-Worming (N=661)	64.30% (60.57-67.86 95% CI)
Reported illness (N= 782)		38.75% (35.40 -42.21 95% CI)
Types of illness	Cough	11.64% (9.57-14.07 95% CI)
	Diarrhoea	9.59% (7.72-11.86 95% CI)
	Fever	12.02% (9.92-14.49 95% CI)
	Fever, Cough	0.38% (0.13-1.12 95% CI)
	Fever, Cough, Diarrhoea	0.64% (0.27-0.72 95% CI)
	Fever, Diarrhoea	0.13% (0.02-0.72 95% CI)
	Others	3.20% (2.17-4.68 95% CI)
Health seeking behaviour		
Treatment sought	None sought	68.29% (64.94-71.45 95% CI)
	Hospital	6.52% (4.99-8.47 95% CI)
	Bought drugs from pharmacy/chemist	1.02% (0.52-2.01 95% CI)
	PHCC/PHCU Private clinic	22.63% (19.84-25.70 95% CI) 0.90% (0.43-1.84 95% CI)
	Traditional practitioner	0.64% (0.27-1.49 95% CI)
Use of Long Lasting Insecticide Treated Nets		77.11% (74.04-79.92 95% CI)

Main Recommendations

- CCM's strategy to employ and train CNVs has helped the improvement of the identification, measurement and understanding of severe malnutrition and the scale up of the coverage of the services the County. However, CCM needs to continue to support the strengthening of the methods to accurately assess the burden of acute malnutrition for service planning, design and monitoring, including assessment according to the criteria used for admission (including bilateral oedema and MUAC) among the CNVs. CCM should particularly support the widespread of assessment of Tonj East County

malnutrition coverage to allow for accurate assessment of the uptake and effectiveness of treatment services for both severe and moderate acute malnutrition.

- Promote nutrition education and awareness, and enhance training on appropriate IYCF practices for pregnant and new mothers and health personnel.Mothers of children enrolled in the CMAM program should receive IYCF information at every visit, this presents an opportunity for the formation of mother-to-mother support group at the villages as they are able to reach other mothers with information on exclusive breast feeding, promotion of early initiation of breastfeeding. These groups can be further linked up with lady health workers and community volunteers.
- Advocate with Health NGOs to ensure availability of adequate access to PHC to step up improved health seeking behavior and promotion of maternal, newborn and child preventive health and nutrition.
- Partnerring with other agencies that are implementing vaccination and deworming will spring board wide coverage via integrated community campaigns in Tonj East to deliver minimum package of routine vaccination, micronutrient supplementation and deworming.
- Providing tailored food security and livelihood FSL interventions that are feasible in the county, in light of the persisting lack of access to income-generating opportunities, in a way that fosters appropriate childcare practices for instance multi-story kitchen gardens is one high impact intervention.
- It would be more appropriate to design a comprehensive Behaviour Change Communication (BCC) programme not only on IYCF but also other issues identified in this report, health issues. BCC programme should be rolled out in the form of a campaign that can set the trend for appropriate IYCF and hygiene practices by change agents (i.e. mothers, care givers, fathers, volunteers or facility staff, religious leaders, camp leaders).
- Build and strengthen the capacity of MoH and other local partners to effectively integrate management of acute malnutrition approach (prevention, detection and treatment) at community and facility level, integrating that treatment with existing maternal and child health services.
- Increase awareness through community mobilization on, Vitamin A supplementation, Measles Vaccination and deworming and Strengthen distribution of vitamin A and deworming drugs to the PHCC/PHCU facilities since most of population can easily access treatment at these facilities
- Support the HHs to diversify income sources to reduce the impact of negative shocks on poor households' livelihoods.

Chapter 1: Introduction

1.1 Introduction

Warrap State is currently facing one of its worse severe hungers in the recent past, which has resulted into a Nutrition Emergency which started in February 2016 and started worsening in April to-date. Donor and development partners are intervening with various actions to avert the situation. The food security and nutrition situation in Warrap continues to deteriorate.

UNICEF and WFP launched the second year of their joint nutrition response plan and malnutrition in South Sudan is a chronic problem as well as an acute emergency. Rates of Global Acute Malnutrition (GAM) are alarmingly high – well above the emergency threshold of 15 per cent in most parts of the country – especially in the Greater Upper Nile States, Warrap and Northern Bahr el Ghazal. A total of 84,227 children with severe acute malnutrition (SAM) were admitted to UNICEF supported nutrition programmes between January and July 2015.

Tonj East is one of the three counties within the greater Tonj, located in Warrap State, South Sudan. It is situated in Eastern part of Warrap State bordering two counties of Unity State know as Koch County in the North and Mayian-dit County to the East. It also borders two counties of Lakes State known as Rumbek North County to the South East and Cuei-bet County to the south. It borders Tonj North in the North West and Tonj South in the west in Warrap State. The County is inhabited mainly by Dinka ethnic group of Reek and Luac-jang. The livelihood here is on cattle keeping and subsistence crop farming.

CCM has been working in South Sudan since 1983 and it deals with territorial medical activities and with a complex network of health structures including hospitals, primary health centres and health units dedicated in particular to the health of women and children. The main activities are the treatment of common pathologies, the assistance to women during pregnancy and delivery, pre- and post-natal visits, vaccination campaigns, fight to malnutrition and prevention of transmission of HIV.

Currently, Comitato Collaborazione Medica (CCM from the Italian Development Cooperation) provides Primary Health Care (PHC) services in the county and operates 2 PHC Centers (PHCCs) and 8 PHC Units (PHCUs) in the 6 payams of Tonj East. In Tonj South and Tonj East counties of Greater Tonj, CCM has combined support to primary health care services with Nutrition preventive and curative services. CCM intervention mainly focuses on 12 target facilities in Tonj East and 8 in Tonj South. There are no ongoing nutrition activities since the closure of World Vision International (WVI) program activities at the end of January 2014.

1.2 Justification of the Survey

CCM Nutrition Project in the greater Tonj aims to provide malnourished children and women nutritional therapies and contribute to a significant reduction in Global Acute Malnutrition prevalence specifically in Tonj East County in Warrap State through health facility based Outpatient Therapeutic Program (OTPs) and supplementary feeding programme. Since there was no recent information about the nutrition situation of Tonj East County, CCM sought to conduct a nutrition SMART survey in project service delivery locations in order to monitor/determine the general nutritional status among the under-five children, boys and girls, pregnant and lactating mothers.

1.3 Objectives of the Survey

The principal objective of this SMART survey was to estimate prevalence of malnutrition among children 6 – 59 months, assess the mortality situation in Tonj East County and identify the contributing factors to malnutrition using the SMART Methodology. Specifically, the survey sought to:

- Determine the prevalence of acute and chronic malnutrition and underweight among children 6 – 59 months in Tonj East County
- Estimate retrospective crude and under five mortality rates.
- Estimate the prevalence of common childhood illnesses (suspected malaria, diarrhea and acute respiratory illnesses) among children aged 6 – 59 months
- Measure the prevalence of malnutrition in pregnant and lactating women.
- Assess proxy infant and young child feeding practices among children aged 0-23 months.
- Assess the proxy coverage of therapeutic programs
- Estimate the coverage of measles vaccination among children aged 9-59 months.

- Estimate the coverage of deworming in the last 6 months among children aged 12 - 59 months
- Determine the coverage of vitamin a supplementation received during the last 6 months among children aged 6-59 months.
- Assess household dietary diversity.
- Provide information on key WASH indicators
- Establish recommendations on actions to be taken to address the situation which will be used to design new interventions and programs.

Chapter 2: Methodology and Approach

The Standardized Monitoring and Assessment of Relief and Transitions (SMART) methodology was used in conducting this survey.

2.1 Population Size

Total number of people living in Tonj East County is 164,215 out of which children aged below 5 years are 34,657. This population figures are from the Government of South Sudan and NGO/UN Agencies population estimates for 2017.

2.2 Survey Design

The target population was children aged 6 to 59 months, pregnant and lactating women and heads of households (for mortality data where they were available). The survey design was a cross sectional study with two-stage cluster sampling using SMART methodology. The sample sizes were calculated using ENA for SMART software and this along with other parameters used for the survey planning and validation by the Nutrition Information Working Group (NIWG).

2.3 Sampling Design and Sample Size Determination

A two-stage cluster sampling with probability proportional to size (PPS) design was employed for the survey. In the first stage cluster sampling, the primary sampling units (villages) were obtained. Since a village is the smallest geographical unit, each village constituted a cluster. All the clusters (from the updated sampling frame) with their respective population sizes were entered into ENA for SMART, and the appropriate number of clusters selected using probability proportional to size (PPS). The second stage involved selection of households within the selected clusters (villages). Sample size for anthropometry and retrospective mortality was determined using Emergency Nutrition Assessment (ENA) for SMART software version 2011 (July 9th, 2015 update). The parameters for the sample size calculation are as outlined in table 1 and 2 below.

Anthropometric Survey

The SMART methodology in table 2 below was used for the calculation of the sample size.

Table 2: Estimated sample size for Anthropometry:

Parameters for Anthropometry	Value	Assumptions based on context
Estimated Prevalence of GAM (%)	12.4 %	Based on the 2017 SMART Survey report for Tonj North County by World Vision International in June 2017. GAM for Tonj North can apply here because both counties are in SS07 and SS09 livelihood zones
± Desired precision	4 %	Based on SMART guidelines
Design Effect *(if applicable)*	1.5	To take into account of the survey timing and the vastness of the area and to cater for any heterogeneity. Slight differences is anticipated between clusters
Children to be included	**426**	
Average HH Size	6.6	Based on the 2017 SMART Survey report for Tonj North County by World Vision International in June 2016
% Children under-5	21 %	Based on Government of South Sudan and NGO/UN Agencies population estimates for 2017
% Non-response Households	3 %	Only minimal refusal to participate in the survey is expected
Households to be included	**352**	

Retrospective Mortality Survey

A retrospective mortality survey over 90 days' recall period of the survey was undertaken alongside anthropometric survey, using SMART methodology. Estimated sample size for retrospective mortality is shown in Table 3.

Table 3: Estimated sample size for retrospective mortality

Parameters for Mortality	Value	Assumptions based on context
Estimated Death Rate /10,000/day	0.5	Based on the 2017 SMART Survey report for Tonj North County by World Vision International in June 2017
± Desired precision /10,000/day	0.3	Based on SMART guidelines Version 1 April 2016 pg 48
Design Effect *(if applicable)*	1.5	To take into account of the survey timing and the vastness of the area and to cater for any heterogeneity. Slight differences is anticipated between clusters
Recall Period in days	90	Recall period of three months
Population to be included	**3872**	
Average HH Size	6.6	Based on the 2017 SMART Survey report for Tonj North County by World Vision International in June 2017
% Non-response Households	3 %	Only minimal refusal to participate in the survey is expected
Households to be included	**605**	

As the two indicators always produce different household samples, the larger of the two calculations that is for mortality (605) was used for both anthropometry and mortality surveys.

Based on issues that impact on the total number of households that can 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, the following details are taken into consideration to determine the number of clusters to be included in the survey based on the given context:

- Departure from office at 8.00 am and back at 6.00 pm.
- Average travel time to reach each cluster (one-way): 30 min.
- Duration for initial introduction and selection of households: 25 min.
- Time spent to move from one household to the next: 10 min.
- Average time in the household: 25 min.
- Breaks: 1 lunch break of 35 min.

The above gives an average 10 hrs (600 min) of working time in each cluster. If on average teams spend 25 min in each HH and 10 min travelling from one HH to another, each team can comfortably reach 13 HH per day. One day in each area (cluster) was assumed. The total number of households in the sample was then divided by the number of households to be completed in one day to determine the number of clusters to be included in the survey.

605 HH / 13 HH per day = 46.54 clusters, approximately 47 clusters. Based on this calculation and considering the number of teams (6 teams) available, 48 clusters were included in the survey.

2.4 Sampling Procedure

The nutrition survey employed two stage cluster sampling methodology

- 1st stage = random selection of clusters: the entire population of interest was divided into small distinct geographic areas (villages). Approximate size of the population in each "village" was determined. At this stage, the primary sampling unit was the village. Afterwards, clusters were assigned randomly to villages using ENA software using probability proportional to population size (PPS).
- 2nd stage = random selection of households within clusters: households were chosen randomly within each cluster using simple random sampling (in the 2nd stage sampling) since they are better than modified EPI in terms of representativeness of the sample and introduce less bias

2.5 Survey Organization

This section describes coordination and collaboration, survey period, survey training, survey teams, data collection tools, survey variables, data quality control and assurance and data entry and analysis. The survey was conducted in the month of March 2017 between 9th of March to 23rd of March 2017.

Questionnaire and Measurement Methods

The questionnaire was in English. Prior to the survey, the questionnaire was pretested. In the course of the interview, the Arabic or local language was used to conduct the interview. Each team had one member who was dedicated to conducting the interview.

Table 4: Measurement Methods

Household Level Indicators	
WASH and Mosquito net:	The questionnaire was based on the standard SMART questionnaires.
Mortality:	The standard SMART questionnaire was used. A recall period of 90 days from the interview date was used to recall if any household member died in the past 3 months.
Individual Level Indicators	
Sex of children:	Gender was recorded as male or female.
Age in months for children 0-59 months:	Age in months was recorded using events calendar if no reliable proof of age was available, as is the case with most children age in South Sudan.
Age of women 15-49 years:	Reported age was recorded in years
Weight of children 6-59 months:	Measurements were taken to the nearest 100 grams using an electronic scale (SECA scale). The scale was placed on firm flat ground before measurements were taken. The double-weighing technique was used to weigh young children unable to stand on their own or unable to understand instructions not to move while on the scale. Clothes were removed during weighing although where necessary, light undergarments were allowed.
Height/Length of children 6-59 months:	Children's height or length was taken to the closest centimeter using a wooden height board. Height was used to decide on whether a child should be measured lying down (length) or standing up (height). Children less than 87cm were measured lying down, while children ≥ 87cm were measured standing up.
Oedema in children 6-59 months:	The presence of bilateral oedema was assessed by applying gentle thumb pressure on to the tops of both feet of the child for three seconds. If a shallow indent remained in both feet, oedema was recorded as present and a picture taken. The survey coordinators verified all oedema cases reported by the survey teams.
MUAC of children 6-59 months:	MUAC was measured at the mid-point of the left upper arm between the elbow and the shoulder and taken to the closest millimetre using standard tapes.
Child enrolment in selective feeding programme for children 6-59 months:	This was assessed for the outpatient therapeutic programme and for the supplementary feeding programme using card or recall. The programme products were shown when recall was used, plumpy nut for the OTP and plumpy sup for the TSFP.
Measles vaccination in children 9-59 months:	Measles vaccination was assessed by checking for the measles vaccine on the Expanded Programme on Immunisation (EPI) card or by carers recall if no EPI card was available. For ease of data collection, all children aged 6-59 months were assessed for measles but analysis was only be done on children aged 9-59 months.
Vitamin A supplementation in last 6 months in children 6-59 months:	Whether the child received a vitamin A capsule over the past six months was recorded from an EPI card or health card if available, or by asking the caregiver to recall if no card was available. A vitamin A capsule was shown to the caregiver when asked to recall.
Diarrhoea in last 2 weeks in children 6-59 months:	an episode of diarrhoea was defined as three loose stools or more in 24 hours. Caregivers were asked if their child had suffered episodes of diarrhoea in the past two weeks.
ANC enrolment and iron and folic acid pills coverage in pregnant women:	Whether the woman was enrolled in the ANC programme and was receiving iron-folic acid pills was assessed by use of the ANC card or by recall. An iron-folic acid was shown to the pregnant woman when asked to recall.
Infant and young child	Considering that the sample size calculation for IYCF should be different from

feeding practices in children 0-23 months:	that of Anthropometry and Mortaltiy, proxy IYCF indicators and Infant and young child feeding practices were assessed based on standard WHO recommendations (WHO 2010). Infant formula feeding and bottle use were also assessed.

Estimation of Coverage

- Coverage of vitamin A supplementation (6-59 months) 6 months' recall
- Coverage of Measles aged 9-59 months confirmed by recall and cards
- Coverage of de-worming (12-59 months) in the last 6 months

Training of Enumerators and Fieldwork

The training took tentatively 4 days from the 09th of March 2017 to the 12th of March 2017, one day for piloting and another one day for data clerks training. The training helped the team members to understand the principles of doing a survey, the reasons why the survey was being done, and the likely interventions that could result depending upon the findings. The enumerators had to be comfortable with this knowledge and not confused. They have to be able to explain and answer questions from community leaders, fathers, and mothers. The main objective was to sufficiently train the teams so that they are confident when they went into the community and were able to select the houses, talk to the mothers, make the specific measurements, and record the results. Participants were recruited from the community with the involvement of the County Health Department and Nutrition Staff from CCM Nutrition Department to capacity build them. Training content included mostly measurement exercises and group work interviews. Standardization and pilot tests concluded the training processes. Teams were then formed based on the capabilities of enumerators.

Assessment of Team and Fieldwork Activities

The consultant oversaw the whole exercise. There were six teams composed of 3 members who conducted anthropometric measurements, Mortality, MUAC for PLW and other indicators. The mother was with her children when they were measured so that they are not frightened by the team (of strangers). The presence of the mother and interacting with her harmoniously helps the children to "settle down" and be more amenable to being measured. Standard Fieldwork Procedures based on the SMART Survey Guidelines were adhered to during data collection.

Data Quality Control and Assurance

The consultant ensured that the training coupled with standardization test, practical field exercise and close supportive supervisions to ensure the quality of the data collected.

- **During Training for the Team:** The standardization test consists of all the members of the teams measuring 10 (or more) different children twice, with a time interval between individual measures. The size of the variation between these repeated measures was calculated to assess how precisely each person measures the children (repeatability of measurements). Each team member's measurements were compared to the mean of the whole group to assess how accurately the measurements were made. Each team member was then given a score of competence in performing measures. The field training data from each of the teams was entered into ENA for SMART and analyzed. The supervisor's measurement were compared to the enumerators measurement to gauge the Technical Error of Measurements (TEM). From experience in South Sudan the results of the TEM has worked well in allocating team tasks (taking height, weight, MUAC and interviews). The results of the TEM were then used to assign roles and responsibilities to the enumerators and curtail pitfalls such as digit preference, age heaping and MUAC taking.
- **Anthropometric Equipment:** The measuring board should be at least 130cm long and made of hardwood with a hard water-resistant finish. All the boards are standardized with a broom handle or dowel that has been cut to measure exactly 100cm. Weight will be measured to the nearest 100 g (0.1kg). The scales will be checked for accuracy before and after each day's measurements, using the same known weights. Each team will use the same standard weights at the base. Standard weights do not need to be carried in the field, but the scale should measure the same in the morning and evening when the team returns from the field. The scales will first be set at zero, with the weighing pants, basket, or basin attached. The standard weight should have the true weight clearly written on it, and the same weight should be used all the time.

- **Estimating Age:** assessment of child's immunization card or other written document showing the child's age or date of birth. If the age of a neighbor's child is known, asking whether their child was born before or after the selected child. Use of a "local-events calendar," which shows dates on which important events took place during the past five years. It can show local holidays, hailstorms, the opening of a nearby school or clinic and political elections, etc. Ask the mother whether the child was born before or after a certain event. In addition, the local calendar can include agricultural events that occur at the same time each year. These events can help identify which month the child was born in. Use of such a calendar can be time consuming.
- **Plausibility Checks During Data Collection:** was conducted by entering anthropometric data at the end of each day. The consultant checked data collected at the end of each day to see if WHZ are feasible and within the plausibility range, and to see if oedema was being realistically reported. Any errors were given as feedback to the enumerators during the daily debriefing sessions and efforts made during these sessions to correct the errors. Where needed and time allowing they went back to the household to correct the errors. Suspicious values were manually checked and where necessary corrected.

Field Exercise

Piloting was conducted in a village that was not selected for the survey. It gave an opportunity for all team members to practice measurement techniques and to familiarize themselves with the tools. They went through all the steps in conducting a nutrition survey under supervision. The supervisor issued instruction and guided the teams in practicing taking anthropometric and MUAC measurements, administering the IYCF and mortality questionnaire. Both male-and female-headed households were visited. Feedback was given based on the gaps observed.

Data Entry and Analysis

ENA for SMART software version 2011/2015 was used to enter and analyze anthropometric and mortality data. Data with extreme values identified by the software were excluded from analysis using SMART flags. Data entry for WASH, IYCF and FSL was done using EPI Info version 7 and analysis done in SPSS version 17. Final report was be based on the Nutrition Cluster's format. The assessment findings will be analyzed authoritatively and synthesized into a number of statements, the detailed assessment conclusions, which provides answers to the assessment questions. To assess malnutrition as determined by WFH, individual measurements were compared to an international reference standard WHO 2006. Interpretation of findings on child growth indicators were based on internationally recognized thresholds, mainly the WHO-UNICEF.

- Global Acute Malnutrition was calculated with % median defined as children falling under 80% and/or having oedema, as compared to the median weight of children of the same height in the reference population.
- Severe Acute Malnutrition was calculated with % median defined as children falling under 70% and/or having oedema, as compared to the median weight of children of the same height in the reference population.
- Severe Underweight Malnutrition was calculated with % median defined as children falling under 70% and/or having oedema, as compared to the median weight of children of the same height in the reference population.

Household access to a variety of food was estimated through dietary diversity, a qualitative measure of food consumption. The Primary data collected through the SMART surveys was triangulated with secondary data– Morbidity trends and admissions trends of malnourished children into feeding programs. Data was interpreted taking into consideration many factors among such as: Trends and changes, Seasonality, Aggravating factorsand even mortality levels. The contextually relevant analysis forms the basis for data interpretation:

- Reference Indicators- overall nutrition situation- GAM/SAM/CMR/U5MR/MUAC Children &PLW/HIS trends/ Admissions in OTP/SFP centers
- Immediate Causes-Household Dietary Diversity, Morbidity/Disease outbreak
- Driving Factors-: Infant young child feeding, Vitamin A supplementation coverage, Measles immunization coverage, access to safe water and sanitation

Reference indicators are categorized into five different phases based on the recognized thresholds: Acceptable, Alert, Serious, Critical and Very Critical (IPC: Food Security and Nutrition).

Chapter 3: Results

This section presents the results of the SMART Nutrition Survey in Tonj East County. The sample d households of the study population constituted 782 children (6 to 59 months).

3.1 Description of Sample

3.1.1 Households

Among the 48 clusters that were planned to be reached, all were surveyed none of the reserve clusters were used. Data were collected from a total of 624 households, 782 children 6-59 months, 379 children 0-23 months and 387 women of reproductive age (15-49 years) in 48 clusters in Tonj East County.

3.1.2 Children Under the Age of Five Years

The number of children who are aged between 24 – 59 months is higher than 0-23 months. Anthropometry data from 782 children and Infant and Young Child Feeding (IYCF) data from 379 youngest children aged 0-23 months from surveyed households from 48 selected households is shown in (table 4).

Table 5: Children under the age of Five Years Present in the Selected Survey

Age category	N
Children under 5 years	860
Children between 6-59 months	782
Children between 24 - 59 months	481
Children under 0-23 months	379
Children under 0-5 months	78
Children between 6_23 months	301

3.1.3 Women of Reproductive Age

In this survey, 387 women of reproductive age were interviewed. Their anthropometric measurements were measured using adult MUAC tape. Pregnant and Lactating women were considered malnourished when their MUAC was < 230 mm. Pregnant women were considered severely malnourished if their MUAC was < 210 mm. MUAC cut-off values of <210 to 230 mm are considered to be having significant risk for Low Birth Weight (LBW)

3.1.4 Distribution of age and sex of the sample

The age ratio of 6-29 months to 30-59 months was 1.06 with an overall sex ratio: p-value = 0.886. Even though the value should be around 0.85, this ratio is still an indication that boys and girls were equally represented among the sampled children (see details in Plausibility report Appendix 1). The age distribution showed under representation of children between 54-59 months (Table 6). This could be explained by the lack of proper documentation for age determination in the county. The sex and age pyramid (Figure 1) on the other hand follows a normal shape

Table 6: Distribution of age and sex of sample

AGE (mo)	Boys		Girls		Total		Ratio
	no.	%	no.	%	no.	%	Boy:girl
6-17	124	54.1	105	45.9	229	29.3	1.2
18-29	74	42.8	99	57.2	173	22.1	0.7
30-41	107	51.7	100	48.3	207	26.5	1.1
42-53	66	54.1	56	45.9	122	15.6	1.2
54-59	22	43.1	29	56.9	51	6.5	0.8
Total	393	50.3	389	49.7	782	100.0	1.0

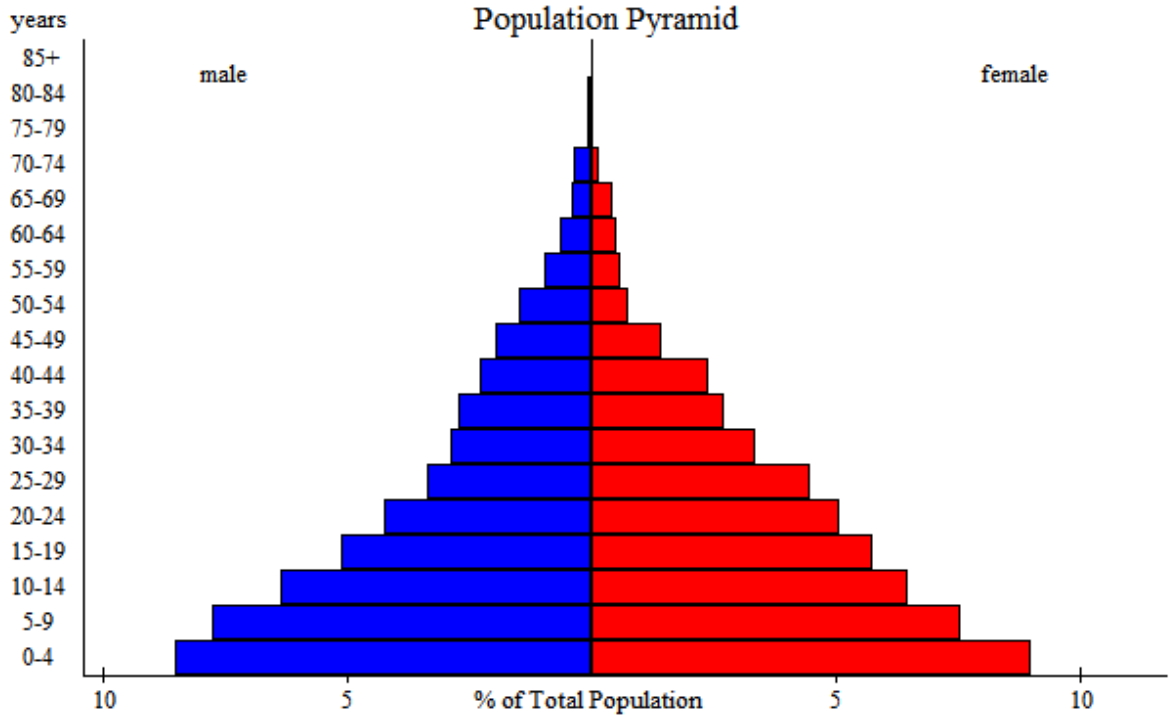


Figure 1: Population age and sex pyramid

3.2 Child Nutritional Status

The nutritional status of children was analyzed using the WHO Child Growth Standards. SMART flags (-3/+3 Z-scores) from the observed survey mean were used to exclude extreme values. Table 7 shows the Z-scores, design effect, and the number of children with flag signs that were were excluded in the analysis. Therefore global acute malnutrition can be defined as <-2 z scores weight-for-height and/or oedema, severe acute malnutrition can be defined as <-3z scores weight-for-height and/or oedema). All the 48 clusters planned were reached. The results are presented with exclusion of SMART flags: Z-score values ranging outside -3 to +3 for all the indexes, WHZ, HAZ and WAZ.

Table 7: Mean Z-scores, design effects and excluded subjects using SMART flags for children 6-59 m

Indicator	N	Mean Z-score ± SD	Design Effect (Z-score < -2)	Z-score out of range
Weight-for-Height	754	-0.77±1.11	1.5	28
Height-for-Age	763	-1.10±1.25	2.64	19
Weight-for-Age	730	-0.96±1.35	2.39	52

3.2.1 Anthropometric Data Quality

The Plausibility Check highlighted the good quality (18%) of the anthropometric data, both in terms of sample representativeness and quality of anthropometric measurements (see attached Plausibility Check report-Annex 1)

3.2.2 Prevalence of Global Acute Malnutrition

Acute malnutrition (moderate or severe) according to World Health Organization (WHO) growth reference for weight-for-height is the condition represented by measures of thinness or bilateral edema and represents current nutritional status. It represents child's failure to receive adequate nutrition in the period before the measurements and may be the result of inadequate food intake or a recent episode of illness causing loss of weight and the onset of malnutrition.

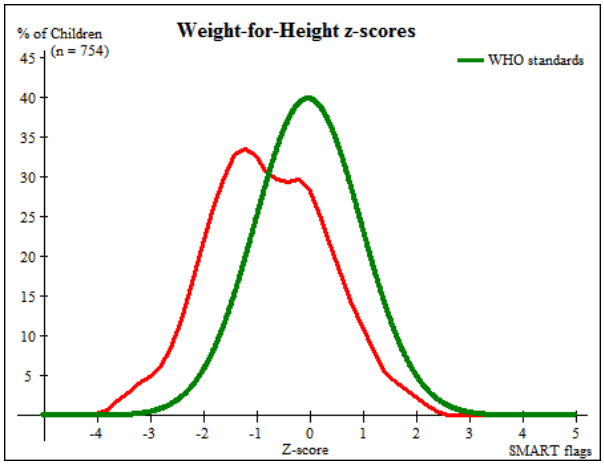


Figure 2: Distribution of Weight-for-Height in Z-score compared to WHO Standards (2006)

The figure shows that the survey distribution of Weight-for-Height (in red) follows close to Gaussian distribution (in green). The mean of Weight-for-Height in Z-score was – 0.77 with a Standard Deviation (SD) of 1.11. A SD which is between 0.8 and 1.2 reflects that the data of weight and height is of good quality.

Furthermore, the curve of the Survey population is slightly shifted to the left of the curve of the reference population, indicating that the surveyed population has more malnourished children than the reference population. Table 8 shows the prevalence of acute malnutrition in children 6-59 months by sex.

Table 8: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 754	**Boys** n = 382	**Girls** n = 372
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(99) 13.1 % (10.4 - 16.5 95% C.I.)	(56) 14.7 % (10.9 - 19.5 95% C.I.)	(43) 11.6 % (8.3 - 15.9 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(81) 10.7 % (8.3 - 13.8 95% C.I.)	(45) 11.8 % (8.5 - 16.1 95% C.I.)	(36) 9.7 % (6.9 - 13.3 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(18) 2.4 % (1.4 - 4.0 95% C.I.)	(11) 2.9 % (1.6 - 5.2 95% C.I.)	(7) 1.9 % (0.8 - 4.6 95% C.I.)

The prevalence of oedema is 0.0 %

The GAM rate based on WHZ was 13.1 % (10.4-16.5 95% C.I.) and SAM was 2.4 % (1.4–4.0 95% CI). Table 9 below shows the prevalence of acute malnutrition by age, based on weight-for-height. The prevalence of wasting is higher among boys as compared to girls. The younger Children (6-29 months) seem to be more affected than older (30-59 months). There was no edematous cases (Table 9).

Table 9: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

		Severe wasting (<-3 z-score)		**Moderate wasting (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**		**Oedema**	
Age (mon)	Total no.	No.	%	No.	%	No.	%	No.	%
6-17	220	8	3.6	30	13.6	182	82.7	0	0.0
18-29	166	4	2.4	20	12.0	142	85.5	0	0.0
30-41	205	3	1.5	13	6.3	189	92.2	0	0.0
42-53	115	3	2.6	11	9.6	101	87.8	0	0.0
54-59	48	0	0.0	7	14.6	41	85.4	0	0.0
Total	754	18	2.4	81	10.7	655	86.9	0	0.0

Table 10: Distribution of acute malnutrition and oedema based on weight-for-height z-scores

	<-3 z-score	**>=-3 z-score**
Oedema present	Marasmic kwashiorkor No. 0 (0.0 %)	Kwashiorkor No. 0 (0.0 %)
Oedema absent	Marasmic No. 34 (4.3 %)	Not severely malnourished No. 748 (95.7 %)

3.2.3 Prevalence of Acute Malnutrition According to MUAC

According to the 2008 WHO and UNICEF Joint Statement on Child Growth Standards and the identification of SAM in infants and children, a MUAC measure of less than 115mm in children 6 to 59 months old is recognized as severe acute malnutrition. MUAC less than 115mm indicates a high elevated risk of death. The use of MUAC measure in children is simple as it is a unisex measure not standardized by age. Based on MUAC, the prevalence of GAM was 9.5% (7.4-12.1 95% CI) and SAM 0.6% (0.3- 1.5 95% CI). GAM and SAM prevalence calculated by MUAC was much lower than the prevalence obtained from Weight-for-Height Z-scores. MUAC is an important measure of acute malnutrition that has a much closer relation to infant and child mortality than Weight-for-Height. Hence, it is imperative to use both methods as independent admission criteria of children enrolment in feeding program

Table 11: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 782	**Boys** n = 393	**Girls** n = 389
Prevalence of global malnutrition (< 125 mm and/or oedema)	(74) 9.5 % (7.4 - 12.1 95% C.I.)	(27) 6.9 % (4.7 - 10.0 95% C.I.)	(47) 12.1 % (8.8 - 16.4 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(69) 8.8 % (6.8 - 11.4 95% C.I.)	(26) 6.6 % (4.5 - 9.7 95% C.I.)	(43) 11.1 % (8.0 - 15.1 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(5) 0.6 % (0.3 - 1.5 95% C.I.)	(1) 0.3 % (0.0 - 1.9 95% C.I.)	(4) 1.0 % (0.4 - 2.7 95% C.I.)

Once again like in the weight for height the prevalence of acute malnutrition by age based on MUAC cut offs is more prevalent on children aged 6-29 months of age (Table 12).

Table 12: Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema

		Severe wasting (< 115 mm)		**Moderate wasting (>= 115 mm and < 125 mm)**		**Normal (> = 125 mm)**		**Oedema**	
Age (mon)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	229	3	1.3	41	17.9	185	80.8	0	0.0
18-29	173	1	0.6	15	8.7	157	90.8	0	0.0
30-41	207	1	0.5	10	4.8	196	94.7	0	0.0
42-53	122	0	0.0	3	2.5	119	97.5	0	0.0
54-59	51	0	0.0	0	0.0	51	100.0	0	0.0
Total	782	5	0.6	69	8.8	708	90.5	0	0.0

3.3. Mortality

Table 13 below presents the results of the mortality survey.

Table 13: Mortality Demographic Information, (623 households interviewed, recall period of 90 days)

HOUSEHOLD INFORMATION			
Total population		Children 0-59 months	
Total number HH residents	4288	Number 0-5 years	901
Total number people joined HH in recall period	60	Number 0-5yrs joined HH during recall period	10
Total number people left HH in recall period	378	Number 0-5 years left HH during recall period	20
Total number births during recall period			40

Total number deaths during recall period	20	Number 0-5 years' deaths during recall period	3
Crude mortality rate (deaths/10,000/day)	0.52 (0.27-0.98 95%CI	Under-5 mortality rate (deaths/10,000/day)	0.44 (0.10-1.95 95% CI)
Design effect	2	Design effect	1.64

The estimate for crude mortality rate (CDR) during the 90 days recall period was 0.52 (0.27-0.98 95% CI) deaths/10,000/day, and for under five death rate (U5DR) was 0.44 (0.10-1.95 95% CI) deaths/10,000/day at acceptable level. 80% of the deaths were caused by illness, 15% by injury/traumatic and 5% were unknow, conversely, 75% of deaths occured in the current location, 15% of deaths occured during migration and 10% in the place of last residence.

3.4 Children's Access to Programs/Services

Table 14 presents findings on coverage of Vitamin A Supplementation, measles vaccination, deworming and mosquito Net use. Measles vaccination and deworming are still a major issue of concern in Tonj East County. Coverage of Vitamin A supplementation and Mosquito Net use were all high (74% and above).

Table 14: Children's, Vitamin A supplementation, measles vaccination deworming and mosquito net use

Parameters	n= Yes	N	%	(95% CI)
Vitamin A (6-59 months)	593	782	75.38%	72.71% – 78.70%
Measles Vaccination (9-59 months)	448	719	62.31%	58.71% – 65.75%
Dewormed (12-59 months)	425	661	64.30%	60.57% – 67.86%
Mosquito Net use (6-59 months)	603	782	77.11%	74.04% – 79.92%

3.4.1 Measles Vaccination

The results show that based on vaccination card records, 56.05% (52.40%-59.64% 95% CI) and mothers recall, 6.26% (4.71%-8.27% 95% CI) of children were vaccinated, either through the routine services or during the special massive measles vaccination. However measles vaccination is still low in Tonj East County. Efforts should be made to boost the same

3.4.2 Vitamin A Supplementation

Provision of vitamin A supplementation every 6 months can help protect a child from death and disease associated with vitamin A deficiency and is recognized as one of the most cost effective approaches to improve child survival. Improving the vitamin A status of deficient children through supplementation enhances their resistance to disease and can significantly reduce mortality. The results of the SMART survey indicate that 75.38% (72.71% – 78.70%) of children 6-59 months had received vitamin A.

3.4.3 Deworming

Deworming helps enhance the iron status of children which eventually helps children to exercise their intellectual ability to the fullest. Deworming is only a short-term measure of reducing worm infestation and re-infestation is frequent. Control measures through improved sanitation, hygiene and deworming are needed to prevent infestation and re-infestation. In Tonj East County, 64.30% (60.57% – 67.86%) children (12 – 59 months) had been dewormed. However deworming coverage is still low in the County and efforts should be made to improve on this..

3.4.4 Long Lasting Insecticide Treated Net

Many households with children less than five years (6-59 months) reported that 77.11% (74.04% – 79.92%) slept under long lasting insecticide treated nets. Increased coverage and use of long-lasting insecticide-treated bed nets (LLIN) can be an effective tool for control and prevention of malaria especially in malaria endemic areas.

3.5 Childhood Morbidity

The morbidity level in Tonj East County two weeks prior to the survey was found to be 38.75% (n=303) (Table 17). The most prevalent disease at this period was fever at 12.02 % (n=94) followed by cough at 11.64% (n=91) and diarrhoea third at 9.59% (n=75) as presented in Table 15.

Table 15: Point prevalence of child morbidity of children 6-59 m two weeks prior to the survey

Parameters	n= Yes	N	%	(95% CI)
Prevalence of Illness	303	782	38.75%	35.40% – 42.21%
Prevalence of reported illness two weeks prior to the survey				
Type of Illness	**n= Yes**	**N**	**%**	**(95% CI)**
Cough	91	782	11.64%	9.57%-14.07%
Diarrhoea	75	782	9.59%	7.72%-11.86%
Fever	94	782	12.02%	9.92%-14.49%
Fever,Cough	3	782	0.38%	0.13%-1.12%
Fever,Cough,Diarrhoea	5	782	0.64%	0.27%-1.49%
Fever,Diarrhoea	1	782	0.13%	0.02%-0.72%
Others	25	782	3.20%	2.17%-4.68%
No Illness	488	782	62.40%	58.96%-65.73%

As reported by the care givers, out of the 303 who felt sick within the previous 14 days prior to the survey, majority of them sought treatment or medical advice from various places. Majority (22.63%) of those who were ill sought treatment from primary health care units (PHCUs) with 6.52% seeking treatment from the hospital. Table 16 summarizes the health seeking behaviour.

Table 16: Treatment Sought, Tonj East County, March 2017

Treatment	n= Yes	N	%	CI (95%)
Hospital	51	782	6.52%	4.99%-8.47%
None	534	782	68.29%	64.94%-71.45%
Pharmacy	8	782	1.02%	0.52%-2.01%
PHCC/U	177	782	22.63%	19.84%-25.70%
Private clinic	7	782	0.90%	0.43%-1.84%
Traditional practitioner	5	782	0.64%	0.27%-1.49%

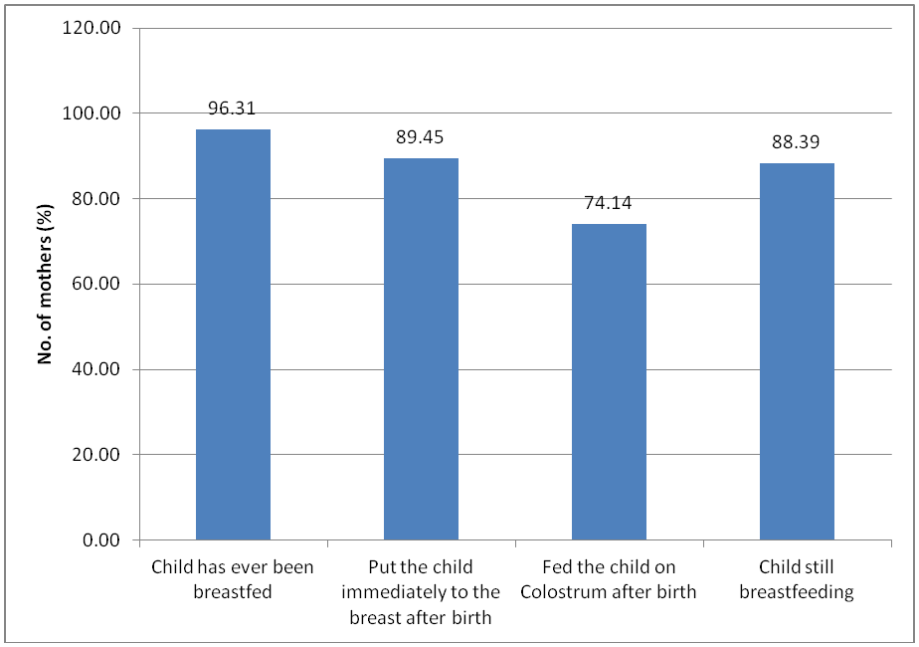
3.6 Maternal and Infant and Young Child Feeding Nutrition

3.6.1 Maternal Nutrition Status (Mid-Upper Arm Circumference (MUAC) for Women

Adequate nutrition is especially critical for women because inadequate nutrition causes damage not only to women's own health but also to their children and the development of the next generation. MUAC was used to assess nutritional status of women of reproductive age (15-49 years old). Out of 387 mothers of children between 6-59 months of age assessed 3.62%% (14) were severely malnourished (<210mm) and 15.25% (59) were moderately malnourished (<230mm). Women are vulnerable to malnutrition because of their high nutritional requirements during pregnancy and lactation.

3.6.2Exclusive Breastfeeding

Breast milk remains a vital source of nourishment for infants during the first six months of child's life is critical for normal growth and development. Mothers with children less than 6 months were the primary respondents on exclusive breastfeeding practices. Mothers and care givers were asked if they breast fed their youngest child the previous day.



Breastfeeding questions were asked in a total of 379 women with children 0-23 months. 96.31% of the mothers indicated that they had ever breastfed their children. Only 14 children were reported not as ever breastfed. At least 88.39% 0f the children were still breastfeeding.
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Figure 3: Breastfeeding Practices

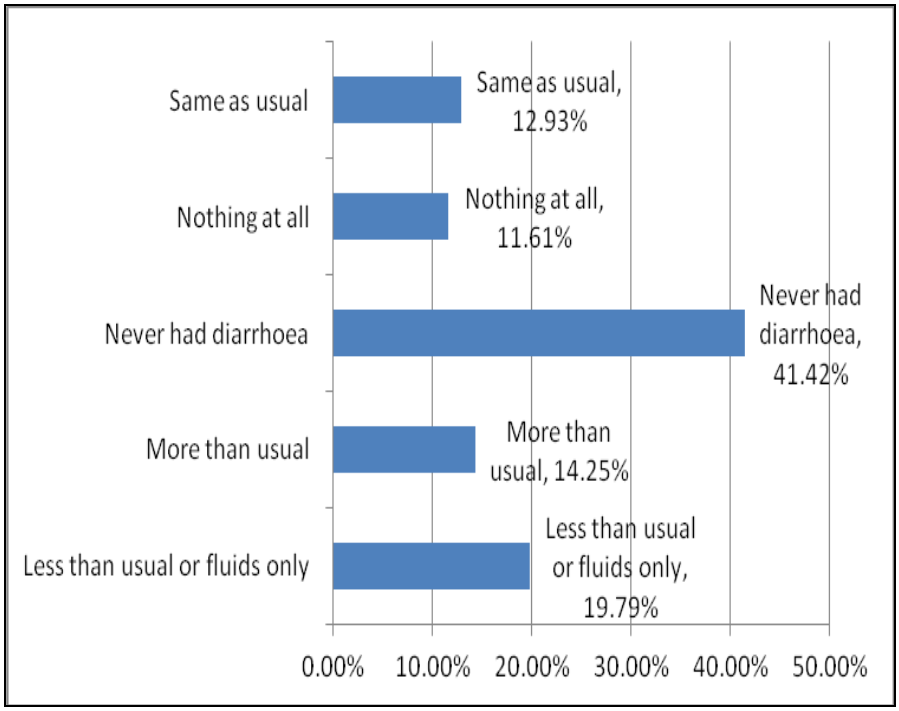
3.6.3. Breastfeeding and Complementary Feeding

Respondents were asked if their youngest child breastfed the previous day during the day or night. The proportion of children 0-23 months who were still breastfeeding was 88.39%, however, the proportion of children who were exclusively breastfed was at 53.85%. The proportion of infants who received both breast milk and solid or semi-solid foods (timely introduction) was high at 80.30%. Breastfeeding seems to be sustained as the children continued to grow, with breast feeding at 1 year at 95.08% and at 2 years at 91.84% (Table 17).

Table 17: Breastfeeding and complementary feeding

Indicator	Age Group	N	n	%	95% CI
Exclusive breast feeding (Proportion of children who are receiving only breast milk),	0-5 months	78	42	53.85%	42.18% - 65.21%
Timely introduction of complementary feeding (Proportion of infants who received both breast milk and a solid or semi-solid food (24-hour dietary recall),	6-8 months	66	53	80.30%	68.68%- 89.07%
Continued breast feeding at 1 year (Proportion of children who were feed breast milk),	12-15 months	61	58	95.08%	86.29% - 98.97%
Continued breastfeeding at 2 years (Proportion of children who were feed breast milk),	20 – 23 months	49	45	91.84%	80.40% - 97.73%

Figure 4: How the child was breastfed when having diarrhoea



Although 41.42% of the mothers indicated that their children had never had diarrhea, those who reported that their children had ever had diarrhoea 19.79 % indicated that they had fed their children less than usual or on fluids only. Only a few mothers (14.25%) fed their children by providing fluids in quantities that were more than usual.

The recommended practice is to feed the child more than usual due to the diarrhoea, currently practiced by only 14.25% of the mothers.

3.6.4 Minimum Dietary Diversity, Meal Frequency and Minimum Acceptable Diet

Minimum Dietary Diversity and Minimum Acceptable Diet are virtually non-existent at 0% for both breastfeeding and non-breastfeeding children 6-23 months (see Table 18 below). Few household are the only ones who scored dismally in terms of minimum meal frequency 28.83% among 281 breastfed children and 40% among 20 non-breast children. The dietary diversity indicator is based on the premise that the more diverse the diets are the more likely they are to provide adequate levels of a range of nutrients. The more diverse the food is utilized in a household the better composition and range nutritional values it consists.

Table 18: Minimum Dietary Diversity, Meal Frequency and Minimum Acceptable Diet

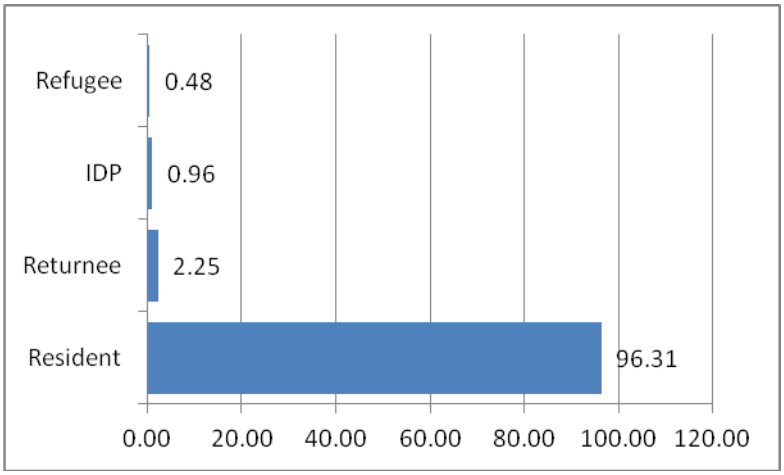
Indicator		Age Group	N	n	%
Minimum Diet Diversity	Proportion of breastfeeding children who fed from ≥4 or more food groups	6-23 months	281	1	0.36%
Minimum meal frequency	Proportion of Breastfed children 6–23 months of age who received solid, semi-solid or soft foods the minimum number of times or more during the previous day	6-23 months	281	43	28.83%
	Proportion of Non-breastfed children 6–23 months of age who received solid, semi-solid or soft foods or milk feeds the minimum number of times or more during the previous day	6-23 months	20	8	40%
Minimum acceptable diet	Proportion of Breastfed children 6–23 months of age who had at least the minimum dietary diversity and the minimum meal frequency during the previous day	6-23 months	281	0	0%
	Proportion of Non-breastfed children 6–23 months of age who received at least 2 milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day	6-23 months	20	0	0%

3.7 Food Security

3.7.1 Food Security and Livelihoods

- An average of 7 individuals resided in each household (total of 4288 from 623 households).
- The majority (96%) of the people were residents of Tonj East County with few returnees and IDPs
- Sale of livestock was the main source of income (41.59%) Figure 6. This was followed by sale of crops (19.74%). This indicates that majority of the households got their income from subsistence farming.
- Results also indicate that majority of the households (97.43%) had not received any humanitarian assistance

Figure 5: Residence Status



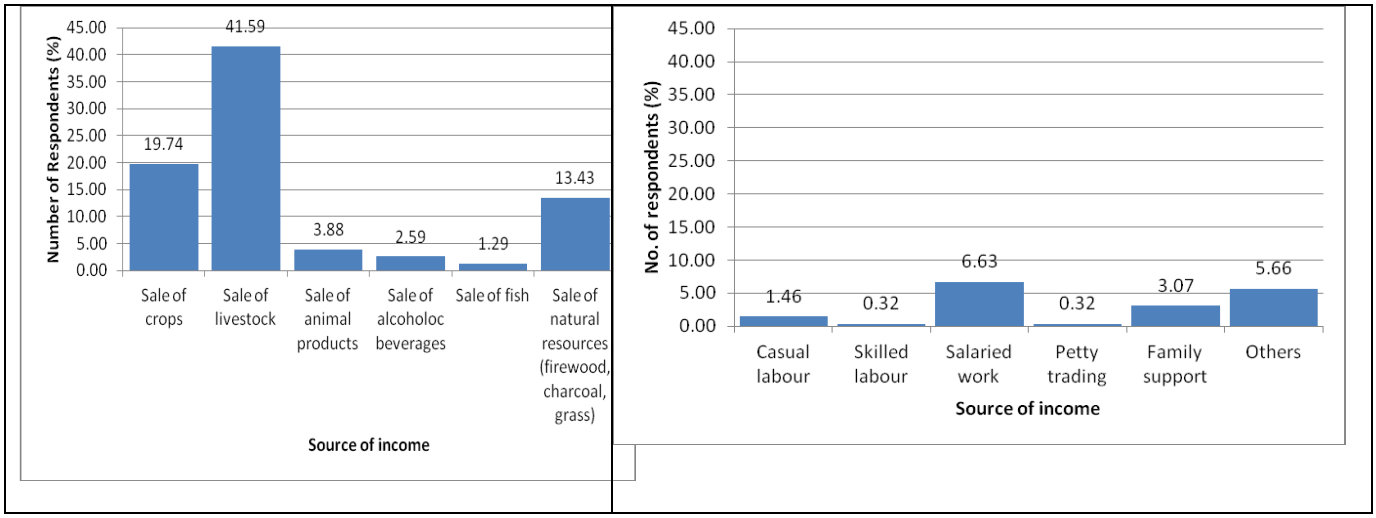


Figure 6: Main source of income

3.7.2 Main Source of food (past 7 days) and main shocks currently faced by the house holds

Residents were requested to give the main source of food for the house hold in the last 7 days and indicate the main shock currently faced by the house hold. Table 19 presents the findings. Table 19 shows that the main source of food for most households was own production at 29.05% yet 26.32% of the households purchased food and 17.50% worked for food while only 7.22% borrowed food. This shows that sharing between households is not such a common occurrence. The main shock for most households in Tonj East County was floods which resulted in destruction of crops hence impacting negatively on food security. For the little food that was available in the market, the prices were high and therefore hindering the households to purchase the food. Other shocks included human sickness, violence/ insecurity, livestock diseases that affected the stocks of livestock further negatively impacting on food security of the county.

Table 19: Main source of food and main shocks currently faced by households

Source of food	Frequency	Percentage
Borrowing/debts	45	7.22%
Gathering	14	2.25%
Gifts from neighbors	23	3.69%
Hunting	17	2.73%
Market/shop	164	26.32%

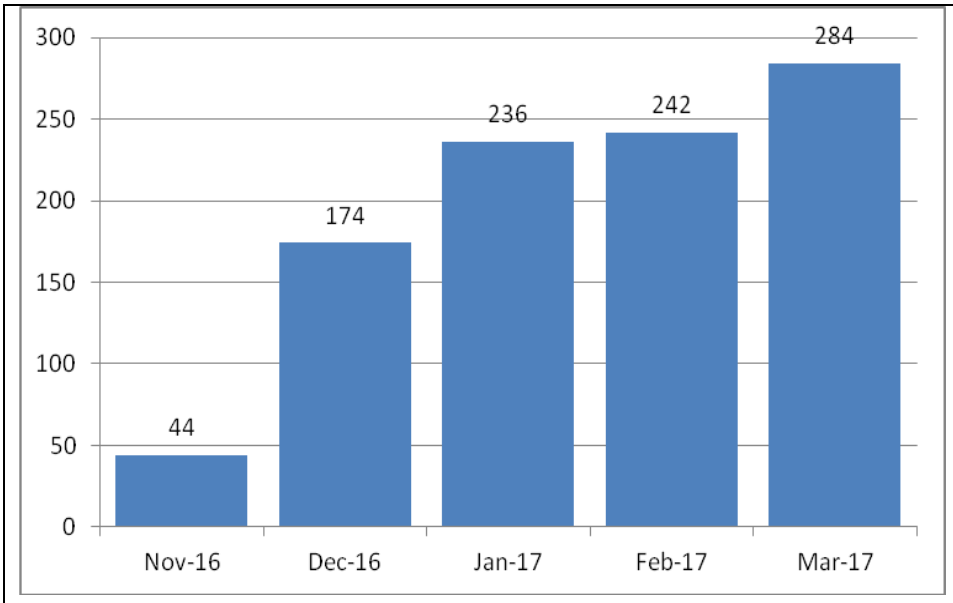
Main shock	Frequency	Percentage
Delay of rains	3	0.48%
Floods	286	45.91%
Food too expensive	233	37.40%
Human sickness	24	3.85%
Insecurity/Violence	39	6.26%

Other sources	70	11.24%
Own production	181	29.05%
Work for food	109	17.50%
Total	623	100.00%

Late food distribution	2	0.32%
Livestock diseases	23	3.69%
Others	3	0.48%
Returnee/IDP	2	0.32%
Social event	5	0.80%
Weeds/pests	3	0.48%
Total	623	100.00%

3.8 Admission Trends/Supplementary and Therapeutic Feeding Programme Coverage

Table 20 presents findings from CCM records showing the admission trends of children for both the SFP and OTP since November 2016 to March 2017.



The cases of malutrition seem to be increasing since November 2016 to March 2017 (Figure 7). This can be attributed to the interventions by CCM. Employing Community Nutrition Volunteers has helped to improve awareness on malnutriton and the availability of the services to address it. Collaboration with the health team is also important especially for the management of acute malnutrition with medical complications.

Figure 7: Admission trends to the OTP

Training among the CNVs has helped to build capacity to conduct follow ulp and defaulter tracing at the community. This activity is done every 3 days each week. As demonstrated by the actions taken at the community, knowledge and data can be powerful tools to leverage resources and stimulate change towards addressing acute malnutrition

3.9 Household Food Consumption & Dietary Diversity

To calculate the Household Dietary Diversity Score (HDDS), you obtain the sum of 12 main groups as per the table by adding frequencies. For each food group a new binominal variable was created that has two possible values: – 1 – yes: the household / individual consumed that specific food group – 0 – no: they did not consume that food. The binomial variables were summed to create a HDDS. The new variable will have a range from 0 through the maximum number of food groups collected (12). The weight of each of the food groups is 1 giving equal importance in the calculation of the HDDS to the spices and caffeine, tea or coffee group[1].

[1] Household Dietary Diversity Indicator Guide for Measurement of Household Food Access (WFP and FANTA)

Table 20: Household Dietary Diversity Score

<table>
<tr><td colspan="3"></td><td colspan="2">HDDS (0-12) 623 HHs</td></tr>
<tr><td rowspan="12">Food Groups consumed by the HH in the last 24 Hours</td><td>A</td><td>Cereals and cereal products</td><td colspan="2"></td></tr>
<tr><td>B</td><td>White Roots and Tubers</td><td colspan="2" rowspan="3">Total number of food groups consumed by members of the household. Values for A through L will be either “0” or “1”.</td></tr>
<tr><td>C</td><td>Legumes, nuts and seeds</td></tr>
<tr><td>D</td><td>Dark green leafy vegetables</td></tr>
<tr><td colspan="2" rowspan="2">Sum (A + B + C + D + E + F + G + H + I + J + K + L) – 623 HHs</td></tr>
<tr><td>E</td><td>Vitamin A rich Fruits, Yellow or orange fleshed tubers and vegetables/Vitamin A-rich</td><td rowspan="2">Average HDDS</td><td>Sum (HDDS) – 1789</td></tr>
<tr><td>F</td><td>Other Fruits</td><td>Total Number of Households (623)</td></tr>
<tr><td>G</td><td>Meat & Offal</td><td colspan="2" rowspan="7">Average HDDS = 2.87</td></tr>
<tr><td>H</td><td>Eggs</td></tr>
<tr><td>I</td><td>Fish and sea foods</td></tr>
<tr><td>J</td><td>Milk and milk products</td></tr>
<tr><td>K</td><td>Sugar and honey, Spices and Caffeine, tea or coffee</td></tr>
<tr><td>L</td><td>Oils/ fats</td></tr>
<tr><td colspan="3">Total</td></tr>
</table>

The HDDS for Tonj East County was 2.87 Phase 3 Severe recent deterioration of HDDS (loss of 2 food groups from usual) as per FANTA[2].

3.10 Food Consumption Score

Food consumption score (FCS) is an analytical method developed by World Food Programme in collaboration with other actors working in the food security sector. FCS is used to define categories of household food insecurity. The information gathered to develop the FCS additionally provides a wealth of unexploited data that can be used to inform on nutrient rich groups consumed by the HH and which are essential for nutritional health and well-being: protein, iron and vitamin A. This survey collected sufficient information to calculate the frequency weighted score of consumption of different food groups consumed by the household during the 7 days before the survey – the Food Consumption Score - FCS. This score is an acceptable proxy indicator to measure caloric intake and diet quality at household level, giving an indicator of food security status of the household if combined with other household access indicators. It is a composite score based on dietary diversity, food frequency, and relative nutritional importance of different food groups.

Table 21: Food Consumption Score for Tonj East County

No	Food groups	Weight	Sum of weighted food scores	New Weight
1	Cereals *(bread, rice, maize, barley)* and tubers *(potatoes, sweet potatoes)*	2	5	10
2	Pulses and nuts (*beans, lentils, peas, peanuts, etc.)*	3	1	3
3	Vegetables	1	1	1
4	Fruits	1	0	1
5	Meat and fish (*all types*)	4	1	4
6	Dairy products *(milk, yoghurt, cheese, other milk's products)*	4	1	4
7	Sugar, honey	0.5	1	0.5
8	Oil, fat, butter	0.5	1	0.5
				24

[2] http://www.fantaproject.org/sites/default/files/resources/HFCIS-report-Dec2015.pdf

Tonj East County has **borderline 24 (FCS = 21.5 to 35)** which means: An expected consumption of staple 7 days, vegetables 6-7 days, sugar 3-4 days, oil/fat 3 days, meat/fish/egg/pulses 1-2 days a week, while dairy products are totally absent.

3.11 Reduced Coping Strategy Index

Table 22 below shows that Tonj East County has been affected by a number of shocks including insecurity/violence, food too expensive, and human sickness. When livelihoods are negatively affected by a shock /crisis, households may adopt various mechanisms (strategies) which are not adopted in a normal day-to-day life, to cope with reduced or declining access to food.

Table 22: RCSI analysis for Tonj East County

Coping Strategies	Raw score	Universal Severity Weight	Weighted Score = Frequency x Weight
1. Rely on less preferred and less expensive foods	1	1	1
2. Borrow food or rely on help from friends or relatives	1	2	2
3. Limit portion size at mealtime	1	1	1
4. Restrict consumption by adults in order for small children to eat	1	3	3
5. Reduce number of meals eaten in a day	1	1	1
Total Reduced CSI	Total for each individual strategy		8

Based on the Tonj East county context the total CSI score can be classified as **medium (CSI = 4-9),** during the past week HHs in Tonj East County have applied all the rCSI in a moderate fashion but the food security especially for the other food groups remans precarious.

3.12.Handwashing and Environmental Sanitation

3.12. 1 Water and Sanitation

From the survey responses of the 623 resident households, about 76.08% were using drinking water from boreholes. Only 1.12 of the surveyed households had household connection/stand pipe (Table 23).

Table 23: Sources of water

Source of water	Frequency	Percentage
Borehole/hand pump	474	76.08%
Dam/pond	1	0.16%
HH Connection/Stand pipe/Tanker	7	1.12%
Open shallow well	57	9.15%
Protected shallow well	61	9.79%
Protected spring	23	3.69%
Total	623	100.00%

The surveyed household reported that they used an average of 3 jerricans (a jerricancan hold 20 liters of water). Survey findings indicated that 70.30% of the survey respondents said they “never treat water in any way to make

it safer for drinking, 3.21% boiled the water before drinking, 25.84% filtered the water with a piece of cloth among other ways. Drinking unsafe/contaminated water coupled with poor sanitation are linked to transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid and polio. Absent, inadequate, or inappropriately managed water and sanitation services expose individuals to preventable health risks which should not be the case. The general public should be educated on simple and inexpensive ways of making their water safer for drinking.

Among the caregivers surveyed, none (0%) washed their hands at all critical times (after visiting the toilet, after cleaning child faeces, before cooking, before eating and before breastfeeding). In all the households surveyed, 3.21% of residents reported that they never washed their hands at all.

3.13 Limitations to the Survey

- There were inherent difficulties in determining the exact age of some children (even with use of the local calendar of events), as some health cards had erroneous information. This may have led to inaccuracies when analysing chronic malnutrition. Most of the mothers were unable to give correct age of the children even after probing using calendar of events (appendix 2). Although verification of age was done by use of health cards, in some cases no exact date of birth was recorded on the card other than the date a child first seen at the health facility or just the month of birth. Chronic malnutrition and underweight estimation of children could be biased as some of them were not included in the calculation for these nutrition indicators. Recall bias may link to wrong age which then leads to wrong weight for age and height for age indices.
- Whilst intensive training was given to team leaders, varying levels of experience and interest meant that not all would have been capable to pick up technical errors and provide detailed and tailored guidance to their teams to the same extent as if the consultants could have been present in all clusters at all times.
- There was poor recording of vitamin A and de-worming in the health cards. Some of the mothers indicated that their children had received Vitamin A and de-worming while it was not recorded in the health cards.

Chapter 4: Discussions, Conclusion and Recommendations

4.1 Discussions

The nutrition situation of in Tonj East County can be classified as seroius with a GAM of 13.1%.Exclusive breastfeeding in Tonj East County was sub-optimal at only 53.85%. It is worth noting that majority of the children 0-23 months old in Tonj East County are still being breastfed, which is a good site and a great spring board for IYCF. Continued breastfeeding at 6 months was 80.30%, at 1 year was 95.08% and at 2 years was 91. .84. Efforts should be made to enhance knowledge on exclusive breastfeeding.

Children become wasted and suffer from acute malnutrition when they lose weight rapidly, usually as a direct result of a combination of infection and diets that do not cover nutritional needs. The main contributors to acute malnutrition in Tonj East County are:

- inadequate caring and feeding practices (e.g. exclusive breastfeeding or low quantity and quality of complementary food);
- poor food security – most residents are reliant on livestock, but also an ongoing lack of food quantity and diversity, characterized by a monotonous diet with low nutrient density, together with inadequate knowledge of patterns of food storage, preparation and consumption; and
- lack of a sanitary environment, including access to safe water, sanitation and hygiene services.

These factors are strongly related to each other and have a cyclical relationship with wasting. Poor diet leads to increased risk of infection, and infection has a profound effect on nutritional status. A previously healthy child can quickly become wasted when faced with a severe infection, potentially leading to a loss of appetite. As wasting worsens, children become more susceptible to infections. This is known as the “vicious cycle” between infection and wasting. Diarrhoeal disease is common in low-income countries, where hygiene and sanitation can be suboptimal, and diarrhoea has been identified as a particular culprit

4.2 Conclusion

These are some of the important findings contributing to poor malnutrition status are given as under:

- GAM rate was 13.1% which is classified as serious.
- Exclusive breastfeeding is a concept not well adapted in Tonj East County
- Very few children 6-23 months of age receive a minimum acceptable diet. Meal frequency is consistently low.
- Despite being suboptimal infant and young children feeding (IYCF) practices and limited coverage of important health services, the nutrition situation shows a promise for improvement especially with the increased cultivation of sorghum and cattle being brought home from the Touch.
- A number of households are affected by, human sickness, too expensive/ increased price of food, yet others are observed to adopt negative coping strategies such as sale of food aid including plumpy nut for the malnourished children.
- Food security need further support,
- Lackof a sanitary environment, mainly latrine facilities may be a contributing factor to high GAM. This together with poor diet leads to increased risk of infection, and infection has a profound effect on nutritional status. These factors are strongly related to each other and have a cyclical relationship with wasting.
- The support provided by agencies with access to watrer may have contributed to low incidences of diarrhoeal disease. However sanitisation is a sub-suboptimal, and diarrhoea has been identified as a particular culprit

4.3 Recommendations

- CCM’s strategy to employ and train CNVs has helped the improvement of the identification, measurement and understanding of severe malnutrition and the scale up of the coverage of the services the County. However, CCM needs to continue to support the strengthening of the methods to accurately

assess the burden of acute malnutrition for service planning, design and monitoring, including assessment according to the criteria used for admission (including bilateral oedema and MUAC) among the CNVs. CCM should particularly support the widespread of assessment of Tonj East County malnutrition coverage to allow for accurate assessment of the uptake and effectiveness of treatment services for both severe and moderate acute malnutrition.

- Promote nutrition education and awareness, and enhance training on appropriate IYCF practices for pregnant and new mothers and health personnel.Mothers of children enrolled in the CMAM program should receive IYCF information at every visit, this presents an opportunity for the formation of mother-to-mother support group at the villages as they are able to reach other mothers with information on exclusive breast feeding, promotion of early initiation of breastfeeding. These groups can be further linked up with lady health workers and community volunteers.
- Advocate with Health NGOs to ensure availability of adequate access to PHC to step up improved health seeking behavior and promotion of maternal, newborn and child preventive health and nutrition.
- Partnerring with other agencies that are implementing vaccination and deworming will spring board wide coverage via integrated community campaigns in Tonj East to deliver minimum package of routine vaccination, micronutrient supplementation and deworming.
- Providing tailored food security and liveihood FSL interventions that are feasible in the county, in light of the persisting lack of access to income-generating opportunities, in a way that fosters appropriate childcare practices for instance multi-story kitchen gardens is one high impact intervention.
- It would be more appropriate to design a comprehensive Behaviour Change Communication (BCC) programme not only on IYCF but also other issues identified in this report, health issues. BCC programme should be rolled out in the form of a campaign that can set the trend for appropriate IYCF and hygiene practices by change agents (i.e. mothers, care givers, fathers, volunteers or facility staff, religious leaders, camp leaders).
- Strengthen programmes and strategies currently addressing infant and young child nutrition (IYCN) with a view to improving the protection, promotion, and support of optimal IYCF. Viable action points include: need for continual monitoring of both facility and community based interventions to track progress while also documenting the process to assess the trends in the outcomes as well as impact indicators. Particular attention should go to improved maternal nutrition, iron/folate supplementation during the prenatal period and ensuring ORS/zinc support for diarrhoea
- Build and strengthen the capacity of MoH and other local partners to effectively integrate management of acute malnutrition approach (prevention, detection and treatment) at community and facility level, integrating that treatment with existing maternal and child health services.
- Increase awareness through community mobilization on, Vitamin A supplementation, Measles Vaccination and deworming and Strengthen distribution of vitamin A and deworming drugs to the PHCC/PHCU facilities since most of population can easily access treatment at these facilities
- Support the HHs to diversify income sources to reduce the impact of negative shocks on poor households' livelihoods.
- Continued sustenance and improvement of SFP, OTP, SC centre in the county to capture all acutely malnourished children is required.

Appendices

Appendix 1: Selected Clusters

Cluster Number	Cluster Name	Payam
1	Machar Kongor	Paliang Payam
2	Marolariau	
3	Amethou	
4	Kuer	
5	Ping Thiec	
6	Kolnyang	Paweng Payam
7	Malik	
8	Gooi Abet	
9	Keukutok	
10	Pakid	
11	Nyinayien	
12	Riangagok	
13	Nyadiar	
14	Wucaat	Makuac Payam
15	Alel	
16	Alongjoth	
17	Ayok	
18	Mayom Liet	
19	Rualkoor	
20	Lieth	
21	Machardit	
22	Bekmadeng	
23	Atuop	
24	Payii	
25	Aguet	
26	Wunakoc	Wunlit Payam
27	Palaam	
28	Alatiep	
29	Pangoth	
30	Mayenador	
31	Wunkuel	
32	Agerbach	
33	Wunyiik	
34	Pakuem Dhiach	
35	Akangar	
36	Pamuok	Ngapagok Payam
37	Ngokkiir	
38	Wunyik	
39	Ageng Dit	
40	Wararoor	
41	Nyin	
42	Awek	
43	Tabar Achuol	
44	Agum Mut	
45	Among Dor	
46	Wunkot	Palal Payam
47	Panayang	
48	Wunkuel	

Appendix 2: Events Calendar Tonj East County (March 2017 to April 2012)

Seasons	Agricultural Seasonal Events	National Events in South Sudan	Local Events Tonj East County	Months	Years	Age (Months)
Heat/Dry season	• Fishing activities • Start of land preparation	National exams – secondary schools		March	2017	1
Heat/Dry season	Fishing activities	Valentine's Day	• Digging of wells • Fishing activities	February	2017	2
Heat/Dry season	• Storage time • Cattle taken to Toic • Cutting of trees in readiness for land preparation	New Year's Day Peace Agreement Day	• Cultural rites including slaughtering of the bull before bulls are taken to Toic • Tukul Building	January	2017	3
Cold season	Tukul Building	Christmas Day Boxing Day	Tuklul Building	December	2016	4
End of short rains and Cold Season begins	Cows removed from Luaks	Tonj East Exams	• Cows removed from Luaks • Celebrations continue	November	2016	5
Short rains	End of harvesting	South Sudan School Certificate	• Traditional dances • Marriage ceremonies	October	2016	6
Long Rains	Harvesting of Dura, beans		• Traditional dances • Marriage ceremonies • Fishing activities	September	2016	7
Long rains	• Harvesting of maize (short) • Harvesting of gee nuts, simsim	Mary Day Celebrations	• Traditional dances • Marriage ceremonies • Fishing activities	August	2016	8
Long rains	• End of weeding • Eat of green maize, pumpkins, vegetables, beans	• Independence Day Celebrations • Conflict starts in Juba between the SPLA and SPLAIO	• Division of old Tonj East into Six counties • Traditional dances	July	2016	9
Rainy Season continues	• Weeding • Driving cows to Luak	World Refuge Day		June	2016	10
Rainy Season	• Cows brought back from Toic • Planting continues	SPLA/Dr. John Garang Day Labour Day	Fattening program	May	2016	11
First Rains	• End of land preparation • Selection of seed and planting starts	Start of National Examinations Coming of Dr. Riek Machar to Juba		April	2016	12
Heat/Dry season	• Fishing activities • Start of land preparation	Easter holiday		March	2016	13
Heat/Dry season	Fishing activities	• Valentines Day • UN sec general visits South Sudan	• Digging of wells • Fishing activities	February	2016	14
Heat/Dry season	• Storage time • Cattle taken to Toic • Cutting of trees in readiness for land preparation	New Year's Day Peace Agreement Day	• Cultural rites including slaughtering of the bull before bulls are taken to Toic • Tukul Building	January	2016	15
Cold season	Tukul Building	Christmas Day Boxing Day	Tuklul Building	December	2015	16
End of short rains and Cold Season begins	Cows removed from Luaks		• Cows removed from Luaks • Celebrations continue	November	2015	17
Short rains	End of harvesting	South Sudan School Certificate Kiir Decrees 28 states	Fighting in Tonj East among communities	October	2015	18

Seasons	Agricultural Seasonal Events	National Events in South Sudan	Local Events Tonj East County	Months	Years	Age (Months)
Long Rains	Harvesting of Dura, beans		• Traditional dances • Marriage ceremonies • Fishing activities	September	2015	19
Long rains	• Harvesting of maize (short) • Harvesting of gee nuts, simsim	Mary Day Celebrations Kiir Signs peace agreement with opposition	• Traditional dances • Marriage ceremonies • Fishing activities	August	2015	20
Long rains	• End of weeding • Eat of green maize, pumpkins, vegetables, beans	Independence Day Celebrations		July	2015	21
Rainy Season continues	• Weeding • Driving cows to Luak	World Refuge Day		June	2015	22
Rainy Season	• Cows brought back from Toic • Planting continues	SPLA/Dr. John Garang Day Labour Day	Fattening program	May	2015	23
First Rains	• End of land preparation • Selection of seed and planting starts	Start of National Examinations		April	2015	24
Heat/Dry season	• Fishing activities • Start of land preparation	Easter holiday		March	2015	25
Heat/Dry season	Fishing activities	Valentines Day UN sec general visits South Sudan	• Digging of wells • Fishing activities	February	2015	26
Heat/Dry season	• Storage time • Cattle taken to Toic • Cutting of trees in readiness for land preparation	New Year's Day Peace Agreement Day	• Cultural rites including slaughtering of the bull before bulls are taken to Toic • Tukul Building	January	2015	27
Cold season	Tukul Building	Christmas Day Boxing Day	Tuklul Building	December	2014	28
End of short rains and Cold Season begins	Cows removed from Luaks		• Cows removed from Luaks • Celebrations continue	November	2014	29
Short rains	End of harvesting	South Sudan School Certificate	• Traditional dances • Marriage ceremonies Fishing activities	October	2014	30
Long Rains	Harvesting of Dura, beans		• Traditional dances • Marriage ceremonies • Fishing activities	September	2014	31
Long rains	• Harvesting of maize (short) • Harvesting of gee nuts, simsim	Mary Day Celebrations	• Traditional dances • Marriage ceremonies • Fishing activities	August	2014	32
Long rains	• End of weeding • Eat of green maize, pumpkins, vegetables, beans	Independence Day Celebrations		July	2014	33
Rainy Season continues	• Weeding • Driving cows to Luak	World Refuge Day		June	2014	34
Rainy Season	• Cows brought back from Toic • Planting continues	SPLA/Dr. John Garang Day Labour Day	Fattening program	May	2014	35
First Rains	• End of land preparation • Selection of seed and planting starts	Start of National Examinations Easter holiday		April	2014	36
Heat/Dry season	• Fishing activities • Start of land preparation			March	2014	37
Heat/Dry	Fishing activities	Valentines Day	• Digging of wells	February	2014	38

Seasons	Agricultural Seasonal Events	National Events in South Sudan	Local Events Tonj East County	Months	Years	Age (Months)
season		UN sec general visits South Sudan	• Fishing activities			
Heat/Dry season	• Storage time • Cattle taken to Toic • Cutting of trees in readiness for land preparation	New Year's Day Peace Agreement Day	• Cultural rites including slaughtering of the bull before bulls are taken to Toic • Tukul Building	January	2014	39
Cold season	Tukul Building	Christmas Day Boxing Day	Tuklul Building	December	2013	40
End of short rains and Cold Season begins	Cows removed from Luaks	Juba fighting	• Cows removed from Luaks • Celebrations continue	November	2013	41
Short rains	End of harvesting	South Sudan School Certificate	• Traditional dances • Marriage ceremonies Fishing activities	October	2013	42
Long Rains	Harvesting of Dura, beans		• Traditional dances • Marriage ceremonies • Fishing activities	September	2013	43
Long rains	• Harvesting of maize (short) • Harvesting of gee nuts, simsim	Mary Day Celebrations	• Traditional dances • Marriage ceremonies • Fishing activities	August	2013	44
Long rains	• End of weeding • Eat of green maize, pumpkins, vegetables, beans	Independence Day Celebrations		July	2013	45
Rainy Season continues	• Weeding • Driving cows to Luak	World Refuge Day		June	2013	46
Rainy Season	• Cows brought back from Toic • Planting continues	SPLA/Dr. John Garang Day Labour Day	Fattening program	May	2013	47
First Rains	• End of land preparation • Selection of seed and planting starts	Start of National Examinations Easter holiday		April	2013	48
Heat/Dry season	• Fishing activities • Start of land preparation			March	2013	49
Heat/Dry season	Fishing activities	Valentines Day UN sec general visits South Sudan	• Digging of wells • Fishing activities	February	2013	50
Heat/Dry season	• Storage time • Cattle taken to Toic • Cutting of trees in readiness for land preparation	New Year's Day Peace Agreement Day	• Cultural rites including slaughtering of the bull before bulls are taken to Toic • Tukul Building	January	2013	51
Cold season	Tukul Building	Christmas Day Boxing Day	Tuklul Building	December	2012	52
End of short rains and Cold Season begins	Cows removed from Luaks		• Cows removed from Luaks • Celebrations continue	November	2012	53
Short rains	End of harvesting	South Sudan School Certificate	• Traditional dances • Marriage ceremonies Fishing activities	October	2012	54
Long Rains	Harvesting of Dura, beans		• Traditional dances • Marriage ceremonies • Fishing activities	September	2012	55
Long rains	• Harvesting of maize (short) • Harvesting of gee nuts, simsim	Mary Day Celebrations	• Traditional dances • Marriage ceremonies • Fishing activities	August	2012	56
Long rains	• End of weeding • Eat of green maize, pumpkins, vegetables,	Independence Day Celebrations		July	2012	57

Seasons	Agricultural Seasonal Events	National Events in South Sudan	Local Events Tonj East County	Months	Years	Age (Months)
	beans					
Rainy Season continues	• Weeding • Driving cows to Luak	World Refuge Day		June	2012	58
Rainy Season	• Cows brought back from Toic • Planting continues	SPLA/Dr. John Garang Day Labour Day	Fattening program	May	2012	59
First Rains	• End of land preparation • Selection of seed and planting starts	Start of National Examinations		April	2012	60

* Shaded areas at the start of the calendar are for children not eligible for 6-59 months surveys.

Instructions: Begin with the local events in Tonj East County and work outwards to other events in confirming the age estimate with the mother/caretaker.

Appendix 3: Plausibility Check Report

Plausibility check for: Tonj East 2 March 2017.as

Standard/Reference used for z-score calculation: WHO standards 2006

(If it is not mentioned, flagged data is included in the evaluation. Some parts of this plausibility report are more for advanced users and can be skipped for a standard evaluation)

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	**5** (3.6 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.886)
Age ratio(6-29 vs 30-59)	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**4** (p=0.002)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (4)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (9)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (5)
Standard Dev WHZ	Excl	SD	<1.1 and	<1.15 and	<1.20 and	>=1.20 or	
.							
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	**5** (1.11)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (0.06)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**1** (-0.31)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**1** (p=0.023)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**18** %

The overall score of this survey is 18 %, this is acceptable.

Appendix 4: SMART Survey Questionnaires

Anthropometric & Health Questionnaire (To be conducted in EVERY SELECTED HH with children 6-59 months)

Date (DD/MM/YY): …. /……/……. Cluster No…… Team No…… State…… County……Payam…… Boma……Village……

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
Child No.	HHNO	Child Name	Sex **m** = Male **f** = Female	Date of Birth (DD/MMYY)	Age in months	Wight in Kg (e.g. 12.4)	Height in cm (e.g. 78.1)	Oedema **n** = No **y** =Yes	MUAC in cm (e.g. 11.3)	Vit. A in last 6 months **0** = No **1** =Yes	Measles Vaccine **0** = No **1** =Yes with EPI card **2** =Yes recall **3** = Child <9m	Illness in past 14 days? **0** = No **1** =Yes If no, go to 16	Type of Illness 1=Fever 2= Cough 3= Diarrhoea 99= Other (specify)	Treatment Sought: **0** = None **1** =Hospital **2** =PHCC/U **3**= Mobile / outreach clinic **4**=CBD **5**=Private clinic **6**=Traditional practitioner **7**=Pharmacy/chemist **99**=Other (Specify)	Did the child sleep under a mosquito net(LLITN) last night? 0= No 1= Yes	Dewormed in last 6 months (12-59 months) **0** = No **1** =Yes 88 =DK	MUAC PLW (cm) ±0.1cm
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	

***BCG: 0 = Not immunized and no scar, 1 = Yes, vaccinated and scar present

FOOD SECURITY AND LIVELIHOOD QUESTIONNAIRE

(continue questionning HH's where we've collected Anthro' & Health information)

Date (D/M/Y): ……/……/…..... Cluster No:…… Team No…..… State:…….. County……..…….. Payam:…….. Boma……..…….. Village:……..……

	18	19	20	21	22	23	24	25	26	27
HH NO*	HH **size** (No. of people living in HH)	**Resident** status of HH: ---------- **1** = Resident **2** = Returnee (in the last 1yr) **3** = IDP **4** = Refugees	Is there any IDP or returnee currently **living** in your household ? --------- **0** = No **1** = Yes	Is the HH **head** male or female? --------- **1** = Male **2** = Female	What was your HHs main source of **income** in the last 30 days? ---------- **1** = Sale of crops **2** = Sale of livestock **3** = Sale of animal product **4**= Sale of alcoholic beverages **5** = Sale of fish **6** = Sale of natural resources (firewood; charcoal; grass) **7** = Sale of food aid **8** = Casual Labour**9** = Skilled labour**10** = Salaried work **11** = Petty trading **12** = Family support **13**= Remitance 99=others (Specify)	Did you **cultivate** in the recent last season? --------- **0** = No **1** = Yes	Does the HH **own** any livestock, heards or farm animals ? ------ **0** = No **1** = Yes	Has your HH received any **Humanitarian Assistance** in the past 3 months? --------- **0** = None **1** = GFD 2= School meals /feeding 3=TFP/SFP 4= Seeds & tools 5=Fishing kits	What was the main **source of food** in the past 7 days --------- **1** =Own production **2** =Work for food **3** =Gifts from neighbours**4** =Market/shop purchase **5** =Borrowing/debts **6** =Food aid **7**= Hunting **8** = Fishing **9** = Gathering **99**= Other, specify	What is the main **shock** currently faced by the HH ---------- **1** = Insecurity /violence **2** = Food too expensive /increased price **3** = Livestock diseases **4** = Flood **5** Human sickness **6** =Returnee/IDP living with HH **7** =Late food distribution **8** = Social event **9** = Delay of rains **10** = Weeds/ Pest **99**= Other(specify)

28 Household Food Consumption & Dietary Diversity

Did any member of your household consume food from any of these food groups in the last 24 hours (from this time yesterday to now)? Include any snacks consumed? 0=No 1=Yes

HHNO	Cereals and cereal products	White Roots and Tubers	Legumes, nuts and seeds	Dark green leafy vegetables	Yellow or orange fleshed tubers and vegetables/Vitamin A-rich	Other vegetables	Vitamin A rich Fruits	Other Fruits	Meat & Offal	Eggs	Fish and sea foods	Milk and milk products	Sugar and honey	Oils / fats	Miscellaneous
	(e.g. maize, spaghetti, rice, caanjera, bread, biscuits)?	(e.g. white potatoes, yams, cassava and their products)?	(e.g. beans, lentils, green grams, cowpeas; peanut)?	(including Vitamin A-rich sweet pepper, local and wild leafy vegetables)?	(e.g. squash/juices pumpkins, carrots, sweet potatoes that are orange or yellow inside)?	(other local and wild vegetables that are not dark green or leafy e.g cabbage, lettuce, greeen pepper)	(e.g. ripe mangoes, pawpaw, etc which are yellow or orange fleshed)?	(other local and wild fruits that are not yellow or orange fleshed e.g bananas)?	(e.g. beef, sheep/goat/camel or game meat, poultry& products)?						(Spices and Caffeine, tea or coffee)?

29 Food Consumption Score										30. Reduced Coping Strategy Index				
Over the last 7 days, how many days did your household consume the following foods?										In the past 7 days, if there have been times when you did not have enough food or money to buy food, how often (days) has your household had to:				
HHNO	Cereals & tubers (maize, rice, sorghum, cassava, potatoes, etc)?	Pulses (beans, peas, groundnuts, green grams, etc)?	Vegetables?	Fruits?	Animal source foods (meat, fish, eggs)?	Milk & dairy products?	Sugar and honey *(e.g.sweetened foods, drinks, chocolates, sweets, candies, etc)*?	Oils/fats *(e.g. fat or oil, butter, ghee, margarine added to food or used for cooking)?*		a. Rely on less preferred and less expensive foods?	b. Borrow food, or rely on help from a friend or relative?	c. Limit portion sizes at meal times?	d. Restrict consumption by adults so that small children can eat?	e. Reduce the number of meals eaten in a day?

WATER AND SANITATION QUESTIONNAIRE

Date (D/M/Y): …./……./…..... Cluster No:…… Team No…..… State:…… County……..…….. Payam:……. Boma……..…..
Village:……...……

	31	32	33	34	35	36	37
HHNO	What is the household's main **source** of drinking water ? ---------- **1**=Borehole/hand pump **2**=Protected Shallow well **3**= Open shallow well **4**= Protected spring **5**= River /Stream **6**= HH connection / Stand pipe /Tanker **7**= Dam / Pond **99**= Other (specify_____)	How **long** does it take the HH to collect water (including travel to and from and waiting)? ---------- **1** = ≤30 min **2** = >30min to ≤1hr **3** = >1hr to ≤ 2hr **4** = >2hr to ≤ 4hr **5** = >4hr	How many **jerricans** of water did the HH use yesterday in total (excluding water for washing clothes and for animal)? (Define how many **litres** in a jerrycan if the population all use the same)	What do you usually do to water to make it safer **before** household members drink it? --------- **0 =**Nothing **1 =**Boiling **2 =**Filtering with a cloth **3 =**Letting it settle **4 =**Water treatment chemicals **99 =**Others(Specify)	**When** do you usually **wash** your hands (more than one if appropriate - do not prompt) --------- **0** = Never **1** = After defecating **2** = Before cooking **3** = Before eating **4** = Before feeding the baby 5=Affter cleaning the baby 99=other (specify)	**What** do you use to **wash** hands? ..... **0** = Nothing **1** = Water only **2** = Water + Soap **3** = Water + Ash 99 = other (specify)	**Where** does the household usually defecate or relieve themselves (include more than one if necessary)? --------- **1** = Undesignated open area **2** = Designated open area **3** = Hole **4** = Latrine **99** = Other (specify)

INFANT AND YOUNG CHILD FEEDING QUESTIONNAIRE

(To be conducted in every HH with children 0-23 months)

Date (D/M/Y): ……. /…..…/…..... Cluster No…… Team No…..… State…….. County……..…….. Payam…… Boma……..……... Village……...……

31	32	33	38	39	40	41	42	43	44	45
Child No.	HHNO	**Age** (in months)	Has this child ever been **breastfed**? --------- 0 = No 1= Yes If no go to 11	**How long** after birth did you first put the child to the breast? --------- **1** = Immediately in 1st hour **2** = In first day **3** = After first day	Did you feed your child with **colostrum** (local language = thiith) --------- 0 = No 1 = Yes	Is this child **still** breastfeeding now? --------- 0 = No 1 = Yes	**Exclusive** breast feeding: What other foods did you give the child before the age of 6 months (other than breast milk)_____ 0 =None other than breast milk 1 = Powder/animal milk/yogurt 2 = Cereals based diet 3 = Plain water 4 = Fruit Juice 5 = Sugar water 6 = Vegetables	What foods were given to the child **yesterday** during the day and night? --------- 1 =Grains/cereal s/tubers 2 = Meat/Fish/Poultry/Organ meats 3 = Legumes/ Nuts 4 = Dairy products 5 = Fruits/vegetables 6= Vitamin A rich fruits & Vegetables 7 = Eggs 8 = Others (specify___)	Since this time yesterday, how many times have you given the child**food**other than liquid? (put number)	How do you feed the child when having **diarrhoea**, do you feed him --------- **0** = Nothing at all **1** = Less than usual or fluids only **2** = Same as usual **3** = More than usual **4** = Never had diarrhoea

DEMOGRAPHY & MORTALITY QUESTIONNAIRE

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

COUNTY:	**PAYAM:**		**NAME OF INTERVIEWER:**
BOMA:	**VILLAGE:**		
CLUSTER NO. [ ][ ]	**TEAM NO.** [ ][ ]	HOUSEHOLD[1] NO. [ ][ ]	

1	2	3	4	5	6	7	8	9	10
No.	Name	Sex (M/F)	Age (years)	Joined on or after: _____ (Start date of the recall period - ex. Jan. 1, 1900)	Left on or after:	Born on or after:	Died on or after:	Cause of death 1= illness 2=injury	Location of death 1=current location 2=during migration 3=in place of last residence 99=other, specify
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									
b) List all the people that slept in this household on the **first night of the recall period (FILL IN DATE/EVENT)** but did **NOTsleep** in the **household last night**.									
1					Y				
2					Y				
3					Y				
4					Y				
5					Y				
6					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		

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

[1] HH definition: Group of people living under same roof & sharing food from the same pot . 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.