Food Security and Nutrition Assessment among South Sudanese Refugees in Adjumani, Arua and Kiryandongo districts, New Caseload

By

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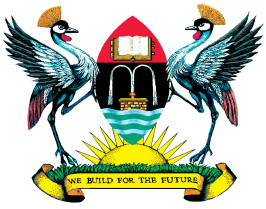

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Table of content

Acknowledgment ii
Table of content iii
List of tables iv
List of figures v
Summary table of findings vi

1. Introduction 1
1.1 Background 1
1.2 Assessment objectives 1
1.2.1 General objective 1
1.2.2 Specific objectives 1
1.3 Assessment methods 2

2. FINDINGS 3
2.1 Socio-demographic characteristics 3
2.1.1 Distribution of age and sex of sampled children 6-59 months 5
2.2 Nutrition status of children 5
2.2.1 Prevalence of Global Acute Malnutrition (GAM) 5
2.2.2 Prevalence of acute malnutrition based on MUAC 7
2.2.3 Prevalence of stunting 8
2.2.4 Discussing the observed low prevalence of stunting 9
2.2.5 Prevalence of underweight 9
2.2.6 Graphical distribution of malnutrition and mean z-scores 10
2.2.7 Anemia status of children 0-59 months 12
2.3 Nutrition status of mothers 13
2.3.1 Underweight status using Body Mass Index (BMI 13
2.3.2 Anemia status of mothers 14
2.4 Infant and young child feeding practices 14
2.4.1 Breastfeeding practices 14
2.4.2 Introduction of complementary feeding 15
2.4.3 Frequency of complementary feeding 15
2.4.5 Quality of complementary food 16
2.4.6 Participation in feeding programs 16
2.5 Food security status 16
2.5.1 General food distribution 16
2.5.2 Diversity of food consumed based on Food Consumption Scores (FCS) 17
2.6 Care-seeking practices, morbidity and mortality 19
2.6.1 Immunization, vitamin A and deworming coverage, children 12-23 months 19
2.6.2 Morbidity 20
2.6.3 Bed net use 20
2.6.4 Mortality 21
2.7 Water and sanitation 21
2.7.1 Safe water sources and coverage 21
2.7.2 Household daily water usage 22
2.7.3 Latrine coverage 22
2.7.4 Disposal of children's faeces 24
2.8 Factors associated with malnutrition 24

3. CONCLUSIONS AND RECOMMENDATIONS 27
Appendix 30
Central Supervisors 30
Plausibility check for Adjumani, Arua and Kiryandongo NFSA 31

List of tables

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF HOUSEHOLDS 3
TABLE 2: DISTRIBUTION OF AGE AND SEX OF SAMPLED CHILDREN 6-59 MONTHS 5
TABLE 3: PREVALENCE OF GAM BASED ON WEIGHT-FOR-HEIGHT Z-SCORES AND BY SEX 6
TABLE 4: PREVALENCE OF STUNTING BASED ON HEIGHT-FOR-AGE Z-SCORES AND BY SEX 8
TABLE 5: PREVALENCE OF UNDERWEIGHT BASED ON WEIGHT-FOR-AGE Z-SCORES BY SEX 10
TABLE 6: MEAN Z-SCORES, DESIGN EFFECTS AND EXCLUDED SUBJECTS 10
TABLE 7: PREVALENCE OF INFANT AND YOUNG CHILD FEEDING PRACTICES INDICATORS- SOUTH SUDANESE REFUGEES, FEBRUARY 2014 14
TABLE 8: MEAN DURATION OF THE FOOD RATIONS ACCORDING TO DISTRICT AND LOCATION OF REFUGEE HOUSEHOLD 17
TABLE 9: TWO-WEEK PREVALENCE OF COMMON CHILDHOOD ILLNESS IN CHILDREN 0 – 59 MONTHS (N=962) . 20
TABLE 10: AMOUNT OF WATER (LITRES) USED ACCORDING TO LOCATION OF REFUGEE HOUSEHOLD 22
TABLE 11: DISPOSAL OF STOOL FOR CHILDREN 0-3 YEARS ACCORDING TO DISTRICT AND LOCATION OF REFUGEE HOUSEHOLD 24

List of figures

FIGURE 1: REPRODUCTIVE HEALTH STATUS OF MOTHERS 15-49 YEARS BY LOCATION OF REFUGEE (N=772) 4
FIGURE 2: ANC ATTENDANCE AND IFA SUPPLEMENTATION AMONG PREGNANT WOMEN (N=91) 5
FIGURE 3: PREVALENCE OF GAM AND SAM ACCORDING TO DISTRICT AND LOCATION OF REFUGEES (N=846) 7
FIGURE 4: PREVALENCE OF GAM ACCORDING TO AGE OF CHILDREN 6-59 MONTHS (N=848) 7
FIGURE 5: PREVALENCE OF STUNTING AND SEVERE STUNTING ACCORDING TO DISTRICT AND LOCATION OF REFUGEE CHILDREN (N=845) 8
FIGURE 6: PREVALENCE OF STUNTING ACCORDING TO AGE GROUP OF CHILDREN 6-59 MONTHS (N=845) 9
FIGURE 7: PREVALENCE OF UNDERWEIGHT AND SEVERE UNDERWEIGHT BY AGE GROUP OF CHILDREN 6-59 MONTHS (N=854) 10
FIGURE 8: DISTRIBUTION OF WEIGHT-FOR-HEIGHT, HEIGHT-FOR-AGE AND WEIGHT-AGE FOR BOTH SEXES AMONG SOUTH SUDANESE REFUGEES, FEBRUARY 2014 11
FIGURE 9: PREVALENCE OF ANEMIA ACCORDING TO AGE GROUP AND SEX AMONG CHILDREN 6-59 MONTHS (N=538) 12
FIGURE 10: PREVALENCE OF ANEMIA IN CHILDREN ACCORDING TO LOCATION 13
FIGURE 11: BMI STATUS OF MOTHERS 15-49 YEARS (N=611) 13
FIGURE 12: ANEMIA PREVALENCE AMONG WOMEN 15-49 YEARS ACCORDING TO DISTRICT AND SETTLEMENT 14
FIGURE 13: MEAL FREQUENCY AMONG CHILDREN 9-23 ACCORDING TO DISTRICT (N=266) 15
FIGURE 14: FOOD CONSUMPTION SCORES ACCORDING TO LOCATION OF REFUGE HOUSEHOLD 17
FIGURE 15: DIVERSITY OF FOODS CONSUMED IN THE SEVEN-DAY RECALL PER FOOD CONSUMPTION GROUPING ACCORDING TO DISTRICT OF LOCATION OF REFUGEE HOUSEHOLDS 19
FIGURE 16: IMMUNIZATION, SUPPLEMENTATION AND DEWORMING COVERAGE AMONG CHILDREN 12-23 MONTHS (N=232) 20
FIGURE 17: BED NET OWNERSHIP ACCORDING TO DISTRICT AND LOCATION OF REFUGEE HOUSEHOLD 21
FIGURE 18: WATER SOURCES FOR REFUGEE HOUSEHOLDS IN ADJUMANI, ARUA AND KIRYANDONGO (N=877) 22
FIGURE 19: LATRINE COVERAGE ACCORDING TO LOCATION OF REFUGEE HOUSEHOLD (N=880) 23
FIGURE 20: SHARING STATUS OF TOILET FACILITIES AMONG REFUGEE HOUSEHOLDS REPORTING USE OF TOILETS (N=565) 23
FIGURE 21: ASSOCIATION BETWEEN GAM STATUS ACCORDING TO HISTORY DIARRHEA AND FEVER 25
FIGURE 22: ASSOCIATION OF STUNTING WITH USE OF BED NET BY CHILDREN (P=0.002) 25
FIGURE 23: ASSOCIATION OF MOTHERS' EDUCATION WITH GAM AND STUNTING STATUS 26
FIGURE 24: ASSOCIATION OF STUNTING WITH THE ANEMIA STATUS OF MOTHERS AND CHILDREN 26

Summary table of findings

Anthropometric indicators for children aged 6-59 months

		Settlements				
		Adjumani	Arua	Kiryandongo	Weighted (combined)	Public health significance
Date of the survey		February 2014				
Planned sample size	n	450	225	225	900	
Achieved sample size	n	437	227	219	883	
Acute Malnutrition						
Valid measurements	n	455	223	171	848	
GAM	% (95% CI)	20.1 (16.4 - 23.8)	15.2 (10.5-19.9)	24.1 (17.6 – 30.6)	19.6 (17.0 - 22.4	*Critical if ≥15% *Serious if 10-14% *Poor if 5-9%
SAM	% (95% CI)	4.6 (2.6-6.6)	2.2 (0.2 -4.1)	5.3 (1.8-8.8)	4.1 (3.0 - 5.7)	
Oedema	% (95% CI)	0	0	0	0	
Stunting						
Valid measurements	n	462	223	171	847	
Stunting	% (95% CI)	9.0 (6.4-11.6)	10.9 (6.8 -15.0)	8.8 (4.5-13.1)	9.1 (7.3-11.2)	*Critical if ≥40% *Serious if 30-39% *Poor if 20-29%
Severe Stunting	% (95% CI)	3.1 (1.5-4.7)	4.5 (1.8-7.2)	2.3 (0.03-4.6)	2.3 (1.3-4.3)	

Anaemia indicators for children aged 6-59 months

		Settlements				
		Adjumani	Arua	Kiryandongo	Weighted (combined)	Public health significance
Date of the survey	February 2014					
Anaemia of children 6-59 months						
Valid measurements	n	269	140	128	537	
Total Anaemia	% (95% CI)	61.7(50.4-73.0)	60.0(45-74.9)	71.9(58.0-85.9)	63.7 (56.1-71.3)	*Critical if ≥40% *Serious if 20-39% *Low if 5-19%
Mild anaemia	% (95% CI)	24.9(13.6-36.2)	25.0(10.0-40.0)	37.5(23.5-51.4)	27.9(20.3-35.5)	
Moderate anaemia	% (95% CI)	32.0(20.7-43.3)	32.9(17.9-47.8)	33.6(19.6-47.5)	32.6(25.0-40.2)	
Severe anaemia	% (95% CI)	4.8(0.0-16.1)	2.1 (0.0-17.1)	0.8(0.0-14.8)	3.2(0.0-10.8)	

Anaemia indicators for women at reproductive age (15-49 years)

		Settlements				
		Adjumani	Arua	Kiryandongo	Weighted (combined)	Public health significance
Anaemia						
Valid measurements	n	154	105	61	320	
Total Anaemia	% (95% CI)	36.4(25.8-46.9)	28.6(17.1-38.8)	49.2(35.0-63.4)	36.3 (29.5-43.1)	*Critical if ≥40% *Serious if 20-39% *Low if 5-19%
Mild Anaemia	% (95% CI)	30.5(20.0-41.0)	23.8(12.9-34.6)	45.9 (31.7-60.1)	31.3(24.5-38.1)	
Moderate Anaemia	% (95% CI)	3.6(0.0-14.4)	2.4(0.0-13.2)	3.3(0.0-17.5)	4.1(0.0-10.9)	
Severe Anaemia	% (95% CI)	1.6(0.0-12.4)	0	0	0.9(0.0-7.7)	

Household food consumption score prevalence

		Settlements				
		Adjumani	Arua	Kiryandongo	Weighted (combined)	Public health significance
Date of the survey	February 2014					
FCS						
Valid measurements	n	345	225	135	705	
Acceptable	% (95% CI)	47.8(39.5-56.1)	11.6(2.5-20.7)	56.3(42.7-69.9)	37.9(31.6-44.2)	
Borderline	% (95% CI)	31.0(22.7-39.3)	23.1(14.0-32.1)	23.0(9.4-36.6)	27.0(20.7-33.3)	
Poor	% (95% CI)	21.2(12.9-29.5)	65.3(56.2-74.4)	20.7(7.1-34.3)	35.2(28.9-41.5)	

Prevalence of common childhood illness

		Settlements				
		Adjumani	Arua	Kiryandongo	Weighted (combined)	Public health significance
Date of the survey	February 2014					
Valid measurements	n	510	250	200	960	
Diarrhoea	% (95% CI)	46.7(42.4-51.0)	60.0(53.9-66.1)	50.0(43.1-56.9)	50.9(47.8-54.0)	
Malaria	% (95% CI)	73.3(69.4-77.2)	69.6(63.9-75.3)	61.2(54.5-67.9)	69.8(66.9-72.7)	
ARI	% (95% CI)	79.8(76.3-83.3)	78.4(73.3-83.5)	73.5(67.4-79.6)	78.1(75.6-80.7)	

1. Introduction

1.1 Background

On December 15, 2013 a civil conflict erupted in South Sudan displacing thousands of people, many of whom sought refugee status in neighbouring Uganda. By February 2014, over 60,000 new refugee caseloads had been registered in Uganda. The majority of the refugees were located in reception centres and settlements in Adjumani district, while some were in Arua and Kiryandondo distritcs. It is part of routine standard procedure to carry out in-depth assessment of Food Security and Nutrition Assessment (FSNA) amongst newly registered refugee population. UNICEF in collaboration with UNHCR and WFP, hired the School of Public Health, Makerere University College of Health Sciences (Mak-SPH) to carry out the FSNA in February 2014.

1.2 Assessment objectives

1.2.1 General objective

The general objective of the FNSA was estimate food security and nutrition status of the refugee population in transit/reception centres and setllements located in Adjumani, Arua and Kiryandongo districts. This was done in order to establish benchmarks for food, nutrition and general livelihood conditions of the refugees in order to ensure adequate planning.

1.2.2 Specific objectives

1. Determine the prevalence of malnutrition among children aged 6-59 months and their mothers
2. Assess the Infant and young child feeding practices.
3. Assess the household food security status
4. Estimate coverage of routine immunizations (DPT, measles, polio), supplementation of vitamin A, and de-worming among children aged 12-23 months

5. Assess the prevalence of common diseases (diarrhoea, measles, ARI and Malaria) among children 6-59 months, two weeks prior to the assessment
6. Estimate the crude and under-five mortality rate

1.3 Assessment methods

A total of 883 households were sampled from 30 clusters. The updated list of villages and blocks within the settlement was obtained from the OPM and the camp commandant. A probability sample of 30 blocks was obtained for the assessment. Each block was stratified into segments and all households in a randomly selected segment were assessed whether they had or did not have children. Food security and mortality were assessed in all households while anthropometric measurements were done on all children 0-59 months if they existed in the sampled household.

Data was collected using a single questionnaire (Appendix), administered face-to-face to mothers and/or household heads in camp settings. The data collection tool was in English but a translator who spoke the local Sudanese language of the refugee was used to translate the questions.

Data was entered in Epi-data software version 3.1 and analyzed using ENA for SMART (May 4th, 2011 version) and SPSS version 17. To determine nutrition indicators of weight-for-height (WHZ), height-for-age (HAZ) and weight-for-age (WAZ), the WHO 2006 standards (with WHO exclusion) were used.

2. FINDINGS

2.1 Socio-demographic characteristics

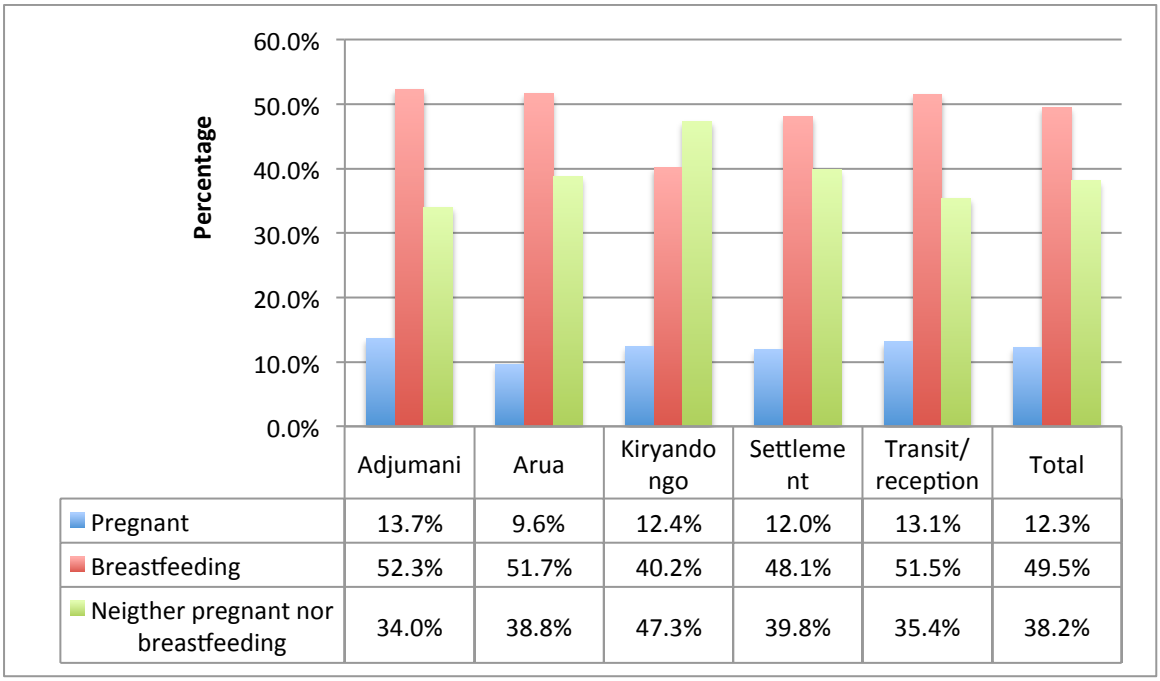
Most of the households (86.5%) were female-headed (Table 1), clearly different from recent refugees from Democratic Republic of Congo where the opposite was true. However, according to the 2010 Sudan household health survey[1] 59% of the households were male headed, which might imply that a high proportion of households in South Sudan are female headed. One in two of the respondents were married.

Table 1: Socio-demographic characteristics of households

Characteristic	Households of Refugees in Adjumani	Households of Refugees in Arua	Households of Refugees, Kiryandongo	Total
	N (%)	N (%)	N (%)	N (%)
Sex of household head				
Male	55 (12.6)	18 (7.9)	46 (21.0)	119 (13.5)
Female	382 (87.4)	209 (92.1)	173 (79.0)	764 (86.5)
Health status of household head				
Disabled	7 (1.6)	0 (0.0)	4 (1.8)	11 (1.2)
Chronically ill	13 (3.0)	3 (1.3)	8 (3.7)	24 (2.7)
Able bodied	417 (95.4)	224 (98.7)	207 (94.5)	848 (96.0)
Education of respondents				
Zero years of formal education	313 (72.0)	155 (68.3)	141 (64.7)	609 (69.2)
Primary	101 (23.2)	61 (26.9)	42 (19.3)	204 (23.2)
Above Primary	21 (4.8)	11 (4.8)	35 (16.1)	67 (7.6)
Marital status of respondents				
Married	259 (59.4)	115 (50.9)	138 (63.3)	512 (58.2)
Single	24 (5.5)	14 (6.2)	27 (12.4)	65 (7.4)
Widowed	59 (13.5)	15 (6.6)	40 (18.3)	114 (13.0)
Separated/Divorced	94 (21.6)	81 (35.8)	11 (5.0)	186 (21.1)

[1] The Republic of South Sudan: The Sudan Household Health Survey, 2010

The mean (SD) age for mothers was 31.3 (11.6) years with a median of 29 years while the mean (SD) number of live birth for mothers was 4.0 (2.1) and the median was 4 children. The mean (SD) household size was 5.8 (2.8) persons with a median of 5 persons. Of the mothers in reproductive years (15-49), 12.3% were pregnant while 49.5% were breastfeeding (Figure 1). There were no mothers who were breastfeeding while pregnant as is often observed in Uganda. This could imply presence of some cultural beliefs and practices among Sudanese refugees that might hinder pregnant mothers from breastfeeding, which is harmful as it might lead to malnutrition of the baby.



	Adjumani	Arua	Kiryandongo	Settlement	Transit/ reception	Total
Pregnant	13.7%	9.6%	12.4%	12.0%	13.1%	12.3%
Breastfeeding	52.3%	51.7%	40.2%	48.1%	51.5%	49.5%
Neigther pregnant nor breastfeeding	34.0%	38.8%	47.3%	39.8%	35.4%	38.2%

Figure 1: Reproductive health status of mothers 15-49 years by location of refugee (N=772)

Of the pregnant mothers only 17.6% were attending Ante-natal care services (ANC) while 13.2% were having iron and folate (IFA) supplements (Figure 2). However, this data should be taken with caution especially for Adjumani because at the time of the study, most of the refugees were either at the transit centres or had just been relocated to new sites where health services were at basic levels.

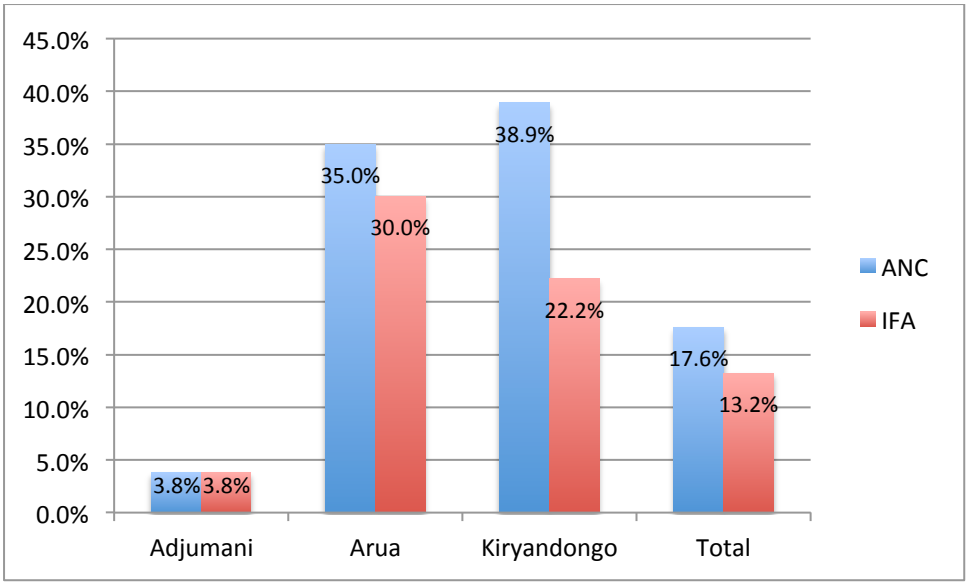


Figure 2: ANC attendance and IFA supplementation among pregnant women (N=91)

2.1.1 Distribution of age and sex of sampled children 6-59 months

The overall sex ratio of the sampled children was one. This confirms the high standard of sampling procedures that were used in the survey (Table 2).

Table 2: Distribution of age and sex of sampled children 6-59 months

	Boys		Girls		Total		Ratio
Age (mo)	no.	%	no.	%	no.	%	Boy:girl
6-17	115	46.9	130	53.1	245	28.6	0.9
18-29	121	54.5	101	45.5	222	25.9	1.2
30-41	94	47.2	105	52.8	199	23.2	0.9
42-53	67	50.0	67	50.0	134	15.7	1.0
54-59	27	48.2	29	51.8	56	6.5	0.9
Total	424	49.5	432	50.5	856	100.0	1.0

2.2 Nutrition status of children

2.2.1 Prevalence of Global Acute Malnutrition (GAM)

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

height and/or oedema). The exclusion of z-scores from Zero (reference mean) were based on WHO flags, that is: WHZ -5 to 5; HAZ -6 to 6; WAZ -6 to 5 (based on WHO standards 2006).

The prevalence of GAM among all assessed Sudanese refugee children 6-59 months was 19.6% (17.0 – 22.4 95% CI) and Severe Acute Malnutrition (SAM) was 4.1% (3.0 – 5.7 95% CI) (Table 3).

Table 3: Prevalence of GAM based on weight-for-height z-scores and by sex

	All n = 848	**Boys** n = 421	**Girls** n = 427
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(166) 19.6 % (17.0 - 22.4 95% C.I.)	(94) 22.3 % (18.6 - 26.5 95% C.I.)	(72) 16.9 % (13.6 - 20.7 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(131) 15.4 % (13.2 - 18.0 95% C.I.)	(73) 17.3 % (14.0 - 21.2 95% C.I.)	(58) 13.6 % (10.7 - 17.2 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(35) 4.1 % (3.0 - 5.7 95% C.I.)	(21) 5.0 % (3.3 - 7.5 95% C.I.)	(14) 3.3 % (2.0 - 5.4 95% C.I.)

The prevalence of oedema was 0.0 %

GAM was at critical level although anecdotal information from field supervisors had suggested a better nutrition situation than what is usually observed in Karamoja region in Uganda. The prevalence of GAM was however, similar to the South Sudanese average of 23% in 2010. Refugees in Rhino camp in Arua (15.2%) had the lowest prevalence of GAM while those in Kiryandongo (24.1%) had the highest prevalence (Figure 3).

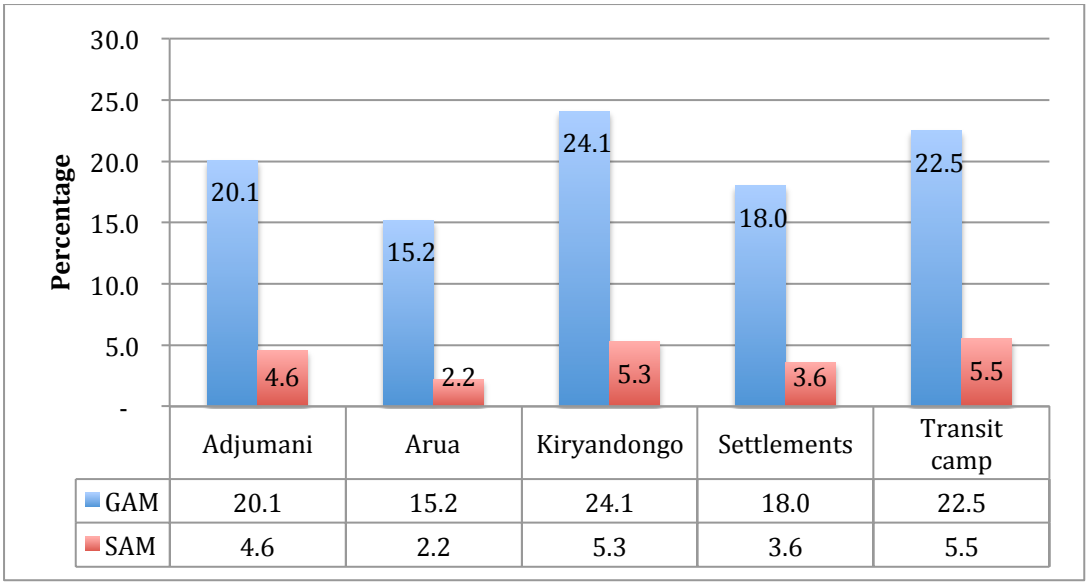


Figure 3: Prevalence of GAM and SAM according to district and location of refugees (N=846)

There were bi-polar peaks of GAM at 6-17 and 54-59 months (Figure 4). Complementary feeding practices in the second year of life should be improved to address the early peak in GAM.

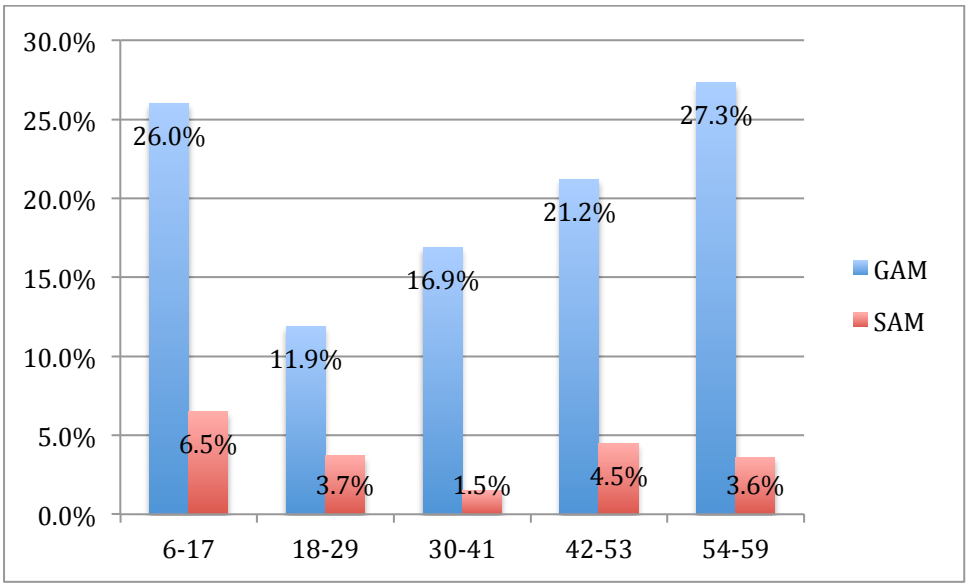


Figure 4: Prevalence of GAM according to age of children 6-59 months (N=848)

2.2.2 Prevalence of acute malnutrition based on MUAC

Based on Mid upper Arm Circumference (MUAC), only 1.0% of the children had severe malnutrition (<11.5 cm), 1.5% moderate malnutrition and 97.5% normal.

2.2.3 Prevalence of stunting

The prevalence of stunting in all the assessed refugee children 6-59 months was at acceptable level 9.1% (7.3 – 11.2, 95% CI), (Table 4). Although boys were more stunted than girls the difference was not statistically significant.

Table 4: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 847	**Boys** n = 421	**Girls** n = 426
Prevalence of stunting (<-2 z-score)	(77) 9.1 % (7.3 - 11.2 95% C.I.)	(46) 10.9 % (8.3 - 14.3 95% C.I.)	(31) 7.3 % (5.2 - 10.1 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(53) 6.3 % (4.8 - 8.1 95% C.I.)	(32) 7.6 % (5.4 - 10.5 95% C.I.)	(21) 4.9 % (3.2 - 7.4 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(24) 2.8 % (1.9 - 4.2 95% C.I.)	(14) 3.3 % (2.0 - 5.5 95% C.I.)	(10) 2.3 % (1.3 - 4.3 95% C.I.)

Prevalence of stunting was higher in refugees at transit centers (11.4%) than those already relocated into settlements (8.2%), (Figure 5) but the differences were not statistically significant.

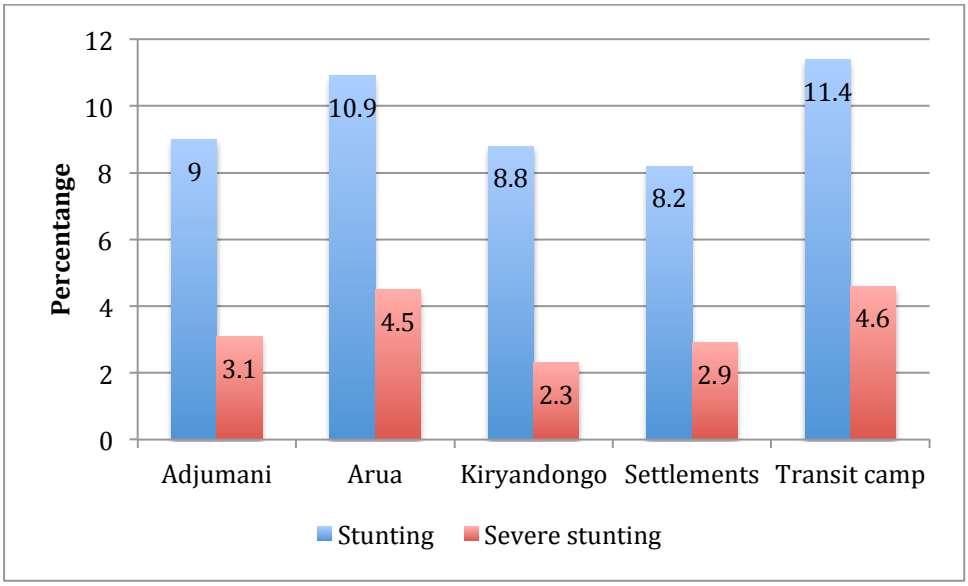


Figure 5: Prevalence of stunting and severe stunting according to district and location of refugee children (N=845)

The peak age of stunting was 30-41 months and was lowest in 54-59 months (Figure 6).

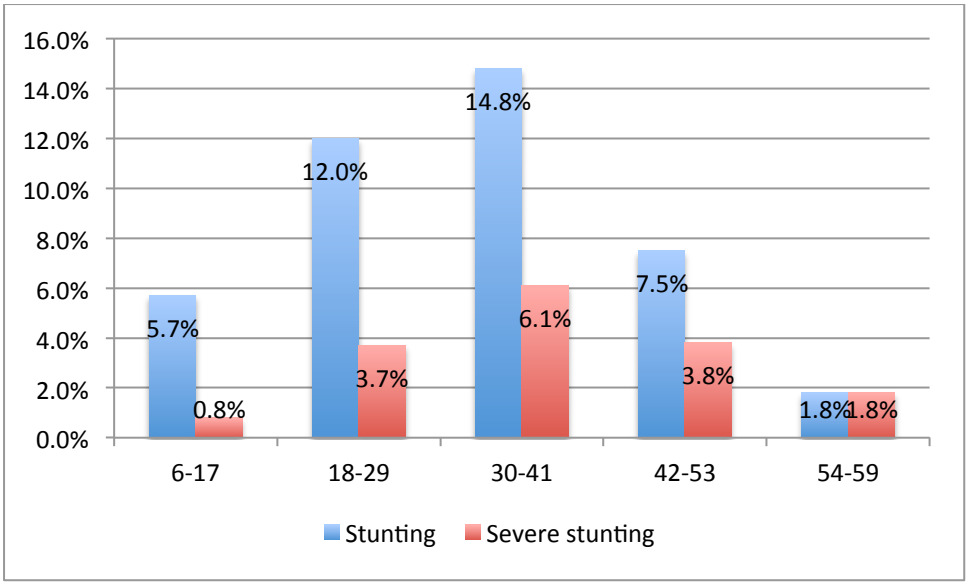


Figure 6: Prevalence of stunting according to age group of children 6-59 months (N=845)

2.2.4 Discussing the observed low prevalence of stunting

Stunting prevalence was surprisingly low in the current survey since the national South Sudan average of 2010 was 31%. The low stunting prevalence observed among refugees could not easily be explained. However, it is possible that households of highest socio-economic status sought refugee in Uganda while the poor remained behind. It is also possible that there were errors with age estimates since most of the mothers were of low or no formal education and they lacked child health cards. Although errors with age estimates are common in set ups of such kind, it is unlikely that such errors are solely responsible for the low stunting prevalence observed in this assessment - from the researchers perspective considering the plausibility checks done on data and the fact that weight-for-age index was within expected limits. It will be nice to collaborate these findings with future assessments.

2.2.5 Prevalence of underweight

The overall prevalence of underweight was 13.3% (11.2 – 15.8, 95% CI), described as poor according to guidelines (Table 5). The difference in underweight prevalence between boys and girls was wide but not statistically significant.

Table 5: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 854	Boys n = 423	Girls n = 431
Prevalence of underweight (<-2 z-score)	(114) 13.3 % (11.2 - 15.8 95% C.I.)	(70) 16.5 % (13.3 - 20.4 95% C.I.)	(44) 10.2 % (7.7 - 13.4 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(93) 10.9 % (9.0 - 13.2 95% C.I.)	(60) 14.2 % (11.2 - 17.8 95% C.I.)	(33) 7.7 % (5.5 - 10.6 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(21) 2.5 % (1.6 - 3.7 95% C.I.)	(10) 2.4 % (1.3 - 4.3 95% C.I.)	(11) 2.6 % (1.4 - 4.5 95% C.I.)

The peak age for underweight was 6-17 months (Figure 7), which indicates that there are problem with complementary feeding practices.

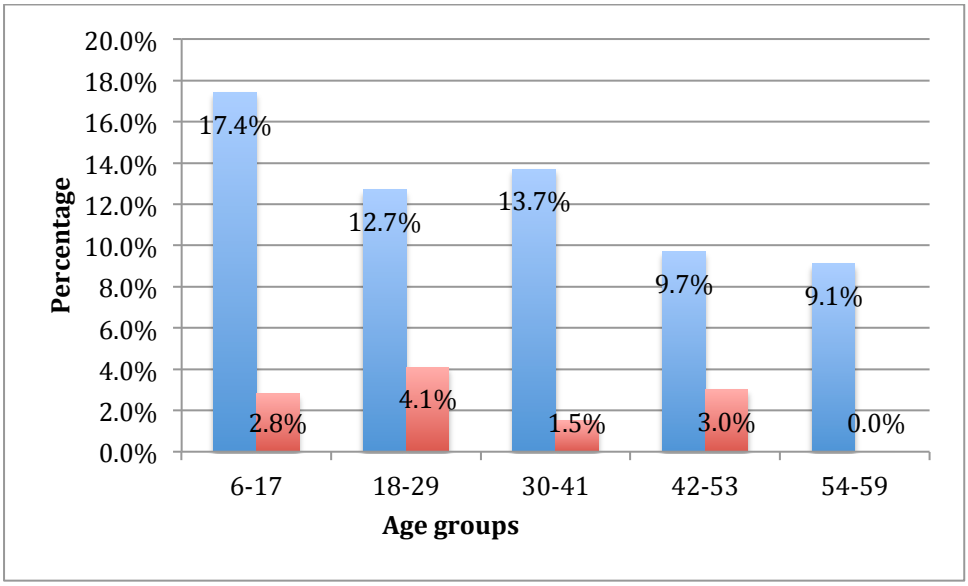


Figure 7: Prevalence of underweight and severe underweight by age group of children 6-59 months (N=854)

2.2.6 Graphical distribution of malnutrition and mean z-scores

The mean z-scores (SD) for weight-for-height, weight-for-age and height-for-age were as indicated in Table 6, below.

Table 6: 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	848	-1.09±1.07	1.00	5	3
Weight-for-Age	854	-0.82±1.13	1.00	1	1
Height-for-Age	847	-0.11±1.56	1.00	4	5

The distribution curve depicts a situation of normally distributed wasted and underweight children 6-59 months (Figure 8).

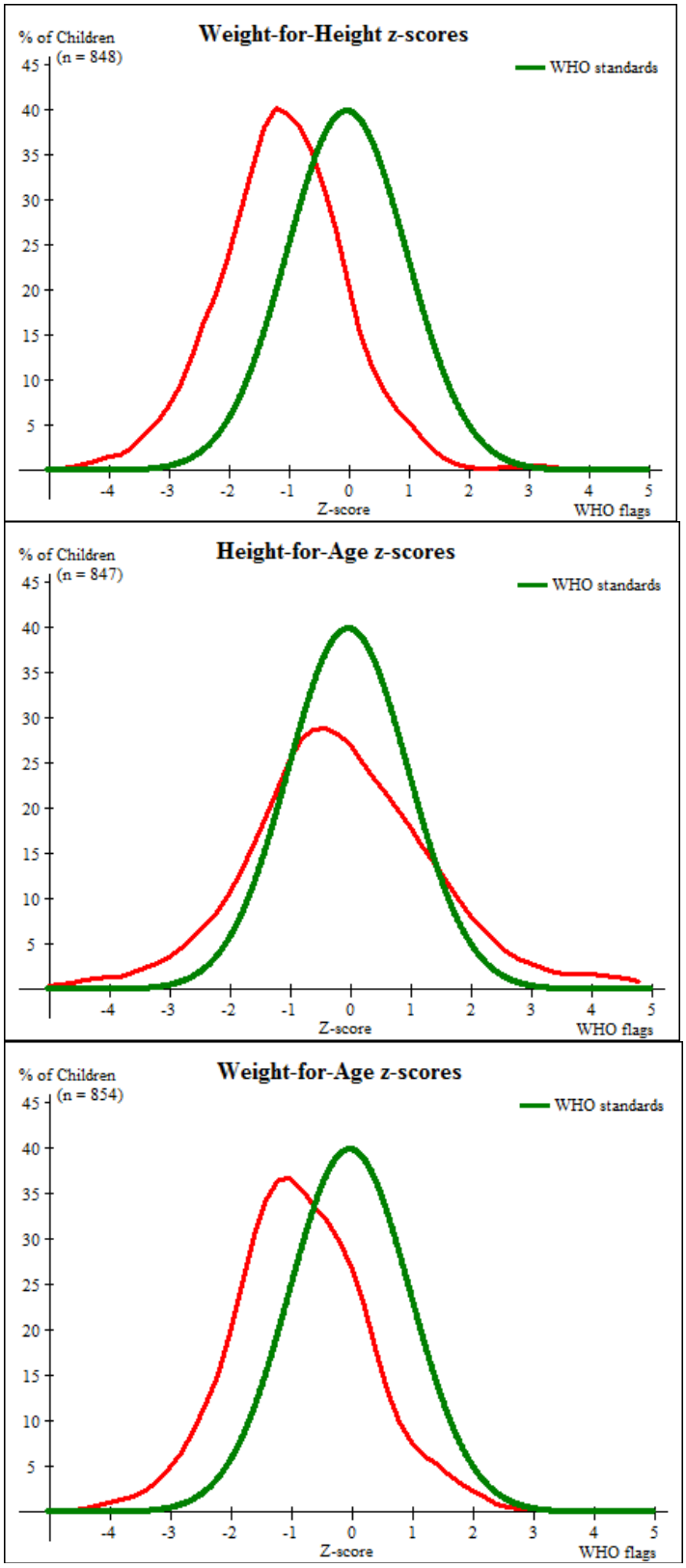


Figure 8: Distribution of weight-for-height, height-for-age and weight-age for both sexes among South Sudanese Refugees, February 2014

2.2.7 Anemia status of children 0-59 months

Anemia was assessed in a sub-sample of children. This was due to insufficient logistics due to the urgency of the exercise. The eligible supplier for micro cuvettes had insufficient quantities at the time of the assessment. We were however able to test 538 children 6-59 months and 321 mothers 15-49 years.

Anemia was highly prevalent in children 6-59 months. Up to 63.8% (49.9 – 77.8, 98% CI) of the children were anemic with younger children more affected than older ones (Figure 9). Boys were also slightly more anemic than girls but differences were not statistically significant.

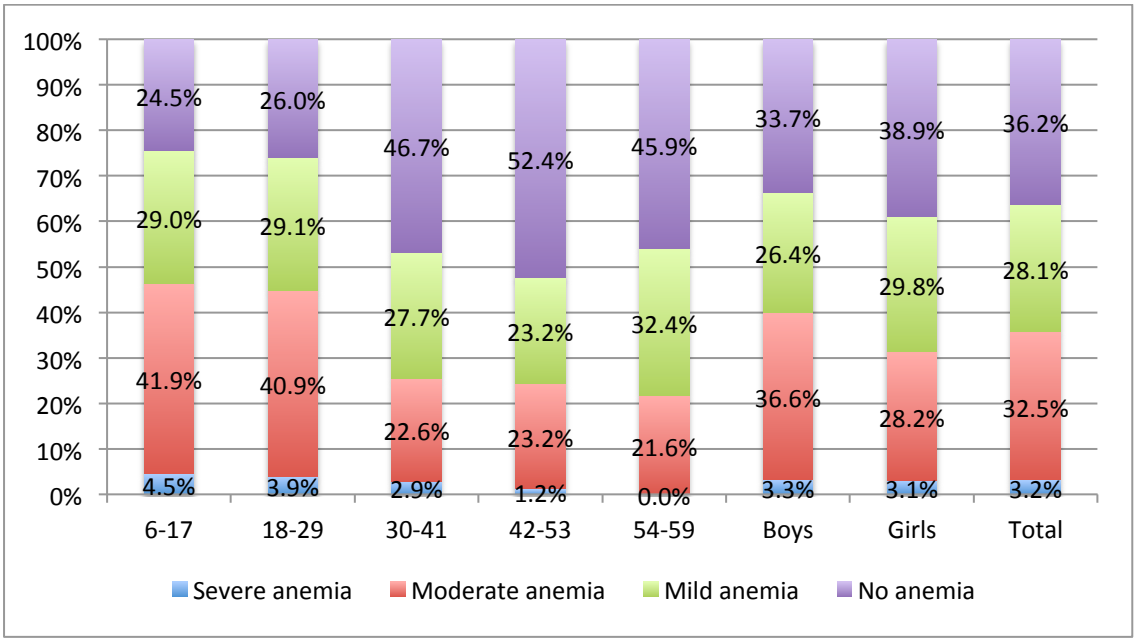


Figure 9: Prevalence of anemia according to age group and sex among children 6-59 months (N=538)

Children in transit/reception centers who were not anemic 39.5% (31.9 – 47.1, 95% CI) were more than those in settlements 36.0% (28.3 – 43.6, 95% CI), (Figure 10) but the difference was not statistically different. However, it is possible that more children might get anemic with time in settlements unless feeding programs and other preventive measures are instituted.

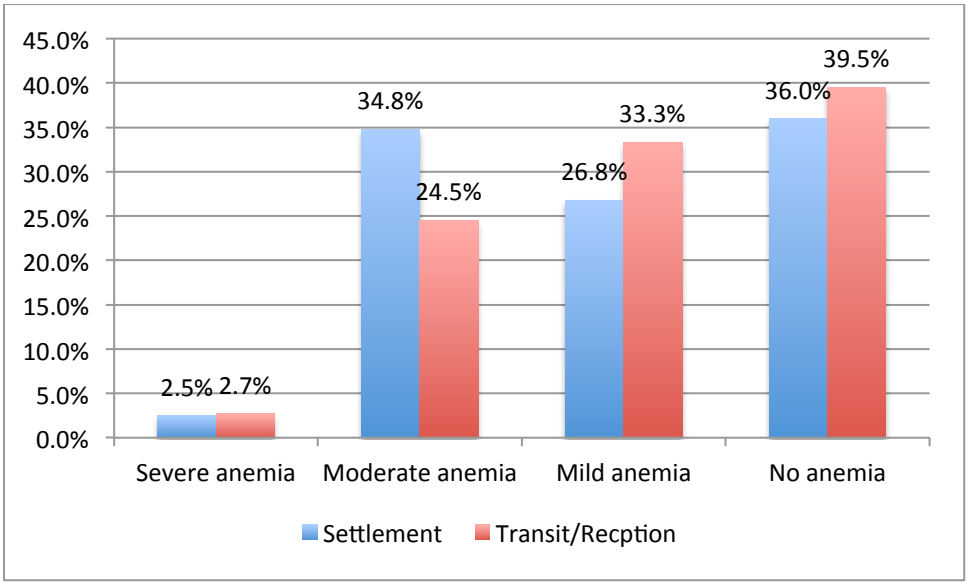
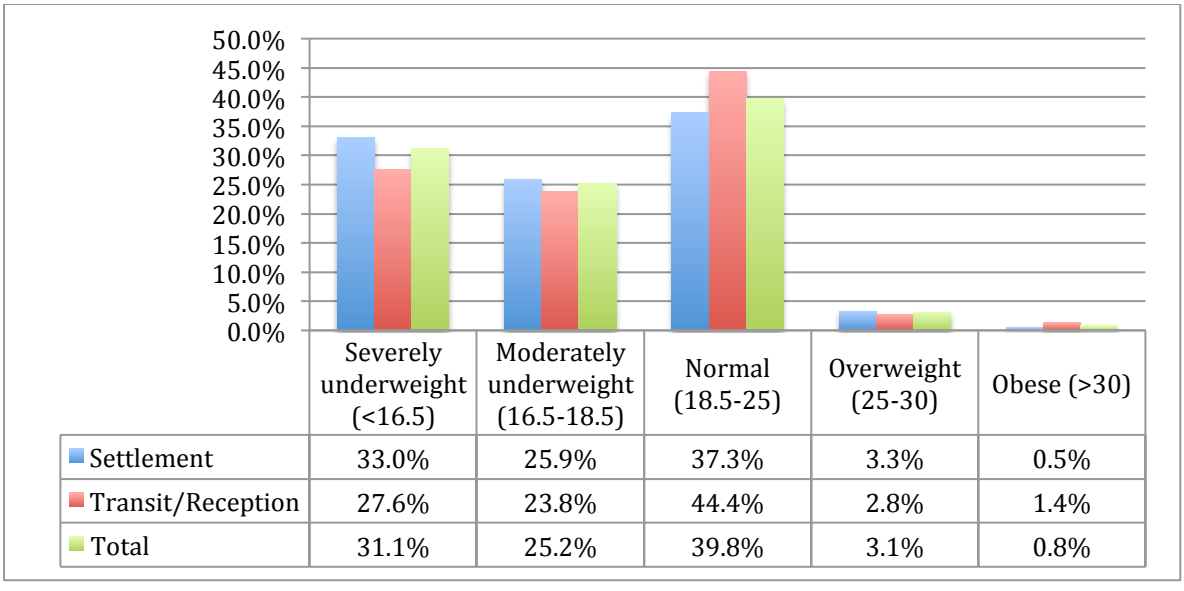


Figure 10: Prevalence of anemia in children according to location

2.3 Nutrition status of mothers

2.3.1 Underweight status using Body Mass Index (BMI

The majority of the mothers 15-49 years (56.4%) were underweight and 1 in 3 severely (Figure 11). Mothers in settlements tended to be more underweight than those in reception centres which, might suggest some deterioration with time spent as refugees in Uganda.



	Severely underweight (<16.5)	Moderately underweight (16.5-18.5)	Normal (18.5-25)	Overweight (25-30)	Obese (>30)
Settlement	33.0%	25.9%	37.3%	3.3%	0.5%
Transit/Reception	27.6%	23.8%	44.4%	2.8%	1.4%
Total	31.1%	25.2%	39.8%	3.1%	0.8%

Figure 11: BMI status of mothers 15-49 years (N=611)

2.3.2 Anemia status of mothers

Up to 36.2% of the mothers were anemic. Mothers in Kiryandongo were more anemic (49.2%) compared to those in Arua and Adjumani (Figure 12). Mothers with boy children were apparently more anemic that those with girl children.

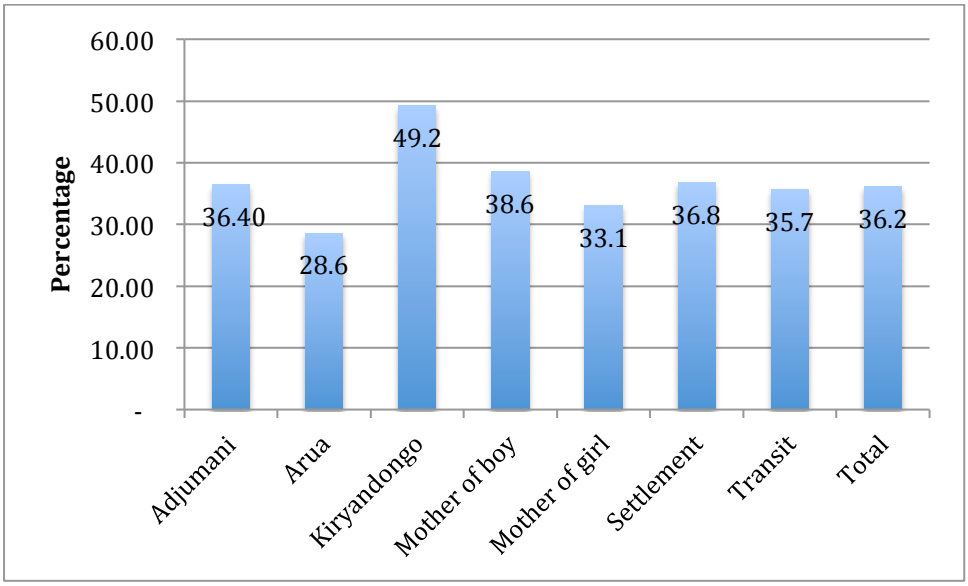


Figure 12: Anemia prevalence among women 15-49 years according to district and settlement

2.4 Infant and young child feeding practices

2.4.1 Breastfeeding practices

Of children 0-23 months, 435 (97.5%) were initiated to breastfeeding, 72.8% were initiated in the first hour of birth while 25.9% were initiated between 1 and 23 hours after delivery (Table 7). Exclusive breastfeeding rate – using 24-hour recall – among children 0-5 months was 91.6%, which was good and should be encouraged as part of good feeding practice even in emergency situations.

Table 7: Prevalence of Infant and Young Child Feeding Practices indicators- South Sudanese refugees, February 2014

Indicator	Age range	Number/total	Prevalence (%)	95% CI
Children ever breastfed	0-23 months	446	97.5	93.7 – 100
Timely initiation of breastfeeding	0-23 months	445	72.8	65.5 – 80.1
Exclusive breastfeeding under 6 months	0-5 months	107	91.6	83.6 – 99.6
Continued breastfeeding at 1 year	12-15 months	227	97.8	90.3 – 100
Continued breastfeeding at 2 years	20-23 months	60	47.7	20.0 – 73.4
Timely introduction of solid, semi-solid or soft foods	6-8 months	71	36.6	23.2 – 49.9

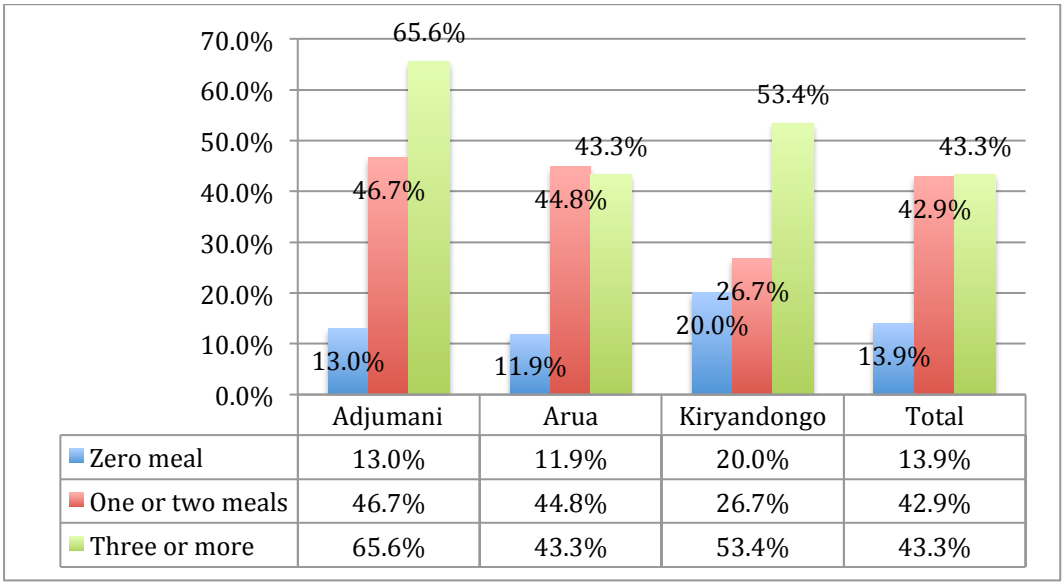
Indicator	Age range	Number/total	Prevalence (%)	95% CI
Children bottle fed	0-23 months	445	0.2	
Consumption of iron rich or iron fortified foods	6-23 months	316	1.6	0.2 – 3.0
Median duration for breastfeeding		446	22.4 month	

2.4.2 Introduction of complementary feeding

Introduction of complementary feeding was not timely at all. Up to 63.4% of the children 6-8 months were exclusively breastfed the previous day of the assessment. Children in this age group need to receive transitional complementary foods, in good consistency and nutrient rich since mothers milk alone is no longer enough by this age.

2.4.3 Frequency of complementary feeding

Even in children 9-23 months there were many who had only been exclusively breastfed in the 24-hour preceding the assessment (Figure 13). Only 43.3% of the children 9-23 months received the required number of meals. Meal frequency and quality should be improved for the refugee children in this age group, otherwise many children will be wasted and subject to micronutrient deficiencies especially anemia in the few coming months.



	Adjumani	Arua	Kiryandongo	Total
Zero meal	13.0%	11.9%	20.0%	13.9%
One or two meals	46.7%	44.8%	26.7%	42.9%
Three or more	65.6%	43.3%	53.4%	43.3%

Figure 13: Meal frequency among children 9-23 according to district (N=266)

Among children 6-23 months who received two or less meals, 61.8% of the mothers/caregivers sited lack of food to give as the main reason while 27.6% though breast milk alone was enough for the baby.

2.4.5 Quality of complementary food

Individual dietary diversity scores (IDDS), which is a measure of the diversity of food groups contained in the diet consumed by children 6-23 months was low. IDDS was assessed based on nine food groups (modified otherwise is based on seven groups) namely: cereals, pulses, meats, oils, eggs, milk, vegetables, fruits and sugar. Minimum dietary diversity has been defined as the proportion of children who received foods from at least 4 food groups the previous day[2]. In the current assessment 99.0% of the children were having low IDDS. This is worrying situation, which should be addressed immediately.

2.4.6 Participation in feeding programs

Only 6 mothers (1.2%) confirmed participating in a feeding program. Both therapeutic and supplementary feeding programs should be strengthened.

2.5 Food security status

2.5.1 General food distribution

A total of 780 (89.2%) of the households reported to possess food ration cards. In settlements up to 99.1% Vs 70.9% of the households in Transit/reception centres had ration cards. Of those without cards, 75.4% said they had not been given the card at registration. Of the households with food cards 20.4% reported to have received full rations while 53.1% received half rations. The mean (SD) duration of the food ration was reported to be 15.1 (9.3) days with a median of 15 days among households that reported to have received full rations. However among all households that received food including half ration, the mean (SD) duration of the food was 12.2 (7.8) days (Table 8).

[2] Low ≤ 3; medium > 3 but ≤ 5; high >5

Table 8: Mean duration of the food rations according to district and location of refugee household

	Mean	Std. Deviation	Median
Adjumani	13.3	7.4	12
Arua	10.8	5.8	10
Kiryandongo	13.4	10.6	14
Settlements	12.5	7.8	10
Transit/Reception	6.9	6.2	5
Total	12.2	7.8	10

2.5.2 Diversity of food consumed based on Food Consumption Scores (FCS)

Food insecurity was assessed using a recall of the number of days for which specific food groups were consumed in the past seven days. The Food Consumption Scores (FCS) that were used equal to the number of days certain food groups was eaten in last 7 days x weight of the particular food group according to WFP/UNICEF guidelines. The weights were: Cereals and tubers (2); pulses (3); vegetables (1); fruits (1); meat, fish, eggs (4); milk and milk products (4); oil (0.5); and sugar (0.5). The total FCS was obtained by summing up FCS obtained for each food group and was then categorised.

Refugees at the Transit or reception centres were in better food security status than those already re-settled. Overall 35.2% of the households assessed were experiencing severe food insecurity or had poor FCS while 27.0% were experiencing borderline food insecurity (Figure 14).

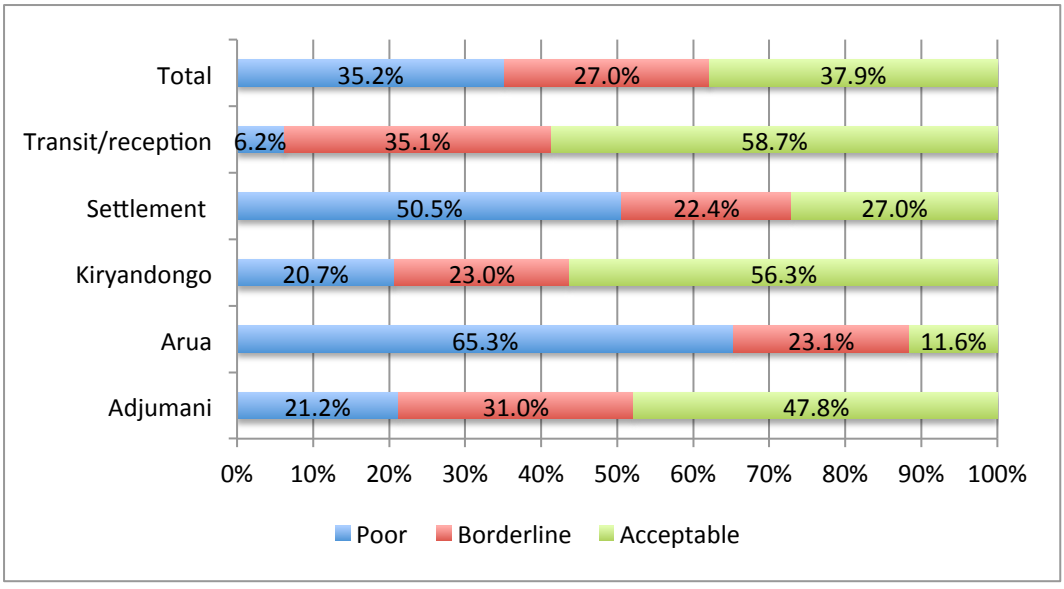
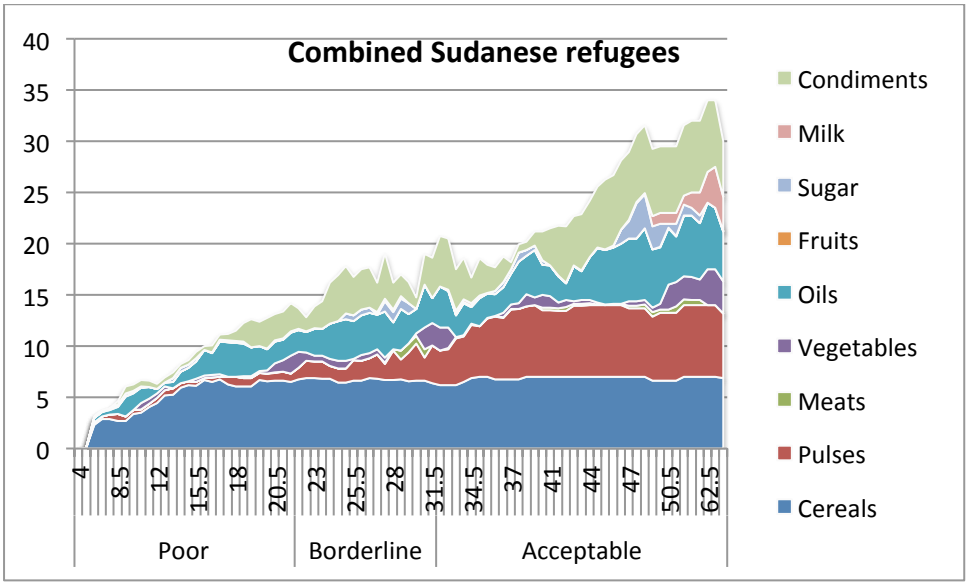
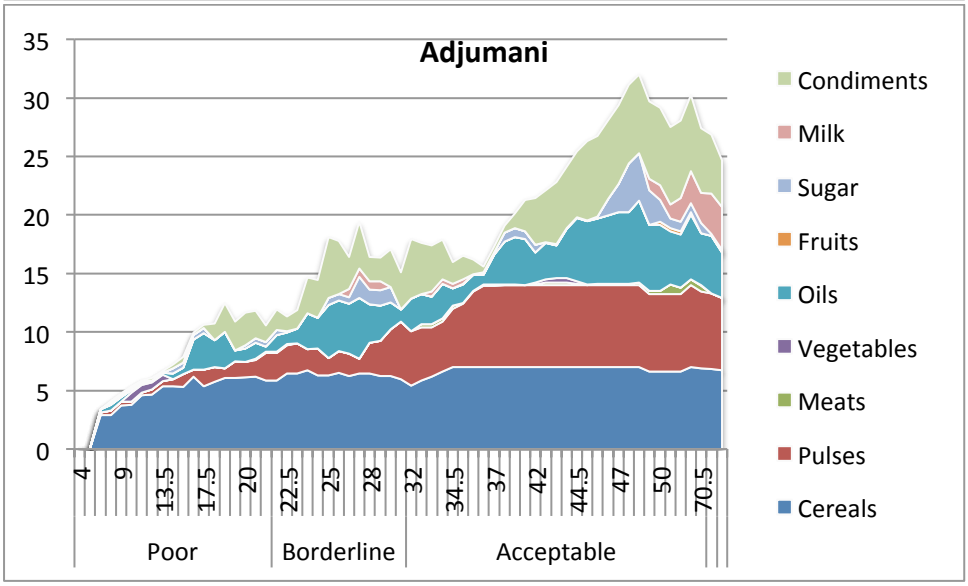


Figure 14: Food consumption scores according to location of refuge household

Descriptively, refugees in all sites were not having milk, meat, sugar, fruits, and vegetables in their diets (Figure 15). Refugees in Rhino camp in Arua district were experiencing more severe food insecurity compared to those in Adjumani and Kiryandongo.





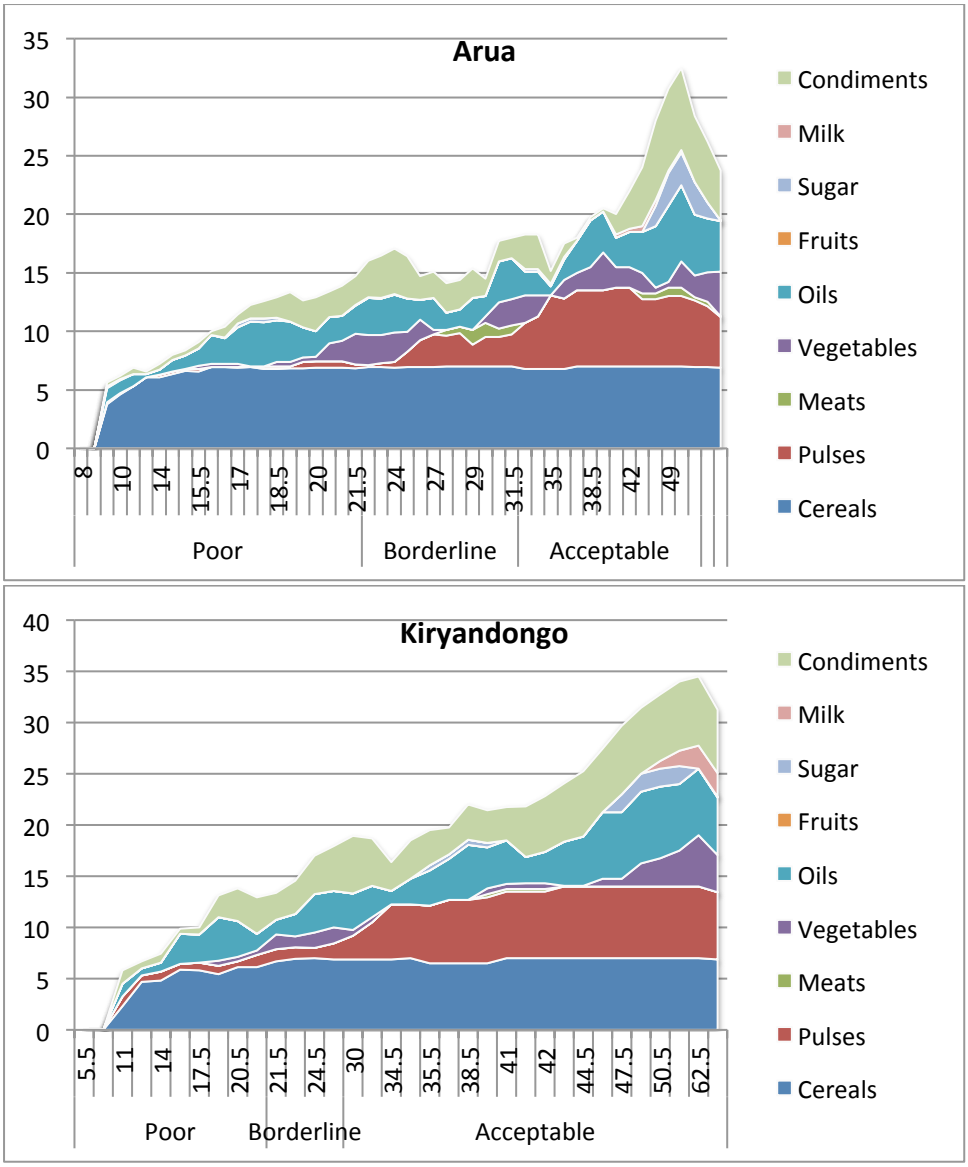
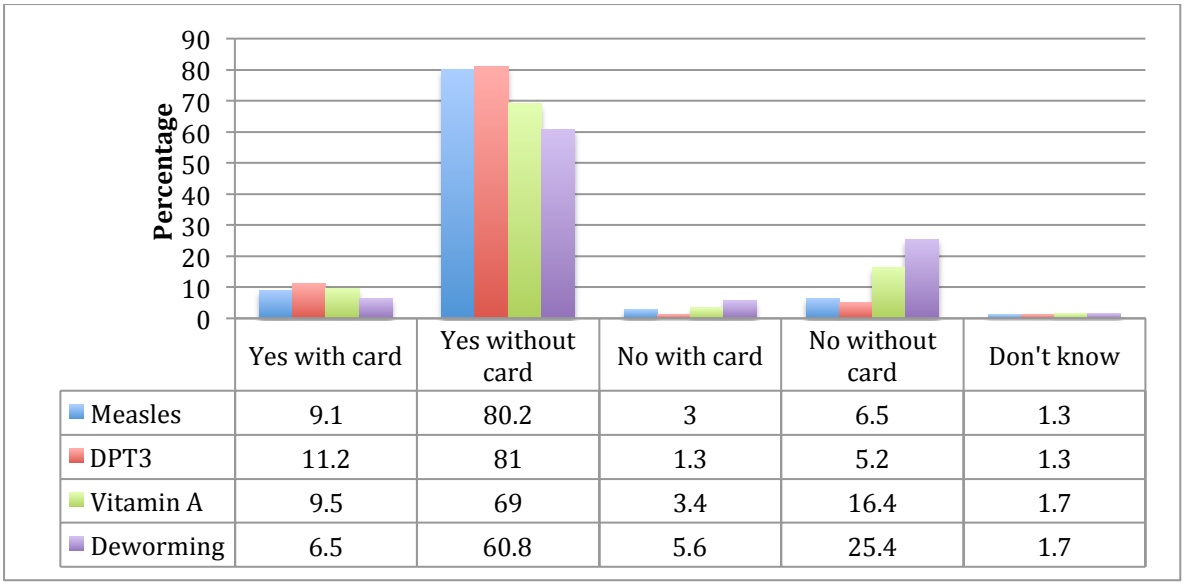


Figure 15: Diversity of foods consumed in the seven-day recall per food consumption grouping according to district of location of refugee households

2.6 Care-seeking practices, morbidity and mortality

2.6.1 Immunization, vitamin A and deworming coverage, children 12-23 months

The majority of the children 12-23 months were reported to have been immunized, supplemented with vitamin A and dewormed in the past 6 six months although they did not have child health cards. If the mothers' history was to be considered, the coverage for measles was about 89.3%, which was close to 95%, the UNHCR target (Figure 16). Child health cards should be supplied.



	Yes with card	Yes without card	No with card	No without card	Don't know
Measles	9.1	80.2	3	6.5	1.3
DPT3	11.2	81	1.3	5.2	1.3
Vitamin A	9.5	69	3.4	16.4	1.7
Deworming	6.5	60.8	5.6	25.4	1.7

Figure 16: Immunization, supplementation and deworming coverage among children 12-23 months (N=232)

2.6.2 Morbidity

The two-week prevalence of common childhood illness was very high. Up to 50.9% of the children were reported to have suffered from diarrhea in the two weeks preceding the assessment (Table 2), out of them only 21.3% had received ORS. The prevalence of illnesses was much higher than what is commonly reported in Uganda and other refugee set-ups calling for the need to strengthen primary health care services for the refugees.

Table 9: Two-week prevalence of common childhood illness in children 0 – 59 months (N=962)

Disease/Condition	Total %	Adjumani %	Arua %	Kiryandongo %
Malaria/fever	69.9	73.3	69.6	61.2
Diarrhoea	50.9	46.7	60.0	50.0
ARI/Cough	78.1	79.8	78.4	73.5

2.6.3 Bed net use

Only 15.1% of the households had a bed net. Of the children 0-23 months only 18.6% of them slept under a bed net the night of the survey (Figure 17). Bed net

coverage was very low, even though it is understandable that net are never distributed until refugees are resettled. More nets should be distributed.

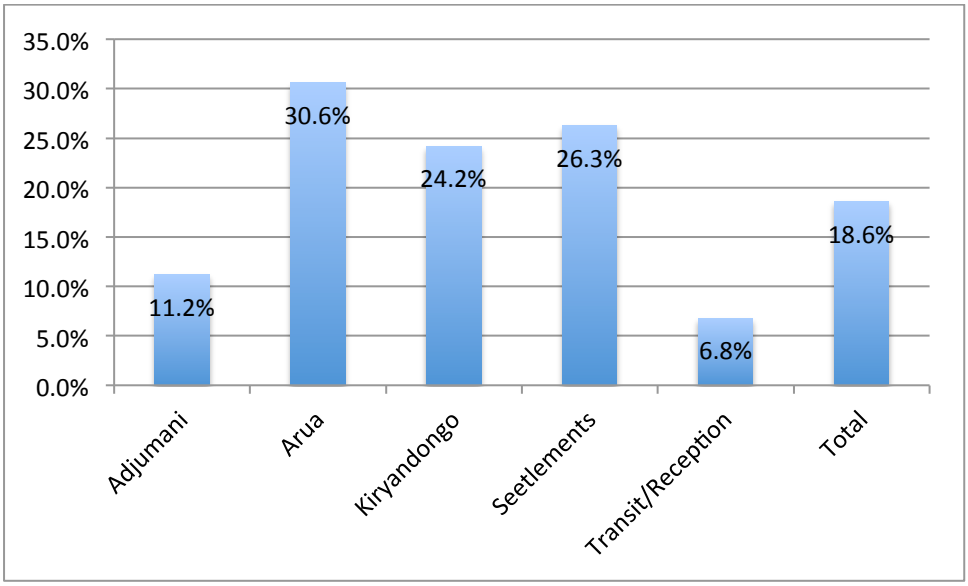


Figure 17: Bed net ownership according to district and location of refugee household

2.6.4 Mortality

Using the guidelines in the table below to interpret the mortality findings, the crude mortality rate was 0.1 deaths per 10,000 persons per day, interpreted to have been under control. There was zero under-five death in the two months recall period, which could as well be interpreted as a situation under control according to the standard humanitarian guidelines.

CMR = deaths/10,000/day:	**Mortality rate for <5 age group**
<1 = Under control	1 = Normal in a developing country
>1 = Serious condition	<2 = Emergency phase: under control
>2 = Out of control	>2 = Emergency phase: in serious trouble
>4 = Major catastrophe	>3 = Emergency phase: out of control

2.7 Water and sanitation

2.7.1 Safe water sources and coverage

The majority of the households reported to receive water from the UNHCR tankers and or tracks (77.4%) and boreholes (20.6%), (Figure 18).

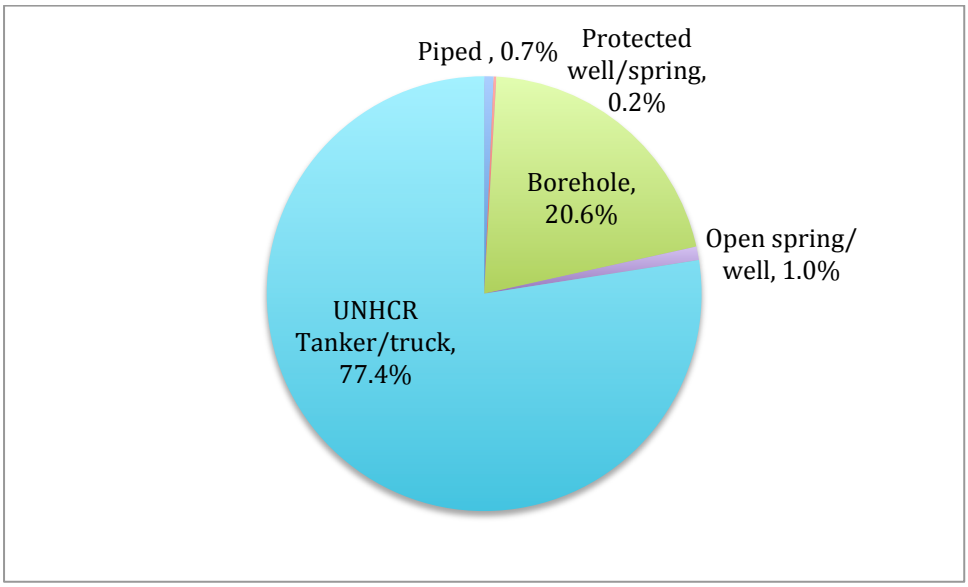


Figure 18: Water sources for refugee households in Adjumani, Arua and Kiryandongo (N=877)

2.7.2 Household daily water usage

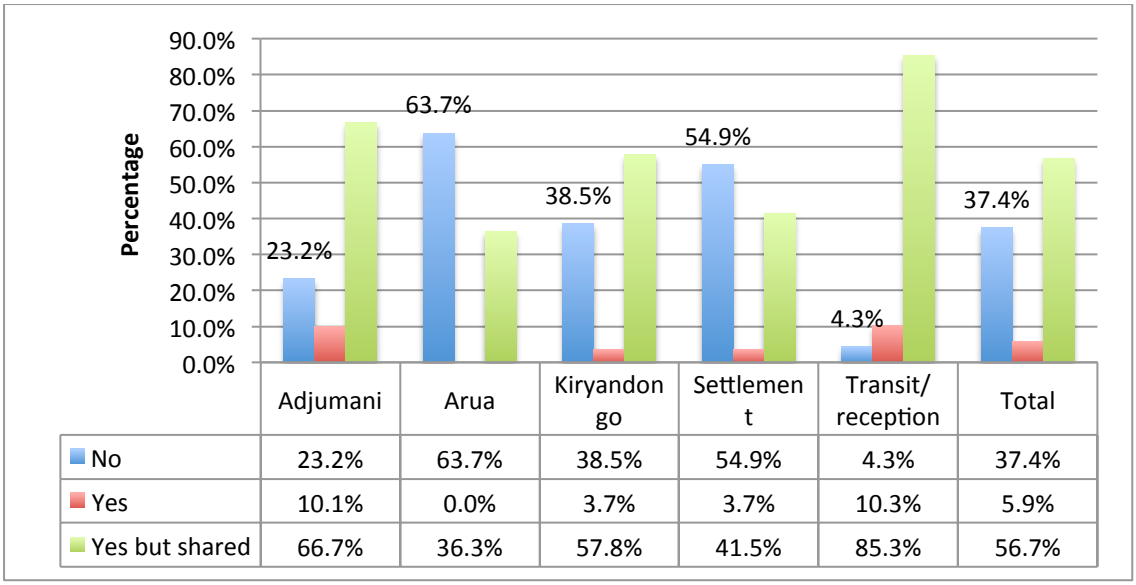
The mean (SD) water used by household was 70.7 (57.3) litres (Table 10). Since the mean household size was 5.8 persons, the amount of water used was close to the recommended standard of a minimum of 15 litres per person per day.

Table 10: Amount of water (litres) used according to location of refugee household

	Mean	SD	Median
Adjumani	74.5	67.5	60
Arua	69.9	37.3	60
Kiryandongo	64.2	51.8	50
Settlements	76.7	47.8	60
Transit/Reception	59.4	71.3	50
Total	70.7	57.3	60

2.7.3 Latrine coverage

Up to 37.4% of the households did not have toilet facilities (Figure 19). Lack of latrines was highest in settlements especially at Rhino camp where 63.7% of the households did not have latrines. The WASH teams need to address this situation to minimize outbreaks of oral-fecal diseases.



	Adjumani	Arua	Kiryandongo	Settlement	Transit/ reception	Total
No	23.2%	63.7%	38.5%	54.9%	4.3%	37.4%
Yes	10.1%	0.0%	3.7%	3.7%	10.3%	5.9%
Yes but shared	66.7%	36.3%	57.8%	41.5%	85.3%	56.7%

Figure 19: Latrine coverage according to location of refugee household (N=880)

The majority of the toilet facilities were open pits without any super structure (63.0%), while others with well-constructed pit latrines (36.6%). Since toilet facilities were public (Figure 18), there is need to construct facilities with better super structures.

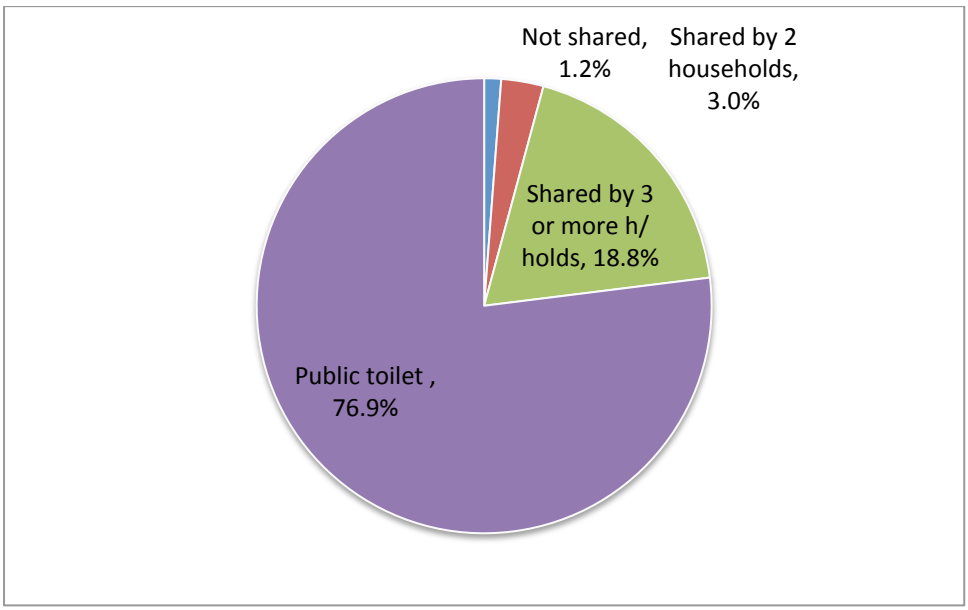


Figure 20: Sharing status of toilet facilities among refugee households reporting use of toilets (N=565)

2.7.4 Disposal of children's faeces

Most of the refugee households were throwing children's stool into latrine or burying underground. A large number (26.4%) of the households in Arua were throwing stool to the garbage or leaving it in the open (Table 11). Promotion of good sanitary practices should be ensured especially at the Rhino camp.

Table 11: Disposal of stool for children 0-3 years according to district and location of refugee household

	Child used latrine	Put/Rinsed into latrine	Buried	Thrown into garbage	Left open	Other
Adjumani (N=339)	1.5%	72.9%	22.7%	0.9%	1.5%	0.6%
Arua (N=155)	0.0%	16.1%	51.0%	13.5%	12.9%	6.5%
Kiryandongo (N=126)	2.4%	57.9%	35.7%	0.8%	2.4%	0.0%
Settlements (N=398)	1.0%	33.9%	48.5%	6.3%	7.0%	3.0%
Transit/Reception (N=216)	1.9%	95.8%	2.3%	0.0%	0.0%	0.0%
Total (N=620)	1.3%	55.6%	32.4%	4.0%	4.5%	1.9%

2.8 Factors associated with malnutrition

A number of factors including household food security, IDDS, BMI of mothers, anemia status, sex of household head and morbidity factors were cross-tabulated with nutrition outcomes. Most of the factors were not associated with the nutrition outcomes except history of diarrhea (p=0.011) and fever (p=0.026), (Figure 21) which were significantly associated with GAM. Bed net use (Figure 22) was significantly associated with stunting.

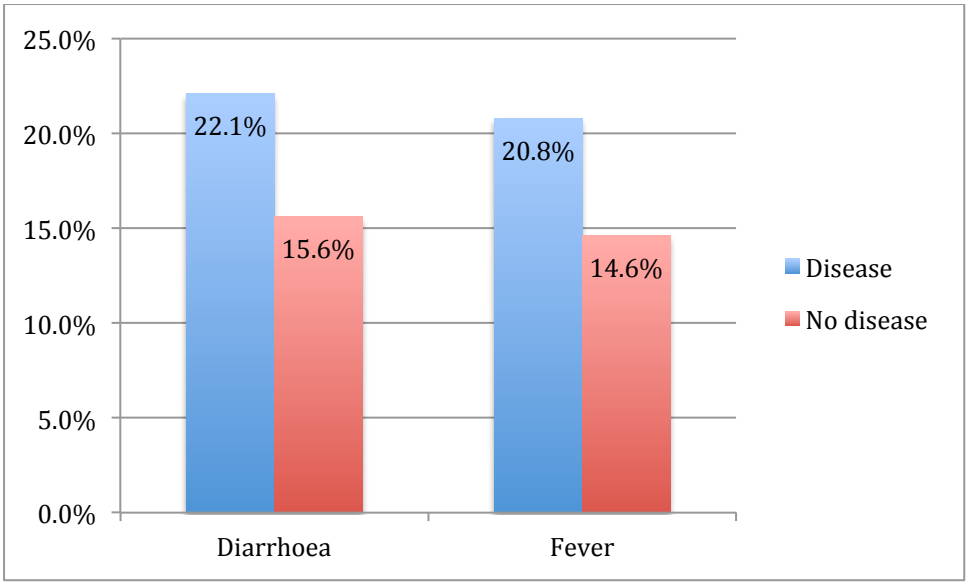


Figure 21: Association between GAM status according to history diarrhea and fever

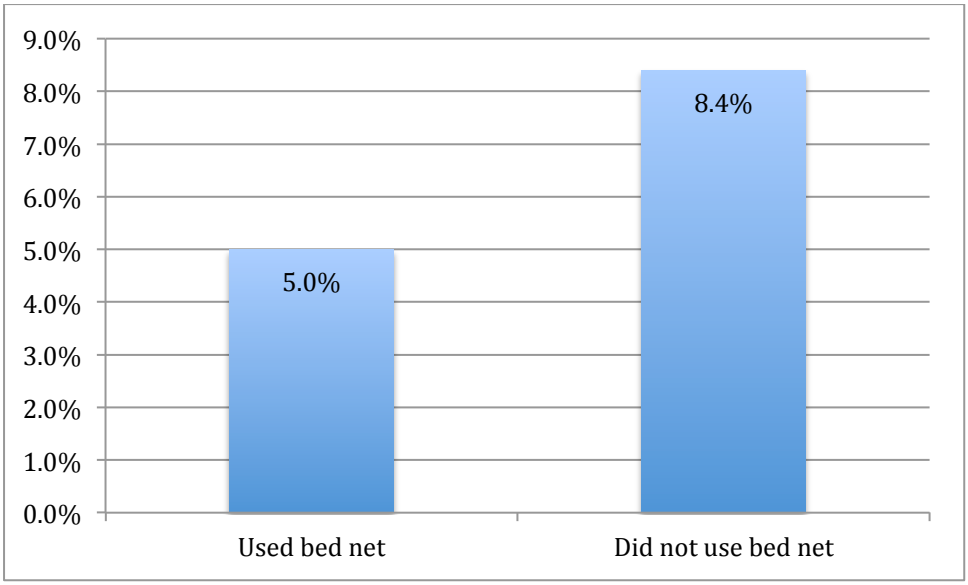


Figure 22: Association of stunting with use of bed net by children (P=0.002)

However, a few others factors exhibited a dose effect relationship even though they were not statistically significant. These included mothers' education (Figure 23), and anemia status of both mothers and children (Figure 24)

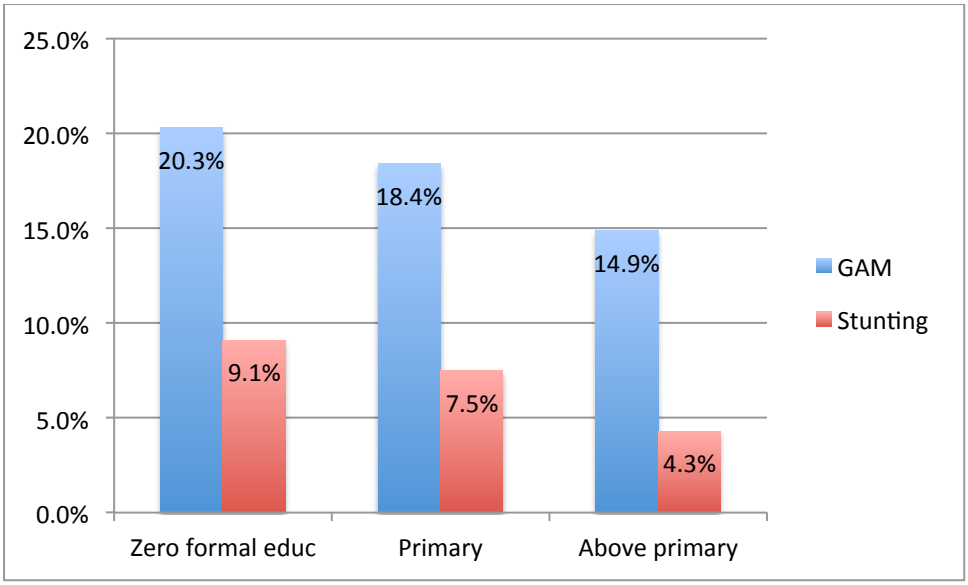


Figure 23: Association of mothers' education with GAM and stunting status

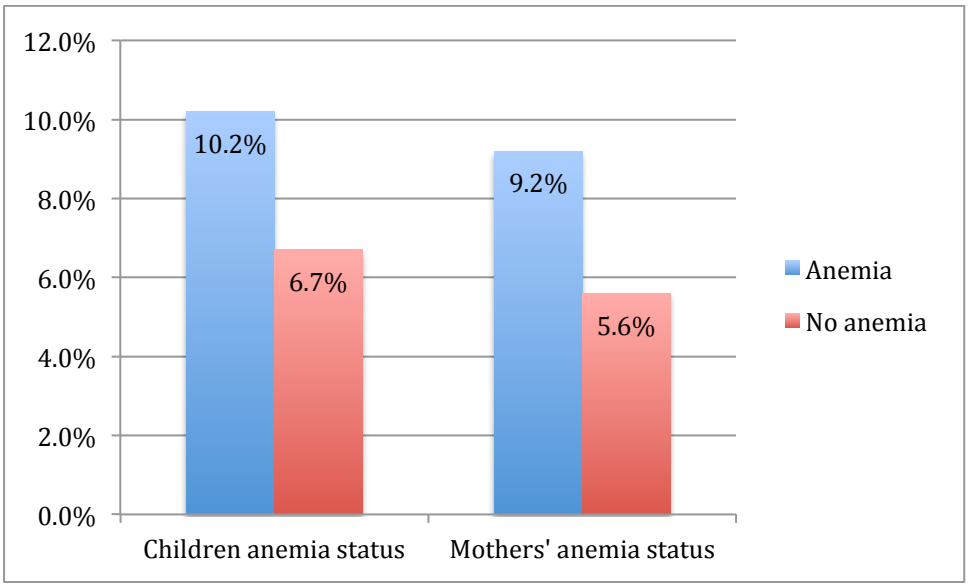


Figure 24: Association of stunting with the anemia status of mothers and children

On multivariate analysis none of the interventional prone factors were significant. Only child sex was significant with GAM and Stunting, and diarrhea with GAM.

3. CONCLUSIONS AND RECOMMENDATIONS

The prevalence of GAM among the new caseload of South Sudanese refugees in Adjumani, Arua and Kiryandongo districts was at critical level, underweight was poor while stunting was at acceptable levels. Two out of three households experienced severe or borderline food insecurity and prevalence of common childhood illness was high. Whereas access to safe water was high, other WASH indicators were poor. Prevalence of common childhood illnesses was at alarming level. We recommend that the following measures are considered to improve the situation in the settlements:

a. Implement targeted feeding programs for children below 5 years. The status of GAM prevalence in children should be closely monitored through facility and community level surveillance. If the GAM situation does not exhibit progressive improvement, blanket supplementary feeding should be considered for all children below five years.

b. Given the high rates of anemia in the under five children and women of reproductive age, both therapeutic and preventive interventions should be instituted by UNHCR, WFP, UNICEF and Partners. Such interventions include distribution and promotion of multiple micronutrient powder/sprinkles for children, Iron and Folate supplementation for mothers, deworming, malaria control, identification and treatment of bilihazia, mosquito net distribution, promoting consumption of iron and vitamin C rich foods, and other dietary measures.

c. Address the observed high prevalence of common childhood illnesses by implementing appropriate health interventions at static facilities and at community level. This could include the establishment of more static facilities; distribution of non-food items such as bed nets, and household utilities; WASH and other appropriate clothing for children.

d. Institute active case finding and expand treatment programs, outreach posts, for the management of acute malnutrition in the settlements. Introduce out

patient management of acute malnutrition for cases without medical complications and inpatient management of acute malnutrition for cases with medial complications. Institute community awareness activities on signs and symptoms of malnutrition, micronutrient deficiencies and best practices on IYCF.

e. Implement blanket supplementary feeding program for pregnant and lactating women until six months post delivery. Enroll all children with moderate acute malnutrition into the supplementary feeding program as per National admission and discharging criteria.

f. Plan and conduct the UNHCR and WFP Joint Assessment Mission sometime this year, preferably the first half of 2014, to match with the fast pace of the emergency. Review modalities on public health support, food security, nutrition, IYCF, WASH, and Community services etc.

g. All implementing and operational partners implementing nutrition programs in the settlements should ensure that human resources, nutrition equipment and supplies are adequately resourced.

h. Agencies implementing nutrition program to scale up the nutrition surveillance system, preventative program and essential nutrition actions: Promotion of optimal nutrition for women; promotion of optimal breastfeeding during the first six months; promotion of optimal complementary feeding; prevention of vitamin A deficiency in women and children, promotion of hygiene practices, food habits and immunizations.

i. Health, WASH and Community Services agencies should scale up community based health program, improve the community approach on primary health care, nutrition and WASH preventive program.

j. WASH agencies to continue with monitoring of WASH facilities to ensure utilization, cleanliness and coverage maintained above sphere standards. WASH agencies to strengthen hygiene promotion component and ensure

regular soap distribution. UNHCR to ensure optimal water storage containers for families.

k. All stakeholders involved in food management to improve food distribution monitoring systems, introduce regular food basket monitoring and post food basket monitoring at household level with the view to ascertain food entitlements received by refugees.

l. WFP and UNHCR should explore provision of milling facilities or consider introduction of cash and / or voucher system to facilitate milling requirements for refugee families.

m. UNHCR should plan for construction of additional food distribution centres to reduce distance, decongest current distribution centres and future anticipated challenges such as diversion of food to pay for transport.

n. After 6 to 12 months UNHCR should conduct another nutrition survey of which the study design should allow separate survey and analysis for each settlement especially for the old and new caseloads to allow for better designs of program interventions.

Appendix

Central Supervisors

No	Name	Phone	Email
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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
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (1.2 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.785)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**10**
(p=0.000)							
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**0** (3)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**2** (7)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (1.01)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (-0.12)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.08)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**12** %

At the moment the overall score of this survey is 12 %, this is acceptable.

Duplicate Entries in the database:

Line=258/ID=999 with Line=256/ID=999
Line=421/ID=999 with Line=420/ID=999
Line=826/ID=999 with Line=749/ID=999

Missing data:

WEIGHT: Line=91/ID=1768
HEIGHT: Line=91/ID=1768, Line=193/ID=386, Line=237/ID=109, Line=461/ID=97

Percentage of children with no exact birthday: 100 %

Anthropometric Indices likely to be in error (-3 to 3 for WHZ, -3 to 3 for HAZ, -3 to 3 for WAZ, from observed mean - chosen in Options panel - these values will be flagged and should be excluded from analysis for a nutrition survey in emergencies. For other surveys this might not be the best procedure e.g. when the percentage of overweight children has to be calculated):

Line=4/ID=360: HAZ (-3.589), WAZ (-3.934), Age may be incorrect
Line=33/ID=2644: HAZ (-3.077), Age may be incorrect
Line=50/ID=3713: HAZ (4.053), Age may be incorrect

Line=53/ID=16: HAZ (-3.779), Age may be incorrect
Line=65/ID=584: **WHZ (2.504)**, Weight may be incorrect
Line=79/ID=1764: HAZ (-4.313), Age may be incorrect
Line=99/ID=118: HAZ (4.138), Age may be incorrect
Line=103/ID=874: **WHZ (-5.551)**, WAZ (-4.256), Weight may be incorrect
Line=117/ID=607: HAZ (-3.221), Height may be incorrect
Line=121/ID=628: HAZ (-3.239), Age may be incorrect
Line=128/ID=319: HAZ (-3.092), Age may be incorrect
Line=134/ID=60: HAZ (-4.355), Age may be incorrect
Line=148/ID=3722: HAZ (3.435), Age may be incorrect
Line=160/ID=150: HAZ (3.558), Age may be incorrect
Line=163/ID=514: HAZ (3.059), Age may be incorrect
Line=168/ID=175: HAZ (4.987), Height may be incorrect
Line=169/ID=4: HAZ (4.204), Age may be incorrect
Line=174/ID=4: HAZ (4.400), Age may be incorrect
Line=182/ID=1845: HAZ (-3.438), Age may be incorrect
Line=183/ID=1811: HAZ (-3.097), Age may be incorrect
Line=208/ID=411: **WHZ (3.335)**, HAZ (-4.626), Height may be incorrect
Line=229/ID=1823: HAZ (4.533), Height may be incorrect
Line=249/ID=83: HAZ (-4.251), Age may be incorrect
Line=263/ID=599: HAZ (-4.321), Age may be incorrect
Line=276/ID=563: **WHZ (2.089)**, WAZ (2.280), Weight may be incorrect
Line=332/ID=2669: HAZ (3.804), Height may be incorrect
Line=337/ID=842: HAZ (4.070), Age may be incorrect
Line=345/ID=1798: HAZ (3.242), Height may be incorrect
Line=356/ID=161: HAZ (-3.847), Age may be incorrect
Line=375/ID=526: HAZ (-4.089), Age may be incorrect
Line=389/ID=812: HAZ (-4.016), WAZ (-3.904), Age may be incorrect
Line=431/ID=400: HAZ (-3.722), Age may be incorrect
Line=461/ID=97: WAZ (-4.216), Age may be incorrect
Line=491/ID=64: HAZ (4.033), Age may be incorrect
Line=495/ID=107: HAZ (3.495), Age may be incorrect
Line=500/ID=118: HAZ (5.466), Age may be incorrect
Line=517/ID=78: HAZ (3.525), Age may be incorrect
Line=518/ID=34: HAZ (-3.776), Age may be incorrect
Line=520/ID=586: **WHZ (3.398)**, WAZ (3.004), Weight may be incorrect
Line=522/ID=1768: HAZ (3.064), Age may be incorrect
Line=524/ID=1789: HAZ (4.591), WAZ (2.317), Age may be incorrect
Line=530/ID=21: HAZ (7.208), Age may be incorrect
Line=540/ID=1848: HAZ (4.628), Age may be incorrect
Line=555/ID=1806: HAZ (4.432), Age may be incorrect
Line=567/ID=75: HAZ (5.182), Age may be incorrect
Line=581/ID=57: **WHZ (-4.497)**, Weight may be incorrect
Line=585/ID=330: HAZ (3.286), Age may be incorrect
Line=620/ID=101: HAZ (6.014), Age may be incorrect
Line=637/ID=150: HAZ (3.477), Height may be incorrect
Line=658/ID=844: HAZ (6.530), WAZ (2.271), Age may be incorrect
Line=675/ID=352: HAZ (3.679), Age may be incorrect
Line=688/ID=473: HAZ (-3.724), Age may be incorrect
Line=690/ID=2668: WAZ (-3.981), Age may be incorrect

Line=706/ID=355: HAZ (-3.735), Age may be incorrect
Line=707/ID=112: HAZ (3.683), Age may be incorrect
Line=724/ID=172: HAZ (-4.035), WAZ (-4.283), Age may be incorrect
Line=730/ID=838: **WHZ (2.944)**, Weight may be incorrect
Line=738/ID=369: **WHZ (-9.813)**, WAZ (-6.692), Weight may be incorrect
Line=742/ID=400: HAZ (3.875), Age may be incorrect
Line=764/ID=77: HAZ (3.405), Age may be incorrect
Line=772/ID=15: HAZ (4.055), Age may be incorrect
Line=779/ID=518: HAZ (5.838), Age may be incorrect
Line=783/ID=119: HAZ (5.142), Age may be incorrect
Line=787/ID=105: HAZ (4.639), Age may be incorrect
Line=793/ID=74: HAZ (4.155), Age may be incorrect
Line=795/ID=1790: **WHZ (3.017)**, WAZ (3.491), Weight may be incorrect
Line=809/ID=1777: **WHZ (-4.435)**, HAZ (-4.716), WAZ (-5.430)
Line=817/ID=791: HAZ (3.405), Height may be incorrect
Line=849/ID=468: HAZ (-4.409), Height may be incorrect
Line=851/ID=843: HAZ (-3.654), Height may be incorrect
Line=854/ID=620: HAZ (8.618), WAZ (2.854), Age may be incorrect

Percentage of values flagged with SMART flags:WHZ: 1.2 %, HAZ: 7.2 %, WAZ: 1.6 %

Age distribution:

Month 6 : ################
Month 7 : ############################
Month 8 : ########################
Month 9 : ################
Month 10 : ##################
Month 11 : ##############
Month 12 : ####################
Month 13 : ######################
Month 14 : ############################
Month 15 : ####################
Month 16 : ##################
Month 17 : ############
Month 18 : ################
Month 19 : ####################
Month 20 : ##################
Month 21 : ##############
Month 22 : ############
Month 23 : ################
Month 24 : ##################
Month 25 : ####################
Month 26 : ##############
Month 27 : ##########
Month 28 : ############################
Month 29 : ##################
Month 30 : ####################
Month 31 : ############################

Month 32 : ########################
Month 33 : ########################
Month 34 : ###########
Month 35 : ######
Month 36 : #########
Month 37 : ################
Month 38 : ############
Month 39 : ###################
Month 40 : ############
Month 41 : ############
Month 42 : ############
Month 43 : ###############
Month 44 : #################
Month 45 : ###############
Month 46 : ########
Month 47 : ############
Month 48 : ###########
Month 49 : #########
Month 50 : ########
Month 51 : ########
Month 52 : ###
Month 53 : ###########
Month 54 : ########
Month 55 : ########
Month 56 : ########
Month 57 : ############
Month 58 : ####
Month 59 : ##############

Age ratio of 6-29 months to 30-59 months: 1.21 (The value should be around 1.0).

Statistical evaluation of sex and age ratios (using Chi squared statistic):

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	116/98.4 (1.2)	132/100.2 (1.3)	248/198.6 (1.2)	0.88
18 to 29	12	120/95.9 (1.3)	100/97.7 (1.0)	220/193.6 (1.1)	1.20
30 to 41	12	94/93.0 (1.0)	104/94.7 (1.1)	198/187.7 (1.1)	0.90
42 to 53	12	67/91.5 (0.7)	68/93.2 (0.7)	135/184.7 (0.7)	0.99
54 to 59	6	27/45.3 (0.6)	28/46.1 (0.6)	55/91.4 (0.6)	0.96
6 to 59	54	424/428.0 (1.0)	432/428.0 (1.0)		0.98

The data are expressed as observed number/expected number (ratio of obs/expect)

Overall sex ratio: p-value = 0.785 (boys and girls equally represented)
Overall age distribution: p-value = 0.000 (significant difference)
Overall age distribution for boys: p-value = 0.000 (significant difference)
Overall age distribution for girls: p-value = 0.000 (significant difference)
Overall sex/age distribution: p-value = 0.000 (significant difference)

Digit preference Weight:

Digit .0 : ##
Digit .1 : ##
Digit .2 : ##
Digit .3 : ##
Digit .4 : ###################################
Digit .5 : ##
Digit .6 : ##
Digit .7 : ##
Digit .8 : ##
Digit .9 : ##

Digit Preference Score: **3** (0-5 good, 6-10 acceptable, 11-20 poor and > 20 unacceptable)

Digit preference Height:

Digit .0 : ##
Digit .1 : ##
Digit .2 : ##
Digit .3 : ##
Digit .4 : ##
Digit .5 : ##
Digit .6 : ######################################
Digit .7 : ####################################
Digit .8 : ##########################
Digit .9 : ##

Digit Preference Score: **7** (0-5 good, 6-10 acceptable, 11-20 poor and > 20 unacceptable)

Evaluation of Standard deviation, Normal distribution, Skewness and Kurtosis using the 3 exclusion (Flag) procedures

.	no exclusion	exclusion from reference mean (WHO flags)	exclusion from observed mean (SMART flags)
WHZ			
Standard Deviation SD:	1.13	1.08	1.01
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	19.9%	19.7%	19.6%
calculated with current SD:	21.4%	19.9%	19.0%
calculated with a SD of 1:	18.6%	18.2%	18.7%
HAZ			
Standard Deviation SD:	1.68	1.61	1.26
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	9.4%	9.4%	7.1%
calculated with current SD:	12.3%	11.7%	7.1%
calculated with a SD of 1:	2.6%	2.8%	3.2%
WAZ			
Standard Deviation SD:	1.16	1.14	1.06
(The SD should be between 0.8 and 1.2)			

```
Prevalence (< -2)
observed:                                13.6%           13.5%           12.9%
calculated with current SD:              15.5%           15.0%           13.3%
calculated with a SD of 1:               12.0%           11.8%           11.8%

Results for Shapiro-Wilk test for normally (Gaussian) distributed data:
WHZ                                   p= 0.000        p= 0.000        p= 0.089
HAZ                                   p= 0.000        p= 0.000        p= 0.002
WAZ                                   p= 0.000        p= 0.004        p= 0.060
(If p < 0.05 then the data are not normally distributed. If p > 0.05 you can consider
the data normally distributed)

Skewness
WHZ                                      -0.45            0.15           -0.12
HAZ                                       0.63            0.34            0.10
WAZ                                      -0.06            0.07            0.12
If the value is:
-below minus 2 there is a relative excess of wasted/stunted/underweight subjects in
the sample
-between minus 2 and minus 1, there may be a relative excess of
wasted/stunted/underweight subjects in the sample.
-between minus 1 and plus 1, the distribution can be considered as symmetrical.
-between 1 and 2, there may be an excess of obese/tall/overweight subjects in the
sample.
-above 2, there is an excess of obese/tall/overweight subjects in the sample

Kurtosis
WHZ                                       4.93            1.07            0.08
HAZ                                       2.01            0.93           -0.36
WAZ                                       1.27            0.71           -0.04
(Kurtosis characterizes the relative peakedness or flatness compared with the normal
distribution, positive kurtosis indicates a relatively peaked distribution, negative
kurtosis indicates a relatively flat distribution)
If the value is:
-above 2 it indicates a problem. There might have been a problem with data collection
or sampling.
-between 1 and 2, the data may be affected with a problem.
-less than an absolute value of 1 the distribution can be considered as normal.
```

Are the data of the same quality at the beginning and the end of the clusters?
Evaluation of the SD for WHZ depending upon the order the cases are measured within each cluster (if one cluster per day is measured then this will be related to the time of the day the measurement is made).

```
Time                                          SD for WHZ
point          0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3

(when n is much less than the average number of subjects per cluster different symbols
are used: 0 for n < 80% and ~ for n < 40%; The numbers marked "f" are the numbers of
SMART flags found in the different time points)
```

Analysis by Team

Team **1** **999**
n = 1 855
Percentage of values flagged with SMART flags:
WHZ: 0.0 1.9
HAZ: 0.0 7.6
WAZ: 0.0 2.0
Age ratio of 6-29 months to 30-59 months:
1.20
Sex ratio (male/female):
0.98

Digit preference Weight (%):

.0 :	100	12	
.1 :	0	9	
.2 :	0	11	
.3 :	0	10	
.4 :	0	8	
.5 :	0	9	
.6 :	0	9	
.7 :	0	10	
.8 :	0	10	
.9 :	0	11	
DPS:	100	3	Digit preference score (0-5 good, 5-10 acceptable, 10-20 poor and > 20 unacceptable)

Digit preference Height (%):

.0 :	0	12	
.1 :	0	9	
.2 :	100	12	
.3 :	0	10	
.4 :	0	10	
.5 :	0	14	
.6 :	0	9	
.7 :	0	8	
.8 :	0	6	
.9 :	0	9	
DPS:	100	7	Digit preference score (0-5 good, 5-10 acceptable, 10-20 poor and > 20 unacceptable)

Statistical evaluation of sex and age ratios (using Chi squared statistic) for:

Team 1:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	1/0.2 (4.3)	0/0.0	1/0.2	
18 to 29	12	0/0.2 (0.0)	0/0.0	0/0.2	
30 to 41	12	0/0.2 (0.0)	0/0.0	0/0.2	
42 to 53	12	0/0.2 (0.0)	0/0.0	0/0.2	
54 to 59	6	0/0.1 (0.0)	0/0.0	0/0.1	
6 to 59	54	1/0.5 (2.0)	0/0.5 (0.0)		

The data are expressed as observed number/expected number (ratio of obs/expect)

Overall sex ratio: p-value = 0.317 (boys and girls equally represented)
Overall age distribution: p-value = 0.507 (as expected)
Overall age distribution for boys: p-value = 0.507 (as expected)
Overall sex/age distribution: p-value = 0.107 (as expected)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls

6 to 17	12	0/0.0	0/0.0	0/0.0
18 to 29	12	0/0.0	0/0.0	0/0.0
30 to 41	12	0/0.0	0/0.0	0/0.0
42 to 53	12	0/0.0	0/0.0	0/0.0
54 to 59	6	0/0.0	0/0.0	0/0.0
6 to 59	54	0/0.0	0/0.0	

The data are expressed as observed number/expected number (ratio of obs/expect)

Evaluation of the SD for WHZ depending upon the order the cases are measured within each cluster (if one cluster per day is measured then this will be related to the time of the day the measurement is made).

Team: 1

Time point	SD for WHZ 0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3

(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked "f" are the numbers of SMART flags found in the different time points)

Team: 2

(for better comparison it can be helpful to copy/paste part of this report into Excel)