Post-Harvest Nutrition and Mortality Survey

Weckol and Padiek Payams, Uror County, Jonglei State, South Sudan

Survey period: 16th -23th January, 2018

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IV. Acronyms

ARI	Acute Respiratory Infection
BCG	Bacillus Calmette-Guerin, Anti-tuberculosis vaccination
CI	Confidence Interval
CHD	County Health Department
CMR	Crude Mortality Rate
DRR	Disaster Risk reduction
ECHO	European Commission
ENA	Emergency Nutrition Assessment
EPI	Expanded Program on Immunization
FGD	Focus Group Discussion
FSL	Food Security and Livelihood
GAM	Global Acute Malnutrition
GFD	General Food Distribution
HH	Household
HAZ	Height for Age Z-score
INGO	International Non-Governmental Organization
IYCF	Infant and Young Child Feeding
LLITN	Long lasting Insecticides Treated Nets
MAM	Moderate Acute Malnutrition
MOH	Ministry of Health
MUAC	Mid Upper Arm Circumference
NCHS	National Centre for Health Statistic
OTP	Outpatient Therapeutic Program
PHCC	Primary Health Care Centre
PHCU	Primary Health Care Unit
PPS	Probability proportional to size
SAM	Severe Acute Malnutrition
SD	Standard Deviation
SFP	Supplementary Feeding Program
SMART	Standardized Monitoring and Assessment of Relief and Transitions
TFP	Therapeutic Feeding Program
U5MR	under Five Mortality Rate
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation and Hygiene
WAZ	Weight for Age Z-score
WHZ	Weight for Height Z- score
WFP	World Food Program
WHO	World Health Organization

2 Executive Summary

Tearfund's operational response in Southern Sudan started in 1998, in response to the famine in the Bahr el Ghazal region. Tearfund has more than 18 years of experience implementing nutrition projects across South Sudan, and also have had programmes in household food security, primary health care, community health education, water and sanitation. These projects have targeted the most vulnerable members of the community including displaced persons, widows and children.

Tearfund is currently implementing a WFP, UNICEF and OFDA funded Emergency nutrition program in Uror County and a DFID funded WASH program. The nutrition intervention aims at identifying and treating acutely malnourished children under five and pregnant and lactating mothers as an immediate life saving measure while at the same time tackling barriers that cause poor utilization of health and nutrition services.

Between 16th and 23rd January 2018, Tearfund South Sudan with support from UNICEF and the Nutrition Cluster conducted a SMART nutrition and mortality assessment covering the government controlled areas of Uror County, Weckol and Padiek Payams. Initially, the survey was planned for the entire Uror County but the security situation started to change quickly on the week of the planned survey which dictated that conducting the survey across all Uror County impossible. Hence, the survey proceeded in Weckol and Padiek Payams alone which were under government control and where movement of the team was not hindered. The main objective of the assessment was to assess the current magnitude of acute malnutrition and food security among the population. A May 2016 pre-harvest SMART survey had indicated global acute malnutrition and mortality rates above *Emergency* levels (GAM>20), while a post-harvest assessment conducted in the County in December 2014 had reported *Serious* acute malnutrition situation (GAM: 10-14.9%); therefore there was a need to determine the current post-harvest situation and collate the latest information on the nutrition status and food security situation of the population. The information would help to evaluate the nutrition intervention and to guide further response.

A two-stage cluster sampling methodology was used, and a total of 468 children aged 6-59 months from 458 households in 33 clusters were assessed for anthropometry. Assessment on mortality was conducted concurrently in 462 households with the mean household size of 7.8 persons. Household related data, such as food consumption and dietary diversity, water and sanitation as well as health access were also collected in the 458 households during the assessment.

The prevalence of Global Acute Malnutrition (GAM) for Weckol and Padiek Payams was **16.0% (13.1-19.5 95% CI)**, and the severe acute malnutrition (SAM) rate (WHZ<-3 or oedema) was **1.9% (1.0- 3.8 95% CI)**. Boys and girls were equally malnourished. The results of the nutrition assessment in Weckol and Padiek Payams of Uror county indicate GAM and SAM rates that are slightly above the *Critical Emergency* threshold (GAM rate>15%) according to WHO classification. The crude mortality rate (CMR) of **1.07** (95% CI: 0.66-1.73), was above the WHO's *alert* thresholds of 1/10,000/day and the under-five mortality rate (U5MR) of **0.34** (95%CI; 0.09-1.32) was below the WHO's *alert* thresholds of 2/10,000/day.

A high prevalence of morbidity was also reported in the assessment. The percentage of children who had reportedly suffered from one or more communicable childhood diseases in the two weeks prior to the assessment was 63.8%. About 55% of the reported illness was fever; 19% of the children who fell ill had cough while 23% had diarrhea. Very low immunization and vitamin A status was reported with only 9% having received vitamin A supplementation and 9.4% of the children (9-59 months) immunized against measles in the previous 6 months. A high proportion (87%) of children continued breastfeeding at 1 year.

Conclusion

In conclusion the nutrition situation in Weckol and Padiek Payams, Uror County, Jonglei State is above the *critical* emergency threshold. Children between the ages 6-59 months are in critical condition because children have inadequate diet and are exposed to poor health and care environments. Results showed that wasting in 6-29 months old children was 17.6% (13.8-22.2 95% CI) and that of 30-59 months was 13.8% (9.9-19.0 95% CI). The two results of prevalence of acute malnutrition are not statistically significant (p-value=0.1976) indicating both age groups are equally affected by acute malnutrition. Higher than normal levels of malnutrition among younger children may indicate a high burden of infection, while an equal level of malnutrition among all ages may indicate acute food insecurity.

At the time of the survey and for the past many years the population was at the front of the persistent insecurity and armed conflict which disrupted livelihood activities, affected market functionality and limited physical access to market.

Majority of at risk people not able to meet their food needs due to insecurity, poor availability of food on the market and very high prices of available food (the country is facing hyperinflation). However, most have been receiving adequate quantities of food aid (58%).

The situation is going to get worse as we approach the lean season. IDPs, people that are without livestock or who did not harvest in the recent past season, and female headed households are the subgroups of the population which are at greatest nutritional risk. The population has very low rates of immunization and supplementation; in light of this the situation will be much serious. The on-going instability, migration, and conflict means that the current reliance on restricted WFP rations, lack of access to livelihoods, poor WASH conditions, inadequate hygiene practices, and limited access to healthcare persists. Due to insufficient vaccination coverage and sanitation, the risk of disease outbreak remains real.

Even though the key underlying factors affecting the nutritional status of the children i.e. food insecurity, morbidity, poor child care and limited sanitation and hygiene facilities remain key risk factors, it is important to note that the situation has remained critical despite seasonal harvests and the food security, health and nutrition interventions.

Recommendation

Immediate

- The existing Therapeutic feeding programme should continue to treat severe and moderate acute malnutrition. It is known that GAM levels using WHZ are high in South Sudan, while MUAC based prevalences are comparatively low. Hence, targeting should include admitting cases of malnutrition using WHZ criteria.

- A large proportion of the population remains dependent on food aid to meet their food needs. Food aid should continue but registrations should be revised in light of the high number of IDPs and women-headed households. This revision should be based on a thorough food security assessment.

- Feasible and appropriate food security interventions which can be targeted at poor people should be investigated to promote improved dietary quality.

- Special effort should be made to target female headed households.

- All children under five should be vaccinated and provided with a vitamin A supplement.

- Continue treating PLW mothers with malnutrition through the existing MAM programme

- Consider distribution and promote use of LLITN.

- Scale up the integrated community case management to increase access of the population to treat and prevent illnesses like diarrhea, cough and malaria.

- Health Education to the community on good health seeking and advocacy to ministry of health on provision of essential drugs to the health facilities across the county.

- Tearfund to continue work in water related issues amongst all villages to ensure adequate coverage and use of a safe water supply. To address the problem of infection, especially diarrhoea, resulting from sub-optimal hygiene and sanitation practices, transmission of faeco-oral diseases and exposure to disease-bearing vectors;- intensify the promotion of information, knowledge and understanding to prevent water and sanitation-related diseases and identify social and cultural norms that might facilitate and/or compromise adherence to safe hygiene practices.

Long term

- Health education on feeding practices during diarrhea

- Continue the implementing the IYCF program and reinforce IYCF activities with quality one-to-one counselling tailored to the individual, peer-led support groups, interactive mass-communication events, and implication/ capacity-building of health decision-makers at the community and family level for larger IYCF messaging and behaviour change.

- To provide tailored FSL interventions, in light of the persisting lack of access to income-generating opportunities, in a way that fosters appropriate childcare practices

- To ensure that all humanitarian interventions have a conflict-sensitive approach and an effective communication/ participation strategy with surrounding populations, using advocacy in a way that provides durable solutions.[1]

- To advocate for significant increase in freedom of movement so that displaced or conflict-affected people can restore their livelihoods and have adequate access to essential services.

Box 1: Summary of main survey results

Characteristic		Percent
Prevalence of underweight (<-2 z-score)		12.4 % (9.0 - 16.7 95% C.I.)
Prevalence of stunting (<-2 z-score)		5 %
Prevalence of reported illness		63.8% (51.8-75.8 95% C.I.)
Converge of Long lasting Insecticides Treated Nets		21.5% (13.0-30.1 95% C.I.)
BCG by scar (6-59 months) (n=468)		18.4% (10.7-26.1 95% C.I.)
Measles by card (9-59 months) (n=420)		7.6% (3.0-12.1 95% C.I.)
Measles by card and recall (9-59 months) (n=420)		9.4% (0.1-17.9 95% C.I.)
Vitamin A in last 6 months (6-59 months) (n=468)		9.0% (0.0-18.0 95% C.I.)
Deworming (12-59) (n=386)		2.4% (0.3-4.4 95% C.I.)
Early initiation of breastfeeding (n=257)	Immediately	80.9% (72.3-89.5 95% C.I.)
	In less than an hour	11.6% (5.0-18.1 95% C.I.)
	In less than 24 hours	7.0% (3.3-10.7 95% C.I.)
	In more than one day	0.5% (0.0-1.5 95% C.I.)
Continued breastfeeding at 1 year		88.6% (77.5-99.7 95% C.I.)
Continued breastfeeding at 2 year		78.3% (56.2-100.0 95% C.I.)
Children ever breastfeed		99.0% (97.4-100.0 95% C.I.)
Exclusive breastfeeding		61.3% (57.4-65.2 95% C.I.)
Colostrum		93.9% (91.0-96.8 95% C.I.)
Average meal frequency		2.4
% that fed minimum	6-8	68.4%
Meal frequency	9-23.9	54.4%
Proportion of households using improved water sources		90.7%
Open defecation		70.3%
	<30 min	58.8% (47.4-70.2 95% C.I.)

[1] There is a complicated group dynamics. For example during the survey some people do not want to go to some areas. This is due to intra clan based conflicts. Therefore, program staff recruitment should consider this. Also, significant work should be done towards peaceful resolution of conflicts. We have observed what a complete breakdown of law and order is. During the survey, a single incidence suddenly transformed itself into a war between sub-sub clans.

Characteristic		Percent
Time to obtain drinking water(round trip)	>30min to <1hr	27.7% (19.2-36.2 95% C.I.)
	>1hr to < 2hr	10.9% (4.4-17.4 95% C.I.)
	>2hr to < 4hr	02.5% (0.0-5.2 95% C.I.)
Proportion of households consuming >/= 15 Liters per person per day		27.7%
Proportion that harvested in the recent past season		71.1%
Proportion of livestock owners		68.1%
GFD coverage		58.8% (47.4-70.2 95% C.I)

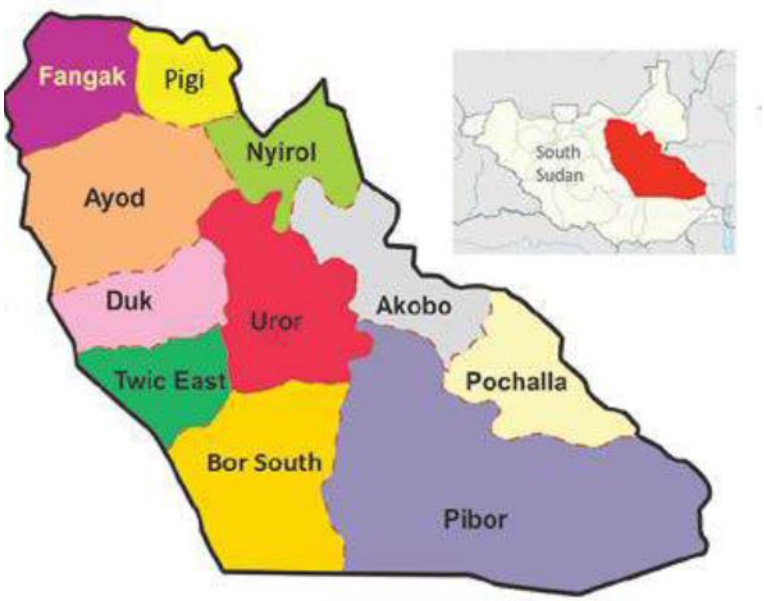
3 Introduction

Tearfund's post-harvest SMART survey was carried out in Weckol and Padiek Payams of Uror County. The survey was originally planned to be conducted in all of Uror County but due to difficult security related issues just at the beginning of the survey period, we were forced to conduct the survey in only Weckol

and Padiek Payams. Tearfund will conduct the survey in the remaining Payams when security get stabilized.

Uror County is situated in the central Upper Nile region. It is one of the eleven counties of Jonglei State. It is bordered by Ayod County to the north and north-west, Nyirol County to the north and north-east Duk and Twic East to the west, Akobo and Pibor counties to the east, and Bor South County to the south. The county's state Jonglei is a very large state characterized by inaccessibility, especially during the rainy season. Jonglei is almost entirely flood plain and a very difficult place to build all-weather roads. In the rainy season many *bomas* become inaccessible for more than half the year, with even 'all-weather' airstrips becoming un-landable during part of the season. This severely constrains transportation and communication.

Based on the 2008 Census conducted by the Southern Sudan Centre for Census, Statistics and Evaluations (SSCCSE), Uror County has a population of 178,519 of whom 99,276 are men and 79,243 women. With an estimated area of 12,142 square kilometres, this county has an estimated density of 15 people per square kilometre. For the entire county 27,541 households were counted, which results in an average household size for the County of 6.5 persons to a household, with urban households having on average 3.4 and rural households 4.6 people. Proportion of urban inhabitants for Jonglei State is 9.5%, which is less than the national average (17%). The proportion of under-five year old children in Uror is 15.5%, while that woman of reproductive health (15-45 years) is 21.8%. Uror County is the biggest County in Jonglei state with an estimated population of 205,655 (178,519 people in 2008 census with annual growth rate of 2.042% per annum) and it is mainly dominated by the Lou Nuer.



A livelihood in Uror is dominated by livestock rearing, particularly by cattle. But the pastoral livelihood system is currently facing major challenges, including incidents of raiding and insecurity, disease, and limited access to water and grazing sites. Cultivation is traditionally practiced by nearly all households in rural areas, but remains limited to two staple grain crops (sorghum and maize) and a handful of other crops (beans, okra, groundnuts, pumpkins). Almost all farming is done by hand; there is little mechanization or use of animals. In general, plot sizes are small and productivity is low, limited by labour, access to markets, and access to tools and inputs. Although land is plentiful, its quality is variable and it is often prone to flooding. Insecurity is also an issue of increasing concern. Fishing is a seasonal activity that can provide both dietary protein and supplemental income to poor households and can also be an

important coping strategy for people who have lost livestock. However, fishing resources are overburdened, and opportunities for selling fish are limited and subject to significant competition.[2]

Conflicts, annual flooding, poor education and limited understanding as to the causes of ill health and malnutrition confound to make the population of Uror County in particular extremely vulnerable for the problem of under nutrition.

Many of the villages in Uror are finding themselves currently hosting IDPs. Although this influx has placed great strain on already meager resources, no major conflict between IDPs and the host community has been reported.

The pre-harvest survey of May 2016 conducted by Tearfund South Sudan in the same County revealed a GAM rate of 24.8 % (21.1 - 29.0 95% C.I.) and a SAM rate of 6.8 % (5.0 - 9.2 95% C.I.). A post-harvest SMART survey conducted during the same year (December 2016) revealed a GAM rate of 20.3 % (16.0 - 25.4 95% C.I.), and a SAM rate of 4.8 % (3.0 - 7.4 95% C.I.). Although the December 2016 survey showed a slight reduction in malnutrition rates as likened to May 2016, it was insignificant as there was overlap in the confidence interval and it was during the post-harvest period when it was anticipated that there was food in the community. This depicted deteriorated nutrition situation.

There are 14 health facilities in Uror: eight primary care centres (PHCCs), five primary care units, which are smaller than PHCCs and usually staffed only by a community health worker; and one larger clinic which is designated as a PHCC but run by MSF. In many cases, there exists a building referred to as a clinic or health centre, but it often lacks qualified staff, medicines, electricity, beds, and other basics.

Tearfund has been implementing CMAM program in Uror County since 2004, currently the program supports nine static Out-patient therapeutic treatment centers. The key components of the activities carried in these centres include : Screening and referral of all malnourished under-five children at the community, admissions and treatment of those identified as malnourished using anthropometric measurements, weekly follow-up of the children enrolled into the OTP program and Bi weekly follow-up in TSFP for both children under 5 years and PLW, provision of routine medication to the children in the program, defaulter tracing, nutrition hygiene and health promotion activities across all the project areas in Uror County, individual and group counseling of caregivers/caretakers, pregnant and lactating mothers about infant and young child feeding practices as well provision of routine immunizations. There are two trained CHVs per village in the county and they have been trained to identify and refer malnourished children to the clinics using colored MUAC tapes.

[2] Daniel Maxwell et al. “Livelihoods, access to services and perceptions of governance: An analysis of Uror and Nyirol counties, South Sudan,” Report 3, Secure Livelihoods Research Consortium (April 2014), viii.

4 Survey Objectives

4.1 Overall objectives

The Overall objective of the SMART assessment is to estimate the current prevalence of acute malnutrition among children 6-59 months of age as well as underlying risk factors contributing to malnutrition such as morbidity, Infant and Young Children feeding (IYCF) practices and estimate retrospective mortality rates of under five years and all persons who live in Weckol and Padiek Payams of Uror County, Jonglei State, South Sudan.

4.2 Specific Objectives

- Estimate the prevalence of acute malnutrition (Global and severe) amongst children aged 6-59 months in Weckol and Padiek Payams of Uror County, Jonglei State, South Sudan.
- Estimate retrospective crude and under five mortality rates in the entire population of Weckol and Padiek Payams of Uror County, Jonglei State, South Sudan.
- Estimate the prevalence of morbidity among children 6-59 months in the last two weeks prior to the survey date in Weckol and Padiek Payams of Uror County, Jonglei State, South Sudan.
- To estimate the vaccination coverage of measles and BCG and Vitamin A supplementation for children 9-59 months and 6-59 months respectively.
- Assess the current food security status in the community (post-harvest) following the last harvest for the purpose of monitoring the nutritional status of children under five and determining whether continued and or scaled up response is necessary in the area.
- To determine infant and young child feeding practices in relation to malnutrition and morbidity in children between 0-23.9 Months, identifying gaps in IYCF practices for the purpose programing.
- To determine the morbidity and health seeking behaviour among children 6- 59 months
- To assess hygiene and sanitation factors that may contribute to malnutrition in children and mothers.
- To draw appropriate recommendations for the improvement of the food security, nutritional and health status of the population in the counties.

5 Methodology

Survey Design: The survey was cross-sectional with two-stage cluster sampling using the Standardized Monitoring and Assessment of Relief and Transition (SMART) methodology.

Sample sizes: The sample sizes were attained taking into account previous survey data and SMART and NIWG recommendations as per below table:

Table 1: Sample size calculation for mortality and nutrition components

Anthropometry		Mortality	
Parameters for Anthropometry	**Value**	**Parameters for Mortality**	**Value**
Estimated Prevalence of GAM (%)	17.8%[3]	Estimated Death Rate /10,000/day	0.45[4]
± Desired precision	±4[5]	± Desired precision /10,000/day	±0.3
Design Effect	1.5	Design Effect	1.38[6]
% Children under-5	18.9%[7]	Recall period	108 days
Non-response	3%	Average HH Size	7.2
Average HH Size	7.2[8]	Non response	3%
Household to be included	483	Household to be included	255
Children to be included	574	Population to be included	1779

Geographic target area and population group: The nutrition survey was carried in Weckol and Padiek Payams of Uror County, Jonglei State, South Sudan. The study population for nutrition component was children from the age of 6 to 59 months, while the entire population was the target population for mortality survey.

Survey period: Training and data collection was conducted from the 17th to 23th of January 2018.

Cluster selection: The data was collected from 33 clusters with 14 households per cluster. Due to security concerns two clusters were not covered. The list of selected clusters is shown on Annex 1.

[3]Based on November 2015 survey (GAM of at 17.8% (14.2-21.9))
[4] November 2015 SMART survey
[5] Based on recommendation of SMART protocol guideline for a GAM prevalence of 15-20% or more a desired precision of ±4% is used.
[6] Based on the DEFF of the May, 2016 survey CMR has a DEFF (DEFF=1.38). This was used as DEFF as it reflects the current situation that is existing on the ground
[7] Based on the 2015 survey finding
[8] Based on the 2015 survey finding

The first stage of sampling was selection of clusters. Each village was considered as a smallest geographical unit (a cluster) and the clusters to be randomly sampled were selected using probability proportional to size (PPS) and ENA for SMART software (July, 2015 update).

A team was assigned to collect data from one cluster per day. A total of 458 Households were visited in 33 clusters where data on Anthropometry, Mortality, food security and WASH was collected. Four households were absent. Data on IYCF was collected from 257 eligible children aged 0-23.9 months from all the sampled households. The survey data collection was carried out by 8 teams where each team collected data from one cluster per day for a total of 4 days. Each team was composed of four team members: one team leader, one measurer, one assistant measurer and one interviewer.

The table below shows timing estimation which was taken into consideration to effectively collect data from 490 HH in 35 clusters. The initial plan was to collect data from 490 household but the teams managed to collect Anthropometry, Food security, mortality and WASH data from 458 households. Anthropometry measurements were taken from 468 children 6-59 months. The information on the table below was used to estimate the number of households to include in the assessment.

Time (hence cluster) estimation for Uror was made based on previous experience considering the following variables:

Baseline information used in determining number of HH to be surveyed in a day:

Table 2: Baseline information used in determining number of HH to be surveyed in a day

Activity	Timing	Total minutes
Start & End time	7.00Am to 6.00Pm	11HrsX60Min= 660Minutes
Time taken to travel from Base to the cluster/Village and back	60 Minutes one way	60MinX2=120 Minutes
Time taken for introduction and meeting with the community leaders upon arrival in the village.	30 Minutes	30 Minutes
Time taken to make a list of households with the village leader and selecting the households to be surveyed	60 minutes	60 minutes
Time taken moving between households	5 minutes	(5X14HH)=70 Mins
One lunch break	30 minutes	30 minutes
Available time for administering all the questionnaires	660-310	350 minutes
Time taken to administer 1 set of questionnaire in 1 HH	25 minutes	
Number of HH that can be visited in a day	350/25=14	14 households
Total number of HH visited by 6 survey teams in 6 days (36 clusters)	14hhsX35 clusters	490

Selection of households: The second stage of sampling was the selection of the households within the clusters (villages) selected for the survey using simple random sampling approach. In the selected households, all children 6-59 months fitting the inclusion criteria were taken their anthropometric measurements and data on WASH, Food Security and Mortality was collected. Additionally, in the sampled household without children 6-59 months, data on Mortality, Food Security and WASH was collected. IYCF questionnaire was administered in all sampled households with children between 0-23.9 months.

5.1 Questionnaire, Training and Supervision

5.1.1 Questionnaire

The questionnaire used is provided in annex 2. There were five set of questionnaires namely: Antropometry, WASH, FSL, IYCF and Mortality questionnaires.

The anthropometric questionnaire used was SMART standard questionnaire. For each eligible child aged 6 to 59 months, the following data were collected:

- Age: whenever available, the child's age was copied from his/her birth certificate and cross-checked with a local events calendar (annex 3). The majority of children had no certificate and their birth date was unknown. In these instances, the local events calendar was used to approximate the child's age.
- Gender: the sex of each child was recorded as "M" for male/boys and "F" for female/girls.
- Weight: children were weighed to the nearest 100g with a 25kg Salter brand hanging scales. All scales were equilibrated daily by using a standard 5 kg weight, and were adjusted to "0" with an empty pair of weighing pants attached before each measurement, as per SMART methodology. Children were weighed with a minimum of clothes.
- Height/Length: each child was measured to the nearest 1mm with a standard wooden anthropometric height-board. Children below 87 cm were measured lying down and those equal to or above 87 cm were measured upright.
- Oedema: the presence of oedema was diagnosed by applying moderate thumb pressure for at least three seconds to the upper side of both feet.
- MUAC: MUAC was measured to the nearest 1mm, at the midpoint of the un-flexed left upper arm (between the tips of shoulder and elbow) using a standard coloured MUAC ribbon.
- Vitamin A supplementation: administration of vitamin A capsules within the last 6 months was considered, and verified with the caretaker by means of showing a capsule sample. Coding was: "0" for No, "1" for Yes.
- Measles vaccination: immunization against measles was checked, and a vaccination card requested in the case of a positive response. Coding was as follows: "0" when the child was not

vaccinated, “1” when vaccination was confirmed by a vaccination card, “2” when vaccination was only able to be confirmed verbally.

- Survey team assessed BCG vaccination by looking for a scar on the upper arm. The scar is normally on the right arm, but may be on the left, so teams checked both by observing the on child’s arm.

Additionally, the anthropometry questionnaire asked questions on status of deworming, use of LLITNs the night before the survey, illness in the past two weeks, and health seeking behaviour.

IYCF, WASH and Food Security and Livelihoods (FSL) questionnaires used were those developed by the NIWG.

The mortality questionnaire used was the SMART standard form (individual questionnaire). The questionnaire has three major sections: Current household members, Household members that have left since the start of the recall period, and household members that have died since the start of the recall period. For each section, team listed information about the respondent, followed by spouse(s), parents, siblings, children and then other current household members.

5.1.2 Training and Supervision

A total of 32 people were trained. They attended 2 days of theoretical training on assessment methodology, measurement, questionnaires and other assessment tools (event calendar). Theory was completed by various practical exercises using SMART standard assessment training tools. In addition, 2 standardization tests took place in order to evaluate and guarantee the enumerators’ accuracy and precision in taking measurements (see results in annex 3). The field team manager used post-training and standardization test results to determine optimal team composition.

The training was completed with a one-day field test on non-selected village to recreate real work conditions and enable each team to become familiar with all work aspects (introduction/ survey explanation, finding of selected children, questionnaire completion, anthropometric measurement, team organization). Children included in the field test were not part of the survey sample.

During data collection, the teams were supervised on a daily basis by the field team manager. A meeting was held each morning between the teams and the field team manager, to discuss the results of the previous day’s anthropometric measurement check results. Feed-back on age distribution, digit preference and measurements’ errors was given and re-measurements were planned as required.

5.2 Data Analysis

Data entry was made simultaneously with data collection. Data collected were entered by one data entry officer and checked by survey manager using the latest version of ENA software (9th July 2015), for daily data quality analysis and SMART/ WHO Flags identification. The team went back to re-measure children with abnormal data (weight, height, MUAC in addition to a second age estimation). Possible data entry errors were also checked.

Analysis then was performed using ENA, and EPINFO (version 3.5.4).

Weight-for-height z-score was not calculated in the field, to avoid possible introduction of bias in measurement. When a child was identified as acutely malnourished during the data entry stage, the respective surveyors were questioned to ensure that the child had been referred to the nearest treatment services.

Overall data quality was only available after completion of all samples (plausibility check reports available in annex 4).

6 Results

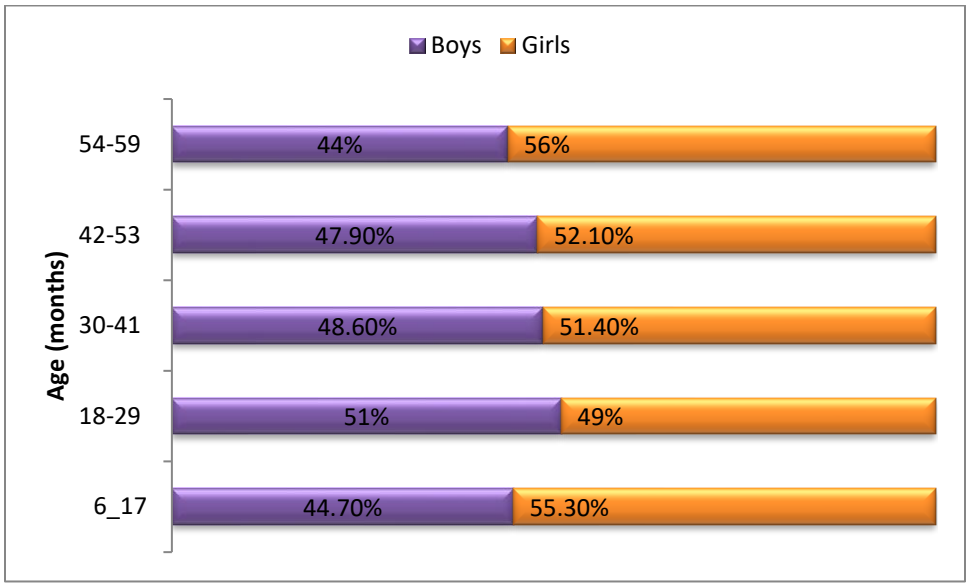
6.1 Demographic Characteristics of the Sample Population

A distribution of the sample according to sex allows verifying that both sexes are equally distributed, and that no selection bias has occurred. The total ratio should be between 0.8 and 1.1 if there was no sex bias in the selection. An age–sex breakdown of the survey sample for the anthropometry survey population (children aged 6–59 months) shows a sex ratio within the range of 0.8-1.1 (ratio of boys/girls 0.91). Statistical test using chi-square statistics shows that boys and girls are equally represented (p-value = 0.309). This shows that there was no selection bias.

Age ratio of 6-29 months to 30-59 months was as expected. Age ratio of 6-29 months to 30-59 months was 1.02 indicating both groups are equally represented (p-value = 0.052).

A population pyramid allows seeing the age/sex distribution graphically, Figure 1.

Figure 1: Age and sex pyramid of the anthropometry sample population (6-59months)



A normal distribution by age group (for a population aged 6–59 months in the developing world) is compared with our sample population (Table 3). The distribution of our sample age groups is almost similar to the expected except the 54-59 month age band which was under represented.

Table 3: Anthropometry sample age distribution compared with expected distribution in developing world

Age group (months)	Sample population	Typical demographic distribution for children aged 6–59 months in the developing world[9]
6_17	28.20%	23.90%
18-29	22.20%	25.50%
30-41	23.70%	22.40%
42-53	20.50%	19.20%
54-59	5.30%	9%

[9] WHO, 2000 (Extracted from Emergency nutrition Assessment Manual of Save the Children)

6.2 Anthropometric results (based on WHO standards 2006):

Anthropometry data was analysed based on WHO standards 2006. Data was collected from 468 children aged 6-59 months in 458 households.

6.2.1 Prevalence of acute malnutrition

6.2.1.1 Weight-for-Height z-scores and/or oedema

Acute malnutrition is classified at individual level as normal, moderate acute and severe acute malnutrition. At population level, the prevalence of malnutrition is expressed as severe acute malnutrition and global acute malnutrition. Global acute malnutrition expresses the sum of severe acute malnutrition and moderate acute malnutrition. This could be summarized:

- Global acute malnutrition prevalence: Proportion of children with WFH <–2 z-scores and/or oedema
- Moderate acute malnutrition prevalence: Proportion of children with WFH <–2 z-scores and WFH > = –3 z-scores
- Severe acute malnutrition prevalence: Proportion of children with WFH <–3 z-scores and/or oedema

Table 4 shows WHO's classification of public health significance or target for Weight-For-Height.

Table 4: Classification of the situation for weight-for-height (WHO)

Cut-off point	Classification of the situation
GAM >15%	Critical (Very High)
GAM > 10%-14%	Serious (High)
GAM >5%-9%	Poor (medium)
GAM <5	Normal (low)

The prevalence of Global Acute Malnutrition (GAM) was 16.0 % (13.1 - 19.5 95% C.I.) and the prevalence of Severe Acute malnutrition (SAM) was 1.9 % (1.0 - 3.8 95% C.I.). No link was established between gender and global acute malnutrition.

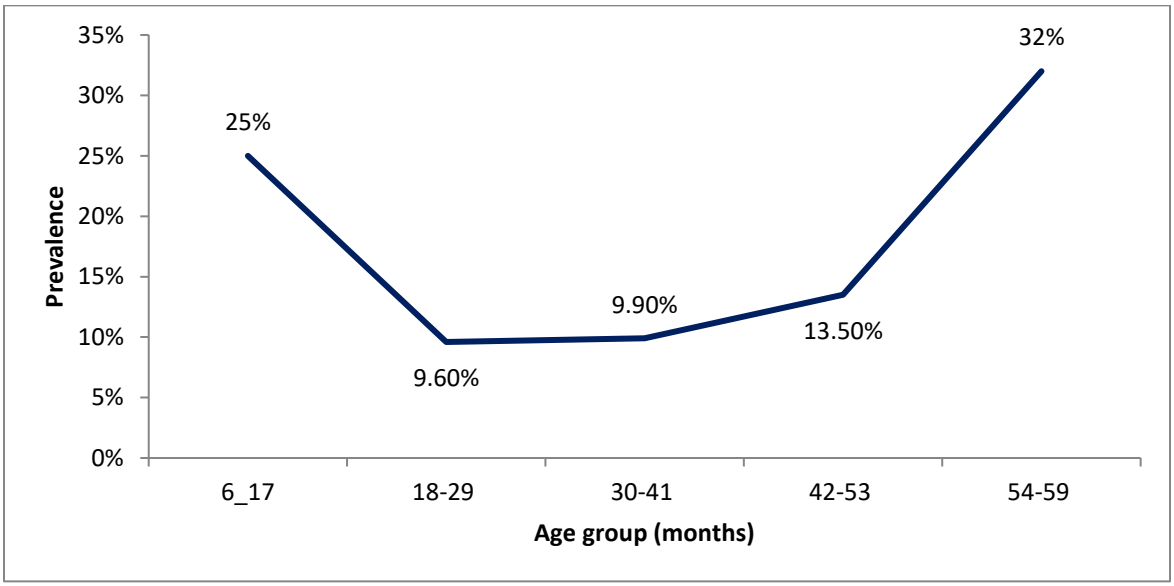
Table 5: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 468	**Boys** n = 223	**Girls** n = 245
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(75) 16.0 % (13.1 - 19.5 95% C.I.)	(35) 15.7 % (11.1 - 21.7 95% C.I.)	(40) 16.3 % (12.0 - 21.9 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(66) 14.1 % (11.6 - 17.1 95% C.I.)	(30) 13.5 % (9.2 - 19.2 95% C.I.)	(36) 14.7 % (10.8 - 19.7 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(9) 1.9 % (1.0 - 3.8 95% C.I.)	(5) 2.2 % (0.9 - 5.4 95% C.I.)	(4) 1.6 % (0.6 - 4.2 95% C.I.)

The prevalence of oedema is 0.0 %

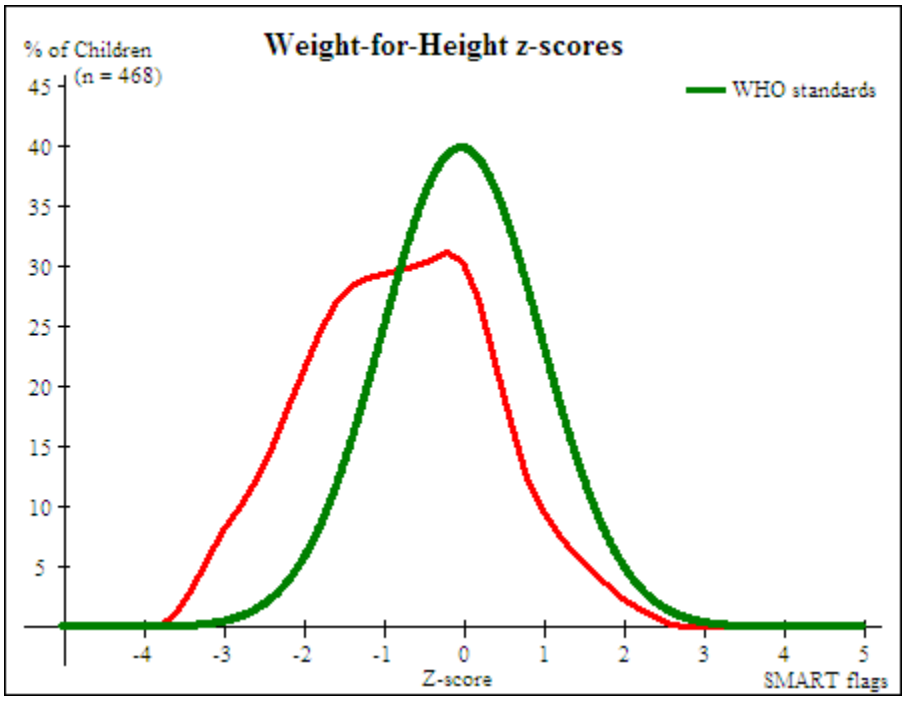
Age-specific prevalence of acute malnutrition: Figure 2 presents prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema. Prevalence of acute malnutrition is highest in 54-59 months (32%) followed by the youngest age group (25%).

Figure 2: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema



The distribution of WFH z-scores of the survey was plotted on a graph (red) and compared with the WHO standard population (green). Distribution curves of z-scores give a complete picture of the nutrition status of the whole population, which can be compared with that of the WHO standard population. Figure 3 shows that the sample population's WHZ distribution (red) is shifted to the left of the WHO standard population showing the population in our sample are malnourished compared with the standard population.

Figure 3: Plot of the standard and sample population weight-for-height z-scores frequency distribution



6.2.1.2 Prevalence of acute malnutrition using MUAC cut-offs

MUAC is closely correlated with mortality and is a better indicator of mortality for severely malnourished children, than WFH. In addition, MUAC is not affected by oedema or heavy parasite loads. The main cut-off criterion for admission children in to selective feeding programs in survey areas is MUAC. The diagnostic criteria for SAM in children aged 6–59 months is MUAC <115 mm and for MAM is MUAC ≧115 mm and < 125 mm.

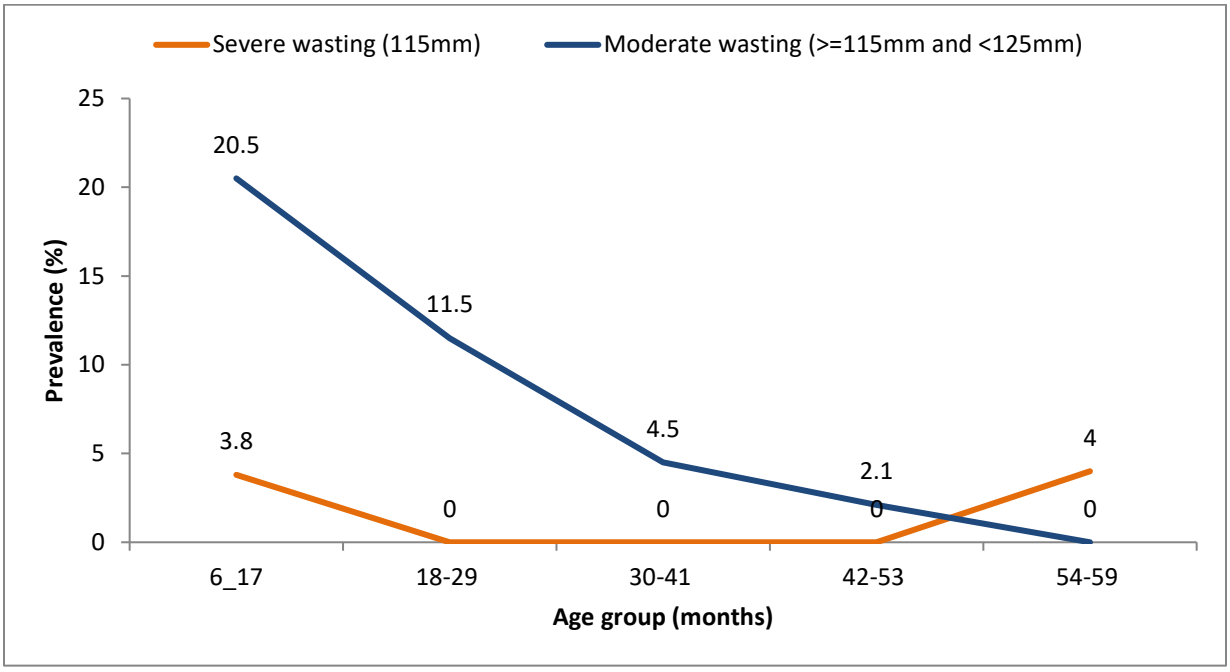
Table 6 shows prevalence of proxy global acute malnutrition using MUAC cut-offs was 11.1% with severe wasting of 1.3%.

Table 6: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 468	**Boys** n = 223	**Girls** n = 245
Prevalence of global malnutrition (< 125 mm and/or oedema)	(52) 11.1 % (8.1 - 15.0 95% C.I.)	(15) 6.7 % (3.7 - 12.0 95% C.I.)	(37) 15.1 % (10.9 - 20.6 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(46) 9.8 % (7.2 - 13.4 95% C.I.)	(14) 6.3 % (3.6 - 10.6 95% C.I.)	(32) 13.1 % (9.2 - 18.3 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(6) 1.3 % (0.6 - 2.6 95% C.I.)	(1) 0.4 % (0.1 - 3.2 95% C.I.)	(5) 2.0 % (0.9 - 4.6 95% C.I.)

Age-specific prevalence of acute malnutrition using MUAC shows the youngest age group is disproportionately affected. It is known that MUAC is biased towards the youngest age group.

Figure 4: Prevalence of acute malnutrition by age, based on MUAC cut off and/or oedema



6.2.2 Prevalence of underweight

Weight-for-age is a composite index of height-for-age and weight-for-height. It takes into account both chronic and acute malnutrition. A child can be underweight for his/her age because he or she is stunted, wasted, or both. Weight-for-age is an overall indicator of a population's nutritional health. At individual level, children with weight-for-age below minus two standard deviations (−2 SD) are classified as underweight. Children with weight-for-age below minus three standard deviations (−3 SD) are considered severely underweight.

At population level, a global WFA ≧ 30% in a population is considered critical (very high), between 20%-29% high, between 10%-19% medium and less than 10% low (normal).

Table 7 shows that 12.4% of under-age five children are underweight (have low weight-for-age).

Table 7: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 461	**Boys** n = 218	**Girls** n = 243
Prevalence of underweight (<-2 z-score)	(57) 12.4 % (9.0 - 16.7 95% C.I.)	(32) 14.7 % (8.9 - 23.2 95% C.I.)	(25) 10.3 % (6.6 - 15.6 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(45) 9.8 % (7.1 - 13.2 95% C.I.)	(24) 11.0 % (7.5 - 15.9 95% C.I.)	(21) 8.6 % (5.1 - 14.3 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(12) 2.6 % (1.1 - 6.3 95% C.I.)	(8) 3.7 % (1.0 - 12.3 95% C.I.)	(4) 1.6 % (0.6 - 4.5 95% C.I.)

6.2.3 Prevalence of chronic malnutrition

Children whose height-for-age Z-score is below minus two standard deviations (−2 SD) from the median of the WHO reference population are considered short for their age (stunted), or chronically malnourished. Children who are below minus three standard deviations (−3 SD) are considered severely stunted. Stunting reflects failure to receive adequate nutrition over a long period of time and is affected by recurrent and chronic illness. Height-for-age, therefore, represents the long-term effects of malnutrition in a population and is not sensitive to recent, short-term changes in dietary intake.

WHO classifications for stunting at a population level are: ≧ 40% critical (very high), 30%-39% high, 20%-29% medium and < 20% low.

Table 8 shows the overall and gender prevalence of stunting. The survey result showed that 6.3% of the 6-59 months are stunted.

Table 8: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 417	**Boys** n = 191	**Girls** n = 226
Prevalence of stunting (<-2 z-score)	(52) 12.5 % (9.4 - 16.3 95% C.I.)	(27) 14.1 % (10.1 - 19.5 95% C.I.)	(25) 11.1 % (7.5 - 16.0 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(44) 10.6 % (8.1 - 13.7 95% C.I.)	(21) 11.0 % (7.9 - 15.1 95% C.I.)	(23) 10.2 % (7.0 - 14.7 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(8) 1.9 % (0.8 - 4.4 95% C.I.)	(6) 3.1 % (1.2 - 7.8 95% C.I.)	(2) 0.9 % (0.2 - 3.7 95% C.I.)

However, the standard deviation of stunting is above 1.2. If the SD is high then the overall result will be to inflate the prevalence of stunting. It is recommended that if the SD is above 1.2 then the estimate of the prevalence of stunting presented in the tables and final results should be the **calculated** result. The plausibility test shows that the calculated stunting with a standard deviation of 1 is 5%.

6.2.4 Nutritional Status of Women

Women of reproductive age are especially vulnerable to chronic energy deficiency and malnutrition due to low dietary intake, inequitable distribution of food within the household, improper food storage and preparation, dietary taboos, infectious diseases, and inadequate care practices. Chronic undernutrition among women is a major risk factor for adverse birth outcomes.

The survey collected anthropometric data on MUAC for pregnant and lactating women. The survey has identified 180 women which are either pregnant or lactating (50% pregnant and 50% lactating). Seven per cent of the pregnant and lactating women have a MUAC level below 210mm, 37.5% were with a MUAC level of ≥210-≤230MM and 55.4% have a MUAC greater than 23.

Table 9: PLW nutritional status (n=180)

MUAC< 210MM	MUAC ≥210-≤230MM	MUAC >230MM
(13) 7.1 % (3.1 - 11.2 95% C.I.)	(68) 37.5 % (27.9 - 47.1 95% C.I.)	(99) 55.4 % (44.7 - 66.0 95% C.I.)

6.3 Mortality results (retrospective over 3 months/90 days prior to interview)

Crude and under-5 mortality rates are key indicators to evaluate the magnitude of a crisis, and **a doubling of non-crisis (baseline)** mortality is taken to define an emergency situation. Mortality is normally reported in two ways: crude mortality rate (CMR) and under-five mortality rate (U5MR). These rates are defined as:

- CMR: the rate of death in the entire population, including both sexes and all ages (total deaths/10,000 people/day
- U5MR: the rate of death among children below five years of age in the population 9deaths in children under five/10,000 children under five/day)

The survey collected mortality data from 462 households and 3,623 persons. General demographic characteristics of the population are presented on Table 10.

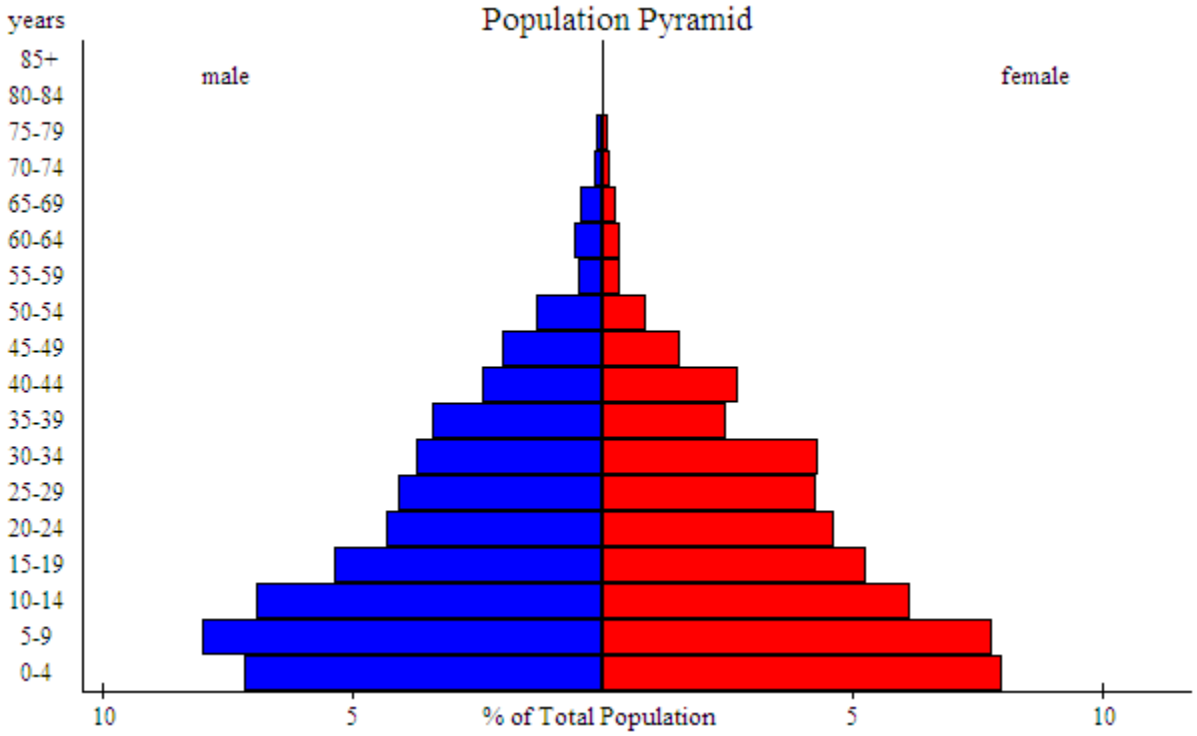
The average household size in the surveyed population is 7.8 persons per household while the 0-59 month old population accounted for 16.5% of the entire population. The birth rate was 1 birth per 10,000 population per day while in-migration rate and out-migration rates were 11.65 and 19.5 persons from 10,000 persons in one day.

Table 10: Demographic characteristics of the survey population

Characteristics	Results:
Total number of HHs	462
Total number of HHs with children under five	342
Average household size	7.8
Mid Interval Population Size	3623
Number of Clusters	33
Percentage of children under five	16.5
Birth Rate	1
In-migration Rate (Joined)	11.65
Out-migration Rate (Left)	19.5

A total of 3,623 individuals stayed overnight in the 462 interviewed households. About 51% of them (1,830) were female, and 49% (1,793) were male. Children under age 15 (44%) and individuals age 15-64 (56%) each represent a significant percentage of the population, while 1.4% of population are age 65 or older. The populations pyramid below shows the population distribution by 5-year age groups, separately for males and females. The broad base of the pyramid indicates that the survey population is young, which is typical of countries with low life expectancies and high fertility rates.

Statistical evaluation of sex and age ratios (using Chi squared statistic) showed that overall sex ratio of children under five as expected indicating boys and girls are equally represented (p-value = 1.000). Similarly, overall age distribution of under-fives (test by two age categories: 0-<2, 2-<5) was also as expected indicating the younger and older child population is adequately represented (p-value = 0.065). Hence, the survey is representative of all age and sex groups.



Mortality rates were calculated retrospectively over a 108 day recall period. In terms of absolute number of deaths over a 108-day recall period there were a total of 42 deaths. The retrospective crude and U5 mortality rates for the 108 days preceding the survey were 1.07 (0.66-1.73) and 0.34 (0.09-1.32), respectively.

Table 11: Mortality rates

	Number of deaths	Deaths/10,000/day	Design effect
CMR (total deaths/10,000 people / day):	40	1.07 (0.66-1.73)	2.35
U5MR (deaths in children under five/10,000 children under five / day):	2	0.34 (0.09-1.32)	1

Table 12 shows gender specific and age specific mortality rates. The mortality rate based on gender shows men die more than women but the difference is not statistically significant. Male deaths are localized while female deaths are uniformly distributed across the county.

Age specific mortality rate indicated that 0-4, 5-11, and 12-17 age groups have a mortality rate below 0.5 Deaths/10,000/day while 18-49, 50-64 and 65-120 age groups have a death rate above 1.

Table 12: Age and sex specific mortality rates

Sex	Death Rate (Deaths/10,000/day	Design Effect
Male	1.42 (0.91-2.21)	1.35
Female	0.72 (0.33-1.60)	2.15
Years		
0-4	0.34 (0.09-1.32)	1
5_11	0.25 (0.06-1.02)	1
12_17	0.37 (0.08-1.56)	1.02
18-49	1.31 (0.81-2.10)	1.28
50-64	6.36 (2.93-13.23)	1.48
65-120	5.61 (1.71-16.78)	1

Verbal autopsy indicated that, most deaths were caused by violence/physical injuries (33.3%), reflecting the outcome of the conflict in the country as well as domestic and marriage conflicts in the assessed

villages. Deaths among adults and children under-five years were also reportedly due to fever, diarrhea, birth or pregnancy related complications and old age in addition to violence/physical injuries.

Table 13 Cause and location of death

Cause of death	%
Fever	5.50%
Diarrhea	5.50%
Birth or pregnancy related complications	13%
Injury/violence	33.30%
Old age	21%
Other causes (unknown sickness)	21%
Location of death	
1] In current location	62
2] Hospital	19
3] In place of last residence	19

6.4 Retrospective morbidity and health

Interpretation of results of the anthropometry survey, need indicators on immediate causes of malnutrition. To this effect, in the anthropometric questionnaire mothers were asked whether any of their children under age five had illness at any time during the two-week period preceding the survey. The validity of these indicators is affected by the mother's perception of diarrhea/fever/cough/measles as an illness and her capacity to recall the events. Thus, these variables should be interpreted with caution.

Table 14 shows that 63.8% of children under age five had illness at any time during the two weeks-period preceding the survey.

Table 14: Prevalence of reported illness in 6-59 months old children in the two weeks prior to interview (n=468)

	6-59 months

Prevalence of reported illness	63.8% (51.8-75.8 95% C.I.)

Those mothers who reported illness in the past 14 days were further asked to describe the symptoms at any time during the past 14 days. Fever was most common (54.5%), followed by diarrhoea (23.2%) and cough (19%).

Table 15: Symptom breakdown in the children in the two weeks prior to the survey (n=295)

	number	6-59 months
Fever	162	54.5% (46.7-62.3 95% C.I.)
Cough	56	19.0% (10.5-27.4 95% C.I.)
Diarrhoea	68	23.2% (16.3-30.1 95% C.I.)
Other	9	1.6% (0.0-6.2 95% C.I.)

For children who had illness in the two weeks preceding the survey, mothers were asked what they did to treat the illness. Table 16 shows the percentage of children with illness who received specific treatments. Overall, 30% did not seek any treatment and 70% seek treatment from various sources.

Table 16: Among children (6-59 months) who had illness in the two weeks preceding the survey, the percentage of whom advice or treatment was sought from a health facility

Treatment sought	Results
None	30%
Hospital	13.8%
PHCC	42.3%
Private	8%
Traditional	1.5%
Pharmacy	4.2%

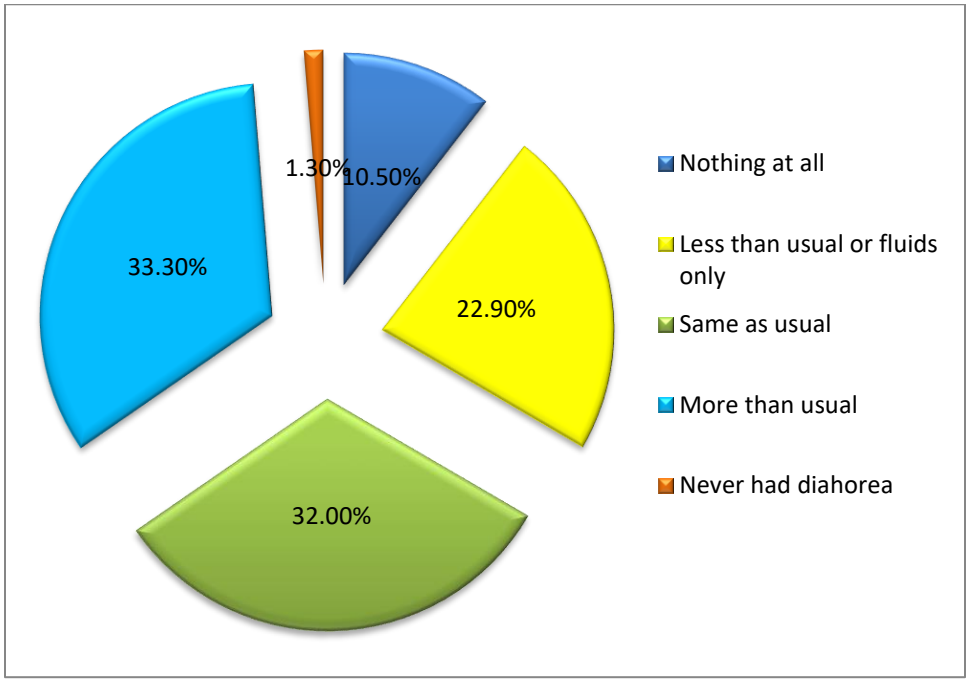
The survey has also found that only 21.5% of the surveyed 468 children did sleep under a mosquito net (LLITN) the previous night.

6.5 Feeding practices during diarrhoea

To reduce dehydration and minimize the effects of diarrhoea on nutritional status, mothers are encouraged to continue normal feeding of children with diarrhoea and to increase the amount of fluids. For question of feeding practices during diarrhoea, mothers reported that 22.9% give less than usual or

fluids only, 32% give the usual amount of liquids and food, 10.5% reported that they do not do nothing and 33.3% of mothers reports that children received somewhat more amount of liquids and foods than usual during diarrhoea episode.

Figure 5: Feeding practices during diarrhoea (n=257)



6.6 Deworming, immunization coverage and vitamin A supplementation

It is essential to measure measles vaccination coverage in humanitarian emergencies, as measles epidemics may lead to high numbers of deaths among children. WHO recommends that 90% of children aged from 9 to 59 months be vaccinated against measles, to ensure effective epidemic prevention.

Information on deworming, BCG and measles vaccinations and vitamin A supplementation coverage were collected during an anthropometric survey because of their relationship with mortality and malnutrition.

The survey collected information on vaccination and supplementation coverage in three ways: from vaccination cards shown to the interviewer, from mothers' verbal reports, and by checking BCG scars. For each of these children, mothers were asked to provide their health card. When interviewers could see these health cards, the data of vaccinations were copied from the card directly onto the questionnaire. The reference period for these indicators was the past six months. If the interviewer did not see the card/card not available or if a vaccine had not been recorded on the card as being administered, the mother was asked to recall the specific vaccines given to her child. The vaccination coverage is based on

both the information copied from the health cards and the information obtained from the mothers'reports.

Table 17 shows deworming, BCG vaccination coverage and vitamin A supplementation in children aged 6-59 months, and measles immunization for 6-59 month, in the six months prior to the survey period. The result shows that vaccination and supplementation as well as deworming coverage are extremely low.

Table 17: Deworming, BCG and measles vaccination and Vitamin A supplementation coverage

	%	95% CI
BCG by scar (6-59 months) (n=468)	**18.4**	10.7 – 26.1
Measles by card (9-59 months) (n=420)	**7.6**	3.0 – 12.1
Measles by card **and** recall (9-59 months) (n=420)	**9.4**	0.1 – 17.9
Vitamin A in last 6 months (6-59 months) (n=468)	**9.0**	0 – 18.0
Deworming (12-59) (n=386)	**2.4**	0.3 – 4.4

6.7 Infant and Young Child Feeding practices (IYCF)

Suboptimal infant and young child feeding practices increase vulnerability to under-nutrition, disease and death. The risks are heightened in disasters and the youngest are most vulnerable. Optimal feeding practices that maximize survival and reduce morbidity in children under-24 months are early initiation of exclusive breastfeeding, exclusive breastfeeding for 6 months, continued breastfeeding to 24 months or beyond, and introduction of adequate, appropriate and safe complementary foods at 6 months.

The IYCF indicators were collected from mothers or primary caretakers. Infant and young child feeding practices reported in this survey are

- Proportion of children born in the last 24 months who were put to the breast within one hour of birth
- Proportion of infants 0-5 months of age who are fed exclusively with breast-milk
- Proportion of children 12-15 months of age who are fed breast milk
- Proportion of children 6-23 months of age who receive foods from 4 or more food groups
- Proportion of children 6-23 months of age who receive a minimum acceptable diet (apart from breast milk)
- Meal frequency of children 6-23 months of age
- Proportion of children born in the last 24 months who were ever breastfed

The survey had used standard guideline of WHO to analyze infant and young feeding practices.[10]

[10]Indicators for assessing infant and young child feeding practices, Part 2 Measurement, WHO, USAID, FANTA II, IFPRI, Unicef

Table 18 shows that 99% of children born in the 2 years before the survey were breastfed at some point. Almost 80.9% were breastfed immediately after birth, 11.6% in less than an hour, 7% in less than two hours and 0.5% in more than one day. Overall, 61.3% of children under age 6 months are exclusively breastfed. Contrary to the recommendation that children under the age of 6 months be exclusively breastfed, many infants are also fed with other liquids such as powder/animal milk (27.8%), cereals (9.9%), and vegetables (0.9%) before reaching age 6 months (0-5 months).

Continued breastfeeding is relatively long at 88.6% at age 1, while 78.3% continue breastfeeding until their second birthdays.

The first breast milk contains colostrum, which is highly nutritious and has antibodies that protect the newborn from diseases. The overwhelmingly majority (94%) mothers reported feeding colostrum to their new born.

Dietary diversity is a proxy for adequate micronutrient density of foods. Minimum dietary diversity assesses food intake among children age 6-23 months from at least four food groups. The cut-off of four food groups is associated with better-quality diets for both breastfed and non-breastfed children. The survey finding revealed that only 11% had received the minimum dietary diversity food.

Minimum meal frequency, a proxy for a child's energy requirements, examines the number of times children received foods other than breastmilk. The minimum number is specific to the age and breastfeeding status of the child. Breastfed children are considered to be consuming minimum meal frequency if they receive solid, semi-solid, or soft foods at least twice a day for infants age 6-8 months and at least three times a day for children age 9-23 months. Non-breastfed children age 6-23 months are considered to be fed with a minimum meal frequency if they receive solid, semi-solid, or soft foods at least four times a day.

According to the survey results, the feeding practices of 68.4% of 6-8 months and 54.4% of 9-23 months meet the minimum standards with respect to number of times they were fed during the day or night before the survey (at least 2 times for 6-8 months and 3 times for 9-23 months).

The mean meal frequency was 2.4.

Table 18: Results of IYCF assessment

Indicator	Age group	n	Value
Early initiation of breastfeeding	Immediately	257	80.9% (72.3-89.5 95% C.I.)
	In less than an hour		11.6% (5.0-18.1 95% C.I.)
	In less than 24 hours		7.0% (3.3-10.7 95% C.I.)
	In more than one day		0.5% (0.0-1.5 95% C.I.)
	at 1 year	39[11]	88.6% (77.5-99.7 95% C.I.)

[11] children 12–15 months of age who received breast milk during the previous day over Children 12–15 months of age

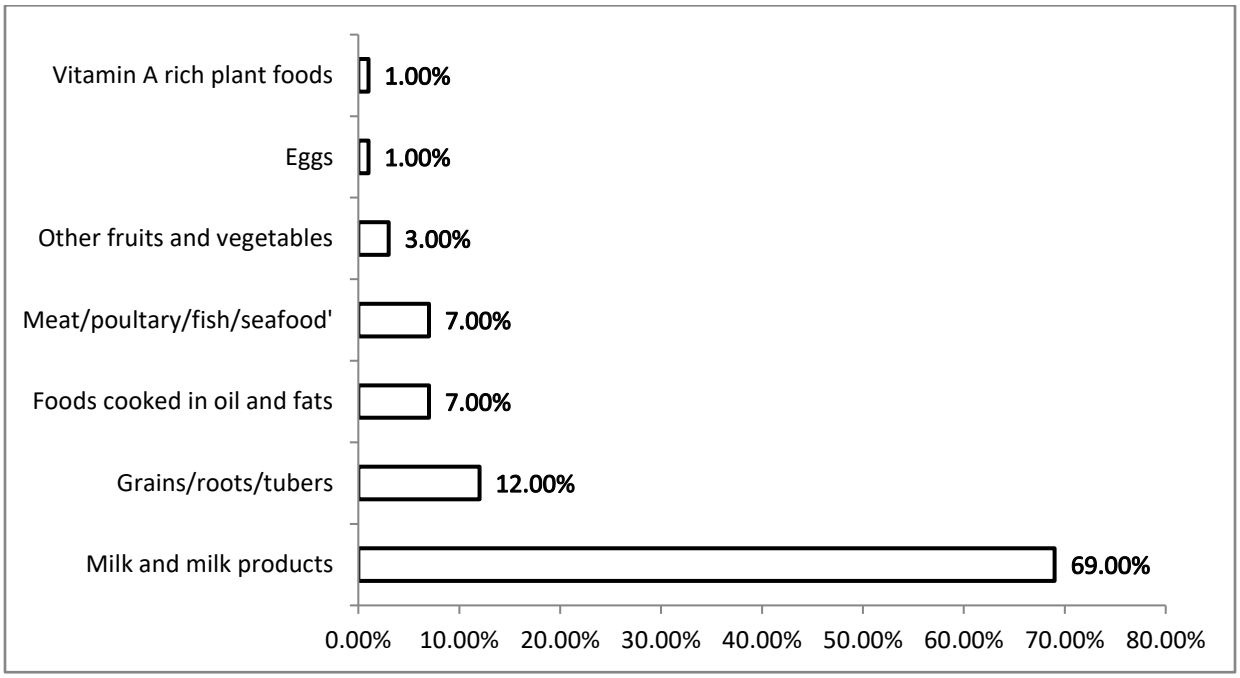
Indicator	Age group	n	Value	
Continued breastfeeding	at 2 years	30[12]	78.3% (56.2-100.0 95% C.I.)	
Children ever breastfed	0-23.9 months	257	99.0% (97.4-100.0 95% C.I.)	
Exclusive breastfeeding	0-5.9	57	61.3% (57.4-65.2 95% C.I.)	
Colostrum	0-23.9	257	93.9% (91.0-96.8 95% C.I.)	
Meal frequency	6-23.9	177	1 times	15.5%
			2 times	33.1%
			3 times	33.1% (mean 2.4)
			4 times	14.3%
			6 or more times	3.8%
Minimum meal frequency (MMF).	6-8	48	68.4%	
	9-23.9	129	54.4%	
Minimum dietary diversity (MDD)	6-23.9	177	11%	

Women who had at least one child living with them who was aged 6-23.9 were asked questions about the types of liquids and foods the child had consumed during the day or night before the interview.

Figure 5 indicates the types of foods and liquids children 6-23 months consumed during the day and night before the interview. Overall, the food items most commonly given to children were milk and milk products, followed by food made from grains/roots/tubers, foods cooked in oil and fats, meat/poultry/fish, and other fruits and vegetables.

[12] Children 20–23 months of age who received breast milk during the previous day over Children 20–23 months of age

Figure 6: Frequency of types of foods and liquids children under 2 years of age consumed during the day and night before the interview



6.8 WASH

Information on the water, sanitation and hygiene characteristics of the survey population provides a context to interpret nutrition and health. This section presents information on sources of drinking water, distance to source of drinking water, sanitation, hand washing, and type of toilet facility.

Table 19 presents information on the percentage of households by drinking water source, water treatment, distance to water point, water consumption, hand washing, means of hand washing and type of latrine facilities used.

Drinking water sources and treatment: 90.7% of surveyed households have access to an improved source of drinking water. Improved sources of drinking water include piped water, public taps, standpipes, tube wells, boreholes, protected dug wells and springs, and rainwater. The two most common sources of drinking water in surveyed households are borehole (88.2%) and river/stream (8.2%).

Clean water is a basic need for human life; however, most household residents (64.7%) report that they do not treat their water prior to drinking. Overall, 35.3% of households are using an appropriate treatment method. Appropriate treatment methods include boiling, straining through a cloth, filtering, and letting it stand and settle.

Distance to water point: Fetching drinking water is an additional chore that could be of great cost to household members, depending on the time spent to obtain it. More than 40% of households (41.2%) travel 30 minutes or longer round trip to fetch drinking water.

Type of latrines: The survey finding revealed a poor level of improved latrine use as only 16.3% of the households use improved latrines with 70% practicing open defecation.

Water Consumption: According to Sphere standards, on average a household of 6 members needs at least 90 liters of water to meet the minimum water requirement of 15 liters per person per day. Only 27.7% of the sampled households were using 15 liters/person per day.

Hand washing: To obtain hand washing information, interviewers asked when household members wash their hands. Nearly 14% reported to wash hands after defecating, 38.2% before cooking, 29.4% before eating, 12.2% before feeding the baby, and 2.9% after cleaning the baby. Only 9% of households reported to practice hand washing during at least 3 critical times and only 3.5% at all critical times. Soap and water, the essential hand washing agents, were used in 18.6% of households.

Table 19 presents information on the percentage of household by WASH indicators.

Table 19: Survey findings of the water, sanitation and hygiene characteristics of the survey population (n=458)

Characteristics	%
Source of drinking water	
Borehole/hand pump	88.2% (79.0-97.5 95% C.I.)
Protected Shallow well	2.5% (0.2-4.9 95% C.I.)
Open shallow well	0.8% (0.0-2.0 95% C.I.)
River/stream	8.2% (0.0-17.4 95% C.I.)
Time to obtain drinking water(round trip)	
<30 min	58.8% (47.4-70.2 95% C.I.)
>30min to <1hr	27.7% (19.2-36.2 95% C.I.)
>1hr to < 2hr	10.9% (4.4-17.4 95% C.I.)
>2hr to < 4hr	02.5% (0.0-5.2 95% C.I.)
Water treatment prior to drinking	
Nothing	64.7%
Boiling	6.3%
Filtering with a cloth	8.4%
Letting it settle	20.6%
Water consumption	
Proportion of households consuming >/= 15 Liters per person per day	27.7%
Percent distribution of households by type of toilet/latrine facility	
Undesignated open area	70.3%
Designated open area	15.3%
Hole	0.8%
Latrine	13.6%
Proportion of caregivers who wash their hands before certain crucial events	
After defecating	13.9%
Before cooking	38.2%
Before eating	29.4%
Before feeding the baby	12.2%
After cleaning the baby	2.9%
Three out of 5 critical times	9%
At all 5 critical times	3.5%
What do you use to wash hands	
Water only	33.8%
Water + Soap	18.6%
Water + Ash	32.9%

6.9 Food security and livelihood

Residence status: Based on results of the survey 20% of the households are either IDP or returnees in the past one year. Further, 59% of the surveyed households have a returnee as a household member.

Household headship status: 55.7% of the households were female headed while 44.7% of them were headed by men.

6.9.1 Households' Source of Income and Food

For the 30 days preceding the survey period (Dec 17, 2017-Jan 17, 2018) the most dominant source of income was sale of crops, 40%, followed by sale of natural resources, 20%, sale of livestock, 13%, and sale of animal products, 12%. On the other hand household's main source food for the week preceding the survey period were own production (68.2%), followed by work for food (11%), gifts (7%) and purchases from market (6%).

Table 20: Income source of food and livelihood

Food Security Results (N=458)	n	%
Household's main source of income (past 30 days):		
Sale of crops/farm produce	183	40
Sale of livestock	60	13
Sale of livestock/animal products	55	12
Brewing	12	3
Sale of natural resources (such as firewood, grass)	92	20
Casual labour	28	6
Other (Sale of fish, salaried work, family support)	28	6
Household's main source of food (Past 7 days):		
Own production	312	68.2
Work for food	50	11.0
Gifts	32	7.0
Purchases	28	6.2
Borrowing	8	1.8
Food aid	12	2.6
Gathering (wild foods)	15	3.2
Households that own livestock	311	68.1
Households that cultivated in the previous season	325	71.1

Majority of the assessed households owned some livestock (68.1%) and/ or cultivated their land in the previous season (71.1%).

6.9.2 General Food Distribution Coverage

The General Food Distribution (GFD) in the surveyed location was 58.8% (47.4-70.2 95% C.I).

7 Discussion

7.1 Nutrition

According to the WHO categorization of the public health significance of undernutrition, the prevalence of GAM in Weckol and Padiek Payams of Uror County at 16.0 % (13.1 - 19.5 95% C.I.), indicates a **critical** level. Nonetheless, the calculated prevalence of stunting is very **low** at 5%. Regarding underweight the prevalence at 12.4 % (9.0 - 16.7 95% C.I.), indicates a **medium** level.

For acute malnutrition further analysis was done by dividing the age groups in the range 6-29 months and 30-59 months in order to see differences in prevalence of acute malnutrition between the younger and the older age group as a whole. Results showed that wasting in 6-29 months old children was 17.6% (13.8-22.2 95% CI) and that of 30-59 months was 13.8% (9.9-19.0 95% CI). The two results of prevalence of acute malnutrition are not statistically significant (p-value=0.1976) indicating both age groups are equally affected by acute malnutrition.

7.2 Mortality

Malnutrition and mortality are inextricably linked and a joint analysis of both factors helps understand the situation better and therefore make more appropriate recommendations for interventions. The UNICEF conceptual framework of the causes of malnutrition shows both mortality and malnutrition at the top of the model. Mortality is the ultimate outcome of health and nutrition conditions and provides an overall picture of a population's health status. While the cause of mortality go beyond those related to malnutrition, there is evidence to show that malnutrition is among causes of mortality in emergencies. SAM children who did not get the care s/he deserve have an elevated probability of dying.[13] Therefore, there is a correlation between SAM level in a given county and child mortality rate. However, the relationship between the two is quite strong but not constant. This means it is not possible to predict the mortality rate on the basis of prevalence of malnutrition, or vice versa. A further distinction of the time

[13]WHO standards for mid-upper arm circumference (MUAC) show that in a well-nourished population there are very few children aged 6-60 months with a MUAC less than 115 mm. Children with a MUAC less than 115 mm have a highly elevated risk of death compared to those who are above. Similarly, following the release of the WHO child growth standards, the relationship between weight-for-height and risk of dying was reassessed in existing epidemiological studies. This analysis showed that children with a weight-for-height below _3 SD have a high risk of death exceeding 9-fold that of children with a weight-for-height above -1 SD.

period the two indicators measure should be factored in. Mortality refers to what is happening in the past 108 days while acute malnutrition concerns itself with what is happening in the population now.

The retrospective crude and U5 mortality rates for the 108 days preceding the survey were 1.07 (0.66-1.73) and 0.34 (0.09-1.32), respectively. Even though the survey was conducted in Weckol and Padiek Payams alone the current mortality rates are compared with previous Uror results. When compared with the December 2014 SMART survey in Uror, the crude mortality result of Padiek and Weckol surveys is more than twice higher while the child mortality rate of this survey is less than half of the result of the December 2014 survey (December, 2014 mortality result in Uror: the crude mortality rate was 0.46 (0.24-0.85) and under five mortality rate was 0.77 (0.33-1.77) deaths/10,000 people per day). More recently (May, 2016), Tearfund had conducted a SMART nutrition and mortality survey that revealed a CMR of 0.32 (0.15-0.69) deaths/10,000 people per day and the U5MR was 0.35 (0.08-1.46) deaths/10,000 people per day. The mortality rate of the current survey is not typical as CMR of the current survey is twice of the 2014 survey and more than triple of the 2016 survey.

Baseline, non-crisis CMRs in most of Sub-Saharan Africa are in the range 0.3-0.6 per 10,000 per day, with a probable current average of 0.44. Based on this, in 1990 Toole and Waldman suggested an approximate doubling of Crude Mortality Rate (to 1 per 10,000 per day) as a useful threshold for formally declaring an emergency, from a health stand point.[14] Given the CMR of the current survey is double or triple of previous surveys it is of concern (it is not typical). Based on the Sphere project (see Table below) the CMR is above the emergency threshold while the U5MR is below emergency threshold.

Table 21: Mortality benchmarks for defining crisis situation[15]

Agencies	Assumed baseline	Emergency thresholds
CDC, MSF, Epicenter, Academia	CMR:0.5/10,000/day	CMR≥ 1/10,000/day or
	U5MR: 1/10,000/day	U5MR≥ 2/10,000/day
UNHCR	CMR:0.5/10,000/day	CMR> 1/10,000/day: 'very serious CMR> 2/10,000/day: 'out of control' CMR> 5/10,000/day: 'major catastrophe'
	U5MR: 1/10,000/day	Double for U5MR thresholds
Sphere Project Note: If baseline is not known, Sphere goal is CMR< 1/10,000/day	Context-specific CMR (U5MR)	
	Sub Saharan Africa (CMR=0.44, U5MR=1.14)	

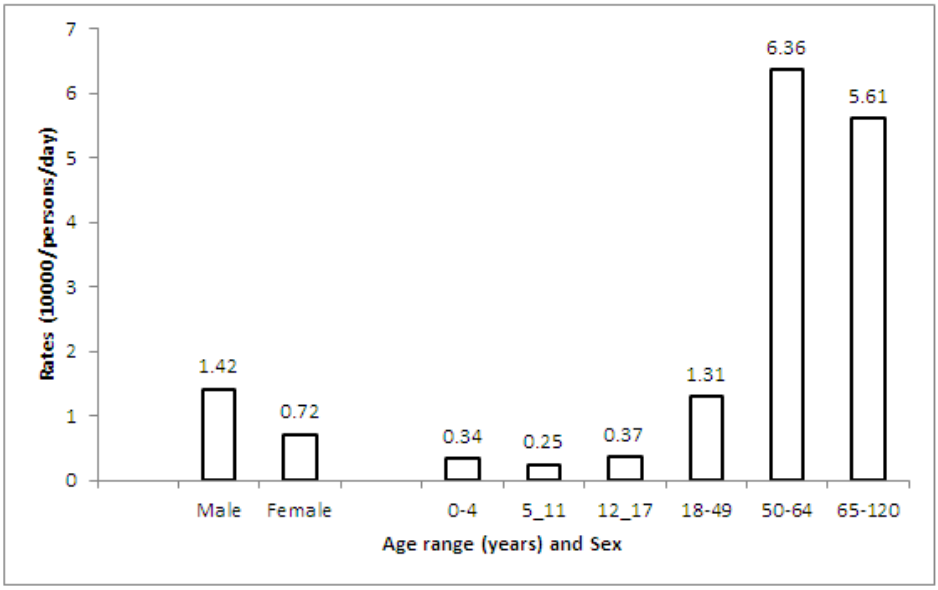
[14] M.J.Toole and R.J.Waldman, Prevention of Excess Mortality in Refugee and Displaced Populations in developing Countries', JAMA, 1990;263(24):3296-302

[15] Adapted from Checchi and Roberts, 2005

Age specific death rate indicated that the age group within the range of 0-4, 5-11, 12-17 years have a mortality rate below the emergency threshold (<0.44 deaths/1000persons/day). The economically active population (18-49 years) has a mortality level above this threshold. The mortality rate for the population over 49 years is also very high; however the confidence intervals are very high and the estimates are not precise.

Sex specific mortality revealed that men are twice more likely to die than women. Hence, the mortality is truncated to men and to age groups greater than 18 years. Review of the mortality by age also indicates over 50% of the deaths were in the age group 20-44 years. The highest proportion of deaths was for the age group 20-24 years (17% of total deaths), 30-34 years (17%) and for the age group 25-29 (10%).

Figure 7: Age and specific mortality rates



Review of the questionnaire has also indicated more male out-migrate than women.

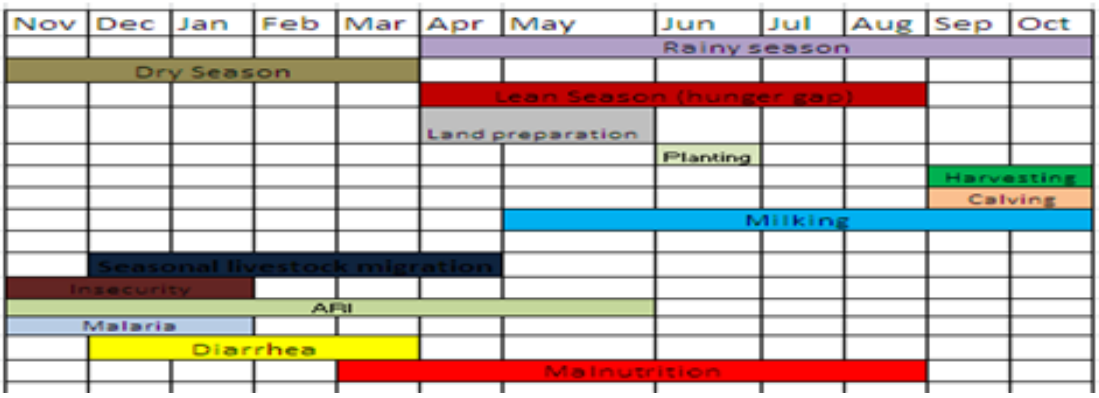
7.3 Morbidity, measles and BCG coverage and vitamin A supplementation

Retrospective morbidity was very high at 63.8%. In the past 14 days the most common illnesses were Fever (54.5%), followed by diarrhoea (23.2%) and cough (19%). Some symptoms (like diarrhoea and fever) are associated with more than one disease (like malaria and measles). Hence, the verbal responses have limitations. However, high diarrhoea rates indicate issues around access to potable water, and poor sanitation and hygiene. Childcare practices may also play a role, particularly in an unclean environment; if small children are frequently unsupervised or not prohibited from putting things in their mouth, it

creates an easy entry point for disease. Variability in access to primary healthcare services may also have an impact on length and virulence of the infection and thus nutritional status.

To understand the morbidity level it may be useful to plot a seasonal calendar of morbidity to compare the current situation with expected patterns – this will help understand whether or not the situation is 'normal' for the time of year. The seasonal calendar for the area indicated that the survey period is associated with malaria and diarrhoea which are closely linked with malnutrition.

Figure 8: Critical events calendar for Uror



Diarrhoea is one of the major contributors to deaths for under age 5 children. Mothers reported that 23.2% of children under age 5 had a diarrhoea episode in the 2 weeks before the survey. Improving early care is a key strategy for early diagnosis and treatment. Appropriate feeding practices for diarrhoea are given more liquids than usual, and as much food or more than usual. The survey observed poor knowledge of appropriate feeding practices for diarrhoea. Twenty-three percent of mothers of 0-23 months old children in the survey reported that they give less than usual or fluids only during diarrhoeal episode, 32% give the usual amount of liquids and food, 10.5% reported that they do not do nothing and 33.3% of mothers reports that children received somewhat more amount of liquids and foods than usual during diarrhoea episode.

The survey finds a very poor deworming, BCG vaccination coverage and vitamin A supplementation in children aged 6-59 months, and measles immunization for 6-59 month, in the six months prior to the survey period. In this survey, measles vaccination coverage was 9.4% far below the 90% recommended by WHO. Vitamin A supplementation had occurred in 9% of children.

7.4 IYCF

Appropriate infant and young child feeding (IYCF) practices include exclusive breastfeeding in the first 6 months of life, continued breastfeeding through age 2, introduction of solid and semisolid foods at age 6 months, and gradual increases in the amount of food given and frequency of feeding as the child\ grows

older. It is also important for young children to receive a diverse diet, which includes eating foods from different food groups that satisfy children's growing micronutrient needs.

The survey finds that breast feeding is nearly universal as 99% of children born in the 2 years before the survey were breastfed at some point. Almost 80.9% were breastfed immediately after birth, 11.6% in less than an hour, 7% in less than two hours and 0.5% in more than one day. Overall, 61.3% of children under age 6 months are exclusively breastfed. Contrary to the recommendation that children under the age of 6 months be exclusively breastfed, many infants are also fed with other liquids such as powder/animal milk (27.8%), cereals (9.9%), and vegetables (0.9%) before reaching age 6 months (0-5 months).

Continued breastfeeding is relatively long at 88.6% at age 1, while 78.3% continue breastfeeding until their second birthdays.

The overwhelmingly majority (94%) mothers reported feeding colostrum to their new born.

Dietary diversity is a proxy for adequate micronutrient density of foods. Minimum dietary diversity assesses food intake among children age 6-23 months from at least four food groups. The cut-off of four food groups is associated with better-quality diets for both breastfed and non-breastfed children. The survey finding revealed that only 11% had received the minimum dietary diversity food.

According to the survey results, the feeding practices of 68.4% of 6-8 months and 54.4% of 9-23 months meet the minimum standards with respect to number of times they were fed during the day or night before the survey (at least 2 times for 6-8 months and 3 times for 9-23 months).

The mean meal frequency was 2.4.

7.5 WASH

Inadequate access to clean water poses a major nutritional risk. Ideally, all people should have safe and equitable access to a sufficient quantity of water for drinking, cooking, and personal and domestic hygiene. Insufficient water provision, in terms of both quantity and quality, increases the risk of diarrhoea diseases and other water-borne diseases. Water is an important consideration for all populations, although the consequences of poor sanitation and hygiene in crowded camps for displaced people may be worse as they can lead to epidemics of cholera, etc.

The survey finding revealed that 90% of surveyed households have access to an improved source of drinking water. The two most common sources of drinking water in surveyed households are borehole (88.2%) and river/stream (8.2%). However, most household residents (64.7%) report that they do not treat their water prior to drinking. Overall, 35.3% of households are using an appropriate treatment method.

Public water points should be sufficiently close to households to enable the use of the minimum water requirement. More than 40% of households (41.2%) travel 30 minutes or longer round trip to fetch drinking water. Time spent on water collection influences water quality and time available for child care.

People should have adequate numbers of latrines, sufficiently close to their dwellings, to allow them rapid, safe and acceptable access at all times of the day and night. Latrines should be sited, designed, constructed and maintained in such a way as to be comfortable, hygienic and safe to use. The survey finding revealed a poor level of improved latrine use as only 16.3% of the households use improved latrines with 70% practicing open defecation.

Average water use for drinking, cooking and personal hygiene in any household should be at least 15 litres per person per day. Only 27.7% of the sampled households were using 15 liters/person per day.

The survey has also indicated a poor hand washing practice. Nearly 14% reported to wash hands before defecating, 38.2%before cooking, 29.4% before eating, 12.2% before feeding the baby, and 2.9% after cleaning the baby. Only 9% of households reported to practice hand washing during at least 3 critical times and only 3.5% at all critical times. Soap and water, the essential hand washing agents, were used in 18.6% of households.

7.6 Food security and livelihood

The survey area was widely affected and still instability continues as it is occupied by either government or rebel forces. Even at the time just before the survey, the survey teams have detected that areas change from one group to other. In addition to the widely known conflict, the survey team has also identified serious inter clan disputes which limit movements. Further, Murle attacks have serious implications for the livelihood of the population under consideration. Therefore, insecurity is a major shock to the population. Findings should be viewed from these contexts.

As observed by the mortality survey the population has a high dependency ratio as children under age 15 are 44% while 1.4% of population is age 65 or older. Additionally it was observed that 55.7% of the households were female headed which is quite high. Hence, the burden of providing relies heavily on mothers which have also to take up the job of child care. The profile of the community has also shown that 20% of the populations are IDPs and 59% of the surveyed households have a returnee in the past 1 year. These are the possible vulnerable groups or are poor wealth group as these households are most at risk of food insecurity.

The dominant livelihood in the surveyed communities was rearing livestock (68.1%) and/ or cultivation (71.1%). Those who are not engaged in livestock rearing (31%) are exposed to serious nutritional deficiencies as milk is the main staple. Moreover, those who did not cultivate during the recent past might face food deficit unless they buy from the market by possibly selling livestock. The most vulnerable are those who do not own neither livestock nor cultivate.

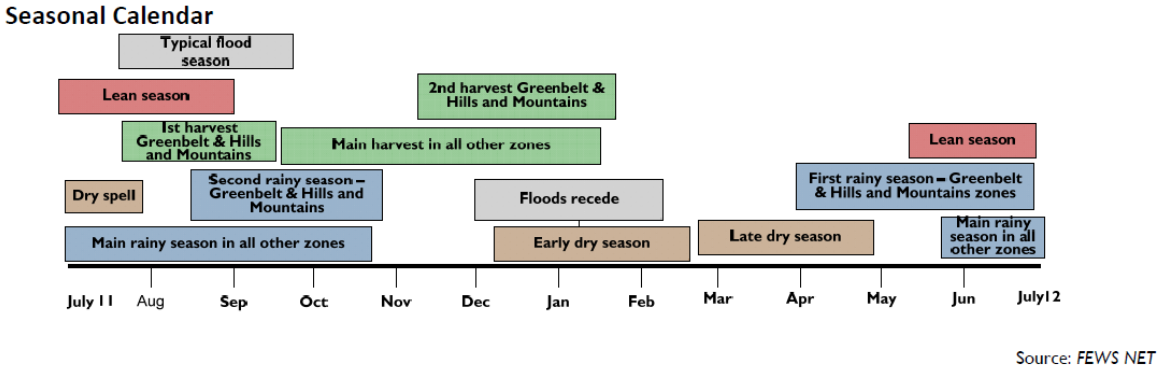
For the 30 days preceding the survey period (Dec 16, 2017-Jan 16, 2018) the most dominant source of income was sale of crops, 40%, followed by sale of natural resources, 20%, sale of livestock, 13%, and sale of animal products, 12%. An increased sale of firewood and charcoal is among the most common types of early or late outcome indicators of food insecurity. The fact that one in five households depend on sale of

natural resources at this point in time (post-harvest) indicates the stresses of some of the households are facing.

Household's main source food for the week preceding the survey period were own production (68.2%), followed by work for food (11%), gifts (7%) and purchases from market (6%).

Intra-annual patterns of food and cash income substantially change by season. As we go away from the harvest season income and food sources from own production will dwindle. During the dry season (June-Aug) livestock will also migrates out of the area. This is because with regards to access to critical resources, Lou-Nuer is at a disadvantage compared with other ethnic groups. Their access to water and pasture within their territories during the dry season is extremely limited.

Once the available resources have been exhausted, the households are moving into humanitarian food and livelihood crises with high and above usual malnutrition and accelerated depletion of livelihood assets that, if continued, will slide the population into humanitarian emergency/famine. The common types of late outcome food insecurity indicators would be high GAM and SAM, unusual migration and displacement, and increases in morbidity and mortality. These indicators can show the severity of the current food insecurity situation in the area.



Source: *FEWS NET*

After completing their current produces of crop households continue to cover their survival requirements by selling livestock, however, those without livestock lose most of their livelihood protection expenditure resulting in a survival deficit that emerges towards the hunger season (June-August), when all savings and stocks have run out.

On a positive note, the survey has indicated already 58% of the population is recipient of WFP general food distribution. This indicates the availability of humanitarian support for those without food.

8 Conclusion

In conclusion the nutrition situation in Weckol and Padiek Payams, Uror County, Jonglei State is above the *critical* emergency threshold. Children between the ages 6-59 months are in critical condition because children have inadequate diets and are exposed to poor health and care environments. Results showed that wasting in 6-29 months old children was 17.6% (13.8-22.2 95% CI) and that of 30-59 months was 13.8% (9.9-19.0 95% CI). The two results of prevalence of acute malnutrition are not statistically significant (p-value=0.1976) indicating both age groups are equally affected by acute malnutrition. Higher than normal levels of malnutrition among younger children may indicate a high burden of infection, while an equal level of malnutrition among all ages may indicate **acute food insecurity**.

At the time of the survey and for the past many years the population was at the forefront of the persistent insecurity and armed conflict which disrupted livelihood activities, affected market functionality and limited physical access to market.

Majority of at risk people not able to meet their food needs due to insecurity, poor availability of food on the market and very high prices of available food (the country is facing hyperinflation). However, most have been receiving adequate quantities of food aid (58%).

The situation is going to get worse as we approach the lean season. IDPs, people that are without livestock or who did not harvest in the recent past season, and female headed households are the subgroups of the population which are at greatest nutritional risk.

The population has very low rates of immunization and supplementation; in light of this the situation will be much serious.

Similarly, the crude mortality rate is above the emergency threshold. The prevalence of acute malnutrition is not 'typical' for the population in the current season. The crude mortality rate is also higher than the rates observed for Uror in previous surveys. However, age specific mortality rates indicated that 0-4, 5-11, and 12-17 age groups have a mortality rate below 0.5 Deaths/10,000/day while 18-49, 50-64 and 65-120 age groups have a death rate above 1. Most probably the mortality is not directly related with malnutrition but it indicates the insecurity the population is facing, which in turn can influence the prevalence of malnutrition. Under five mortality rates however remain below the WHO's *alert* levels.

Even though the key underlying factors affecting the nutritional status of the children i.e. food insecurity, morbidity, poor child care and limited sanitation and hygiene facilities remain key risk factors, it is important to note that the situation has remained critical despite seasonal harvests and the food security, health and nutrition interventions.

Poor Infant and Young child Feeding Practices have been known to expose children to morbidity, malnutrition and even death.

Overall the other key underlying factors for acute malnutrition are child care, morbidity (fever, diarrhea and cough in particular), and poor sanitation.

The on-going instability, migration, and conflict means that the current reliance on restricted WFP rations, lack of access to livelihoods, poor WASH conditions, inadequate hygiene practices, and limited access to

healthcare persists. In light of insufficient vaccination coverage and sanitation, the risk of disease outbreak remains real.

9 Recommendation

Immediate

- The existing Therapeutic feeding programme should continue to treat severe and moderate acute malnutrition. It is known that GAM levels using WHZ are high in South Sudan, while MUAC based prevalences are comparatively low. Hence, targeting should include admitting cases of malnutrition using WHZ criteria.
- A large proportion of the population remains dependent on food aid to meet their food needs. Food aid should continue but registrations should be revised in light of the high number of IDPs and women-headed households. This revision should be based on a thorough food security assessment.
- Feasible and appropriate food security interventions which can be targeted at poor people should be investigated to promote improved dietary quality.
- Special effort should be made to target female headed households.
- All children under five should be vaccinated and provided with a vitamin A supplement.
- Continue treating PLW mothers with malnutrition through the existing MAM programme
- Consider distribution and promote use of LLITN.
- Scale up the integrated community case management to increase access of the population to treat and prevent illnesses like diarrhea, cough and malaria.
- Health Education to the community on good health seeking and advocacy to ministry of health on provision of essential drugs to the health facilities across the county.
- Tearfund to continue work in water related issues amongst all villages to ensure adequate coverage and use of a safe water supply. To address the problem of diarrhoea, resulting from sub-optimal hygiene and sanitation practices, transmission of faeco-oral diseases and exposure to disease-bearing vectors; - intensify the promotion of information, knowledge and understanding to prevent water and sanitation-related diseases and identify social and cultural norms that might facilitate and/or compromise adherence to safe hygiene practices.

Long term

- Continue the health education on feeding practices during diarrhea
- Continue and expand the implementation of the IYCF program. To continue and reinforce IYCF activities with quality one-to-one counselling tailored to the individual, peer-led support groups, interactive mass-communication events, and capacity-building of health decision-makers at the community and family level for larger IYCF messaging and behaviour change.
- To provide tailored FSL interventions, in light of the persisting lack of access to income-generating opportunities, in a way that fosters appropriate childcare practices
- To ensure that all humanitarian interventions have a conflict-sensitive approach and an effective communication/ participation strategy with surrounding populations, using advocacy in a way that provides durable solutions.[16]
- To advocate for significant increase in freedom of movement so that displaced or conflict-affected people can restore their livelihoods and have adequate access to essential services

[16] There is a complicated group dynamics. For example during the survey some people do not want to go to some areas. This is due to intra clan based conflicts. Therefore, program staff recruitment should consider this. Also, significant work should be done towards peaceful resolution of conflicts. We have observed what a complete breakdown of law and order is. During the survey, a single incidence suddenly transformed itself into a war between sub-sub clans.

Annex 1: List of selected village

Geographical unit	Population size	Cluster
Dingmajak	1477	1
Kuelnyakong	1487	2
Dhony Bang	1370	3
kuerdak	1488	4
Ciokjiok	1508	5
Kuel luotdit	1381	
Jakway	1594	6
Block 1	1488	7
Block 2	1486	8
Block 3	1593	9
Block 4	1487	10
Dhuony	1234	11
Kueli	1234	
Khot	1234	12
Kuenyoda	1340	13
Kuerkuong	1234	
Chokjiok	1234	14
Dengmajak	1234	15
Nyawiyiak	1241	16
Wek	1340	
Pimpiny	1447	17
Pamai	1534	18
Kurthom	146	
Wardeng	1380	RC
Pathat	1371	19
Kuerboth	1128	
Uror	1128	20
Ciergew	1128	21
Horgot	1128	
Kuernek	1128	22
tiam	1149	RC
Pulthakbil	1128	
Thempiny	287	23
Kamel	319	
Ngapgany	447	
Wichpuol	255	
Rupkeini	223	
Kherwith	185	
Mannyok	217	
Dungnip	249	24

Pulthepkherjok	268		
Manhoth	351		
Biditil	229		
Gathaktuang	261		
Pulbowa	159		
Pullam	185		
Pulchot	127	RC	
Rupluak	172		
Kuirwara	243		
Patuek	147		
Manhorjok	192		
Tapnyaruai	159		
Weikuony	255		
Pebor	319		
Nyawan	153		
kuobong	217	RC	
Maborwuol	147		
Koatbol	198		
Tambar	255		
Wangnyakoang	185		
Pultoang	229		
Nakbok	166		
Pulkuol	210		
kactong	849		25
pathat	523		
Patuak	268		
Warmor	192		
Ramjara	192		26
Waryow	325		
Pathepchangath	574		
Nyalou	127		
Panyang	204		
Turu	319		
Manyang	255		27
Bongyel	268		
But	223		
Kuirmol	306		
Geukei	134		
Kuirkoat	243		
Kuirler	287		
Kuirkoni	217		28
Weiyep	108		
Dawen	96		

Payet	90	
Kuakkhir	64	
Tuek	121	
Tuek	0	
Yian	765	
Pulthambil	999	29
Orgot	287	
Kolziak	376	
Kuerbidiet	325	
Rialjak	268	30
Dingmajak	223	
Weilam	192	
Weithon	255	
Kueryong	217	
Nyaruai	229	
Pulthep	185	
Kueryaka	274	
Yikchar	306	31
waralik	134	
Door	153	
Ngop	198	
Weibayak	236	
Luopyier	185	
Gatwel	510	
Milkiek	319	32
Pulkuai	287	
Koatwuol	249	
Pulbowa	147	
Kueinor	542	
Kuirmalith	370	33
Koatgatwei	198	
Tindir	134	
Zuony	376	
Worthou	115	
Weipuot	96	
Hou	127	
pakhernyieth	319	
Pawat	300	34
Cholatim	217	
Karitha	294	
Pulthalual	210	
Kueli	172	
Pakualnyang	243	

Paliew	121	
Warlang	80	
Ruplual	192	
Mangol	236	35
Purthangnyang	90	
Pulthadieng	204	
Pakchamjok	376	
Gumut	153	
warwar	382	
Jokduel	357	

Annex 2: Survey tools

ANTHROPOMETRIC & HEALTH QUESTIONNAIRE

(To be conducted in EVERY SELECTED HH with children 6-59 months)

Date (DD/MM/YY): ...…/……/……..... Team No…..… County:…….. …. Payam……..…….. …. Bom number……..……..

1	2	3	4	5	6	7	8	9	10
Child No.	HHNO	Sex **m** = Male **f** = Female	Age in months	Weght in Kg (eg 12.4)	Height in cm (eg 78.1)	**Oedema n = No y =Yes**	MUAC in cm	Vit. A in last 6 months --------- **0** = No **1** =Yes	Measles Va ---- **0** = No **1** =Yes with card **2** =Yes reca **3** = Child <9
1									
2									

Food Security and Livelihood Questionnaire

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

	18	19	20	21	22	23	24	25	26	

HH NO*	HH **size** (No. of people living in HH)	**Residence** status of HH: **1** = Resident **2** = Returnee (in the last 1yr) **3** = IDP/PoCs **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 and harvested** 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	**MUAC PLW (c**

WATER AND SANITATION QUESTIONNAIRE

31	32	33	34	35	36	37	38

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)	Capacity of the jerrycan in litres (the jerry can mentioned in Q33)	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)
1								
2								
3								
4								
5								
6								

IYCF Questionnaire

Child No.	HHNO	**Age** (in months)	Has this child ever been **breastfed**? --- 0 = No 1 = Yes If no go to 47	**How long** after birth did you first put the child to the breast? **1** = Immediately **2** = In less than an hour **3** = In less than 24 hours 4= In more than one day	Did you feed your child with **colostrum** (local language = tiith) --- 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/roots/tubers 2=Vitamin A rich plant foods 3 = Other fruits and vegetables 4 = Meat/Poultry/fish/seafood 5=Eggs 6 = Milk and milk products 7= Foods cooked in oil and fat	Since this time yesterday , how many times have you given the child **food** other than liquid? (put number)	How do you child when **diarrhoea**, him **0** = Nothing **1** = Less th fluids only **2** = Same a **3** = More th **4** = Never h 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:	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
				2-Sep					
a) List all the people that slept in this household last night.									
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									

17									
18									
b) List all the people that slept in this household on the **first night of the recall period (FILL IN DATE/EVENT)** but did **NOT sleep** in the **household last night**.									
1					Y				
2					Y				
3					Y				
4					Y				
5					Y				
6					Y				
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.

Annex 3: Results of standardization test

Standardisation test results					Precision			Accuracy	
Weight		subjects #	mean kg	SD kg	max kg	Technical error TEM (kg)	TEM/mean TEM (%)	Coef of reliability R (%)	Bias from superv Bias (kg)	Bias med Bias
	Supervisor	10	15.2	3	9.9	2.22	14.6	44.3	-	
-0.6	0.07	TEM reject	R value poor		Bias acceptable					
	Enumerator 2	10	14.6	1.8	2.1	0.49	3.3	92.4	-0.54	
	Enumerator 3	10	14.6	1.8	0.6	0.19	1.3	98.9	6.11	
	Enumerator 4	10	21.3	29.3	130.1	29.09	136.7	1.5	-0.5	
	Enumerator 5	10	14.7	1.8	0.3	0.11	0.7	99.6	-0.51	
	Enumerator 6	10	14.7	1.8	0.6	0.21	1.4	98.7	-0.5	
	Enumerator 7	10	14.7	1.8	0.4	0.15	1	99.3	-0.54	
	Enumerator 8	10	14.6	1.7	0.6	0.23	1.6	98.3	-0.5	
	Enumerator 9	10	14.7	1.8	0.6	0.19	1.3	98.8	-0.49	
	Enumerator 10	10	14.7	1.8	0.2	0.12	0.8	99.5	-0.52	
	Enumerator 11	10	14.6	1.8	0.7	0.2	1.4	98.7	-0.49	
	Enumerator 12	10	14.7	1.9	0.4	0.11	0.8	99.6	-0.43	

		Enumerator 13	10		14.7	1.8	0.4	0.11	0.8	99.6		-0.51	
		Enumerator 14	10		14.7	1.8	0.1	0.02	0.2	100			
		enum inter 1st	13x10		15.7	11.6	-	11.43	72.9	3.2	-		-
		enum inter 2nd	13x10		14.6	1.7	-	0.19	1.3	98.8	-		-
		inter enum + sup	14x10		15.2	8	-	5.58	35.6	54.8	-		-
		TOTAL intra+inter	13x10	-		-	-	11.43	75.3	-89.1		0	
		TOTAL+ sup	14x10	-		-	-	11.01	72.6	-87.4	-		-

Height			subjects #	mean cm	SD cm	max cm	Technical error TEM (cm)	TEM/mean TEM (%)	Coef of reliability R (%)	Bias from superv Bias (cm)	Bias med Bias
		Supervisor	10	102.4	6.9	8.9	2.65	2.6	85.1	-	
	0.53 -1.53	TEM poor	R value acceptable		Bias good						
		Enumerator 2	10	103	6.8	2.9	0.93	0.9	98.1	0.8	
		Enumerator 3	10	103.2	6.9	3.2	0.75	0.7	98.8	-0.1	
		Enumerator 4	10	102.3	6.8	2.4	0.61	0.6	99.2	-4.23	
		Enumerator 5	10	98.2	21.6	98	21.93	22.3	-2.6	0.5	
		Enumerator 6	10	102.9	6.6	1.7	0.71	0.7	98.9	0.41	
		Enumerator 7	10	102.9	6.7	3.9	0.93	0.9	98.1	3.43	
		Enumerator 8	10	105.9	14.8	60	13.42	12.7	18	1.01	

	Enumerator 9	10	103.5	7.2	11.7	2.7	2.6	86	1.14			
	Enumerator 10	10	103.6	7.2	7.1	2.13	2.1	91.2	-4.68			
	Enumerator 11	10	97.8	23.7	101.89	22.8	23.3	7.1	0.3			
	Enumerator 12	10	102.7	6.7	1.2	0.41	0.4	99.6	0.53			
	Enumerator 13	10	103	6.6	1.3	0.48	0.5	99.5	0.37			
	Enumerator 14	10	102.8	6.6	0.1	0.02	0	100				
	enum inter 1st	13x10	102.3	10.5	-	8.69	8.5	31.9	-	-		
	enum inter 2nd	13x10	102.5	12.2	-	10.39	10.1	28	-	-		
	inter enum + sup	14x10	102.4	11.1	-	9.17	8.9	35.3	-	-		
	TOTAL intra+inter	13x10	-	-	-	13.56	13.2	-41.5	0			
	TOTAL+ sup	14x10	-	-	-	13.06	12.8	-37.9	-	-		

MUAC			subjects #	mean mm	SD mm	max mm	Technical error TEM (mm)	TEM/mean TEM (%)	Coef of reliability R (%)	Bias from superv Bias (mm)	Bias med Bias
	Supervisor		10	14.4	0.6	0.5	0.16	1.1	93.2	-	
0.18	0.29	TEM good	R value reject		Bias good						
	Enumerator 2		10	14.6	0.8	1.5	0.51	3.5	62.4	-0.06	
	Enumerator 3		10	14.4	0.6	0.5	0.15	1	94.3	-0.24	
	Enumerator 4		10	14.2	0.7	2.7	0.67	4.8	15.8	-0.16	
	Enumerator 5		10	14.3	0.7	0.6	0.25	1.7	87.9	0.01	

Enumerator 6	10		14.4	0.8	1.1	0.38	2.6	75.2		-0.01
Enumerator 7	10		14.4	0.8	1.2	0.43	3	68.3		-0.07
Enumerator 8	10		14.3	0.8	1.4	0.51	3.6	62.6		0.14
Enumerator 9	10		14.6	0.6	0.6	0.26	1.8	82.8		0.01
Enumerator 10	10		14.4	0.7	1.3	0.3	2.1	80.6		0.01
Enumerator 11	10		14.4	0.7	1.1	0.36	2.5	75.1		-0.02
Enumerator 12	10		14.4	1	3	0.84	5.8	33		0.09
Enumerator 13	10		14.5	0.6	0.3	0.12	0.8	95.9		0.07
Enumerator 14	10		14.5	0.6	0	0	0	100		
enum inter 1st	13x10		14.4	0.7	-	0.42	2.9	64.1	-	-
enum inter 2nd	13x10		14.4	0.8	-	0.43	3	67.9	-	-
inter enum + sup	14x10		14.4	0.7	-	0.41	2.9	68.6	-	-
TOTAL intra+inter	13x10	-		-	-	0.61	4.2	32.1		0
TOTAL+ sup	14x10	-		-	-	0.58	4.1	35.4	-	-

Suggested cut-off points for acceptability of measurements

Parameter		MUAC mm	Weight Kg	Height cm
individual	good	<2.0	<0.04	<0.4
TEM	acceptable	<2.7	<0.10	<0.6
(intra)	poor	<3.3	<0.21	<1.0
	reject	>3.3	>0.21	>1.0
Team TEM	good	<2.0	<0.10	<0.5

(intra+inter)	acceptable	<2.7	<0.21	<1.0
and Total	poor	<3.3	<0.24	<1.5
	reject	>3.3	>0.24	>1.5
R value	good	>99	>99	>99
	acceptable	>95	>95	>95
	poor	>90	>90	>90
	reject	<90	<90	<90
Bias	good	<1	<0.04	<0.4
From sup if good	acceptable	<2	<0.10	<0.6
outcome, otherwise	poor	<3	<0.21	<1.4
from median	reject	>3	>0.21	>1.4

Annex 5: Plausibility check for: SSudan_01062018_Tearfund_Uror.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	**0** (0.0 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.309)
Age ratio(6-29 vs 30-59)	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**2** (p=0.052)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (7)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (11)
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	<1.15	<1.20	>=1.20	
.			and	and	and	or	
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	**5** (1.14)
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	**3** (-0.48)

```
Poisson dist WHZ-2       Excl    p    >0.05 >0.01    >0.001   <=0.001
                                        0     1         3         5        0 (p=0.161)

OVERALL SCORE WHZ =                    0-9  10-14    15-24     >25         12 %
```

The overall score of this survey is 12 %, this is good.