



**Defending Dignity.
Fighting Poverty.**

**Report of Integrated Nutrition SMART survey in
Rubkona County of Northern Liech State, South
Sudan,
May 2017.**

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Funded by:



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Report written by: Anthony M. Kanja

LIST OF ABBREVIATIONS AND ACRONYMS

CI	Confidence interval (at 95% throughout report)
CMR	Crude Mortality Rate
EBF	Exclusive Breastfeeding
ENA	Emergency Nutrition Assessments
FSL	Food Security and Livelihoods
GAM	Global Acute Malnutrition
GFD	General Food Distribution
HFA	Height for Age
HAZ	Height for Age Z scores
HH	Household
IDPs	Internally Displaced Persons
IPC	Integrated Phase Classification
IYCF	Infant & Young Child Feeding
MIYCN	Infant and Young Child Feeding
LLITN	Long Lasting Insecticide Treated Net
MAM	Moderate Acute Malnutrition
MOH	Ministry of Health
MUAC	Mid Upper Arm Circumference
OTP	Out-Patient Therapeutic Programme
PHCC	Primary Health Care Centre
PHCU	Primary Health Care Unit
PLW	Pregnant & Lactating Women
PPS	Probability Proportional to Size
RUSF	Ready to Use Supplementary Food
RUTF	Ready to Use Therapeutic Food
SAM	Severe Acute Malnutrition
SC	Stabilization Centre
SD	Standard Deviation (measure of spread around the mean)
SFP	Supplementary Feeding Programme
SMART	Standardized Monitoring and Assessment of Relief and Transitions
TFC	Therapeutic Feeding Program
TSFP	Targeted Supplementary Feeding Program
UNICEF	United Nations International Children's Emergency Fund
U5MR	Under 5 Mortality Rate
VAS	Vitamin A supplementation
WAZ	Weight for Age Z scores
WFA	Weight for Age
WFP	World Food Program
WFH	Weight for Height
WHO	World Health Organization
WHZ	Weight for Height Z scores

EXECUTIVE SUMMARY

Between 16th and 22nd May 2017 an integrated nutrition and mortality survey using SMART methodology was conducted in Rubkona county, Northern Liech state, South Sudan. The main objective of the survey was 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, food security, water and hygiene sanitation as well as Infant and Young Children Feeding (IYCF) practices and estimate retrospective mortality rates

Emergency Nutrition Assessment (ENA) for Standardized Monitoring of Relief and Transition (SMART) was used to calculate Anthropometry and mortality samples. The calculated sample size for anthropometry was **519** children in 502 households while that of mortality was 2765 persons and **462** households. The anthropometry sample of 502 HHs was the overall sample size for the survey. Each survey team of 4 individuals was estimated to cover 13 households each day and this translated into 39x13 cluster design. The 39 clusters were selected randomly using PPS. In the second stage, selection of 13 HHs to be surveyed was done by simple random sampling from a list of all households in the sampled village/cluster.

The anthropometric and mortality data were entered and analyzed using ENA for SMART, (July 9th, 2015 version) while the other set of data (vaccination and deworming status, Vitamin A supplementation, nutrition status of pregnant women and mothers with children <5 years, food security & livelihoods as well as water hygiene and sanitation data) was entered in MS excel and analyzed using Epi Info (version 3.5.4).

SMART Methodology training for a survey team of 23 individuals (all being males) took place for 4 days from 12th to 15th May 2017, while data collection was carried out for 7 days beginning on 16th May to 22nd May, 2017.

This preliminary report contains the nutrition, health, Water and Sanitation Hygiene (WASH), Food Security & Livelihoods (FSL) and Maternal Infant and Young Child Nutrition (MIYCN) indicators collected from the survey. Data were collected from a total of 504 households and 467 children 6-59 months (between 65cm & 110cm in length/height)¹, in 39 clusters (villages) by the assessment team.

The Global acute malnutrition (GAM) WHZ was 17.4 % (12.9 - 23.0 95% C.I.), whereas SAM WHZ was 3.9% (2.1- 7.3 95% CI). No oedema case was observed during the assessment (7 SMART flags were excluded from analysis of WHZ). A summary of the survey findings are contained in table 0-1.

¹ Where the age is not available or **reliable**, and a local events calendar cannot be used to estimate the age of the children, then a **height cutoff** can be used for selecting children instead of age. The height of normal children aged 6–59 months is approximately 65cm and 110cm respectively (SMART_Manual_v1_FINAL, page 66)

Table 0-1: Summary of key findings from Rubkona SMART survey, May 2017

Characteristic	May 2017			May 2016 ²
	N	n	% (95% CI)	% (95% CI)
Overall GAM (WFH <-2 Z score or presence of oedema) - WHO 2006	460	80	17.4% (12.9-23.0)	29.2% (24.5-34.4)
Overall SAM (WFH <-3 Z score or presence of oedema) - WHO 2006	460	18	3.9% (2.1- 7.3)	7.8% (5.2-11.4)
Overall underweight (WFA <-2 Z score) – WHO 2006	463	98	21.2% (16.1-27.3)	24.0% (19.4-29.3)
Overall Severe underweight (WFA <-3 Z score)- WHO 2006	463	19	4.1% (2.6- 6.4)	5.0% (3.6- 7.0)
Overall stunting (WFA <-2 Z score) – WHO 2006	449	88	19.6% (15.5-24.4)	15.4% (11.6-20.0)
Overall Severe stunting (WFA <-3 Z score)- WHO 2006	449	17	3.8% (2.0- 7.0)	1.0% (0.4- 2.6)
Overall GAM (MUAC < 125 mm and/or oedema)	467	32	6.9% (4.5-10.3)	11.2% (7.8-15.8)
Overall SAM(MUAC < 115 mm and/or oedema)	467	3	0.6% (0.2- 2.0)	1.4% (0.6- 3.4)
Maternal MUAC (<23cm)	226	37	16.4% (11.8 - 21.9)	2.80% (0.60-7.80)
CMR (deaths/10,000/day)	3332	40	1.11 (0.77-1.60)	1.19 (0.81-1.74)
U5MR (deaths in children<5/10,000/day)	550	5	0.89 (0.31-2.47)	0.64 (0.14-2.75)
Measles immunization (card & recall) for children 9-59 months	425	259	60.9%(56.1- 65.6)	72.0%
Vitamin A supplementation coverage children 6-59 months	467	229	49.0% (44.4-53.7)	65.5% (60.7-70.0)
Deworming for Children (12-59 months) in the last 6 months	406	118	29.1%(24.7- 24.7)	72.3%
Exclusive breastfeeding 0-5months:	52	41	78.8% (65.3-88.9)	54.2% (32.8 -74.4)
Minimum Meal Frequency > 3 times (9- 23 months) and breastfeeding	144	15	10.4% (5.9-16.6)	22.2% (15.3-30.5)
Minimum Dietary Diversity 4+ food groups and breastfeeding (6-23months):	182	25	13.7% (9.1-19.6)	-
Mean Food Consumption Score (FCS):	504	-	44	26.31
Mean Reduced Coping Strategy Score Index (rCSI):	504	-	20	20.9
Median Household Hunger Scale (HHS) Score:	504	-	3	-
Hand washing on at least 3 or more critical times	502	74	14.7% (11.8- 18.2)	-
Water usage >15 litres /person/day	502	120	23.9%(20.3-27.9)	-
Proper excreta disposal	502	97	19.3%(16.0-23.1)	-

² Integrated Nutrition and Mortality SMART Survey, Rubkona County, May 2016

In summary the prevalence of acute malnutrition reported was at a **critical** level and above the WHO threshold of 15% GAM WHZ and 4% for SAM WHZ used to declare a humanitarian emergency. Comparatively there was a significant decline in the rates of acute malnutrition where a GAM rate of 29.2% (24.5-34.4 95% C.I.) and SAM was 7.8% (5.2-11.4 95% C.I.), was recorded in a similar period last year. However, the critical nutrition situation of the surveyed population may be aggravated by **poor maternal and child care** (high proportion of malnourished women, sub-optimal exclusive breastfeeding & complementary feeding practices), **poor hygiene and sanitation practices** (low level of hand washing and safe excreta disposal) as well as low **coverage of primary health programs** namely immunization, Vitamin A Supplementation and deworming coverage (which were below Sphere standards target of >80%). Moreover the food security is still a major concern considering the vulnerable situation of the surveyed population which is reliant on Food aid both as a source of food (3 in 4 people) and as a major source of income (for about 1 out 5 people).

The following is recommended based on survey findings:

Health and Nutrition

- **Continued provision of Community based management of malnutrition interventions (Community mobilization, TSFP, OTP and SC) in Rubkona County.** Focus should be emphasised on areas with high cases of malnutrition especially in Rubkona & Bentiu Payams which are the most populated areas in the county outside the Bentiu PoC. Case detection could potentially be enhanced via systematic mass screenings
- **Continue to actively vaccinate children for measles, provide vitamin A supplementation and deworming.** Focus should be amplified to ensure coverage of 80% or more by ensuring that outreach services are strengthened and CMAM activities are integrated into Child Health Days and immunization campaigns.
- **Further strengthening of MIYCN practices.**

Food Security/Livelihoods

- **Continued GFD distributions**
- **Scaling up the resilience activities to enhance food security and livelihood efforts in the county.** A broad base approach using an integrated program of Health, Nutrition, WASH and FSL can be pursued to address the large scale food and nutrition insecurity at household level.

Water and Sanitation

- **Increase access to water.** This can imply increase of water points to address on time taken and quantity of water accessed.
- **Promotion of hand washing, and proper water treatment techniques.** Efforts can be concerted towards community sensitization and empowerment to construct latrines using locally available materials. This can be done using community dialogue and community structure already established.

1 INTRODUCTION

1.1 Background

CARE South Sudan is a subsidiary of CARE International, a leading humanitarian and development agency fighting global poverty around the world. CARE's operations in South Sudan dates back to the early 1980s, focusing on emergency and disaster relief to the conflict affected populations. Currently, CARE South Sudan works in three States, Unity, Jonglei and Upper Nile States, addressing both humanitarian and recovery/development needs. In development/recovery programming, CARE South Sudan focuses on four broad areas namely governance and sustainable integrated livelihoods (Food security, health and Nutrition, WASH, protection of civilians and peace building) focusing on women and youth.

Rubkona County which was targeted for the Nutrition SMART Survey is made up of ten administrative Payams (Rubkona, Budang, Norlamwel, Ngop, Kaljak, Dhor Bor, Wathjak, Nhialdiu, Panhiany and Bentiu). It is situated in northern part of South Sudan in the newly created state of Northern Liech. The county's population is estimated at 100,236 according to 2008 Sudan census. However majority of the inhabitants had been displaced across the county with some moving to Bentiu PoCs due to the protracted strife in the area that had started in December 2013. CARE is one of the leading implementing partners for nutrition in the county running 4 OTP sites, 7 TSFP sites and 4 MIYCN sites.

Findings from Care International SMART survey final report, Dec 2016 the prevalence of Global Acute Malnutrition (GAM) of **GAM rate 20.2%** (17.1-23.7 95% CI) and the severe acute malnutrition (SAM) rate (WHZ<3 or oedema) of 2.8% (1.5- 5.1 95% CI) indicating a **'critical'** phase of acute malnutrition according to WHO 2006 classification. Similar findings above WHO emergency threshold were reported during the May 2016 SMART survey in Rubkona County where the GAM WHZ was 29.2% (24.5-34.4), and SAM rate was 7.8% (5.2-11.4).

The Food security data as per the May 2016 survey also showed a major concern in the county. Household Dietary Diversity in the last 24 hours was 5 food groups out of 15 food groups assessed. On average, majority of HHs surveyed had poor reduced coping strategy index of >21. From the analysis of food consumption scores (FCS) mean consumption score was within the borderline i.e. FCS 21.5 – 35.

Like other part of South Sudan the food security and nutrition situation was **likely to worsen³ between January to April 2017**, corresponding with the dry season and start of the lean season: projection based on trend analysis indicates that **around 4.6 million people are likely to be severely food insecure**. This denotes a 62 percent increase when compared to the same season last year and a 28 percent increase when compared to the current period (October—December 2016). Food and nutrition insecurity is anticipated to **further deteriorate during the peak of the lean season**

³ WFP South Sudan Food and Nutrition Security Update, Special Report — 1 December 2016

from May to July 2017 to the highest levels ever in the lean period, unless the humanitarian response is stepped up further to an unprecedented level.

1.2 Rationale for conducting surveys/assessments

Since nutritional status frequently deteriorates due to several factors including poor food access, availability and utilization, poor IYCF practices and poor water and sanitation as well as high morbidity among the affected populations. There is need for constant monitoring of the nutrition situation in Rubkona County to further inform the government and partners to better serve the community.

The nutrition survey will be needed to determine to assess the current health and Nutrition status for the community. The survey will also be done with the view of gathering data to inform and guide specific responses to address emergency nutrition challenges for children under 5 years as well as support rehabilitation efforts to ensure sustainable long-term impact.

1.3 Main Objective of SMART Survey

The Overall objective of the SMART assessment was 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 all persons who live in Rubkona county, Northern Liech state, South Sudan. The specific objectives included the following:

1. To estimate the prevalence of malnutrition in children aged 6-59 months and their caregivers (Pregnant and lactating mothers)
2. To determine retrospective crude mortality rates (CMR) and under five mortality rates (U5MR)
3. To determine the morbidity and health seeking behaviors in the county.
4. To estimate the coverage of measles vaccination (9-59 months), Vitamin A supplementation status among children aged 6-59 months and deworming.
5. To determine infant and young child feeding practices
6. To assess the current household food security situation of the county
7. Assess the hygiene practices and access to water and sanitation.

1.4 Timing of the Survey

The Nutrition SMART Survey was conducted in the month of May 2016 and the reports submitted within June 2016. It was conducted during the pre-harvest season.

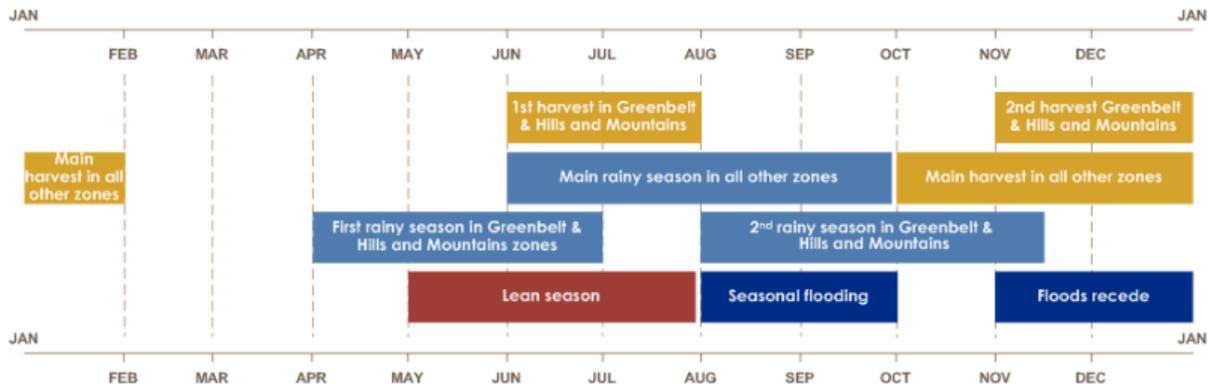


Figure 1-1: Seasons calendar in South Sudan (source FEWSNET)

1.5 Area to be surveyed

The Nutrition SMART survey was conducted in Rubkona County in Unity State.

2 METHODOLOGY

2.1 Study Design

The study design was a cross-sectional using SMART methodology with two stage clusters sampling.

2.2 Study Population

The target population for these surveys were children aged 6 – 59 months for the anthropometry (nutrition), caregivers/women with children 0-23 months for IYCF practices. General population of Rubkona County formed the target for the mortality, WASH and FSL data.

2.3 Sample size

Calculation of Anthropometry and mortality samples size used Emergency Nutrition Assessment (ENA) for Standardized Monitoring of Relief and Transition (SMART) (July 9th, 2015 version).

Sample size of Anthropometry and Mortality was determined on the basis of estimated prevalence rates of malnutrition (GAM) or estimated death rate, desired precision and design effect, average household size, percentage of <5's in the population and percentage of non-response rate using the ENA for SMART software. The total sample size of households was by collating both the Anthropometry, and Mortality samples,

Table 2-1: Estimated sample sizes for Anthropometry in Rubkona county

Parameter	Values used	Justification
Estimated prevalence %	29.2 %	Upper C.I of GAM prevalence (29.2% (24.5-34.4) of CARE Rubkona March 2016 SMART survey. There is anticipated rate of acute malnutrition which is likely to mirror what was reported in previous pre-harvest survey.
±desired precision %	5 %	As per SMART Manual guidelines based on the estimated prevalence
Design effect	1.5	As per SMART Methodology guidelines.
Average household size	6.3	CARE Rubkona May 2016 SMART survey.
% of children under-five	19.2 %	CARE Rubkona May 2016 SMART survey.
% of non-response households	5 %	Anticipated non response
Children to be included	519	
Households to be included	502	

Table 2-2: Estimated sample size for retrospective mortality in Rubkona county

Parameter	Values used	Justification
Estimated death rate per 10000/day	1.19	Point prevalence of CARE Rubkona May 2016 SMART survey. CDR was 1.19 (0.81-1.74 95% C.I.). The anticipated mortality situation is likely to be the same.
±desired precision per 10000/day	0.5	As per SMART Methodology guidelines, April 2006
Design effect	1.5	As per SMART Methodology guidelines. The DEFF was low (1.0) from Dec 2016 SMART Survey.
Recall period in days	108	RP calculated from 1st February 2017 was assumed as there was no suitable event applicable across the county. End of RP was 19 th May 2017
Average household size	6.3	CARE Rubkona May 2016 SMART survey.
% of non-response households	5 %	Anticipated non response
Population to be included	2765	
Households to be included	462	

As the two indicators showed different household samples, the survey used the larger of the two calculations (**502**) for both mortality and anthropometric surveys.

Based on issues that impact on the total number of households that can be done in a day i.e. travel hours, introduction and household listing ,lunch breaks and time taken to administer a questionnaire in a household, it was estimated that **13** households could be visited by one team per day. The total number of clusters obtained after dividing the total number of households (502/13) was 39 clusters.

The IYCF sample used the household sample size computed above. *However due to possibilities of insufficient sample sizes for IYCF*, the survey was used to collect proxy IYCF indicators for: Exclusive Breastfeeding, Initiation of breastfeeding 0-23 months, Continued Breastfeeding at 12 months, Continued Breastfeeding at 24 months, Minimum Dietary Diversity and Minimum Meal Frequency.

2.4 Cluster and Household Selection

The surveys applied a two-stage cluster sampling using the SMART methodology based on probability proportional to population size (PPS). Stage one sampling involved the sampling of the clusters to be included in the survey while the second stage sampling involved the selection of the households from the sampled clusters.

The smallest geographical unit in Rubkona County i.e. a village defined a cluster.

2.4.1 First Stage Sampling

This stage involved the selection of clusters using ENA for SMART based on PPS. The number of clusters selected was determined by first establishing the sample size to be involved in the survey.

Selection of a sample of clusters was from an updated sampling frame (list of all accessible and inhabited villages in Rubkona County. Coming up with an updated sampling frame relied on information from SSRRC, CHD, or County authorities.

2.4.2 Second Stage Sampling

Households' selection was random in every sampled cluster. The survey teams obtained an updated list of households per cluster from village elders/guides and selected the households accordingly through simple random sampling. Questionnaire on Mortality administered in all sampled households. Administration of Anthropometric and IYCF questionnaire was done in sampled households with eligible children (6 – 59 Months old and 0-23 months respectively).

2.5 Data Collection Techniques

2.5.1 Quantitative Methods

This involved the collection of anthropometry, morbidity, vaccination and de-worming status, IYCF, and Vitamin A supplementation. Collection of retrospective mortality information used the individual questionnaire where, from all households were visited including those without children under the age of five.

Moreover, secondary quantitative data from surveys/assessments (SMART, MUAC assessments e.t.c.) previously undertaken in Rubkona County or a similar neighbouring County by various partners will form a wealth of information to be utilized to inform and corroborate the findings of this survey

2.6 Organization of the Survey

2.6.1 Survey Coordination and Collaboration

With the lead of CARE International South Sudan, communication was done of survey objectives to all the relevant administrative authorities as well as stakeholders such as MOH, NBS, and other partners.

2.6.2 Data Collection Teams

Six teams each comprising of four enumerators (all male) was deployed to collect data in all the selected clusters from 16th to 22nd May 2016.

2.6.3 Training of the Survey Team:

Training of the survey team was for 4 days from 12th to 15th May, inclusive of Standardization. The training mainly focused on anthropometric measurements, accurate data recording, household selection, data quality, and general field procedure.

2.7 Data Entry, Analysis and Report Writing

2.7.1 Data Entry

Anthropometry and morbidity data entry and analysis used ENA for SMART (July 9, 2015 version). IYCF, vaccination and de-worming status, Vitamin A supplementation, data will be analysed on Epi Info version 3.5.4.

2.7.2 Data Quality

Assurance of data quality was through conducting high quality training for survey teams i.e. enumerators coupled with standardization test, practical field exercise (pre - test survey in Shilak West village in Rubkona Payam) and close supervision of teams. Daily data entry and running plausibility test was done to guarantee high quality data. Additionally triangulation of quantitative data with qualitative data was done to test the consistency of the data obtained during the survey.

2.7.3 Data Analysis, Reporting and Dissemination

Analysis of the data used ENA for SMART and Epi Info version 3.5.4. The preliminary results presentation to CARE South Sudan technical team and the NIWG was done in MS power point and Word version.

The ENA software was used to generate the report format which was modified to have information that is more conclusive to qualify the report beyond the anthropometric and mortality data.

2.8 Field Supervision

CARE nutrition project staff supported the consultant with supervision during data collection. Close supportive supervision during data collection together with daily debriefing meetings with survey team and regular plausibility checks of data served to ensure the outcome of the data quality would be good.

2.9 Survey Limitations

All ages were estimated by recall-using a local calendar of events (appendix 4), something that can potentially lead to recall bias and affect quality of the age data.

3 FINDINGS & DISCUSSIONS

3.1 General characteristics of study population and households

i. Households and children 6-59 months

In the survey 39 sampled clusters were surveyed out of the possible 39 clusters planned. Further about 91% of the sample size of children 6-59 months of age was met without resulting to visit the 4 planned reserve clusters (RCs). Data were collected from a total of 504 households, 467 children 6-59 months (between 65cm & 110cm in length/height)⁴, within the 39 clusters (villages) surveyed as shown in the table below.

Table 3-1: Summary of households and children 6-59 months planned and those surveyed

Number of HH planned	Number of HH surveyed	% surveyed /planned	Number of children 6-59 months planned	Number of children 6-59 months surveyed	% surveyed /planned
502	504	100.3%	519	467	90.0%

ii. Women of Reproductive Age

In this survey, 226 pregnant & lactating women were screened for malnutrition by MUAC.

3.2 Anthropometry

Anthropometric measurements taken during the survey were used to come up with nutrition indices. The indices were then compared to the World health Organization Standards 2006 to determine the levels of wasting, underweight and stunting. SMART flags: WHZ -3 to 3; HAZ -3 to 3; WAZ -3 to 3 were used in final analysis to exclude z-scores with extreme values from observed mean.

A total of 467 children aged 6-59 months (65-110cm tall) were assessed for their nutritional status using anthropometric measurement from the 504 surveyed households in 39 clusters.

Among the sampled children, 249 (52.8%) were boys while 223 (47.2%) were girls. The overall sex ratio of the surveyed children was 1.1 (p=0.231) indicating that both sexes were equally represented within the sample (sex ratio should be between 0.8-1.2) (see appendix 1 for plausibility check on anthropometric results).

⁴ Where the age is not available or **reliable**, and a local events calendar cannot be used to estimate the age of the children, then a **height cutoff** can be used for selecting children instead of age. The height of normal children aged 6–59 months is approximately 65cm and 110cm respectively (SMART_Manual_v1_FINAL, page 66)

Table 3-2: Distribution of age and sex of sample

AGE (mo)	Boys		Girls		Total		Ratio
	no.	%	no.	%	no.	%	Boy:girl
6-23	103	58.2	74	41.8	177	37.9	1.4
24-29	29	48.3	31	51.7	60	12.8	0.9
30-41	69	53.5	60	46.5	129	27.6	1.1
42-53	37	52.1	34	47.9	71	15.2	1.1
54-59	11	36.7	19	63.3	30	6.4	0.6
Total	249	53.3	218	46.7	467	100.0	1.1

Further analysis of the demographics in the survey was done to explain the proportion of under fives in the overall population of Rubkona County. From the survey the under fives constitute 16.5% of the overall population, a proportion which is lower than the 19.2% reported in May 2016 SMART survey and still lower than the national average of 21% according to 2008 Sudanese population census. Demographic and mortality data collected in the survey showed that there was a high rate of out-migration⁵ in the county. Further Qualitative findings from informal interviews from surveyed population revealed that the out-migration mostly affected the under fives population with a significant proportion residing in the Bentiu PoC due to insecurity. On disaggregation of the data by gender, the results show that the males 0-4 years and 5-11 years of the age were more compared to the females of similar age in the population, a trend which reverses in the other age groups up the population pyramid (figure 3-1). This implies the male population was affected by conflict leading to a higher migration (*and even mortality*) compared to the female gender.

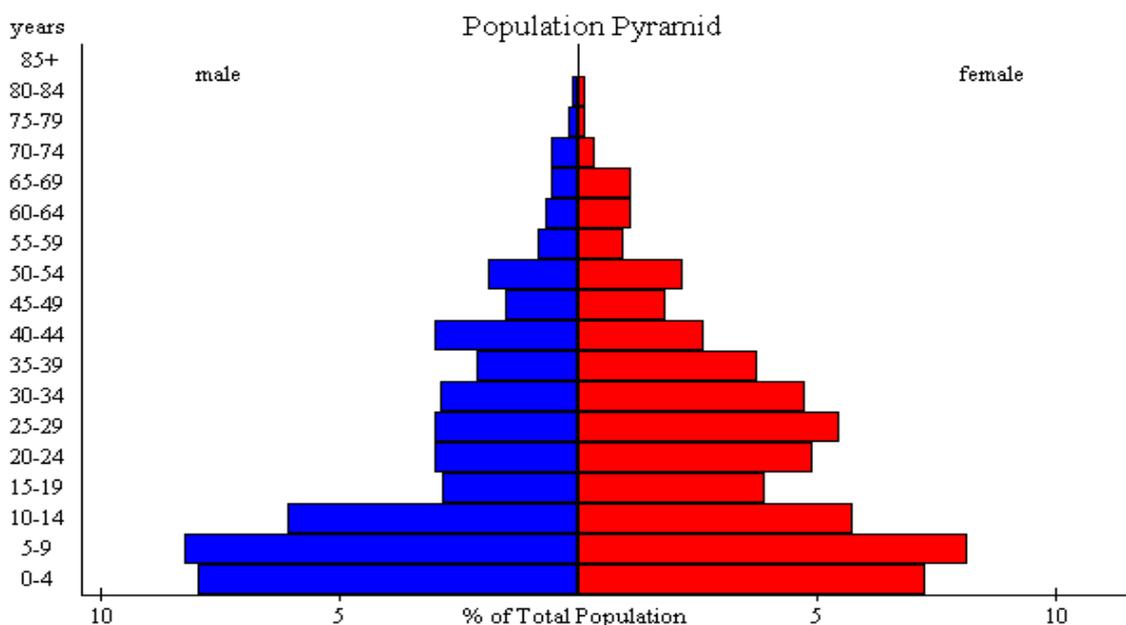


Figure 3-1: Population age and sex pyramid

⁵ Out-migration rate was 20.73% according to demographic & mortality data collected in the survey compared to 10.02% observed in May 2016 survey

3.2.1 Prevalence of acute malnutrition based on weight-for-height z-scores

Global acute malnutrition (GAM) WHZ is defined as <-2 z scores weight-for-height and/or oedema while severe acute malnutrition is defined as <-3z scores weight-for-height and/or oedema. In Rubkona county SMART May 2017 survey (GAM) WHZ was 17.4 % (12.9 - 23.0 95% C.I.), whereas SAM WHZ was 3.9% (2.1- 7.3 95% CI). No oedema case was observed during the assessment (Table 3-3). The findings indicate a **critical** nutrition situation according to WHO classification.

In the final analysis, 7 children were excluded due to out of range values using SMART flags (-3 to 3 Z-score).

Table 3-3: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 460	Boys n = 244	Girls n = 216
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(80) 17.4 % (12.9 - 23.0 95% C.I.)	(42) 17.2 % (12.0 - 24.0 95% C.I.)	(38) 17.6 % (12.0 - 25.0 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(62) 13.5 % (9.9 - 18.1 95% C.I.)	(29) 11.9 % (8.0 - 17.2 95% C.I.)	(33) 15.3 % (10.1 - 22.4 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(18) 3.9 % (2.1 - 7.3 95% C.I.)	(13) 5.3 % (2.6 - 10.6 95% C.I.)	(5) 2.3 % (0.8 - 6.6 95% C.I.)

The prevalence of oedema is 0.0 %

According to table 3-4 younger children 6-23months were the most malnourished by WHZ than any other age group.

Table 3-4: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

Age (mo)	Total no.	Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
		No.	%	No.	%	No.	%	No.	%
6-23	172	10	5.8	39	22.7	123	71.5	0	0.0
24-29	59	4	6.8	5	8.5	50	84.7	0	0.0
30-41	128	2	1.6	9	7.0	117	91.4	0	0.0
42-53	71	1	1.4	4	5.6	66	93.0	0	0.0
54-59	30	1	3.3	5	16.7	24	80.0	0	0.0
Total	460	18	3.9	62	13.5	380	82.6	0	0.0

Table 3-5: Distribution of acute malnutrition and oedema based on weight-for-height z-scores

	<-3 z-score	>=-3 z-score
Oedema present	Marasmic kwashiorkor No. 0 (0.0 %)	Kwashiorkor No. 0 (0.0 %)
Oedema absent	Marasmic No. 23 (4.9 %)	Not severely malnourished No. 444 (95.1 %)

3.2.2 Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema)

MUAC is another indicator used to diagnose as well as assess acute malnutrition for children aged 6- 59 months. A very low MUAC (<11.5 cm for children under five years) is considered as severe acute malnutrition with a high mortality risk while MUAC readings of 11.5 cm to 12.4 cm are considered to be moderate acute malnourished. The prevalence of global acute malnutrition based on MUAC (<125 mm) and/or oedema was 6.9% (4.5 - 10.3 95% C.I.) and of severe acute malnutrition (MUAC<115 mm and/or oedema) was 0.6% (0.2 - 2.0 95% C.I.). The GAM rate by MUAC was at a **serious** level while SAM rate by MUAC was at an **Alert level** of acute malnutrition according to WHO classification (GAM 5.6-8% and SAM <1%), detailed results are presented in tables 3-6.

Table 3-6: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 467	Boys n = 249	Girls n = 218
Prevalence of global malnutrition (< 125 mm and/or oedema)	(32) 6.9 % (4.5 - 10.3 95% C.I.)	(20) 8.0 % (4.9 - 12.9 95% C.I.)	(12) 5.5 % (3.1 - 9.6 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(29) 6.2 % (4.0 - 9.5 95% C.I.)	(18) 7.2 % (4.3 - 12.0 95% C.I.)	(11) 5.0 % (2.7 - 9.2 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(3) 0.6 % (0.2 - 2.0 95% C.I.)	(2) 0.8 % (0.2 - 3.3 95% C.I.)	(1) 0.5 % (0.1 - 3.4 95% C.I.)

According to table 3-6 younger children 6-23months were more malnourished by MUAC than older children above 2 years of age. This is perhaps is indicative of sub-optimal feeding practices of children below 2 years.

Table 3-7: Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema

Age (mo)	Total no.	Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
		No.	%	No.	%	No.	%	No.	%
6-23	177	3	1.7	25	14.1	149	84.2	0	0.0
24-29	60	0	0.0	3	5.0	57	95.0	0	0.0
30-41	129	0	0.0	0	0.0	129	100.0	0	0.0
42-53	71	0	0.0	1	1.4	70	98.6	0	0.0
54-59	30	0	0.0	0	0.0	30	100.0	0	0.0
Total	467	3	0.6	29	6.2	435	93.1	0	0.0

3.2.3 Prevalence of underweight based on weight-for-age z-scores

Weight for Age is a composite index that measures both stunting and wasting. The prevalence of underweight in the survey area was 21.2 % (16.1 - 27.3 95% C.I.), with severe underweight rates being 4.1 % (2.6 - 6.4 95% C.I.) as indicated in table 3-8.

Table 3-8: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 463	Boys n = 245	Girls n = 218
Prevalence of underweight (<-2 z-score)	(98) 21.2 % (16.1 - 27.3 95% C.I.)	(55) 22.4 % (17.0 - 29.0 95% C.I.)	(43) 19.7 % (13.6 - 27.7 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(79) 17.1 % (12.7 - 22.5 95% C.I.)	(44) 18.0 % (13.2 - 23.9 95% C.I.)	(35) 16.1 % (10.6 - 23.5 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(19) 4.1 % (2.6 - 6.4 95% C.I.)	(11) 4.5 % (2.7 - 7.5 95% C.I.)	(8) 3.7 % (1.8 - 7.3 95% C.I.)

3.2.4 Prevalence of stunting based on height-for-age z-scores

Stunting is indicated by low height/length for age compared to WHO standard 2006. Stunting is an indicator for poor linear growth and is greatly affected by antenatal, intra uterine and postnatal nutrition among other factors. From the survey findings, the stunting rate for children aged 6-59 months in Rubkona County was 19.6 % (15.5 - 24.4 95% C.I.), while 3.8 % (2.0 - 7.0 95% C.I.) were severely stunted as indicated in table 3-9.

Table 3-9: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 449	Boys n = 238	Girls n = 211
Prevalence of stunting (<-2 z-score)	(88) 19.6 % (15.5 - 24.4 95% C.I.)	(57) 23.9 % (18.7 - 30.1 95% C.I.)	(31) 14.7 % (10.3 - 20.4 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(71) 15.8 % (12.2 - 20.2 95% C.I.)	(46) 19.3 % (14.0 - 26.0 95% C.I.)	(25) 11.8 % (8.0 - 17.1 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(17) 3.8 % (2.0 - 7.0 95% C.I.)	(11) 4.6 % (2.3 - 8.9 95% C.I.)	(6) 2.8 % (1.1 - 7.0 95% C.I.)

3.2.5 Mean z-scores, Design Effects and excluded subjects

The standard deviations (SD) for WHZ, WAZ & HAZ were within the acceptable range of 0.8-1.2 while the design effects were 1.98, 2.09, and 1.38 for WHZ, WAZ & HAZ respectively (table 3-10). This shows the sampled population had some heterogeneity with regards to acute and chronic malnutrition –except stunting rates. Further investigation of the plausibility checks (appendix 1) showed the poison distribution had a p value less 0.05 (p=0.005) indicating that the cases are aggregated into certain clusters (there appear to be pockets of cases especially in clusters within Rubkona & Bentiu payams according to the data sets).

Table 3-10: Mean z-scores, 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	460	-1.05±1.04	1.98	0	7
Weight-for-Age	463	-1.13±1.05	2.09	0	4
Height-for-Age	449	-0.76±1.26	1.38	0	18

* contains for WHZ and WAZ the children with edema.

3.3 Mortality

Mortality data was collected using the mortality individual questionnaire in the survey. The recall period for questions relating to the mortality data was 108 days starting from 1st February 2017 and ending on the date of mid-point of the data collection period 19th May 2017. The crude mortality rate (CMR) was 1.11 deaths/10,000/day and the under-five mortality rate (U5MR) was 0.89 deaths/10,000/day as shown in table 3-11.

Table 3-11: Mortality rates, Rubkona County, May 2017

Parameters for Mortality	Results (CI 95%)
CMR (deaths per 10 000/day)	1.11 (0.77-1.60)
U5MR (deaths in children <5/10 000/day)	0.89 (0.31-2.47)
Persons recorded within recall period	3332
Current residents <5 years old	16.5%
Mean household size	6.6
Total deaths during the recall period	40
Total deaths during the recall period <5 years old	5
Recall Period (days)	108
Population to be included	2765
Average HH Size	6.3
% Non-response Households	5
Households to be included	462

The main cause of death was due to illness (72.5%) and most deaths occurred in the current location of residence (42.5%) as shown in table 3-12.

Table 3-12: Causes and location of Death

Cause of death, N=5	%	Location of death	%
1] Unknown	7.5	1] In current location	42.5
2] Injury/Traumatic	20	2] During migration	15
3] Illness	72.5	3] In place of last residence	7.5
		4] Other	35

3.4 Health data

3.4.1 Children's morbidity

About 76.9% (95% CI: 72.7%-80.6%) of surveyed children reportedly suffered from one or more illness in the two weeks prior to the assessment. Many of these had fever (70.2%), ARI (cough/difficult breathing) (38.2%) and diarrhoea (43.5%) while 7.2% had other illness (Table 3-13).

Table 3-13: Prevalence of reported illness in children in the two weeks prior to interview (N=467)

	n	%
Prevalence of reported illness	359	76.9% (72.7%-80.6%)
Fever	252	70.2%
Cough	137	38.2%
Diarrhoea	156	43.5%
Others ⁶	26	7.2%

⁶ Other illnesses reported were skin infection, eye infection and vomiting

3.4.2 Health Seeking Behaviour

Out of the 359 children who were reported to have been ill with 2 weeks prior to the survey, only 16.4% (59 cases) did not seek treatment. Majority of those who sought treatment got it from Primary Health Care Centre/Unit (PHCC/U) (48.6%) and hospital (25.1%), with a mere 5.9% seeking treatment from mobile/outreach clinic as shown in Figure 3-2.

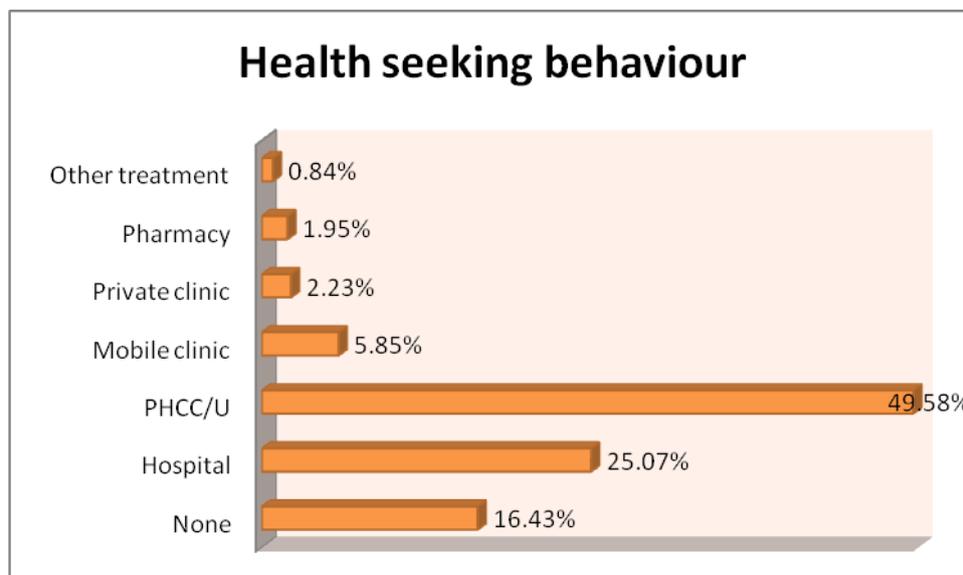


Figure 3-2: Health seeking behaviour

3.4.3 Usage of Long Lasting Insecticide Treated Nets (LLITN)

Malaria is the leading cause of death and disease responsible for 25% deaths in South Sudan⁷. Two in every 10 people seen at the health facilities die from malaria, 66% of HHs own a mosquito net. The human toll that malaria exacts and the economic and social impacts are devastating: sick children miss school, working days are lost. Malaria disproportionately affects the rural poor who can neither afford insecticide-treated bed nets for prevention nor access appropriate treatment when they fall sick. Nearly 7 out of 10 children were reported to have slept under a mosquito during the night preceding the survey.

Table 3-14: LLITN use

LLITN	Frequency	Percent	95% CI
No	143	30.3%	26.2%- 34.7%
Yes	329	69.7%	65.3%-73.8%
Total	472	100.0%	

⁷ South Sudan Humanitarian and Development Statistics Jan 2014

3.4.4 Vaccination, VAS and Deworming Results

Immunization programs take care of a wide range of health needs of infants and children by ensuring timely preventive measures to a number of nutrition and health problems. This reduces morbidity and mortality in children due to preventable childhood illnesses like and measles⁸. Full immunization coverage is defined as receiving Polio, Diphtheria, Pneumonia and Tetanus (DPT) as well as a measles vaccine by 12 months of age, and possibly, this should be verified by an immunization card. For children not having a health card, measles immunization status was obtained by caretaker recall and was found to be 60.9%- far below the Sphere (2011) coverage standards of above 80%.

Deficiencies in vitamin A have various negative implications for child health, nutritional status, and mortality. The potential consequences of vitamin A deficiency include diminished cellular integrity, immune competence, and increased mortality risk

Only 49.0% (5 out of 10) of children 6-23 months (n=350) had received vitamin A supplementation⁹ in the previous 6 months (Table 3-15).

Deworming for children 12-59 months in the past 6 months prior to the survey was 29.1%. These values though just indicative of children less than five years micronutrient supplementation and deworming programs are far below the Sphere (2011) coverage standards of above 80%.

Table 3-15: Vaccination coverage, VAS and Deworming

	Indicator	n	% 95% C.I.)
Measles	Children (9-59 months) immunized against measles, based on recall and card , N=425	259	60.9% (56.1%- 65.6%)
Vitamin A Supplementation	Children (6-59 months) who received Vitamin A in the last 6 months, N= 467	229	49.0% (44.4%-53.7%)
Deworming	Children (12-59 months) who were dewormed in the last 3 months, N=406	118	29.1% (24.7%- 24.7%)

3.5 Maternal nutrition

Evidence reveals the importance of the nutritional status of women at the time of conception and during pregnancy, both for the health of the mother and for ensuring healthy fetal growth and development. Fetal growth restriction and suboptimum breastfeeding together cause more than 1.3 million deaths, or 19.4% of all deaths of

⁸ E-Library of Evidence for Nutrition Actions (eLENA)

⁹ Samples of Vitamin A capsule –both red & blue, and Deworming tablets were displayed to the caregivers to aid in recall and ensure improved accuracy of coverage data.

children younger than 5 years, representing 43.5% of all nutrition-related deaths¹⁰. This strengthens the case for a continued focus on the crucial 1000 day window during pregnancy and the first 2 years of life. It also shows the importance of intervening early in pregnancy and even before conception.

i. *Mid-Upper Arm Circumference (MUAC) Measurement for Women*

The nutritional status of mothers of reproductive age was analyzed by MUAC. From the survey 16.4% (11.8% - 21.9% 95% CI) of women were found to be malnourished since they were below a MUAC of <23cm as shown in table 3-16.

Table 3-16: Maternal nutrition

N=226	Frequency	Percent	95% Conf Limits
Severely Malnourished PLW, MUAC <21cm	4	1.8%	0.5%-4.5%
Moderately Malnourished PLW, MUAC >21-<23cm	33	14.6%	10.3%-19.9%
Well nourished PLW, MUAC >23cm	189	83.6%	78.1%-88.2%

3.6 *Infant and Young Child Feeding*

Optimal infant and young child feeding practices rank among the most critical interventions to ensuring improved child health, nutrition and development. It is estimated that sub-optimal breastfeeding, especially non-exclusive breastfeeding in the first 6 months of life, results in 1.4 million deaths and 10% of the disease burden in children younger than 5 years¹¹. Generally the sharpest increase in malnutrition occurs between 6 and 23 months of age, the time when children grow most rapidly and are introduced to other foods in addition to breast milk.

Appropriate MIYCN practices include timely initiation of breastfeeding within 1 hour of birth, exclusive breastfeeding for the first 6 months, complementary feeding after 6 months with continued breastfeeding up to 2 years, and improved feeding during and after illness. WHO and UNICEF recommend babies to be placed skin to skin contacts with their mothers immediately within an hour after birth. Early initiation promotes exclusiveness and duration of breastfeeding. It also protects the newborn from acquiring infections and reduces newborn mortality which is due to diarrhoea and other infections to children who are partially breastfed or not breastfed at all. Infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health. This survey noted that nearly 9 out of 10 children are initiated to breastfeeding within 1 hour of birth while 8 in 10 children **under 6 months (Infants 0-5 months)** received exclusive breastfeeding (EBF) out of which only 69.6% of **infants 4-5 months** are exclusively breastfed. The rates of exclusive breastfeeding (EBF) thus can be considered sub-optimal below the recommended threshold of above 80%.

¹⁰ Black RE, Victora CG, Walker SP, and the Maternal and Child Nutrition Study Group. Maternal and child under nutrition and overweight in low-income and middle-income countries. *Lancet* 2013; published online June 6. [http://dx.doi.org/10.1016/S0140-6736\(13\)60937-X](http://dx.doi.org/10.1016/S0140-6736(13)60937-X).

¹¹ WHO *Infant and young child feeding. Model Chapter for Text books for medical students and allied health professionals* 2009

Complementary feeding is the process of introducing other foods and liquids that are needed, along with breast milk or a breast-milk substitute starting at 6 months when breast milk or infant formula alone is no longer sufficient to meet the nutritional requirements of infants. The target range for complementary feeding is generally taken to be 6 to 23 months¹². It is recommended that breastfeeding continues for up to two years of age or beyond while the infants should receive nutritionally adequate and safe complementary foods. Complementary feeds should be adequate in; *frequency, amounts, consistency and variety* to cover the nutritional needs of the growing child. From the survey findings the rates of Introduction of solid, semi-solid or soft foods, minimum meal frequency and minimum dietary diversity were below 80% (table 3-17) hence considered suboptimal and likely to aggravate malnutrition rates.

Table 3-17: Summary of IYCF indicators Rubkona County SMART survey May 2017

Indicator	N	n	%	95% CI
Ever breastfed	234	234	100%	100.0%-100.0%
Timely initiation of breastfeeding (children 0-23 months)	234	213	91.0%	86.6%-94.4%
Exclusive breastfeeding under 6 months (Infants 0-5 months)	52	41	78.8%	65.3%-88.9%
Exclusive breastfeeding (infants 4–5 months)	23	16	69.6%	47.1%-86.8%
Continued breastfeeding at 12 months (Children 12-15 months)	37	35	94.6%	81.8%-99.3%
Continued breastfeeding at 24 months (Children 20-23 months)	33	22	66.7%	48.2%-82.0%
Introduction of solid, semi-solid or soft foods (infants 6–8 months)	38	16	42.1%	26.3%-59.2%
Minimum Meal Frequency ≥ 2 times (6-8 months) and breastfeeding	38	10	26.3%	13.4%-43.1%
Minimum Meal Frequency ≥ 3 times (9- 23 months) and breastfeeding	144	15	10.4%	5.9%-16.6%
Minimum Meal Frequency ≥ 4 times (6- 23 months) and non breastfeeding	25	1	4.0%	0.1%-20.4%
Minimum Dietary Diversity 4+ food groups and breastfeeding	182	25	13.7%	9.1%-19.6%

3.7 Food Security and Livelihoods

Out of the 504 HHs analysed for FSL information, 60.3% were female headed while the rest were male headed (39.7%). Nearly two thirds of all respondents (65.1%, n=328) were residents of the locations the survey was conducted (figure 3-3).

¹² WHO Essential Nutrition Actions: Improving maternal, newborn, infant and young child health and nutrition 2013

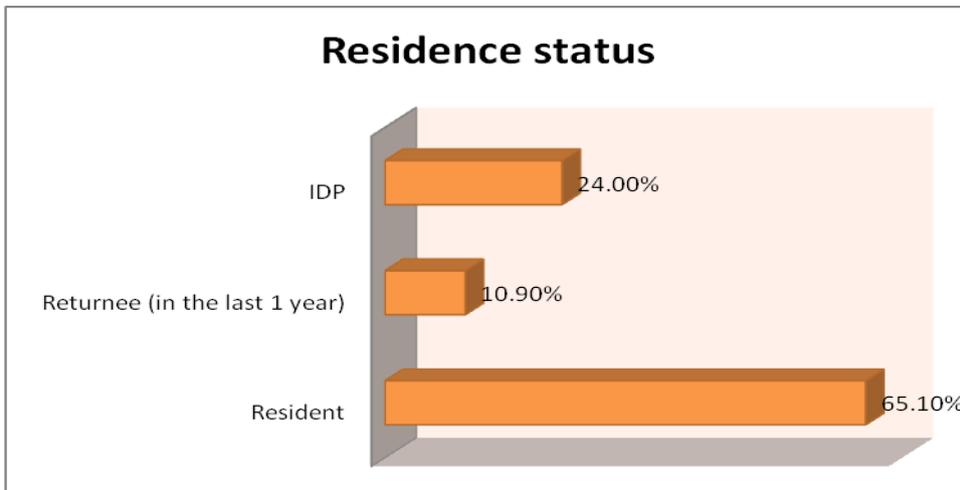


Figure 3-3: HH residence status

3.7.1 Main source of household income

A thirty days recall period was used to probe the respondents on the main source of household income. The main sources of household income commonly reported were Sale of natural resources (firewood; charcoal; grass) (25.4%), Sale of food aid (17.3%), Petty trading (16.3%), sale of alcoholic beverages (8.90%) and sale of animal products (5.6%). Other sources reported are as indicated in the figure 3-4

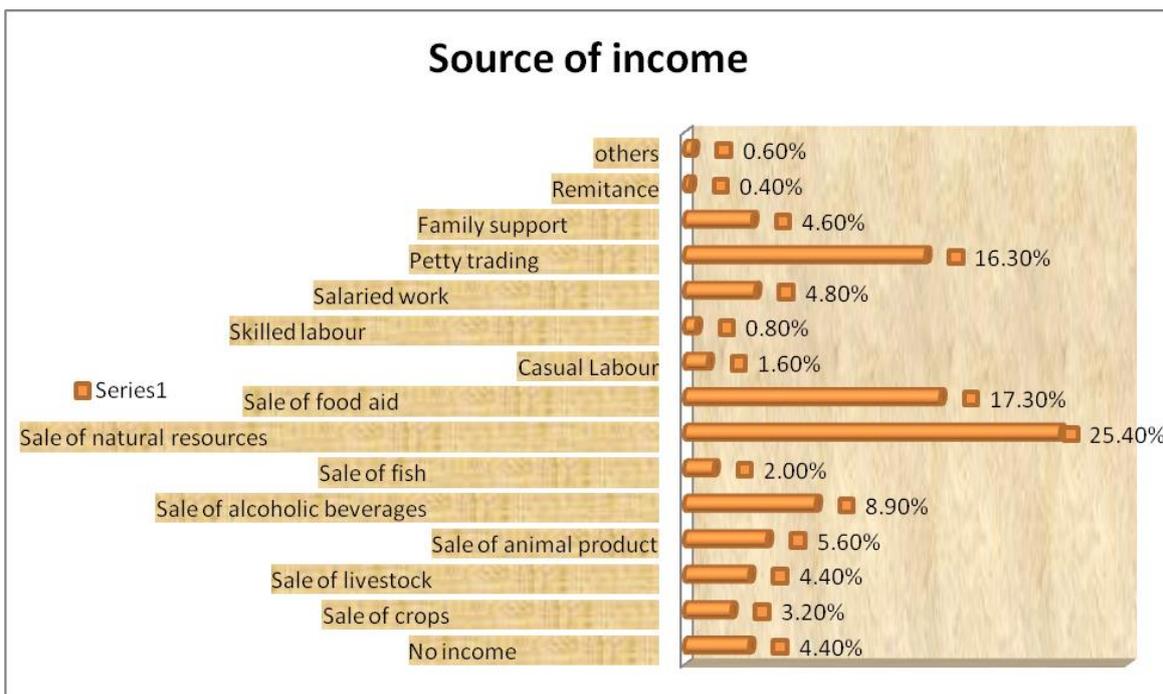


Figure 3-4: Main Income Source

3.7.2 Main source of food

Food aid from General Food Distribution was the main source of food for 75.80% of HHs in the past 7 days. This underscores the role played by WFP & humanitarian sector in alleviating food insecurity in Rubkona County. Other main sources included; own

production 7.30%, market/shop purchase 6.20%, and gathering 5.20%. The other sources are as shown in figure 3-5 below.

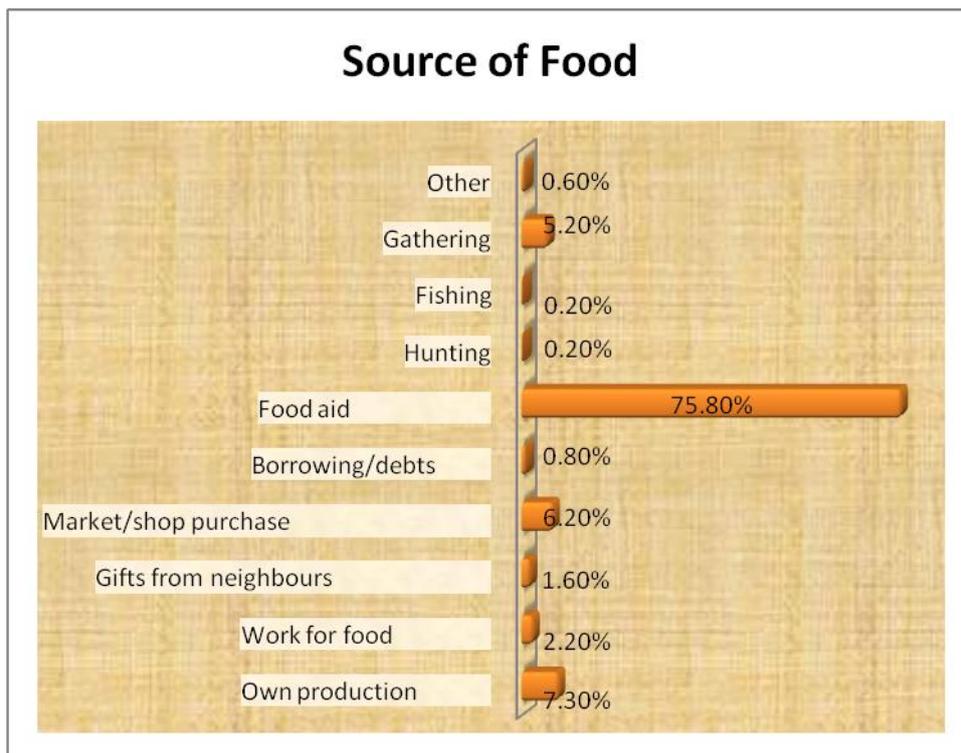


Figure 3-5: Main Source of Food

3.7.3 Cultivation in the recent last season and Livestock ownership

About 44.8% (226 out of 504 HHs) of HH had cultivated in the recent last season as shown in figure 3-6.

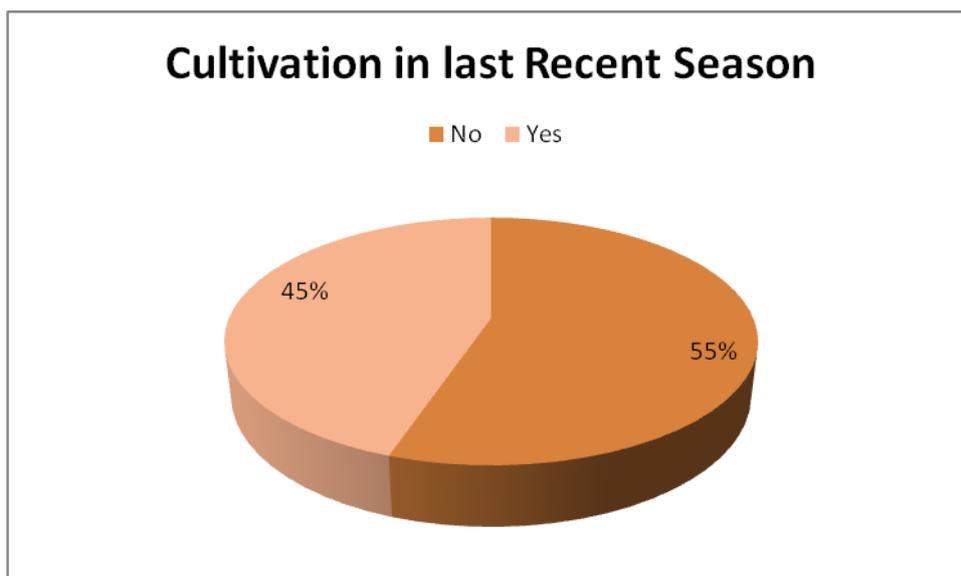


Figure 3-6: Cultivation in recent last season

Only 37.7% (n=190) of respondents reported that they owned livestock at the time of

the survey. Majority (57.3%) of HHs had witnessed a large decrease in livestock ownership from the first fighting of December 2013 as shown in figure 3-7.

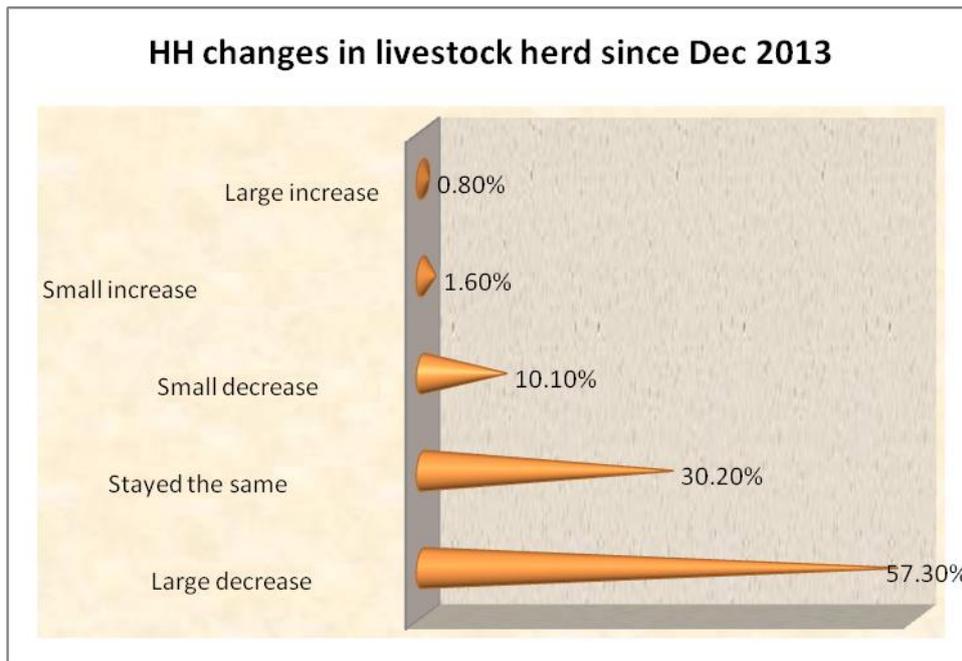


Figure 3-7: Changes in livestock herd since Dec 2013

3.7.4 Humanitarian assistance in the last 3 months

About 73.6% (95% CI: 69.5% - 77.4%) of HH received humanitarian assistance in the past 3 months. Six out of ten households reported they had received GFD (figure 3-8), something which is consistent with the proportion of HHs which had sourced food from food aid in the past one week.

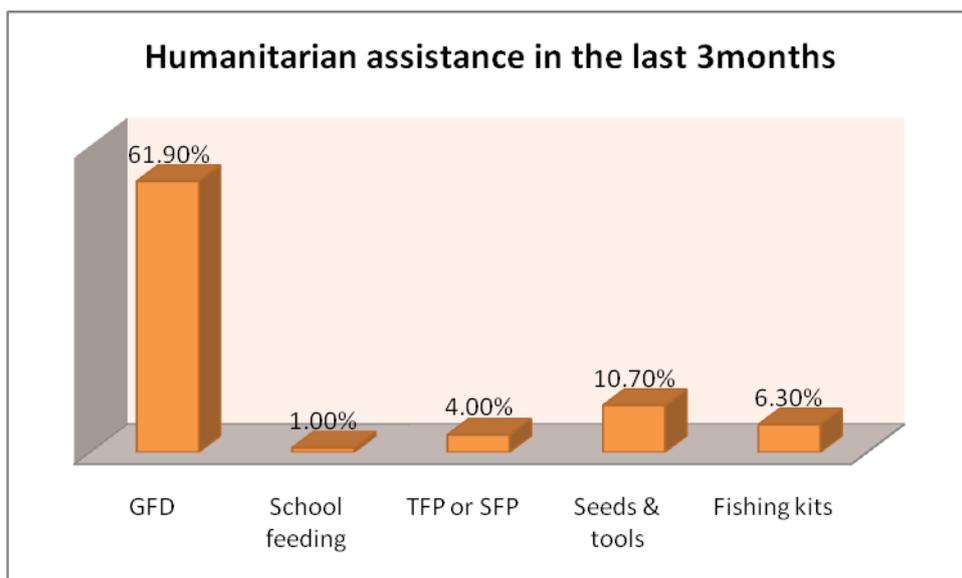


Figure 3-8: Humanitarian Assistance in the last 3 months

3.7.5 Food Consumption

Food Consumption Score: An indicator developed by WFP that captures the quantity and quality of [household] food consumption¹³. The FCS¹⁴ is a composite score based on the number of food groups (out of 8 possible food groups) that any household member has consumed over the previous 7 days, multiplied by the number of days that the food group was consumed, weighted by the nutritional importance of the food group, for a total possible score ranging from 0 to 112. Only foods consumed in the home are counted in this indicator. Broad food groups and associated FCS weights are: main staples—weighted at 2, pulses—weighted at 3, vegetables—weighted at 1, fruit—weighted at 1, meat and fish—weighted at 4, milk—weighted at 4, sugar—weighted at 0.5, and oil—weighted at 0.5. (Condiments can also be captured but are weighted at 0). Thresholds are imposed on the continuous score to differentiate households into one of three categories: acceptable (> 35, > 42 in areas where oil and sugar are consumed regularly), borderline (21–35; 28–42 in areas where oil and sugar are consumed regularly), and poor (< 21; < 28 in areas where oil and sugar are consumed regularly) (WFP 2008).

The mean food consumption score for all HH surveyed was 44 which classify Rubkona County food security at **acceptable** food consumption (table 3-18).

Table 3-18: Food Consumption Score

FCS, N=504	Frequency	Percent	95% Conf Limits
Poor (FCS, 0 – 21)	141	28.0%	24.1% -32.2%
Borderline (FCS, 21.5 – 35)	12	2.4%	1.3%- 4.2%
Acceptable (FCS, > 35)	351	69.6%	65.4% -73.6%

Cereals & tubers group was the most reportedly consumed food group followed by oils/fats group (figure 3-9), perhaps confirming a food basket emanating from GFD.

¹³ http://documents.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp197216.pdf.

¹⁴ Vaitla, Bapu; Coates, Jennifer; and Maxwell, Daniel. 2015. *Comparing Household Food Consumption Indicators to Inform Acute Food Insecurity Phase Classification*. Washington, DC: FHI 360/Food and Nutrition Technical Assistance III Project (FANTA).

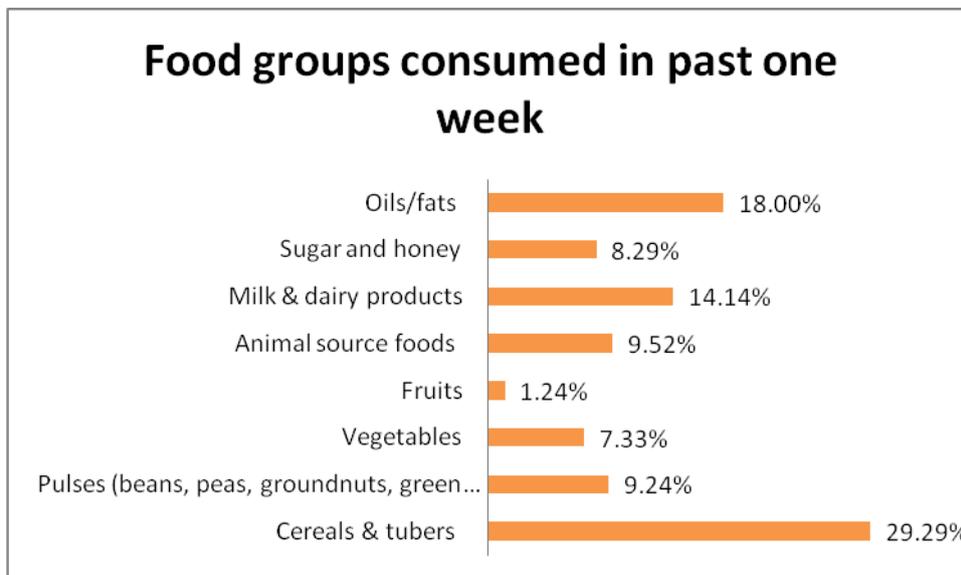


Figure 3-9: Proportion of Food groups consumed in past one week

3.7.6 Household Hunger Scale

The HHS is a household food deprivation scale for cross-cultural use, based on the idea that the experience of household food deprivation causes predictable reactions that can be captured through a survey and summarized in a scale¹⁵. HHS focuses on the food quantity dimension of food access and does not measure dietary quality. Additionally, because the HHS is a household level indicator, it does not capture data on food availability or food utilization, which are other components of food security.

The HHS tool consists of three occurrence questions and three frequency-of-occurrence questions. The HHS occurrence questions ask whether or not a specific condition associated with the experience of food insecurity ever occurred during the previous 4 weeks (30 days).

From the survey the median Household Hunger Scale Score (HHS Score) was 3 (Moderate hunger in the households) while around fifteen percent of the HHs had experienced severe hunger in the last 4 weeks (30 days) prior to the survey (table 3-19).

Table 3-19: Household Hunger Scale Score

HHS Score, N=504	Frequency	Percent	95% Conf Limits
Little to no hunger (HHS Score, 0 – 1)	63	12.5%	9.8% -15.8%
Moderate hunger (HHS Score, 2-3)	402	79.8%	75.9%- 83.1%
Severe hunger (HHS Score, 4-6)	39	7.7%	5.6%-10.5%

¹⁵ Ballard, Terri; Coates, Jennifer; Swindale, Anne; and Deitchler, Megan. *Household Hunger Scale: Indicator Definition and Measurement Guide*. Washington, DC: Food and Nutrition Technical Assistance II Project, FHI 360. Published August 2011

3.7.7 Reduced Coping Strategy Index

The Coping Strategy Index (CSI), a tool developed by the World Food Programme, is commonly used as a proxy indicator for access to food. Coping can be consumption changes, expenditure reduction or income expansion¹⁶. In particular, this indicator captures how many times in the past 7 days any household member engaged in the following behaviors: eating less preferred but less expensive foods—weighted at 1, reducing the number of meals per day—weighted at 1, limiting portion size at mealtime—weighted at 1, prioritizing consumption for certain household members (e.g., limiting adult intake)—weighted at 3, and borrowing food/money from friends and relatives—weighted at 2, for a total possible index score ranging from 0 to 56.

During the previous 7 days period, about 90.1% of the sampled households reported having experienced a food shortage or had no money to buy food. Nearly half the sampled population (46.0%) was discovered to have a poor reduced coping strategy index as shown in table 3-20. The mean Reduced Coping Strategy Index for all HH surveyed was 20, meaning all HH combined had an average rCSI according to WFP thresholds.

Table 3-20: Reduced Coping Strategy Index

rCSI N=504	N	Percent	95% Conf Limits
Good (rCSI, 0 – 4)	72	14.3%	11.4% -17.7%
Average (rCSI, 5 – 20)	198	39.3%	35.0% -43.7%
Poor (rCSI, > 21)	234	46.4%	42.0%-50.9%

3.8 Water, Sanitation & Hygiene (WASH)

3.8.1 Use of improved water Source

An improved water source is defined as: piped water into dwelling, plot, or yard; public tap/standpipe; tube well/borehole; protected dug well; protected spring; or rainwater collection.

Only 79.1% of the surveyed population reported they have access to clean safe water from protected stand pipe, shallow well and borehole/hand pump (figure 3-10). Household access to clean safe water is important in preventing diseases that are water-borne.

¹⁶

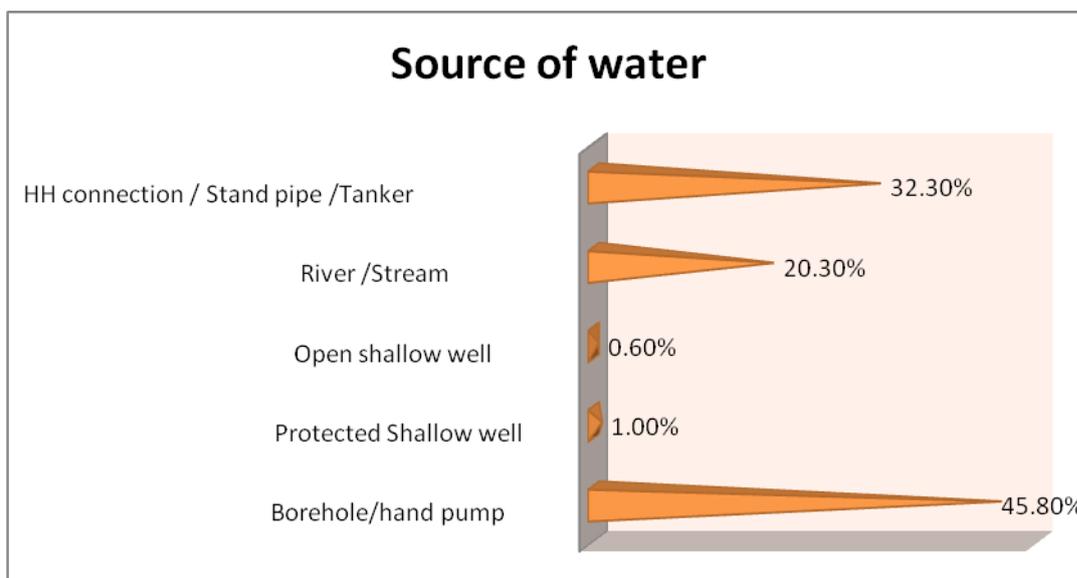


Figure 3-10: Sources of water for the households

3.8.2 Time taken to collect water

Approximately 28% of the population surveyed took <30 minutes to collect their water from water source (table 3-21). This included time for travelling to water source, waiting and a return journey. The recommended time is less than thirty minutes according to Sphere Standards¹⁷. It also gives the maximum queuing time at a water source which should be no more than 15 minutes and it should not take more than three minutes to fill a 20-litre container.

Table 3-21: Time taken to collect water

Time taken to collect water from water source, N= 502	Frequency	Percent	95% CI
<30 min	297	59.2%	54.7% - 63.5%
>30min to <1hr	152	30.3%	26.3% - 34.5%
>1hr to < 2hr	25	5.0%	3.3% - 7.4%
>2hr to < 4hr	26	5.2%	3.5%- 7.6%
>4hr	2	0.4%	0.1%- 1.6%

3.8.3 Water Access

Using the household size and assuming equal amount of water usage per person average liters/person/day was calculated. This considered all water from all sources collected by or delivered to the household and used for drinking, cooking and hygiene excluding water for washing clothes and for animals.

In 26.1% of households, water consumption is below 7 litres per person, a consumption which is below the Sphere emergency target of 7 litres of water per person per day. In only 23.9% of HHs is the standard Sphere target of 15 litres reached or exceeded (table 3-22).

¹⁷ The SPHERE Project Handbook (2011), Humanitarian Charter and Minimum Standards in Disaster Response

Table 3-22: Water access

Water access, N=502	Frequency	Percent	95% CI
0-<7 litres	131	26.1%	22.4%- 30.2%
7-<15 litres	251	50.0%	45.5%- 54.5%
>15 litres	120	23.9%	20.3%- 27.9%

3.8.4 Treatment of water for drinking

Nearly forty percent of HHs treated their drinking water (figure 3-11). Letting the water to settle (21.3%) was the most reported water treatment method at HH level.

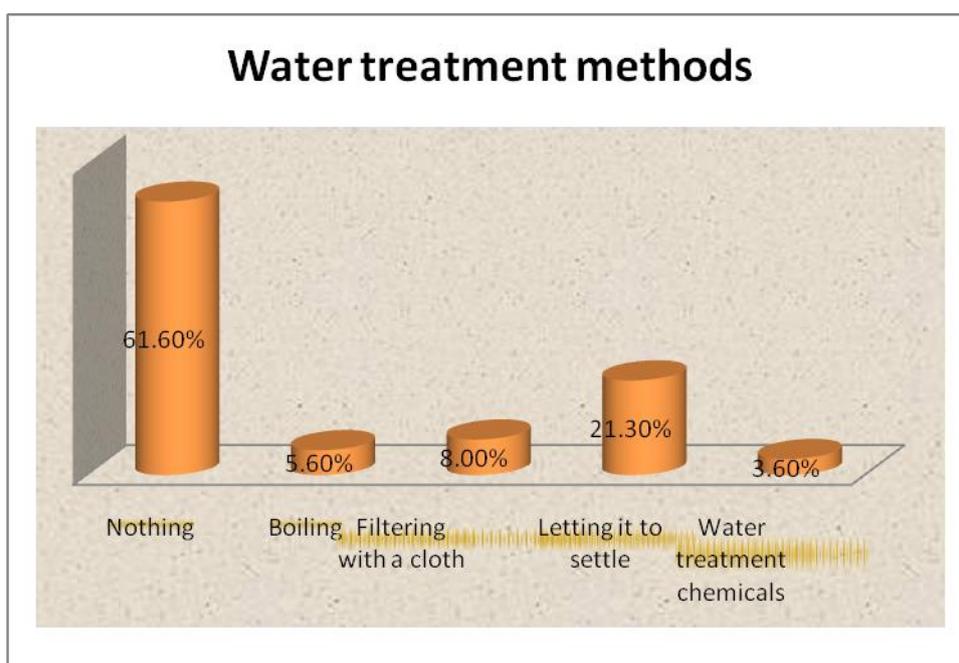


Figure 3-11: Treatment of water for drinking at HH level

3.8.5 Appropriate Hand Washing Behaviour

It is recommendable to wash hand with soap or an alternative such as ash at five critical times - after using a latrine, before eating or preparing food, before feeding infant, and after changing baby’s diapers/nappies¹⁸. Poor sanitary habits increase the incidences of diseases such as diarrhoea, which often results in diminished nutrition status. The survey sought to find out the proportion of respondents who know 3 of 5 critical times to wash hands.

Only a combined 14.7% (95% CI: 11.8% - 18.2%) (n=74) of caregivers interviewed washed their hands on at least 3 or more recommended hand washing incidences (table 3-23). Out of those who reported to wash their hands, 42.8% used water + soap, 23.1% used water + ash while the majority (43.6%) used a water only (figure 3-12).

¹⁸ The SPHERE Project Handbook (2011), Humanitarian Charter and Minimum Standards in Disaster Response

Table 3-23: Critical times for hand washing

Hand washing at critical times, N= 502	Frequency	Percent	95% Conf Limits
Never	14	2.8%	1.6% - 4.7%
One critical time	233	46.4%	42.0% - 50.9%
Two critical times	140	27.9%	24.1% - 32.1%
Three critical times	60	12.0%	9.3% - 15.2%
Four critical times	10	2.0%	1.0% - 3.8%
Five critical times	4	0.8%	0.3% - 2.2%
Other non critical times	41	8.2%	6.0% - 11.0%

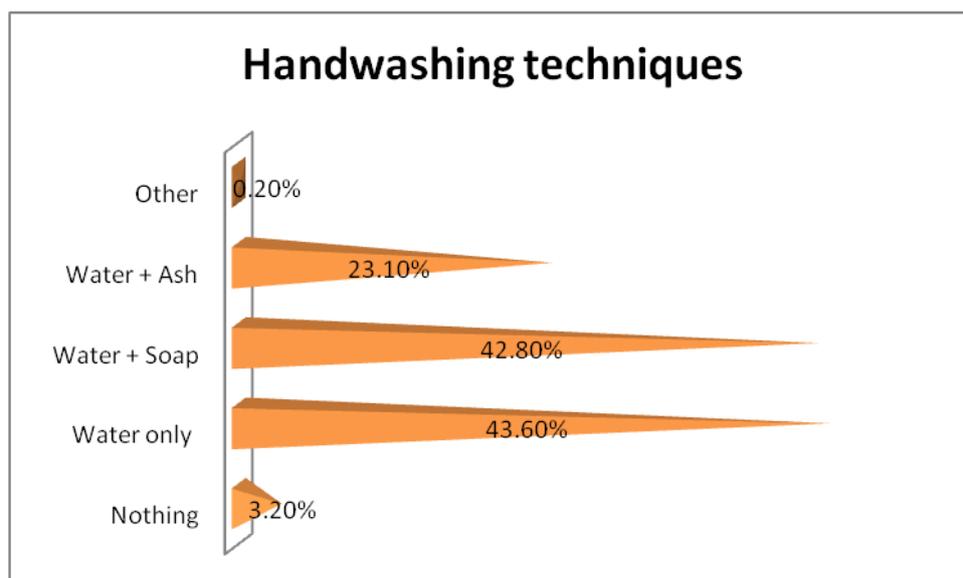


Figure 3-12: Hand washing technique

3.8.6 Excreta Disposal

Proper disposal is defined as using any method which safely isolates excreta from the environment (e.g. ventilated improved pit (VIP) latrine, pit latrine, cat hole).

About 19.3% (95% CI: 16.0% - 23.1% of HHs (n=97) reported they had access to a latrine facility while 80.7% (n=405) practiced open defecation in designated and undesignated areas.

Poor excreta disposal exposes to pathogens and other toxins that imperil health and nutrition status at the individual and community levels.

Table 3-24: Excreta disposal

Excreta disposal, N=502	Frequency	Percent	95% CI
Undesignated open area	348	69.3%	65.1%-73.3%
Designated open area	58	11.6%	9.0%-14.8%
Hole	14	2.8%	1.6%-4.7%
Latrine	97	19.3%	16.0%-23.1%

4 CONCLUSION

Nutrition status: The current GAM WHZ of 17.6% (13.0-23.5 95% CI) and SAM WHZ of 3.9% (2.1- 7.2 95% CI) indicate a *critical* phase of acute malnutrition as per WHO 2006 classification. Comparatively the SMART survey of May 2016 showed a *critical* situation of malnutrition with a GAM (WHZ) rate of 29.2% (24.5-34.4 95% C.I.), and a SAM rate of 7.8% (5.2-11.4 95% C.I.). This shows an improving situation of nutritional status of children 6-59 months. The change is statistically significant when looking at the p-values (we are 99.9% sure that the prevalence from May 2017 pre-harvest survey is lower than May 2016 pre-harvest survey) and the confidence interval in both surveys are not overlapping.

Survey 1						
Total Sample Size	Prevalence	Design Effect	Number of Clusters	Estimated Variance		
n1	p1	Deff1	C1	s1 ²	se	
411	29.20%	1.16	32	0.000583	0.024156	
Survey 2						
Total Sample Size	Prevalence	Design Effect	Number of Clusters	Estimated Variance		
n2	p2	Deff2	C2	s2 ²	se	
467	17.60%	1.98	39	0.000615	0.024797	
p1-p2	Pooled Variance	t	p	DF	2 sided	1 sided
11.60%	3.46%	3.35	0.0013	69	99.9%	99.9%

Figure 4-1: statistical test using CDC-Calculator -Two-Surveys

The malnutrition prevalence by MUAC was higher among girls than boys. The proportion of boys 2.0% (0.8- 4.7 95% CI) affected by moderate acute malnutrition were nearly half that of girls 5.2% (2.6-10.0 95% CI). Nonetheless, this does not imply that the intervention should be inclined to target girls more but it is just a statistical note and therefore both genders should be given equal attention when mainstreaming any rehabilitation programmes.

Mortality rates: Crude mortality rate of 1.11 (0.77-1.60 CI 95%) deaths per 10 000/day and under-five mortality rate of 0.89 (0.31-2.47 CI 95%) deaths in children U5/10 000/day recorded are below the WHO emergency threshold (1/10,000 persons/day for crude mortality rate and 2/10,000 U5 children/day for U5MR). The CDR & U5DR figures were not statistically different from what was recorded in May 2016 SMART survey where CMR was 1.19 (0.81-1.74) and U5MR was 0.64 (0.14-2.75).

Morbidity status: Morbidity rate was at 76.9% (95% CI: 72.7%-80.6%) of surveyed children in the two weeks prior to the assessment with Fever (70.2%) being the most prevalent. Despite morbidity being high it had a low negative correlation¹⁹ with malnutrition.

¹⁹ Pearson correlation coefficient , r= -0.16225

Access to health care: Immunization, VAS and deworming coverage was below the Sphere (2011) coverage standards of 80%. These are timely preventive measures to a number of nutrition and health problems among children 6-59 months implying that efforts to promote primary health programs in the county need further strengthening.

Caring practices: The survey though used to collect proxy MIYCN indicators due to low sample size registered suboptimal maternal infant and young child nutrition (MIYCN) practices. Notably the proportion of infants 4–5 months receiving Exclusive breastfeeding was below 80% meaning infants were being introduced to other foods in addition to breast milk before completion of six months age. Complementary feeds given to children were inadequate in; *frequency, amounts, consistency and variety* to cover the nutritional needs of the growing child. The minimum meal frequency of two or more meals per day was met by 26.3% of 6-8 months while only 10.4% of 9- 23 months received three or more meals a day. More than 80% of children 6- 23 months who are breastfeeding did not consume the minimum diet diversity, which is eating from 4 or more of 7 standard food categories.²⁰. This means that most children 6-23 months are not being given nutritionally adequate and safe complementary foods. Optimal MIYCN is among the most critical interventions to ensuring improved child health and development and reducing under-five mortality.

The proportion of malnourished women recorded in the survey was high with 16.4% (11.8% - 21.9% 95% CI) of women of reproductive age being found to have a MUAC of <23 cm. Nutritional statuses of pregnant and lactating women are crucial for ensuring healthy fetal growth and development.

Clean water access, hygiene and sanitation: From the survey 3 out of 4 households have water consumption that is below the Sphere minimum target of 15 litres per person per day. The poor access to safe and clean water, as well as poor hand washing and excreta disposal practices recorded have the potential to worsen the incidences of diseases such as diarrhoea which in turn exacerbates malnutrition if left unchecked.

Food intake and access: The mean food consumption score from the survey was 44 implying an acceptable food consumption score according to WFP threshold (FCS, >35). Similarly, the median Household Hunger Scale Score (HHS Score) in the last 4 weeks (30 days) prior to the survey was 3 (Moderate hunger in the households). Further the mean Reduced Coping Strategy Index for all HH surveyed was 20, meaning all HH combined had an average rCSI. These indicators though depicting an improving trend in Food security should be viewed with caution since most of the population is still dependent on humanitarian assistance (3 out of 4 HHs reported Food Aid had been their main source of Food for the last 7 days before the survey while nearly 20% of HHs had relied on sale of food aid as a source income in the last 30 days before the survey).

In summary the prevalence of acute malnutrition reported was at a **critical** level and above the WHO threshold of 15% GAM WHZ and 4% for SAM WHZ used to declare a humanitarian emergency. Comparatively there was a significant decline in the rates of acute malnutrition where a GAM rate of 29.2% (24.5-34.4 95% C.I.) and SAM was 7.8% (5.2-11.4 95% C.I.), was recorded in a similar period last year. However, the critical nutrition situation of the surveyed population may be aggravated by **poor maternal**

²⁰ For non-breastfed children, one of these 4 categories must be dairy products to achieve the minimum

and child care (high proportion of malnourished women, sub-optimal exclusive breastfeeding & complementary feeding practices), **poor hygiene and sanitation practices** (low level of hand washing and safe excreta disposal) as well as **low coverage of primary health programs** namely immunization, Vitamin A Supplementation and deworming coverage (which were below Sphere standards target of >80%). Moreover the food security is still a major concern considering the vulnerable situation of the surveyed population which is reliant on Food aid both as a source of food (3 in 4 people) and as a major source of income (for about 1 out 5 people).

5 RECOMMENDATIONS

Health and Nutrition

- Continued provision of Community based management of malnutrition interventions (Community mobilization, TSFP, OTP and SC) in Rubkona County. Focus should be emphasised on areas with high cases of malnutrition especially in Rubkona & Bentiu Payams which are the most populated areas in the county outside the Bentiu PoC. Case detection could potentially be enhanced via systematic mass screenings.
- Possibilities of Blanket Supplementary Feeding Programme can be explored to prevent more under fives from sinking into malnutrition before the next harvesting season.
- Continued provision and scaling up of primary health care or mobile clinics to increase access of the population to treat and prevent illnesses like diarrhoea, upper respiratory infections and fever.
- **Continue to actively vaccinate children for measles, provide vitamin A supplementation and deworming.** Focus should be amplified to ensure coverage of 80% or more by ensuring that outreach services are strengthened and CMAM activities are integrated into Child Health Days and immunization campaigns.
- **Further strengthening of MIYCN practices.** Agencies in the county should implement a coordinated county-wide behavior change strategy, focusing on MIYCN. Awareness campaigns and community education programmes on exclusive breastfeeding and appropriate complementary feeding.

Food Security/Livelihoods

- **Continued GFD distributions**
- **Scaling up the resilience activities to enhance food security and livelihood efforts in the county.** A broad base approach using an integrated program of Health, Nutrition, WASH and FSL can be pursued to address the large scale food and nutrition insecurity at household level.

Water and Sanitation

- **Increase access to water.** This can imply increase of water points to address on time taken and quantity of water accessed.

- **Promotion of hand washing, and proper water treatment techniques.** A high proportion of HHs did not wash hands at the appropriate times. Additionally most did not treat their water before consumption. Emphasis should be laid on appropriate times to wash hands and best water treatment techniques. This can be done through health education campaigns. Increasing this practice is critical to preventing under nutrition and death.
- **Promoting safe excreta disposal.** Only 2 out of 10 HHs reported they had access to a latrine facility while 80.9% practiced open defecation. This can highly compromise the sanitation situation and increase susceptibility to communicable disease. Efforts can be concerted towards community sensitization and empowerment to construct latrines using locally available materials. This can be done using community dialogue and community structure already established.

6 APPENDICIES

Appendix 1

Plausibility Report

Plausibility check for: RUB_201705_CARE_SSD.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 (% of out of range subjects)	Incl	%	0-2.5 0	>2.5-5.0 5	>5.0-7.5 10	>7.5 20	0 (1.5 %)
Overall Sex ratio (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	0 (p=0.151)
Age ratio(6-29 vs 30-59) (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	4 (p=0.037)
Dig pref score - weight	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	0 (4)
Dig pref score - height	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	2 (11)
Dig pref score - MUAC	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	2 (8)
Standard Dev WHZ .	Excl	SD	<1.1 and 0	<1.15 and 5	<1.20 and 10	>=1.20 or 20	0 (1.04)
Skewness WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	0 (-0.19)
Kurtosis WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	0 (-0.15)
Poisson dist WHZ-2	Excl	p	>0.05 0	>0.01 1	>0.001 3	<=0.001 5	3 (p=0.005)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	11 %

The overall score of this survey is 11 %, this is good.

There were no duplicate entries detected.

Percentage of children with no exact birthday: 100 %

Appendix 2

Assignment of Clusters

	Geographical unit	Population size	Cluster
Payam No.1: RUBKONA	Shilak East	3780	1,2,3
	Mankuai A	2796	4,5
	Mankuai B	2802	6,7
	Hiselam	3486	8,9
	Suksitah	2400	10,11
	Mater	1938	12
	Tong	900	13
	Ngonp	1200	14
	Pakur	1200	15
	Dengdeng	2400	16
Payam No. 2: BUDANG	Tharluol	471	17
	Chotchora	1281	18
	Nyearomne	1214	
	Raideng	210	19
Payam No. 3: DHORBOR	Juach	134	
	Boaw	751	
	Norchuayebier	594	20
Payam No. 4: BENTIU Town	Daer A	3300	21,22
	Daer B	450	
	Dhiepah	972	23
	Biemruoh	690	
	Market 7	564	24
	Suckchabe	1398	25
	Hai Engas	3540	26,27
	Nyuenyphiu	738	28
	Kordapdap	174	
	Naifasha	3660	29,30,31
	Khalibalek	1722	32
	Kuerbona	954	
	Payam No. 5: NHIALDIU	Chour	2249
Chotjiok		1787	RC
Chanlual		1742	35,36
Tongedol		1235	
Nhialdiu		2792	37,RC
Payam No. 6: PANHIANY	Bielbar	1984	RC,38
	Manguol	815	
Payam No. 7: KALJAK	Wajai	745	RC
	Biel Chier	1431	39
Payam No. 8: NORLAMWEL	Tongedol Two	423	

Appendix 3

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	0.16		3/2	
Enumerator 1	0.15 OK	0.13 OK	3/3	2/2
Enumerator 2	0.19 OK	0.15 OK	1/4	1/5
Enumerator 3	0.17 OK	0.05 OK	4/1	3/4
Enumerator 4	0.26 OK	0.16 OK	2/3	3/4
Enumerator 5	0.24 OK	0.06 OK	3/4	4/2
Enumerator 6	0.37 POOR	0.15 OK	4/1	1/6

Height:

	Precision: Sum of Square [H1-H2]	Accuracy: Sum of Square [Enum.(H1+H2)- Superv.(H1+H2)]	No. +/- Precision	No. +/- Accuracy
Supervisor	1.97		9/1	
Enumerator 1	4.02 POOR	12.13 POOR	4/4	2/8
Enumerator 2	4.55 POOR	13.12 POOR	8/1	5/5
Enumerator 3	0.99 OK	4.94 OK	3/4	2/8
Enumerator 4	3.55 OK	3.26 OK	8/1	7/2
Enumerator 5	3.64 OK	7.75 POOR	9/0	5/5
Enumerator 6	15.33 POOR	7.72 POOR	8/2	6/2

MUAC:

	Precision: Sum of Square [MUAC1-MUAC2]	Accuracy: Sum of Square [Enum.(MUAC1+MUAC2)- Superv.(MUAC1+MUAC2)]	No. +/- Precision	No. +/- Accuracy
Supervisor	11.17		2/7	
Enumerator 1	140.00 POOR	212.85 POOR	3/2	4/6
Enumerator 2	18.00 OK	213.05 POOR	3/3	10/0
Enumerator 3	75.00 POOR	79.25 POOR	2/7	3/7
Enumerator 4	106.00 POOR	66.05 POOR	7/1	7/3

Enumerator 5	34.00 POOR	117.45 POOR	1/4	1/9
Enumerator 6	116.00 POOR	113.65 POOR	1/7	0/10

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.

Appendix 4: Calendar of Events

CALENDER OF EVENTS FOR RUBKONA COUNTY

Month	Season	2012	2013	2014	2015	2016	2017
January	Taking of cattle to cattle camps		CPA signing day 52	CPA signing day/start of humanitarian response in UNMISS Bentiu Base 40	CPA signing day 28	CPA signing day 16	4
February			51	39	27	15	3
March	Clearing bushes		50	38	26	14	2
April	Clearing bushes		49	37	Resurgence of violence in Bentiu 25	13	1
May	Start of rains:		48	36	24	12	0
June	Planting of crops; maize,sorghum		59	47	35	23	11
July	weeding of farms	1st independence day/Martyr day 58	Independence day celebration /martyr day 46	Independence day celebration /martyr day. 34	Independence day celebration /martyr day 22	Independence day celebration /martyr day 10	
August	weeding of farms		57	45	33	21	9
September	Maize harvesting		56	44	32	20	8
October	Sorghum harvesting		55	43	31	19	7
November	Sorghum harvesting		54	42	30	18	6
December	Christmas Day celebrations		53	Fighting erupt in Juba, 41	29	17	5