Food Security and Nutrition Assessment in the Karamoja Region

Report

UNWFP – Uganda

May 2013

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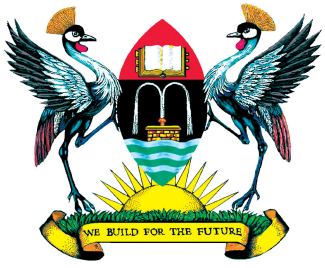
WFP United Nations World Food Programme

unicef



Acknowledgement

The School of Public Health, Makerere University College of Health Sciences (Mak-SPH) team led by Dr Henry Wamani – the Principal Investigator - and assisted by Dr Arthur Bagonza acknowledges the enormous support from UNWFP, Ministry of Health and District Health Offices of, Abim, Amudat, Kaabong, Kotido, Moroto, Nakapiripirit and Napak for supporting the surveillance surveys in different ways.

We sincerely thank the 20 Central Supervisors, 84 enumerators from the seven districts and 7 data entrants who supported the Surveillance surveys. Our special thanks go to Darryl Miller, Dorothy Bushara and the entire WFP sub-offices for the invaluable support offered for the assessment.

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Accronyms

ARI	Acute respiratory Infections
BMI	Body Mass Index
CMR	Crude Mortality Rate
DHO	District Health Officer
ENA	Emergency Nutrition Assessment
EWS	Early Warning System
FNSA	Food Security and Nutrition Assessment
GAM	Global Acute Malnutrition
HFA	Height-for-Age
IDDS	Individual Dietary Diversity Scores
ITC	Inpatient Therapeutic Care
LRTI	Lower Respiratory Tract Infection
Mak-SPH	School of Public Health, Makerere University College of Health Sciences
MAM	Moderate Acute Malnutrition
MOH	Ministry of Health
MUAC	Mid Upper Arm Circumference
NCHS	National Centre for Health Statisitics
OR	Odds Ratio
OTC	Outpatient Therapeutic Care
SAM	Severe Acute Malnutrition
SFP	Supplementary Feeding Program
SMART	Standardized Monitoring and Assessment of Relief and Transition
SPSS	Statistical Package for Social Sciences
U5MR	Under-five Mortality Rate
UNICEF	United Nations Children's Fund
UNWFP	United Nations World Food Program
WFA	Weight-for-age
WFH	Weight-for-Height
WHO	World Health Organization
UDHS	Uganda Demographic and Health Survey
UGX	Uganda Shillings

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Summary of findings

Karamoja is a semi-arid and chronically food insecure region with a long standing history of high prevalence of acute malnutrition and food insecurity. Regular food security and nutrition assessments (FSNA) are conducted in the region at least twice a year around May and December, with support from UNWFP and UNICEF. The current assessment was carried out in May 16-25, 2013 to obtain data on food security, nutrition, health and sanitation indicators.

Nutrition

- The greatest challenge to malnutrition in children 6-59 months in Karamoja was still high Global Acute Malnutrition (GAM) prevalence levels (12.5%). The prevalence of GAM was above 10% in all the districts except Abim district. While such rates are not unusual in Karamoja at this time of year, they do exceed the 10% 'alert level' established by global standards. GAM levels were above or near critical levels in both Moroto (20%) and Nakapiripirit (14.5%), in relation both to global standards (which establish 15% as 'emergency level') and past trends.

- Severe Acute Malnutrition (SAM) for the region was 3.0% exceeding the 2% 'emergency threshold' that is a global standard in five districts (Kaabong, Kotido, Moroto, Nakapiripirit, Napak). SAM at this point last year was also above the emergency threshold.

- Out of the 259 children who were reported with GAM only 30.5% were reported enrolled in any of the feeding programs. Up to 261 of 340 (79.0%) children who were enrolled in any of the feeding programs were without GAM. However, the fact that many children reported enrolled on the feeding programs were found without GAM could suggest that they had recovered. But, it may also imply that many ineligible children were being recruited to the programs. There is need for screening program to actively search for GAM cases and other children at high risk to be enrolled in OTC.

- On multivariate analysis, independent explanatory factor for high GAM prevalence were mothers education and household food insecurity. That is, zero formal education had a 2.2-fold risk of malnutrition in children compared to those children with mothers who had obtained secondary level education; and severely food insecure households had 1.8-fold risk of malnutrition in children and moderate food insecure households had 1.6-fold risk compared to children who lived in houseolds that had acceptable food security status.

- Exclusive breastfeeding (nothing else by mouth except medication) among children aged less than six months was above 80% in Karamoja. However, complementary feeding practices were far from the recommended practice. Up to 87% of the children 6-24 months had low individual dietary diversity score (IDDS). That is, fed on 3 or less food groups the day prior to the assessment. Likewise, the majority of the children 6-23 months (64%) had consumed less than the recommended three meals a day. Moroto and Napak children were more likely to have had less than the recommended meals

compared to other districts.

- Using Body Mass Index (BMI) 24% of the mothers 15-49 years were underweight, 5% severely underweight. Up to 4.0% of the mothers were overweight, Abim (7.0%) and Nakapiripirit (5.8%) had the highest proportion of overweight mothers (BMI > 25).

Mortality, morbidity and immunization

- Mortality rates were normal. There were no indications of excess mortality except in Napak district where under-5 mortality was 1.7 deaths per 10,000 children per day and was classified as very serious warranting further investigation. Most of the children (66.7%) had died of fever and diarrhea (13.3%).

- One in five children had suffered at least one common childhood illness in the two weeks prior to the survey. Fever/malaria, diarrhoea and acute respiratory infection were the most prevalent. The prevalence of diarrhoea is increasing. Diarrhoea is associated with undernutrition and needs to be addressed.

- Nearly 80% of the children did not sleep under a mosquito bed net the night before the survey, depicting a major deterioration since over 80% of the children were using bed nets in 2009.

- Two thirds (65%) of Karamoja children aged 9-23 months had received measles vaccination, confirmed by a health card. When mothers' reports (even those without cards) were considered all districts had over 85% of children fully immunised. This level of coverage should be sustained and mothers should be encouraged to pick health cards from health facilities and keep them well.

Water and sanitation

- In each district, the majority of the population accessed safe drinking water from boreholes. The proportion of people who used boreholes was lowest in Amudat (69%) and highest in Abim (93%).

- However, up to 73% of the households in the Karamoja region lacked latrines. Compared to previous assessments, there was no improvement in latrine coverage. The lack of latrine is a precursor to faecal-oral diseases such as cholera, hepatitis A and dysentery with serious health implications.

Food security

- Overall, the food security situation in Karamoja was poor but not extreme. High rates of poor food consumption were noted across Karamoja. An unusually poor food security situation was noted in four districts: Kaabong, Kotido, Moroto and Napak.

- The food consumption score, a key WFP indicator, showed high 'poor food consumption'

prevalence rates in Moroto (29%), Kotido (20%), Kaabong (24%) and Napak (28%). While higher rates have been seen in the recent past (in May 2011 'poor food consumption' was identified in 55% of Moroto households and 45% of Kotido households), the current findings are a reason for concern.

- The majority of the population in Abim, Amudat and Nakapiripirit had an acceptable level of food consumption. The food security situation in Abim, Amudat and Nakapiripirit overall was relatively stable (relative both to other districts in Karamoja and to past trends).

- There was evidence of varying levels of food stress on families in all districts, with some employing coping strategies such as borrowing food or reducing the number of meals eaten.

Recommendations

Arising from the study and the dissemination meeting of preliminary findings held in Karamoja the following recommendations should be pursued by various implementers in the region:

- Since GAM in Moroto and Nakapiripirit was at critical level there is need for urgent intervention.

- There is increased need for food assistance to address the reducing levels of food availability.

- Families rely on school meals for their school-aged children to help cope with food insecurity; the school meals programme is one existing vehicle for response that should be sustained.

- Close monitoring of forth coming harvests is required. The near-term outlook will depend a great deal on the extent of the harvest in Karamoja this season. The FSNA also calls for ongoing action to address the underlying problems that make food insecurity and undernutrition chronic in Karamoja.

Chapter 1

INTRODUCTION

The long history of recurrent droughts and conflict, coupled with poor infrastructure and limited social services have left a substantial number of households in Karamoja vulnerable to poverty, food insecurity and persistently high malnutrition levels. Previous nutrition and food security assessments in the Karamoja region revealed spiking levels of Global Acute Malnutrition (GAM) and Severe Acute Malnutrition (SAM) during the lean period notably from the 2011 and 2012 May Nutrition Surveillance rounds. The lean season spans January to April in pastoral areas and April to June in agricultural and agro-pastoral areas. The problem of worsening nutrition indicators has been more apparent for SAM than GAM reflecting an existing but rather unapparent problem that worsens in the lean period. The depletion of food stock during the lean period coupled with inadequate family care practices could be the contribute to the spikes in malnutrition during this period.

A Karamoja food security and nutrition assessment (FSNA) was also conducted by UNICEF in December 2012. The results showed that the overall GAM was above the alert levels of 10% while SAM was nearly double the 2% emergency threshold (3.9%). Overall morbidity levels also remained high across the region with more than half of the children having suffered at least one illness in the two weeks prior to the assessment. Besides the above, non-optimal Infant and Young Child Feeding Practices as well as appalling sanitation conditions are common findings in FSNA done in Karamoja. These factors negatively impact the food security and nutrition situation in Karamoja.

Based on the above, there was need to continually monitor the food security and nutrition situation in Karamoja particularly during the lean period when that situation tended to deteriorate. Therefore, it was against this background that the May 2013 food security and nutrition assessment was conducted.

1.1 Objectives for food security and nutrition assessment in the seven districts

1.1.1 Broad objective

To assess indicators of health, nutrition, food security and retrospective mortality among populations in the seven districts of Karamoja (Abim, Kotido, Kaabong, Moroto, Napak, Amudat and Nakapiripirit) in order to generate information for improved programme and policy interventions.

1.1.2 Specific objectives for general assessment

- Determine the levels of retrospective crude mortality rates and age specific mortality rates for under-5s in a specific time period;
- Determine the prevalence of malnutrition (wasting, stunting and underweight) among children aged 6-59 months (and/or measuring 65-110 cm in length or height);
- Determine the coverage of health interventions (e.g. routine immunization coverage (DPT, Measles, polio and de-worming) and vitamin A supplementation among children under five;
- Determine the incidence of common diseases (diarrhoea, measles and ARI) among the target population, two weeks prior to the assessment and access to/ uptake of health services for treatment;
- Analyse factors associated with malnutrition;
- Assess the current food security status of households, including food consumption and dietary diversity (using 7-day dietary recall methods) of the general population in Karamoja:
- Analyse factors that determine household food security status;
- Recommend appropriate course of action by the Government, UNICEF, WFP and other stakeholders based on the findings of the assessment.

1.2 Conceptual framework for food and nutrition security

The nutrition component of the survey was based on the conceptual framework of the causes of malnutrition adapted from the 1990 UNICEF model, which suggests that

fundamental influences to nutrition and food security outcomes remain within the environment where people live (Figure 1).

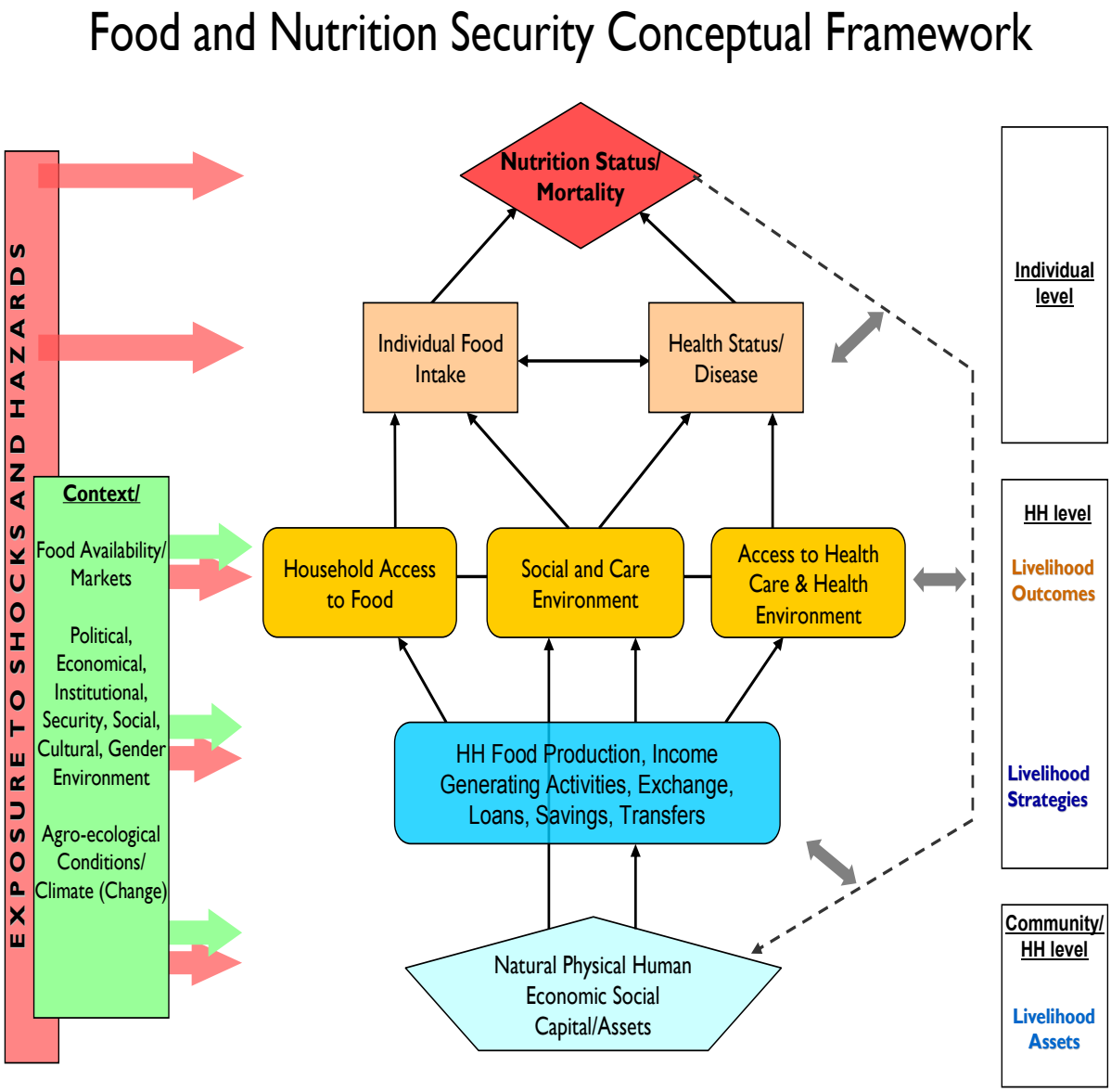


Figure 1: Conceptual framework to analyze food security and nutrition in society (adapted from UNICEF 1990)

Information was collected on factors at most of the framework levels with the exception of the total potential resources

Chapter 2

METHODOLOGY

The surveys were population based and cross-sectional targeting seven districts of Abim, Amudat, Kaabong, Kotido, Moroto, Nakapiripirit and Napak. Data were collected May 16 – 25, 2013.

2.1 Target population

The targets were district representative households in the five districts regardless of who occupies them. Children between the ages of 0 and 59 months and their mothers if they existed in the sampled households were assessed. Where children and/or mothers never existed in a household the head of household was interviewed to collect information only on food security. Age of children was confirmed by use of child health cards. Children with physical disabilities were assessed but findings on anthropometry were excluded.

2.2 Sample size and sampling procedure

The target was to detect a minimum variation of 5% of Global Acute Malnutrition (GAM) with 85% precision. Empirically it was established that a minimum of 25 clusters was required for a survey to be representative and valid in sub-Saharan setups. We therefore aimed to sample a total of 480 representative households per district using a multi-stage 30x16 cluster randomization design. At the first stage a probability sample of 30 clusters was selected using an updated list of parishes that constitute a district (probability proportional to population size approach). The updated lists were obtained from the District Population Offices. At the second stage households were systematically sampled. Systematic sampling was done by ensuring a random start and using a calculated sampling interval using a list of village households obtained from the village head. A total of 3360 households were therefore targeted for sampling in the five districts but we were able to reach up to 3157. All children 0-59 months leaving in the sampled households were assessed.

4.3 Variable measurements and data collection instruments

Data was collected on the following variables: age; sex; weight; height; bilateral pedal oedema; morbidity for common diseases and conditions; infant feeding practices; ownership of household assets, livestock and food produced; income sources and expenditures; food consumption diversity; hunger and food security; education status of mother; water and sanitation; immunization/supplementation and deworming; and household coping strategies.

Age and sex:

Exact age of the child was reported in months using information on child health cards. Where these did not exist, age (month and year of birth) was determined using a local calendar of events. An age chart (Appendix 3) was used to read off age in months if date of birth (month and year) was known. Sex was assessed using mothers' reports and/or observation as appropriate.

Weight

Any child falling within the age bracket of 0 to 59 months found in the household sampled was weighed. The weight was recorded to the nearest 0.1kg accuracy on the conventional scales. Even those with oedema were weighed and the Emergency Nutrition Assessment (ENA) for SMART software was used for data analysis and accounted for such.

Height

Children above the age of two years were measured standing upright whilst those below 2 years were measured lying down to nearest 0.1cm. Where age was difficult to determine, those measuring less than 85cm were generally measured lying down and those taller than 85cm measured standing upright. ***Note****: Only data of children measuring between 65cm and 110cm were used for analysis where age was not known.*

Bilateral oedema

Oedema was assessed by exerting medium thumb pressure on the upper side of each foot for three seconds. Oedema was recorded as present if a skin depression remained on both feet after pressure was released.

MUAC

The mid-upper arm circumference is the measure of the circumference of the mid- upper arm. It is measured on the left arm, halfway between the shoulder and the elbow. The arm must be relaxed, using a special tape measure; the reading is taken at the window in the tape-measure, by moderately tightening the tape measure around the arm.

MUAC is recorded to the nearest mm. Only children above six months and mothers were assessed for MUAC.

BMI

Mothers/caregivers 15-49 years of age were assessed for weight and height to calculate their Body Mass Index (BMI).

Family care practices, hygiene and sanitation status

Based on the national nutrition survey guidelines, data were collected on infant feeding practices; water and sanitation; immunisation, vitamin A supplementation and deworming coverage; bed net use and care seeking practices.

Feeding practices that were assessed included the breastfeeding (current practices, period of exclusive breast-feeding and the duration of breastfeeding period); and complementary feeding practices (types of foods served, and frequency). Individual dietary diversity scores (IDDS) were assessed to establish adequacy of complementary feeding among children 6-23 months. Measles and DPT3 vaccination coverage (children >9 but less than 24 months) were ascertained from child health cards or mothers recall. Vitamin A supplementation (children >5 months) and de-worming (children >11 months) in the last six months was assessed through any documented record or mothers recall.

Household source of water and daily water usage was ascertained in 20 litre Jerrican units (commonly used containers in Uganda). Access to latrines was probed and observed from individual households whilst extent of sharing (people/stance ratio) was established.

Information was also collected on bed net availability, and whether a child under question slept under the net the previous night of the survey.

Morbidity

Morbidity patterns were assessed by obtaining history of any episodes of fever/malaria, measles, diarrhoea, ARI/cough, skin disease, eye disease or any other illness in the 2 weeks prior the interview. The WHO definitions for these disease conditions were used.

Retrospective mortality

The number of household members who were alive on day of interview was assessed per specified age group. Additionally, households were asked about the number of deaths each household had had in the recall period and the presumed cause of death.

These questions allowed for the calculation of both the Crude Mortality Rate (CMR) and the Under Five Mortality Rate (U5MR) as well as probable cause of death. The mortality rate (MR) was determined for both, whole population (CMR) and children under 5 years (U-5MR).

Food security:

Data was gathered on household agricultural food production of common crops such as maize, millet, sorghum, potato, cassava and banana. The types of food and the number of times they were eaten in the past 7 days were assessed. Any foods bought by the household and the income sources were gathered. Coping strategies in case of starvation and any assistance (food and non-food) obtained by households were assessed. Household socioeconomic status was established by collecting information on household assets (donkey cart, bicycle, radio, hoe/axe, mobile phone, motorcycle/car, tables, chairs, beds and television); and animals (cow, donkey, camel, goad, sheep, chicken, horse and pig).

4.4 Data collection

Data was collected using a single questionnaire (Appendix 3), administered face-to-face to mothers and/or household heads in the home settings. The data collection tool was in English but a translated tool was used to administer the questionnaire. Data was collected simultaneously in all the seven districts by trained research assistants. Field data collection lasted a total of 11 days in each district while training of research assistants last for 3 days – May 12-25, 2013. For successful data collection in Uganda, the use of local and civic leaders is imperative. In this regard, local officials were identified and used as guides to identify households for interviews and to support anthropometric measurements.

4.5 Quality assurance procedures during data collection

To ensure that good and accurate information was collected by research assistants, the following quality assurance measures were put in place:

- Research assistants were required to edit research tools or data at the point of data collection. This enabled effective correction and verification of data collected;
- The supervisors edited questionnaires and ensured that they are correct and complete while in the field;
- A record of daily activities showing the number of tools completed, by whom and the location where they were undertaken was kept; and

- Daily debriefing of the research team was ensured at the end of every day's activities.

4.6 Data Management

Data were entered in Epidata 3.1 software by clerks based at the School of Public Health. Entered data was copied, saved and exported to ENA software for generation of z-scores and eventual analysis of the nutrition data. Data was backed-up daily including saving it on distant servers through the email system. Other data were analysed in SPSS Version 21.

4.7 Data analysis and interpretation of findings

Data were analyzed by the Principal Investigator assisted by the co-Investigator. Findings were interpreted based on national indicators. District specific and regional data were concurrently presented. As much as possible data on key indicators were disaggregated by sex and age. Current findings were compared to previous surveys to establish any positive or negative changes.

4.7.1 Analysis of anthropometric data

Anthropometric indices were presented based on the WHO standard. However, results with NCHS references have been provided in Appendix 1 for comparison with previous surveys. Acute malnutrition or wasting was estimated from the weight for height (WFH) index values combined with the presence of oedema. WFH indices were expressed in Z-scores.

Global acute malnutrition (GAM)

Was estimated using Weight-for-Height index and oedema. Children presenting with a weight for height index less than –2 z-scores with/without oedema were considered to fall in this category.

Moderate Acute Malnutrition (MAM)

Was estimated using Weight-for-Height index. Children presenting less than –2 z-scores but greater than –3 z-scores were regarded as moderately malnourished.

Severe Acute Malnutrition (SAM):

Was estimated using Weight-for-Height index and oedema. Children presenting with a weight for height index less than –3 z-scores and/or presence of bilateral oedema were

regarded as severely malnourished. Likewise, underweight (weight-for-age) and stunting (height-for-age) were analysed.

MUAC

MUAC was also evaluated using national guidelines as indicated in table below.

MUAC	Interpretation
< 115 mm	Severe Malnutrition
≥ 115 mm and < 125 mm	Moderate Malnutrition
≥ 125mm - < 135 mm	Mild Malnutrition (At risk)
≥ 135mm	Good Nutritional Status

BMI

BMI was calculated for mothers/caregivers as weight in Kilograms divided by height in meters squared. Interpretation was based on WHO criteria, that is < 16.5 severely underweight, < 18.5 underweight, 18.5 – 25 normal, 25.1 – 30 overweight, and above 30 obese.

4.7.2 Analysis of morbidity and other health and sanitation data

Prevalence of diseases and conditions occurring two weeks prior the survey, latrine and coverage of health indicators were reported using descriptive statistics.

Mortality

The Mortality rate (MR), for U-5s and for the whole population was determined with the equation used in ENA for SMART software as follows:

If: n = the number of deaths (in the last 3 months)

And: N_1 = the number alive at the beginning of the recall period (90days)

N_2 = the total number of individuals living in the household at the time of the survey

Then: $DR = n/ [(n+N_1) + N_2) /2]$

The mortality rate = (DR X 10,000)/90. It was expressed as deaths per 10,000 people/day.

The defined limits were as follows[1];

Crude Mortality Rate: ***Alert level***: 1/10,000 people/day; ***Emergency level:*** 2/10,000 people/day

[1] Health and nutrition information systems among refugees and displaced persons, Workshop report on refugees nutrition, ACC / SCN, Nov 95.

Under 5 Mortality Rate: ***Alert level***: 2/10,000 people/day; ***Emergency level***: 4/10,000 people/day

4.7.3 Analysis of food security data

Food security data was systematically analyzed. First, a household wealth index was generated from ownership of household property using principal components analysis. The wealth index was derived from the first principal component, which was then ranked and categorized into quintiles. Second, household food consumption scores were generated based on 8 food groups derived from the 16 food columns in the questionnaire using the UNWFP/UNICEF – weighted scores of certain food groups. These pre-assigned weights for starch, meat, pulses, sugar, oil and milk are 2, 4, 3, 0.5, 0.5 and 4, respectively, were used. Third, other facet of food security such as food sources, expenditures on food and coping mechanisms were accordingly analysed largely using descriptive statistics.

4.7.4 Analysis of factors associated with malnutrition and food security

Factors independently associated with GAM and household food consumption diversity (food consumption scores) were assessed using binary logistic regression in case of the former since it was a dichotomous variable (1=wasted, 0=not wasted), and multinomial logistic regression for the latter. We used the variable FCG-Low with 3 categories (1) poor consumption, (2) borderline consumption, and (3) acceptable consumption. The category for acceptable food consumption was used as reference category in the multinomial logistic regression model. The covariates modeled included household socioeconomic status, mothers' education, health and sanitation practices, and morbidity factors; and history of crop cultivation in case of the food security models.

Chapter 3

FINDINGS AND DISCUSSION

3.1 Demographic characteristics

3.1.1 Household size

Based on the ENA for SMART methodology, data was collected on the number of people that reside in households permanently or had joined household members temporarily in the past three months. Babies born in the recall period were also considered. The average household size for Karamoja was six people (Table 1).

Table 1: Household population size according to district

District	N	Mean	S D	Median	Sum
Abim	469	7.1	2.8	7	3350
Amudat	434	5.7	2.3	5	2476
Kaabong	397	6.4	2.4	6	2530
Kotido	500	7.0	3.3	7	3695
Moroto	464	5.7	2.1	5	2624
Nakapiripirit	483	5.7	2.5	5	2747
Napak	410	6.4	2.4	6	2605
Karamoja	**3157**	**6.4**	**2.6**	**6**	**20027**

3.1.2 Average number of children under 5 years of age

Overall, households had an average of 1 child below 5 in all districts (Table 2). On average, Amudat (1.5) and Moroto (1.3) districts had the highest number of children under-5 years of age while Nakapiripirit district had the lowest (0.9).

Table 2: Household number of children under 5 years

District	N	Mean	S D	Median	Sum
Abim	463	1.1	0.9	1	518
Amudat	428	1.5	1.5	1	637
Kaabong	396	1.2	0.8	1	493
Kotido	500	1.1	1.0	1	559
Moroto	463	1.3	0.9	1	586
Nakapiripirit	482	0.9	0.8	1	421
Napak	410	1.1	0.9	1	464
Karamoja	**3142**	**1.2**	**1.0**	**1**	**3678**

3.1.3 Age and sex distribution of the sampled children

A total of 3051 children were included for anthropometric analysis. That is, 390 for Abim, 546 for Amudat, 471 for Kaabong, 436 for Kotido, 505 for Moroto, 353 for Nakapiripirit and 350 for Napak district (Table 3). Flagged cases although very few were excluded from the analysis using WHO standards (cases suspected to have measurement errors). Overall, there was equal representation of male and female children in districts depicting effective sampling procedures.

Table 3: Number of children assessed for anthropometry by sex, age group, and by district

District	Sex ratio of sampled children			Distribution of sampled children by age					
	Boys	Girls	Boy:Girl ratio	6-17	18-29	30-41	42-53	54-59	Total
Abim	226	208	1.09	118	97	81	64	30	390
Amudat	309	312	0.99	144	149	126	99	28	546
Kaabong	255	271	0.94	149	142	115	52	13	471
Kotido	263	228	1.15	137	133	85	65	16	436
Moroto	264	284	0.93	148	127	116	82	32	505
Nakapiripirit	199	190	1.05	122	94	70	56	11	353
Napak	192	202	0.95	82	97	94	52	25	350
Karamoja	**1708**	**1695**	**1.01**	**900**	**839**	**687**	**470**	**155**	**3051**

3.1.4 Caregiver characteristics

Overall, primary care giving for children assessed (87.3%) was by the biological mothers (Table 4). Apart from Napak district where there was large number of caregivers (26.2%) other than mothers, the presence of biological mothers was high and should be encouraged. The mean age of the respondents was 33.2 years.

Table 4: Respondents category and their mean age by district

	Respondents category		Respondents mean age
	Mothers	Caregivers	Mothers/caregivers
District	N (%)	N (%)	Years (SD)
Abim	317 (89.3)	38 (10.7)	33.7 (11.1)
Amudat	355 (91.7)	32 (8.3)	29.7 (10.9)
Kaabong	320 (92.2)	27 (7.8)	34.3 (11.3)
Kotido	313 (89.7)	36 (10.3)	32.3 (10.2)
Moroto	334 (85.4)	57 (14.6)	31.6 (11.4)
Nakapiripirit	278 (91.1)	27 (8.9)	30.9 (10.1)
Napak	296 (73.8)	105 (26.2)	39.5 (16.4)
Karamoja	2213 (87.3)	322 (12.7)	33.2 (12.3)

At a mean age of 33 years, mothers/caregivers had on average given birth to four live children. Mothers/caregivers in Moroto district were having a lower average of 3.5 children compared to other districts (Table 5)

Table 5: Parity of the respondents

District	Mean number of live births	Std. Deviation
Abim (N=326)	5.3	2.9
Amudat (N= 380)	4.0	2.5
Kaabong (N= 349)	4.0	2.3
Kotido (N=347)	4.5	2.5
Moroto (N= 385)	3.5	1.9
Nakapiripirit (N=296)	4.4	2.5
Napak (N= 387)	5.1	2.7
Karamoja (N=2470)	**4.4**	**2.6**

3.1.5 Education status of mothers and/ or care givers

More than three quarters of the mothers/care givers in the districts of Karamoja region had no formal education (Table 6). Kotido district (92.0%) recorded the highest number of mothers/ caregivers without formal education while Abim district (50.4%) recorded the least. Education is a factor that highly correlates with stunting status, it is therefore important that focus on both girl and boy child education is strengthened in the region.

Table 6: Education status of mother/ caregiver by district

District	None	Primary	Secondary	Tertiary
	N (%)	N (%)	N (%)	N (%)
Abim	173 (50.4)	127 (37.0)	25 (7.3)	18 (5.2)
Amudat	330 (87.3)	39 (10.3)	9 (2.4)	0 (0.0)
Kaabong	303 (86.30	35 (10.0)	9 (2.6)	4 (1.1)
Kotido	312 (92.0)	21 (6.2)	4 (1.2)	2 (0.6)
Moroto	307 (87.2)	36 (10.2)	5 (1.4)	4 (1.1)
Nakapiripirit	212 (70.2)	76 (25.2)	12 (4.0)	2 (0.7)
Napak	356 (89.7)	33 (8.3)	4 (1.0)	4 (1.0)
Karamoja	**1993 (81.0)**	**367 (14.9)**	**68 (2.8)**	**34 (1.4)**

3.1.6 Mother pregnancy and/ or breastfeeding status

The majority (56.9%) of the mothers were breastfeeding while 1.6% were pregnant and breastfeeding.

Only 29.2% of the mothers were neither pregnant nor breastfeeding (Table 7). This implies that more than 70% of the mothers were either pregnant or breastfeeding. This situation calls for concerted effort to improve family planning services.

Table 7: Current pregnancy and breastfeeding status of the respondents

District	Pregnant	Breastfeeding	Pregnant and breastfeeding	Neither pregnant nor Breastfeeding
	N (%)	N (%)	N (%)	N (%)
Abim (N= 304)	40 13.2)	162 (53.3)	4 (1.3)	98 (32.2)
Amudat (N=358)	57 (15.9)	224 (62.6)	4 (1.1)	73 (20.4)
Kaabong (N=343)	22 (6.4)	227 (66.2)	2 (0.6)	92 (26.8)
Kotido (N=342)	52 (15.2)	182 (53.2)	12 (3.5)	96 (28.1)
Moroto (N=354)	42 (11.9)	205 (57.9)	2 (0.6)	105 (29.7)
Nakapiripirit (N=286)	36 (12.6)	179 (62.6)	11 (3.8)	60 (21.0)
Napak (N=356)	42 (11.8)	153 (43.0)	2 (0.6)	159 (44.7)
Karamoja (N=2243)	**291 (12.4)**	**1332 (56.9)**	**37 (1.6)**	**683 (29.2)**

3.2 Infant and young child feeding practices

3.2.1 Breastfeeding and complementary feeding practices

In the 24-hour recall, up to 75.0% of the children 0-6 months were exclusively breastfed, that is, had not taken anything else other than breast milk in the 24-hour recall (Table 8). The highest proportion of exclusively breastfed children was in Abim district (96%). The recommended practice is that mothers should exclusively breastfeed children 0 – 6 months. The practice of exclusive breastfeeding amongst infants under 6 months should be sustained at high levels by continued education of mothers.

Table 8: Breastfeeding status of children 0-6 months in the 24-hour recall period by district

District	Breast milk alone	Breast milk and other foods	Bottled or milk in cup	Other foods only	No children below 6 months
	N (%)	N (%)	N (%)	N (%)	N (%)
Abim	24 (96.0)	0 (0.0)	1 (4.0)	0 (0.0)	0 (0.0)
Amudat	40 (80.0)	9 (18.0)	0 (0.0)	0 (0.0)	1 (2.0)
Kaabong	34 (77.3)	6 (13.6)	0 (0.0)	2 (4.5)	2 (4.5)
Kotido	33 (75.0)	10 (22.7)	0 (0.0)	0 (0.0)	1 (2.3)
Moroto	16 (72.7)	4 (18.2)	0 (0.0)	0 (0.0)	2 (9.1)
Nakapiripirit	22 (62.9)	10 (28.6)	0 (0.0)	0 (0.0)	3 (8.6)
Napak	17 (60.7)	9 (32.1)	0 (0.0)	0 (0.0)	2 (7.1)
Karamoja	**186 (75.0)**	**48 (19.4)**	1 (0.4)	**2 (0.8)**	**11 (4.4)**

Mothers of infants 0-6 months were asked how long after birth they had put the baby to the breast. The majority of the mothers had put their newborn babies to the breast within the first hour of birth, which is the recommended practice (Table 9). Health workers ought to continue encouraging mothers to sustain such good practices.

Table 9: Time taken to place baby to the breast after birth

District	Within first hour	After 1 hour	Did not breast feed at all	Don't know
	N (%)	N (%)	N (%)	N (%)
Abim	26 (65.0)	13 (32.5)	0 (0.0)	1 (2.5)
Amudat	59 (85.5)	9 (13.0)	0 (0.0)	1 (1.4)
Kaabong	31 (60.3)	17 (33.3)	2 (3.9)	1 (2.0)
Kotido	49 (89.1)	5 (9.1)	0 (0.0)	1 (1.8)
Moroto	27 (67.5)	6 (15.0)	0 (0.0)	7 (17.5)
Nakapiripirit	26 (74.3)	8 (22.9)	0 (0.0)	1 (2.9)
Napak	41 (93.2)	3 (6.8)	0 (0.0)	0 (0.0)
Karamoja	**259 (77.5)**	**61 (18.3)**	**2 (0.6)**	**12 (3.6)**

The majority of the children 6-23 months, (64.0%), had consumed less than the recommended 3 meals a day. Moroto and Napak children were more likely to have had 1 -2 meals compared to other districts (Table 10). Of the households which provided less than the recommended 3 meals per day to young children, the majority of the respondents (77.7%) identified the main reason as being a lack of food to give to the children. The second most frequent reason was that the child had taken in enough breast milk.

Table 10: Frequency of meals taken by child 6-23 months according district

District	Zero	1-2 meals	3-4 meals	Over 4 meals
Abim	7 (4.2)	113 (68.5)	42 (25.5)	3 (1.8)
Amudat	1 (0.5)	45 (22.0)	112 (54.5)	47 (22.9)
Kaabong	3 (1.4)	121 (57.3)	80 (37.9)	7 (3.3)
Kotido	4 (1.8)	142 (65.1)	67 (30.7)	5 (2.3)
Moroto	11 (5.9)	151 (80.3)	25 (13.3)	1 (0.5)
Nakapiripirit	3 (1.9)	104 (65.4)	48 (30.2)	4 (2.5)
Napak	5 (4.0)	104 (83.2)	15 (12.0)	1 (0.8)
Karamoja	**34 (2.7)**	**780 (61.4)**	**389 (30.6)**	**68 (5.4)**

3.2.2 *Diversity of complementary foods eaten by children 6-23 months*

Using 24-hour recall, individual dietary diversity score (IDDS) was assessed based on seven food groups. The analysis was done for children 6-23 months. Minimum dietary diversity has been defined as the proportion of children who received foods from at least 4 food groups the previous day[2]. The majority of the children in all districts had low or moderate IDDS (Figure 2). Poor complementary feeding practices are a challenge in Uganda and more so in Karamoja. Programs should improve on the promotion of adequate complementary feeding for infants and young children.

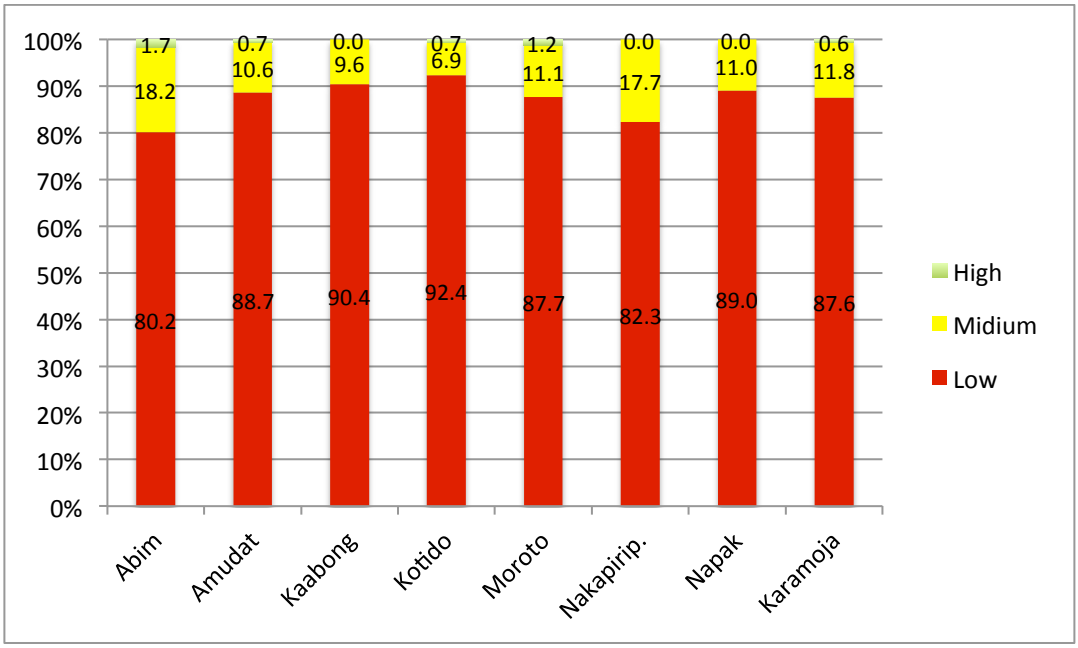


Figure 2: Individual dietary diversity score for children 6-23 months

3.3 Nutrition status of children and mothers

3.3.1 *Distribution of malnutrition in the Karamoja region*

The mean weight-for-height z-score (wasting status) for Karamoja was - 0.72 (SD = 1.33). There were 23 cases of oedema (0.8%). The population mean and distribution of GAM in Karamoja in most, if not all of the assessments, is always shifted to the left. The shift to the left depicts an increased problem of wasting in the population (Figure 3).

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

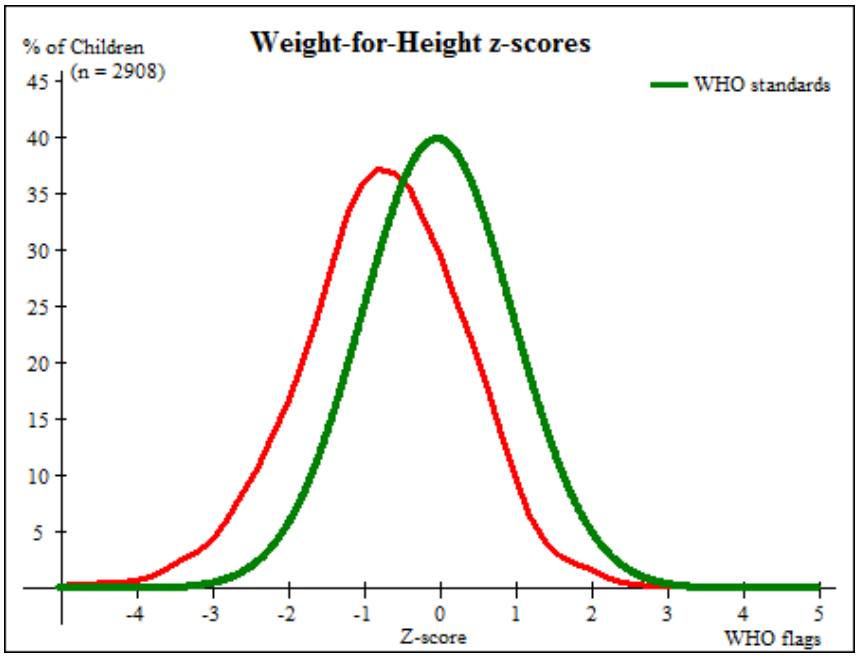


Figure 3: Distribution of weight-for-height z-scores for both sexes Karamoja region, May 2013

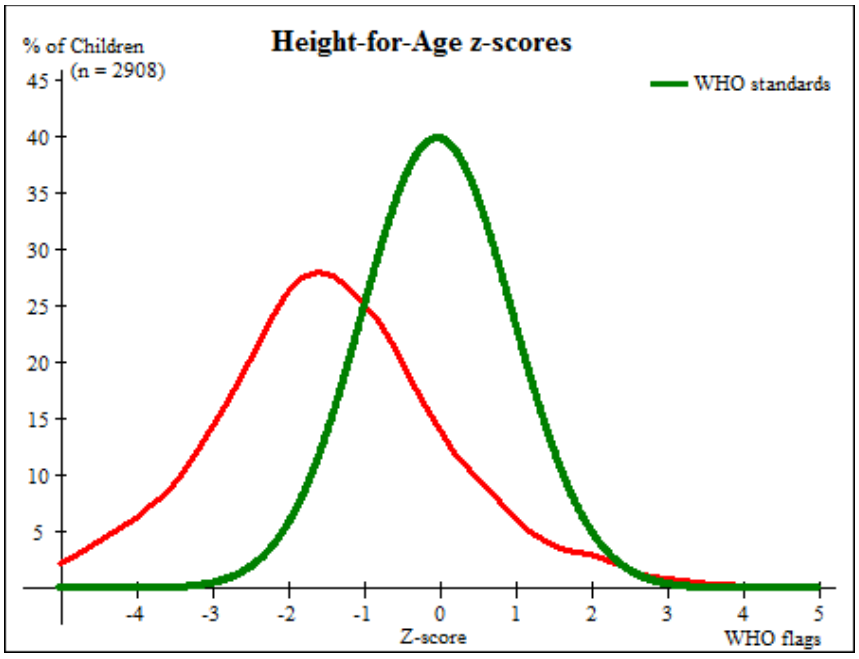


Figure 4: Distribution of height-for-age z-scores for both sexes for Karamoja region, May 2013

The mean height-for-age z-score was -1.42 (SD=1.64). The distribution is shifted to left depicting a high problem of stunting but the curve also depicts problems associated with taking age assessment or height measurements by the enumerators (Figure 4).

However, in this assessment it was largely due to errors in age estimation.

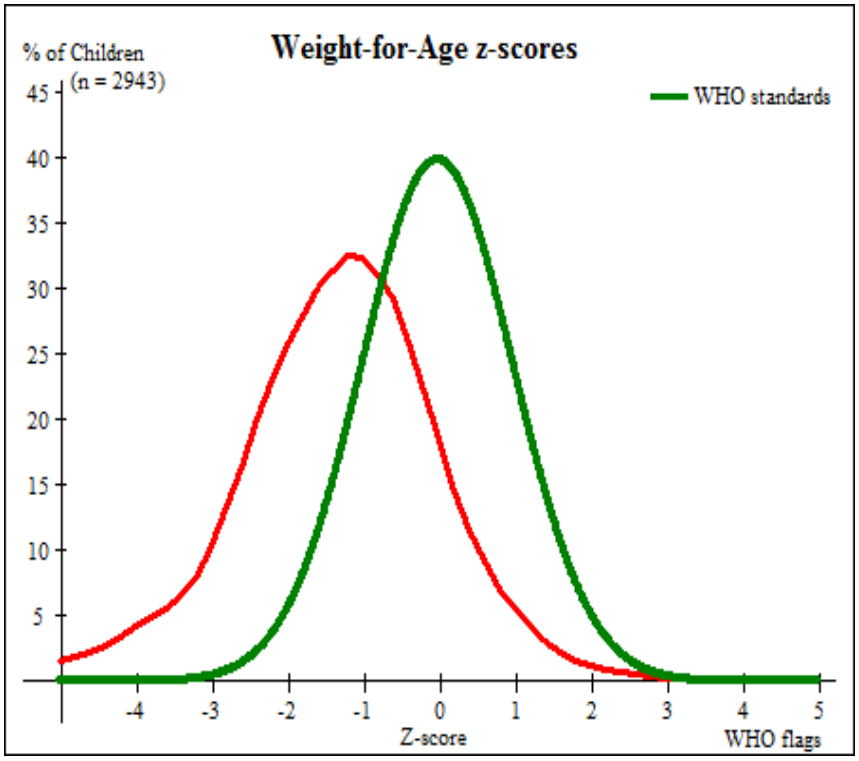


Figure 5: Distribution of weight-for-age z-scores for both sexes in the Karamoja region, May 2013

The mean weight-for-age z-score was -1.30 (SD=1.34). The distribution shift to the left calls for improved intervention to address underweight (Figure 5).

3.3.1 Prevalence of wasting, stunting and underweight

The prevalence of Global Acute Malnutrition (GAM) was 12.5% and the prevalence of Severe Acute Malnutrition (SAM) was 3.0% in pooled analyses. All results are based on weight-for-height Z-scores and/or oedema (Table 11). The prevalence of (GAM) was above 10% (alert level) in all the districts except Abim district. The prevalence of GAM in the Karamoja region was more than double the national average of 5% while stunting (34.9%) was comparable to the national average of 33%, and underweight (27.6%) was worse than the national average of 14% (UDHS 2011).

Table 11: Nutrition status of children aged 6-59 months according district (WHO flags)

District	GAM	SAM	Stunting	Underweight
	% (95% CI)	% (95%CI)	% (95%CI)	% (95%CI)
Abim (N=382)	6.3 (4.9-9.8)	0.8 (0.7-3.4)	28.8 (24.5-33.6)	21.9 (18.0-26.3)
Amudat (N=503)	10.1 (8.3-13.7)	1.4 (1.1-3.6)	24.6 (21.1-28.6)	19.9 (16.6-23.6)
Kaabong (N=463)	11.4 (8.9-14.7)	3.5 (2.3-5.8)	35.5 (31.3-40.0)	28.9 (25.0-33.2)
Kotido (N=427)	10.5 (8.4-14.3)	2.6 (1.8-5.1)	34.1 (29.8-38.7)	23.7 (19.9-27.9)
Moroto (N=475)	20.2 (16.8-24.1)	6.1 (4.3-8.6)	44.4 (40.0-48.9)	38.5 (34.3-42.9)
Nakapiripirit (N=342)	14.5 (11.5-19.1)	2.6 (2.0-6.0)	38.8 (33.8-44.1)	31.3 (26.6-36.4)
Napak (N=339)	13.3 (10.3-17.6)	2.9 (2.0-6.1)	40.1 (35.0-45.4)	29.0 (24.4-34.0)
Karamoja (N=2931)	**12.5 (11.6-14.0)**	**3.0 (2.8-4.1)**	**34.9 (33.2-36.7)**	**27.6 (26.0-29.2)**

WHO classifies prevalence of malnutrition as indicated in the diagrammatic illustration below:

	Acceptable (%)	Poor	Serious (%)	Critical (%)
Wasting	0-5%	5%-10%	10%-15%	>15%
Stunting	<20%	20%-30%	30%-40%	>40%
Underweight	<10%	10%-20%	20%-30%	>30%

Fitting the illustration with the survey findings Abim district had the best position while Moroto was in critical condition for all the indicators (Table 12).

Table 12: Diagrammatic view of malnutrition expressed according to the WHO classification

District	Wasting	Stunting	Underweight
Abim	Poor	Poor	Serious
Amudat	Serious	Poor	Poor
Kaabong	Serious	Serious	Serious
Kotido	Serious	Serious	Serious
Moroto	Critical	Critical	Critical
Nakapiripirit	Serious	Serious	Critical
Napak	Serious	Serious	Serious

3.3.2 Analysis of trends of GAM, 2009 - 2013

The trends of GAM in point estimates within districts and for the region since December 2009 shows some increases in prevalence (Figure 6). Except for Abim district, the GAM rate appears to be rising slowly over the years.

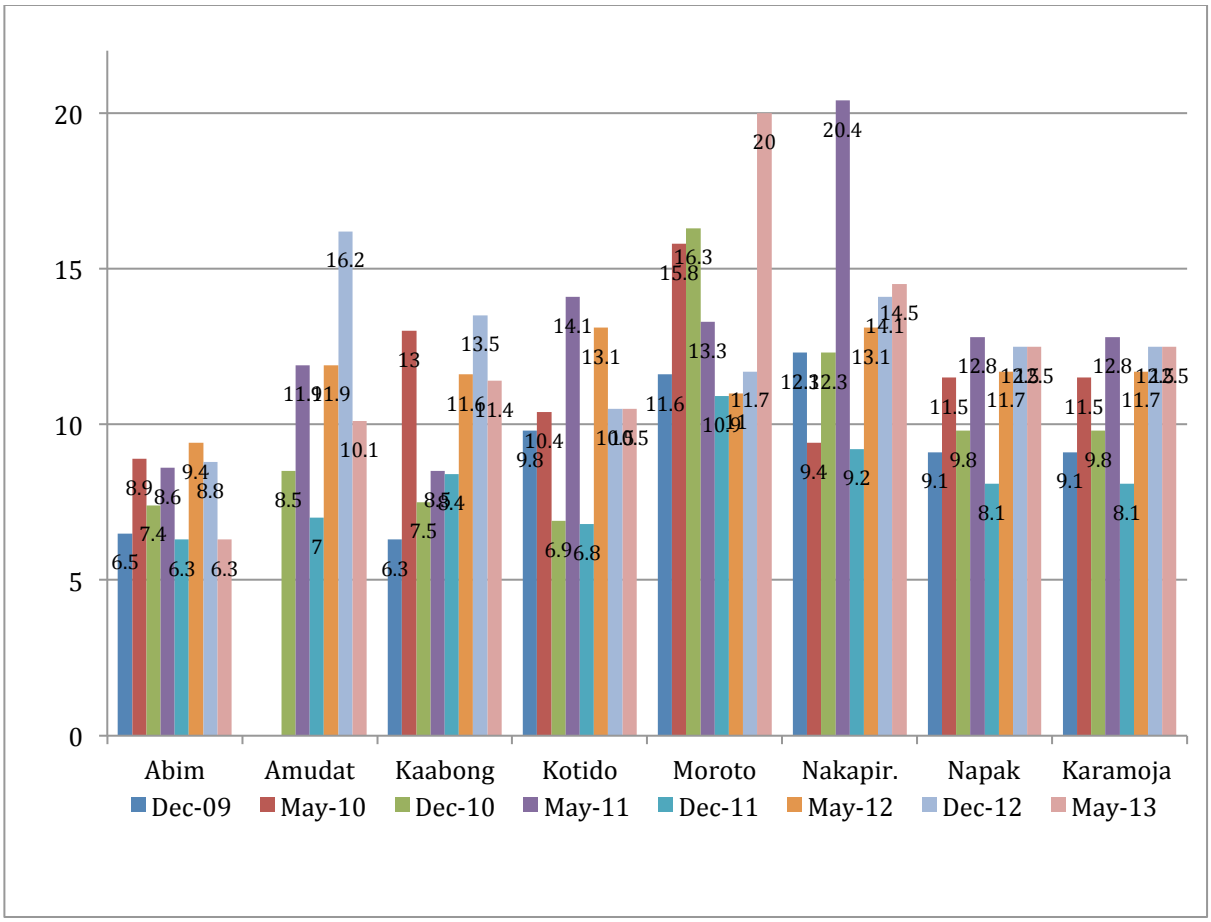


Figure 6: Trend of GAM prevalence in districts of Karamoja, December 2009 – May 2013

The linear forecast does not also depict a favourable projection. In case interventions and programming does not improve, malnutrition is likely to deteriorate with time (Figure 7).

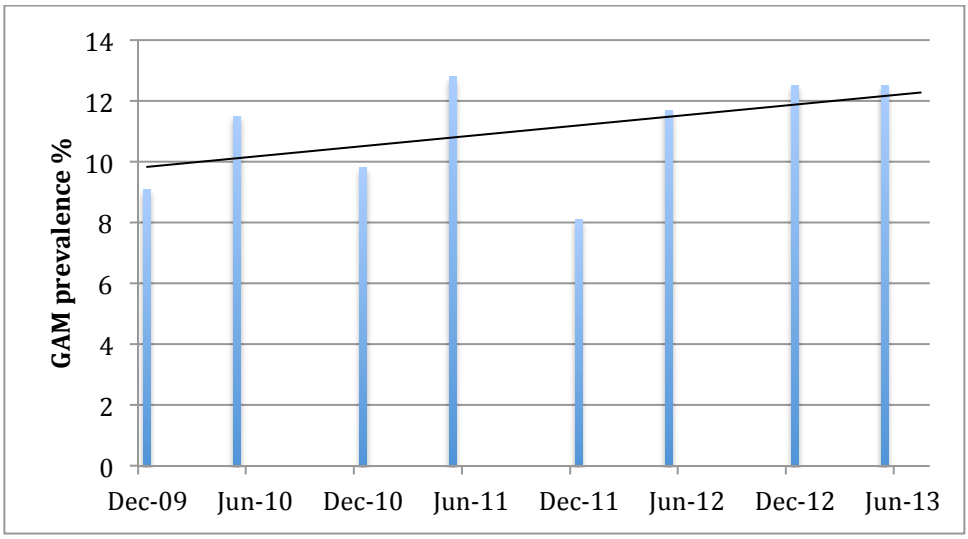


Figure 7: Linear forecast trend-line for GAM in Karamoja region, 2009 to 2013

3.3.3 Recruitment of children with GAM into feeding programs

Children with GAM were supposed to be admitted to particular feeding programs depending on severity of the condition. Ongoing feeding prgrams in Karamoja include: Outpatient Therapeutic Care (OTC), In-patient Therapeutic Care (ITC) and Supplementary Feeding Program (SPC). However out of the 259 children who were reported with GAM only 79 (30.5%) were reported enrolled in any of the feeding programs. Another 261 out of 340 (79.0%) children who were enrolled in any of the feeding programs were without GAM. However, the fact that many children reported enrolled on the feeding programs were found without GAM may suggest that they could have recovered. Which is positive. But, it may also imply that many ineligible children were being recruited to the program. It was also noted that no major differences were so far observed in the new cases admitted in OTC programs in the region in 2013 as compared to similar periods in 2012 (Figure 8). There is need for screening program to actively search for GAM cases and other children at high risk to be enrolled in feeding programs.

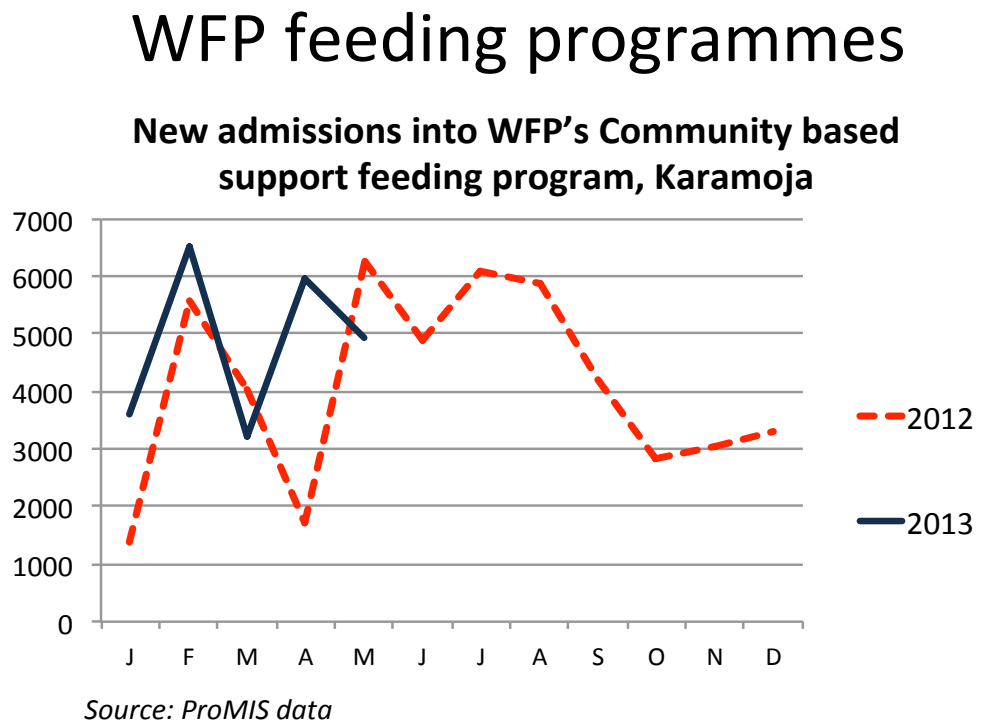


Figure 8: New admission into WFP's community based support feeding program in Karamoja

3.3.4 Prevalence of malnutrition according to sex

The sex difference in malnutrition was statistically significant for all indicators. For example stunting was 39.6% for boys compared to 30.3% for girls (Table 13); and underweight was 31.2% for boys compared to 24.0% for girls in pooled analyses (results not presented in table). The differences in under nutrition between male and female children are common findings in studies done in sub-Saharan Africa. Unfortunately there are no programmatic actions, which have been instituted to address the sex differences and even the causes of such differences in the Ugandan setup. Since sex differences in malnutrition seem to disappear in higher socioeconomic households[3], there is therefore need to empower households economically so that nutrition insults to boys are minimized.

Table 13: Sex differences in GAM and stunting according to district

District	GAM		Stunting	
	Male	Female	Male	Female
	% (95% CI)	% (95%CI)	% (95% CI)	% (95% CI)
Abim	9.2 (5.9-14.1)	4.4 (2.6-8.9)	35.6 (29.2-42.5)	21.7 (16.4-28.2)
Amudat	11.3 (7.9-15.8)	10.2 (7.1-14.5)	28.5 (23.2-34.4)	20.9 (16.4-26.4)
Kaabong	13.8 (9.9-18.9)	9.2 (6.2-13.6)	44.8 (38.5-51.4)	26.6 (21.3-32.6)
Kotido	12.3 (8.7-17.2)	9.5 (6.2-14.4)	34.2 (28.3-40.6)	34.0 (27.8-40.8)
Moroto	26.3 (21-32.5)	14.7 (10.9-19.7)	49.8 (43.3-56.3)	39.5 (33.6-45.7)
Nakapiripirit	14.7 (10.2-20.8)	15.1 (10.5-21.2)	44.0 (36.8-51.6)	33.7 (27.1-41.1)
Napak	17.3 (12.3-23.7)	9.9 (6.3-15.3)	42.9 (35.6-50.4)	37.3 (30.3-44.8)
Karamoja	**15.0 (13.2-16.9)**	**10.6 (9.1-12.3)**	**39.6 (37.1-42.2)**	**30.3 (28.0-32.7)**

3.3.5 Prevalence of malnutrition according to age

The prevalence of GAM in Karamoja data peaked at 6–17 months while that of stunting and underweight at 18-29 months (Figure 9). Similar trends have been observed before for wasting and stunting in Uganda. These findings depict the need to improve complementary feeding practices in order to reduce GAM prevalence in the second year of life which translate to stunting in the third year of life due to the chronic malnutrition

[3] Boys are more stunted than girls in sub-Saharan Africa: a meta-analysis of 16 demographic and health surveys. Wamani H, et al

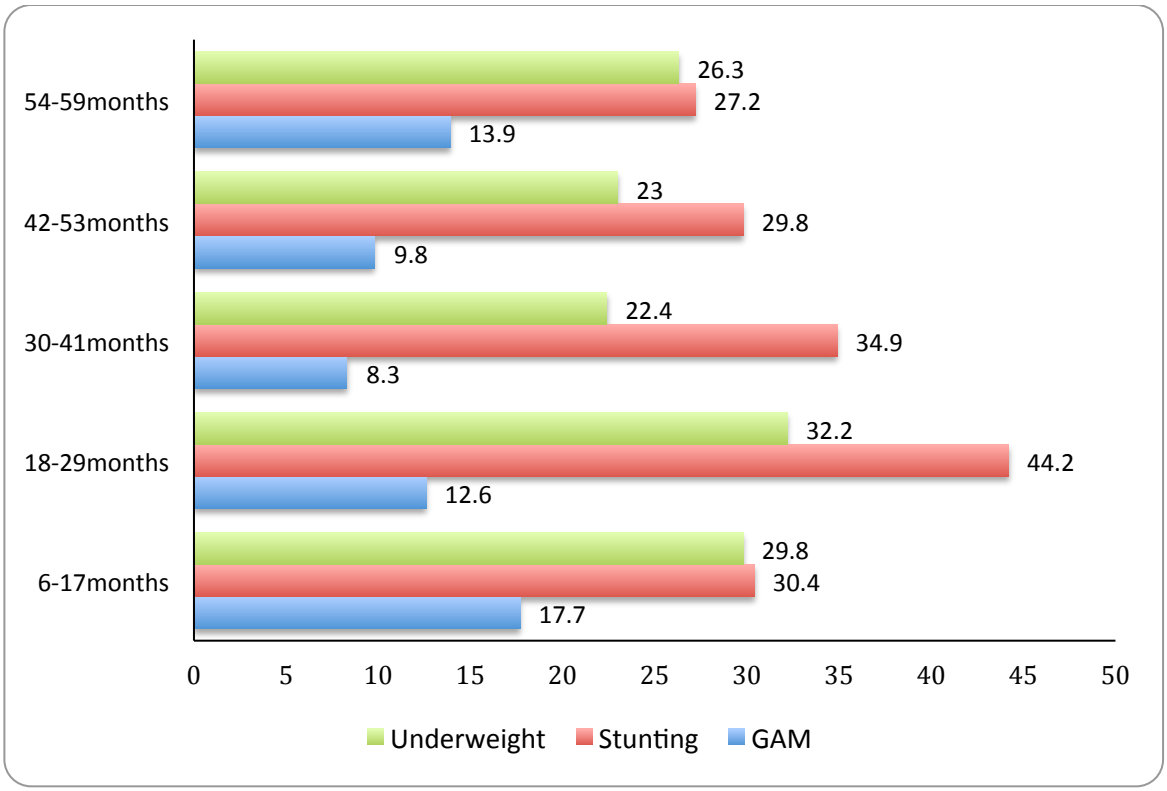


Figure 9: Prevalence of GAM, stunting and underweight according to age categories in Karamoja

3.3.6 Prevalence of malnutrition according to socioeconomic status in Karamoja

Socioeconomically better off households were at less risk of malnutrition compared to the most disadvantaged (Figure 310).

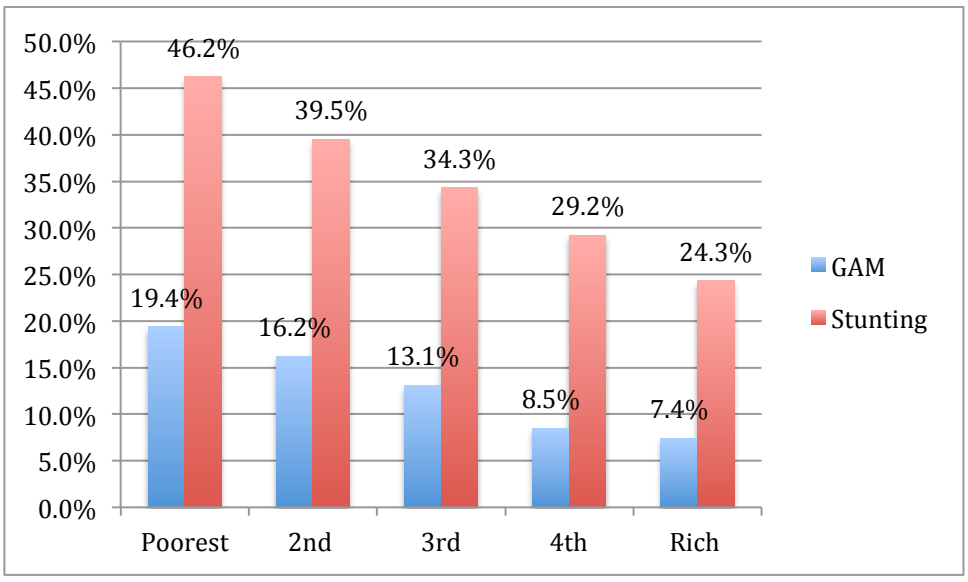


Figure 10: Prevalence of GAM and stunting according to household socioeconomic status in Karamoja

3.3.7 Prevalence of malnutrition according to household food security status in Karamoja

Households with acceptable food security status were less likely to have wasted and stunted children compared to those with poor food security status (Figure 3.11).

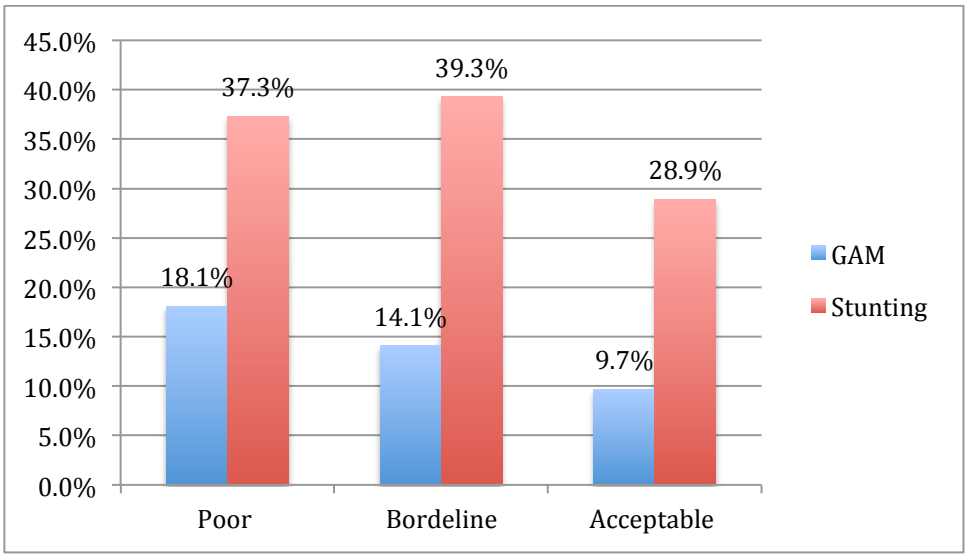


Figure 11: Prevalence of GAM and stunting according household food security in Karamoja

3.3.8 Prevalence of malnutrition according to mothers education status in Karamoja

Mothers' education was associated with less risk of malnutrition more especially GAM. Mothers who had attained tertiary education level were found to have no wasted children (Figure 3.12).

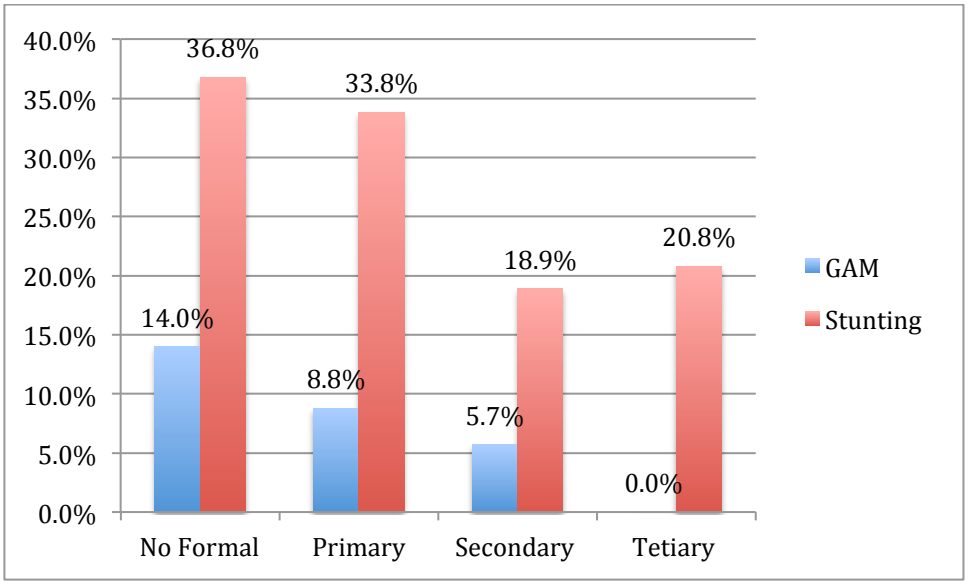


Figure 12: Prevalence of GAM and stunting according to mothers education status in Karamoja

3.3.9 Prevalence of malnutrition according to nutrition and health practices

Children who were reported to have slept under the bed net were less likely to have been malnourished (Figure 3.13). Children who did not use a bednet had two-fold risk of having GAM.

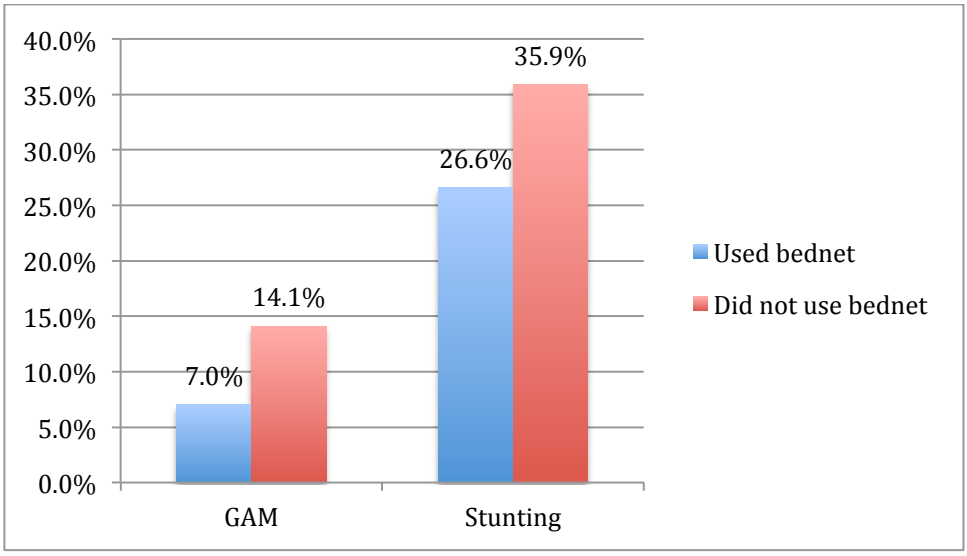


Figure 13: Prevalence of GAM and stunting according bed net use in Karamoja

Additionally, children with high dietary diversity score (IDDS) had less risk of GAM compared to those with low IDDS (Figure 3.14). Promotion or more awareness about the importance of a diet that provides diverse foods or nutrients to children should be made.

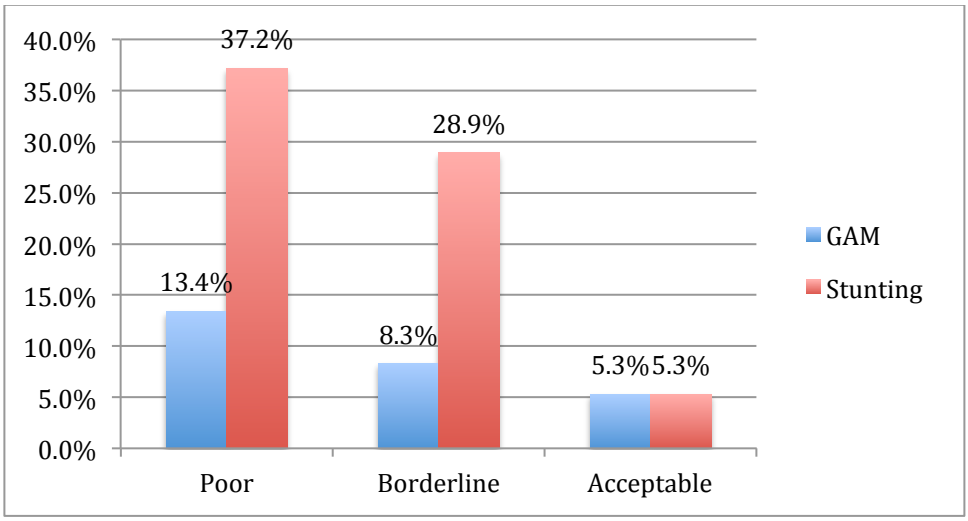


Figure 14: Prevalence of GAM and stunting according IDDS in Karamoja

Fetching drinking water from open well/dam was associated with high prevalence of GAM (Figure 3.15). Whereas, the majority of the households were using boreholes (water and sanition section – below), there is still need to increase safe water sources since 12.1% of the households that accessed water from open wells or dams had a higher risk of GAM.

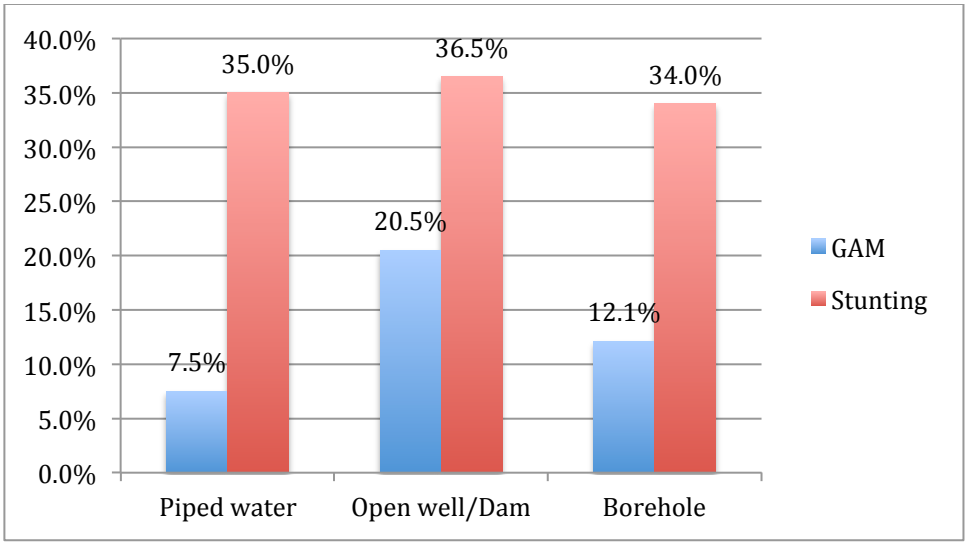


Figure 15: Prevalence of GAM and stunting according drinking water source in Karamoja

3.3.10 Prevalence of malnutrition according to morbidity

Children with diarrhoea, fever and ARI had prevalence above average for GAM (regional average was 12.5%) and above average for stunting (34.6%) (Figure 16). Children with diarrhoea particularly had high GAM prevalence because of the high causal relationship.

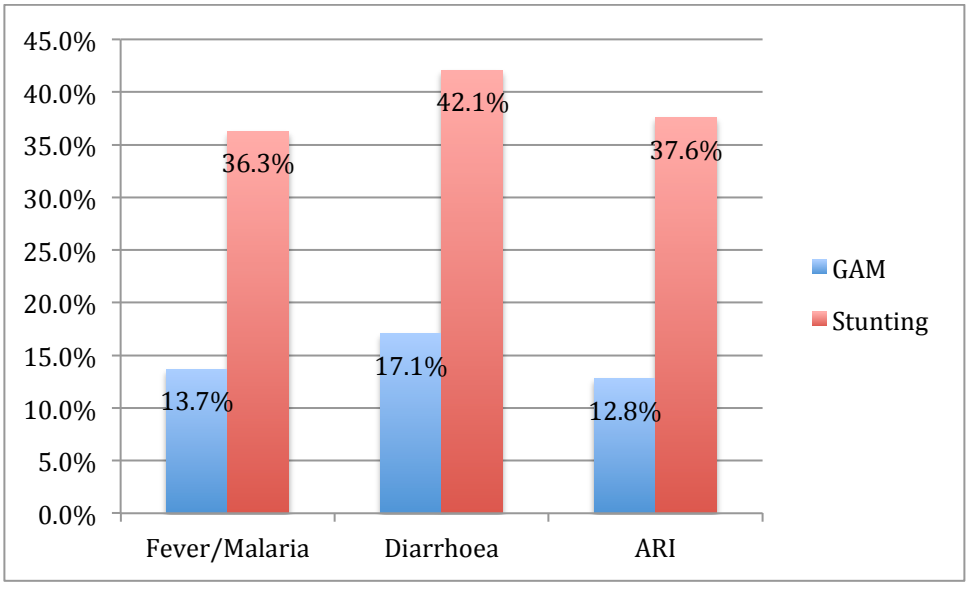


Figure 16: Prevalence of GAM and stunting according to history of fever, diarrhea and ARI

3.3.11 Wasting assessed by mid-upper arm circumference (MUAC) in children

The Mid Upper Arm Circumference (MUAC) anthropometric assessments in children 6-59 months depicted a severe wasting status of 2.5% and moderate wasting of 8.1% among aged children 6-59 in Karamoja (Table 14). The proportion of severely and moderately wasted children was highest in Nakapiripiri (20.3%) followed by Moroto (14.3%), and was lowest in Amudat (3.0%).

Table 14: Wasting status of children 6-59 months assessed with MUAC by district

District	MUAC CATEGORISED			
	<11.5	11.5-12.5	12.6-13.5	>13.5
	N (%)	N (%)	N (%)	N (%)
Abim	4 (1.0)	22 (5.7)	76 (19.7)	283 (73.5)
Amudat	2 (0.4)	13 (2.6)	71 (14.1)	416 (82.9)
Kaabong	13 (2.8)	39 (8.4)	146 (31.5)	265 (57.2)
Kotido	7 (1.6)	28 (6.5)	107 (25.0)	286 (66.8)
Moroto	16 (3.3)	54 (11.0)	160 (32.5)	262 (53.3)
Nakapiripirit	20 (5.7)	51 (14.6)	95 (27.2)	183 (52.4)
Napak	10 (2.9)	32 (9.4)	107 (31.6)	190 (56.0)
Karamoja	**72 (2.4)**	**239 (8.1)**	**762 (25.8)**	**1885 (63.7)**

3.3.12 Wasting status of mothers assessed using MUAC and BMI

Mid-upper arm circumference (MUAC) was assessed for mothers 15-49 years of age. Using a cut-off of less than 22.5 cm, 12.1% of the women were classified as malnourished (Table 15) an increase from 9.1% observed in the region in December 2012. Kaabong district (21.8%) had the highest proportion of women classified as malnourished while Abim district (4.2%) recorded the least proportion malnourished women of the districts.

Table 15: Wasting status of mothers/caregivers 15-49 years using MUAC according to district

District	Mothers MUAC CATEGORISED	
	<22.5	>22.5
	N (%)	N (%)
Abim (312)	13 (4.2)	299 (95.8)
Amudat (531)	43 (8.1)	488 (91.9)
Kaabong (458)	100 (21.8)	358 (78.2)
Kotido (436)	30 (6.9)	406 (93.1)
Moroto (379)	52 (13.7)	327 (86.3)
Nakapiripirit (345)	48 (13.9)	297 (86.1)
Napak (282)	45 (16.0)	237 (84.0)
Karamoja (2743)	**331 (12.1)**	**2412 (87.9)**

Additionally mothers were weighed and height taken. The BMI indicated that 23.7% of the mothers were wasted, while 4.8% were severely wasted. Abim (7.0%) and Nakapiripirit (5.8%) had the highest proportion of overweight mothers (Table 16). In December 2012, a lower proportion (19.8%) of the mothers were wasted in Karamoja region.

Table 16: BMI status of mothers/caregivers 15-49 years according to district

District	Severely wasted (BMI <16.5)	Wasted (BMI<18.5)	Normal (BMI 18.5-25)	Overweight (BMI 25.1-30)	Obese (BMI>30)
	%	%	%	%	%
Abim (N=272)	1.5	13.2	78.3	7.0	0.0
Amudat (N=440)	3.0	26.8	65.5	4.1	0.7
Kaabong (N=384)	6.0	24.0	67.2	2.9	0.0
Kotido (N=364)	4.1	19.2	75.0	1.6	0.0
Moroto (N=268)	6.3	26.5	63.1	3.4	0.7
Nakapiripirit (N=310)	5.2	26.1	61.9	5.8	1.0
Napak (N=241)	8.7	29.9	59.3	1.7	0.4
Karamoja (N=2279)	**4.8**	**23.7**	**67.4**	**3.7**	**0.4**

3.4 Immunization, vitamin A supplementation and de-worming

3.4.1 Measles coverage

Two thirds (65.2%) of children aged 9-23 months had received a measles vaccination as identified with a marked health card (Table 17). A noteworthy percentage of children (8.6%) were found not having been immunized as evidenced by a card. Amudat, Kaabong and Nakapiripirit revealed more than 10% of the children who were not immunized but in ownership of cards. However, all districts had immunization coverage above 85% when mothers' reports (even those without cards) were considered. This level of coverage should be sustained and mothers should be encouraged to pick health cards from health facilities and keep them well or the health system should ensure that cards are distributed to the new born.

Table 17: Measles immunization coverage among children 9-23 months by district

District	Yes with card	Yes without card	No with card	No without card
	N (%)	N (%)	N (%)	N (%)
Abim (142)	71 (50.0)	51 (35.9)	14 (9.9)	6 (4.2)
Amudat (172)	70 (40.7)	73 (42.4)	23 (13.4)	6 (3.5)
Kaabong (171)	88 (51.5)	54 (31.6)	20 (11.7)	9 (5.3)
Kotido (195)	173 (88.7)	10 (5.1)	8 (4.1)	4 (2.1)
Moroto (162)	134 (82.7)	24 (14.8)	2 (1.2)	2 (1.2)
Nakapiripirit (134)	93 (69.4)	17 (12.7)	22 (16.4)	2 (1.5)
Napak (106)	76(71.7)	23 (21.7)	4(3.8)	3(2.8)
Karamoja (1082)	**705 (65.2)**	**252 (23.3)**	**93 (8.6)**	**32 (3.0)**

3.4.2 Vitamin A supplementation

Vitamin A supplementation during child days normally done every six months had been received by 95.9% of the children aged 6-59 months; verified either by a health card or caretaker's recall. Coverage levels in the districts were highest in Kotido, followed by Moroto and were lowest in Amudat (Table 18). All the assessed districts in the Karamoja region met the national target of 80% or more for vitamin A when mothers' reports were considered.

Table 18: Vitamin A coverage among children 6-59 months by district

District	Yes with card	Yes without card	No with card	No without card
	N (%)	N (%)	N (%)	N (%)
Abim (386)	192 (49.7)	178 (46.1)	14 (3.6)	2 (0.5)
Amudat (533)	197 (37.0)	295 (55.3)	30 (5.6)	11 (2.1)
Kaabong (442)	181 (41.0)	237 (53.6)	19 (4.3)	5 (1.1)
Kotido (429)	354 (82.5)	55 (12.8)	19 (4.4)	1 (0.2)
Moroto (500)	369 (73.8)	127 (25.4)	3 (0.6)	1 (0.2)
Nakapiripirit (345)	225 (65.2)	107 (31.0)	12 (3.5)	1 (0.3)
Napak (350)	234 (66.9)	112 (32.0)	3 (0.9)	1 (0.3)
Karamoja (2985)	**1752 (58.7)**	**1111 (37.2)**	**100 (3.4)**	**22 (0.7)**

3.4.3 DPT 3 coverage

Overall, DPT3 immunization had been received by 96.5% of children aged 9-23 months, verified either by health card or the caretaker's recall (Table 19).

Table 19: DPT3 coverage among children 9-23 months by district

District	Yes with card	Yes without card	No with card	No without card
	N (%)	N (%)	N (%)	N (%)
Abim (143)	83 (58.0)	56 (39.2)	4 (2.8)	0 (0.0)
Amudat (172)	77 (44.8)	81 (47.1)	13 (7.6)	1 (0.6)
Kaabong (186)	112 (60.2)	66 (35.5)	6 (3.2)	2 (1.1)
Kotido (196)	181 (92.3)	10 (5.1)	4 (2.0)	1 (0.5)
Moroto (163)	136 (83.4)	25 (15.3)	2 (1.2)	0 (0.0)
Nakapiripirit (134)	112 (83.6)	19 (14.2)	3 (2.2)	0 (0.0)
Napak (106)	79 (74.5)	25 (23.6)	0 (0.0)	2 (1.9)
Karamoja (1100)	**780 (70.9)**	**282 (25.6)**	**32 (2.9)**	**6 (0.5)**

3.4.4 De-worming coverage

De-worming in Karamoja data was 96.4% among children 12– 59 months, verified by either a health card or caregiver's recall (Table 20). Routine deworming is a public health intervention with nutrition benefits and should be sustained at high level.

Table 20: Deworming coverage among children 12-59 months according district

District	Yes with card	Yes without card	No with card	No without card
	N (%)	N (%)	N (%)	N (%)
Abim (334)	155 (46.4)	171 (51.2)	7 (2.1)	1 (0.3)
Amudat (467)	168 (36.0)	275 (58.9)	15 (3.2)	9 (1.9)
Kaabong (390)	152 (39.0)	220 (56.4)	15 (3.8)	3 (0.8)
Kotido (366)	295 (80.6)	56 (15.3)	12 (3.3)	3 (0.8)
Moroto (437)	308 (70.5)	109 (24.9)	1 (0.2)	19 (4.3)
Nakapiripirit (271)	168 (62.0)	94 (34.7)	8 (3.0)	1 (0.4)
Napak (304)	200 (65.8)	104 (34.2)	0 (0.0)	0 (0.0)
Karamoaja (2569)	**1446 (56.3)**	**1029 (40.1)**	**58 (2.3)**	**36 (1.4)**

3.5 Prevalence of common childhood diseases

3.5.1 Morbidity due to common childhood illness among children under 5 years

Mothers were asked if the child had been ill during the two weeks prior to the survey. The survey specifically assessed for fever/malaria, measles, diarrhoea, ARI/cough, skin diseases, eye disease, other diseases or no illness at all.

In Karamoja, the most prevalent illnesses affecting children were malaria/fever (55.9%) followed by Acute Respiratory Infection (ARI) (40.8%) and diarrhea (35.5%) (Table 21). The prevalence rates were similar to findings of December 2012 in the same region. The current level of morbidity was high. There is therefore need for district health office and partners to devise ways of curbing incidence of diseases.

Table 21: Two-week prevalence of common childhood illness among children under 5

District	Malaria/fever	Measles	Diarrhoea	ARI	Skin infection	Eye infection	Other illness	No illness
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Abim	259 (62.6)	1 (0.2)	100 (24.2)	174 (42.0)	23 (5.6)	11 (2.7)	9 (2.2)	66 (15.9)
Amudat	278 (47.1)	1 (0.2)	93 (15.8)	188 (31.9)	19 (3.2)	43 (7.3)	40 (6.8)	214 (36.3)
Kaabong	331 (66.2)	5 (1.0)	210 (42.0)	256 (52.2)	95 (19.0)	74 (14.8)	5 (1.0)	53 (10.6)
Kotido	204 (42.0)	1 (0.2)	201 (41.4)	185 (38.1)	32 (6.6)	51 (10.5)	9 (1.90	138 (28.4)
Moroto	229 (44.0)	8 (1.5)	201 (38.7)	201 (38.7)	37 (7.1)	138 (26.5)	78 (15.0)	106 (20.4)
Nakapiripirit	236 (64.0)	3 (0.8)	170 (46.1)	191 (51.8)	23 (6.2)	49 (13.3)	3 (0.8)	32 (8.7)
Napak	219 (57.6)	0 (0.0)	120 (31.6)	136 (35.8)	45 (11.8)	48 (12.6)	2 (0.5)	79 (20.8)
Karamoja	**1756 (54.8)**	**19 (0.6)**	**1095 (34.3)**	**1336 (41.5)**	**274 (8.5)**	**414 (12.5)**	**146 (4.0)**	**688 (20.2)**

3.5.2 Bed net coverage

Respondents were asked whether children had slept under mosquito nets the day before the survey. Most of the children (78.7%) did not sleep under mosquito net the night before the survey. Moroto district (94.3%) had the highest number of children who had not sleept under a mosquito net (Table 22). The situation of bed net use in Karamoja has deteriorated. For instance in December 2010, 86.1% of the children were reported to have had slept under a bed net in Karamoja region. It can also be noted that fever was very rampant in the Karamoja region and was the number one killer among children. Relevant authorities need to ensure that an adequate number of mosquito nets are urgently delivered in order to have over 85% of the children sleep under nets.

Table 22: Bed net use among children 0-59 months according to district

District	Didn't use bed net	Used bed net
	N (%)	N (%)
Abim	187 (45.1)	228 (54.9)
Amudat	465 (78.8)	125 (21.2)
Kaabong	429 (84.4)	77 (15.2)
Kotido	341 (69.7)	148 (30.3)
Moroto	500 (94.9)	27 (5.1)
Nakapiripirit	269 (72.1)	104 (27.9)
Napak	274 (70.8)	113 (29.2)
Karamoja	**2465 (75.0)**	**822 (25.0)**

3.6 Water and Sanitation

3.6.1 Sources of drinking water

The majority of the population in districts of Karamoja accessed drinking water from boreholes. The proportion of people who used boreholes was lowest in Amudat (69%) and highest in Abim (93%) (Figure 17).

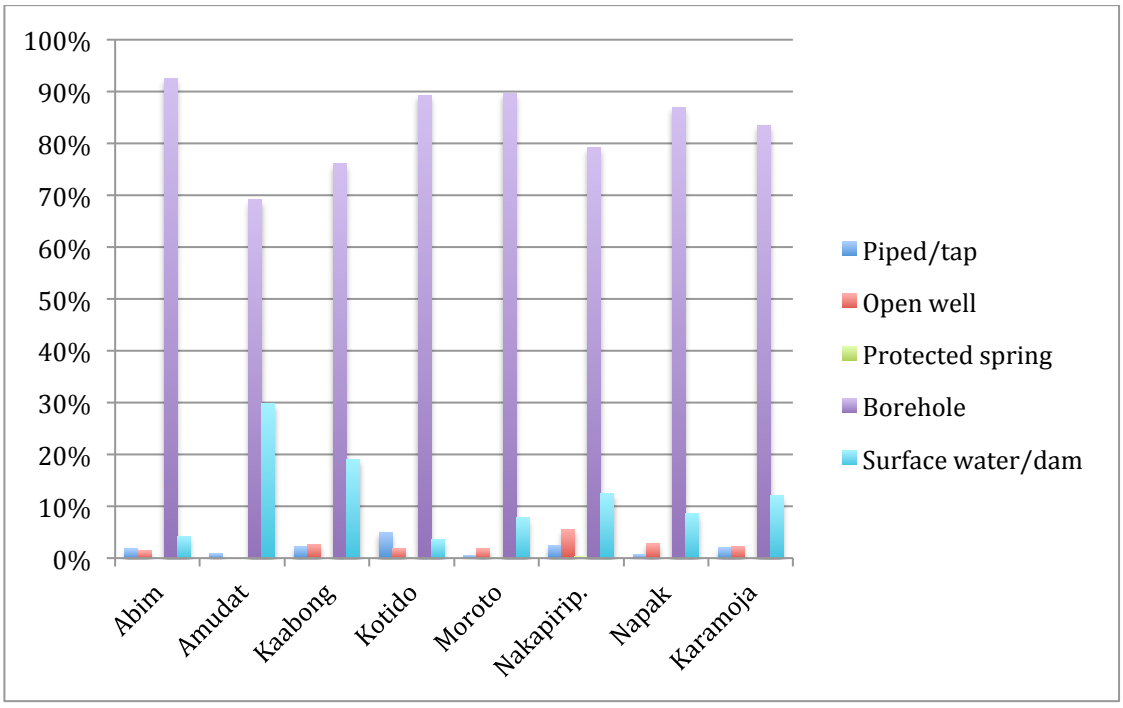


Figure 17: Sources of drinking water according to district

3.6.2 Latrine coverage

Up to 73.2% of the households in the Karamoja region lacked latrines (Table 23). Compared to previous findings, there was no significant improvement. Lack of latrine usage is a precursor for faecal-oral diseases such as cholera, hepatitis and dysentery with serious health implications. Implementation research is needed to explore how quickly households can be supported to construct and used latrines for faecal disposal.

Table 23: Latrine usage by district

District (N)	Private latrine	Community latrine	Bush / open air	Neighbours
Abim (467)	46.9%	6.2%	32.5%	14.3%
Amudat (431)	3.9%	0.7%	93.5%	1.4%
Kaabong (394)	32.5%	2.3%	57.9%	6.9%
Kotido (495)	10.7%	3.4%	83.2%	2.2%
Moroto (462)	3.2%	8.4%	87.7%	0.6%
Nakapirip. (479)	14.4%	1.9%	78.1%	5.4%
Napak (410)	15.9%	2.2%	78.8%	2.7%
Karamoja (3138)	18.0%	3.7%	73.2%	4.8%

3. 7 Mortality

The retrospective 90-day Crude Mortality Rate (CMR) and Under-five Mortality Rates (U5MR) were normal except for Napak district where under-5 mortality was at very serious situation (Table 24). The U5MR in Napak deserves urgent investigation. Additionally due to the current ongoing drought and media reports, which suggested increased death in the region after our data collection, it is important that mortality trends are monitored closely in the entire region.

Table 24: Retrospective mortality status according to district in Karamoja region

District	CMR	U5MR	Standard to interprete findings		
Abim	0.2	0.6	*CMR*	*U5MR*	
Amudat	0.7	0.7	*<0.5/10,000/day*	*<1.0/10,000/day*	*Normal for stable situations in developing countries.*
Kaabong	0.7	0.6	*>1.0/10,000/day*	*<2.0/10,000/day*	*Very serious situation. Should investigate.*
Kotido	0.5	0.7	*>2.0/10,000/day*	*<4.0/10,000/day*	*Emergency out of control. Demand immediate actions.*
Moroto	0.3	0.2			
Nakapirip.	0.4	0.5			
Napak	0.7	1.7			
Karamoja	**0.6**	**0.7**			

3.7.1 Causes of mortality in children under 5 years

Caretakers of children were asked if a child had died in the past three months. They were also asked to mention the cause of death of the child. Table 25 shows that most of the children (66.7%) had died of fever. The second most serious cause of death was diarrhoea (13.3%).

Table 25: Cause of mortality amongst children under 5 in Karamoja region

Cause	N	(%)
Diarrhoea	2	13.3
Fever	10	66.7
L.R.T.I*	1	6.7
Malnutrition	1	6.7
Other	1	6.7

*Lower respiratory tract infection

3.7.2 Causes of mortality in adults

A few adults who were reported to have died in the past three months had also mostly died due to fever (4 people) and other causes (8 people), (Table 26).

Table 26: Causes of mortality in adults in Karamoja region

Cause	N	(%)
Fever	4	25
L.R.T.I*	2	12.5
Accident	2	12.5
Other	8	50

*Lower respiratory tract infection

3.8 Food Security, coping strategies and economic vulnerability

3.8.1 Wealth profile of households

Household socioeconomic status is one of the factors, which aggravate hunger and food insecurity among households. Socioeconomic status was determined from an index generated using principal components/factor analysis from variables on ownership of valuable household goods such as bed, chairs, mattress, hoe, oxplough, radio, bicycle,

phone, motocycle and car. The first principal component was ranked and then categorized into quintiles with the 1st or lowest quintile representing the poorest and the 5th or highest quintile representing the rich. Abim district had the highest proportion of socioeconomically well off households (48.8%), (Table 27).

Table 27: Distribution of household socioeconomic status according to districts

District (N)	Quintile 1 (Lowest)	Quintile 2	Quintile 3	Quintile 4	Quintile 5 (highest)
	N (%)	N (%)	N (%)	N (%)	N (%)
Abim (422)	12 (2.8)	71 (16.8)	21 (5.0)	112 (26.5)	206 (48.8)
Amudat (387)	9 (2.3)	158 (40.8)	18 (4.7)	98 (25.3)	104 (26.9)
Kaabong (511)	25 (4.9)	296 (57.9)	97 (19.0)	44 (8.6)	49 (9.6)
Kotido (535)	7 (1.3)	86 (16.1)	162 (30.3)	184 (34.4)	96 (17.9)
Moroto (503)	65 (12.9)	304 (60.4)	44 (8.7)	39 (7.8)	51 (10.1)
Nakapiripirit (522)	32 (6.1)	221 (42.3)	79 (15.1)	81 (15.5)	109 (20.9)
Napak (423)	24 (5.7)	240 (56.7)	32 (7.6)	83 (19.6)	44 (10.4)
Karamoja (3303)	**174 (5.3)**	**1376 (41.7)**	**453 (13.7)**	**641 (19.4)**	**659 (20.0)**

3.8.2 Household asset ownership

The hoe (91.6%), ox-plough (19.4%), and cellphone (16.7%) were the most prevalent assets in Karamoja region (Table 28). This situation depicts the impoverishment of households in Karamoja and calls for more concerted efforts by government and partners to improve the socioeconomic status and general standard of living in the region.

Table 28: Household asset ownership by district

District	Radio	Cellphone	Bicycle	Motocycle	Hoe	OxPlough
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Abim	115 (26.4)	137 (30.9)	122 (28.0)	10 (2.4)	465 (93.0)	75 (17.4)
Amudat	74 (18.4)	189 (44.6)	27 (6.8)	17 (4.4)	449 (96.4)	6 (1.5)
Kaabong	22 (4.3)	33 (6.4)	15 (2.9)	5 (1.0)	474 (92.8)	127 (24.8)
Kotido	44 (8.2)	38 (7.1)	59 (11.0)	4 (0.7)	505 (94.4)	210 (39.3)
Moroto	34 (6.8)	56 (11.1)	16 (3.2)	3 (0.6)	417 (82.9)	45 (8.9)
Nakapiripirit	85 (16.3)	79 (15.1)	59 (11.3)	8 (1.5)	468 (89.5)	131 (25.0)
Napak	33 (7.8)	31 (7.3)	64 (15.1)	2 (0.5)	394 (93.1)	49 (11.6)
Karamoja	**407 (1 2.2)**	**563 (16.7)**	**362 (10.9)**	**49 (1.5)**	**3172 (91.6)**	**643 (19.4)**

3.8.3 Main income sources

A third of the households in the Karamoja region (33.0%) were involved in petty trade activities such as sale of firewood and brewing liquor (Figure 18). Food crop production (15.9%) was second to petty trading. Agricultural wage labour and self-employment were also main sources of income but lower in the pecking order than those mentioned above.

Since food crop production was a major source of income, there is need for continued support to the agricultural sector. Stakeholders should also create more awareness in the region about climate change as an avenue of curtailing the fast disappearing tree cover being used for charcoal. Through anectdotal information a problem of massive felling of natural trees was reported more especially in Kaabong district.

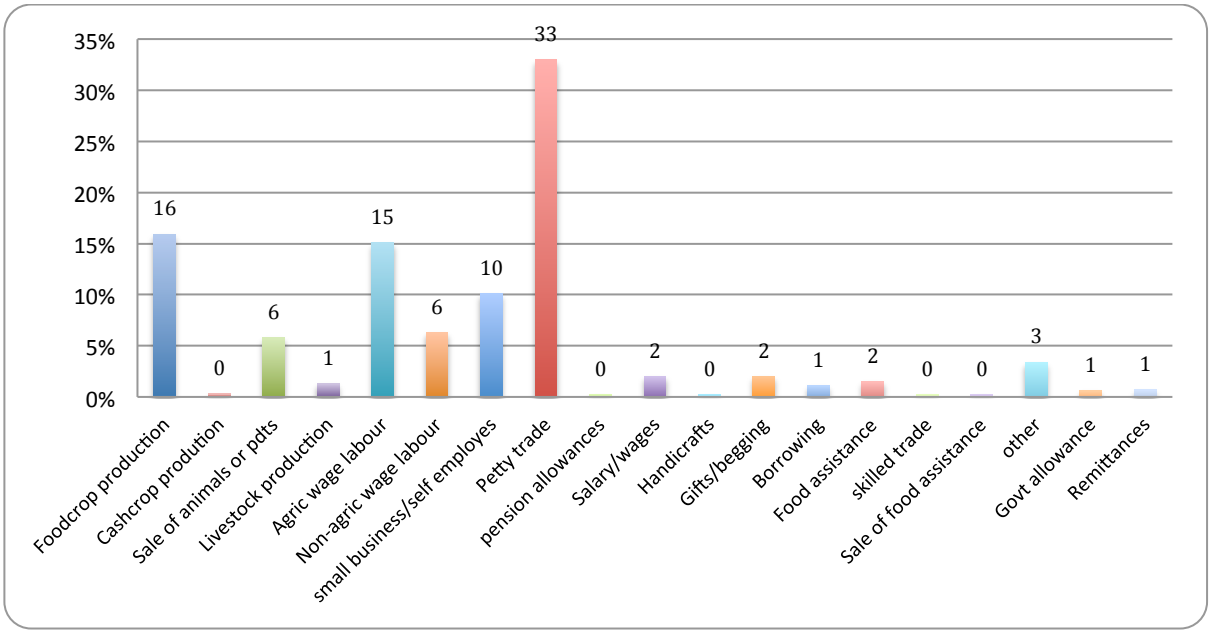


Figure 18: Main income sources in Karamoja

Abim district (37.9%) had the highest proportion of households reporting food crop production as the main income source, while Moroto (4.4%) was the lowest in this variable (data not presented). Moroto district (57.3%) ranked highest as far as petty trading i.e. selling firewood and local brew, followed by Kotido (43.1%) while Amudat (12.0%) and Abim (13.1%) were not so much involved in the practice (data not presented).

3.8.4 Household food production

For the year 2012, up to (24.3%) of the households in Karamoja never cultivated any crop while over 80.0% the households in Abim, Amudat Kaabong cultivated. About 70% of the households in other districts also cultivated some crops.

Of the households that cultivated some crops the majority 74.5% planted sorghum (constituting 56.4% of all households including those that never cultivated) while 48.5% planted maize, 31.8% beans, 15.6% millet, 8.0% sweet potatoes, 3.2% cassava, and 0.4% rice. The main food produced was sorghum followed by maize and beans, respectively (Table 29). We did not assess the amount of land that was cultivated. It is therefore difficult for us to assess productivity according to land usage. However, harvests for maize in Amudat, Kaabong and Nakapiripirit; and for sorghum in Abim, Kaabong and Napiripiripit could be considered reasonably sufficient for a household.

Table 29: Total household food production according to district

District		*Maize Kg*	*Millet Kg*	*Sorghum Kg*	*Sweet potatoes Kg*	*Rice Kg*	*Beans Kg*	*Cassava Kg*
Abim	% households which planted	12.9%	25.3%	73.1%	29.1%	1.0%	27.1%	8.2%
	Mean	188	78	212	294	624	115	734
	Median	100	100	200	150	900	80	360
Amudat	% households which planted	76.4%	0.9%	8.7%	0.6%		25.1%	1.3%
	Mean	463	28	74	107		77	65
	Median	300	5	50	120		24	18
Kaabong	% households which planted	63.7%	13.1%	67.2%	1.4%	0.2%	25.0%	1.4%
	Mean	1,145	33	883	977	1,500	376	374
	Median	100	20	100	125	1,500	25	60
Kotido	% households which planted	41.3%	35.9%	67.8%	3.6%		35.5%	0.2%
	Mean	71	43	130	124		36	6
	Median	40	20	100	80		20	6
Moroto	% households which planted	15.1%	0.6%	59.6%	0.4%		7.4%	0.4%
	Mean	193	53	249	125		97	140
	Median	100	40	165	125		50	140
Nakapiripirit	% households which planted	23.3%	1.3%	50.3%	3.6%	0.8%	16.3%	2.5%
	Mean	743	86	315	392	5,929	257	337
	Median	100	100	105	120	4,700	80	160
Napak	% households which planted	24.6%	1.9%	65.5%	3.1%	0.5%	33.1%	3.1%
	Mean	79	71	127	73	40	69	308
	Median	40	100	100	40	40	40	160
Total	**% households which planted**	**36.7%**	**11.8%**	**56.4%**	**6.0%**	**0.3%**	**24.1%**	**2.4%**
	Mean	**535**	**54**	**319**	**292**	**2,368**	**138**	**503**
	Median	**100**	**20**	**100**	**150**	**650**	**40**	**210**

3.8.5 Household ownership of animals and poultry

Only a few households in Karamoja owned animals or poultry. Only 32.3% of the households owned cattle, 21.7% sheep, 35.0% goat, 36.4% poultry, 1.9% pig, 3.0% donkey and 0.2% rabbit. Amudat was the leading district in ownership of cattle, sheep, and goat (Table 30). The median for animal and birds owned was low suggesting the need for intensified restocking on part of government especially of cattle the traditional source of livelihood in Karamoja.

Table 30: Animal head and birds owned by households according to district

District		Cattle	Sheep	Goat	Pig	Rabbit	Poultry	Donkey
Abim	% household with animal	19.9%	2.0%	3.6%	9.0%		4.0%	0.6%
	Mean	3	13	4	2		6	7
	Median	2	4	2	1		4	1
Amudat	% households with animal	86.8%	49.1%	83.6%		0.2%	6.8%	4.6%
	Mean	8	8	10		20	8	3
	Median	4	5	6		20	5	2
Kaabong	% households with animal	29.2%	27.5%	33.2%	2.5%	0.6%	4.7%	6.8%
	Mean	3	3	4	1	2	4	2
	Median	2	2	2	1	2	3	1
Kotido	% households with animal	38.5%	32.3%	37.3%	0.4%	0.2%	29.5%	6.2%
	Mean	4	6	7	3	1	5	2
	Median	2	3	4	3	1	4	2
Moroto	% households with animal	10.7%	11.7%	18.1%	0.2%		17.7%	1.8%
	Mean	3	5	5	2		4	3
	Median	2	3	3	2		3	3
Nakapiripirit	% households with animal	26.0%	17.0%	24.9%	0.2%		27.7%	0.6%
	Mean	4	4	5	1		4	3
	Median	2	2	3	1		3	2
Napak	% households with animal	15.6%	12.1%	11.6%	1.2%	0.2%	25.3%	
	Mean	3	4	5	2	4	4	
	Median	2	3	3	2	4	4	
Total	% households with animal	**32.3%**	**21.7%**	**35.0%**	**1.9%**	**0.2%**	**36.4%**	**3.0%**
	Mean	**5**	**6**	**7**	**2**	**5**	**6**	**2**
	Median	**3**	**3**	**4**	**1**	**2**	**4**	**2**

3.8.6 Household food consumption scores

The prevalence of severely food insecure or poor food consumption households was 20.0% in Karamoja region. The proportion of households with poor food consumption was most prevalent in Moroto district (28.2%) (Figure 19) while Amudat district (82.4%) had the highest proportions of food secure households.

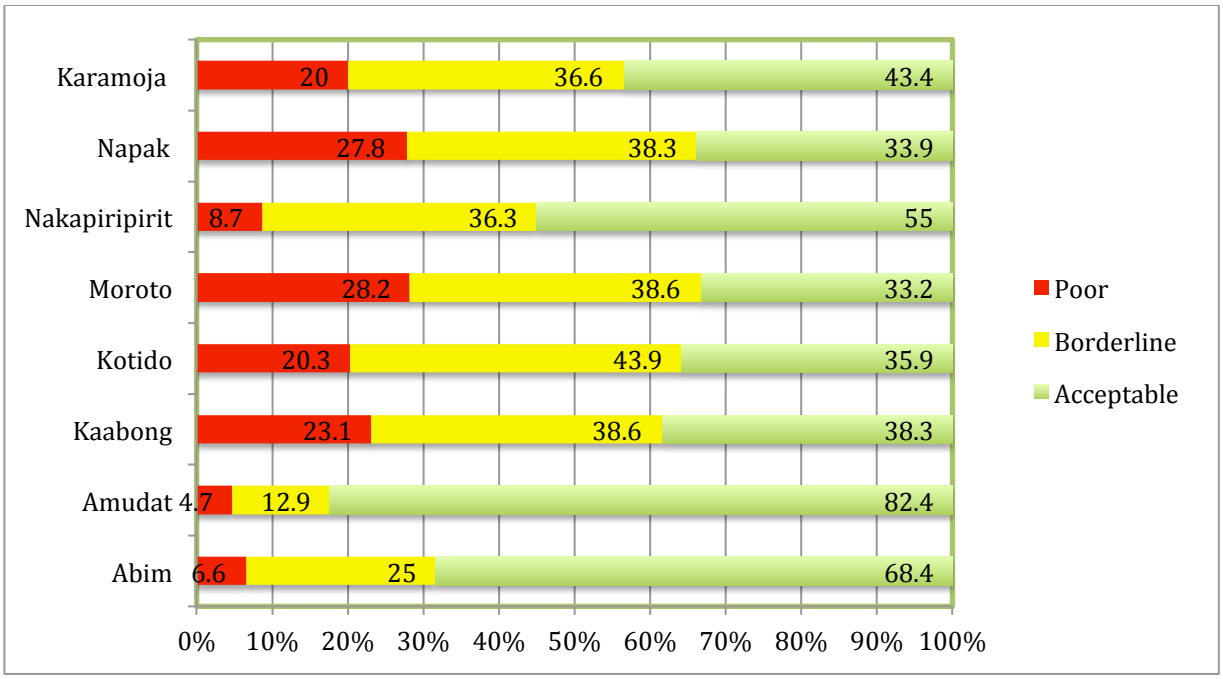


Figure 19: Food consumption status at household level by district

Food that was least consumed in Karamoja were fruits (Figure 20). Severely (poor) and moderately (borderline) food insecure households hardly reported any consumption of milk, fruits, sugar and meat.

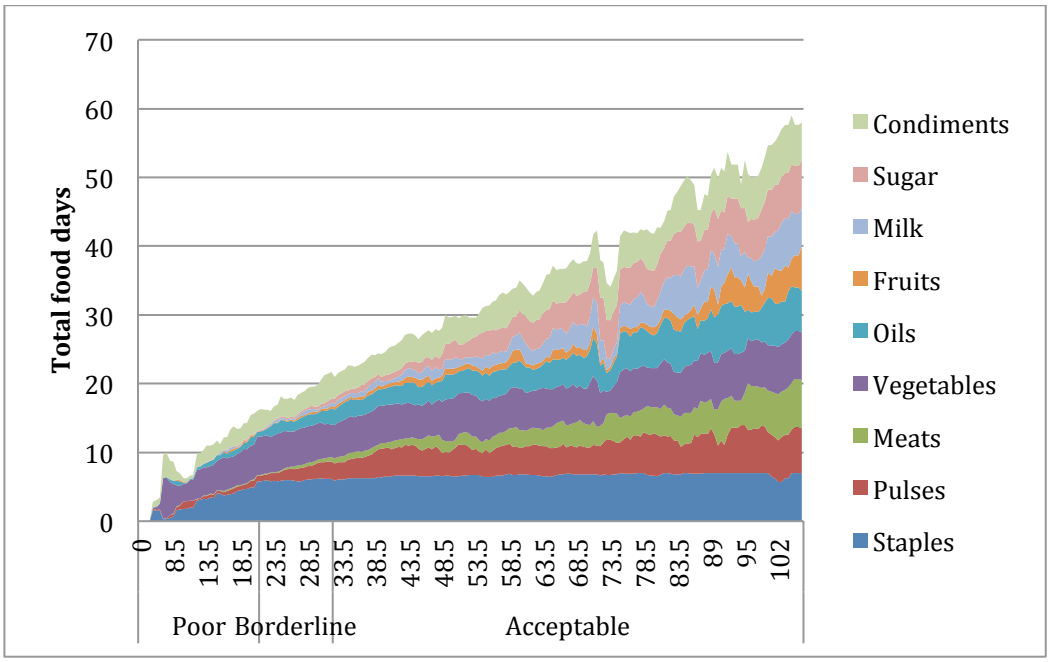
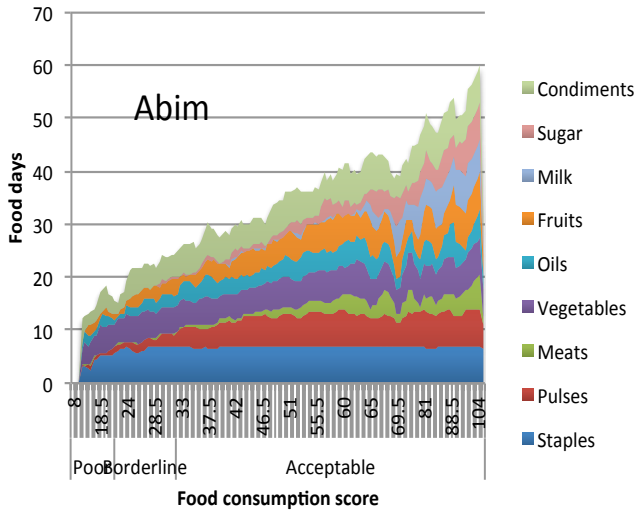
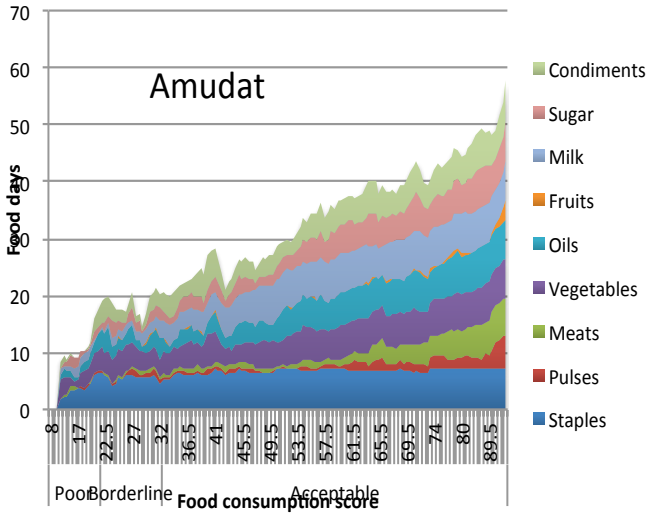
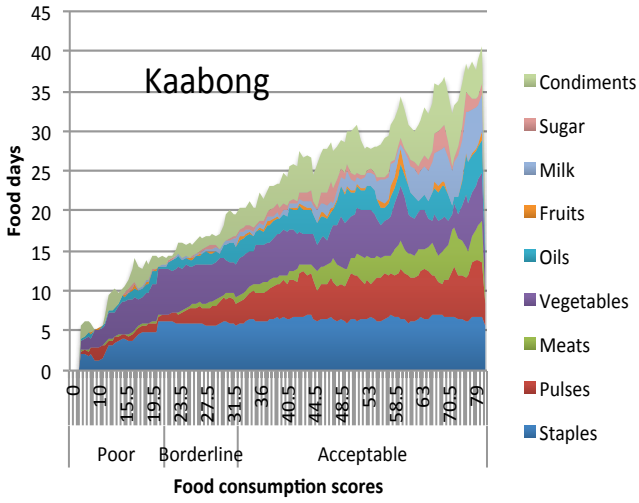


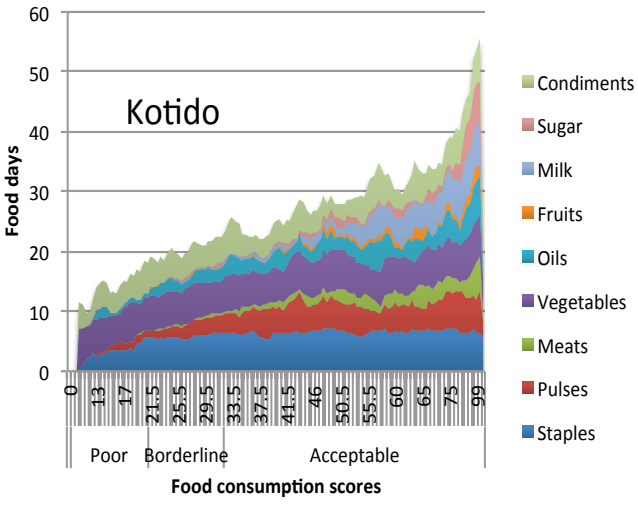
Figure 20: Diversity of food consumed in the seven days of the recall period per food consumption grouping for Karamoja region

Although Amudat had the highest proportion of food secure households, the graphical distribution of food consumed in the past seven days indicated that food secure households in Abim district age more diverse foods and at a higher frequency including more fruits compared to other districts (Figure 21). However, Amudat reported the highest frequency of consumption of milk.









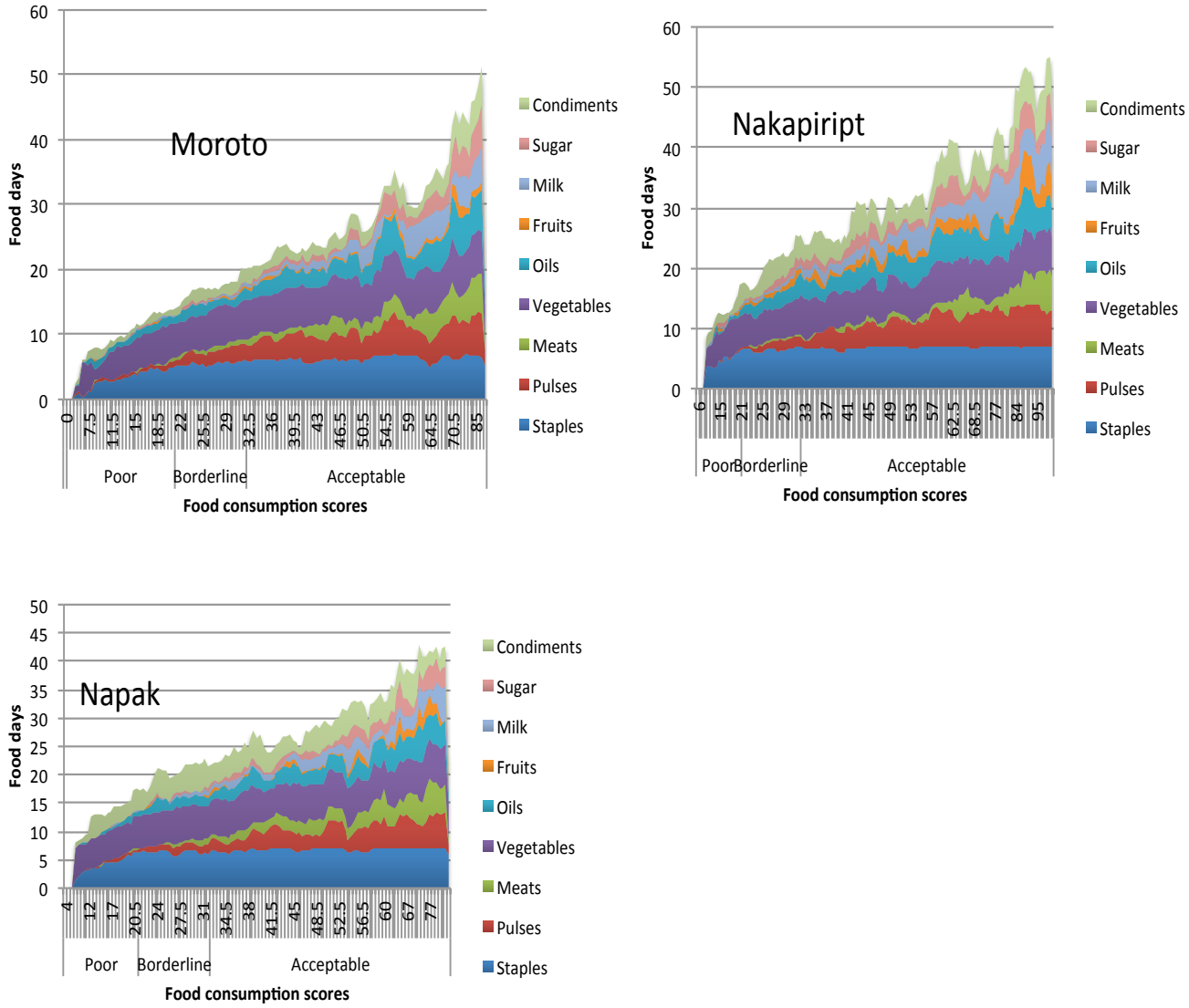


Figure 21: Diversity of food consumed in the seven days of the recall period per food consumption grouping according to district

3.8.7 Trend analysis of food insecurity/poor food consumption scores in Karamoja

The level of food insecurity in Karamoja region was consistent with what is normally found in similar periods over the past years and was not the worst for this period of the year (Figure 22).

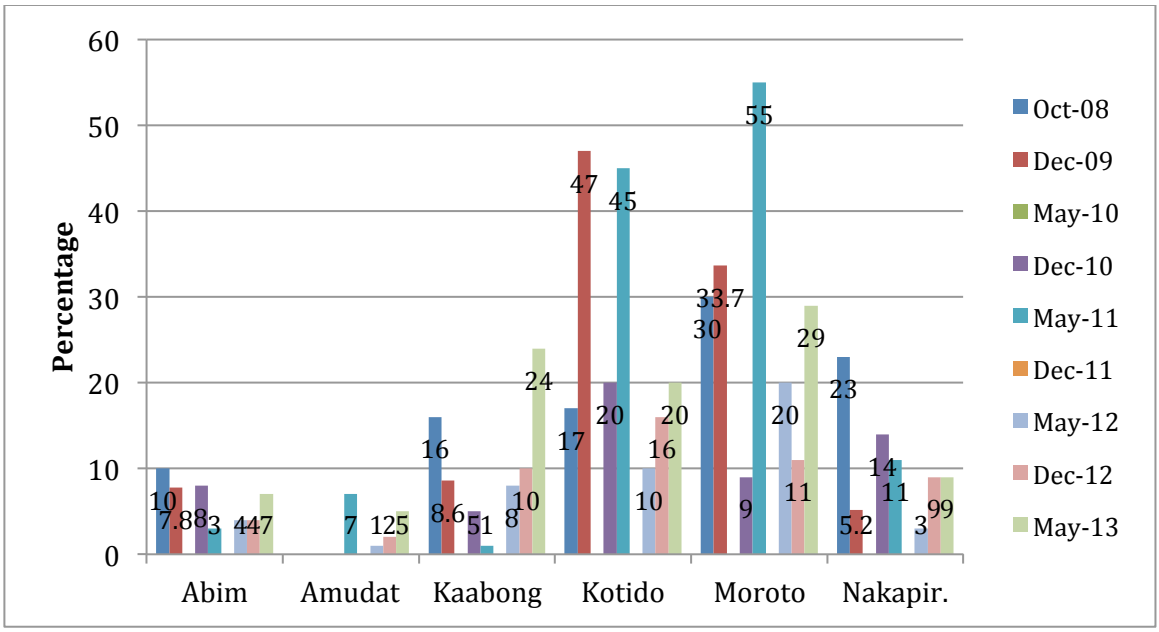


Figure 22: Trend of severe food insecurity in Karamoja region since December 2009

3.8.7 Factors associated with food insecurity/poor food consumption scores

Households in lowest socioeconomic quintile were at a higher risk of being severely food insecure compared to households which were socioecomically better (Figure 23). Interventions aimed at increasing wealth and the general standard of living of the population should be promoted by the government and partners.

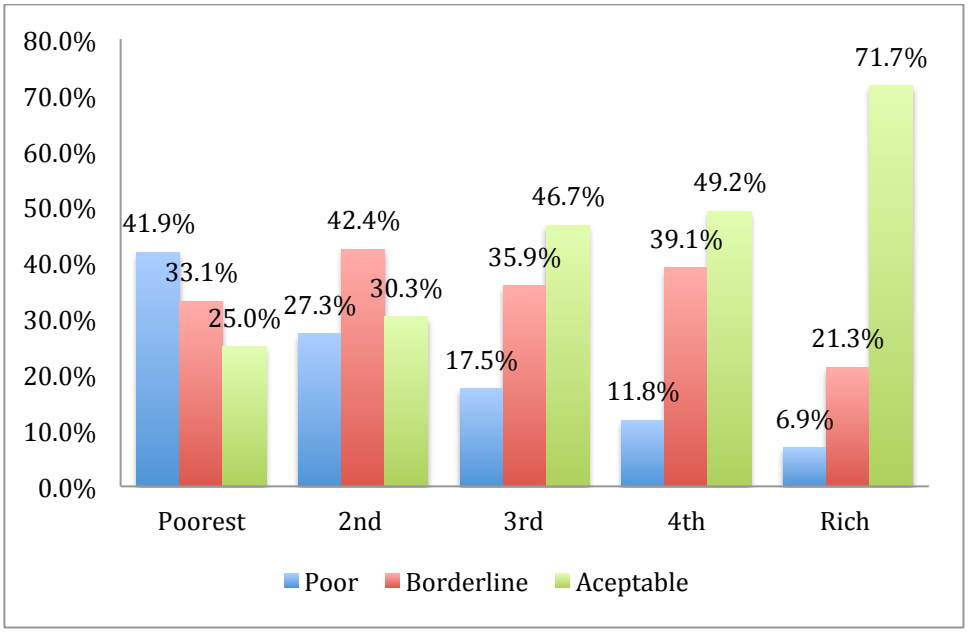


Figure 23: Prevalence of household food insecurity according to socioeconomic status

Households that reported to have planted some crops either in the first or second season of 2012 were at a reduced risk of food insecurity (Figure 24) compared to those who had not planted any crop. It is important to note that cultivating of land contributes to some improvement in household food consumption at household level. The agricultural promotion efforts in Karamoja should be encouraged.

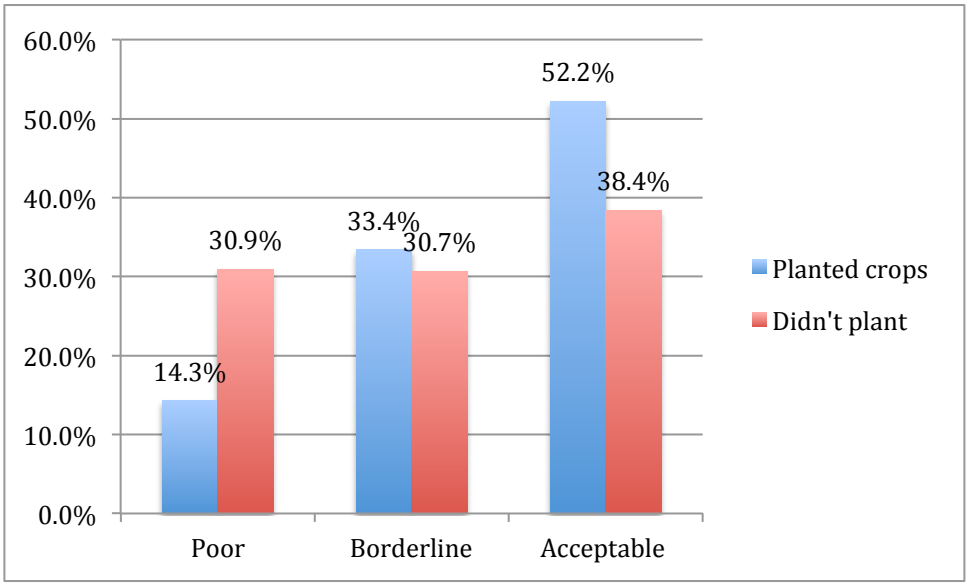


Figure 24: Prevalence of household food insecurity according to agricultural food production

3.8.8 Household expenditure on food

Asessment of expenditure on food in the previous 30 days indicated cereals as having the highest costs to households – median expenditures UGX 12,000/=. Expenditures on other items were equally low (Table 31).

Table 31: Median household expenditure (UGX) on food items in past 30 days

District		Cereals	Tubers	Pulses	Fruits/vegs	Meats	Oils/butter	Milk	Sugar/salt	Water	Bread/tea
Abim	N	453	435	456	431	426	441	404	456	422	413
	Median	10,000	0	19000	0	0	8000	0	2000	0	0
	Mean	21,383	8,173	24,011	2,486	7,984	11,463	1715	10,372	132	115
Amudat	N	417	346	365	352	355	405	353	412	342	386
	Median	30,000	0	0	0	0	7,000	0	10000	0	1000
	Mean	46,418	2,614	8,983	6,113	3,489	13,327	3,631	18,185	755	2,889
Kaabong	N	395	397	396	396	397	397	397	397	397	397
	Median	16,500	0	4,000	0	1,000	1,000	0	1,500	0	0
	Mean	31,163	1,321	13,708	1,129	5,532	3,793	1,768	2,645	169	575

District		Cereals	Tubers	Pulses	Fruits/vegs	Meats	Oils/butter	Milk	Sugar/salt	Water	Bread/tea
Kotido	N	500	499	500	499	499	499	499	499	498	498
	Median	15500	0	5,000	0	0	1,200	0	1,600	0	0
	Mean	29,288	2,325	13,415	1,495	2,892	3,910	1,251	3,179	705	374
Moroto	N	460	459	460	459	460	460	460	460	460	460
	Median	9,000	2,000	4,000	0	0	1,000	0	1,000	0	0
	Mean	19,686	3,729	9,534	1,395	3,914	3,909	1,594	3,661	283	1,242
Nakapiripirit	N	481	477	477	472	472	480	478	482	472	471
	Median	17,500	1,000	3,000	0	0	2,000	0	1,000	0	0
	Mean	30,045	3,813	7,991	1,744	3,039	4,469	3,235	2,915	392	456
Napak	N	410	410	410	410	410	410	410	410	410	410
	Median	10,000	0	2,000	0	0	1,200	0	1,500	0	0
	Mean	13,102	3,421	5,860	655	3,153	3,107	992	2,845	169	264
Karamoja	**N**	**3,116**	**3,023**	**3,064**	**3,019**	**3,019**	**3,092**	**3,001**	**3,116**	**3,001**	**3,035**
	Median	**12,000**	**0**	**4,000**	**0**	**0**	**2,000**	**0**	**1,500**	**0**	**0**
	Mean	**27,239**	**3,664**	**12,064**	**2,037**	**4,242**	**6,186**	**1,995**	**6,134**	**372**	**950**

Considering the proportional expenditures, the majority of the households in districts had very high expenditures on food (Figure 25).

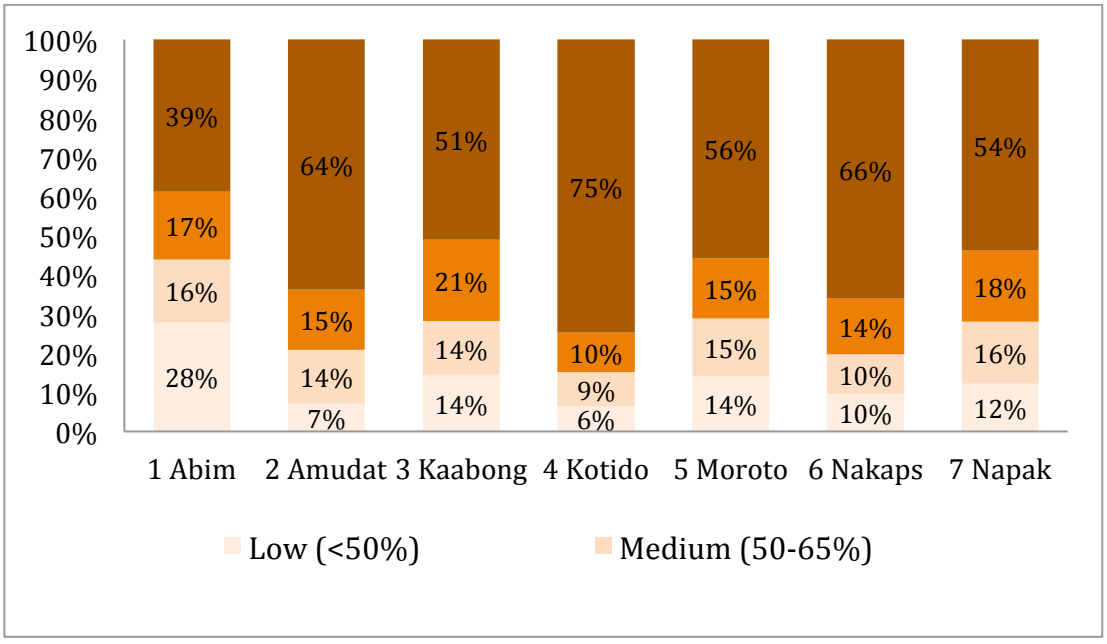


Figure 25: Household proportional expenditure on food

3.8.9 Retail prices of staples, Jan-May 2013 compared to similar periods in 2012

According to the regular market surveys by UNWFP, retail prices for staples had not yet changed so much compared to similar period in 2012 (Figures 26 – 31).

This could be due to the fact that most of the food sold in Karamoja is obtained from other parts of the country or to the fact that the purchase power might be low due to scarcity of money among households.

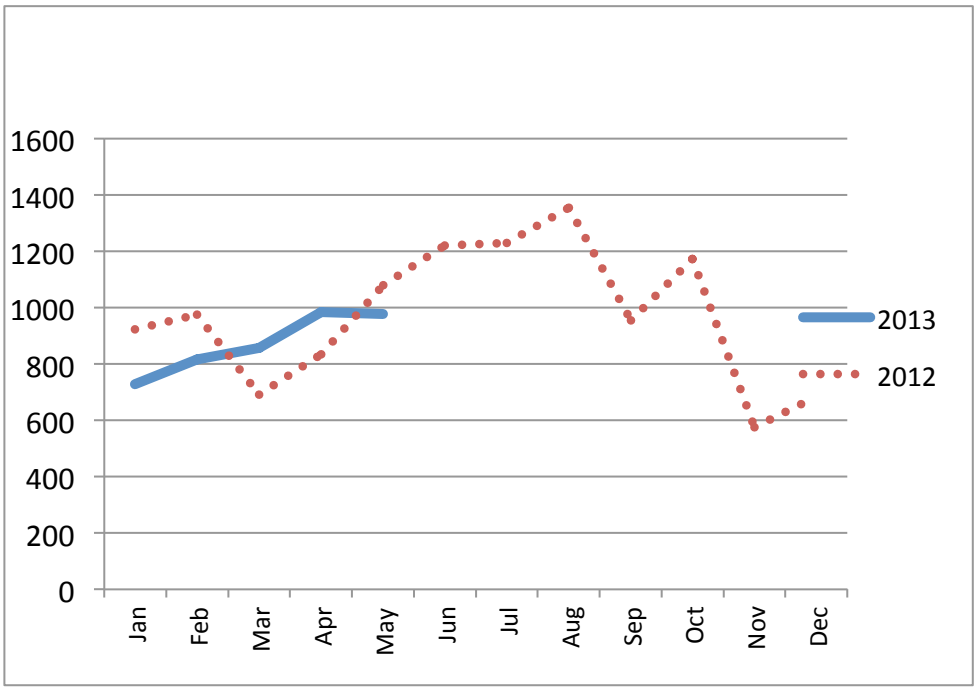


Figure 26: Maize grain retail prices, Karamoja, 2012 and 2013

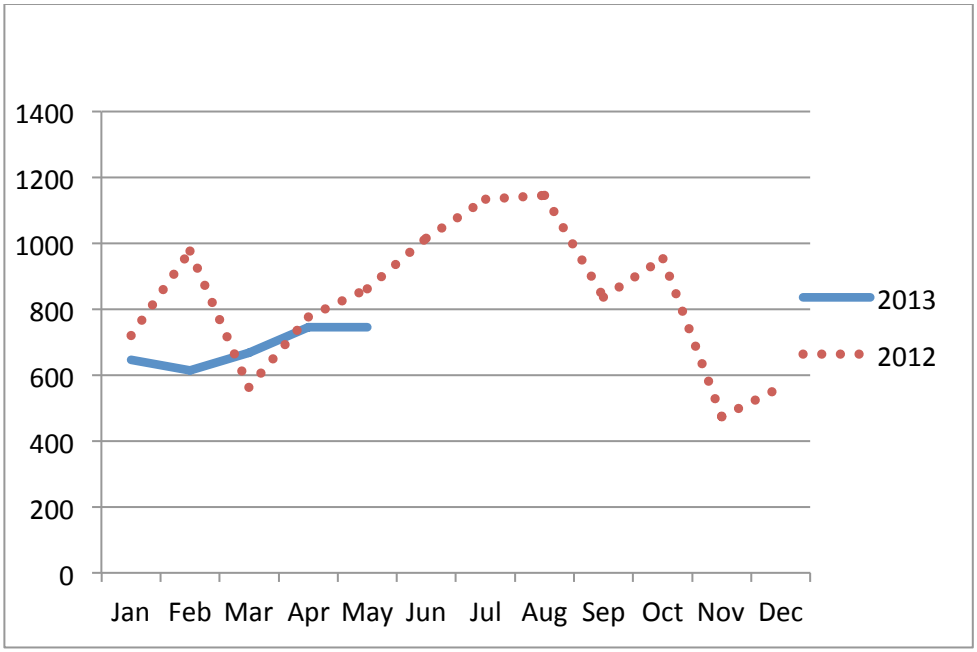


Figure 27: Sorghum retail prices, Karamoja, 2012 and 2013

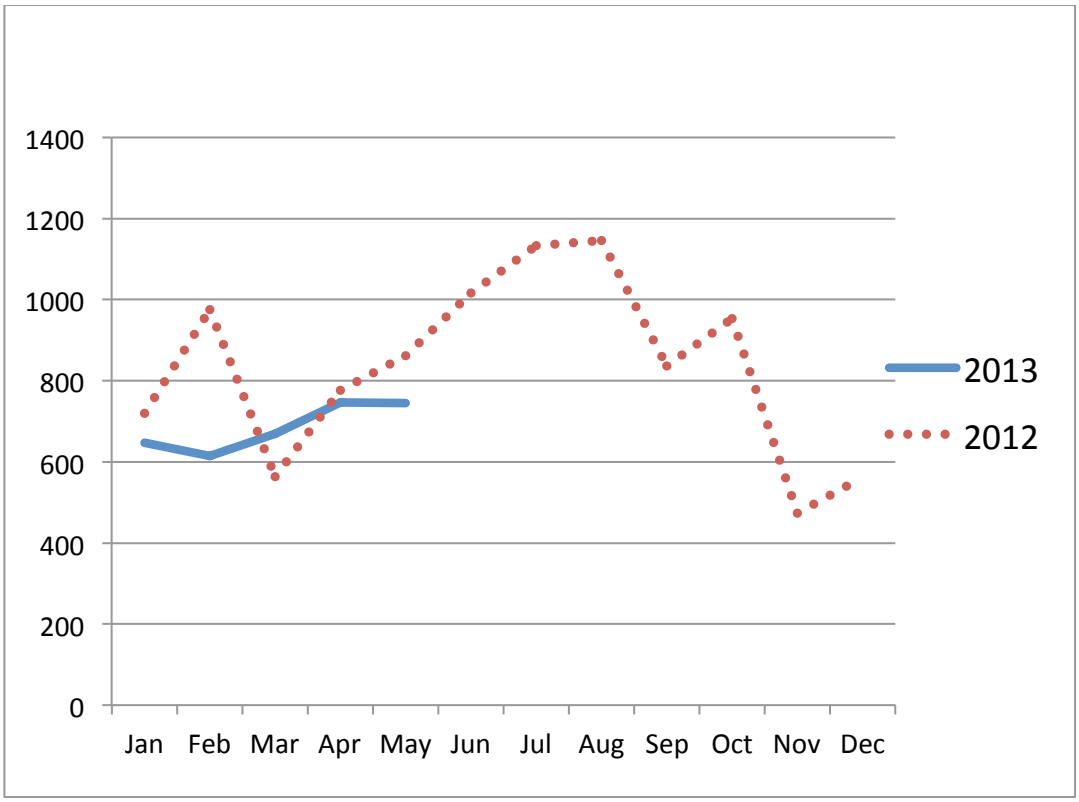


Figure 28: Sorghum retail prices, Karamoja, 2012 and 2013

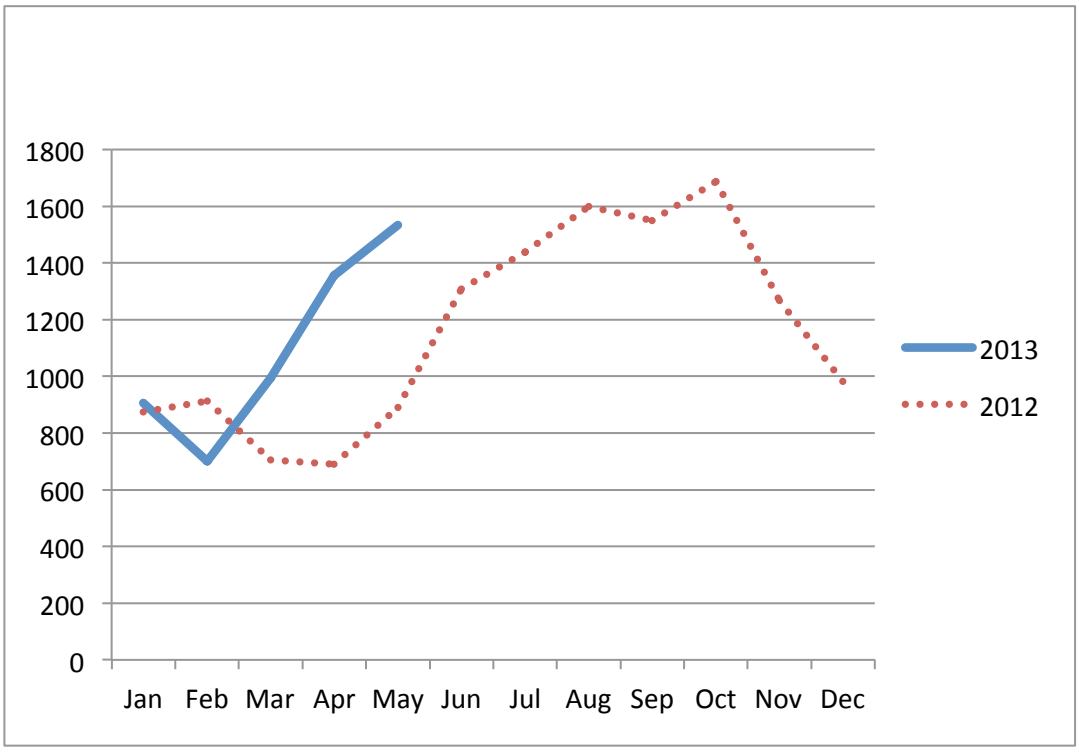


Figure 29: Cassava flour retail prices, Karamoja, 2012 and 2013

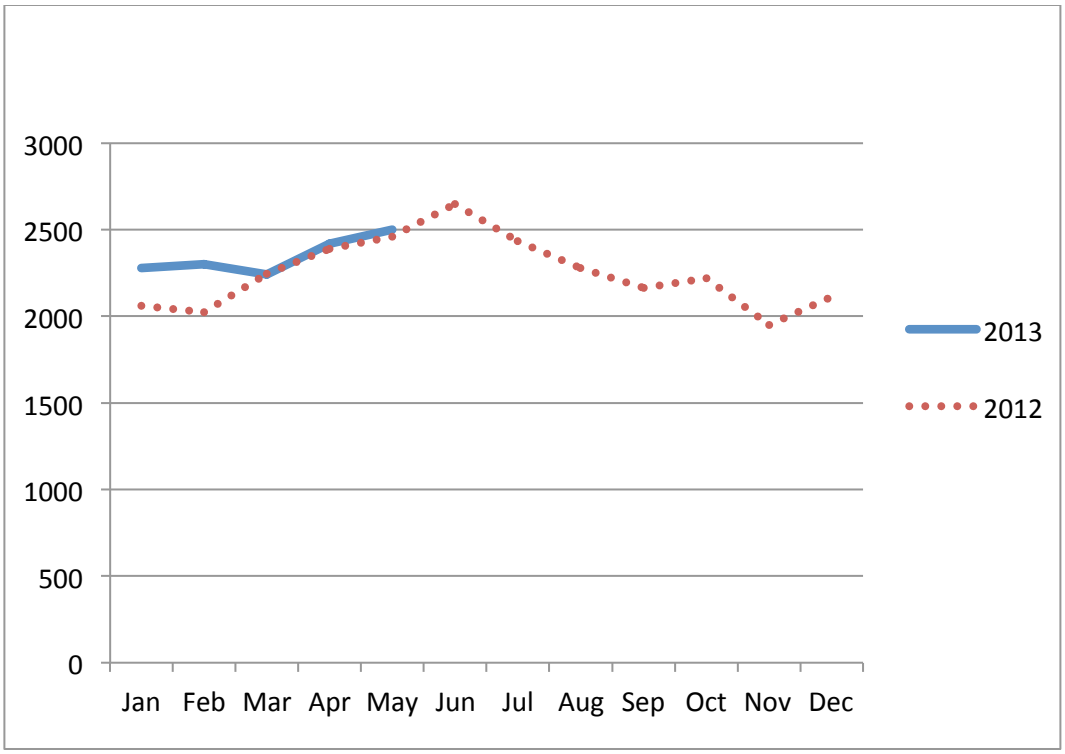


Figure 30: Retail prices of Beans (Nambale) in Karamoja in 2012 and 2013

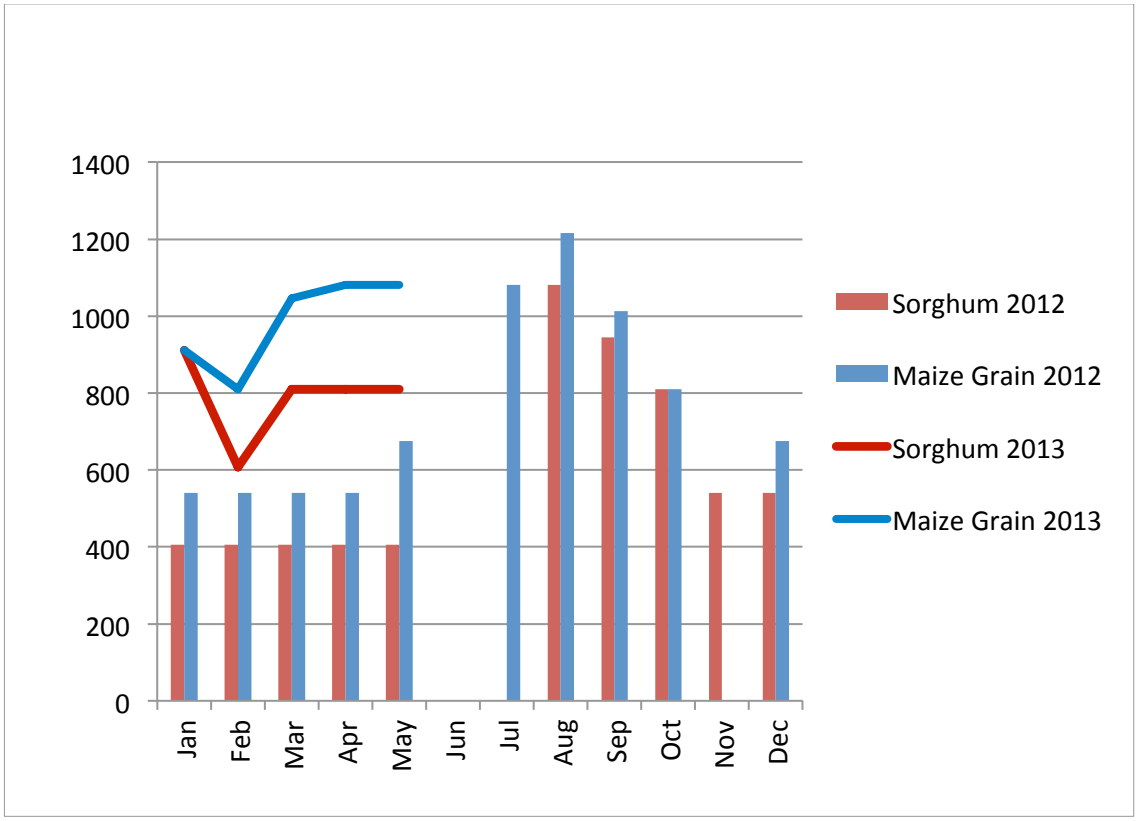


Figure 31: Sorghum & Maize retail prices in Kaabong in 2012 & 2013

3.8.10 Coping strategies

The proportion of households engaged in coping strategies were high (Figure 32 – 37). Households that reported to have borrowed food or relied on help from friends/family for at least one day in a week was high. Abim district (53%) had the highest proportion of households that did not borrow food or relied on help from friends (Figure 3.31). About 2 in every 3 households borrowed or relied on help from friends for at least three days in a week.

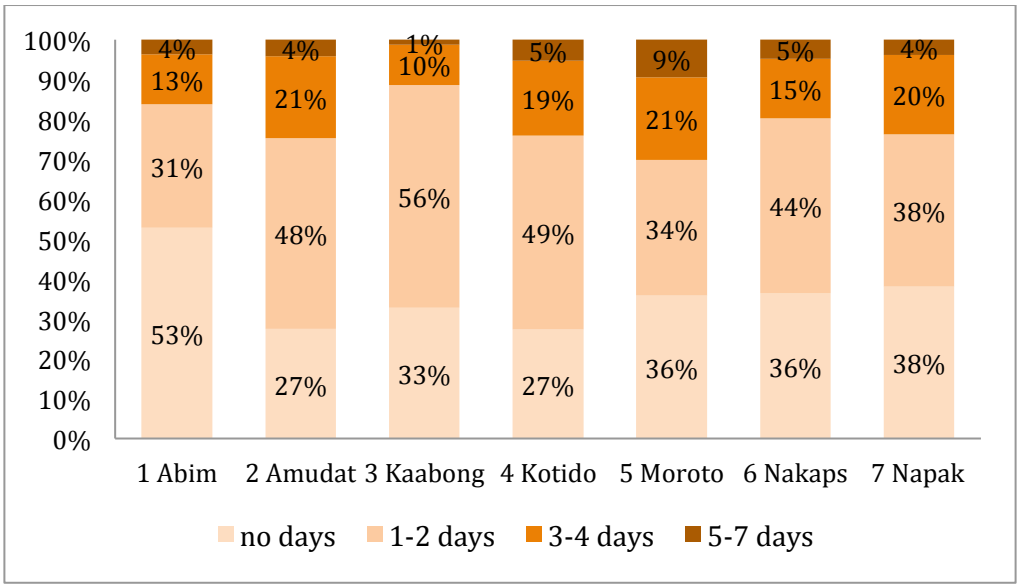


Figure 32: Proportion of households that borrowed food or relied on help from friends

Likewise the proportion of households that reported to have reduced the number of meals eaten in day or to have engaged in other coping strategies was high.

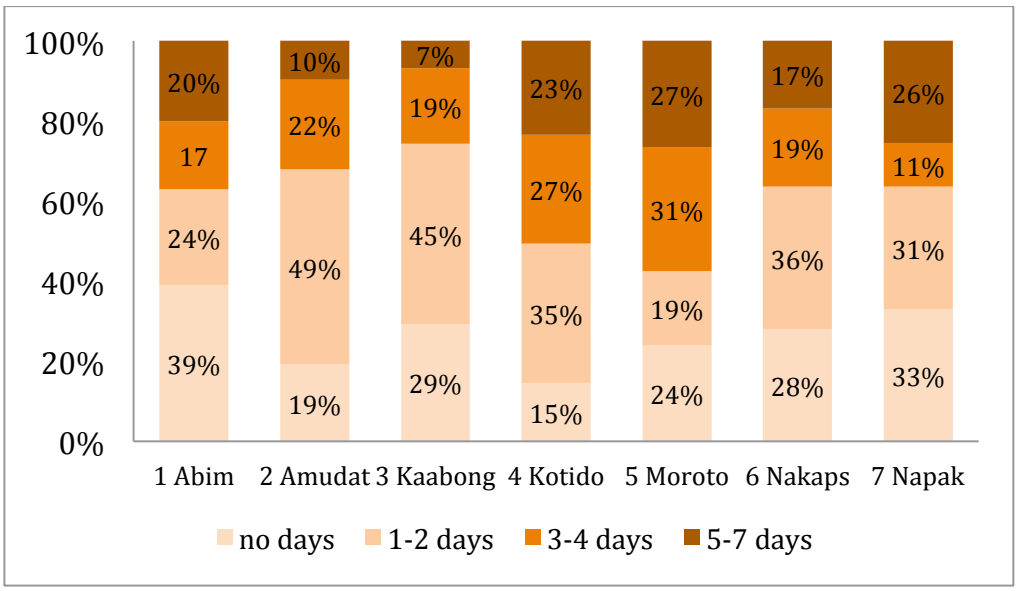


Figure 33: Proportion of households that reduced the number of meals eaten in a day

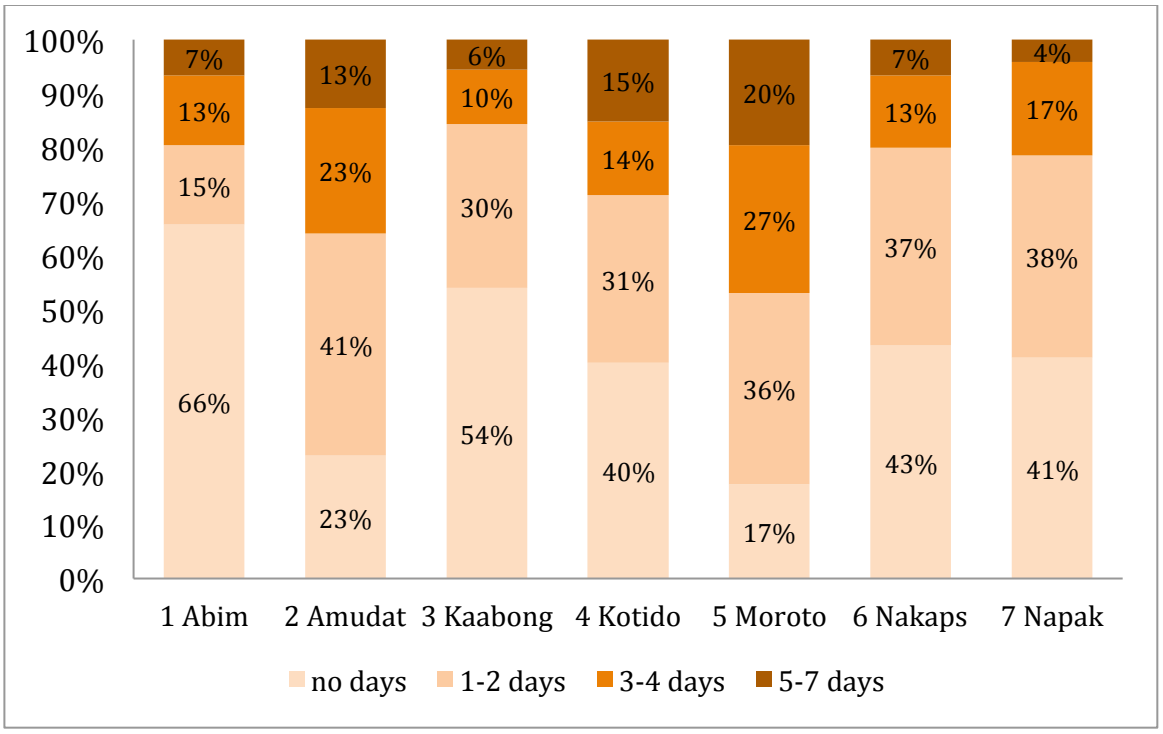


Figure 34: Proportion of households that reduced quantities of food consumed by adults

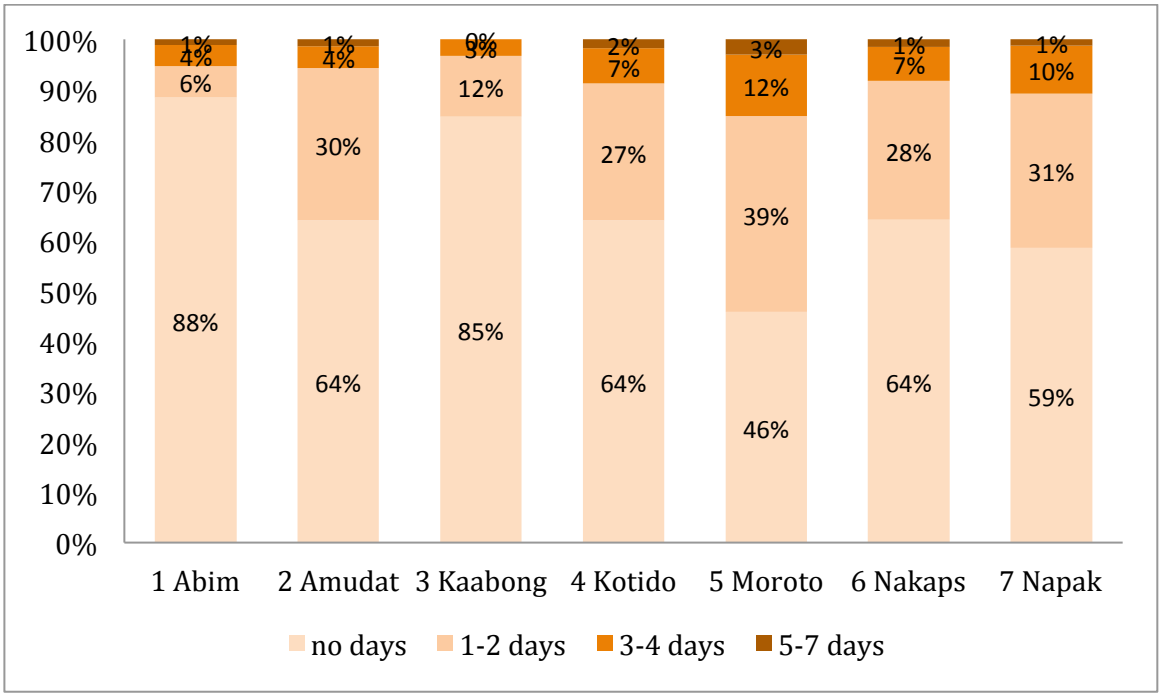


Figure 35: Proportion of households that sent household members to elsewhere

Members who ate out were largely children being sent to eat school meals. This incentive should be sustained to ensure children are kept in school.

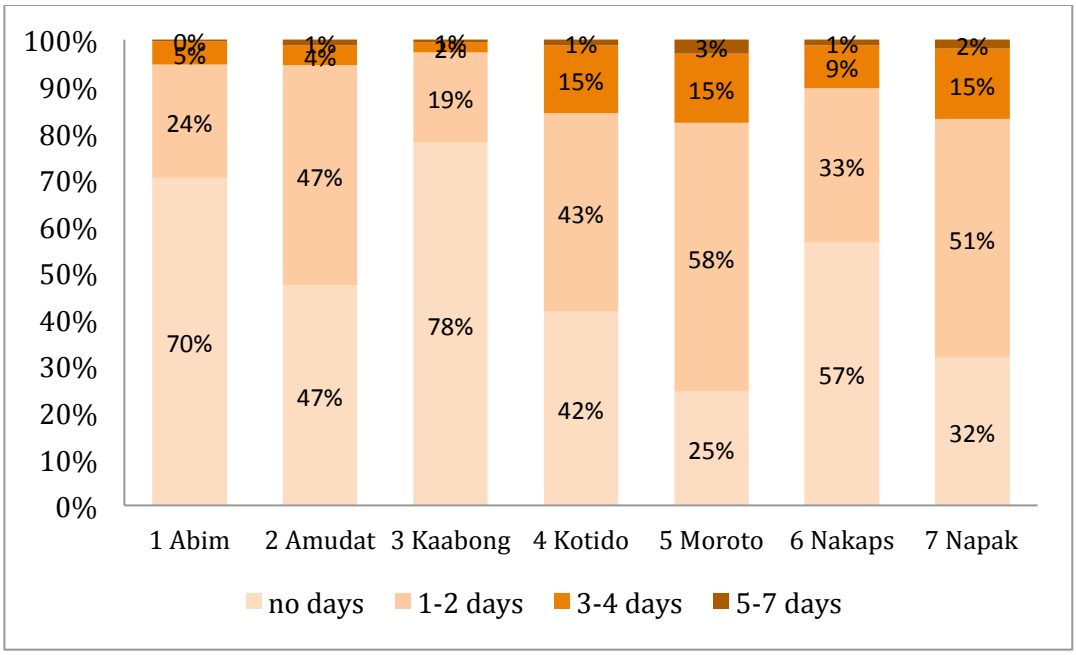


Figure 36: Proportion of households that went an entire day without eating

Overall when an index of the coping strategy variables was developed (CSI_reduced), districts such as Moroto, Kotido, Amudat and Napak were categorized engaging in very high coping survive (Figure 36).

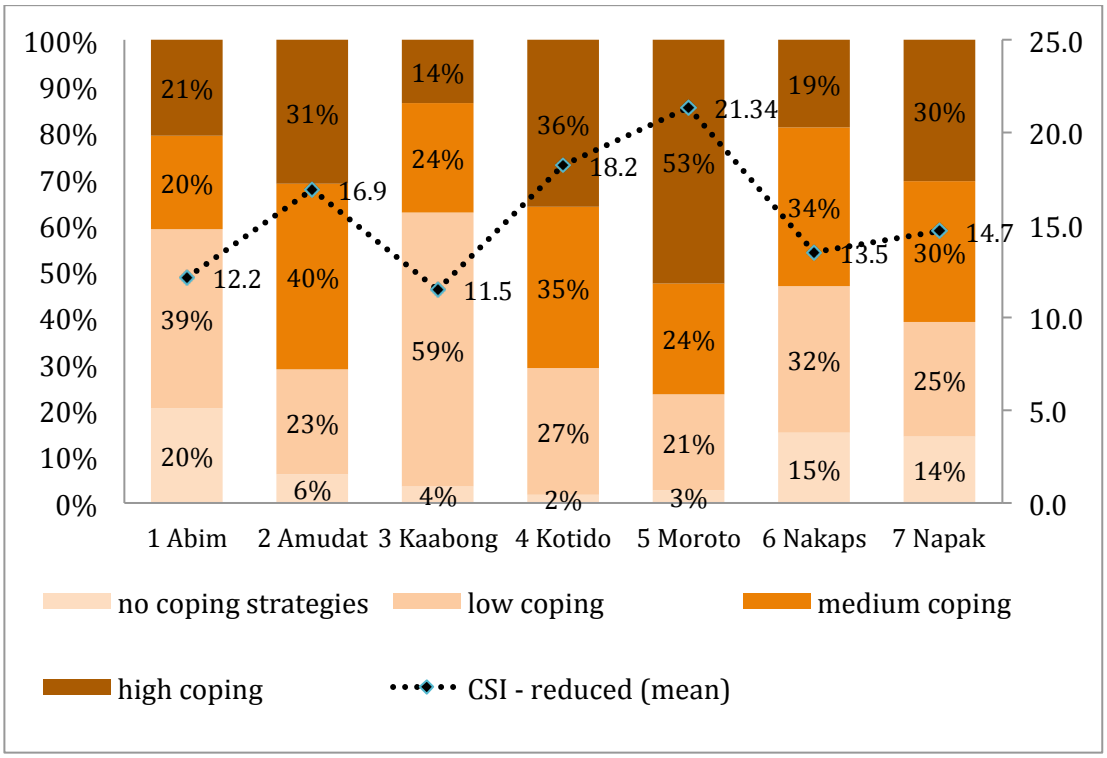


Figure 37: Coping strategies' index quartiles

3.9 Factors independently associated with GAM and food insecurity

3.9.1 Factors associated with GAM

Whereas a number of factors were associated with GAM on bivariate analysis, only a few maintained independent relationships in adjusted analyses. A logistic model was constructed simultaneously adjusting for child sex, household socioeconomic status, mothers education, IDDS, FCS, drinking water source and bed net use for children. The factors that were independently associatd with GAM were:

i) Mothers education, that is, zero formal education, OR = 2.2 (95% CI 1.1 – 4.7) compared to those with secondary level of education

ii) Household food security status, that is, low FCS, OR =1.8 (95% CI 1.2 – 2.7) and borderline FCS, OR = 1.6 (95% CI 1.1 – 2.3) compared to those with acceptable food security

iii) Being boy, OR = 1.7 (95% CI 1.3 – 2.3) compared to being girl

Whereas in previous surveys and other studies done in sub-Saharan Africa, food security is often not associated with GAM outcome, current findings fits the theorical model that food security is an important factor in GAM prevalence in Karamoja. Food distribution and supplementary feeding programs should be immediately intensified in the region as a short-term measure while education and other food security interventions should be increased.

3.9.2 Factors associated with poor food consumption scores

The multinomial logistic regression model simultaneously adjusted for household socioeconomic status, mothers' education, and cultivation of food crops in 2012. Households in the poorest socioeconomic quintile, OR = 22.5; 2nd quintile, OR = 14.7; 3rd quintile, OR = 7.0; and 4th quintile, OR = 3.8 all had significantly higher risk of being severely food insecure compared to those in the 5th (rich) quintile. Likewise belonging to different socioeconomic quintiles carried respective risks of being moderately food insecure, that is, being in the 1st (poorest) quintile OR = 5.3; 2nd quintile OR = 4.1; 3rd quintile OR = 3.1; and 4th quintile OR = 2.2, as compared to those in 5th (rich) quintile. Not planting any crops in 2012, OR = 2.5 (95% CI 1.8 – 3.3) was risk factor for being severely food insecure. Household food production and socioeconomic status were therefore important factors for predicting food insecurity at household level. This further emphasizes the need for income generating activities and introducing modern farming methods to ensure food production at household level in all conditions.

Chapter 4

CONCLUSIONS AND RECOMMENDATIONS

4. 1 Conclusions

The prevalence of GAM was 12.5% in Karamoja region and was above 10% 'alert level' in all districts except Abim (6.3%). GAM levels were above or near critical levels (15% and above) in both Moroto (20.2%) and Nakapiripirit (14.5%), and were 10.1% in Amudat, 11.4% in Kaabong, 10.5% in Koitdo and 13.3% in Nakapiripirit. While such rates are not unusual in Karamoja at this time of year, they do exceed the 10% 'alert level' established by global standards. On multivariate analysis, independent predictors of GAM were lack of formal education for mothers, household food security and the male gender.

Additionally, SAM for the region was 3.0% and exceeded the 2% 'emergency threshold' in five districts (Kaabong, Kotido, Moroto, Nakapiripirit, Napak). SAM at this point last year was also above the emergency threshold. Although children with GAM or SAM should be feeding programs, only a small proportion of children with GAM (30.5%) were currently being managed in such centres.

Some care practices with direct influence to nutrition outcomes such as exclusive breastfeeding practice was above 80% for infants below six months, which was good and within national targets. However there were major challenges with complementary feeding practices. Up to 87% of the children 6-24 months had low IDDS and the majority of the children 6-23 months (64%) had consumed less than the recommended three meals a day. Previous studies have also reported poor quality of complementary feeding.

Morbidity factors such as prevalence of common childhood illness were high. One in five children had suffered at least one common childhood illness in the two weeks prior to the survey. Fever/malaria (54.8%), acute respiratory infection (41.4%) and diarrhoea (34.3%) were the most prevalent. The prevalence of diarrhoea is on the rise in the region. Besides immunization, vitamin A supplementation and deworming whose coverage was above 85% in all districts, and access to safe drinking water through boreholes (over 80%), other preventive measures were not that good. For instance over 80% of the children did not sleep under a mosquito bed net the night before the survey. Yet in 2009, over 80% of the children

were using bed nets in 2009 in Karamoja region. Even with a high presence of boreholes fetching of drinking water from open well/dam was associated with high prevalence of GAM on bivariate analysis. The propoprtion of households with latrines was also low with up to 73% of the households without any latrine.

Mothers 15-49 years of age were also not spared with malnutrition. One out of five mothers was underweight and 5% were severely underweight. Additionally a large proportion of mothers (over 75%) had zero years of formal education a factor that correlates highly with nutrition status of children. Kotido district (92.0%) recorded the highest number of mothers/ caregivers without formal education while Abim district (50.4%) recorded the least.

The overall food security situation in Karamoja was poor but not extreme. High rates of poor food consumption were noted across Karamoja. An unusually poor food security situation was noted in four districts: Kaabong, Kotido, Moroto and Napak. The food consumption score, a key WFP indicator, showed high 'poor food consumption' prevalence rates in Moroto (29%), Kotido (20%), Kaabong (24%) and Napak (28%). While higher rates have been seen in the recent past (in May 2011 'poor food consumption' was identified in 55% of Moroto households and 45% of Kotido households), the current findings are a reason for concern. The majority of the population in Abim, Amudat and Nakapiripirit had an acceptable level of food consumption. The food security situation in Abim, Amudat and Nakapiripirit overall was relatively stable (relative both to other districts in Karamoja and to past trends). Independent predictors of household food insecuiry in multivariate analysis were food crop production and household socioeconomic status. Lack of planting of food crops had a 2.5-fold risk of food insecurity compared to those who had planted, and being in poorest socioeconomic quintile had 22.5-fold risk of food insecurity compared to the wealthiest socioeconomic quintile. There also was evidence of varying levels of food stress on families in all districts, with some employing coping strategies such as borrowing food or reducing the number of meals eaten.

Mortality rates for both adults and children were normal. There were no indications of excess mortality except in Napak district where under-5 mortality was 1.7 deaths per 10,000 children per day and was classified as very serious warranting further investigation. Most of the children (66.7%) died of fever and diarrhea (13.3%).

4.2 Recommendations

Arising from the study and the dissemination meeting of preliminary findings held in Karamoja the following recommendations should be pursued by various implementers in the region:

- Since GAM in Moroto and Nakapiripirit was at critical level there is need for urgent intervention. There is also need for screening program to actively search for GAM cases and other children at high risk to be enrolled in OTC.

- There is increased need for food assistance to address the reducing levels of food availability.

- Since complementary feeding is inadequate, efforts should aim at increasing the diversity of food nutrients for children on complementary feeding.

- Families rely on school meals for their school-aged children to help cope with food insecurity; the school meals programme is one existing vehicle for response that should be sustained.

- Close monitoring of forth coming harvests is required. The near-term outlook will depend a great deal on the extent of the harvest in Karamoja this season. The FSNA also calls for ongoing action to address the underlying problems that make food insecurity and undernutrition chronic in Karamoja.

- It was observed that diarrhea prevalence was rising in the region, and there was poor latrine coverage. This calls for intensified control measures for the diarrhea disease prevention.

- Whereas, the majority of the households were using boreholes, 12% of the households accessed water from open wells/dams and this was associated with a higher risk of GAM. There is need to ensure 100% of safe water sources.

- The situation of bed net use in Karamoja has deteriorated. Responsible agencies should urgently address this matter.

- Since households that reported to have planted some crops either in the first or second season of 2012 were at a reduced risk of food insecurity, efforts to ensure agricultural production in Karamoja should be encouraged.

- District leaders should take a central role in communicating and advocating for food security and nutrition issues within and outside the district; district leaders need to further disseminate findings of the FSNA at key district administrative levels focusing on areas that need improvement as a call to action to improve the food security and nutrition situation in Karamoja

- Institute legislature at local government level to improve food security in the district; Abim district is the case in point where the leaders have instituted a food security ordinance in which all households are mandated to produce at least an acre of cassava and 10 fruit trees. Similarly, all households should be mandated to have kitchen gardens. This should form part of the strategy for sustainable food security at the districts. There is currently an existing Karamoja Food Security Action plan that should be shared

- During the dissemination meeting, it was appranet that there is need to improve animal stock levels as animals are more resistant to climatic changes than the crops; and are a better source of livelihood. Restocking should therefore be a larger priority than before on the part of government.

- Establish/strength internal/district level Early Warning Systems (EWS) that can provide timely information for response in the event of a rapidly deteriorating situation.

- Promote education of both girl and boy children; additional effort should be made to keep the girl-child in school in order to improve current poor maternal and child health and nutrition indicators that have been long associated with poor formal schooling

- Since over 70% of the mothers were either pregnant or breastfeeding, there is need for concerted effort to improve family planning services.

Appendix 1: Supervisors

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15	Onyo Patrick		
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Appendix 2: Results based on NCHS reference 1977

Abim district

Table 3.2: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 382	**Boys** n = 195	**Girls** n = 187
Prevalence of global malnutrition **(<-2 z-score and/or oedema)**	(27) 7.1 % (4.9 - 10.1 95% C.I.)	(18) 9.2 % (5.9 - 14.1 95% C.I.)	(9) 4.8 % (2.6 - 8.9 95% C.I.)
Prevalence of moderate malnutrition **(<-2 z-score and >=-3 z-score, no oedema)**	(21) 5.5 % (3.6 - 8.3 95% C.I.)	(13) 6.7 % (3.9 - 11.1 95% C.I.)	(8) 4.3 % (2.2 - 8.2 95% C.I.)
Prevalence of severe malnutrition **(<-3 z-score and/or oedema)**	(6) 1.6 % (0.7 - 3.4 95% C.I.)	(5) 2.6 % (1.1 - 5.9 95% C.I.)	(1) 0.5 % (0.1 - 3.0 95% C.I.)

The prevalence of oedema is 1.0 %

Table 3.3: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

		Severe wasting **(<-3 z-score)**		**Moderate wasting** **(>= -3 and <-2 z-score)**		**Normal** **(> = -2 z score)**		**Oedema**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	114	1	0.9	10	8.8	102	89.5	1	0.9
18-29	96	0	0.0	9	9.4	85	88.5	2	2.1
30-41	80	0	0.0	0	0.0	80	100.0	0	0.0
42-53	62	1	1.6	1	1.6	59	95.2	1	1.6
54-59	30	0	0.0	1	3.3	29	96.7	0	0.0
Total	382	2	0.5	21	5.5	355	92.9	4	1.0

Table 3.4: 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. 4 (1.0 %)
Oedema absent	Marasmic No. 2 (0.5 %)	Not severely malnourished No. 376 (98.4 %)

Table 3.5: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 385	**Boys** n = 196	**Girls** n = 189
Prevalence of global malnutrition **(< 125 mm and/or oedema)**	(385) 100.0 % (99.0 - 100.0 95% C.I.)	(196) 100.0 % (98.1 - 100.0 95% C.I.)	(189) 100.0 % (98.0 - 100.0 95% C.I.)
Prevalence of moderate malnutrition **(< 125 mm and >= 115 mm, no oedema)**	(0) 0.0 % (0.0 - 1.0 95% C.I.)	(0) 0.0 % (0.0 - 1.9 95% C.I.)	(0) 0.0 % (0.0 - 2.0 95% C.I.)
Prevalence of severe malnutrition **(< 115 mm and/or oedema)**	(385) 100.0 % (99.0 - 100.0 95% C.I.)	(196) 100.0 % (98.1 - 100.0 95% C.I.)	(189) 100.0 % (98.0 - 100.0 95% C.I.)

Table 3.6: Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema

		Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	116	116	100.0	0	0.0	0	0.0	1	0.9
18-29	96	96	100.0	0	0.0	0	0.0	2	2.1
30-41	81	81	100.0	0	0.0	0	0.0	0	0.0
42-53	62	62	100.0	0	0.0	0	0.0	1	1.6
54-59	30	30	100.0	0	0.0	0	0.0	0	0.0
Total	385	385	100.0	0	0.0	0	0.0	4	1.0

Table 3.7: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 379	**Boys** n = 192	**Girls** n = 187
Prevalence of underweight (<-2 z-score)	(83) 21.9 % (18.0 - 26.3 95% C.I.)	(49) 25.5 % (19.9 - 32.1 95% C.I.)	(34) 18.2 % (13.3 - 24.3 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(62) 16.4 % (13.0 - 20.4 95% C.I.)	(39) 20.3 % (15.2 - 26.6 95% C.I.)	(23) 12.3 % (8.3 - 17.8 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(21) 5.5 % (3.7 - 8.3 95% C.I.)	(10) 5.2 % (2.9 - 9.3 95% C.I.)	(11) 5.9 % (3.3 - 10.2 95% C.I.)

Table 3.8: Prevalence of underweight by age, based on weight-for-age z-scores

		Severe underweight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	113	6	5.3	15	13.3	92	81.4	1	0.9
18-29	94	6	6.4	20	21.3	68	72.3	2	2.1
30-41	81	4	4.9	12	14.8	65	80.2	0	0.0
42-53	61	3	4.9	7	11.5	51	83.6	1	1.6
54-59	30	2	6.7	8	26.7	20	66.7	0	0.0
Total	379	21	5.5	62	16.4	296	78.1	4	1.1

Table 3.9: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 378	**Boys** n = 194	**Girls** n = 184
Prevalence of stunting (<-2 z-score)	(109) 28.8 % (24.5 - 33.6 95% C.I.)	(69) 35.6 % (29.2 - 42.5 95% C.I.)	(40) 21.7 % (16.4 - 28.2 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(64) 16.9 % (13.5 - 21.0 95% C.I.)	(45) 23.2 % (17.8 - 29.6 95% C.I.)	(19) 10.3 % (6.7 - 15.6 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(45) 11.9 % (9.0 - 15.6 95% C.I.)	(24) 12.4 % (8.5 - 17.7 95% C.I.)	(21) 11.4 % (7.6 - 16.8 95% C.I.)

Table 3.10: Prevalence of stunting by age based on height-for-age z-scores

		Severe stunting (<-3 z-score)		Moderate stunting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	114	5	4.4	18	15.8	91	79.8
18-29	93	16	17.2	21	22.6	56	60.2
30-41	80	11	13.8	15	18.8	54	67.5
42-53	62	7	11.3	8	12.9	47	75.8
54-59	29	6	20.7	2	6.9	21	72.4
Total	378	45	11.9	64	16.9	269	71.2

Table 3.11: 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	378	-0.31±1.05	1.00	11	1
Weight-for-Age	379	-0.94±1.34	1.00	10	1
Height-for-Age	378	-1.25±1.66	1.00	5	7

* contains for WHZ and WAZ the children with edema.

Amudat District

Table 3.2: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 503	Boys n = 248	Girls n = 255
Prevalence of global malnutrition **(<-2 z-score and/or oedema)**	(54) 10.7 % (8.3 - 13.7 95% C.I.)	(28) 11.3 % (7.9 - 15.8 95% C.I.)	(26) 10.2 % (7.1 - 14.5 95% C.I.)
Prevalence of moderate malnutrition **(<-2 z-score and >=-3 z-score, no oedema)**	(44) 8.7 % (6.6 - 11.5 95% C.I.)	(21) 8.5 % (5.6 - 12.6 95% C.I.)	(23) 9.0 % (6.1 - 13.2 95% C.I.)
Prevalence of severe malnutrition **(<-3 z-score and/or oedema)**	(10) 2.0 % (1.1 - 3.6 95% C.I.)	(7) 2.8 % (1.4 - 5.7 95% C.I.)	(3) 1.2 % (0.4 - 3.4 95% C.I.)

The prevalence of oedema is 0.8 %

Table 3.3: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	140	2	1.4	16	11.4	121	86.4	1	0.7
18-29	141	0	0.0	14	9.9	126	89.4	1	0.7
30-41	105	3	2.9	4	3.8	98	93.3	0	0.0
42-53	89	0	0.0	7	7.9	81	91.0	1	1.1
54-59	27	1	3.7	3	11.1	22	81.5	1	3.7
Total	502	6	1.2	44	8.8	448	89.2	4	0.8

Table 3.4: 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. 4 (0.8 %)
Oedema absent	Marasmic No. 6 (1.2 %)	Not severely malnourished No. 493 (98.0 %)

Table 3.5: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 502	**Boys** n **=** 250	**Girls** n **=** 252
Prevalence of global malnutrition **(< 125 mm and/or oedema)**	(502) 100.0 % (99.2 - 100.0 95% C.I.)	(250) 100.0 % (98.5 - 100.0 95% C.I.)	(252) 100.0 % (98.5 - 100.0 95% C.I.)
Prevalence of moderate malnutrition **(< 125 mm and >= 115 mm, no oedema)**	(0) 0.0 % (0.0 - 0.8 95% C.I.)	(0) 0.0 % (0.0 - 1.5 95% C.I.)	(0) 0.0 % (0.0 - 1.5 95% C.I.)
Prevalence of severe malnutrition **(< 115 mm and/or oedema)**	(502) 100.0 % (99.2 - 100.0 95% C.I.)	(250) 100.0 % (98.5 - 100.0 95% C.I.)	(252) 100.0 % (98.5 - 100.0 95% C.I.)

Table 3.6: Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema

		Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	139	139	100.0	0	0.0	0	0.0	1	0.7
18-29	142	142	100.0	0	0.0	0	0.0	1	0.7
30-41	104	104	100.0	0	0.0	0	0.0	0	0.0
42-53	89	89	100.0	0	0.0	0	0.0	1	1.1
54-59	27	27	100.0	0	0.0	0	0.0	1	3.7
Total	501	501	100.0	0	0.0	0	0.0	4	0.8

Table 3.7: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 503	**Boys** n = 247	**Girls** n = 256
Prevalence of underweight (<-2 z-score)	(100) 19.9 % (16.6 - 23.6 95% C.I.)	(53) 21.5 % (16.8 - 27.0 95% C.I.)	(47) 18.4 % (14.1 - 23.6 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(79) 15.7 % (12.8 - 19.1 95% C.I.)	(42) 17.0 % (12.8 - 22.2 95% C.I.)	(37) 14.5 % (10.7 - 19.3 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(21) 4.2 % (2.7 - 6.3 95% C.I.)	(11) 4.5 % (2.5 - 7.8 95% C.I.)	(10) 3.9 % (2.1 - 7.0 95% C.I.)

Table 3.8: Prevalence of underweight by age, based on weight-for-age z-scores

		Severe underweight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	141	4	2.8	32	22.7	105	74.5	1	0.7
18-29	141	7	5.0	26	18.4	108	76.6	1	0.7
30-41	106	5	4.7	12	11.3	89	84.0	0	0.0
42-53	88	4	4.5	5	5.7	79	89.8	1	1.1
54-59	26	1	3.8	3	11.5	22	84.6	1	3.8
Total	502	21	4.2	78	15.5	403	80.3	4	0.8

Table 3.9: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 499	**Boys** n = 246	**Girls** n = 253
Prevalence of stunting (<-2 z-score)	(123) 24.6 % (21.1 - 28.6 95% C.I.)	(70) 28.5 % (23.2 - 34.4 95% C.I.)	(53) 20.9 % (16.4 - 26.4 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(84) 16.8 % (13.8 - 20.4 95% C.I.)	(49) 19.9 % (15.4 - 25.4 95% C.I.)	(35) 13.8 % (10.1 - 18.6 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(39) 7.8 % (5.8 - 10.5 95% C.I.)	(21) 8.5 % (5.7 - 12.7 95% C.I.)	(18) 7.1 % (4.5 - 11.0 95% C.I.)

Table 3.10: Prevalence of stunting by age based on height-for-age z-scores

		Severe stunting (<-3 z-score)		Moderate stunting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	136	8	5.9	25	18.4	103	75.7
18-29	142	18	12.7	30	21.1	94	66.2
30-41	104	8	7.7	16	15.4	80	76.9
42-53	89	5	5.6	9	10.1	75	84.3
54-59	27	0	0.0	3	11.1	24	88.9
Total	498	39	7.8	83	16.7	376	75.5

Table 3.11: 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	499	-0.69±1.05	1.00	47	1
Weight-for-Age	503	-1.00±1.27	1.00	44	0
Height-for-Age	499	-0.96±1.68	1.00	41	7

* contains for WHZ and WAZ the children with edema.

Kaabong district

Table 3.2: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 463	Boys n = 225	Girls n = 238
Prevalence of global malnutrition **(<-2 z-score and/or oedema)**	(53) 11.4 % (8.9 - 14.7 95% C.I.)	(31) 13.8 % (9.9 - 18.9 95% C.I.)	(22) 9.2 % (6.2 - 13.6 95% C.I.)
Prevalence of moderate malnutrition **(<-2 z-score and >=-3 z-score, no oedema)**	(36) 7.8 % (5.7 - 10.6 95% C.I.)	(19) 8.4 % (5.5 - 12.8 95% C.I.)	(17) 7.1 % (4.5 - 11.1 95% C.I.)
Prevalence of severe malnutrition **(<-3 z-score and/or oedema)**	(17) 3.7 % (2.3 - 5.8 95% C.I.)	(12) 5.3 % (3.1 - 9.1 95% C.I.)	(5) 2.1 % (0.9 - 4.8 95% C.I.)

The prevalence of oedema is 0.6 %

Table 3.3: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	147	6	4.1	13	8.8	127	86.4	1	0.7
18-29	140	2	1.4	11	7.9	125	89.3	2	1.4
30-41	114	3	2.6	7	6.1	104	91.2	0	0.0
42-53	49	3	6.1	3	6.1	43	87.8	0	0.0
54-59	13	0	0.0	2	15.4	11	84.6	0	0.0
Total	463	14	3.0	36	7.8	410	88.6	3	0.6

Table 3.4: 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. 3 (0.6 %)
Oedema absent	Marasmic No. 14 (3.0 %)	Not severely malnourished No. 446 (96.3 %)

Table 3.5: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 463	**Boys** n = 224	**Girls** n = 239
Prevalence of global malnutrition **(< 125 mm and/or oedema)**	(463) 100.0 % (99.2 - 100.0 95% C.I.)	(224) 100.0 % (98.3 - 100.0 95% C.I.)	(239) 100.0 % (98.4 - 100.0 95% C.I.)
Prevalence of moderate malnutrition **(< 125 mm and >= 115 mm, no oedema)**	(0) 0.0 % (0.0 - 0.8 95% C.I.)	(0) 0.0 % (0.0 - 1.7 95% C.I.)	(0) 0.0 % (0.0 - 1.6 95% C.I.)
Prevalence of severe malnutrition **(< 115 mm and/or oedema)**	(463) 100.0 % (99.2 - 100.0 95% C.I.)	(224) 100.0 % (98.3 - 100.0 95% C.I.)	(239) 100.0 % (98.4 - 100.0 95% C.I.)

Table 3.6: Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema

		Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	146	146	100.0	0	0.0	0	0.0	1	0.7
18-29	138	138	100.0	0	0.0	0	0.0	2	1.4
30-41	115	115	100.0	0	0.0	0	0.0	0	0.0
42-53	51	51	100.0	0	0.0	0	0.0	0	0.0
54-59	13	13	100.0	0	0.0	0	0.0	0	0.0
Total	463	463	100.0	0	0.0	0	0.0	3	0.6

Table 3.7: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 463	**Boys** n = 223	**Girls** n = 240
Prevalence of underweight (<-2 z-score)	(134) 28.9 % (25.0 - 33.2 95% C.I.)	(76) 34.1 % (28.2 - 40.5 95% C.I.)	(58) 24.2 % (19.2 - 30.0 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(86) 18.6 % (15.3 - 22.4 95% C.I.)	(49) 22.0 % (17.0 - 27.9 95% C.I.)	(37) 15.4 % (11.4 - 20.5 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(48) 10.4 % (7.9 - 13.5 95% C.I.)	(27) 12.1 % (8.5 - 17.0 95% C.I.)	(21) 8.8 % (5.8 - 13.0 95% C.I.)

Table 3.8: Prevalence of underweight by age, based on weight-for-age z-scores

		Severe underweight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	147	12	8.2	32	21.8	103	70.1	1	0.7
18-29	138	23	16.7	35	25.4	80	58.0	2	1.4
30-41	114	9	7.9	11	9.6	94	82.5	0	0.0
42-53	51	4	7.8	8	15.7	39	76.5	0	0.0
54-59	13	0	0.0	0	0.0	13	100.0	0	0.0
Total	463	48	10.4	86	18.6	329	71.1	3	0.6

Table 3.9: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 456	**Boys** n = 223	**Girls** n = 233
Prevalence of stunting (<-2 z-score)	(162) 35.5 % (31.3 - 40.0 95% C.I.)	(100) 44.8 % (38.5 - 51.4 95% C.I.)	(62) 26.6 % (21.3 - 32.6 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(84) 18.4 % (15.1 - 22.2 95% C.I.)	(52) 23.3 % (18.2 - 29.3 95% C.I.)	(32) 13.7 % (9.9 - 18.7 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(78) 17.1 % (13.9 - 20.8 95% C.I.)	(48) 21.5 % (16.6 - 27.4 95% C.I.)	(30) 12.9 % (9.2 - 17.8 95% C.I.)

Table 3.10: Prevalence of stunting by age based on height-for-age z-scores

		Severe stunting (<-3 z-score)		Moderate stunting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	141	19	13.5	29	20.6	93	66.0
18-29	138	38	27.5	27	19.6	73	52.9
30-41	114	15	13.2	25	21.9	74	64.9
42-53	50	6	12.0	3	6.0	41	82.0
54-59	13	0	0.0	0	0.0	13	100.0
Total	456	78	17.1	84	18.4	294	64.5

Table 3.11: 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	-0.81±1.11	1.00	10	1
Weight-for-Age	463	-1.37±1.29	1.00	7	1
Height-for-Age	456	-1.50±1.66	1.00	7	8

* contains for WHZ and WAZ the children with edema.

Kotido district

Table 3.2: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 427	**Boys** n = 227	**Girls** n = 200
Prevalence of global malnutrition **(<-2 z-score and/or oedema)**	(47) 11.0 % (8.4 - 14.3 95% C.I.)	(28) 12.3 % (8.7 - 17.2 95% C.I.)	(19) 9.5 % (6.2 - 14.4 95% C.I.)
Prevalence of moderate malnutrition **(<-2 z-score and >=-3 z-score, no oedema)**	(34) 8.0 % (5.8 - 10.9 95% C.I.)	(21) 9.3 % (6.1 - 13.7 95% C.I.)	(13) 6.5 % (3.8 - 10.8 95% C.I.)
Prevalence of severe malnutrition **(<-3 z-score and/or oedema)**	(13) 3.0 % (1.8 - 5.1 95% C.I.)	(7) 3.1 % (1.5 - 6.2 95% C.I.)	(6) 3.0 % (1.4 - 6.4 95% C.I.)

The prevalence of oedema is 0.7 %

Table 3.3: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

		Severe wasting (<-3 z-score)		**Moderate wasting (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**		**Oedema**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	133	5	3.8	19	14.3	108	81.2	1	0.8
18-29	131	3	2.3	8	6.1	120	91.6	0	0.0
30-41	83	1	1.2	3	3.6	78	94.0	1	1.2
42-53	65	0	0.0	3	4.6	61	93.8	1	1.5
54-59	15	1	6.7	1	6.7	13	86.7	0	0.0
Total	427	10	2.3	34	8.0	380	89.0	3	0.7

Table 3.4: 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. 3 (0.7 %)
Oedema absent	Marasmic No. 10 (2.3 %)	Not severely malnourished No. 414 (97.0 %)

Table 3.5: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 427	**Boys** n **=** 226	**Girls** n **=** 201
Prevalence of global malnutrition **(< 125 mm and/or oedema)**	(427) 100.0 % (99.1 - 100.0 95% C.I.)	(226) 100.0 % (98.3 - 100.0 95% C.I.)	(201) 100.0 % (98.1 - 100.0 95% C.I.)
Prevalence of moderate malnutrition **(< 125 mm and >= 115 mm, no oedema)**	(0) 0.0 % (0.0 - 0.9 95% C.I.)	(0) 0.0 % (0.0 - 1.7 95% C.I.)	(0) 0.0 % (0.0 - 1.9 95% C.I.)
Prevalence of severe malnutrition **(< 115 mm and/or oedema)**	(427) 100.0 % (99.1 - 100.0 95% C.I.)	(226) 100.0 % (98.3 - 100.0 95% C.I.)	(201) 100.0 % (98.1 - 100.0 95% C.I.)

Table 3.6: Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema

		Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	132	132	100.0	0	0.0	0	0.0	1	0.8
18-29	132	132	100.0	0	0.0	0	0.0	0	0.0
30-41	83	83	100.0	0	0.0	0	0.0	1	1.2
42-53	65	65	100.0	0	0.0	0	0.0	1	1.5
54-59	16	16	100.0	0	0.0	0	0.0	0	0.0
Total	428	428	100.0	0	0.0	0	0.0	3	0.7

Table 3.7: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 427	**Boys** n = 228	**Girls** n = 199
Prevalence of underweight (<-2 z-score)	(101) 23.7 % (19.9 - 27.9 95% C.I.)	(60) 26.3 % (21.0 - 32.4 95% C.I.)	(41) 20.6 % (15.6 - 26.8 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(68) 15.9 % (12.8 - 19.7 95% C.I.)	(40) 17.5 % (13.2 - 23.0 95% C.I.)	(28) 14.1 % (9.9 - 19.6 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(33) 7.7 % (5.6 - 10.7 95% C.I.)	(20) 8.8 % (5.8 - 13.2 95% C.I.)	(13) 6.5 % (3.9 - 10.9 95% C.I.)

Table 3.8: Prevalence of underweight by age, based on weight-for-age z-scores

		Severe underweight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	133	9	6.8	27	20.3	97	72.9	1	0.8
18-29	132	15	11.4	15	11.4	102	77.3	0	0.0
30-41	83	4	4.8	14	16.9	65	78.3	1	1.2
42-53	64	3	4.7	11	17.2	50	78.1	1	1.6
54-59	15	2	13.3	1	6.7	12	80.0	0	0.0
Total	427	33	7.7	68	15.9	326	76.3	3	0.7

Table 3.9: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 425	**Boys** n = 225	**Girls** n = 200
Prevalence of stunting (<-2 z-score)	(145) 34.1 % (29.8 - 38.7 95% C.I.)	(77) 34.2 % (28.3 - 40.6 95% C.I.)	(68) 34.0 % (27.8 - 40.8 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(95) 22.4 % (18.6 - 26.6 95% C.I.)	(48) 21.3 % (16.5 - 27.1 95% C.I.)	(47) 23.5 % (18.2 - 29.8 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(50) 11.8 % (9.0 - 15.2 95% C.I.)	(29) 12.9 % (9.1 - 17.9 95% C.I.)	(21) 10.5 % (7.0 - 15.5 95% C.I.)

Table 3.10: Prevalence of stunting by age based on height-for-age z-scores

		Severe stunting (<-3 z-score)		Moderate stunting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	132	10	7.6	21	15.9	101	76.5
18-29	131	21	16.0	36	27.5	74	56.5
30-41	82	8	9.8	25	30.5	49	59.8
42-53	65	10	15.4	11	16.9	44	67.7
54-59	15	1	6.7	2	13.3	12	80.0
Total	425	50	11.8	95	22.4	280	65.9

Table 3.11: 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	424	-0.60±1.13	1.00	9	3
Weight-for-Age	427	-1.26±1.24	1.00	8	1
Height-for-Age	425	-1.50±1.41	1.00	7	4

* contains for WHZ and WAZ the children with edema.

Moroto district

Table 3.2: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 475	**Boys** n = 224	**Girls** n = 251
Prevalence of global malnutrition **(<-2 z-score and/or oedema)**	(96) 20.2 % (16.8 - 24.1 95% C.I.)	(59) 26.3 % (21.0 - 32.5 95% C.I.)	(37) 14.7 % (10.9 - 19.7 95% C.I.)
Prevalence of moderate malnutrition **(<-2 z-score and >=-3 z-score, no oedema)**	(67) 14.1 % (11.3 - 17.5 95% C.I.)	(40) 17.9 % (13.4 - 23.4 95% C.I.)	(27) 10.8 % (7.5 - 15.2 95% C.I.)
Prevalence of severe malnutrition **(<-3 z-score and/or oedema)**	(29) 6.1 % (4.3 - 8.6 95% C.I.)	(19) 8.5 % (5.5 - 12.9 95% C.I.)	(10) 4.0 % (2.2 - 7.2 95% C.I.)

The prevalence of oedema is 0.8 %

Table 3.3: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

		Severe wasting (<-3 z-score)		**Moderate wasting (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**		**Oedema**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	134	11	8.2	23	17.2	99	73.9	1	0.7
18-29	118	7	5.9	18	15.3	92	78.0	1	0.8
30-41	113	2	1.8	15	13.3	95	84.1	1	0.9
42-53	80	3	3.8	8	10.0	68	85.0	1	1.3
54-59	30	2	6.7	3	10.0	25	83.3	0	0.0
Total	475	25	5.3	67	14.1	379	79.8	4	0.8

Table 3.4: 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. 4 (0.8 %)
Oedema absent	Marasmic No. 25 (5.3 %)	Not severely malnourished No. 446 (93.9 %)

Table 3.5: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 492	**Boys** n = 236	**Girls** n = 256
Prevalence of global malnutrition **(< 125 mm and/or oedema)**	(492) 100.0 % (99.2 - 100.0 95% C.I.)	(236) 100.0 % (98.4 - 100.0 95% C.I.)	(256) 100.0 % (98.5 - 100.0 95% C.I.)
Prevalence of moderate malnutrition **(< 125 mm and >= 115 mm, no oedema)**	(0) 0.0 % (0.0 - 0.8 95% C.I.)	(0) 0.0 % (0.0 - 1.6 95% C.I.)	(0) 0.0 % (0.0 - 1.5 95% C.I.)
Prevalence of severe malnutrition **(< 115 mm and/or oedema)**	(492) 100.0 % (99.2 - 100.0 95% C.I.)	(236) 100.0 % (98.4 - 100.0 95% C.I.)	(256) 100.0 % (98.5 - 100.0 95% C.I.)

Table 3.6: Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema

		Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	143	143	100.0	0	0.0	0	0.0	1	0.7
18-29	124	124	100.0	0	0.0	0	0.0	1	0.8
30-41	112	112	100.0	0	0.0	0	0.0	1	0.9
42-53	81	81	100.0	0	0.0	0	0.0	1	1.2
54-59	32	32	100.0	0	0.0	0	0.0	0	0.0
Total	492	492	100.0	0	0.0	0	0.0	4	0.8

Table 3.7: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 491	**Boys** n = 236	**Girls** n = 255
Prevalence of underweight (<-2 z-score)	(189) 38.5 % (34.3 - 42.9 95% C.I.)	(102) 43.2 % (37.1 - 49.6 95% C.I.)	(87) 34.1 % (28.6 - 40.1 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(111) 22.6 % (19.1 - 26.5 95% C.I.)	(53) 22.5 % (17.6 - 28.2 95% C.I.)	(58) 22.7 % (18.0 - 28.3 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(78) 15.9 % (12.9 - 19.4 95% C.I.)	(49) 20.8 % (16.1 - 26.4 95% C.I.)	(29) 11.4 % (8.0 - 15.9 95% C.I.)

Table 3.8: Prevalence of underweight by age, based on weight-for-age z-scores

		Severe underweight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	141	25	17.7	30	21.3	86	61.0	1	0.7
18-29	124	25	20.2	34	27.4	65	52.4	1	0.8
30-41	114	13	11.4	19	16.7	82	71.9	1	0.9
42-53	80	11	13.8	19	23.8	50	62.5	1	1.3
54-59	32	4	12.5	9	28.1	19	59.4	0	0.0
Total	491	78	15.9	111	22.6	302	61.5	4	0.8

Table 3.9: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 473	**Boys** n = 225	**Girls** n = 248
Prevalence of stunting (<-2 z-score)	(210) 44.4 % (40.0 - 48.9 95% C.I.)	(112) 49.8 % (43.3 - 56.3 95% C.I.)	(98) 39.5 % (33.6 - 45.7 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(102) 21.6 % (18.1 - 25.5 95% C.I.)	(51) 22.7 % (17.7 - 28.6 95% C.I.)	(51) 20.6 % (16.0 - 26.0 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(108) 22.8 % (19.3 - 26.8 95% C.I.)	(61) 27.1 % (21.7 - 33.3 95% C.I.)	(47) 19.0 % (14.6 - 24.3 95% C.I.)

Table 3.10: Prevalence of stunting by age based on height-for-age z-scores

		Severe stunting (<-3 z-score)		Moderate stunting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	137	24	17.5	31	22.6	82	59.9
18-29	114	39	34.2	27	23.7	48	42.1
30-41	111	18	16.2	24	21.6	69	62.2
42-53	80	23	28.8	13	16.3	44	55.0
54-59	31	4	12.9	7	22.6	20	64.5
Total	473	108	22.8	102	21.6	263	55.6

Table 3.11: 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	471	-0.99±1.23	1.00	21	13
Weight-for-Age	491	-1.65±1.42	1.00	11	3
Height-for-Age	473	-1.66±1.79	1.00	13	19

* contains for WHZ and WAZ the children with edema.

Nakapiripirit District

Table 3.2: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 342	Boys n = 170	Girls n = 172
Prevalence of global malnutrition **(<-2 z-score and/or oedema)**	(51) 14.9 % (11.5 - 19.1 95% C.I.)	(25) 14.7 % (10.2 - 20.8 95% C.I.)	(26) 15.1 % (10.5 - 21.2 95% C.I.)
Prevalence of moderate malnutrition **(<-2 z-score and >=-3 z-score, no oedema)**	(39) 11.4 % (8.5 - 15.2 95% C.I.)	(16) 9.4 % (5.9 - 14.7 95% C.I.)	(23) 13.4 % (9.1 - 19.3 95% C.I.)
Prevalence of severe malnutrition **(<-3 z-score and/or oedema)**	(12) 3.5 % (2.0 - 6.0 95% C.I.)	(9) 5.3 % (2.8 - 9.8 95% C.I.)	(3) 1.7 % (0.6 - 5.0 95% C.I.)

The prevalence of oedema is 0.9 %

Table 3.3: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	119	5	4.2	21	17.6	91	76.5	2	1.7
18-29	90	3	3.3	12	13.3	75	83.3	0	0.0
30-41	67	0	0.0	4	6.0	62	92.5	1	1.5
42-53	55	0	0.0	2	3.6	53	96.4	0	0.0
54-59	10	1	10.0	0	0.0	9	90.0	0	0.0
Total	341	9	2.6	39	11.4	290	85.0	3	0.9

Table 3.4: 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. 3 (0.9 %)
Oedema absent	Marasmic No. 9 (2.6 %)	Not severely malnourished No. 330 (96.5 %)

Table 3.5: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 350	**Boys** n = 176	**Girls** n = 174
Prevalence of global malnutrition **(< 125 mm and/or oedema)**	(350) 100.0 % (98.9 - 100.0 95% C.I.)	(176) 100.0 % (97.9 - 100.0 95% C.I.)	(174) 100.0 % (97.8 - 100.0 95% C.I.)
Prevalence of moderate malnutrition **(< 125 mm and >= 115 mm, no oedema)**	(0) 0.0 % (0.0 - 1.1 95% C.I.)	(0) 0.0 % (0.0 - 2.1 95% C.I.)	(0) 0.0 % (0.0 - 2.2 95% C.I.)
Prevalence of severe malnutrition **(< 115 mm and/or oedema)**	(350) 100.0 % (98.9 - 100.0 95% C.I.)	(176) 100.0 % (97.9 - 100.0 95% C.I.)	(174) 100.0 % (97.8 - 100.0 95% C.I.)

Table 3.6: Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema

		Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	122	122	100.0	0	0.0	0	0.0	2	1.6
18-29	93	93	100.0	0	0.0	0	0.0	0	0.0
30-41	69	68	98.6	0	0.0	0	0.0	1	1.4
42-53	55	55	100.0	0	0.0	0	0.0	0	0.0
54-59	10	10	100.0	0	0.0	0	0.0	0	0.0
Total	349	348	99.7	0	0.0	0	0.0	3	0.9

Table 3.7: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 342	**Boys** n = 171	**Girls** n = 171
Prevalence of underweight (<-2 z-score)	(107) 31.3 % (26.6 - 36.4 95% C.I.)	(61) 35.7 % (28.9 - 43.1 95% C.I.)	(46) 26.9 % (20.8 - 34.0 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(65) 19.0 % (15.2 - 23.5 95% C.I.)	(35) 20.5 % (15.1 - 27.1 95% C.I.)	(30) 17.5 % (12.6 - 23.9 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(42) 12.3 % (9.2 - 16.2 95% C.I.)	(26) 15.2 % (10.6 - 21.3 95% C.I.)	(16) 9.4 % (5.8 - 14.7 95% C.I.)

Table 3.8: Prevalence of underweight by age, based on weight-for-age z-scores

		Severe underweight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	117	18	15.4	23	19.7	76	65.0	2	1.7
18-29	92	15	16.3	16	17.4	61	66.3	0	0.0
30-41	67	4	6.0	14	20.9	49	73.1	1	1.5
42-53	55	2	3.6	10	18.2	43	78.2	0	0.0
54-59	10	3	30.0	1	10.0	6	60.0	0	0.0
Total	341	42	12.3	64	18.8	235	68.9	3	0.9

Table 3.9: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 340	**Boys** n = 168	**Girls** n = 172
Prevalence of stunting (<-2 z-score)	(132) 38.8 % (33.8 - 44.1 95% C.I.)	(74) 44.0 % (36.8 - 51.6 95% C.I.)	(58) 33.7 % (27.1 - 41.1 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(76) 22.4 % (18.2 - 27.1 95% C.I.)	(37) 22.0 % (16.4 - 28.9 95% C.I.)	(39) 22.7 % (17.1 - 29.5 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(56) 16.5 % (12.9 - 20.8 95% C.I.)	(37) 22.0 % (16.4 - 28.9 95% C.I.)	(19) 11.0 % (7.2 - 16.6 95% C.I.)

Table 3.10: Prevalence of stunting by age based on height-for-age z-scores

		Severe stunting (<-3 z-score)		Moderate stunting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	118	16	13.6	22	18.6	80	67.8
18-29	90	19	21.1	27	30.0	44	48.9
30-41	66	12	18.2	14	21.2	40	60.6
42-53	55	6	10.9	10	18.2	39	70.9
54-59	10	2	20.0	3	30.0	5	50.0
Total	339	55	16.2	76	22.4	208	61.4

Table 3.11: 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	339	-0.77±1.17	1.00	10	4
Weight-for-Age	342	-1.44±1.43	1.00	7	4
Height-for-Age	340	-1.55±1.64	1.00	7	6

* contains for WHZ and WAZ the children with edema.

Appendix 3: Questionnaire