THE REPUBLIC OF UGANDA

NUTRITION SURVEILLANCE DATA ANALYSIS

KARAMOJA, UGANDA

DECEMBER 2009 – MAY 2012

August 2013

ACTION AGAINST HUNGER
ACF INTERNATIONAL

Acknowledgments

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ACF would like to specially thank the technical team from the ministries, the districts, who through their diligence and perseverance were able to analyse the data and come up with a report even though there are many competing activities within the sectors.

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1 Executive Summary

Overview

Between December 2009 and May 2012, the District Health Office with support from ACF-USA implemented a UNICEF-funded nutrition project to reduce child mortality through strengthening the capacity of the Ministry of Health in detection and treatment of acute malnutrition in Uganda. One of the expected results of this project was to have a functional nutrition surveillance system established and strengthened in six districts within Karamoja region (Kaabong, Abim, Kotido, Moroto/Napak, Nakapiripirit, and Amudat). The nutrition surveillance system was implemented by conducting regular surveys (multi-stage cluster sampling methodology), three times a year at the same time of year (May, September and December), collecting data on key anthropometric, health, food security and livelihoods and WASH indicators. By May 2012, by the end the District Health Office with support ACF-USA had conducted eight rounds of nutrition surveillance surveys and reports shared with stakeholders. This report presents the results of the meta-analysis of the eight surveys combined, creating a sample of 17,696 children under 5 years of age and 13,973 households.

Key findings

Severe Acute Malnutrition (SAM) in the Karamoja region across the eight rounds of data collection was 2.1% (1.9-2.3) with fluctuations between the seasons peaking during the hunger gap in May. In the three year period of data collection, SAM rates did not significantly change, and as of May 2012 remain above the WHO threshold of 2% for a nutritional emergency.

Global Acute Malnutrition (GAM) in the Karamoja region overall across the eight rounds of data collection was 10.0 % (9.6-10.5) with fluctuations between the seasons peaking during the hunger gap in May. In the three year period of data collection, GAM rates did not significantly change. As of May 2012, all districts with the exception of Abim reported serious levels of GAM according to WHO thresholds.

Morbidity increases the likelihood of acute malnutrition with an odds ratio of 1.5 (1.3-1.7 95% CI). Of all the illnesses assessed during the data collection, **diarrhoea** has the strongest link to malnutrition with an odds ratio of 1.9 (1.7-2.1 95% CI). The association of morbidity with malnutrition showed even greater relation on MUAC with odd ration of 2.0 (1.8 -2.3) for morbidity and 2.8 (2.5 -3.1 95% CI) for diarrhoea.

Children in **agro- pastoralist** livelihood zones are less likely to be acutely malnourished with an odds ratio of 0.9 (0.79-0.97 95% CI) as compared to children in **pastoralist** livelihood zones who are slightly more likely to be acutely malnourished with an odds ratio of 1.13 (1.02-1.25 95% CI). However the relation between **Agricultural** livelihoods has inconclusi**ve** impact on malnutrition.

Children in households with a poor **Food Consumption Score (FCS)** have an increased risk of being acutely malnourished with both by MUAC and Z score an odds ratio of 1.38 (1.19-1.60 95% CI) while borderline FCS may not influence malnutrition (odds ratio of 1.06 (0.95-1.18) and acceptable FCS reduces the chance of acute malnutrition (odds ratio of 0.80 (0.72-0.90).

Children whose **Household Diet Diversity Score (HDDS)** is low have an increased risk of acute malnutrition with an odds ratio Of 1.28 (1.14-1.43 95% CI) while medium and high HDDS reduces the risk of acute malnutrition.

Children in households whose **current source of food** is mainly from purchase have an increased risk of acute malnutrition with an odds ratio of 1.36 (1.19-1.56 95% CI).

The use of **protected springs** reduces the risks of malnutrition with an odds ratio of 0.33 (0.12-0.89 95% CI) while the use of boreholes and unprotected springs may not influence nutrition status.

Summary of key recommendations

- Scale up the Integrated Management of Acute Malnutrition (IMAM) within the health system, and increase access and coverage to health and nutrition services across the region to address morbidity and malnutrition
- Improve the nutrition-sensitivity of food security and livelihoods interventions and improve the integration between programs that prevent and treat malnutrition using multi-sectoral approach as outlined in Uganda Nutrition Action Plan (UNAP).
- Promote a disaster-risk reduction (DRR) approach to livelihoods and resilience in the region, to diversify livelihoods strategies and strengthen coping strategies in times of drought or migration
- Scale-up the provision of protected water, treated mosquitoes net and promote hygiene and sanitation practices to reduce the incidence of diseases especially diarrhoea.
- Implement a longer-term nutritional surveillance system through the Ministry of Health and Ministry of Agriculture, Animal industry and Fisheries to better identify trends and relationships in the factors underlying malnutrition

2 Introduction and context

Between December 2009 and May 2012, the District Health Office with support from ACF-USA implemented a UNICEF-funded nutrition project to reduce child mortality through strengthening the capacity of the Ministry of Health in detection and treatment of acute malnutrition in Uganda. One of the expected results of this project was to have a functional nutrition surveillance system established and strengthened in six districts within Karamoja region (Kaabong, Abim, Kotido, Moroto/Napak, Nakapiripirit, and Amudat). The nutrition surveillance was implemented by conducting regular surveys (multi-stage cluster sampling methodology), three times a year at the same time of year (May, September and December), collecting data on key anthropometric, health, food security and livelihoods and WASH indicators. By May 2012, the District Health Office with support from ACF-USA had conducted eight rounds of nutrition surveillance surveys and the reports were shared with stakeholders. This report presents the results of the meta-analysis of the eight surveys combined, creating a sample of 17,696 children under 5 years of age and 13,973 households.

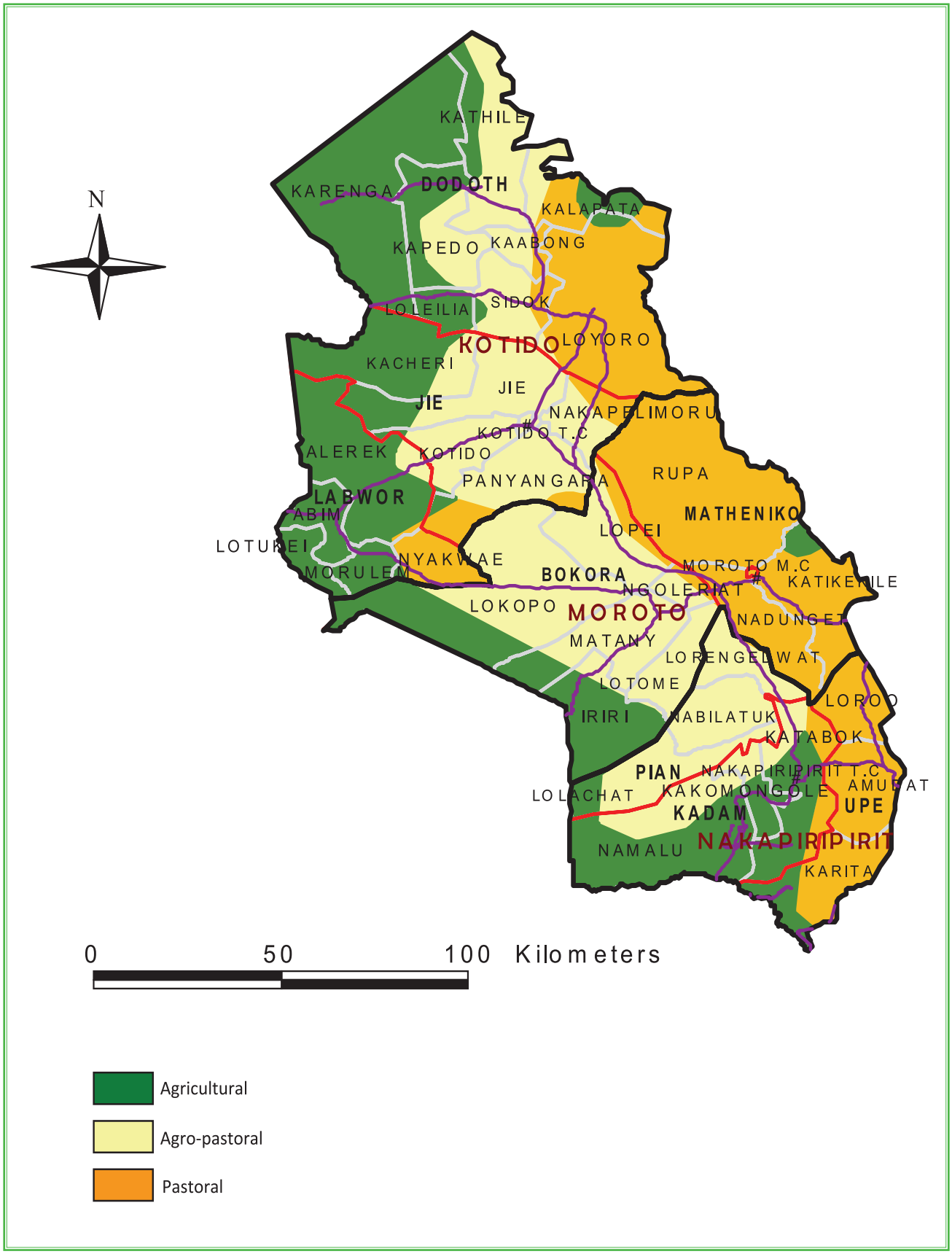
Karamoja region is located in north eastern Uganda covering a total land area of over 27,900 square kilometers with a population of approximately 1.1 million people and a population density of 48 people per square kilometer . The region is divided in seven administrative units (districts) that overlap with three main livelihood zones (agricultural, agro-pastoral and pastoral). The survey began in six districts, but later Napak was curved out of Moroto to make the seventh district in Karamoja, but the surveillance system continued including Napak under Moroto.

Table 1: Karamoja Population Figures by District

District	Total population
Kaabong	266,707 [1]
Abim	111,989 [4]
Kotido	170,738 [2]
Moroto/Napak	322,057 [3]
Nakapiripirit	176,114 [4]
Amudat	104,859 [1]
Total	**1,152,464[5]**

1- IMU, UN OCHA Uganda, http://WWW.Ugandaclusters and http://ochaonline.un.org
2- World Vision 2009 village population data
3- Kotido district 2009 village population data
4- Samaritan Purse 2009 village population data
5- WFP 2009 village population data
6- 1,062,000 according to Uganda Bureau of Statistics August 2009

Figure 1: Karamoja region livelihood zones mapping



3 Objectives

3.1 Objectives of the periodic surveillance for the districts in Karamoja Region:

- To monitor the nutrition status of children aged between 6 and 59 months,
- To identify rates of acute malnutrition among children aged between 6 to 59 months,
- To monitor health and morbidity, food security & livelihoods (FSL), and water, sanitation and hygiene (WASH) factors linked to acute malnutrition,
- To collect data according to the seasonal calendar developed for Karamoja, three times a year in May, August/September and December,
- To build the capacity of district nutrition focal persons (DNFP) and health workers on implementing a nutrition surveillance system, and
- To strengthen District Health Officers (DHO) skills to identify acute malnutrition trends, through the monitoring of aggravating factors of acute malnutrition, and contributing to the design of appropriate interventions accordingly.

3.2 Objectives of the meta analysis:

- Demonstrate sensitivity of key nutrition, FSL WASH, livelihood and seasonality variables to nutrition status; and to
- Study the behaviour of selected indicators across time and how they relate to each other and whether this is different by season and livelihood zone.

4 Methodology

4.1 Data collection methodology for the periodic surveillance

For each of the eight rounds of data collection, a multi-stage cluster sampling method was used. The clusters (villages) per district were distributed proportionally to the population size (PPS) of each livelihood zone (LHZ) that the district contains. For each district, village populations were entered in ENA software for random selection of clusters. For each selected village, a ballot system was used to randomly select one manyatta, and then to randomly select one section of the manyatta. Systematic random sampling was used to select the households (household list of the manyatta's section provided by the village leader). Between 250-500 households were selected for each round of data collection.

For each selected household anthropometric measurements, morbidity, health, FSL and WASH data were collected and analysed with ENA for SMART, Epi Info, SPSS and Excel software and the results shared in the form of a survey report for each of the eight rounds of data collection[1].

Selected households received two questionnaires:

- The first one targeting all eligible children (6- to 59 months old) in the household, capturing anthropometric measures, occurrence of common diseases (diarrhea, measles and acute respiratory infections) two weeks prior to the assessment, information regarding measles vaccination and vitamin A supplementation.
- The second questionnaire aimed at assessing possible underlying factors of malnutrition by collecting information about nutrition, health, FSL, and WASH indicators.

4.2 Meta Analysis Methodology

Datasets from 8 rounds of surveillance (from Dec 2009 through May 2012) were merged and analyzed as one dataset creating a sample of 17,696 children under 5 years of age and 13,973 households. The data was analysed using Epiinfo Version 3.5.3 and SPSS 16 to obtain overall indicators. The analysis also was stratified by district and survey round to obtain survey round and district specific indicators.

Severe Acute Malnutrition (SAM) and Global Acute Malnutrition (GAM) were the main outcome variables considered during the meta-analysis. GAM was defined as weight-for-height z-score <-2 and/or edema while SAM was defined as weight-for-height z-score <-3 and/or edema. The prevalence of GAM and SAM was determined as the proportion of children who were classified as having GAM/ SAM out of the total number of children surveyed whose records were not flagged for weight and height. (See table 2)

Bivariate analysis was conducted by cross tabulation of GAM/SAM with selected independent variables such as illness history (i.e. illness suffered two weeks prior to the survey), Livelihoods, FCS, HDDS, current food sources and water sources to determine their relationship with GAM and SAM. Odds ratio (OR) was the measure of association used to determine the relationship between GAM/SAM with the independent variables. A significant relationship was established if the 95% Confidence interval for OR did not include a one (1) in its range. That is, the interval had to be either entirely below or above one (1) for the factor to be considered a significantly related to GAM or SAM.

1- Link to all survey reports: http://www.actionagainsthunger.org/technical-surveys/list?field_tax_country_tid=121&field_pub_date_value%5bvalue%5d%5byear%5d=&items_per_page=20&page=1

5 Results

Summary of key findings

Severe Acute Malnutrition (SAM) in Karamoja region across the eight rounds of data collection was 2.1% (1.9-2.3) with fluctuations between the seasons peaking during the hunger gap in May. In the three year period of data collection, SAM rates did not significantly change, and as of May 2012 remain above the WHO threshold of 2% for a nutritional emergency.

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Children in **agro- pastoralist** livelihood zones are less likely to be acutely malnourished with an odds ratio of 0.9 (0.79-0.97 95% CI) as compared to children in **pastoralist** livelihood zones who are slightly more likely to be acutely malnourished with an odds ratio of 1.13 (1.02-1.25 95% CI). However the relation between **Agricultural** livelihoods has inconclusi**ve** impact on malnutrition.

Children in households with a poor **Food Consumption Score (FCS)** have an increased risk of being acutely malnourished both by MUAC and Z score with an odds ratio of 1.38 (1.19-1.60 95% CI) while borderline FCS may not influence malnutrition (odds ratio of 1.06 (0.95-1.18) and acceptable FCS reduces the chance of acute malnutrition (odds ratio of 0.80 (0.72-0.90).

Children whose **Household Diet Diversity Score (HDDS)** is low have an increased risk of acute malnutrition with an odds ratio of 1.28 (1.14-1.43 95% CI) while medium and high HDDS reduces the risk of acute malnutrition.

Children in households whose **current source of food** is mainly from purchase have an increased risk of acute malnutrition with an odds ratio of 1.36 (1.19-1.56 95% CI).

The use of **protected springs** reduces the risks of malnutrition with an odds ratio of 0.33 (0.12-0.89 95% CI) while the use of boreholes and unprotected springs may not influence nutrition status.

5.1 Demographic Results

Across the region, a total of eight rounds of data collection were conducted from December 2009 to May 2012. About 13,973 households were interviewed and 17,696 children 6 to 59 months were measured. **Table 1** (on page 4) summarises information on households interviewed, children measured and children flagged.

Table 2: Information related to sample size, number of children measured and number of children flagged for implausible results.

	Abim	Amudat	Kaabong	Kotido	Moroto	N/k/p	Total Karamoja
N. of HH interviewed	2339	2332	2333	2327	2303	2339	13973
N. of children measured	3011	2224	3089	3386	3138	2848	17696
N. of children flagged W/H Z score	0	1	7	0	7	5	20
N. of children flagged H/A Z score	1	0	2	8	10	6	27
N. of children flagged W/A Z score	0	0	2	1	6	4	13

5.2 Results by objectives

5.2.1 Demonstrate sensitivity of key nutrition, FSL and WASH variables to nutrition status, seasonality and livelihoods zones.

- ✓ See "Table 3: Relationship between global acute malnutrition (GAM) in children under 5 years of age and selected variables" in **Annex 5.**

5.2.2 Study the behavior of selected indicators across time and how they relate to each other and whether this is different by season and livelihood zone.

- ✓ See "Table 4: W/H-Z (wasting)-GAM among children 6 to 59 months per district, WHO 2006 Growth Standards" in **Annex 6**.
- ✓ See "Table 5: W/H–Z (wasting)-SAM among children 6 to 59 month per district, WHO 2006 Growth Standards" in **Annex 7**.
- ✓ See "Table 6: Relationship between Mid-Upper Arm Circumference (MUAC) in children under 5 years of age and selected variables" in **Annex 8.**

6 Discussions of Findings

6.1 Sensitivity of morbidity to acute malnutrition

The results show that disease has an impact on malnutrition. Children who are ill (malaria, diarrhea and acute respiratory tract infection) have an increased likelihood of being acutely malnourished with an odds ratio of 1.5 (1.3-1.7 95% CI). The results also further shows increased risk of becoming acutely malnourished in children with diarrhea with an odds ratio of (1.9 (1.7-2.1 95% CI).Illness from malaria and Acute Respiratory Infection (ARI) increases the likelihood of acute malnutrition by 1.23 times (1.11-1.36 95% CI) and1.2 (1.1-1.3 95% CI) respectively.

These results clearly indicate the possible nutritional benefits attained from interventions which prevent or reduce child illnesses.

6.2 The link between livelihoods and acute malnutrition

Pastoralist Zones:

The results show that pastoralist livelihood zones are more at risk of acute malnutrition than their counterparts in the agro-pastoralist or agricultural zones according to Results of the data. Pastoralist zones have a slightly increased risk of acute malnutrition with an odds ratio of 1.13 (1.02-1.25 CI 95%). Pastoralist livelihood zones have slightly increased risk of being acutely malnourished compared to other livelihood groups combined. This could be related to many pastoralists losing their entire livestock holdings and thus were unable to sustain themselves based upon a pastoralist livelihood as indicated in FAO report 2011[2]. They have been forced to live with relatives, take up petty-cash employment, and begging ("pastoralist drop-outs"). Pure pastoralists (those depending solely on their animals) who still have reproductive animals appear to be much better off those who are settling and trying to adopt another livelihood form. **The data on food security for much of the population in the pastoralist zone is affected by these "pastoralist drop-outs".** There are many households (55.8%) living in Karamoja but they do not own animals[3]. Although erratic weather puts a stress on livelihoods in Karamoja, the main threats currently are not from the weather, but from loss of ownership of cattle, restrictions on movement with cattle and insecurity.

Agricultural Zone:

The results show that being in Agricultural Zone has inconclusive results to malnutrition. Crop failure was much less and yet poor and very poor households had no greater self-sufficiency. In the event of a complete crop failure, it is hard to see how they could have coped without external assistance. The results of the comparison should not be surprising, looking at income from non-agricultural sources, it is clear that in case of crop failure, Agricultural Zone can reach close to their coping limit, and engaging in environmentally at-risk activities.

Agro-pastoralist Zones:

The resilience of the agro-pastoralist livelihoods is particularly remarkable given the very limited development support received. They have slightly lower chances of becoming acutely malnourished compared to other livelihood groups with an odds ratio of 0.9 (0.79-0.97 95% CI). This may be attributed to the diversification of livelihoods leading to increased

2 - Karamoja crop and livestock production and productivity assessment, FAO-2011

3 - Nutrition and Food Security Assessment in Karamoja 2012- Makerere school of public health

resilience. This suggests that the best livelihood strategies for most of Karamoja, both for income maximization and for resilience (DRR) are a combination of livestock-based herding and agriculture. Basic support to existing livestock strategies (in particular to animal health and marketing), could improve livestock productivity. Although crop harvests are unreliable in most of Karamoja, households that are able to rely on both agriculture and semi-nomadic herding as the main livelihood strategies appear to have more resilience.

6.3 Sensitivity of food security to acute malnutrition

There is an association between households with high food insecurity and high rates of acute malnutrition in the data analysed. However the available data on trends suggest that provision of food (or food as the predominant response) has not solved the problem, as acute malnutrition rates have not been reduced overall during the three years of data collection. Emergency food aid interventions have been on-going for the last 40 years in Karamoja, but provision of food aid has failed to bring acute malnutrition rates below emergency levels.

6.3.1 Food Consumption Score (FCS)

Results shows children in households with poor FCS are at increased risk of acute malnutrition with an odds ratio of 1.38 (1.19-1.60 95% CI), borderline FCS in a household has an inconclusive impact on malnutrition with an odds ratio of 1.06 (0.95-1.18 95%) and acceptable FCS in a household reduces the risk of acute malnutrition in children below 5 years with an odds ratio of 0.80 (0.72-0.90). Recent research by the International Food Policy Research Institute (IFPRI) attempted to validate the use of the FCS for classifying household food security status, based on survey data from three countries – Burundi, Haiti and Sri Lanka. The study found the usefulness of the dietary diversity and food frequency indicators encouraging. There are positive and statistically significant associations with calorie consumption per capita, particularly when small quantities are excluded from food frequencies. However, the cut-off points currently used by WFP to define poor, borderline and adequate food consumption groups correspond with energy intake that is considerably below the usual average 2,100 kcal/capita/day benchmark used to define undernourishment. Hence, the poor food consumption group corresponds with extreme undernourishment.[4]

6.3.2 Household Dietary Diversity (HDDS)

Results of children below 5 years of age in households with Low HDDS are at a higher risk of acute malnutrition with an odds ratio of 1.28 (1.14-1.43 95% CI) while Medium HDDS and High HDDS reduce the risk of acute malnutrition among children with odds ratios of 0.87 (0.80-0.99 95 % CI) and 0.84 (0.73-0.97 95 % CI) respectively. HDDS cannot be used as a proxy indicator of child nutrition status, but the results indicate that household food security affects the quality of food consumed by children.

6.3.3 Household Main Food Source

Children in households whose current main source of food is from purchase were at a higher risk of acute malnutrition with an odds ratio of 1.36 (1.19-1.56 95% CI). Children in households whose current main source of food is cultivation were less likely to be acutely malnourished with an OR of 0.83 (0.74-0.92 95% CI). Food aid as the main source of food had no significant influence on malnutrition with an OR of 0.91 (0.68-1.22). Households that purchase food as their main source of food, continue to be high in Karamoja especially

4 - WFP 2009 Emergency Food Security Assessment Handbook

during the month of May. During this time of the year most of the households have depleted food reserves and hence rely more on the purchase of food. Compounding this problem is the steady increase in food prices during this time of the year, placing additional hardship on poor households.

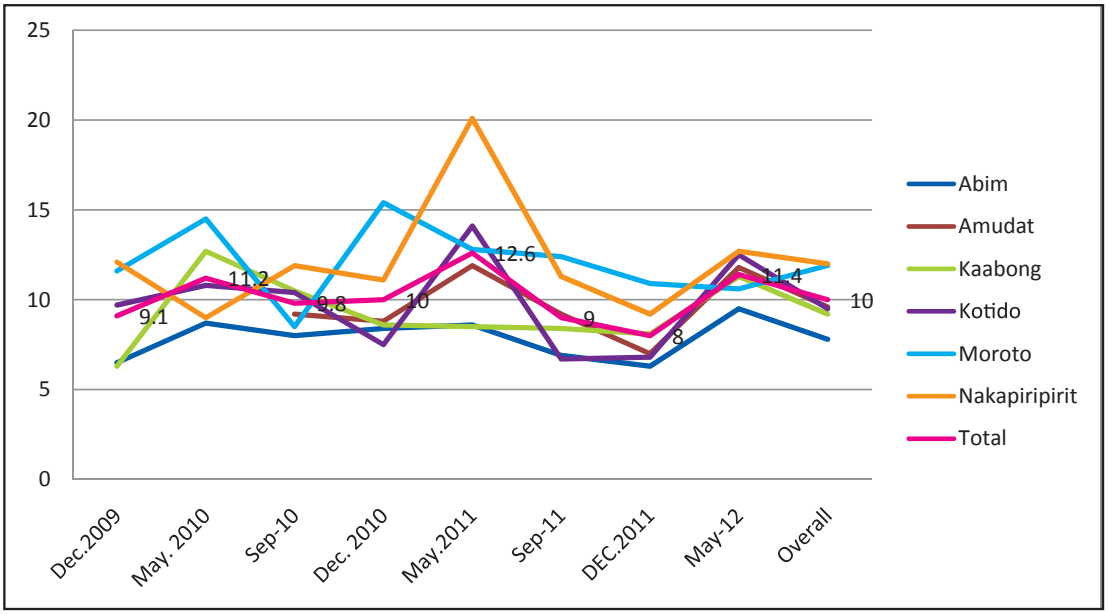
6.4 Relationship between water, sanitation and hygiene to malnutrition

If household water security is defined as accessibility, reliability and timely availability of adequate safe water to satisfy basic human needs[5], then many households in Karamoja would be classified as water-insecure. Safe water and sanitation is associated with improved child health in communities where the risk of diarrhea is high, in conjunction with the presence of sanitation facilities to promote hygiene[6].

Results shows that using water from unprotected water sources had an inconclusive impact on malnutrition with an odds ratio of 1.11 (0.90-1.36 95% CI) and using a bore hole as a source of water for the households also had an inconclusive impact on malnutrition with an odds ratio of 1.00 (0.86-1.16 95% CI) while use of a protected water source significantly reduced the risk of malnutrition with an odds ratio of 0.33 (0.12-0.89 95% CI). Distance is one of the main factors influencing water accessibility in Karamoja[7] and may also affect child care practices because of increased workload and reduced time for childcare by caretakers. Additionally, transport and storage of water in multi-purpose containers allows for increased opportunity for contamination, increasing the risk of water borne disease, such as diarrheal disease.

6.5 Behavior of selected indicators across time and how they relate to each other

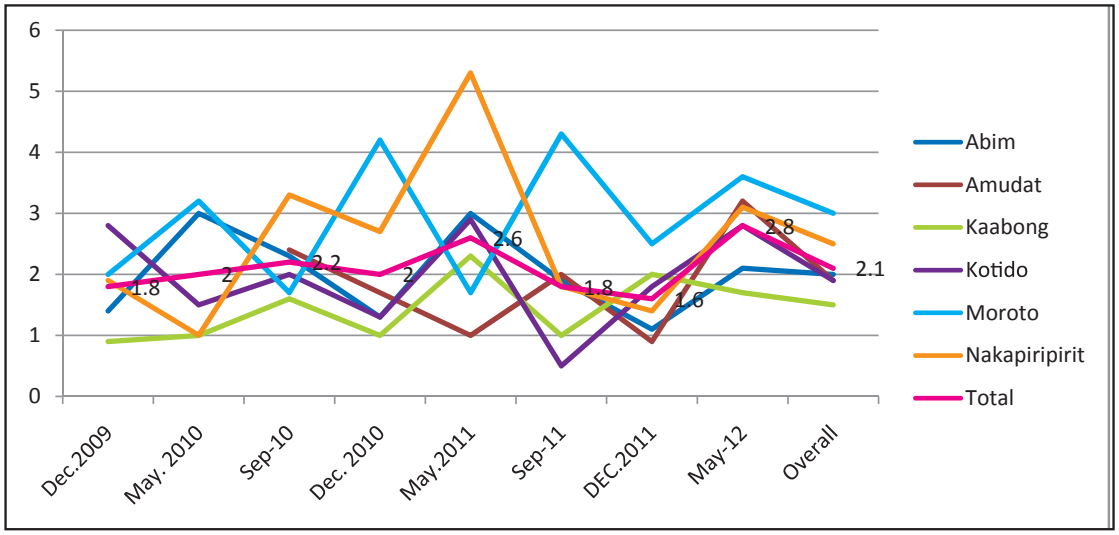
Figure 2: Trend of GAM among children 6 to 59 month per district, WHO 2006 Growth Standards



5 - UNICEF guideline on Water Sanitation and Hygiene-2006
6 - Effect of water and sanitation on childhood health in a poor-Peruvian peri-urban community
7 - DHO/ACF Nutritional Surveillance Report May 2012

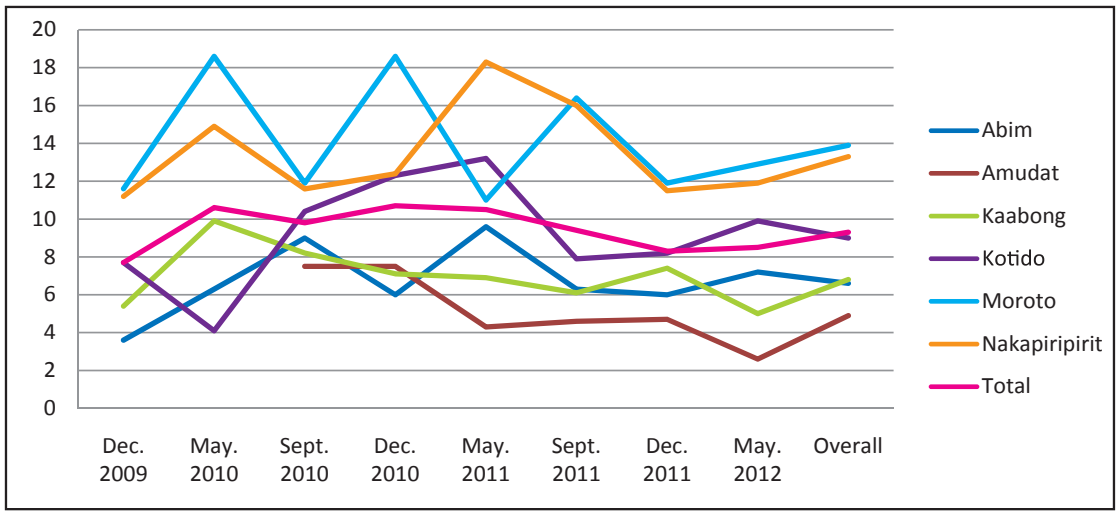
All districts with the exception of Abim reported serious levels of GAM according to WHO thresholds. The increase of GAM in May is a 'usual' trend for Karamoja as it reflects the hunger gap. Although 'normal,' this trend should not be misunderstood as being acceptable for Karamoja and calls for a reinforcement of already established programs to deal with the expected increase in acutely malnourished cases. Moroto/Napak district continues to show chronically serious prevalence rates of acute malnutrition regardless of the timing of surveillance, showing that emphasis on nutrition related programs should be reinforced throughout the year in this district.

Figure 3: Trend of SAM among children 6 to 59 months per district, WHO 2006 Growth Standards



Since the beginning of data collection the overall prevalence of SAM has not improved within Karamoja region, with fluctuations at the district level. Current programs established to prevent a deterioration of nutritional status in children are not adequately addressing the high numbers of children identified with nutritional needs.

Figure 4: Trend of Malnutrition by MAUC among children 6 to 59 months per district, WHO 2006 Growth Standards.



7 Conclusions

The meta-analysis indicates that the reasons for persistently high rates of malnutrition in Karamoja are multi-faceted and multi-causal. This is in line with the standard reference tool for understanding and analyzing the direct, indirect and underlying causes of malnutrition (adapted from UNICEF's Causal Framework for Malnutrition, see Annex 4). The causal framework cites disease and inadequate food intake as the immediate causes of malnutrition, with a number of underlying causes (water and sanitation, access to health services, care practices and food accessibility and availability) affected by deeper-rooted basic socio-economic factors.

The basic, deeper-rooted causes of malnutrition related to socio-economic factors in the Karamoja region include insecurity, livestock diseases, droughts and flooding. **Insecurity** is a chronic hazard undermining both crop and livestock production. Livestock raids have led to the loss of all types of livestock in the past. Insecurity prevents households from cultivating productive land that is located in insecure areas, reducing overall production. Inter clan conflict among Karamojong with other tribes from neighboring countries for control of resources for their livestock (water and pasture), has led to the migration of Karamojong out of the normal dry season grazing areas. This adds to the food insecurity faced by pastoralists which in turn impacts negatively on nutrition status as well as impeding access to health services leading to delays in the prevention and treatment of major illnesses that cause malnutrition. Malnourished children who are already in the nutrition program have challenges finishing nutrition treatment as a caretaker may end up dropping out because of security issues. **Livestock diseases** diminish income that can be obtained from livestock sales because it creates a situation where households can no longer survive independently when the rains are poor. However, although erratic weather also puts a stress on livelihoods in Karamoja, the main threats, currently, are not from the weather, but from loss of ownership of cattle due to cattle theft, restrictions on movement with cattle and insecurity. **Prolonged dry spells/drought and flooding** are a persistent threat, and have led to crop failures in the last three years resulting in food insecurity throughout the zone and the whole of Karamoja Region. The last serious flooding was reported in 2007. Normal seasonal water-logging occurs in low lying areas.

The data presented in this report indicate a child under five years of age has a stronger likelihood of being acutely malnourished if he/she:

- Has been ill in the previous two weeks, with malaria, ARI and particularly diarrhoea
- Lives in a pastoralist household (possibly related to the 'pastoralist drop-out effect')
- Lives in a food insecure household (classified in this report as having a poor food consumption score (FCS 0-21) or a low household dietary diversity score (HDDS $\leq$ 3)
- Lives in a household whose main source of food is from purchase rather than own production

Factors that seem to protect children against acute malnutrition include:

- Lives in a household that practices agro-pastoral livelihoods
- Lives in a household that is more food secure (FCS >35 or a HDDS >3)
- Lives in a household that cultivates own food
- Has access to a protected water source

The levels of acute malnutrition (GAM and SAM) across the six districts of Karamoja did not significantly change from the beginning of the surveillance period (December 2009) to the end of surveillance (May 2012). Current nutrition programming is not sufficient to adequately address the recurrence of malnutrition in the annual lean period and further surveillance is needed to more clearly identify the trends, causality and inter-relationship between the factors underlying malnutrition.

8 Recommendations

8.1 Health

To strengthen the health system in order to improve access, coverage and quality of treatment of common childhood illnesses and malnutrition- including the active surveillance of cases and the promotion of healthy behaviors at the community level.

8.2 Nutrition

To scale up the treatment of acute malnutrition within the health system, and increase access and coverage to health and nutrition services across the region to address morbidity and malnutrition.

To improve the nutrition-sensitivity of food security, livelihoods, and WASH interventions and improve the integration between programs that prevent and treat malnutrition.

8.3 Food Security and Livelihoods

To diversify options for livelihoods and increase resilience- support the strengthening of pastoralist systems combined with other forms of livelihoods including agriculture, and income generating activities along with restocking for pastoralist drop-outs and the most vulnerable.

To promote a disaster-risk reduction (DRR) approach to livelihoods and resilience in the region, to diversify livelihoods strategies and strengthen coping strategies in times of drought or migration.

8.4 Water Sanitation and Hygiene (WASH)

To scale-up the provision of protected water, and promote hygiene and sanitation practices to reduce the incidence of diarrhea. Hygiene programs that include hygiene kits, construction of latrines and hand-washing stations as well as teaching healthy practices like hand-washing, cooking with clean utensils, and drawing water from protected sources may reduce water related diseases.

8.5 Nutritional Surveillance

To advocate for Implementation of a longer-term nutritional surveillance systems through the Ministry of Health to better identify trends and relationships in the factors underlying malnutrition. The period of surveillance under consideration in this report (December 2009- May 2012) was not sufficient to establish longer-term trends or attribute statistical significance for a number of key indicators.

In order to complement the quantitative trend analysis and support program development adapted to the approach, it is recommended that a Nutrition Causal Analysis (NCA) exercise be conducted for the different livelihood zones in the region.

Annexes

Annex 1 - Anthropometry /Health Assessment

Sub-county: _____Parish: _____Village: _____

Manyatta Name: _____Date: _____ Cluster no._____ Team no_____

Child #	Sex (F/M)	Age in Months (probe age using calendar of event)	Weight (kg) ±0.1 kg	Height/ Length (cm) ±0.1cm	oedema (Y/N)	MUAC (mm)	Did this child have the following illnesses in the last 2 weeks						Is this child enrolled in any Nutritionprogram?[7]
							Diarrhoea (Y/N)	ORS treatment for diarrhoea (Y/N)	Malaria (Y/N)	ARI (Y/N)			

Annex 2 - Food security, Livelihood, water, sanitation and hygiene questionnaire

HH No.	1	2	3	4	5
	Gender of respondent 1=Male 2=Female	**Current HH income source** 1. Selling livestock 2. Selling crops 3. Selling brew 4. CFW (food aid) 5. Paid employment 6. Cash loan Handicrafts 7. Charcoal/firewood 8. Begging 9. Other	**Main HH expenses** 1. Food 2. Health 3. Education 4. Others (specify	**Current HH food source** 1. Cultivation 2. Hunting/ Gathering Borrowing 3. Food Aid Purchasing 4. Barter (exchange) Other	**Which of the following food groups were consumed in the household in the last 24 hours?** **(Yes=1 and No=0).** **C** = Cereals (e.g Maize, sorghum, wheat, rice, millet, residue) **O** = Oils and fats **S** = Sugar/honey **M** =Meat, offal and blood **ML** = Milk and milk products eg butter **T** =Tubers, roots and plantains eg potatoes, yams, cassava **V**=Vegetables **E**=Eggs **SCB**=Spices, condiments and beverages **L** = Beans, Lentils, Nuts **FR**=Fruits **F**=Fish

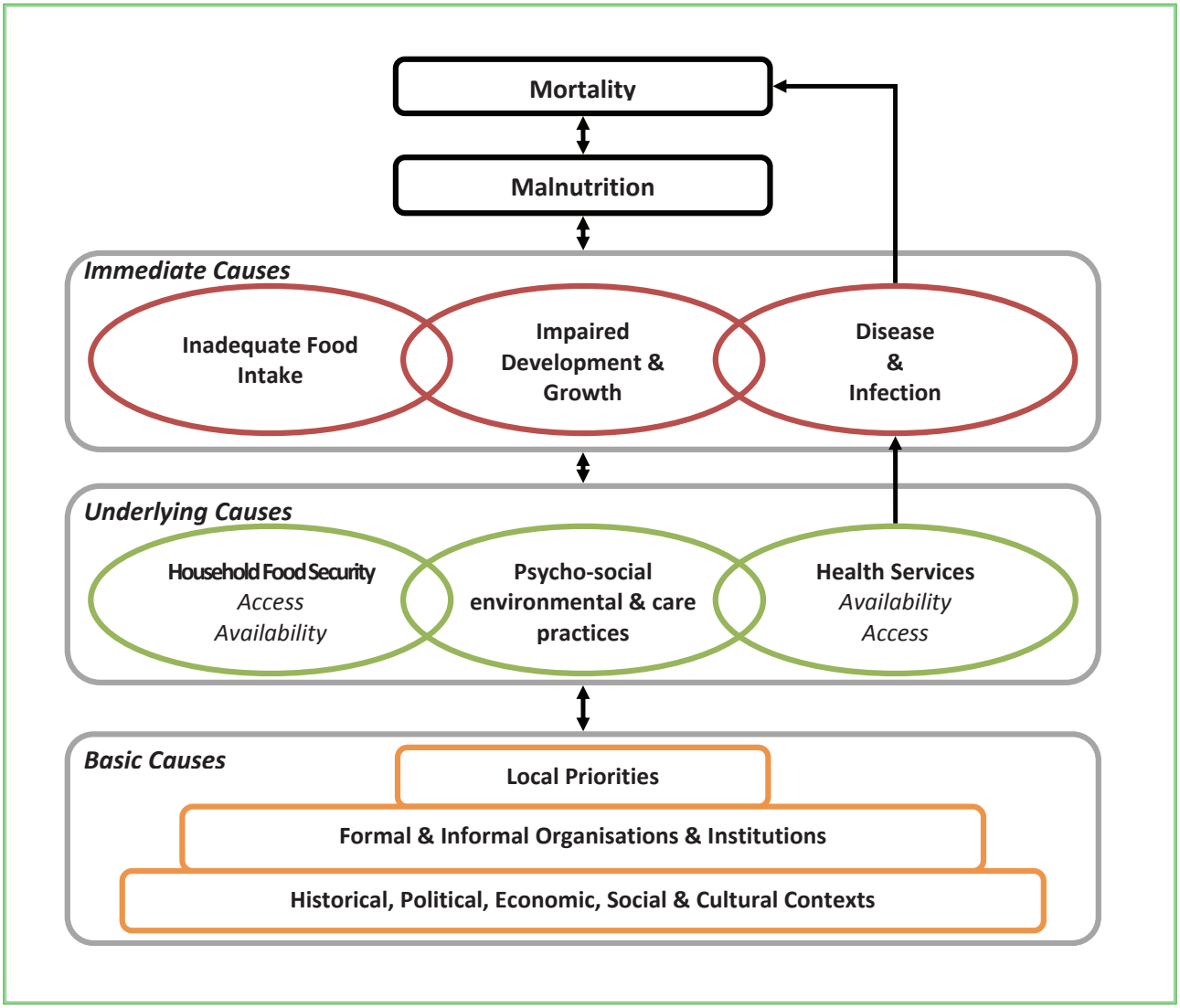
	6	7	8	9	10
	Ask how many days in the past 7 days, the household consumed each of the following food items. **C=**Cereals and tubers (Maize/ posho, sorghum, wheat, rice, cassava, millet, residue, matooke, potatoes) **O=**Oils and fats(butter, ghee, simsim, sunflower etc) **S=**Sugar honey / sweets/cakes/soda **M=**Meat,offal and blood , fish, eggs **ML=**Milk and milk products eg yoghurt, cheese **V=**Vegetables (onion, tomato, boo, akeo, ekadolia, ekoorete, etsaboliet, ejaapo, yellow pumpkin etc) **P** Pulses = Beans Lentils/Nuts peas, groundnuts, simsim) **FR=**Fruits (mango, pawpaw, ripe banana, ekimune, citrus, passion, etc.)	**Which of the following food groups were consumed by children 6-59 months in the last 24 hours? (Yes=1 and No=0).** **A=** Bread, rice noodles, biscuits, cookies, foods millet, sorghum, maize, rice, wheat, or **B** = Pumpkin, carrots, squash, sweet potatoes **C** = Roots or tubers? **D** = Any dark, green, leafy vegetables? **E=** Any other veg.? **F** = Any ripe mangoes, ripe papayas **G=**Any other fruits? **H** = Any meats? **I** = liver, kidney, heart, or blood based foods? Any eggs? **K** = Any fresh or dried fish or shellfish? **N=**Any beans, peas, nuts or lentils? **Q=** Any milk or milk products? **R=** Any foods made with oil, fat, or butter? **U=** Any sugar, soda, candies or honey? **W=** Any other foods, such as condiments, salt, pepper, coffee, tea, alcoholic beverage	**Which of the following coping Mechanisms did your household adopt in the past 7 days when they didn't have enough money or food?** 1. Rely on less preferred or less expensive food? 2. Gather wild food, hunt or harvest immature crops? 3. Consume seed stock held for next season? 4. Restrict consumption by adults in order for small children to eat? 5. Feed working members of the household at the expense of non-working members? 6. Reduce number of meals eaten in a day? 7. Not applicable 8. others (specify)	**How many meals did children 6 to 59 months in your HH eat in a day (during the last 24 hours)?** 1 = Zero 2 = One 3 = Two 4= Three 5=Four and above	**What are you feeding your child of 0-6months?** 1.Breast milk only 2.breast milk and other foods 3. Other foods only 4.Bottled milk 5. Not Applicable

	11	12	13	14	15
	What is the current main source of water for drinking in your household? 1. Bore hole 2. Protected well / spring 3. Unprotected well /spring 4. Seasonal stream / pond(Angol) 5. Swamp water 6. Pan (Akuja) 7. Tap 8. Other specify	**What is the distance to current water source? (minutes**	**Household water treatment** 1. Boiling 2. Solar 3.Flocculent/disinfectant 4. None 5. Others (specify	**Where do you dispose of human waste in your household?** 1. Private pit Latrine 2. Community pit latrine 3. Bush 4. Burying in backyard Other(specify	**What do you use to wash hands?** 1. Soap 2. Ash 3. Water only 4. Others **(if no soap, skip to 17)**
	16	**17**	**18**	**19**	
	When are the times you wash your hands with soap? 1. After Defecating 2. Baby Bottom Wash 3. Before feeding child 4. Before food preparation 5. other	**Does your household own a ITN (If yes go to 21. if no go to 20)** 1=Yes 2=No	**Why don't you own a net?** 1. Never received 2. Lost 3. Give Away 4. Destroyed 5. Sold 6. Other(specify	**Who slept in the ITN ?** 1. Children below five 2. Children above five 3. Mother 4. Father 5. None	

Annex 3 - Calendar of events

	Annual Events	2007		2008		2009		2010		2011		2012	
Jan	New Year's Day	Feast of National Unity			54		42		30	Presidential eletions	18		6
Feb	Cleaning the field, opening of schools	Beginning of rainy season			53	Fire outbreak in St. Balikuddembe (Owino) market	41		29	Presidential eletions	17		5
Mar	Women's day, Sea-nut season				52	Beginning of rainy season	40		28		16		4
Apr	Easter, White-aunt season, April fool's day			Fire outbreak at Buddo Junior Primary School	51		39		27		15		3
May	Labour day, Mango Season				50	National Child health days	38		26	Hailstorm destroys houses and crops	14		2
Jun	3rd Martyrs day,				49		37		25		13		1
Jul	9th heroes day				48	Harvesting period	36		24	15 children die due to mal	12		0
Aug	Harvest of Millet		59		47		35		23		11		
Sept	Weeding of 2nd session		58		46		34		22		10		
Oct	9th Independence Day		57		45		33		21		9		
Nov	Harvest of Millet and Maize		56		44		32		29		8		
Dec	Christmas		55		43		31		19		7		

Annex 4 - Causal Framework of Malnutrition



Annex 5 - Table 3: Relationship between global acute malnutrition (GAM) in children under 5 years of age and selected variables

Key indicators	N	GAM n (%)	Odds Ratio (OR)[7]	95% CI of OR	Interpretation
Person factors					
Illness in children <5 years in prior 2 weeks					
Yes	12840	1412 (11.0%)	1.5	(1.3 - 1.7)	Illness **increases risk** of malnutrition
No	4843	364 (7.5%)	Reference		
Malaria					
Yes	8195	907 (11.1)	1.23	(1.11- 1.36)	Malaria **increases risk** of malnutrition
No	9488	869 (9.2)	Reference		
Diarrhea					
Yes	6164	862 (14.0%)	1.9	(1.7- 2.1)	Diarrhea increases risk of malnutrition
No	11519	*914 (7.9%)*	Reference		
Acute Respiratory Infection					
Yes	7396	800 (10.8%)	1.2	(1.1- 1.3)	ARI increases risk of malnutrition
No	10287	976 (9.5%)	Reference		
Household Factors					
Livelihoods					
Agricultural	6052	606 (10.0%)	1.0	(0.9 - 1.1)	The malnutrition levels among Agriculturists is not different from those other livelihood groups combined
Agro-Pastoral	5149	472 (9.2%)	0.9	(0.79 – 0.97)	Agro-Pastoralist have decreased risk of malnutrition compared to other livelihood groups combined
Pastoral	6482	698 (10.8%)	1.13	(1.02 – 1.25)	Pastoralist have increased risk of malnutrition compared to other livelihood groups combined
Food Consumption Score (FCS)					
Poor (0 – 21)	1854	239 (12.9)	1.38	1.19 – 1.60	Children in Households with Poor FCS have increased risk for malnutrition
Borderline (21.5 – 35)	5278	551 (10.4)	1.06	0.95-1.18	Borderline FCS in a household has an inconclusive impact on malnutrition
Acceptable (>35)	7256	661 (9.1)	0.80	0.72 -0.90	Acceptable FCS in a household decreases the risk of malnutrition
Household Dietary Diversity Score (HDDS)					
Low HDDS (≤ 3)	4727	549 (11.6)	1.28	1.14 -1.43	Children below 5 years of age in households with Low HDDS are at increased risk of malnutrition
Medium HDDS (≤5)	6812	650 (9.5)	0.89	0.80 – 0.99	Medium HDDS reduces the risk of malnutrition among children
High HDDS (>5)	2849	252 (8.8)	0.84	0.73 – 0.97	High HDDS reduces the risk of malnutrition among children

Key indicators	N	GAM n (%)	Odds Ratio (OR)[8]	95% CI of OR	Interpretation
Current main food source					
Buy food	2460	310 (12.6)	1.36	1.19 -1.56	Children in Households whose current source of food is purchase had increased risk malnutrition
Cultivation	6934	637 (9.2)	0.83	0.74 - 0.92	Children in households whose current main source of food is cultivation had decreased risk of malnutrition
Food Aid	548	51 (9.3)	0.91	0.68 -1.22	Children in households whose current main source of food is food aid had an inconclusive impact on malnutrition
Water source					
Borehole	12089	1219 (10.1)	1.00	0.86 -1.16	Bore hole as a source of water for households had an inconclusive impact on malnutrition
Unprotected water sources	998	110 (11.0)	1.11	0.90-1.36	Using water from unprotected water sources had an inconclusive impact on malnutrition
Protected water sources	112	4 (3.6)	0.33	0.12 -0.89	Using water from protected water sources reduces the risk of malnutrition

Annex 6 - Table 4: W/H–Z (wasting)-GAM among children 6 to 59 months per district, WHO 2006 Growth Standards

	Round 1: Dec 2009 % (95% CI)	Round 2: May 2010 % (95% CI)	Round 3: Sept 2010 % (95% CI)	Round 4: Dec 2010 % (95% CI)	Round 5: May 2011 % (95% CI)	Round 6: Sep 2011 % (95% CI)	Round 7: Dec 2011 % (95% CI)	Round 8: May 2012 % (95% CI)	Overall (All Rounds) (95% CI)
Abim	6.5 (4.4 -9.4)	8.7 (5.7-12.4)	8.0 (5.2 -11.7)	8.4 (5.5-12.1)	8.6 (5.8-12.5)	6.9 (4.9-9.7)	6.3 (4.3-9.0)	9.5 (7.1-12.6)	7.8 (6.9-8.8)
Amudat			9.2 (6.2 -13.1)	8.8 (5.8-12.6)	11.9 (8.6-16.2)	9.2 (6.8-12.3)	7.0 (4.9-9.9)	11.8 (9.0-15.4)	9.6 (8.4-10.9)
Kaabong	6.3 (4.1 - 9.5)	12.7 (9.1-17.0)	10.5 (7.4 -14.6)	8.6 (5.6-12.4)	8.5 (5.7-12.3)	8.4 (6.2-11.2)	8.1 (6.0-10.8)	11.3 (8.6-14.7)	9.2 (8.2-10.3)
Kotido	9.7 (6.9-13.4)	10.8 (7.8- 14.7)	10.4 (7.2 -14.4)	7.5 (5.0-11.2)	14.1 (10.7-18.3)	6.7 (4.9-9.1)	6.8 (5.0-9.1)	12.5 (9.9-15.7)	9.5 (8.6-10.6)
Moroto	11.6 (8.5-15.6)	14.5 (10.9-19.0)	8.5 (5.6 -12.3)	15.4 (11.7-20.0)	12.8 (9.6-16.8)	12.4 (9.6-15.8)	10.9 (8.5-14.0)	10.6 (8.2-13.7)	11.9 (10.8-13.1)
Nakapiripirit	12.1 (8.8-16.4)	9.0 (6.0- 12.9)	11.9 (8.6 -16.2)	11.1 (7.8-15.2)	20.1 (15.6-25.3)	11.3 (8.5-14.7)	9.2 (6.7-12.4)	12.7 (9.9-16.1)	12.0 (10.8-13.3)
Total	**9.1 (7.8-10.5)**	**11.2 (9.6 -12.9)**	**9.8 (8.4 -11.3)**	**10.0 (8.7-11.5)**	**12.6 (11.2-14.2)**	**9.0 (8.0-10.1)**	**8.0 (7.1-9.1)**	**11.4 (10.3-12.7)**	**10.0 (9.6-10.5)**

Annex 7 - Table 5: W/H–Z (wasting) - SAM among children 6 to 59 month per district, WHO 2006 Growth Standards

	Round 1: Dec 2009 % (95% CI)	Round 2: May 2010 % (95% CI)	Round 3: Sept 2010 % (95% CI)	Round 4: Dec 2010 % (95% CI)	Round 5: May 2011 % (95% CI)	Round 6: Sept 2011 % (95% CI)	Round 7: Dec 2011 % (95% CI)	Round 8: May 2012 % (95% CI)	Overall (All Rounds) (95% CI)
Abim	1.4 (0.6-3.3)	3.0 (1.4-5.6)	2.3 (0.9-4.8)	1.3 (0.4-3.4)	3.0 (1.5-5.8)	1.9 (1.0-3.8)	1.1 (0.4-2.7)	2.1 (1.1-3.9)	**2.0 (1.5-2.5)**
Amudat			2.4 (1.0-4.9)	1.7 (0.6-3.9)	1.0 (0.3-3.1)	2.0 (1.0-3.8)	0.9 (0.3-2.5)	3.2 (1.9-5.5)	**1.9 (1.4-2.6)**
Kaabong	0.9 (0.2-2.7)	1.0 (0.2-3.0)	1.6 (0.6-4.0)	1.0 (0.2-3.0)	2.3 (1.0-4.9)	1.0 (0.4-2.3)	2.0 (1.0-3.6)	1.7 (0.8-3.5)	**1.5 (1.1-2.0)**
Kotido	2.8 (1.5-5.3)	1.5 (0.5-3.6)	2.0 (0.7-4.3)	1.3 (0.4-3.4)	2.9 (1.5-5.5)	0.5 (0.1-1.6)	1.8 (0.9-3.3)	2.8 (1.6-4.7)	**1.9 (1.5-2.4)**
Moroto	2.0 (0.9-4.3)	3.2 (1.6-6.0)	1.7 (0.6-3.9)	4.2 (2.3-7.2)	1.7 (0.7-3.9)	4.3 (2.7-6.7)	2.5 (1.4-4.3)	3.6 (2.2-5.7)	**3.0 (2.4-3.6)**
Nakapiripirit	1.9 (0.8-4.3)	1.0 (0.2-3.0)	3.3 (1.7-6.2)	2.7 (1.2-5.2)	5.3 (3.0-8.6)	1.8 (0.8-3.7)	1.4 (0.6-3.1)	3.1 (1.8-5.2)	**2.5 (2.0-3.2)**
Total	**1.8 (1.3-2.6)**	**2.0 (1.3-2.8)**	**2.2 (1.6-3.1)**	**2.0 (1.5-2.8)**	**2.6 (2.0-3.5)**	**1.8 (1.4-2.4)**	**1.6 (1.2-2.2)**	**2.8 (2.2-3.5)**	**2.1 (1.9-2.3)**

Annex 8 - Table 6: Relationship between Mid-Upper Arm Circumference (MUAC) in children under 5 years of age and selected variables

Key indicators	N	MUAC-GAM n (%)	Odds Ratio (OR)	95% CI of OR	Interpretation
Person factors					
Any Illness					
Yes	12,849	10.7	2.0	1.8 -2.3	Significantly increases Malnutrition (According to MUAC) by 2 time
No	4,847	5.5	Reference		
Malaria					
Yes	8,200	11.1	1.5		Significantly increases Malnutrition (According to MUAC) by 1.5 time
No	9,496	7.7	Reference		
Diarrhea					
Yes	6,169	15.2	2.8	2.5 -3.1	Significantly increases Malnutrition (According to MUAC) by 2.8 time
No	11,527	6.1	Reference		
Acute Respiratory Infection					
Yes	7,402	10.1	1.2	1.1 -1.3	Slightly increases Malnutrition (According to MUAC) by 1.5 time
No	10,294	8.7	Reference		
Household Factors					
Livelihoods					
Agricultural	4784	9.8	1.1	0.96 -1.22	The malnutrition levels by MUAC among Agriculturists has **inconclusive** impact on malnutrition
Agro-Pastoral	4363	8.7	0.90	0.79 -1.02	The malnutrition levels by MUAC among Agro-Pastoralists has **inconclusive** impact on malnutrition
Pastoral	5241	9.5	1.02	0.91 -1.15	The malnutrition levels by MUAC among Pastoralist has **inconclusive** impact on malnutrition

FCS					
Poor **(0 – 21)**	1854	14.2	1.76	1.52 -2.03	Children in Households with Poor FCS are at **increased** risk for Malnutrition by almost 2 times
Borderline **(21.5 – 35)**	5278	10.3	1.18	1.05 -1.32	Borderline FCS in a household **slightly increases** the chances of malnutrition among children below 5 years
Acceptable **(>35)**	7256	7.4	0.63	0.56 -0.71	Acceptable FCS in a household **reduces** the risk of malnutrition in children below 5 years
HDDS					
Low HDDS (≤ 3)	4727	11.6	1.47	1.31 -1.65	Children below 5 years of age in households with Low HDDS are at **higher risk** of Malnutrition
Medium HDDS	6812	8.6	0.85	0.76 -0.95	Medium HDDS score **reduces the risk** of malnutrition among children
High HDDS	2849	7.3	0.72	0.61 -0.84	High HDDS **reduces the risk** of malnutrition among children

Key indicators	N	MUAC-GAM n (%)	Odds Ratio (OR)	95% CI of OR	Interpretation
Current food source					
Buy food	2460	11.5	1.33	1.16 -1.53	Children in Households whose current source of is Buying were at **higher risk** malnutrition
Cultivation	6934	8.6	0.84	0.75 -0.94	Children in households whose current source of food is cultivation were **slightly less** likely to be malnourished
Food Aid	548	11.7	1.30	0.99 -1.69	Food aid had had **inconclusive** impact on malnutrition
Water source					
Borehole	12089	9.7	1.31	1.11 -1.54	Bore hole as a source of water for households **slightly increased** chance of malnutrition by MUAC among children in the household
Unprotected water sources	998	8.3	0.87	0.69 -1.10	Using water from unprotected water sources had **inconclusive** impact on malnutrition
Protected water sources	112	5.4	0.54	0.24 -1.25	Using water from protected water did not affect the nutrition status among children

Annex 9 - Table 7: Malnutrition by MUAC

	Abim % (95% CI)	Amudat % (95% CI)	Kaabong % (95% CI)	Kotido % (95% CI)	Moroto % (95% CI)	Nakapirip-irit % (95% CI)	Total % (95% CI)
Round 1	3.6 (2.1 -6.0)		5.4 (3.4 -8.5)	7.7 (5.2 -11.1)	11.6 (8.5 -15.6)	11.2 (8.0 -15.3)	7.7 (6.5 -9.0)
Round 2	6.3 (3.9 -9.7)		9.9 (6.8 -14.0)	4.1 (2.3 -6.9)	18.6 (14.6 -23.5)	14.9 (11.0 -19.6)	10.6 (9.2 -12.3)
Round 3	9.0 (6.0 -12.9)	7.5 (4.7 -11.1)	8.2 (5.5 -12.0)	10.4 (7.2 -14.4)	11.9 (8.5 -16.2)	11.6 (8.3 -15.8)	9.8 (8.4 -11.3)
Round 4	6.0 (3.6 -9.3)	7.5 (4.7 -11.1)	7.1 (4.5 -10.7)	12.3 (9.0 -16.5)	18.6 (14.5 -23.5)	12.4 (8.9 -16.7)	10.7 (9.4 -12.3)
Round 5	9.6 (6.6 -13.6)	4.3 (2.4 -7.4)	6.9 (4.4 -10.5)	13.2 (9.9 -17.4)	11.0 (8.0 -14.9)	18.3 (14.0 -23.3)	10.5 (9.2 -12.0)
Round 6	6.3 (4.3 -9.0)	4.6 (2.9 -7.0)	6.1 (4.3 -8.6)	7.9 (5.9 -10.5)	16.4 (13.2 -20.2)	16.0 (12.7 -19.8)	9.4 (8.4 -10.5)
Round 7	6.0 (4.1 -8.8)	4.7 (3.0 -7.3)	7.4 (5.4 -9.9)	8.2 (6.3 -10.8)	11.9 (9.3 -15.0)	11.5 (8.7 -14.9)	8.3 (7.4 -9.4)
Round 8	7.2 (5.2 -10.0)	2.6 (1.3 -4.7)	5.0 (3.3 -7.5)	9.9 (7.6 -12.9)	12.9 (10.2 -16.1)	11.9 (9.2 -15.2)	8.5 (7.5 -9.5)
Overall (All Rounds) (95% CI)	**6.6 (5.8 -7.6)**	**4.9 (4.1 -6.0)**	**6.8 (6.0 -7.8)**	**9.0 (8.1 -10.1)**	**13.9 (12.7 -15.2)**	**13.3 (12.1 -14.7)**	**9.3 (8.9 -9.7)**

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