# WFP Uganda
# Emergency Food Security Assessment Of IDP Camps and Settled Areas in The Northern and North-eastern Conflict Affected Regions.
# March-April 2007

**Final Report**
**August 2007**

## ACKNOWLEDGEMENT

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**Country Director and Representative**
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## Brief History of the Conflict in Northern Uganda

The conflict in Northern Uganda has been labelled as one of the most vicious in Africa, and is, after 20 years, one of the longest running conflicts in Africa. Led by Joseph Kony, The Lord's Resistance Army (LRA) began a guerrilla war in 1987 in Northern Uganda against the Uganda People's Defence Force (UPDF). The conflict has caused extensive suffering to the people of Northern Uganda. Around 1.24 million people still live in the IDP camps, hundreds of thousands of people from Adjumani to Soroti have been killed, between 20,000 to 25,000 children have been abducted, and the economy (especially agriculture) in the Acholi areas has been almost completely destroyed. The economic cost of the conflict on the national economy has been estimated at over $1.33 billion US$. This is equivalent to 3% of GDP, or $100 million annually[1].

The insurgency was historically contained to the region known as Acholiland, consisting of the districts of Kitgum, Gulu, and Pader, though since 2002 violence has overflowed into other Ugandan districts. The LRA also operated across the porous border region with Southern Sudan and most recently into the North-eastern Ituri Province in the Democratic Republic of the Congo.

## WFP Assistance

Currently WFP is running a Relief and Recovery Operation (PRRO) from April 2005 to March 2008. A planning figure of 1.28 million IDPs was used, as it was assumed that 1.24 million would voluntarily return to their homes by the end of 2007. Food assistance was planned to provide the IDPs with 50 percent of the 2,100 kcal/person/day in 2005–2006 and a reduction in the ration to 30 percent in 2006–2007. In May 2007 WFP was feeding 1.24 million IDPs in Acholiland and Lira and providing a ration of between 50 and 60% of the 2,100 Kcal limit.

With improving security, IDPs in the Lango subregion are returning home. It is estimated that only 165,000 will still be in camps at the end of 2006, and they will all have returned home by the end of 2007. In Acholi region up to 380,000 IDPs are expected to return home in 2007, leaving a caseload of 703,000 in 2008. The situation is difficult to predict in Acholi region, however, and results from an EFSA in October 2006 indicated that because of security concerns – the lack of a comprehensive peace agreement - about 73 percent of the people in camps did not know when they would return. Only 13 percent were certain of returning between 2006 and 2008, and 14 percent did not intend to leave the camps.

A recent FAO led Land Access Survey indicated that households are increasing their access to land as well as plot size, enlarging from 3.29 in 2006 acres to 4.09 acres in 2007. It is hoped that this trend will continue as security improves. Potential production levels remain uncertain as there is a shortage of seeds and tools.

As IDP households begin the process of returning, they will require more cash to rebuild their homes and livelihoods. Anecdotal reports suggest that to acquire enough money to resettle, IDP households are selling more of their own production than they would otherwise. In order for this not to have an affect on the household nutritional status, WFP will continue to provide general food assistance to IDPs in camps, at the current ration level of between 50% and 60% of the WFP's recommended daily ration of 2,100 Kcal.

[1] Jeff Dorsey and Steven Opeitum for the Civil Society Organisations for Peace in Northern Uganda (CSOPNU), The Net Economic Cost of the Conflict in the Acholiland Sub-Region of Uganda, Kampala, September 2002

## Study objectives and methodology

The purpose of the study was to determine the degree of food insecurity in Northern Uganda. The study focused on the Gulu, Pader and Kitgum, mother and transit camps, the and Oyamin, Amuria, and Katakwithe mother camps and Lira resettlement camps.

## Definition, terminology and concepts

Food Security: Based on the definition from the 1996 World Food Summit food security is defined as *when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life*.

## Sources of data

### Primary data collection and tools

The results of this study are based on collected household data from the mother, transit and resettlement camps in Northern Uganda. The data were collected at the beginning of April by enumerators using a quantitative household questionnaire. The questionnaire was a closed ended tool which focused on household demographics, economic and livelihood activities, access to land and agricultural activities, consumption, expenditure, shocks and coping and mother and child MUAC (Middle Upper Arm Circumference).

## Sampling procedures

The sample for the study is based on a two stage sampling procedure. The first stage or cluster is the village and was selected by PPS (Probability Proportion to Size). Households within the cluster were then randomly selected. For the purposes of this study, the sample universe was all villages in the resettled areas in Lira, all IDP camps (mother and transit) in Gulu, Pader, Kitgum, Apac, Oyamin, Amuria, and Katakwithe. The population figures for the selection of the clusters were based on the WFP distribution figures and population figures for the resettlement area came from Government of Uganda. In the resettlement areas, if the villages had a population greater than 5000 people they were removed from the sample prior to selection as these population centres are not classified as rural by WFP-VAM.

## Stratification

The study was designed to be representative at the mother and transit camps[2] for each of the districts and for the Lira resettlement area. **For the purposes of reporting unless the results for a particular strata differed significantly from the mean, the results will be reported at the super-strata level** (Mother Camps, Transit Camps and Resettlement Area). The breakdown of the super strata and strata are as follows:

[2] Please note, when the sample for this study was designed, transit camps were classified as the intermediate areas where IDP households had gathered outside of the official IDP camps. These camps have been re-classified as spontaneous settlements.

**Mother Camps (5).**

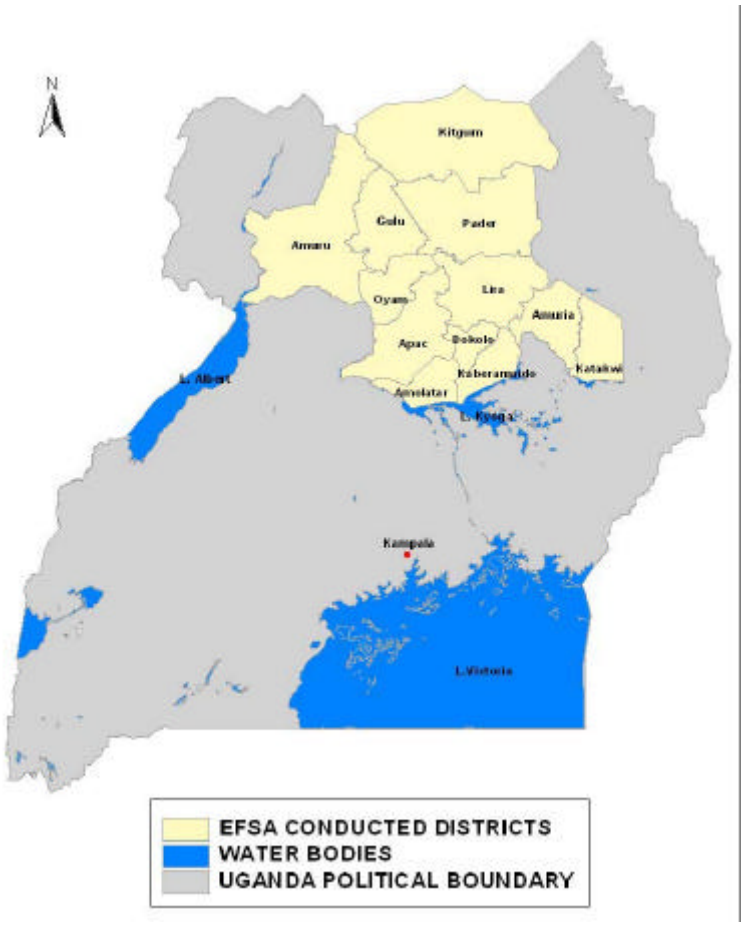
- Gulu
- Pader
- Kitgum
- Apac & Oyamin
- Amuria, & Katakwe .

**Transit Camps (3)**

- Gulu
- Pader
- Kitgum

**Resettled Areas**

- Lira




**Clusters Selection**

Based on the WFP sampling guidelines, it was calculated that 22 clusters per strata were required to provide a representative sample with a 95% confidence interval at a precision of +/- 7.5%. The clusters were selected by PPS, based on a systematic sampling pattern with a fixed interval combined with an initial random number.

Household Selection

Households for this study were selected based on a systematic sampling pattern with a fixed interval combined with an initial random number. The households were drawn from camp/village resident lists of households provided by camp administrators or community leaders.

Table below is the number of households by strata interviewed:

| Strata | Number of Households | Number of Strata |
|---|---|---|
| Gulu Mother Camp | 210 | 21 |
| Gulu Transit Camp | 220 | 22 |
| Kitgum Mother Camp | 220 | 22 |
| Kitgum Transit Camp | 219 | 22 |
| Pader Mother Camp | 219 | 22 |
| Pater Transit Camp | 217 | 22 |
| Apac & Oyam Mother Camps | 209 | 21 |
| Amuria & Katakwi Mother Camps | 221 | 22 |

**Data entry and statistical analysis**

When the questionnaires were completed, they were forwarded to Kampala for data entry. A data entry application was created by ODK in Microsoft Access. The application was installed on a local network. One half-day training was given to the clerks which outlined the process of data entry and practice with the application. Eleven data entry clerks entered all the questionnaires over a period of 7 days. As the households questionnaires were completed, they were filed in numerical sequence for checking purposes. Data supervisors, aside from clarifying queries from the clerks on the data entry, marked a random selection of questionnaires to estimate the accuracy of the clerks. After marking 3% of all the questionnaires, an error rate of 0.01% was calculated.

Statistical analyses were mainly run using SPSS. Principal component analyses and Cluster Analyses were run using ADDAWIN.

**Limitations to the study**

While the study was conducted in the most rigorous manner possible, some limitations must be acknowledged.

**Representativness:** Data were collected to be representative at each of the camps and selected districts and can be used for comparison across strata but not within. As always with large scale surveys, sampling error due to multi-stage sampling needs to be acknowledged in interpreting the results

Additionally urban populations are not included in this sample. The specific needs of these communities are not addressed in this analysis. Inclusion of these populations would have lead to under representation of rural households. Also, due to the difference in their needs and situation requires different data collection tools and sampling.

**Questionnaires:** The questionnaire was designed in English and then administered in a local dialect. Intensive training was provided to the supervisors and enumerators together and in small groups. Despite all efforts to reduce error in understanding of the concepts and individual questions contained in the questionnaires, misinterpretation of the questions contained in the survey tools is possible and may have affected the outcome of the analysis.

**Data quality:** Inaccurate recall and quantitative estimates may have affected the quality of the results. The experience of the enumerators and additional training was used to facilitate such recalls and estimates through various methods (e.g. event calendars, proportional piling and income estimation). In some cases social desirability[3]

[3] When a respondent answers in a way that he or she thinks will please the interviewer or result in direct benefits to him or her.

and expectations (e.g. food aid) may have affected the responses. During the training the enumerators were briefed on the importance of ensuring that the interviewees understood that there was no direct benefit from participation in the study nor would the interview process result in inclusion in an intervention.

Although every effort was made to collect data from the Head of Household in each case many of the respondents were the spouse of the household head. The variability in the recall of expenditure and income between these individuals is likely to have affected the quality of the data.

**Contextual:** The data were collected in April. This is during the onset of dry or 'lean' season. Therefore, although the questions are designed to capture longer-term information about the household the current circumstances are likely to reflect in the data collected. Thus interpretation of the data should consider the timing of the survey.

### Household food consumption and access profiling

Household food security profiles were developed using information on dietary diversity, the consumption frequency of staple and non-staple food, sources of foods consumed, the percentage of total household expenditure spent on food and per capita monthly expenditure.

The number of different foods from different food groups, consumed in a household reflects the dietary diversity and it provides a measure of the quality of the household diet. The variety of foods/food groups consumed by household members is a proxy indicator of household food security and research has demonstrated that dietary diversity is highly correlated with caloric and protein adequacy, percentage of protein from animal sources (high quality protein) and household income.

In order to classify households on the basis of their actual weekly food consumption, the frequency of consumption for the 19 food items was reorganized into 9 main food groups (days of consumption, 0 to 7 days per week). The organisation of these groups is defined in the annexes at the end of this report.

Each household was asked to report the main sources for each food item consumed in the past week. Possible options included: own production, hunting, fishing and gathering, exchange labour/items for food, borrowing, purchase, gift from relatives and food aid. The number of responses for each source was 'weighted' by the frequency of consumption of the foods that were accessed through that particular source. Then the proportion of consumption from each source was calculated.

Using information from expenditure section, share of expenditure devoted to food and per capita expenditure were calculated.

### Methodology for analyzing food consumption and access data

The analysis of multiple variables simultaneously required the use of multivariate statistical techniques. Specifically a principal component analysis (PCA) followed by cluster analysis[4] was used to cluster together households that share a particular food consumption/access pattern. The advantage of running a cluster analysis on principal components and not on the original variables is that the clustering is done on the relationship among variables. A PCA was run on the frequency of consumption of the above mentioned food groups, sources of consumed foods, share of total household expenditure spent on food and per capita monthly expenditure.

[4] The software used for multivariate analyses (PCA and Cluster Analysis) is ADDAWIN, freely available at http://cidoc.iuav.it/~silvio/addawin_en.html

A cluster analysis was run on 14 principal components obtained by PCA, which explained more than 90% of the variance of the original dataset. Such a high level of consistency with the original complexity of the dataset ensures a good reflection of the relationships among variables. It guarantees also that particular combinations of variables' values (frequencies of consumption of single food groups, particular food source and expenditure patterns) are maintained and not smoothed too much through a high data reduction approach.

Based on this analytical approach, 16 distinct profiles of households were identified being characterized by their different food consumption and access patterns. These 16 profiles could be summarized into 5 main food consumption groups and into 5 different access profiles. The combinations of those characteristics together with expenditure capacity will result into a 4-group food security classification.

Annexes I-III contain tables that present average characteristics for each consumption and access category.

**Household Food security profiling**

Household food security profiles were determined through a qualitative interpretation of the different pieces of information entered into the analysis. The final classification was based on convergence of food access, actual food consumption, food sources and expenditure on food and per capita total expenditure. Based on this convergence of indicators, four final categories were created: Food Insecure, Moderately Food Insecure, Moderately Food Secure and Food Secure.

Based on the results of the analysis, below is the proportion of households by food security category and a brief description of the principal factors describing the households.

**Food Insecure (13%)**

- Households with very poor or poor food consumption that accessed their food mainly through the market but with little cash availability both for food and non-food basic needs.
- Households with poor food consumption that declared having borrowed food/money for food, again with little cash availability.

**Moderately Food Insecure (55%)**

- Households with poor food consumption relying on their own production but do not have enough cash to improve their diet; households with a borderline[5] diet that depends heavily on food aid/gift as sources of their food needs but expenditure capacity is already on food is already quite high.
- Households with borderline diet buying their food with a relatively higher proportion of their expenditure allocated on non-food items, but with very low total expenditure.
- Households with good food consumption heavily relying on aid and with a very small total expenditure.

**Moderately Food Secure (14%)**

- Households with borderline diet getting food from purchase and exchange of goods/labour and have little money but also very little dependency from aid.
- Households with good diet that acquire a lot of their food from aid and are currently spending proportionally very little on food:
- Households with a good diet but are focused on starchy staple. They are currently getting less food aid compared to the sub-groups described above.

[5] Borderline implies a consumption pattern of households consuming staples daily; pulses between 4 and 6 days/week; vegetables 3 days/week and oil 2 days/week on average. For more details on the consumption patters please refer to Annex 2

**Food Secure (18%)**

- Households with good food consumption from mixed sources and per capita expenditure is above the sample average.
- Households with very good diet relying on purchases with per capita cash expenditure well above the sample average.

**Geographic distribution of consumption profiles**

Applying the results of the analysis above on the household data collected for each of the strata, the distribution of the food security classes by strata is as follows:

| | Food Insecure | Moderately Food Insecure | Moderately Food Secure | Food Secure |
|---|---|---|---|---|
| Gulu Mother Camps | 8% | 56% | 22% | 14% |
| Gulu Transit Camps | 8% | 68% | 17% | 8% |
| Kitgum Mother Camps | 10% | 53% | 12% | 25% |
| Kitgum Transit Camps | 8% | 54% | 18% | 21% |
| Pader Mother Camps | 11% | 52% | 12% | 25% |
| Pader Transit Camps | 14% | 70% | 9% | 7% |
| Apac & Oyam Mother Camps | 24% | 52% | 19% | 5% |
| Amuria, Katakwi Mother Camps | 24% | 27% | 19% | 30% |
| Lira Resettlements | 15% | 59% | 8% | 18% |
| ***Total*** | ***13%*** | ***55%*** | ***14%*** | ***18%*** |

The table above shows Food Security profiles being fairly equally distributed across the nine surveyed areas. However, **the proportion of food insecure households in the Pader Transit camps, the Apac & Oyam camps. The Amiruia & Katakwi camps and Lira resettlement areas is significantly higher that the other strata**.

**Household Survey Results/Outcomes**

**Demographics**

Slightly more than 28% of the households in the sample were headed by women. On average households headed by a woman were more common in mother camps (31%), while transit camps and resettlement areas scored a similar prevalence (21%). In particular, 42% of households were female headed in Amuria and Katakwi mother camps and 39% in Pader mother camps. Gulu and Kitgum transit camps had the lowest female head prevalence, 15% and 18% respectively. There is no statistically significant relationship between the food security status of the household and the sex of the head of the households. **The highest prevalence of female headed households is found among households relying on borrowing and gift for their food needs, 62% and 54% respectively.**

The average household head age was estimated at 40 years and that of the head's spouse at 33 years. Average household size is approximately 6 people.

According to household responses, 61% of the households heads reported being married, 17% living with but not married to a partner, 16% were widow or widower, about 2% were living apart but not divorced, another 2% were never been married and slightly more than 1% declared to be divorced.

Significant differences were found according to sex of household head: of the female heads, 54% reported being widowed, 29% married and less than 5% were cohabiting

without being married. Male heads were married in 74% of the cases, cohabitating in 22% and less than 2% were widowers.

Among male heads, 30% declared to have polygamous households. However, polygamous households did not report having statistically significant larger households or younger or older head and spouse.

### Chronically ill or disabled

Approximately 14% of the heads declared to be chronically ill or disabled. Households in Lira resettlement areas were found to have statistically significant ($p<.05$) lower prevalence (6%) compared to mother and transit camps (17% and 14%). The prevalence of ill or disabled household heads in the Pader camps, both mother and transit, were found to be lower when compared to the camps in other areas.

A similar trend was found about households with chronically ill or disabled people other than the head. The lowest rate was found in Lira resettlement areas (9%) versus a higher incidence in mother and transit camps (18% and 20%). The Pader mother camps registered the lowest rate among camps (12%).

### Education

### Adult education

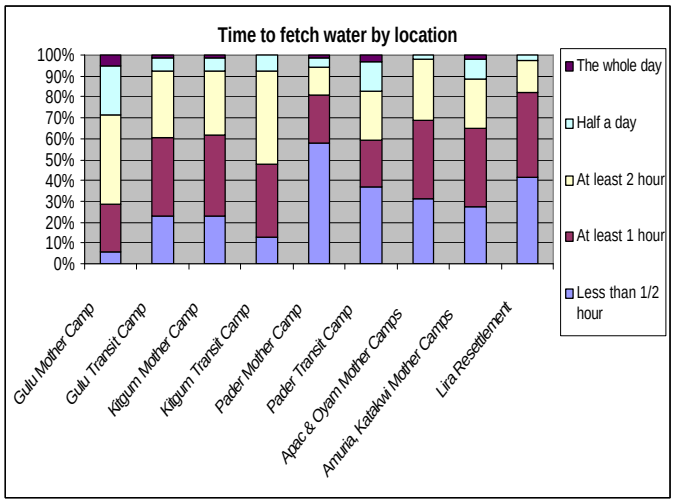
69% of the household heads interviewed and 38% of the household head's spouse can read and write. The percentage of literacy among spouses in transit camps was found to be significantly ($p<.05$) lower (28%) than the mother camps and resettlement areas (38% and 43%).

About 75% of household heads declared to have had some formal education. The lowest percentage was found in camps in Amuria and Katakwi where just 45% of household heads could read and write.

### Health

### Important diseases

Diarrhea and malaria were the two most frequently self-reported diseases: 59% of the sampled households reported having had at least one member suffering diarrhea in the previous 3 months and 85% reported malaria. However, it should be noted that the percentages are based on self-reporting and not checked through appropriate malaria testing. Simple fever, flu and malaria might have been confused by people and reported identified as the same disease. Estimating disease prevalence was not part of the survey's objective.




### Water Access

Access to safe drinking water is estimated by the percentage of the population using improved drinking water sources, as per UNICEF's

definition[6]. The most common source of water was from borehole, used by 70% of the sample. This was followed by protected spring/well (10%) and unprotected spring/well (10%). While the large majority of households in all the camps got water from boreholes, 37% of households in Lira resettlements got water from unimproved sources (in particular, 33% from unprotected spring/wells).

Thirty percent of the households reported that it took less than half an hour to fetch water; another 32% reported water collection takes at least 1 hour, 27% at least 2 hours, 11% half a day or more. The graph above shows time breakdown by location.

Expect for Lira, there is little variance between the water source and the time needed to collect water. This could be explained, as very few households indicated water sources outside of a borehole. In the Lira settlement strata, on average, water collection took between 'less than half an hour' to '2 hours' regardless of the source except for households that access water from and un-protected spring/well. Households that drank water from this source had a significantly ($p<0.05$) higher proportion requiring '2 hours or more' to collect water.

### Displacement

90% of the surveyed households (excluding Lira) declared to be currently displaced from their normal place of living. The highest prevalence was found in mother camps (91%), followed by households in transit camps (84% of those living there being displaced). Just 3% of the households living in Lira resettlements affirmed to be displaced at the time of the survey.

### Distance of displacement

Almost all of those displaced living in camps were living in their district and sub-county[7] of origin. A higher percentage of households in the transit camps indicated currently residing in their parish of origin (Kitgum 95%, Pader 90% and Gulu 70%). Where as fewer households in the mother camps indicated this (Pader 62%, Gulu 47% and Kitgum 46%).

### Duration of Displacement

On average, 52% of currently displaced household declared to have been so for between 1-5 years. However, almost all (95%) of the displaced households in Apac & Oyam mother camps reported being displaced within the last 1-5 years. Among the other camps, the highest share of households being displaced for prolonged period were found among Amuria & Katakwi mother camps where 22% reported being displaced for 15 years or longer.

### Returning Strategy

Almost 90% of the displaced households intended to return to their place of origin (mother camps 89% and transit camps 93%). On average, 36% of displaced households hoped they could return within the current year (2007), while another 30% hoped to get back to their place of origin the following year (2008). On average, **32% of households reported not to know when they could return to their place of origin**. However this figure is significantly higher for households in the Gulu transit camps (67%), Kitgum

[6] safe drinking water is defined by households using improved drinking water sources which include: Household connection, Public standpipe, Protected dug well, Protected spring, Rainwater collection.
[7] The sub-county is the smallest administrative unit in Uganda. Typically, a district or would be made up of between 6-8 sub counties. Gulu, Pader, Kitgum, Apac, Katakwi, Oyam, Lira and Amuria are all districts.

transit camps (53%) and Amuria & Katakwi mother camps (53%) who did not know when they would return. It should also be noted that the 52% of households in the Kitgum mother camps; 44% in the Pader mother and 47% in the Pader transit camps indicated that they hoped to return to their place of origin within the current.

### Impediments to Returning

Among the households that indicated being displaced, **60% reported insecurity as one of the reasons that prevented the household from returning to their place of origin**. The percentage of households mentioning insecurity as a reason for not returning was highest in Kitgum (transit camps 89%, mother camps 76%), Gulu and Pader transit camps (74%) and in Amuria & Katakwi mother camps (87%).

Aside from insecurity, the following are the key impediments for returning:

- 53% of households indicated a lack of shelter in their village of origin
- 27% declared that they were waiting for directives from the government. This reason was mentioned by one third of households in Kitgum, Gulu and Pader
- 20% of the displaced households in the Apac & Oyam camps indicated that the lack of food distributions in their place of origin was a cause for not returning.[8]
- In the Gulu transit camp:
    - 37% indicated that it was the lack of potable water (11% for the entire sample)
    - 33% of households reported that land mines were delaying their return (9% for the entire sample)
    - 31% of household indicated that it was the lack of health facilities (9% for the entire sample)
    - 24% indicated that is was because there was no school in their place of return (8% for the entire sample)

Based on an analysis of the household intention to return and their food security status, there is no significant relationship between the food security status of the household and their decision to return to their place of origin. **This would suggest that the food security status of a household does not seem to be a factor influencing the decision of households to return to their place of origin.**

### Agriculture

Households were asked whether they had access to adequate arable land to grow enough food for the households. On average, 68% of the interviewed households responded they had access to land. As expected land access was reported to be better in Lira resettlement areas (92%) compare to transit camps (75%) and mother camps, where on average 59% of households reported having access to enough land.

Among households who reported not to have access to enough land, the main reasons were:

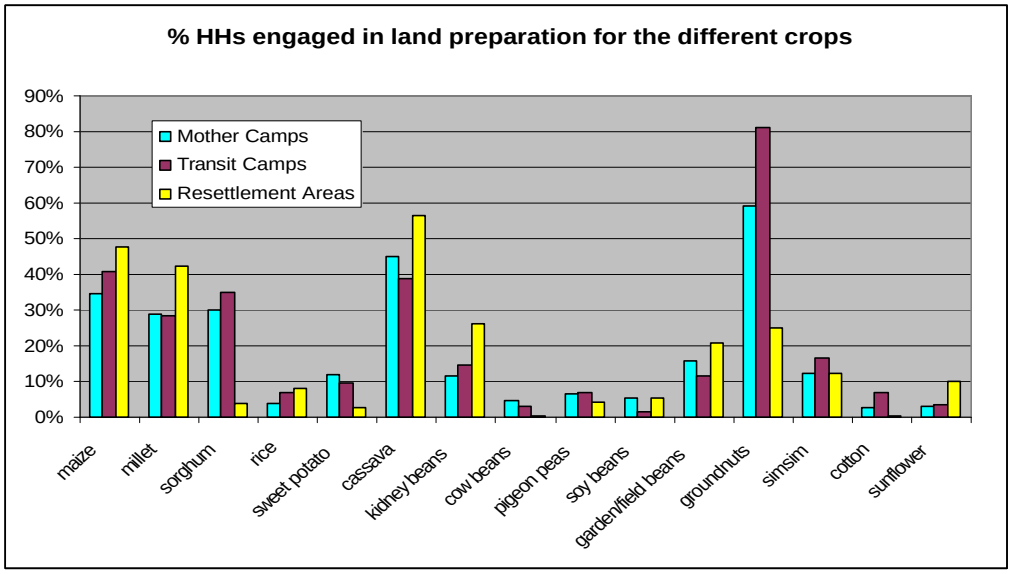
- Insecurity (reported by 30%)[9]
- No resources to buy more land (30%)
- Inadequate seeds and tools (12%)[10]

### Agriculture season and activities

[8] This response is confusing as it is shown later that the household in the Apac & Oyam camps food aid is not a source of food.
3 Insecurity was highly reported in Amuria and Katakwi mother camps (61%) and Pader transit camps (51%).
4 Inadequate seeds and tools were reported most in Gulu transit and mother camps and Pader mother camps, 27%, 16% and 11% respectively

The data were collected in early April. This is during the late stages of the dry season and is reflected in the agricultural activities reported by the households. In the study, households were asked about their engagement in land preparation, planting or weeding, and harvesting.

On average 73% of households declared to have been engaged in land preparation in the past three months. The graph below shows percentages of households **engaged in land preparation** for the different crops by the three main strata.




Twenty-one percent of households indicated that they had been **engaged in planting or weeding** in the past 3 months. This percentage is statistically higher in Lira resettlement areas (43%) compared to mother and transit camps (15% and 11%). However, Amuria and Katakwi mother camps reported a similar high share, 40%. A possible explanation for the significantly higher proportion of households in the Amuria and Katakwi camps engaged in planting is the relatively earlier arrival of the rainy season than the other strata.

Among engaged households, planting or weeding groundnut fields was most reported in transit camps with 58% in Gulu and 30% in Kitgum. In Lira, households were more engaged in planting or weeding millet and cassava.

Due to the time of data collection, few households reported having been **engaged in crop harvesting** (15% out of the total sample). However, the crops reported harvesting by households were cassava, sweet potatoes, maize and sorghum.

### Livestock Holding

On average, only one quarter of the interviewed households indicated possessing any livestock or poultry. This percentage was statistically higher ($p<.000$) in Lira resettlement, with 38% of households owning livestock, compared to mother (21%) and transit camps (19%).

**The percentage household owning livestock among Food Secure households was found to be statistically higher (39%, $p<0.00$) compared to the other 3 groups**

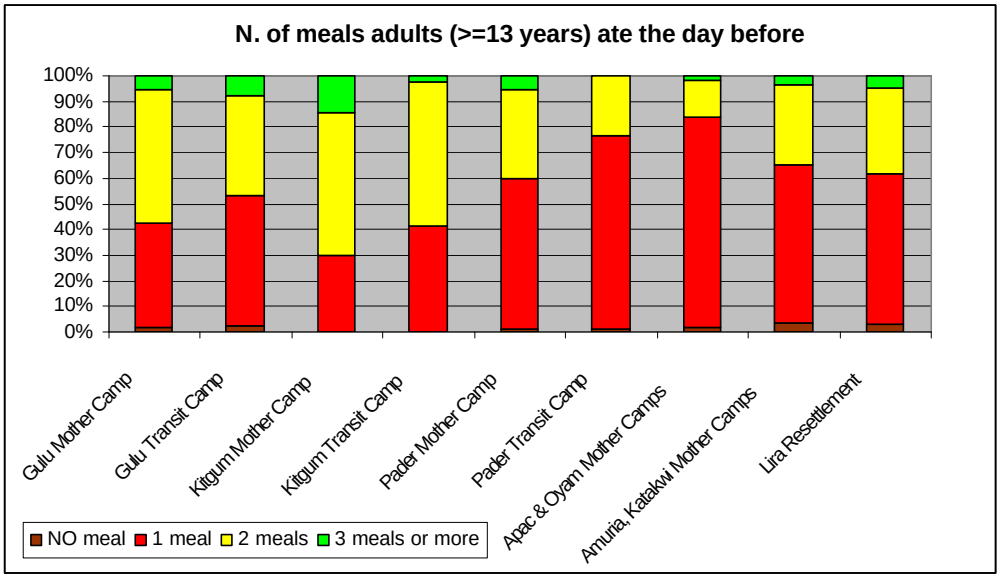
Households owning livestock were asked whether they had been able to regularly get milk, blood and other animal products from the animals during the past 3 months. 85% replied affirmatively, with no differences among geographical or food security strata. Of the households reporting acquiring milk and blood from animals, 25% reported that they only received irregular amounts of animal products due to:

- inadequate pasture (57%)
- animals were sick (27%)
- animals had migrated to another area (19%)
- water for animals was insufficient (12%).

**Meals Consumed**

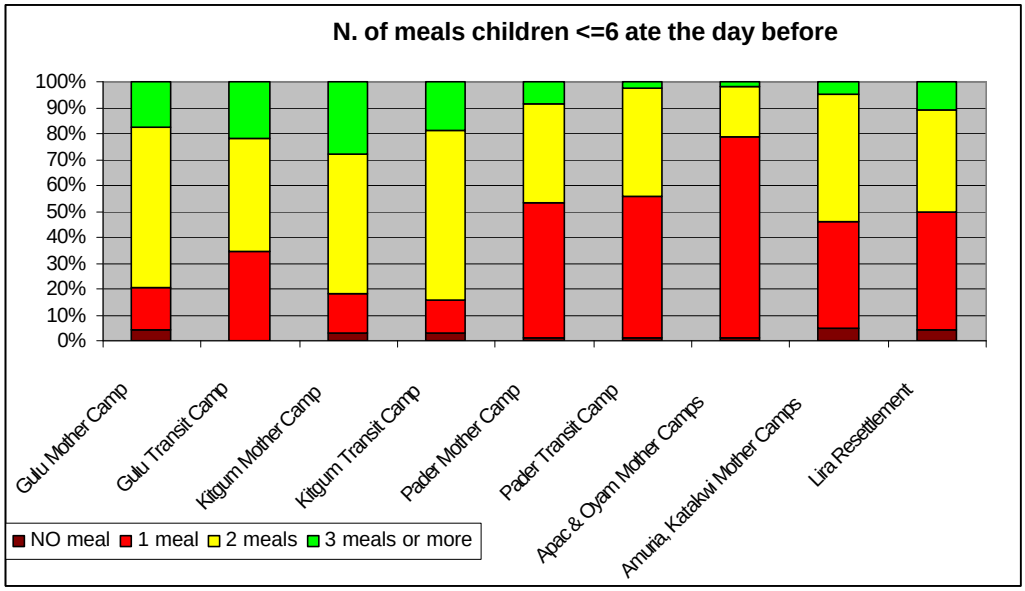
**Adults**

On average, less than 2% of the households with at least one person or more 13 years or older reported not eating any meals the day before the interview. Adults in 52% of the households ate one meal; this proportion was higher in transit camps (60%) and Lira resettlements (59%) compared to mother camps (48%). Of the households that indicated that adults consumed 2 meals or more the previous day, 50% of households in mother camps ate at least twice the previous day where as 38% in transit camps and 39% in resettlement areas indicated a similar number of meals.



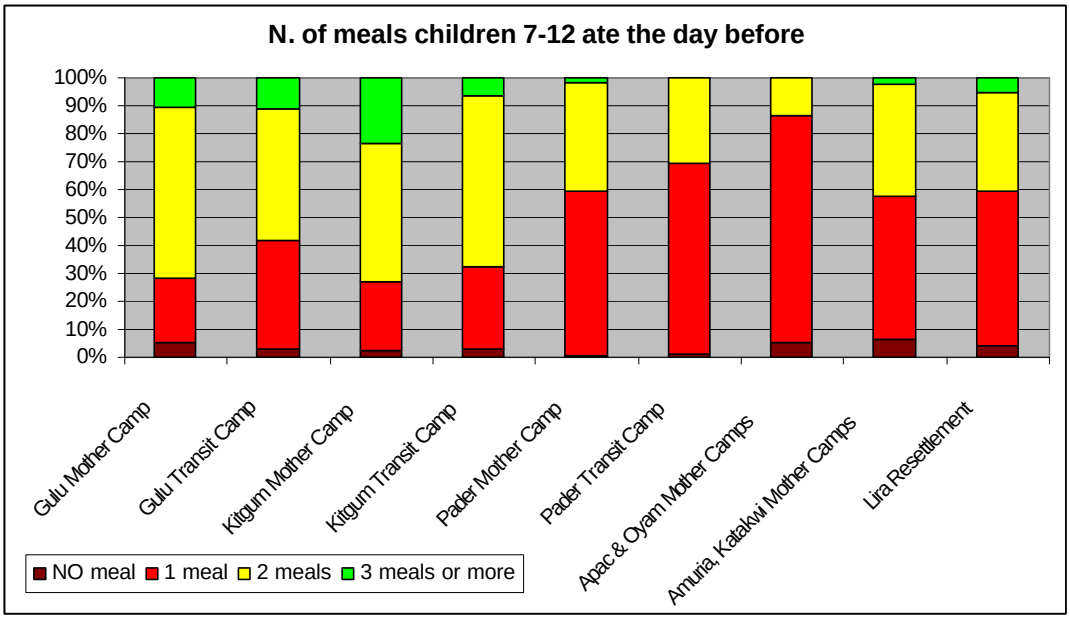

**Children**

About 79% of households had al least 1 child younger than 6 years. Of those households, 3% reported that children had not eaten any meals the day before the interview, 36% reported 1 meal only, 47% 2 meals and 14% 3 meals or more.




**Camps in Pader, Apac & Oyam and Amuria & Katakwi together with Lira resettlements have a higher percentage of children and eating fewer meals.**

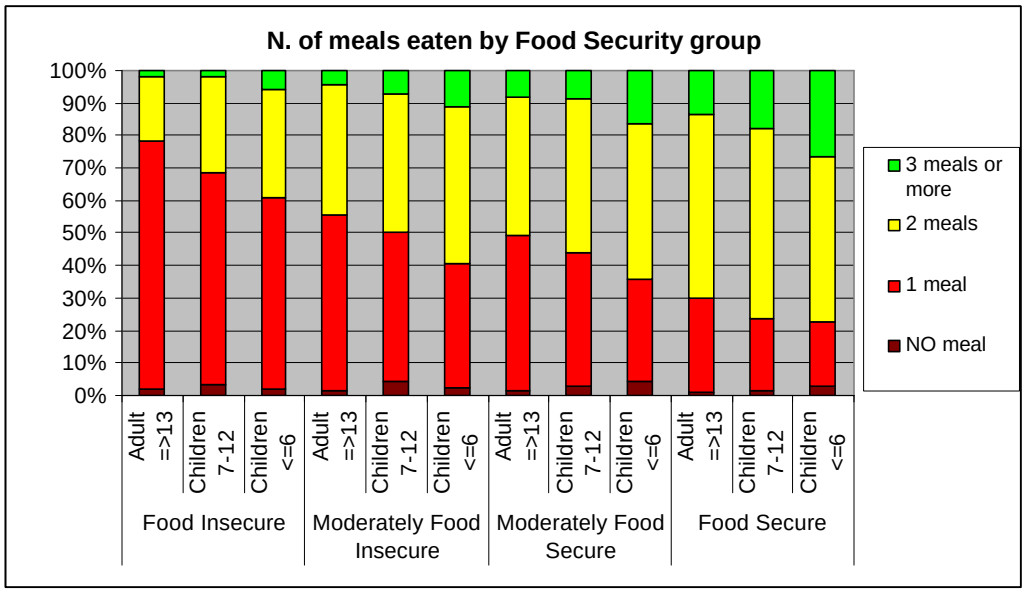
For households with at least 1 child between 7 and 12 years, 4% of these households declared they did not manage to give their children a meal the day before the survey; 44% gave 1 meal, another 44% 2 meals and an average of 8% 3 provided 3 meals or more.




Again, **Apac & Oyam camps and Pader transit camps registered the worst situation, with 87% and 70% of their households reporting that their 7-12 year old children ate 1 meal or no meal the day before the interview**. Pader, Amuria & Katakwi mother camp and Lira resettlements followed with an estimate of about 58-59%.

**Food Security Classes**

Food Security groups captured the differences in number of meals for each of the 3 age groups, adults 13 years and above, children between 6 and 12 and children under 6 years of age.




**Food sources and diversity**

In general households in the different strata regular consumed **staples** on an average of 6.5 days/week. However, different staples tended to be consumed in different areas. For example, maize, was more frequently consumed in Gulu, Kitgum and Pader camps. In Apac & Oyam and in Amuria & Katakwi mother camps, roots and tubers were the most frequently consumed staples. The different "preferences" could be explained through a food source analysis: 75% of the households that ate maize reported to access it from food aid. The limited contribution of food aid reported by the households in Apac & Oyam and in Amuria & Katakwi mother camps could explain this difference

Different locations presented diverse frequencies of **pulses and groundnut** consumption. On average pulses are consumed between 3-4 days/week in all the areas except Amuria & Katakwi camps, where pulses were reported on average to be eaten slightly more than 1 day/week. The majority of the households in camps indicated that they received pulses as food aid; 83% of households consuming pulses in Apac & Oyam and 82% of households in Amuria & Katakwi camps reported accessing pulses through the market. In Lira resettlements, the primary source for pulses was purchase (63% of the households eating pulses) followed by own production (24%). Consumption frequency of groundnuts was generally low except in Amuria & Katakwi camps indicated on average they consumed groundnuts of 4 days/week. The primary source for groundnuts in those camps was own production (47%) followed by purchase (39%).

The average consumption of **vegetables** (an important source of micronutrients) were consumed 3 days/week. The consumption average was higher in Amuria & Katakwi camps, where: 46% of households reported acquiring vegetables from gathering, 31% to grow and 16% from the market. Vegetable gathering was also significantly reported in Apac & Oyam camps and in Lira resettlements. Gathering food seemed more difficult in camps in Gulu, Kitgum and Pader, limiting the households to access food from this source.

The last food group consumed with a relative average frequency was **oil, fats and butter**, 2.5 days/week in the entire sample. However, a statistical significant difference ($p<.001$) was found between Gulu, Kitgum and Pader mother camps (average

consumption between 2.9 and 3.5 days/week) and Pader transit, Amuria & Katakwi, Apac & Oyam and Lira resettlements (average consumption between 1 and 1.7 days/week). 73% of the oil consumed in the Gulu, Kitgum and Pader mother camps came from food aid. Amuria & Katakwi, Apac & Oyam and Lira resettlements respondents indicated that their main source for oil was the market. Few households in Pader transit camps reported consuming oil; which seem inconsistent as the majority (63%) of the households who consumed oil acquired it from food aid. In the other camps, the average of consumption was very low (1.2 days/week).

**Food sources**

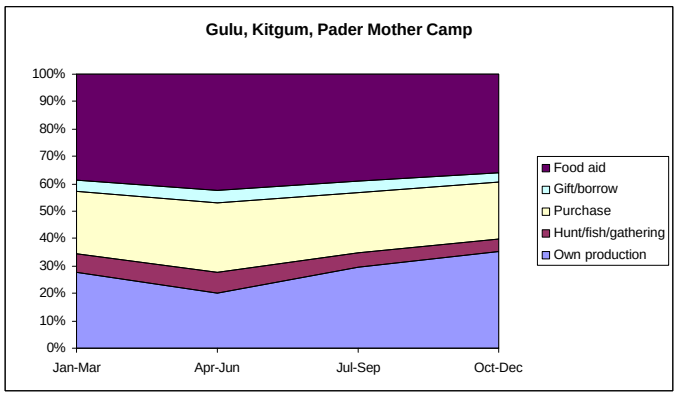
In the study households were asked to provide an indication of the seasonal pattern of the different food sources during the past calendar year (2006).

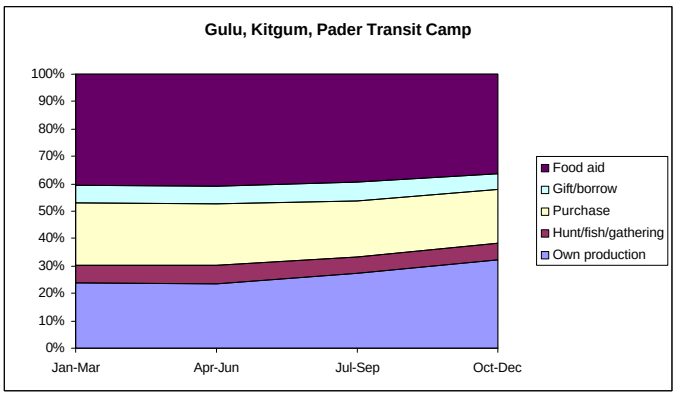
As expected, the share of food from the household's own production mirrors the agriculture calendar. During the lean season, between April and June, households complement their own production with food accessed through the market. Drawing from the 7-day and annual responses from the households, **as the food security status improves, a significantly higher ($p<0.00$) proportion of the household's food basket is acquired from their own production**.

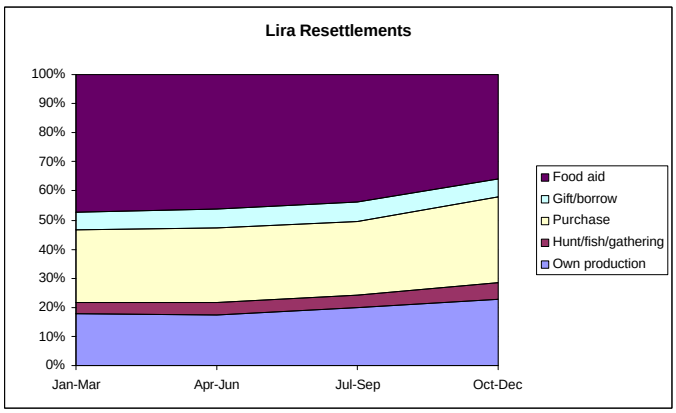
The graphs below illustrate the seasonal pattern between own production, the market and food aid as key contributing sources to the households' food basket. However, the graphs also highlight that **there is a striking difference in the relative importance of own production, food aid, and the market as key food sources for the Gulu, Kitgum, Pader camps (mother and transit) Lira resettlement areas and the Apac & Oyam and Amuria & Katakwi camps**.

Throughout the year in the mother, transit and resettlement strata, food aid contributes to between 40 and 50 percent of the household food basket. The market and own production contribute to between 20 and 40 percent respectively to the food basket and the remainder of the household's food basket is acquired from gathering and borrowing. It should be noted that in the mother and transit camps, during the harvest season (October to December), own production peaks contributing to over 30 percent of the household's food basket.

In the Lira resettlement areas, own production contributes on average less to the household than the Gulu, Kitgum and Pader camps. The smaller contribution of own production to the household food basket could partly explain the significantly higher proportion of food insecure households in the Lira Resettlement area.

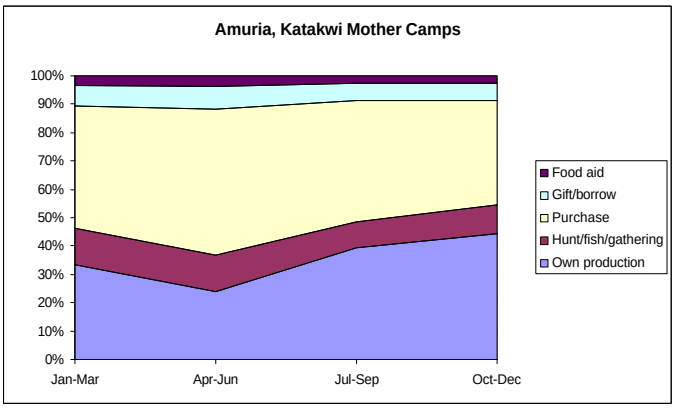


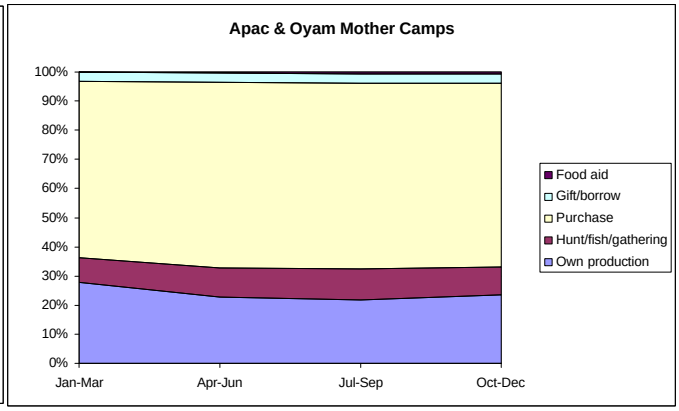






For households in the Amuria & Katakwi and Apac & Oyam camps, own production contributes to between 25% and 40% of the household's food basket in Amuria and Katakwi camps and between 25% and 20% in the Apac and Oyam camps

As indicated in the graphs below, the camps in the Amuria & Katakwi and Apac & Oyam strata depend on the market throughout the year as a key food source. It is little surprise that the households in these camps devote a significantly ($p<0.05$) higher proportion of their expenditure to food than the other strata. The higher proportion of expenditure allocated to food in the Apac & Oyam camps could provide some explanation as to the cause of the significantly higher proportion of food insecure households in these camps.



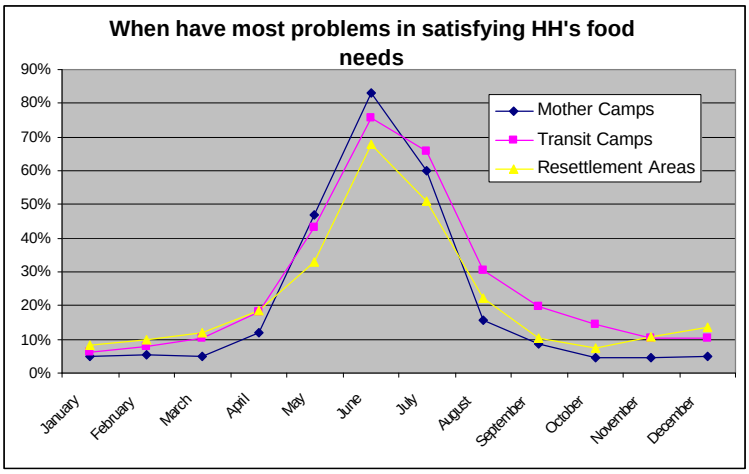




## Difficulty Feeding Household

According to the respondents, 82% of the households indicated having difficulties in securing enough food to feed their household members in the past 3 months. Across the camps and strata, the period when the majority of households indicated they faced problems to cover their food needs was between April and August, with the highest peak in June, with an average of 79% interviewed households reporting difficulties.

- The stress period was reported to start earlier by more households in Lira resettlement areas and transit camps compared ($p<.05$) to households living in mother camps

- The lean period was found to last longer in transit camps: in August, September and October the proportion of households facing food need problems was significant higher ($p<.05$) in transit camps during these months.

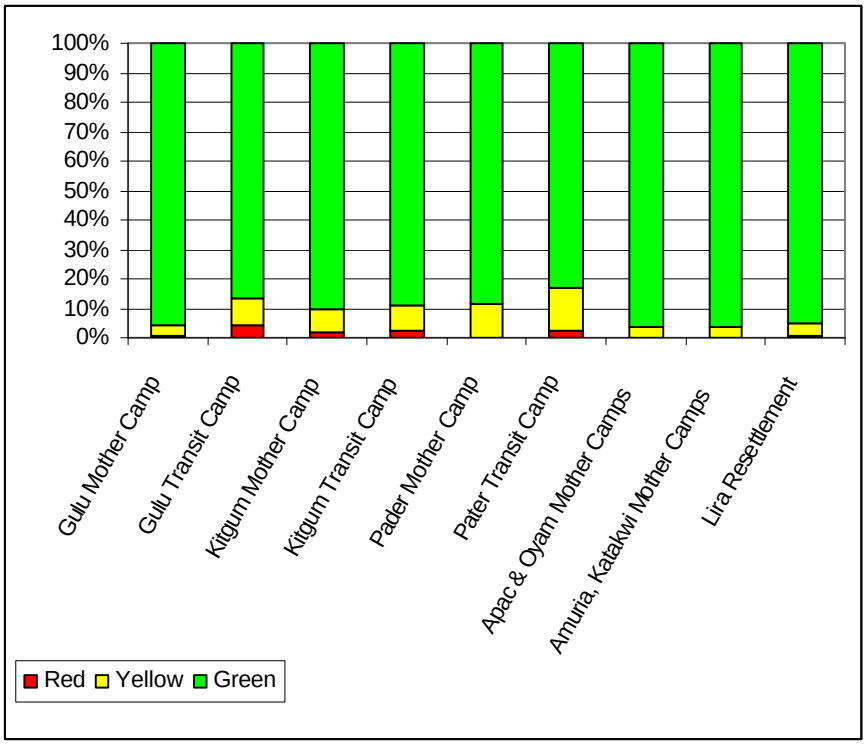



## MUAC

About 1% of the children in surveyed households were found severely malnourished when their MUAC was measured (tape in red section, <11cm), while around 7% were found moderately malnourished (MUAC tape in yellow section, >11 cm and <12.5 cm).

The worst situation was found in Pader transit camps where 2% of measured children were found severely malnourished and almost 15% were found moderately malnourished. Second worst were Gulu transit camp children (4% severely and 9% moderately), followed by children in Pader mother camps (<1% severely and 11% moderately) and Kitgum transit camps (3% severely and 8% moderately).

The percentage of households with severely and moderately malnourished children by strata is presented below.



**Summary of Findings**

Own production and the market are contributing to between 20% and 40% of the household food basket. The remainder is predominately acquired from food aid. The small contribution of food aid (<5% in the previous 7-days and annually) indicated by the households in the Apac & Oyams and the Amuria & Katakwi camps, and the high proportion of household expenditure on food provides insight on why the proportion of food insecure households is significantly ($p<0.05$) higher than the other camps and resettlement areas.

According to the study, 68% of the sample is classified as food insecure or moderately food insecure. Food aid contributed to over 40% of the household's food basket in the previous 7-days and over a third throughout the year[11]. Based on the findings of this study and drawing upon the example of the Apac & Oyam and Amuria & Katakwi camps which have a higher proportion of food insecure households and receive little to no food aid; a reduction in the current ration below 50% is likely to cause the food security status of the moderately food security to deteriorate; increasing the prevalence of food insecure in the camps from 8% -14%[12] food insecure to possible 60% or more.

The small contribution of own production to the household's food basket over the previous seven days and seasonal variations in the household sources of food throughout the year suggests that more work needs to be done to improve household access to land for agricultural production. The recent FAO Land Access Survey indicated that only 10% of households have access to 5 acres of more of land and 70% of the households had 3 acres of less of land. Households with less than 3 acres were classified as food insecure as they did not have a sufficient quantity of land to support their food needs. According to the households in this study insecurity and lack of resources (money and inputs) were factors contributing to not having enough land. As noted earlier in this report, there is a strong relationship between household food security status and average contribution of own production to the household's food basket. This would suggest that activities to increase the amount of land available to households for farming or programmes to provide credit or inputs would have a positive impact on the food security status of the households.

As indicated by the households, a significantly high percentage of households have difficulty feeding themselves during the months of May, June, July and August. As the seasonal sources of food indicate, during this period, households compensate with borrowing and gathering foods. Programmatic responses could be considered to reduce the high prevalence of food scarcity during this period through indirect market interventions to stabilise prices. However, a market analysis study would be required to ensure that interventions in the market would not have negative consequences.

The ongoing peace talks in Juba between the LRA and UPDF continue to create optimism for the potential return of IDPs to their areas of origin. However, due to insecurity and the lack of official guidance on the IDP return process, only 35% of the IDPs indicated that they would return to their area of origin in 2007. A second cohort of 30% of the population indicated that they would return in 2008.

The report also finds that one-third of the households in camps are undecided on their return date. Improved information on returnee policy and non-food assistance such as shelter, water and education and health facilities are identified by IDPs as constraints for returning to their place of origin. Improvement in the social infrastructure and directives on returning could increase the percentage of households leaving the camps and returning to their communities of origin.

[11] Excluding the Apac & Oyams and the Amuria & Katakwi camps
[12] Excluding the Apac & Oyams and the Amuria & Katakwi camps

**Further Investigation**

The purpose of this study was to determine the degree of food insecurity in Northern Uganda. The study focused on the Gulu, Pader and Kitgum, mother and transit camps, the and Oyamin, Amuria, and Katakwithe mother camps and Lira resettlement areas. The study has quantified the prevalence of food insecurity within the strata and statistically significant factors associated with the strata and the food security classes. However, the results of this study have also raised some interesting questions that can not be answered by quantitative methods alone. If possible, this study recommends that the following themes are further investigated through focus group and key informant discussions.

1) The households in the Apac or Oyam camps indicated that it was the lack of food aid assistance that was impeding their return. As indicated in this report, households in these camps were not receiving food. This could mean the respondents were either fishing for "resettlement" rations or are there other issues around perceived food scarcity that are inhibiting households from returning which the study did not capture.

2) What are the various market related activities available to the IDPs? How do the households earn money for their food and non-food needs? The results of the study highlight that as the food security status of the household improves more income is derived from agriculture. Where as a higher proportion of the food insecure households income is drawn from casual labour. As IDPs return to their place of origin, will these income generating activities remain available? And if not, how do the food insecure households, who currently depend of casual labour (*Leja Leja*), anticipate earning an income when they have returned to their villages of origin?

3) There is a sharp seasonal spike in the seasonal calendar when households indicate difficulty feeding their families. Is this because of the agricultural calendar? Or, are there other factors that are contributing to the acute period of reported food scarcity? What are households doing to mitigate this and are there programme responses suggested by the IDPs, in order to ameliorate this reported scarcity?

**Annex 1: Grouping of household food items**

| | | |
|---|---|---|
| **1.** | Maize Grain | **Staples (cereals)** |
| **2.** | Rice | |
| **3.** | Other cereals *(Sorghum, millet, …)* | |
| **4.** | Roots and tubers *(potatoes, cassava, …)* | |
| **5.** | Bread, Mandazi etc | |
| **6.** | Matooke | |
| **7.** | Beer residue (Adakai) | |
| **8.** | Corn Soya Blend (CSB) | **CBS** |
| **9.** | Beans and Peas | **Pulses, nuts and seeds** |
| **10.** | Ground nuts, Sim sim | |
| **11.** | Other vegetables | **Vegetables** |
| **12.** | Fresh fruits | **Fruit** |
| **13.** | Fish | **Animal protein rich items (Animal products)** |
| **14.** | Meat | |
| **15.** | Eggs | |
| **16.** | Blood | |
| **17.** | Milk | **Milk** |
| **18.** | Oil, fat, butter | **Oil, fat, butter** |
| **19.** | Sugar | **Sugar** |

**Annex 2: Food Consumption Groups**

| Consumption Class | Number of profiles | Description | Pct of Sample (weighted) |
|---|---|---|---|
| Very Good | 3 | Household consume staples daily; pulses and animal products were generally complemented with average consumption frequency of 5 and 3 days/week respectively. Oil and sugar 3 days each, vegetables between 2 and 3 days on average. | 10% |
| Good | 4 | Diet looked like to be sufficient (at least in term of macro nutrients), even though these households did not access all the different food groups daily. Frequent consumption of pulses and oil (5 and 4 days/week on average). Vegetables 3 days. Staples were consumed every day. | 32% |
| Borderline | 5 | Households consumed daily staples; pulses were consumed between 4 and 6 days/week; vegetables 3 and oil 2 days/week on average. | 37% |
| Poor | 3 | Diet was based on daily consumption of staples. Pulses and vegetables were sometimes consumed, on average 4 days per week. Oil eaten more rarely (avg. 1 day/week). | 15% |
| Very Poor | 1 | Very low food intake, almost certainly nutritionally inadequate. On average, households did not manage to eat even staple on a daily base. Staple and pulses were consumed 3 days/week, vegetable 2 days Just few household consumed oil (less than 2 days/week on average). | 6% |

**Annex 3: Households Food Access Categories**

| Access Class | Number of profiles | Description | Pct of Sample (weighted) |
|---|---|---|---|
| Own production | 1 | 78% of their food come from own production, 13% purchase. | 8% |
| Purchase | 3 | Purchase accounting between 60 and 90% of the consumed food basket. Three profiles complemented with food aid (about 20%); other 2 profiles with own production (18 and 32%). One profile almost purely on purchase (90%). | 36% |
| Market + in kind | 2 | One profile complemented food obtained through exchange (labour or items), 54%, with purchase (21%). The second relied more on purchased (35%) complemented with hunt/fish/gathering (37%) and own production (15%). | 8% |
| Dependent | 4 | Two profiles scored high contribution from food aid (between 59 and 75%). For the other 2 relevant amount of food was borrowed (32%) or received as gift (45%). | 29% |
| Mixed | 3 | Consumed food was accessed through a combination of purchase (on average between 28 and 44%), food aid (26-46%) and own production (21-31%). | 19% |

**Annex 4: Study Sample**

Sample for Gulu, Kitgum, Pader, Apac & Oyams and the Amuria & Katakwi camps and Lira Strata

| Gulu Mother camps Strata Code | | |
|---|---|---|
| Camp code | sampled camps | No of HH |
| 001 | Acet | 10 |
| 002 | Alero | 10 |
| 003 | Aloklum | 10 |
| 004 | Amuru | 20 |
| 005 | Anaka | 10 |
| 006 | Atiak | 10 |
| 007 | Awer | 10 |
| 008 | Bobi | 10 |
| 009 | Dino | 10 |
| 010 | Koch Goma | 10 |
| 011 | Koro Abili | 10 |
| 012 | Labongogali | 10 |
| 013 | Lalogi | 10 |
| 014 | Opit | 10 |
| 015 | Pabbo | 20 |
| 016 | Pagak | 10 |
| 017 | Palenga | 10 |
| 018 | Pawel | 10 |
| 019 | Unyama | 10 |
| 020 | Wii Anaka | 10 |

| Gulu Transit camps Strata Code | | |
|---|---|---|
| Camp code | sampled camps | No of HH |
| 021 | Adak | 20 |
| 022 | Atoo Hills | 10 |
| 023 | Bira | 10 |
| 024 | Corner Agula | 20 |
| 025 | Corner Nwoya | 10 |
| 026 | Guru-Guru | 10 |
| 027 | Jeng-gari | 10 |
| 028 | Kinene | 10 |
| 029 | Labongo-gali | 20 |
| 030 | Lamin Latoo | 10 |
| 031 | Langol | 10 |
| 032 | Loyajonga | 10 |
| 033 | Minakulu St. Thomas | 10 |
| 034 | Omel Apem | 10 |
| 035 | Onang village | 10 |
| 036 | Orapwoyo | 10 |
| 037 | Oroko | 10 |
| 038 | Otong | 10 |
| 039 | Pabwo Mon Roc | 10 |

| Kitgum Mother Camps Strata Code 003 | | |
|---|---|---|
| Camp code | sampled camps | No of HH |
| 040 | Agoro | 10 |
| 041 | Mucwini | 10 |
| 042 | Nam Okora | 10 |
| 043 | 12. Omiya Anyima | 10 |
| 044 | 13. Orom | 10 |
| 045 | 15. Padibe East | 10 |
| 046 | 16.Padibe West | 10 |
| 047 | 17. Palabek Gem | 10 |
| 048 | 18. Palabek Kal | 20 |
| 049 | 19. Palabek Ogili | 10 |
| 050 | 2. Akilok | 10 |
| 051 | 20. Paloga | 10 |
| 052 | 3. Akwang | 20 |
| 053 | 4. Amida | 20 |
| 054 | 5. Kitgum Matidi | 10 |
| 055 | 7. Layamo | 10 |
| 056 | 8. Lokung | 20 |
| 057 | 9. Madi Opei | 10 |

| Kitgum Transit Camps Strata Code 004 | | |
|---|---|---|
| Camp code | sampled camps | No of HH |
| 058 | Anaka central | 10 |
| 059 | Aparo Hill top | 10 |
| 060 | Lagot | 20 |
| 061 | Lakwor | 10 |
| 062 | Lalekan | 20 |
| 063 | Lamola | 10 |
| 064 | Lukwor | 20 |
| 065 | Obyen | 30 |
| 066 | Ocettoke | 20 |
| 067 | Okidi | 30 |
| 068 | Pawena | 10 |
| 069 | Pawidi | 10 |
| 070 | Pella | 10 |
| 071 | Teso Bar | 10 |

| Pader Mother Camps Strata Code | | |
|---|---|---|
| Camp code | sampled camps | No of HH |
| 072 | Acholibur | 10 |
| 073 | Geregere | 10 |
| 074 | Kalongo | 30 |
| 075 | Lapul | 10 |
| 076 | Lira Palwo | 10 |
| 077 | Lukole | 10 |
| 078 | Adilang | 10 |
| 079 | Mutto | 10 |
| 080 | Odokomit | 10 |
| 081 | Pader TC | 10 |
| 082 | Pajule | 10 |
| 083 | Patongo | 20 |
| 084 | Porogali | 10 |
| 085 | Puranga | 10 |
| 086 | Amyel | 10 |
| 087 | Atanga | 20 |
| 088 | Arum | 10 |
| 089 | Awere | 10 |

| Pader Transit Camps Strata Code | | |
|---|---|---|
| Camp code | sampled camps | No of HH |
| 090 | Achol Pii Lapono | 10 |
| 091 | Agora | 10 |
| 092 | Atenge | 10 |
| 093 | Awere Lakoga | 10 |
| 094 | Bar Ayom | 10 |
| 095 | Kineni | 10 |
| 096 | Kokil | 10 |
| 097 | Kuywee | 10 |
| 098 | Lakoga | 10 |
| 099 | Lanyatido | 10 |
| 100 | Lomoi | 10 |
| 101 | Odum | 10 |
| 102 | Ogom Akuyam | 10 |
| 103 | Ogom Telela | 10 |
| 104 | Ogom Telela | 10 |
| 105 | Okinga | 10 |
| 106 | Ongalo | 10 |
| 107 | Onudapet | 10 |
| 108 | Opyelo | 10 |
| 109 | Pacer | 10 |
| 110 | Pakor central | 10 |
| 111 | Tyer | 10 |

| Apac and Oyam Camps Strata Code | | |
|---|---|---|
| Camp code | sampled camps | No of HH |
| 112 | Abok | 10 |
| 113 | Acimi | 10 |
| 114 | Acokora | 10 |
| 115 | Adit | 10 |
| 116 | Aleka | 10 |
| 117 | Alibi | 10 |
| 118 | Alito | 20 |
| 119 | Anyomolyec | 20 |
| 120 | Barrio | 10 |
| 121 | Ngai TC | 30 |
| 122 | Ojwil | 10 |
| 123 | Onekgwok | 10 |
| 124 | Opeta | 10 |
| 125 | Otwal Railway | 20 |
| 126 | Otwal TC | 20 |

| Amuria, Katakwi Camps Strata Code | | |
|---|---|---|
| Camp code | sampled camps | No of HH |
| 127 | Acanga PS | 10 |
| 128 | Acowa | 10 |
| 129 | Adepar | 10 |
| 130 | Ameritele | 10 |
| 131 | Angedakiteng | 10 |
| 132 | Centre Camp | 10 |
| 133 | Kapelebyong | 10 |
| 134 | Milimil | 10 |
| 135 | Morungatuny | 10 |
| 136 | Obalanga | 30 |
| 137 | Obulengorok | 10 |
| 138 | Oditel | 10 |
| 139 | Odoot | 10 |
| 140 | Okocho Adacar | 10 |
| 141 | Olupe | 10 |
| 142 | Orungo Corner | 10 |
| 143 | Osudio | 10 |
| 144 | Osukunya | 10 |
| 145 | Otungul | 10 |
| 146 | Palam | 10 |

| Lira District Strata Code | | |
|---|---|---|
| Parish Code | sampled villages | No of HH |
| 147 | Abiting | 10 |
| 148 | Abukamola | 10 |
| 149 | Abunga | 10 |
| 150 | Adekokwok | 10 |
| 151 | Akangi | 10 |
| 152 | Akano | 10 |
| 153 | Akia | 10 |
| 154 | Alebere | 10 |
| 155 | Alebtong | 10 |
| 156 | Anara | 10 |
| 157 | Angetta | 10 |
| 158 | Anyanga | 10 |
| 159 | Apua | 10 |
| 160 | Ating | 10 |
| 161 | Barocok | 10 |
| 162 | Boroboro | 10 |
| 163 | Olworngu | 10 |
| 164 | Omee | 10 |
| 165 | Omito | 10 |
| 166 | Ongica | 10 |
| 167 | Onyakede | 10 |
| 168 | Otweo-toke | 10 |

## Annex 5 : Principal Component Analysis: analyzing relationships among variables[13]

A domain of statistics called **factor** or **multivariate analysis** offers several techniques for multi-dimensional data analysis in order to capture the essence of the relationship among various indicators of food security[14].

Principal Component Analysis (PCA) is one technique of multivariate analysis that applies to *continuous* variables. The objective of PCA is to identify and describe the underlying relationships amongst the variables by creating new indicators (called 'factors' or 'principal components') that capture the essence of the associations between variables.

Although a single PCA can be applied to food security indicators in general (covering food availability, access, utilization, and even risk/vulnerability), the objective of the WFP/VAM approach (identifying the optimal description of household food security status by examining three dimensions of food security: availability, access, and utilization) requires that each of these dimensions of food security (and even sub-categories within them, such as food consumption) are treated separately using PCA.

### Example of Principal Component Analysis (PCA)

Suppose you have several different variables relevant to food security. If you could simultaneously envision all variables, then there would be little need for **ordination methods**. However, with more than three dimensions, we usually need a little help. PCA takes the cloud of data points that depict the relationship between variables, and rotates it such that the maximum variability is visible. In this example, we take a simple set of 2-D data and apply PCA to determine the principal axes. Although the technique is used with many dimensions, 2 dimensional data makes it simpler to visualize. The Principal Component Analysis is performed on these data and the correlation matrix is calculated. The Principal Components are calculated from the correlation matrix. Principal Components Analysis chooses the first PCA axis as that line that goes through the **centroid**, but also minimizes the square of the distance of each point to that line. Graphically, the first principal component lies along the line of greatest variation and it is as close to all of the data as possible. The second PCA axis also must go through the centroid, and also goes through the maximum variation in the data, but with a certain constraint. It must be completely uncorrelated i.e. at right angles, or "**orthogonal**" to PCA axis 1

PCA is essentially a process of data reduction. A series of variables measuring a particular category of behavior (e.g. food consumption) are optimized into **principal components** capturing the essence of the relationships among initial variables of this behavior. Each principal component is thus a new indicator that represents the "best" summary of the linear relationship among the initial variables. PCA yields as many principal components as there are initial variables. However, the contribution of each principal component in explaining the total variance found amongst households will progressively decrease from the first principal component to the last. As a result, a limited set of principal components explain the majority of the matrix variability and principal components with little explanatory power can be removed from the analysis. The result is data reduction with relatively little loss of information.

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[13] The following information comes from the World Food Programme's VAM unit guidance on measuring food security. The entire document can be downloaded from http://vam.wfp.org

[14] 4 This type of analysis can be applied to all sorts of data (e.g. agriculture production, expenditures, nutrition, etc.) and to various aggregations or units of analysis (e.g. geographic area, households, individuals, etc.). For WFP/VAM, the primary unit of analysis used is households.

## Annex 6: Cluster analysis: exploring the distribution of principal components among households

The second phase of the analysis consists of exploring the distribution of the principal components among the units of analysis. Although the units of analysis can be administrative or geographic regions, individuals, or households, for WFP/VAM the unit of analysis is usually households.

**Cluster analysis** provides a means of identifying and *clustering* households characterized by very similar patterns as described by the principal component indicators developed in the previous step. Clustering methods use the similarities or distances between objects (i.e. households) when forming the clusters. These similarities are a set of rules that serve as criteria for grouping or separating households and can be based on a single principle component or multiple principle components. Each principal component included in the cluster analysis represents a rule or condition for grouping households.

The most straightforward way of computing similarities between households in a multidimensional space (defined by principle components included in the analysis) is to compute **Euclidean distances**. If the space is two or three dimensional, the Euclidean distance is the actual geometric distance between households (as if measured with a ruler).

The highest similarity possible is *zero* distance between households (e.g. households are exactly the same). However, in practice clustering only those households that are exactly the same would result in a large number of clusters of very small size. It is much more useful to identify a limited number of clusters that contain households that are similar, but not exactly the same. To this end, cluster analyses (performed by statistical software) involve a series of iterations that creates mutually exclusive clusters by obtaining the lowest dispersion among households belonging to each cluster (e.g. grouping together households that are similar as indicated by the small geometric distance between them).