ACF SOUTH SUDAN

Nutrition & Mortality SMART Survey Report, Duk County, South Sudan, March 2017

Funded by

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Contents

List of tables 3
List of Figures 3
Acknowledgments 4
Executive Summary 5

1. INTRODUCTION 7
1.1 Background 7
1.2. Justification of the Survey 8
1.3 Survey Objectives 10
1.3.1 General Objective 10
1.3.2 Specific Objectives 10

2. METHODOLOGY 10
2.1. Sample size Anthropometry 10
2.2. Sample Size Mortality 11
2.3. Survey Sample Size 12
2.4. Number of households per cluster 12
2.5. Cluster Sampling Strategy 13
First stage sampling- Selection of clusters 13
Second stage sampling- Selection of households 13
Data Collection Questionnaires 14
Survey Variables 14
2.6. Survey teams 16
2.7. Survey Quality assurance 16

3. SURVEY RESULT 18
3.1. Demographic characteristics of sampled households 18
3.2. Anthropometry Result (Based on 2006 WHO standards) 19
3.2.1. Acute malnutrition 19
3.2.2. Chronic malnutrition 23
3.3. Mortality Results 24
3.4. Child Morbidity and Health coverage 25
3.5. Water sanitation and Hygiene (WASH) 27
3.6. Food security and livelihood situation 29

4. CONCLUSIONS & RECOMMENDATION 31
REFERENCE 32
Annexes 33
Annex 1: Selected Clusters 33
Annex 2: Plausibility Report 34
Annex 3: Report for evaluation of enumerators 35
Annex 4: Questionnaires 36
Annex 5. Calendar of events, Duk County, March 2017 42

List of tables

Table 1 Factors used and sample size estimates for anthropometry. 11
Table 2- Factors used and sample size estimates for mortality survey. 12
Table 3- Proportion of households and children 6-59 months included in the survey..... 12
Table 4: Demographic characteristics of Duk County, South Sudan, March 2017 18
Table 5: Distribution of age and sex in children 6-59 months, Duk County, South Sudan, March 2017..... 19
Table 6: Prevalence of acute malnutrition based on WFH Z score (and/or oedema) and by sex..... 20
Table 7: Prevalence of acute malnutrition by age, based on WFH z scores and/or oedema 21
Table 8: Distribution of acute malnutrition and oedema based on WFH z score 21
Table 9: Prevalence of acute malnutrition based on MUAC cut offs (and/or oedema) by sex..... 21
Table 10: Prevalence of acute malnutrition by age, based on MUAC cut offs and/or oedema..... 22
Table 11: Prevalence of underweight based on WFA Z score by sex..... 23
Table 12: Prevalence of stunting based on HFA z score by sex 23
Table 13: Mean z-score, design effects and excluded subjects..... 24
Table 14: Mortality rates and detailed parameters, Duk County, March 2017 24
Table 15: Summary of coverage/enrolment of health indicators, Duk County, March 2017 26
Table 16: Time required to collect household water in Duk County, March 2017..... 27
Table 17: Main income and food source, Duk County, March 2017..... 29
Table 18: Coping strategies exercised by Duk County, March 2017..... 30

List of Figures

Figure 1: Sketch map of Duk County..... 7
Figure 2: Food insecurity classification for south Sudan for the projection period, January to March 2017 9
Figure 3: Population pyramid, Duk County, March 2017..... 19
Figure 4: Gaussian curve showing distribution of WFH Z score measurement among under five children, Duk County, March 2017 20
Figure 5: Distribution of wasting in different age group using weight for height Z score, Duk County, March 2017..... 22
Figure 6: Distribution of wasting in different age group using MUAC measurement, Duk County, March 2017..... 23
Figure 7: Causes of deaths in Duk County, March 2017 25
Figure 8: Childhood Illness/Symptoms reported 2 weeks prior to the survey, Duk County, March 2017..... 25
Figure 9: Care seeking behaviour of Duk community for reported childhood illness, March 2017 26
Figure 10: Main source of drinking water in Duk County, March 2017..... 27
Figure 11: Use of hand washing material, Duk County, March 2017..... 28
Figure 12: Place of excreta disposal, Duk County, March 2017..... 28
Figure 13: Household food consumption score, Duk County, March 2017..... 30

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- The entire data collection teams for making their commitment to ensure quality and successful data collection

Executive Summary

The Duk County Nutrition and mortality SMART survey was conducted by ACF-USA between 27th of March 2017 to 2nd of April 2017. A total of 467 HHs were assessed.

***Objective*:** To estimate the prevalence of Global Acute Malnutrition and mortality among under-five children in the county.

***Methodology*:** SMART methodology and a two-stage cluster sampling with probability proportional to size (PPS) design was employed. .

***Coverage of the survey*:** 6 Payams and 24 Bomas were assessed. A total of 39 villages were selected by PPS and 12 households were selected per village.

Information collected: Anthropometric, mortality, morbidity, health seeking behaviour of mothers/caretakers, food security /livelihood and WASH information were collected.

***County level participation*:** John Dau foundation (JDF) and Duk County health department (CHD) staffs participated in the data collection as a member of the survey teams.

The survey was funded by OFDA. The proposal was reviewed and approved by the Nutrition and information working group of South Sudan (NIWG).

Summary of key anthropometric and mortality findings:

ANTHROPOMETRY
• A total of 648 children were assessed • GAM was 26.1% (22.2-30.5 95% CI) and SAM was 5.5% (3.7- 8.1 95% CI) based on Weight-for-Height. • No children with oedema were identified. • Total stunting was 14.7% (10.7-19.9 95% CI) and severe stunting was 1.7% (0.9-3.4 95% CI). • Total underweight was 20.2% (17.2-23.5 95% CI) and severe underweight was 2.5% (1.6- 3.9 95% CI). • Proxy GAM (based on MUAC) was 22.4% (19.5-25.6 95% CI) and SAM was 4.5% (2.9-6.8 95% CI). ***Summary anthropometric findings have excluded extreme values (SMART Flags— +/- 3SD from the observed mean).***
MORTALITY
• Crude death rate was 1.18 (0.73-1.90). • Under 5 death rate was 0.96 (0.38-2.38). • The most common causes of death were: Unknown **(32.4%); violence/conflict (29.4%) and** Illness **(26.5%)**; • All of the deaths occurred in current location **(91.2%)**; and during migration **(8.8%).**

Conclusion

Based on WHO crisis classification, with GAM 26.1 % and SAM 5.5%, the nutrition situation of Duk County is at the critical level. Main possible contributing factor to the high level of malnutrition could be

- ***Poor food security situation***: 67.2% households had poor FCS
- ***Poor WASH service***. Only 8% the households had the minimum requirement of 15 lit of water per person/day and ¾ of the population practice open defecation. Latrine utilization is very low.
- ***Prevalent childhood illness:*** More than half of (58.5 %) surveyed children had at least one of the childhood illness. Diarrhoea was the cause of illness for half of the sick children. .
- ***Poor nutrition service***: From the total cchildren found malnourished by MUAC measurement, more than half of them (53.8) were not enrolled in any of nutrition program (TFU/TSFP). JDF, a local NGO, is the only organization implementing nutrition program in the county. The program has not reached all Boma/Payams of the county.

Recommendation

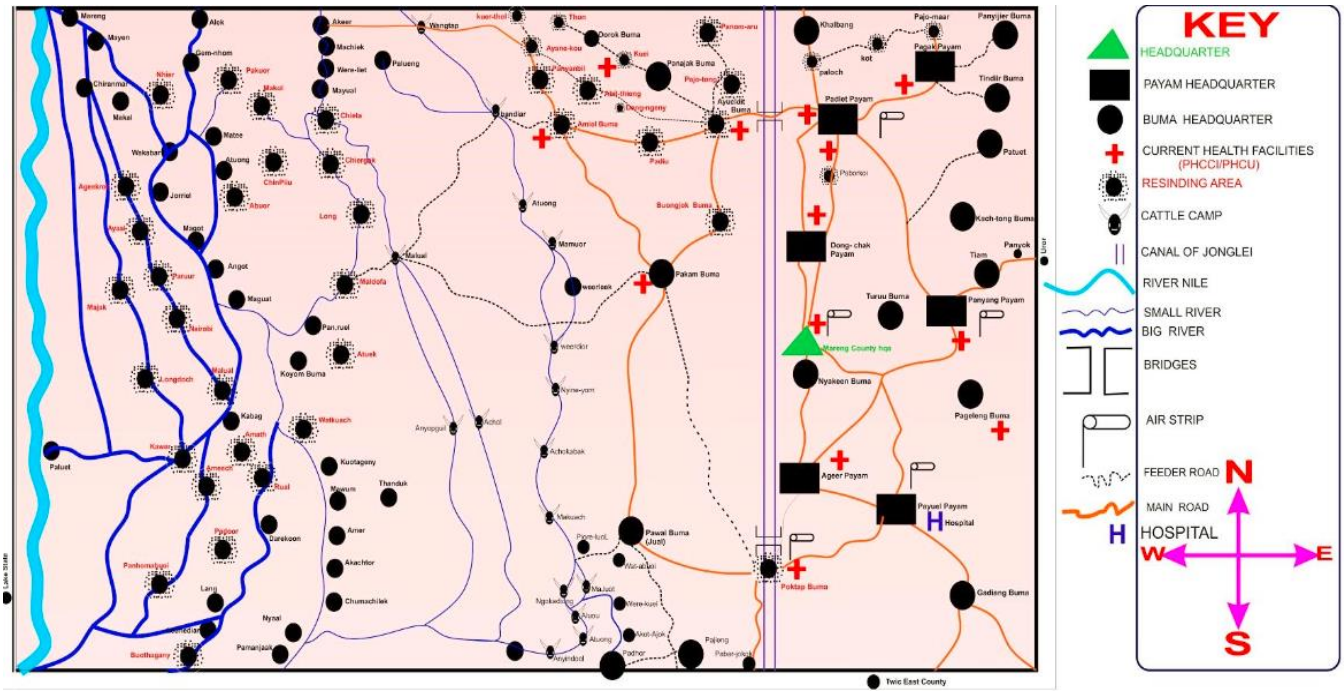
- Efforts have to be made to strengthen nutrition service delivery in the County. More nutrition centres/sites has to be established to areas close to the community.
- Screening of malnourished children should be conducted routinely to identify cases early.
- Health promotion programs should be strengthened so that children are brought to health care services and get treatment on time.
- Worsening of food security and nutrition situation is expected in the county in the coming few months before the harvest is started. Therefore; General food distribution (GFD) program should be initiated/scaled up.
- Currently there is no NGO in the area working on WASH programs. Therefore, the NIWG should advocate so that the responsible sector/cluster take action.
- One payam was excluded from the survey because of inaccessibility. Such remote and inaccessible areas might have worse nutrition situation. Therefore, the nutrition IP (JDF) should monitor the situation and conduct mass screening in those areas.

1. INTRODUCTION

1.1 Background

Duk County in western Jonglei State, South Sudan is one of the hardest to reach areas of the country, because of poor road conditions and insecurity due to cattle raiding and its proximity to active fighting. The county borders with Ayod County to the north, with Uror County to the east, with Twic East County to the south and with Panyijar County to the west. The western half of Duk County is covered with several rivers, lakes, and marshland, including the White Nile. The River Nile flows along the county's western border. The area immediately around the Nile is characterized by swampy vegetation. Most part of the county is prone to flooding during rainy season; this can extend one to two months after the rains. Moving east, the County's landscape is characterized by low, flood plains and bush. Duk County has about 8 to 10 islands which form part of the county; these can only be reached from Bor and is approximately 18 hours boat ride. The county's headquarter is Mereng. Duk county has 6 administrative Payams namely; Ageer, DongChak, Panyang, Pajut, Payuel, Padiet[1].

Figure 1: Sketch map of Duk County[2].



The county population is scattered due to displacements and past conflicts. However, three

[1] http://southsudanhumanitarianproject.com/counties/11791/
[2] Email communication with John Dau Foundation, South Sudan

areas are considered to have majority of the population in the county, these include: Poktap, Ayueldit and Pajut/Panyang. Majority of the population are either internally displaced (IDPs) or returnees from North Jonglei; Nyirol and Uror Counties. The total population of the county is estimated to be 156,009. The major ethnic groups of Duk County are Dinka (Hoi) and Dinka (Nyarweng).[3] The survey was conducted at the end dry season and before the rain has started. *(See annex for population distribution of Duk County).*

The livelihood activities in Duk County include agriculture, rearing livestock, and fishing. The main crops grown are sorghum, maize, groundnut and cowpeas. Livestock normally move towards the River Nile from February to April and return to homesteads from May to June. There is a traditional livestock migration from Ayod County into the Sudd wetlands of Duk County. Under normal conditions floods are a main livelihood hazard as they can limit fishing activities and reduce crop, livestock, and wild foods production. Additionally, cattle raids, livestock diseases, crop pests and drought are major factors affecting livelihoods.[4]

With support from UNICEF and WFP, John dau foundation (JDF), a local NGO, runs stabilization center (SC), outpatient therapeutic program (OTP), targeted supplementary feeding program (TSFP) and maternal infant and young child feeding (MIYCF) services in 20 sites in Ayueildit, koyoom, pajut, poktab and padiet payams[5].

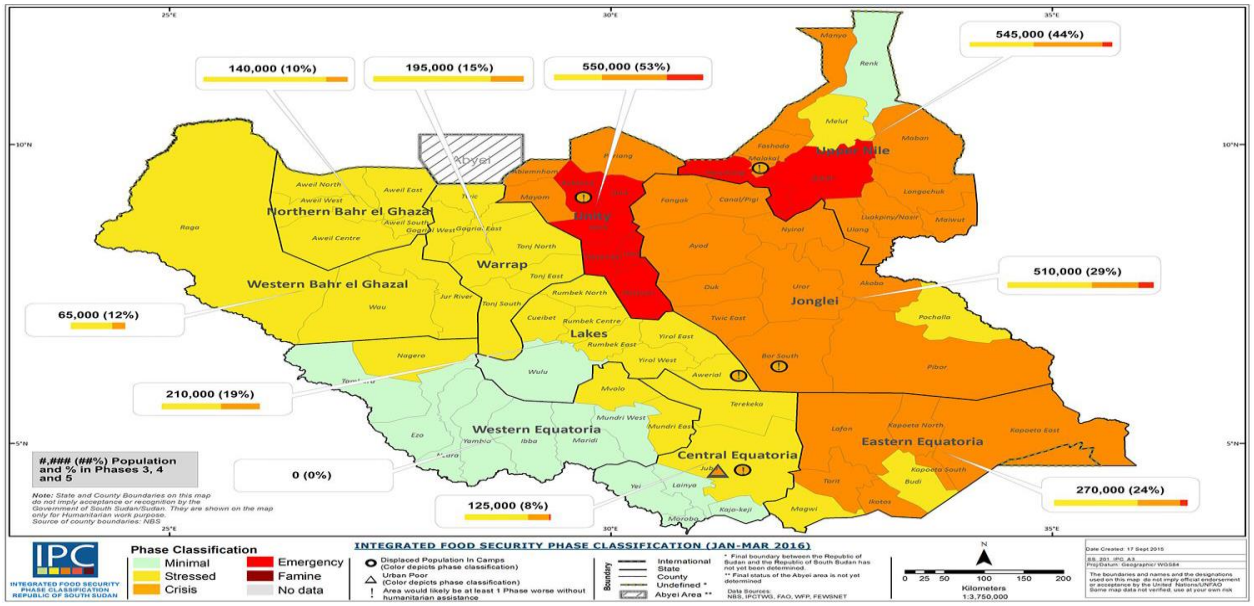
1.2. Justification of the Survey

The violence that erupted in South Sudan mid-December 2013 has led to a humanitarian crisis involving a massive displacement of 2.4 million people nationwide6. The conflict, and associated displacement, has had a significant impact on food security and, consequentially, the prevalence of malnutrition. Large numbers of displaced from neighboring areas, and periodic internal conflict and flooding related displacement within Duk County. In northern parts of the county, IDPs fled from violence along the Nile and especially from fighting in Malakal town and Canal/Pigi County7.

[3] http://southsudanhumanitarianproject.com/counties/11791/
4 http://southsudanhumanitarianproject.com/counties/11791/
[5] Nutrition clusters 5 Ws report, January 2017.
[6] South Sudan situation report, UNICEF, APRIL 2016.
[7] http://southsudanhumanitarianproject.com/counties/11791/

The IPC food security outlook update revealed extreme levels of food insecurity are expected across South Sudan through at least the first half of 2017. Food availability is likely to be lower than normal due to below-average production and volatile trade. Very high prices will further limit food access. Despite the ongoing harvest, levels of acute malnutrition remain at Crisis (IPC Phase 3) and Emergency (IPC Phase 4) thresholds in many counties. The IPC also reports "crisis" levels of food insecurity for Duk County for January to March 2017. Given the likely early depletion of household stocks and continued constraints to normal livelihood activities, a high level of acute malnutrition was expected to persist throughout the outlook period[8].

Figure 2: Food insecurity classification for south Sudan for the projection period, January to March 2017[9]



Thus, concern remained regarding the deterioration of nutrition situation and the high level of acute malnutrition in the county. For these reasons, Action against Hunger (ACF) conducted a SMART Nutrition and mortality Survey in order to determine the level of acute malnutrition and mortality as well as the status of main factors contributing to child under nutrition such as, WASH, food security and Health status of children.

[8] IPC Classification for South Sudan for the projection period, January to March, 2017
[9] IPC Classification for South Sudan for the projection period, January to March, 2017

1.3 Survey Objectives

1.3.1 General Objective

The overall objective of this survey was to determine the prevalence of acute malnutrition and mortality among under-five children in Duk County

The detailed objectives of the survey were:

1.3.2 Specific Objectives

- To estimate the prevalence of acute malnutrition in children aged 6 to 59 months
- To estimate retrospective Crude mortality rate (CMR) and under five death rates (U5MR) among population and under five children, respectively, in Duk County;
- To estimate the prevalence of morbidity (Diarrhoea, Fever, Cough and etc.) in children 6-59 months in the last two weeks prior to the survey dates;
- To estimate the vaccination coverage of Measles (9-59 months), Deworming (12-59 months) and Vitamin A supplementation for children 6-59 months;
- To assess the health seeking behaviour of mothers/caretakers of children 6-59 months and use of LLITN;
- To assess the food security and livelihood situation, WASH in the county
- To make appropriate recommendation based on findings.

2. METHODOLOGY

2.1. Sample size Anthropometry

The sample size for the nutrition survey was determined using ENA for SMART software (9th July, 2015, version). The following assumptions based on the given context were made to obtain the number of children and households to be included in the survey.

Table 1 Factors used and sample size estimates for anthropometry.[10]

Parameter	Anthoro	Rationale/Source
Estimated prevalence	25.6	The 2016 Twic East county, Jonglei state, SMART survey reported the GAM rate of 25.6 (21.8-29.8 95% CI). Assuming that nutrition situation would be the same with Duk as they are in the same livelihood zone (SS06)[11], a GAM prevalence of 25.6 % was used to plan this survey.[12]
Desired precision	5	SMART survey guideline recommendation for prevalence level of 25.6%.
Design effect	1.5	The 2016 Twic East county nutrition survey showed a design effect of 1.23. But, assuming slight variation between clusters, a design effect of 1.5 was used to plan this survey.
Average household size	6.6	Based on population data compiled at field level by JDF[13]
Percent of under five children	22.5	Result from 2016 Twic East county nutrition survey
Percent of non-respondent	3	Non- respondents anticipated
Children/population to be included	***478***	
Sample sizes (Households)	***369***	

2.2. Sample Size Mortality

The sample size for the retrospective mortality survey was determined using ENA for SMART software (9th July, 2015, version). The following assumptions based on the given context were made to obtain the population and number of households to be included.

[10] Because there was no representative SMART survey conducted in Duk County the entire factors used were from the adjacent county SMART survey, Twic East.
[11] South Sudan livelihood zones and description, FEWS NET, August 2013.
12 Twic East county Jonglei state, SMART survey, May 2016.
[13] Compiled by John dau foundation (JDF) staffs at field level

Table 2- Factors used and sample size estimates for mortality survey.[14]

Parameter	Mortality	Rationale/Source
Estimated prevalence	0.68	The 2016 Twic East county, Jonglei state, mortality survey reported 0.68 (0.41-1.14) death/10,000/day.
Desired precision	0.4	SMART survey guideline recommendation for mortality rate level of 0.68
Design effect	1.5	The 2016 Twic East county nutrition survey showed a design effect of 1.35. But, assuming slight variation between clusters, a design effect of 1.5 is used to plan this survey.
Recall period	90	Tentative of a 3 month recall period is assumed. Actual recall period will be decided on the field and changes will be made accordingly.
Average household size	6.6	Based on population data compiled at field level by JDF[15]
Percent of non-respondent	3	Anticipated response rate
Children/population to be included	**2962**	
Sample sizes (Households)	**468**	

2.3. Survey Sample Size

The sample size for the anthropometric components was 369 while for the mortality was 468 households. The sample size for mortality survey (468 households) was used as the sample size for both nutrition and mortality survey
Table 2.3: Percent of households and children 6-59 months included in the survey

Table 3- Proportion of households and children 6-59 months included in the survey

HH planned	HH surveyed	% surveyed	Children 6-59 months planned	Children 6-59 months surveyed	% surveyed
468	467	99.9%	478	648	135%

2.4. Number of households per cluster

The number of households to be completed per day was determined according to the time the team could spend on the field excluding transportation, other procedures and break times. The details below are taken into consideration when performing this calculation based on the given context:

1. Departure from base at 7:00 am and back at 6:00 pm.
2. Average travel time to reach each cluster (two-way): 2 hr.
3. Duration for initial introduction and selection of households: 1.5 hrs.

[14] Because there is no representative SMART survey conducted in Duk County the entire factors used are from the adjacent county SMART survey, Twic East.
[15] Compiled by John dau foundation (JDF) staffs at field level

4. Time spent to move from one household to the next: 5 min.
5. Average time in the household: 25-30 min.
6. Breaks: 1 lunch break of 1 hr.

The above gives an average 6 hrs (360 min) of working time in each cluster. If on average, teams spend 25-30 minutes in each HH and 5 minutes traveling from one HH to another, each team can comfortably reach 12 HH per day. One day in each cluster is assumed.

The total number of households in the sample (463 HH) was then divided by the number of households to be completed (12 HH) in one day to determine the number of clusters to be included in the survey.

463 HH/ 12 HH per day = 38.58, when rounded up, it gave 39 clusters.

Based on this calculation, 39 clusters were planned to be included in the survey.

2.5. Cluster Sampling Strategy

First stage sampling- Selection of clusters

Each village was considered as a smallest geographic unit. In order to obtain actual sampling frame of primary sampling units (villages); the list of villages and their respective population size was compiled and updated, on the ground by JDF staffs together with the local authorities, before the actual cluster selection. An effort was made to make sure that all inaccessible/insecure villages were excluded from the sampling frame. In this survey, Koyom and Pagak villages were excluded from sampling because they were not accessible. The sampling frame of all villages with their total population was entered in to ENA for SMART software (July 9th, 2015 update version), and a total of 39 clusters were selected using probability proportional to size (PPS), excluding the reserve clusters

Second stage sampling- Selection of households

Simple random sampling method was used to select households within the selected clusters. A household was defined as a 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 were considered as separate HHs. Wives living in different houses and eating from same pot were considered as one HH.

The survey team in collaboration with village leaders prepared a list of all households in the village. In villages where greater than 150 households were found, segmentation was done after which one segment was randomly selected for the survey.

The team started the survey from any convenient household of the randomly selected households (12 households) to carry out anthropometric and mortality questionnaires. Revisits was done to households in which eligible children (under five) or entire family found to be absent at first attempt. Survey team was strictly told not to substitute any households.

Data Collection Questionnaires

Structured questionnaire was used to collect anthropometric and health data (anthropometric questionnaire) from all children within the eligible age range (6-59 months). However, mortality data (individual mortality questionnaire), food security and livelihood and WASH data was collected from all sampled households regardless of whether they had children or not.

Survey Variables

A. Anthropometric data

- **Age of the child (months):** Most of the children's age was determined based of maternal recall of exact birth dates or ages in completed months using local seasonal event calendar. Birth certificate and immunization card record was also used.
- **Sex of child (m/f):** was determined by asking directly of respondents. The sex information was confirmed by observation during measurement.
- **Height/Length (cm):** was measured using 130 cm long, Stadio-meter wooden height boards of type Shorr Productions, 17802 Shortly Bridge Place - Maryland, USA and recorded to the nearest 0.1 centimetre. Height was taken for children two years and above (or 87 cm and above when age was not known) while standing. Length was taken for children below two years of age (below 87 cm when age was not known). Those children was measured lying horizontally on the length measuring board. Boots

and hats was removed when taking length/height. For measuring height/length 2 data collectors (one measurer and one assistant) was assigned. Heights/length was taken following recommended steps described in the Nutrition Survey (SMART Methodology) Guideline for South Sudan. [16]

- **Weight (Kg):** was measured by using a calibrated SECA scales, 100g precision and recorded to the nearest 0.1 kilogram. Weight was taken following recommended steps described in the 2011 national guideline for nutrition survey in South Sudan.[17]
- **Nutritional Oedema:** was diagnosed by applying medium thumb pressure on the upper side of the foot for three seconds. A child was considered as edematous when both feet presented with pitting oedema.
- ***MUAC (Mid Upper Arm Circumference):*** was measured using a three colour coded (red, yellow, green) flexible, non-stretchable, 26.5cm long tape, graduated with 1 mm precision. MUAC was measured at the mid-point of the left upper arm. The reading and recording was to nearest 1 millimeter. MUAC measurement was taken following recommended steps described in the National Guideline for Nutrition Surveys in South Sudan. [18]

B) Deworming, Measles immunization and Vitamin A supplementation

- ***Deworming (for 6-59 months)*** - mothers/caretakers were asked whether the child had been dewormed in the last 6 months. Deworming tablets were shown to caregivers to aid in recall
- ***Measles vaccination status***- each child's mother/caretaker was asked if the child had received a measles vaccine, and where possible this was also checked against written records on a vaccination card. Status of measles immunization was assessed from all children 9-59 months old.
- ***Vitamin A supplementation (for 6-59 months)***- was also assessed by showing the mother / respondent vitamin A capsule if the child had taken one or two of these in the last six months. Hence, enumerators was provided Vitamin A capsule to show to the respondents. At the same time EPI cards was also used.

C) Morbidity and Mortality data

[16] Guidance note for Nutrition survey (SMART methodology) for South Sudan, Nutrition cluster/MOH/RSS/UNICEF, 2011
[17] Guidance note for Nutrition survey (SMART methodology) for South Sudan, Nutrition cluster/MOH/RSS/UNICEF, 2011
[18] Guidance note for Nutrition survey (SMART methodology) for South Sudan, Nutrition cluster/MOH/RSS/UNICEF, 2011

- ***Retrospective morbidity***- morbidity over the two weeks prior to the survey was recorded for each sampled child. Definitions of common morbidities (fever, diarrheal, cough, etc.) were provided to enumerator to ensure uniformity and standardize among the interviewers.
- ***Health care seeking***: For children reported as being sick during the recall period, utilization of health service was collected from the caretaker.
- ***Retrospective mortality***- this section collected data on the number of people preset a night before the date of data collection in the sampled households, those who were present at the beginning of the recall period, birth and passing away. The method also took into account the number of people who joined or left the households during the recall period.

D) Food Security, Livelihoods (FSL) and WASH

Heads of all sampled households was interviewed to understand about household's food consumption and coping strategies as well as WASH indicators.

2.6. Survey teams

Six teams of four members (one team leader and three data collectors) were employed to collect the data. The data collectors were selected from the Duk County in collaboration with John Dau foundation and relevant authorities. These data collectors were selected based on their academic achievement, technical skill and health status, and previous work history/experience of conducting survey. The survey team was also included nutrition program staff, drawn from JDF and CHD, which had prior experience in nutrition surveys. Each team was assisted by a village guide (village leader) to lead and guide the survey team within the village and locating the selected households.

2.7. Survey Quality assurance

The survey teams were intensively trained for five days. The training focused on survey objectives, methodology, anthropometric measurements, field procedures, interviewing techniques, administration of the survey tools. Standardization test and field test were conducted as part of the training. During standardization, two batches of 10 children between 6 and 59 months were used. Each measurer measured 10 children twice with rest period in between. The same children were measured by the supervisor twice. ENA software was used to calculate precision and accuracy of height and weight measurements.

Then measurers with acceptable level of precision and accuracy, was selected to make anthropometric measurements during the actual data collection.

During data collection, completed survey questionnaire were review by the survey manager and feedback were given every morning before the team departs to villages for the data collection.

3. SURVEY RESULT

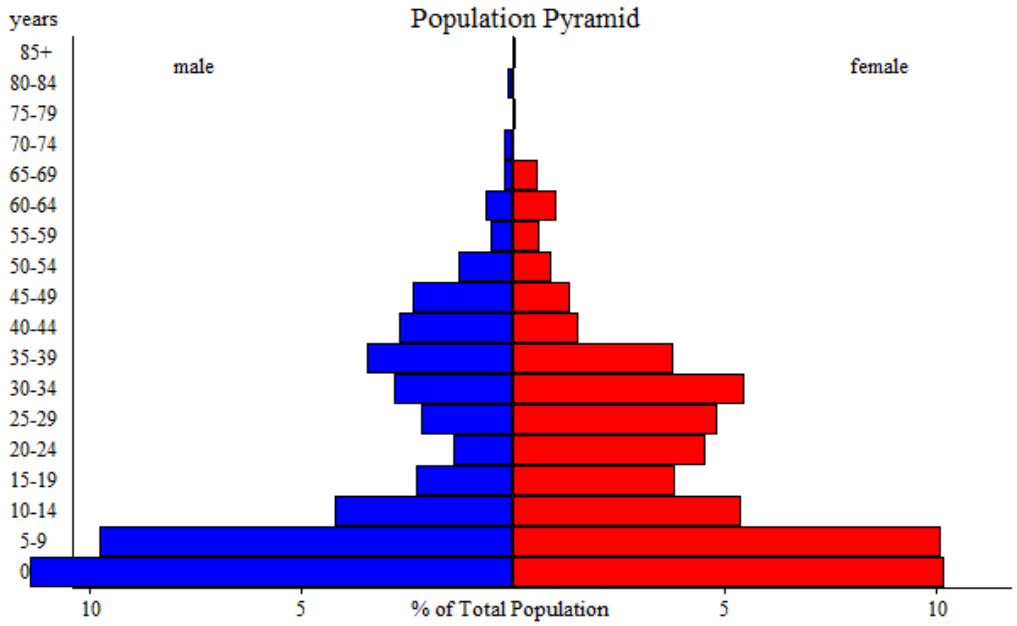
3.1. Demographic characteristics of sampled households

A total 467 households and 3211 population were included in the survey. The average household size was 6.9 individuals per household. Out of these households, 86.7% of households had children aged 6-59 months and the total children included in the survey were 648. Of all the residents involved in the survey; 57.8% were residents, 39.4% were returnees and 2.6% were IDPs. Majority of households were female headed (60.2%).

Table 4: Demographic characteristics of Duk County, South Sudan, March 2017

Characteristics	Value (no.%)
Number of Clusters	39
Total Population	3211
Total number of HHs	467
Total number of HHs with children under five	405
Average household size	6.9
Percentage of children under five	22.6%
Birth Rate	1.04
In-migration Rate (Joined)	2.91
Out-migration Rate (Left)	15.6
Resident	270 (57.8%)
Return	184 (39.4%)
IDP	12 (2.6%)
Other	1 (0.2%)
Male headed households	186 (39.8%)
Female headed households	281 (60.2%)

Figure 3: Population pyramid, Duk County, March 2017



3.2. Anthropometry Result (Based on 2006 WHO standards)

3.2.1. Acute malnutrition

Anthropometry data was collected from 648 children aged between 6-59 months from 467 households. The survey reached 135% of the calculated sample size o (478 children) which makes the sampling of the survey representative of Duk County under five children.

The data was analyzed based on WHO standards 2006. 46.9% (n=304) of all the children surveyed were girls while 53.1 % (n=344) were boys giving acceptable sex ration of 1:1. *(See the table below)*

Table 5: Distribution of age and sex in children 6-59 months, Duk County, South Sudan, March 2017

	Boys		Girls		Total		Ratio
AGE (mo)	**no.**	**%**	**no.**	**%**	**no.**	**%**	**Boy: girl**
6-17	80	49.7	81	50.3	161	24.8	1.0
18-29	82	51.3	78	48.8	160	24.7	1.1
30-41	87	55.1	71	44.9	158	24.4	1.2
42-53	78	58.6	55	41.4	133	20.5	1.4
54-59	17	47.2	19	52.8	36	5.6	0.9
Total	344	53.1	304	46.9	648	100.0	1.1

Global acute malnutrition (GAM) is defined as <-2 z scores weight-for-height and/or oedema and severe acute malnutrition (SAM) is defined as <-3z scores weight-for-height and/or oedema.

All exclusion of z-scores was determined by applying SMART flags (WHZ -3 to 3; HAZ -3 to 3; WAZ -3 to 3) which are based on the observed survey mean. Flagged nine anthropometry datasets were excluded in WHZ analysis.

Based on weight for height z-scores, prevalence of global acute malnutrition **(GAM)** was **26.1%** (167) and from this, 20.7% (132) of children were moderately malnourished **(MAM)** and 5.5% (35) were severely malnourished **(SAM).** No child with Oedema was found. *(See table below).*

Table 6: Prevalence of acute malnutrition based on WFH Z score (and/or oedema) and by sex

	All n = 639	Boys n = 339	Girls n = 300
Prevalence of **GAM** (<-2 z-score and/or oedema)	(167) **26.1 %** (22.2 - 30.5 95% C.I.)	(83) 24.5 % (20.1 - 29.4 95% C.I.)	(84) 28.0 % (22.1 - 34.7 95% C.I.)
Prevalence of **MAM** (<-2 z-score and >=-3 z-score, no oedema)	(132) **20.7 %** (17.2 - 24.6 95% C.I.)	(63) 18.6 % (14.7 - 23.2 95% C.I.)	(69) 23.0 % (17.9 - 29.0 95% C.I.)
Prevalence of **SAM** (<-3 z-score and/or oedema)	(35) **5.5 %** (3.7 - 8.1 95% C.I.)	(20) 5.9 % (3.7 - 9.3 95% C.I.)	(15) 5.0 % (2.9 - 8.4 95% C.I.)

The prevalence of oedema is 0.0 %

Childhood wasting (WFH) is normally distributed in Duk population. The County's Gaussian curve of wasting (red) is moved to right of the reference population (green) indicating that in general, Duk County has large proportion of wasted children compared to the reference population.

Figure 4: Gaussian curve showing distribution of WFH Z score measurement among under five children, Duk County, March 2017

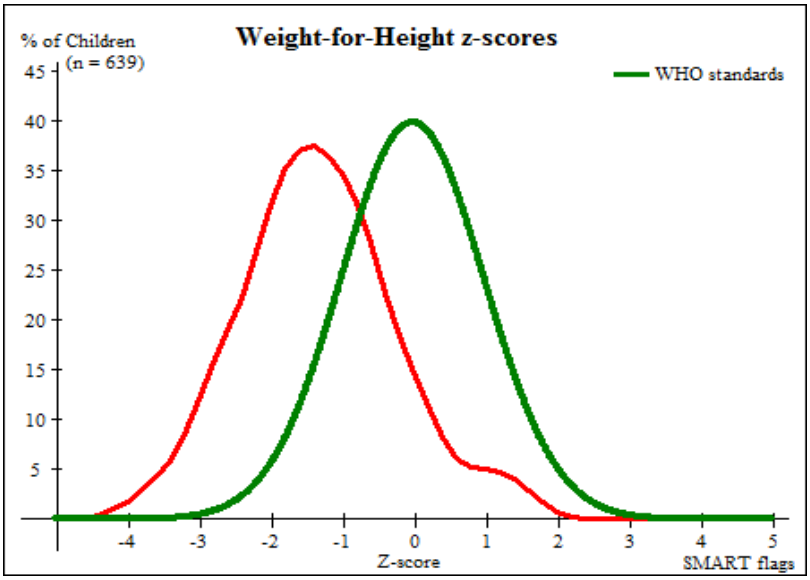


Table 7: Prevalence of acute malnutrition by age, based on WFH z scores and/or oedema

		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	***Total no.***	***No.***	***%***	***No.***	***%***	***No.***	***%***	***No.***	***%***
6-17	159	22	13.8	31	19.5	106	66.7	0	0.0
18-29	154	3	1.9	38	24.7	113	73.4	0	0.0
30-41	157	7	4.5	25	15.9	125	79.6	0	0.0
42-53	133	2	1.5	27	20.3	104	78.2	0	0.0
54-59	36	1	2.8	11	30.6	24	66.7	0	0.0
Total	**639**	**35**	**5.5**	**132**	**20.7**	**472**	**73.9**	**0**	**0.0**

No Oedema (Kwashiorkor) case was observed among the targeted children. There were 5.4% (n=35) of Marasmus cases.

Table 8: Distribution of acute malnutrition and oedema based on WFH z score

	<-3 z-score	**>=-3 z-score**
Oedema present	Marasmic kwashiorkor No. 0 (0.0 %)	Kwashiorkor No. 0 (0.0 %)
Oedema absent	Marasmic No. **35 (5.4 %)**	Not severely malnourished No. 613 (94.6 %)

The prevalence of global acute malnutrition based on MUAC, known as proxy GAM, was 22.4% (145) and the prevalence for SAM was of 4.5 % (29). Both, prevalence of MAM & SAM levels were recorded lower using MUAC measurement than WFH Z score. That is, the proxy GAM (MUAC) is 3.4% lower than the actual GAM (WFH).

Table 9: Prevalence of acute malnutrition based on MUAC cut offs (and/or oedema) by sex

	All n = 648	**Boys** n = 344	**Girls** n = 304
Prevalence of global malnutrition (< 125 mm and/or oedema)	(145) **22.4 %** (19.5 - 25.6 95% C.I.)	(68) 19.8 % (16.1 - 24.1 95% C.I.)	(77) 25.3 % (20.3 - 31.1 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(116) **17.9 %** (15.2 - 21.0 95% C.I.)	(56) 16.3 % (13.0 - 20.2 95% C.I.)	(60) 19.7 % (15.1 - 25.4 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(29) **4.5 %** (2.9 - 6.8 95% C.I.)	(12) 3.5 % (1.9 - 6.3 95% C.I.)	(17) 5.6 % (3.4 - 9.2 95% C.I.)

Table 10: Prevalence of acute malnutrition by age, based on MUAC cut offs and/or oedema

		Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
Age (mo)	***Total no.***	***No.***	***%***	***No.***	***%***	***No.***	***%***	***No.***	***%***
6-17	161	24	14.9	64	39.8	73	45.3	0	0.0
18-29	160	3	1.9	39	24.4	118	73.8	0	0.0
30-41	158	2	1.3	11	7.0	145	91.8	0	0.0
42-53	133	0	0.0	2	1.5	131	98.5	0	0.0
54-59	36	0	0.0	0	0.0	36	100.0	0	0.0
Total	**648**	**29**	**4.5**	**116**	**17.9**	**503**	**77.6**	**0**	**0.0**

As indicated in the two figures below, MUAC identified more malnourished children who are younger (less than 29 months); however, wasting in under-five children using WFH Z score is normally distributed (SD for WFH Z score is 1.09 which is acceptable) across all age group. *(See figure 3.3 & 3.4)*

Figure 5: Distribution of wasting in different age group using weight for height Z score, Duk County, March 2017

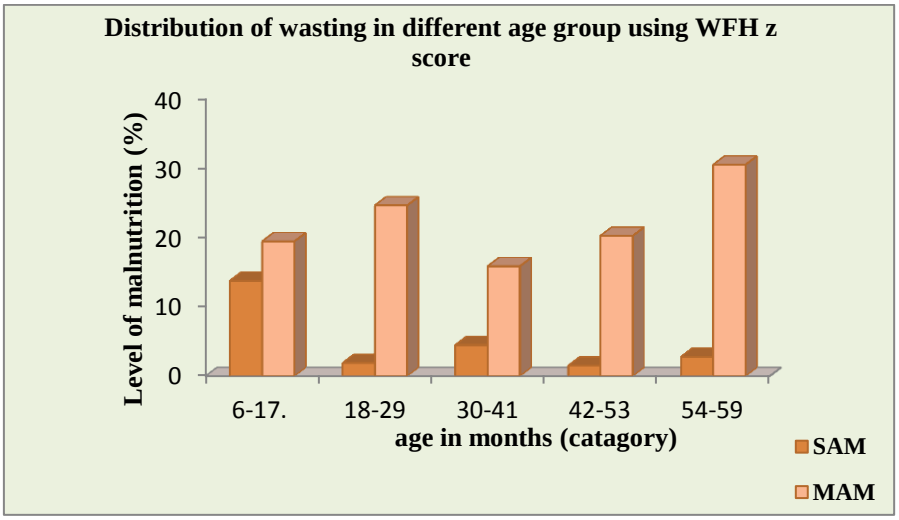


Figure 6: Distribution of wasting in different age group using MUAC measurement, Duk County, March 2017

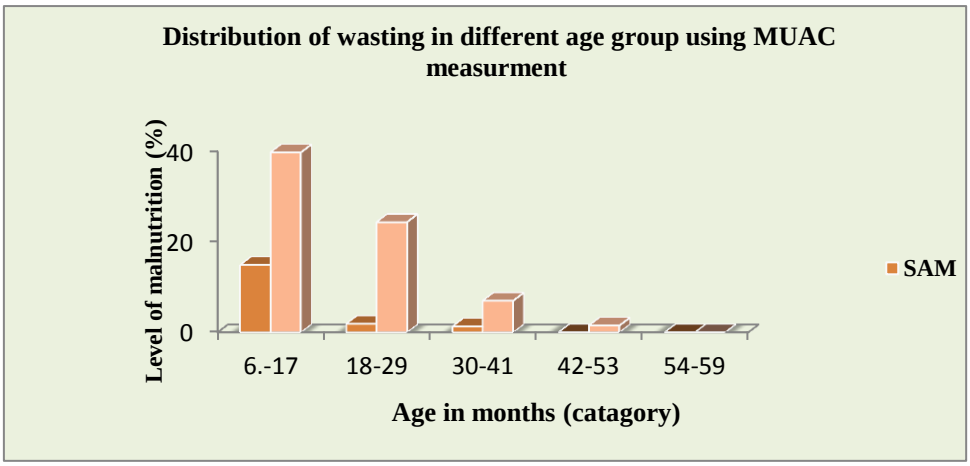


Table 11: Prevalence of underweight based on WFA Z score by sex

	All n = 645	Boys n = 342	Girls n = 303
Prevalence of underweight (<-2 z-score)	(130) 20.2 % (17.2 - 23.5 95% C.I.)	(72) 21.1 % (17.2 - 25.5 95% C.I.)	(58) 19.1 % (15.4 - 23.6 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(114) 17.7 % (14.8 - 21.0 95% C.I.)	(61) 17.8 % (14.0 - 22.5 95% C.I.)	(53) 17.5 % (14.1 - 21.5 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(16) 2.5 % (1.6 - 3.9 95% C.I.)	(11) 3.2 % (1.8 - 5.7 95% C.I.)	(5) 1.7 % (0.7 - 3.6 95% C.I.)

3.2.2. Chronic malnutrition

Overall stunting was found to be 14.7% and sever stunting was 1.7%. Stunting is at a low public health significance level in Duk County, according to "WHO cut off values for public health significance" [19]

Table 12: Prevalence of stunting based on HFA z score by sex

	All n = 639	Boys n = 341	Girls n = 298
Prevalence of stunting (<-2 z-score)	(94) 14.7 % (10.7 - 19.9 95% C.I.)	(53) 15.5 % (10.9 - 21.8 95% C.I.)	(41) 13.8 % (8.8 - 20.8 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(83) 13.0 % (9.3 - 17.9 95% C.I.)	(44) 12.9 % (8.9 - 18.4 95% C.I.)	(39) 13.1 % (8.4 - 19.7 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(11) 1.7 % (0.9 - 3.4 95% C.I.)	(9) 2.6 % (1.2 - 5.8 95% C.I.)	(2) 0.7 % (0.2 - 2.6 95% C.I.)

[19] http://www.who.int/nutrition/nlis_interpretation_guide.pdf *low prevalence is* ***<20%,*** *medium prevalence is* ***20-29%,*** *high prevalence is* ***30-39%*** *& very high prevalence is* ***≥40%***

Table 13: Mean z-score, design effects and excluded subjects

Indicator	n	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	639	-1.32±1.09	1.41	0	9
Weight-for-Age	645	-1.09±1.02	1.00	0	3
Height-for-Age	639	-0.43±1.33	2.63	0	9

* contains for WHZ and WAZ the children with oedema.

3.3. Mortality Results

Mortality data was collected using the individual mortality questionnaire from 467 household using a 90 days recall period which started from January 27th 2017. A total of 3,211 individuals were included in the mortality survey, out of which 648 were children 0-5years. There were 405 HH with children less than 5 years and overall average HH size was 6.9 individuals per Household. Percentage of children under 5 years was 22.6% and birth rate of 1.04.

The Crude mortality rate (CMR) and under five mortality rate (U5MR) of 1.18 (0.73-1.90) and 0.96 (0.38-2.38) deaths/10,000/day were recorded respectively. The CMR is at emergency WHO threshold while U5MR is below WHO emergency alert thresholds of sub-Saharan Africa of 0.8/10,000/day and 2.1/10,000/day respectively. This increased mortality in adults could be resulted from the conflict currently going in the area. One cluster in Pajut village reported more deaths (#7). This was because of the cholera epidemic occurred in the week of data collection. Summary of mortality results are indicated below.

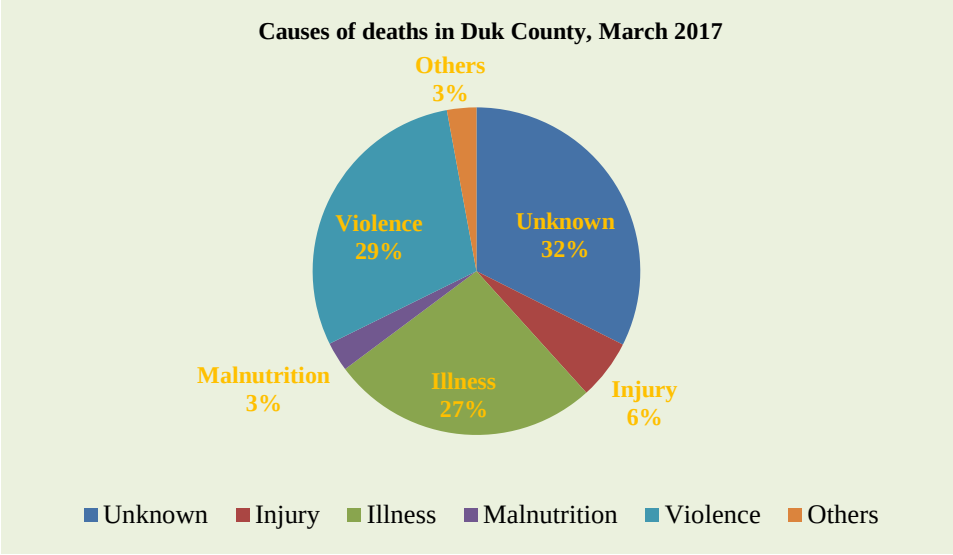
Table 14: Mortality rates and detailed parameters, Duk County, March 2017

Parameters	Results:	Design effect
Crude mortality rate (death/10,000/day)	1.18 (0.73-1.90	1.92
U5DR (Deaths in children /10,000/day)	0.96 (0.38-2.38)	1.23
Total number of HHs	467	
Total number of HHs with children under five	405	
Average household size	6.9	
Mid Interval Population Size	3211.5	
Number of Clusters	39	
Percentage of children under five	22.6	
Birth Rate	1.04	
In-migration Rate (Joined)	2.91	
Out-migration Rate (Left)	15.6	

A total of 34 deaths recorded during the recall period of 90 days prior to the date of data collection. Among the 34 deaths recorded, 6 occurred in children under five years old and 28 in persons older than 5 years of age. Almost half of the death occurred in the age of 18-49 year group. The three major causes of deaths (88.3% all together) were unknown

(32.4%), violence (29.4%) and illness (26.5%). 91.2% of deaths occurred in the current place of residence and the rest 8.8% occurred during migration.

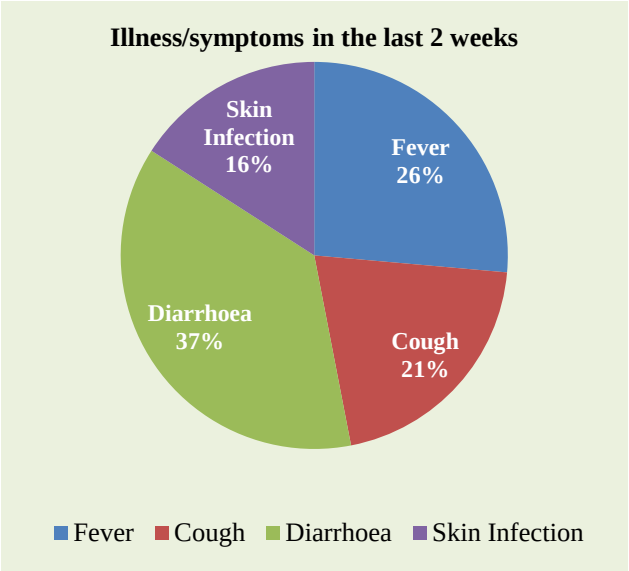
Figure 7: Causes of deaths in Duk County, March 2017



3.4. Child Morbidity and Health coverage

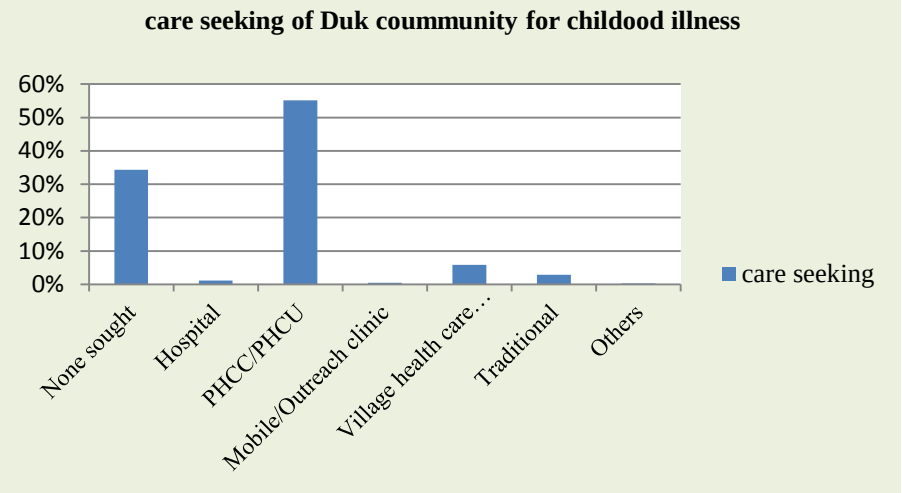
Totally, 379 children were reported to have illness in the last 2 weeks prior to the survey. The overall prevalence of reported illness was 58.5%. Diarrhoea (37%), fever (26%) and cough (21%) were the most common prevalent reported illnesses.

Figure 8: Childhood Illness/Symptoms reported 2 weeks prior to the survey, Duk County, March 2017



From those who were reported to be ill, 34.3% of them didn't get any of available care.

Figure 9: Care seeking behaviour of Duk community for reported childhood illness, March 2017



Coverage of health indicators

Coverage of immunization (measles) is 74.8% and more than half of surveyed children didn't receive deworming and vitamin A supplementation. More than half of (53.8%) children found malnourished by MUAC measurement were not enrolled in any of nutrition program (TFU/TSFP).

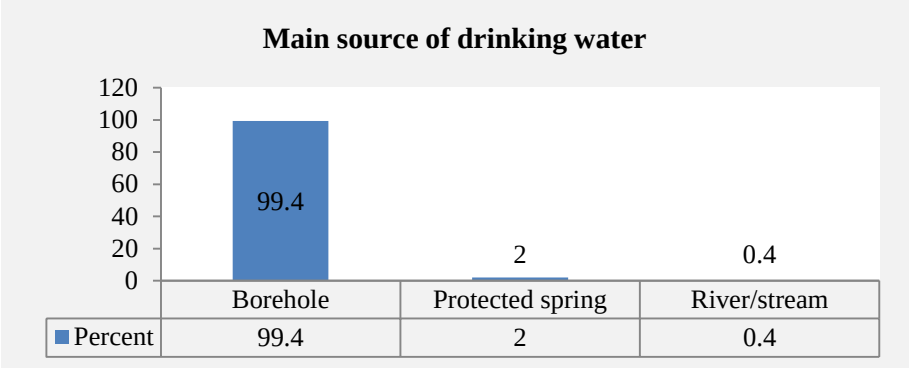
Table 15: Summary of coverage/enrolment of health indicators, Duk County, March 2017

Type	Indicator	No. of cases	%	95% CI
Vaccination / Supplementation Type	Measles with EPI card (9-59 months) (n=619)	275	44.4%	19.1-25.8
	Measles with EPI card and recall (9-59 months) (n= 619)	463	74.8	71.1-78.1
	Deworming (12-59 months) (n= 573)	282	49.2	44.6 – 54.6
	Vitamin A in last 6 months (6-59 months) (n=648)	314	48.5%	44.6 – 52.4
Bed net (LLITNs utilization)	Yes	191	29.5%	
	No	457	70.5%	
Enrolment of malnourished children in to nutrition program (based on MUAC < 125 MM) (#145)	Not in any of a program	78	53.8 %	
	In TFU	24	16.6%	
	In TSF	43	29.6%	

3.5. Water sanitation and Hygiene (WASH)

Large number of households (99.4%) collected water from bore hole.

Figure 10: Main source of drinking water in Duk County, March 2017



The sampled households were asked on the time taken to fetch water and the amount of water consumed the day prior to the survey date. 16.3 % households travelled less than half an hour, 22.1% travelled in between 30 minutes and one hour and 61.5% travelled for more than 1 hour to collect water for household consumption.

According to Sphere standards, 15 liters per person per day is the minimum daily water requirement[20]. In the sample households, only 8% the households had the minimum requirement of 15 lit of water per person/day on the day prior to the survey.

Table 16: Time required to collect household water in Duk County, March 2017

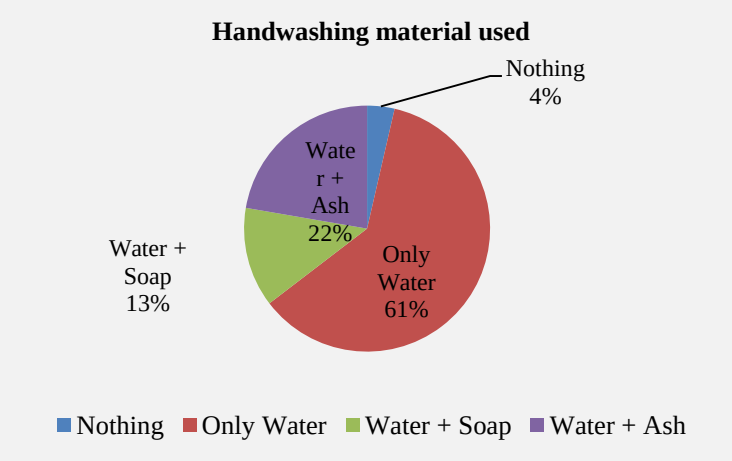
Time required*	Frequency	Per cent
< 30 minute	76	16.3%
> 30 min to < 1hr	103	22.1%
> 1hr to < 2hr	91	19.5%
> 2hr to < 4hr	82	17.6%
> 4hr	115	24.6%
Total	**467**	**100.0%**

**Time spent includes travel to and from and waiting*

[20] The SPHERE project Humanitarian charter and minimum standards in humanitarian response, 2011

Cleaning material used for hand washing

Figure 11: Use of hand washing material, Duk County, March 2017



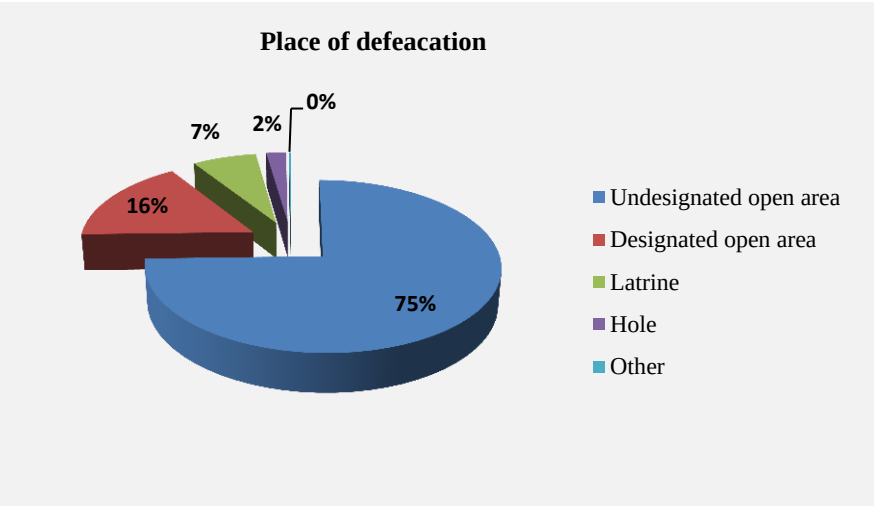
Water treatment practices

87.6% of the households didn't use any of the water treatment methods. Boiling is practiced by 6.2%, filtering by clothes is by 2.5%, "letting to settling" is by 2.1% of households and chlorination is the least (at 1.5%) practiced water treatment method.

Place of excreta disposal

Open defecation is common at 75% of the households. Only 7% of HHs utilized latrine.

Figure 12: Place of excreta disposal, Duk County, March 2017



3.6. Food security and livelihood situation

Food security data was collected from 467 households selected for Anthropometry, mortality and WASH survey to determine household food security and households livelihood situation of Duk County. The assessment covered the main components of food security.

Main source of income and Food

To determine the availability and access to food, the surveyed HH were asked on the main source of food in the last 7 days and main source of income in the last 30 days prior to the survey. Majority of the HH's indicated work for food at 36.6%, purchase at 22.3% and gathering at 15.8% as their main sources of food. Very small number of households, 3.9% and % 5.6%, reported own production and food aid respectively as main source of food.

Sales of natural resource at 59.5% reported to be the main source of income 30 days prior to the survey. Only 32.8 of households reported to own livestock

Table 17: Main income and food source, Duk County, March 2017

Indicators	Response	Frequency	Percent
Main source of income	Sales of crops	7	1.5%
	Salaried work	13	2.8%
	Other petty trading	3	0.6%
	Small business	10	2.1%
	Family support	6	1.3%
	Sales of livestock	23	4.9%
	Sales of animal products	15	3.2%
	Brewing	24	5.1%
	Sales of fish	8	1.7%
	Sales of natural resources	278	59.5%
	Sales of food aid	1	0.2%
	Casual work	47	10.1%
	Skilled labour	7	1.5%
	Other	25	5.4%
	Total	**467**	**100.0%**
Main source of food	Own production	18	3.9%
	Work for food	171	36.6%
	Gifts	15	3.2%
	Market/shop purchase	104	22.3%
	Borrowing	19	4.1%
	Food aid	26	5.6%
	Hunting	20	4.3%
	Fishing	7	1.5%
	Gathering	74	15.8%
	Other	13	2.8%
	Total	**467**	**100.0%**

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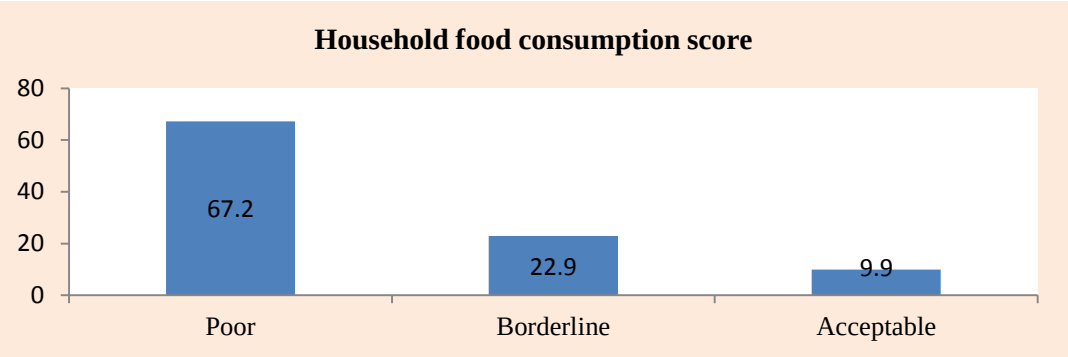
Food consumption score

Food consumption score (FCS) is a composite score of dietary diversity, food frequency, and relative nutritional importance of different food groups. It represents households' dietary diversity and nutrient intake. The FCS was calculated from households' consumption of different food groups in the last 7 days prior to the survey. A score of 0-21 was considered as poor, 21.5-35 as borderline and above 35 as acceptable consumption score21. Majority of the Households (67.2%) reported to have poor FCS and only 9.9% had acceptable FCS.

Figure 13: Household food consumption score, Duk County, March 2017



Coping mechanism

96.4% of households reported that there were times when they did not have enough food or money to buy food during the last one month before the survey. From known categories of coping strategies[22], *dietary change* and *rationing strategies* are the most exercised strategies in Duk County. Limited portion size at meal (51%), reduced number of meals (47.1%), relying on less preferred/cheaper foods (42%) and restrict adult consumption for children (42%) are frequently used strategies.

Table 18: Coping strategies exercised by Duk County, March 2017

Coping mechanism		Frequency	%
Rely on less preferred/ cheaper food		196	42.0%
Borrowing/ kinship support		70	15.0%
Limit portion size at meals		238	51.0%
Restrict adults' consumption for children		196	42.0%
Reduce number of daily meals		220	47.1%
Sell more animals than usual		48	10.3%
Consume seed stocks		107	22.9%
Other		10	2.1%
Others (Specified)	sell of firewood	1	25.0%
	wild leaves	3	75.0%

[21] Calculation and use of the food consumption score in food security analysis, UNWFP, 2008
[22] General coping strategy categories: Dietary changes, increasing short-term food access, decreasing number of people to feed and Ration strategies.

4. CONCLUSIONS & RECOMMENDATION

Conclusion

Based on WHO crisis classification, with GAM 26.1 % and SAM 5.5%, the nutrition situation of Duk County is at the critical level. Main possible contributing factor to the high level of malnutrition could be

- ***Poor food security situation***: 67.2% households had poor FCS
- ***Poor WASH service***. Only 8% the households had the minimum requirement of 15 lit of water per person/day and ¾ of the population practice open defecation. Latrine utilization is very low.
- ***Prevalent childhood illness:*** More than half of (58.5 %) surveyed children had at least one of the childhood illness. Diarrhoea was the cause of illness for half of the sick children. .
- ***Poor nutrition service***: From the total cchildren found malnourished by MUAC measurement, more than half of them (53.8) were not enrolled in any of nutrition program (TFU/TSFP). JDF, a local NGO, is the only organization implementing nutrition program in the county. The program has not reached all Boma/Payams of county.

Recommendation

- Efforts have to be made to strengthen nutrition service delivery in the County. More nutrition centres/sites has to be established to areas close to the community.
- Screening of malnourished children should be conducted routinely to identify cases early.
- Health promotion programs should be strengthened so that children are brought to health care services and get treatment on time.
- Worsening of food security and nutrition situation is expected in the county in the coming few months before the harvest is started. Therefore; General food distribution (GFD) program should be initiated/scaled up.
- Currently there is no NGO in the area working on WASH programs. Therefore, the NIWG should advocate so that the responsible sector/cluster take action.
- One payam was excluded from the survey because of inaccessibility. Such remote and inaccessible areas might have worse nutrition situation. Therefore, the nutrition IP (JDF) should monitor the situation and conduct mass screening in those areas.

REFERENCE

- South Sudan situation report, UNICEF, APRIL 2016.
- IPC Classification for South Sudan for the projection period, January to March, 2017
- South Sudan livelihood zones and description, FEWS NET, August 2013.
- Twic East county Jonglei state, SMART survey, May 2016.
- Guidance note for Nutrition survey (SMART methodology) for South Sudan, Nutrition cluster/MOH/RSS/UNICEF, 2011
- The SPHERE project Humanitarian charter and minimum standards in humanitarian response, 2011
- Calculation and use of the food consumption score in food security analysis, UNWFP, 2008

Annexes

Annex 1: Selected Clusters

Payam	Boma	Geographical unit/Village	Population size	Number of Selected cluster
Ageer	Poktap	Poktap	23,000	6
	Poktap	Patronoi	2,800	1
Duk Payuel	Nyaken	Duk Payuel	1,500	1
Padiet	Padiet	Duk Padiet	24,000	7
	Dorok	Kuei	7,000	2
	Dorok	Dorok	7,000	2
Donchak	Ameil	Dong Chak	6,000	1
	Panajak	Panajak	3,000	1
	Ameil	Ameil	2,500	1
Panyang	Kachtong	Patuet	6,893	2
	Kuergai	kuerleer	4,851	2
	Jokdnel	Jokdnel	3,500	1
	Pulthep	pulthep	2,700	1
	Pajut	Pajut	40,000	11
Total				39

Annex 2: Plausibility Report

Plausibility check for: SSD_1703_DUK_ACF (1).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** (1.4 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.116)
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=0.067)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (6)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (7)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (6)
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	**0** (1.09)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**1** (0.27)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (0.10)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**0** (p=0.093)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**3** %

The overall score of this survey is 3 %, this is excellent.

Annex 3: Report for evaluation of enumerators

Weight:

	Precision: Sum of Square [W1-W2]	Accuracy: Sum of Square [Enum.(W1+W2)-(Superv.(W1+W2)]	No. +/- Precision	No. +/- Accuracy
Supervisor	0.05		0/5	
Enumerator 1	0.02 OK	0.19 POOR	2/0	1/4
Enumerator 2	0.04 OK	0.15 OK	4/0	1/5
Enumerator 3	0.10 OK	0.15 OK	1/1	1/5
Enumerator 4	0.12 POOR	0.13 OK	2/1	0/6
Enumerator 5	0.02 OK	0.19 POOR	1/1	1/4
Enumerator 6	0.02 OK	0.05 OK	1/1	0/5
Enumerator 7	0.06 OK	0.09 OK	1/2	3/3
Enumerator 8	0.04 OK	0.07 OK	0/4	2/2
Enumerator 9	0.01 OK	0.14 OK	0/1	0/6
Enumerator 10	0.03 OK	0.04 OK	2/1	2/2
Enumerator 11	0.04 OK	0.11 OK	4/0	1/4
Enumerator 12	0.05 OK	0.06 OK	5/0	1/2
Enumerator 13	0.00 OK	0.29 POOR	0/0	1/5
Enumerator 14	0.03 OK	0.48 POOR	3/0	2/3
Enumerator 15	0.01 OK	0.04 OK	1/0	0/4

Height:

	Precision: Sum of Square [H1-H2]	Accuracy: Sum of Square [Enum.(H1+H2)-Superv.(H1+H2)]	No. +/- Precision	No. +/- Accuracy
Supervisor	0.04		2/2	
Enumerator 1	0.06 OK	0.22 POOR	2/1	2/3
Enumerator 2	0.07 OK	0.07 OK	2/2	1/3
Enumerator 3	1.53 POOR	0.59 POOR	3/1	3/3
Enumerator 4	0.04 OK	0.06 OK	2/2	0/3
Enumerator 5	0.05 OK	0.07 OK	2/3	1/3
Enumerator 6	0.06 OK	0.02 OK	4/2	2/0
Enumerator 7	0.05 OK	0.31 POOR	2/3	1/4
Enumerator 8	0.06 OK	0.10 OK	1/5	1/3
Enumerator 9	0.03 OK	0.07 OK	2/1	3/1
Enumerator 10	0.09 POOR	0.11 OK	2/4	1/4
Enumerator 11	0.04 OK	0.10 OK	1/3	1/3
Enumerator 12	0.04 OK	0.16 POOR	0/4	2/3
Enumerator 13	0.08 POOR	0.38 POOR	1/4	1/5
Enumerator 14	0.09 POOR	0.03 OK	3/3	1/2
Enumerator 15	0.05 OK	0.35 POOR	0/2	1/4

MUAC:

	Precision: Sum of Square [MUAC1-MUAC2]	Accuracy: Sum of Square [Enum.(MUAC1+MUAC2)-Superv.(MUAC1+MUAC2]	No. +/- Precision	No. +/- Accuracy
Supervisor	5.00		5/0	
Enumerator 1	4.00 OK	13.00 OK	2/2	1/3
Enumerator 2	6.00 OK	11.00 OK	3/0	1/4
Enumerator 3	6.00 OK	9.00 OK	5/1	3/0
Enumerator 4	6.00 OK	9.00 OK	2/4	1/2
Enumerator 5	4.00 OK	9.00 OK	1/3	3/0
Enumerator 6	5.00 OK	70.00 POOR	4/1	2/2
Enumerator 7	4.00 OK	5.00 OK	4/0	0/2
Enumerator 8	9.00 OK	52.00 POOR	2/1	2/4
Enumerator 9	4.00 OK	11.00 OK	2/2	1/2
Enumerator 10	4.00 OK	9.00 OK	0/4	0/3
Enumerator 11	1.00 OK	20.00 POOR	1/0	2/2
Enumerator 12	3.00 OK	14.00 OK	2/1	0/3
Enumerator 13	3.00 OK	12.00 OK	0/3	0/4
Enumerator 14	21.00 POOR	58.00 POOR	4/1	3/3
Enumerator 15	2.00 OK	11.00 OK	0/2	2/3

For evaluating the enumerators the precision and the accuracy of their measurements is calculated.
For precision the sum of the square of the differences for the double measurements is calculated. This value should be less than two times the precision value of the supervisor.
For the accuracy the sum of the square of the differences between the enumerator values (weight1+weight2) and the supervisor values (weight1+weight2) is calculated. This value should be less than three times the precision value of the supervisor.
To check for systematic errors of the enumerators the number of positive and negative deviations can be used.

Annex 4: Questionnaires

ANTHROPOMETRIC & HEALTH QUESTIONNAIRE

(To be conducted in EVERY HH with children 6-59 - from the random starting point onwards)

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

1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	1.12	1.13	1.14	1.15	1.16	1.17
Child ID	HH ref. no. (To be copied from the CF/LF)	Sex --- **m** = Male **f** = Female	Age in months (use local calendar of event, heath card, birth certificates/ notifications)	Source of Age information 1. Birth certificate/ notification 2. Health card 3. Mothers recall/ calendar of events	Weight in Kg (e.g. 12.4)	Height in cm (e.g. 78.1)	Oedema --- **n** = No **y** = Yes	MUAC in cm (e.g. 11.3)	VIT A (**in last 6 months**) --- **0** = No **1** = Yes	Deworming **(in past 6 months)** --- **0** = No **1** = Yes **3**= Do not know	Measles Vaccine --- **0** = No **1** = Yes with EPI card **2** = Yes recall **3**= Do not know **88** = Child <9m	Illness **in past 2** weeks? --- **0** = No **1** = Yes If no, go to 1.17	Type of Illness --- **1** = Fever* **2** = Cough** **3** = Diarrhea*** **4** = Skin Infections **5** = Eye infections **66** = Other (**specify**) _____	Treatment sought --- **0** = None sought **1** = Hospital **2** = PHCC/PHCU **3** = Mobile /outreach clinic **4** = Village health care worker **5** = Private physician **6** = Relative/ friend **7** = Shop **8** = Traditional practitioner **9** = Pharmacy **66** = Other (**specify**)_____	Did the child sleep under a mosquito net (LLITN) last night? --- 0 = No 1 = Yes	If malnourished (MUAC < 11.5 and/or the child has edema), is child currently enrolled in treatment Programme? 0 = No 1 = yes, (in TFP) 2 = yes, (in SFP) 99 = NA (the child is not malnourished)
1																
2																
3																
4																
5																
7																
8																
9																
10																

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

*Fever: Elevated body temp and chills

**Cough: Fever and difficulty in breathing

***Diarrhea: Three or more loose stool/ day

DEMOGRAPHY & MORTALITY QUESTIONNAIRE

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

COUNTY:	**PAYAM:**	**NAME OF INTERVIEWER:**
BOMA:	**VILLAGE:**	
CLUSTER NO. [ ][ ]	**TEAM NO. [ ][ ]**	**HOUSEHOLD[23] NO. [ ][ ]**

01	02	03	04	05	06	07	08	09	10
No.	**Name**	**Sex** (M/F)	**Age** (in completed years)	**Joined on or after:** _____ (Start date of the recall period - ex. Jan. 1, 1900) **WRITE 'Y' for YES. Leave BLANK if NO.**	**Left on or after:**	**Born on or after:**	**Died on or after:**	**Cause of death** 1) Diarrhea 2) Fever 3) Measles 4) Cough and difficulty breathing 5) Malnutrition 6) Violence/ conflict related 7) Injury 8) unknown 9) Others (Specify---------	**Location of death** 1=current location 2=during migration 3=in place of last residence 4=other
a) List **ALL** the household members that are **currently living** in this household (that slept in this household last night).									
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
b) List all the household members that have **left this household** (out migrants) since **the start of the recall period, i.e.** *all the people that slept in this household on the* ***first night of the recall period*** *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		

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

[23] 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.

WATER AND SANITATIONQUESTIONNAIRE

(To be conducted in ALL households and continue questioning HHs where "Anthro & Health", Mortality and FSL information has been collected)

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

Payam: ……..…… Boma: ……..…….. Village: ……..……..

4.1	*4.2*	*4.3*	*4.4*	*4.5*	*4.6*	*4.7*	*4.8*
HH ref. no.	**What is the main source of drinking water for this household?** 1) Borehole 2) Protected shallow well 3) Open shallow well 4) Protected spring 5) River/stream 6) HH connection/stand pipe or tanker 7) Dam/pond 66) Other (Specify) ----------	**How long does it takes to collect HH water (including travel to and from and waiting)?** 1) < 30 minute 2) ≥ 30 min to < 1hr 3) ≥ 1hr to < 2hr 4) ≥ 2hr to < 4hr 5) ≥ 4hr	**How many liters (Jerri cans) of water did the HH use yesterday in total (excluding water for washing)?** Define how many liters a Jerri can hold if the population all uses same. Consider balance of the fetched amount and leftover).	What is done to the water **before** household members drink it? 1) Nothing 2) Boiling 3) Filtering with a cloth 4) Letting it settle 5) Chlorination 6) Other (Specify) ----------	When do you usually wash your hands during the day (List ALL options mentioned)? 1) Never 2) After defecting 3) After cleaning child feces 4) Before eating 5) Before breast feeding 66) Other (Specify)-----	What do you use to wash hands? 1) Nothing 2) Water only 3) Water + soap 4) Water + ash 66) Other (Specify) ----------	**Where** does the household usually use the toilet (include more than one if necessary)? 1) Undesignated open area 2) Designated open area 3) Hole 4) Latrine 66) Other (Specify) ----------

FOOD SECURITY AND LIVELIHOOD QUESTIONNAIRE

(continue questionning HHs where Mortality 'Anthro' & Health Info' has been collected)

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

3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	3.10	3.11	3.12	3.13	3.14	3.15	3.16	3.17	3.18
HH Ref. No:	**HH size ------ (No. of people living in HH)**	**Resident status of HH:** --------- 1 = Resident 2 = Returnee (in the last 1 year) 3 = IDP 4 = Refugee 66 = Other (specify) _____	**Is the HH head male or female ?** --------- 1 = Male 2 = Female	**What was your HHs main income activity in the last 30 days? (choose 1 option)** ---------- 1 = Sale of crops 2 = Sale of livestock 3 = Sale of animal products 4 = Brewing 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 = Other petty trading 12 = Small business 13 = Family support 66 = Other (specify)	**How many days in past 7 days did your household consumed the following items?**									**What was the main source of food in the past 7 days? (choose 1 option)** ---------- 1 = Own production 2 = Work for food 3 = Gifts 4 = Market/ shop purchase 5=Borrowing/ debt 6 = Food aid 7 = Hunting 8 = Fishing 9 = Gathering 66 = Others ----------	**Did you cultivate in the recent last season?** --------- 0 = No 1 = Yes	**Does the HH own any livestock, herds or farm animals?** ------ --- 0 = No 1 = Yes	**In the past 30 days, have there been times when you did not have enough food or money to buy food?** ---------- 0 = No 1 = Yes	**If yes, which coping strategies were used? (list ALL options mentioned)** ---------- 1 = Rely on less preferred/ cheaper food 2 = Borrowing/ kindship support 3 = Limit portion size at meals 4 = Restrict adults' consumpiton for children 5 = Reduce number of daily meals 6 = Sell more animals than usual 7 = Consume seed stocks 66=Other (specify) ----------
					Cereal and tubers: Maize/ sorghum/ cassava/ potatoes/ sweet potatoes/ millet/ pasta/ bread/ rice/ other cereals and tubers	**Pulses:** beans/ lentils/ greengrams/groundnuts/ cashew nuts/ sesame/ peas	**Vegetables/ green leaves**	**Fruits**	**Animal protein:** Beef, goat, pork, poultry, eggs, fish	**Milk and other dairy products** (yog hurt, curd)	**Sugar, honey, sweets**	**Oil, fats, butter**					

Annex 5. Calendar of events, Duk County, March 2017

	2012	2013	2014	2015	2016	2017
Jan ***Peei de tok***		Beginning of dry season **50**	Beginning of dry season **38**	Beginning of dry season **26**	Beginning of dry season **14**	Beginning of dry season **2**
Feb ***Peei de ro***	Murle attack in Padiet	Relocating of cattle 49	Nuer captured payuel & Padiet 37	Inauguration of Bishop 25	Relocating of cattle 13	Relocating of cattle **1**
March ***Peei de diak***	**60**	**48**	Burning of poktap **36**	**24**	**12**	Survey start day **0**
April ***Peei de nguan***	Easter **59**	Easter **47**	Easter **35**	Easter **23**	Easter **11**	
May ***Peei de dhiech***	16 may **58**	16 may **46**	16 may **34**	16 may SPLA recapture pajut **22**	16 may **10**	
June ***Peei de dhetem***	**57**	**45**	**33**	**21**	**9**	
July ***Peei de dhorou***	Independence day (beginning of raining season) **56**	Independence day (beginning of raining season) **44**	Independence day (beginning of raining season) **32**	Independence day (beginning of raining season) **20**	Independence day (beginning of raining season) **8**	
Aug ***Peei de bet***	Flooding time **55**	Flooding time **43**	Flooding time **31**	Pajut attack Flooding time **19**	Flooding time **7**	
Sept ***Peei de dhonguan***	Beginning of harvest **54**	Beginning of harvest **42**	Beginning of harvest **30**	Beginning of harvest **18**	Beginning of harvest **6**	
Oct ***Peei de thier***	Sorghum harvest **53**	**41**	**29**	**17**	**5**	
Nov ***Peer de thier ku tok***	**52**	Nuer Attacked Pajut 40	**28**	**16**	**4**	
Dec ***Peei de Thier ku rou***	Christmas **51**	Bor captured Christmas 39	Christmas **27**	Christmas **15**	Christmas **3**	