



# **Nutrition Survey Report**

**Duk Payuel and Ageer Payams,  
Duk County, Jonglei State,  
Southern Sudan**

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## Acknowledgements

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JDF's sincere thanks also go to local surveyors for their diligence, hard work and perseverance during the 13 days of the survey.

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## List of Acronyms

|       |   |
|-------|---|
| ARI   | Acute Respiratory Infections                            |
| ACF   | Action Contre la Faim (Action Against Hunger)           |
| ANLA  | Annual Needs and Livelihoods Assessment                 |
| BCG   | Bacille Calmette Guerin                                 |
| CI    | Confidence Interval                                     |
| CMR   | Crude Mortality Rate                                    |
| CPA   | Comprehensive Peace Agreement                           |
| ENA   | Emergency Nutrition Assessment                          |
| EPI   | Expanded Programme for Immunization                     |
| JDF   | John Dau Foundation                                     |
| GAM   | Global Acute Malnutrition                               |
| MAM   | Moderate Acute Malnutrition                             |
| MUAC  | Mid-Upper Arm Circumference                             |
| NCHS  | National Centre for Health Statistics                   |
| NGO   | Non-Governmental Organization                           |
| NPA   | Norwegian People's Aid                                  |
| PHC   | Primary Health Care                                     |
| PLWHA | People Living with HIV/AIDs                             |
| SAM   | Severe Acute Malnutrition                               |
| SD    | Standard Deviation                                      |
| SFP   | Supplementary Feeding Programme                         |
| SMART | Standard Monitoring Assessment of Relief and Transition |
| SPSS  | Statistical Package for Social Scientists               |
| SRRC  | Sudan Relief and Rehabilitation Commission              |
| TB    | Tuberculosis  |
| TFP   | Therapeutic Feeding Programme                           |
| U5    | Under-five  |
| U5MR  | Under-five Mortality Rate                               |
| UN    | United Nations  |

|      |                                      |
|------|--------------------------------------|
| UNDP | United Nations Development Programme |
| USA  | United States of America             |
| VCT  | Voluntary Counselling and Treatment  |
| WASH | Water, Sanitation and Hygiene        |
| WFH  | Weight for Height                    |
| WFP  | World Food Programme                 |
| WHO  | World Health Organisation            |
| WHZ  | Weight for Height Z-scores           |

## Executive Summary

### Context

Duk County is a large, remote and climatically challenging region with serious health and nutritional needs in the best of times. In August 2009, the estimated prevalence of Severe Acute Malnutrition (SAM) in children under five was 7.5% and the County was listed as “Very Food Insecure” by the World Food Program (WFP) Annual Needs & Livelihood assessment (ANLA). Following severe floods, poor harvests, and displacement of people in the 2010 cropping season, the situation was anticipated to be worse. As such, the John Dau Foundation planned and executed a survey to assess the severity of malnutrition and mortality on the ground and, subsequently, inform the UN, NGO and humanitarian organisations about the needed interventions and relief.

### Specific Objectives

1. To quantify GAM and SAM among children aged 6-59 months
2. To quantify morbidity in children under five
3. To quantify crude mortality rate (CMR) and U5 mortality rate (U5MR)
4. To estimate measles immunisation, BCG and vitamin A supplementation coverage
5. To quantify and qualify food security risks and coping strategies
6. To provide recommendations and benchmarks for nutrition programming, including at primary health care (PHC) level

### Survey Methodology

A nutrition survey was conducted from 15-23<sup>rd</sup> November 2010 in Duk Payuel and Ageer Payams (Patuenoi Boma) of Duk County, which were accessible during the time of the survey. In this regard, all populations within 5km of the Duk Payuel PHCC (“Duk Lost Boys Clinic”) were engaged. SMART methodology and an exhaustive approach were used. The anthropometric survey measured all children aged 6-59 months (n=564), while the mortality survey included all households (n=400) regardless of the presence or absence of U5 children. Mothers and/or care takers were the respondents for the survey. To triangulate the survey findings, key informant interviews and simple observations were conducted. Mortality and anthropometric data were analysed in ENA (Emergency Nutrition Assessment) software except MUAC findings, which were analysed in SPSS alongside non-anthropometric data. Qualitative data from key informants and observations were analysed manually and have been reported as a narrative summary.

## Summary of the main findings

*Findings for anthropometry (WFH z-scores- WHO 2005), mortality and immunisation coverage*

| Indicator                                      |  |                              | Findings                            |                                       |
|--|--|------------------------------|-------------------------------------|---------------------------------------|
| Acute Malnutrition<br>(WFH z-scores -WHO 2005) | All                                      | GAM (<-2 WHZ and/or oedema)  | (86)15.2 %<br>(9.8 - 20.6 95% C.I.) |                                       |
|  |  | SAM (< -3 WHZ and/or oedema) | (28) 5.0 %<br>(2.1 - 7.8 95% C.I.)  |                                       |
|  | By Payam                                 | Duk Payuel                   | GAM (<-2 WHZ and/or oedema)         | (66) 20.2 %<br>(13.6 - 26.8 95% C.I.) |
|  |  |                              | SAM (< -3 WHZ and/or oedema)        | (20) 6.1 %<br>(2.3 - 9.9 95% C.I.)    |
|  | Ageer                                    | GAM (<-2 WHZ and/or oedema)  | (20) 8.4 %<br>(2.0 - 14.9 95% C.I.) |                                       |
|  |  | SAM (< -3 WHZ and/or oedema) | (8) 3.4 %<br>(0.6 - 6.1 95% C.I.)   |                                       |
| Mortality                                      | CMR (total deaths / 10,000 people / day) |                              | 0.83<br>(-0.07-1.74 95% C.I.)       |                                       |
|  | U5MR (deaths in <5s / 10,000 / day)      |                              | 0.61<br>(-0.34-1.55 95% C.I.)       |                                       |
| Vaccination and vitamin A coverage             | BCG                                      | By card                      | (224) 40%<br>(35.8-44.2 95% C.I.)   |                                       |
|  |  | According to caretaker       | (309) 55%<br>(50.8-59.2 95% C.I.)   |                                       |
|  | Vitamin A                                | By card                      | (189) 34%<br>(30.0-38.0 95% C.I.)   |                                       |
|  |  | According to caretaker       | (318) 57%<br>(52.8-61.2 95% C.I.)   |                                       |
|  | Measles                                  | By card                      | (198) 38%<br>(33.8-42.2 95% C.I.)   |                                       |
|  |  | According to caretaker       | (282) 54%<br>(49.6-58.4 95% C.I.)   |                                       |

## Conclusions

This survey found GAM rate of 15.2% and SAM of 5.0%, figures which are higher than the WHO threshold levels of 15% and 4% for global and severe acute malnutrition, respectively. Of the malnourished, 10.2% were moderately wasted and in danger of becoming severely malnourished. The prevalence of acute malnutrition was particularly high in Duk Payuel, where GAM of 20.2% and SAM of 6.1% were recorded compared to GAM of 8.4% and SAM of 3.4 found in Ageer. Generally, the food security situation and outlook for the coming months were poor. Moreover, incidences of malaria and diarrhoeal diseases were common-exacerbated by the recent flooding, and poor sanitation and hygiene. Aside from this, Duk and Ageer lack basic infrastructures and services, which impede the social and economic progress of the people. The very poor and poor, who comprise 60-75% of the population, are particularly affected and hard-pressed. Interestingly, however, the survey found CMR (0.83

deaths/10,000/day) and U5MR (0.61 deaths/10,000/day) that are below the alert and emergency threshold levels according to Sphere, and 1.6 times lower than figures recorded in the 2004 ACF survey of Duk Payuel. Arguably, this reflects the positive impact of the health care and relief services provided by the Duk Lost Boys clinic and WFP, respectively. Nevertheless, despite this progress, the need for regular humanitarian assistance continues in order to sustain low mortality rates in the survey area and bring malnutrition rates to levels below the emergency thresholds.

### **Recommendations**

- Provide general food distributions to the entire population during the dry and pre-harvest season (January-August 2011). Early planning of relief food is needed to ensure timely intervention. Proper coordination and close monitoring are also vital to shun any malpractices in the food storage and distribution exercise
- Start SFP for children under five and TFP for severely malnourished children. In this regard, sufficient qualified staff are needed for the recently introduced growth monitoring at Duk Lost Boys clinic to ensure that eligible children are diagnosed and rehabilitated of malnutrition
- Promote sanitation and hygiene in Duk Payuel. Health education and support for construction of improved latrines are central to the success of this intervention
- Continued provision and support of health care services at Duk Lost Boys clinic to curb morbidity and mortality
- Food for recovery programmes are needed to improve infrastructure and road network which would in turn enhance the social and economic progress of the people (e.g. by opening up market, trade and employment opportunities)
- Distribution of seeds and tools before the start of the next cropping season, April-November 2011. Consider including sweet potato vines and cassava cuttings bearing in mind that Duk County is climatically challenging. These crops are culturally acceptable and would bring in the much desired food diversification and security
- Plan and undertake a nutrition survey of the other Payams and Bomas in Duk County, preferably during the dry season (January-April, for easy mobility), to paint a comprehensive, holistic and better picture of malnutrition and food insecurity

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## 1.0 Introduction

### 1.1 Context

Duk County is beset by regular, natural and manmade disasters such as tribal conflicts and cattle raiding. In the 2004 ACF-USA survey, Duk County recorded a 4.1% SAM rate among children under-five and GAM of 22.7%. In 2010, the County experienced severe floods that occurred as a result of continuous and heavy rains from August through November. A rapid assessment by the World Food Programme (WFP), in September 2010, found that 1,720 people were displaced. More displacements were anticipated and projected. The displaced sought shelter in churches, schools and nearby communities. Aside from this, there was significant damage to standing crops, livestock and household assets. Moreover, the floods made the roads impassable and prevented food traders, from Bor and Malakal, from reaching the markets in Duk and Ageer. As a consequence, food stocks were depleted in those markets. In light of these challenges, there were serious and heightened concerns about the nutritional and health needs of the people. As such, the John Dau Foundation (JDF) planned to execute a nutrition survey to assess the situation on the ground and, subsequently, provide empirical basis for intervention programs. The survey was sponsored by the United Nation's Development Programme (UNDP) Emergency Response Fund.

### 1.2 Survey objectives

The main objective of this survey is to determine the extent of malnutrition and mortality in Duk and Ageer Payams of Duk County and decide on appropriate response for the UN, NGOs and Government organisations.

#### *1.2.1 Specific Objectives*

1. To quantify GAM and SAM among children aged 6-59 months
2. To quantify morbidity in children under five
3. To quantify crude mortality rate (CMR) and U5 mortality rate (U5MR)
4. To estimate measles immunisation, BCG and vitamin A supplementation coverage
5. To quantify and qualify food security risks and coping strategies
6. To provide recommendations and benchmarks for nutrition programming, including at primary health care (PHC) level

### 1.3 Geography

Duk County of Southern Sudan is a lowland area with some swampy areas and mostly black cotton soil. It comprises six Payams: Duk Payuel, Duk Padiet, Pagak, Dongchak, Panyang, and Ageer. The latter two Payams are sometimes considered part of Greater Duk Payuel and the others part of Greater Duk Padiet, respectively. In this regard, Duk Payuel consists of 6 Bomas: Duk, Poktap, Jolong, Pabek, Ageer and Panyang or Pajut. Mareng, in Ageer Payam, is the administrative centre. Conversely, Duk Padiet has seven Bomas: Pakam, Amiel, Padiet, Dorok, Ayueldit, Atheny and Paken. The Jonglei canal is running through Duk Padiet (Annex A).

## 1.4 Population

Duk County was an area nearly abandoned after the Civil War in Southern Sudan. Since the comprehensive peace agreement (CPA) was signed in 2005, the population of Duk County has slowly been returning. According to the 2008 Census, the total population of the County was 65,588 people spread out over an area of 8,000 square kilometres, with 13,919 people residing in Duk Payuel<sup>1</sup>. The people in Duk and Ageer, who are Dinka and Nuer by tribe, are agro-pastoralists. Their staple food is sorghum and maize which are grown on small scale, in feddans. Other crops cultivated include pumpkins, okra, beans, local cow peas (*akwem*) and groundnuts. In terms of livestock, the Dinka and Nuer people are cattle farmers. Wealth is described in terms of cattle ownership. The rich are said to have more than 20 cows, the middle class own 10-20 cows, while the poor and very poor possess 5-9 and 0-4 cows, respectively<sup>2</sup>. In general, 60-75% of the population are the poor and very poor<sup>3</sup>. Each year, in January, the Dinka and Nuer people take their cattle to the camps (*toic* or seasonal rivers) in search of grazing pasture. They return to the villages at the onset of rainy season in April or May. Annex B shows the seasonal calendar of events typical of the County.

## 1.5 Healthcare and Education

At present, there is only one health facility situated in Duk Payuel, the Duk Lost Boys Clinic, which was established in May 2007 by the John Dau Foundation (JDF). The clinic received over 39,000 patient visits by November 2010 and serves as Duk County's central referral centre. Aside from this, the clinic provides routine treatment of most common diseases, birthing services, antenatal care, VCT and TB/DOTS and outreach programs, including trainings and mass EPI, Vitamin A, and de-worming campaigns. Conversely, each of the two Payams visited, Duk and Ageer, has a primary school. Upon successful completion of primary education, pupils ought to attend secondary education elsewhere.

## 1.6 Nutrition programs

Generally, there are no nutrition programs in Duk and Ageer, despite the need. A transect walk in these areas revealed that only World Food Programme (WFP) and Norwegian People's Aid (NPA) have structures on ground. Key informants indicated that WFP uses its warehouses for food storage and distribution, while NPA's structures serve as a training centre where farmers learn different agricultural techniques and methodologies.

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<sup>1</sup> Population estimates based on SRRC figures

<sup>2</sup> ACF-USA rapid assessment report of Duk County, November 2004

<sup>3</sup> WFP rapid assessment report of Duk Payuel, September 2010

## 2.0 Survey Methodology

### 2.1 Survey area and time

This survey was undertaken from 15-23rd November 2010 in Duk and Ageer (Patuenoi) Payams of Duk County. During the time of the survey, it was flooded and impassable in the Payam and Duk County as a whole. In the survey area, the floods were worse in Duk Payuel than Ageer. Duk and Ageer are situated within a walking distance from the Duk Lost Boys Clinic and were therefore reached by foot. On the whole, 16 out of 27 villages available in Duk Payuel were visited in this survey (Annex C), encompassing all households within a 5km radius of the Duk Payuel PHCC.

### 2.2 Survey Approach

This survey followed the Standardized Monitoring Assessment in Relief and Transition (SMART) methodology. The nutrition and mortality data were collected from homesteads, which included host and displaced families. The later data were collected even in homesteads without under-five children. In addition to this, a household questionnaire was administered to assess the food security situation, child morbidity, child feeding and caring practices, program coverage and water, sanitation and hygiene (WASH). Moreover, key informant interviews, market assessments and simple observations were undertaken to triangulate the quantitative data. The anthropometric and mortality data were entered and analysed in ENA (Emergency Nutrition Assessment) software, which was also used in the planning, training and quality assurance of the survey data. Conversely, mid-upper arm circumference (MUAC) and non-anthropometric data from the household questionnaires were analysed in SPSS. Qualitative data from key informant interviews, market assessments and simple observations were analysed manually through content analysis.

### 2.3 Sampling procedure and sample size determination

The overall large sample size method was used in this assessment. In this method, the largest sample size calculated is used for the anthropometry and mortality survey. For example, the sample size for the anthropometric survey was calculated based on under-five children's population size of 2,923, a wasting prevalence of 22%, a precision of  $\pm 5\%$  and a design effect of 2. The needed sample size was 484 children, which we anticipated to obtain from 484 households assuming an average household size of one child. On the other hand, the sample size for the mortality survey was calculated based on the population size of 13,919, a mortality prevalence rate of 0.5/10,000/day, a precision of  $\pm 0.40\%$ , a design effect of 2 and a recall period of 90 days. The needed population size for the mortality survey was 2,425 people. Assuming an average household size of 5-6 people, which is typical of most populations, this meant engaging almost 404 households in Duk and Ageer Payams. In this regard, the sample size for anthropometric survey was chosen and increased by 10% (532) to allow for unforeseen contingencies, such as refusals and finding empty houses, and rounded off to a convenient figure of 540<sup>4</sup>.

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<sup>4</sup> Determination of sample size for the anthropometric and mortality surveys was based on the 2008 population census figures, and the 2004 ACF-USA's findings for GAM and CMR in Duk Payuel

## **2.4 Selection of clusters, households and children**

We anticipated displacement of the people from Duk County due to floods and, therefore, a reduced population. As such, we decided to undertake an exhaustive survey of the two Payams, Duk and Ageer (Patuenoi), taking the aforesaid sample size as our point of reference and guidance. Considering time to be spent on lunch breaks and walking in flood water, it seemed logical for each of the three survey teams we recruited to visit at least 15 homesteads per day. For this reason, 35 clusters were assigned, in ENA Software, proportional to the population sizes of different villages in Duk and Ageer (Annex C). Being exhaustive in nature, the survey targeted all households and children under five. A length or height of 65-110cm was used to determine eligible children in the absence of the child's health card and lack of mother's memory about the child's birth date. Children who were not present when their homesteads were visited were followed up so that they could be measured before leaving the clusters.

## **2.5 Survey teams, training and supervision**

The survey was undertaken by three teams of four members, namely one team leader, two anthropometry measurers and one interviewer (Annex D). The team leaders and measurers were local nurses and clinical staff from Duk Lost Boys clinic, each with some prior training and experience in assessments. The interviewers were hired locally in Duk and Ageer. All 12 surveyors and measurers were conversant with English and the local dialects (Dinka and Nuer) and attended a 4-day training, which was offered by two international and nutrition consultants. The training focused on the introduction to malnutrition as well as the survey objectives, design and methodology. Enumerators practiced taking anthropometric measurements and administering the mortality and child health questionnaire. Three children were obtained from the nearby village for practice in taking measurements. For the mortality and child health questionnaires, the enumerators practiced how to interpret the English questions into Dinka and Nuer for uniform and easy administration thereafter (Annexes E-G).

As part of the training, the mortality and child questionnaires were piloted in the nearby village to test their readability and identify problem areas. Moreover, the standardization test was conducted to examine the accuracy and precision of enumerators in taking anthropometric measurements. Eight children were identified for this task and measured in turns by the supervisors and measurers. The results of the test were compared and corrections were made for deviations that were observed in taking measurements. The enumerators and measurers worked under close supervision of survey consultants and JDF staff. Among other things, supervision involved ensuring that the survey methodology was followed closely, checking completeness of questionnaires, verifying cases of oedema, ensuring that the measuring scales were functional, and discussing and rectifying any problems encountered in the field.

## **2.6 Data collected**

In line with the objectives of this survey, data were collected on anthropometry, mortality and causes of malnutrition in children. Anthropometry and mortality forms were generated in

ENA Software and used in data collection. Causes of malnutrition in children were elicited using a questionnaire which was administered to the child's mother or care taker. In addition to this, key informant interviews, market assessments and simple observations were conducted. All the data collected are discussed singly and briefly below.

#### *2.6.1 Children's anthropometric and immunisation data*

Three indices are useful in determining acute malnutrition in children aged 6-59 months, namely weight-for-height (WFH), bilateral oedema and MUAC. For this reason, the following data were collected in the anthropometric survey:

- **Age:** recorded in months and determined using the child's health card, mothers' memory or height of 65-110cm
- **Gender:** direct observation or asking the mother whether the child was male or female
- **Weight:** measured in kilograms (to the nearest 100g or 0.1 kg). All children were weighed undressed using 25kg hanging Salter scales
- **Height/Length:** taken in centimetres (to the nearest millimetre). Wooden measuring boards (with precision of 0.1cm) were used. Children less than 85cm (<24 months) were measured lying down, while those equal or greater than 85cm (≥24 months) were measured while standing up
- **Bilateral oedema:** diagnosed by applying a moderate thumb pressure on both feet of the child for three seconds. A shallow pit after releasing the thumb pressure from the feet meant that the child was oedematous
- **MUAC:** measured to the nearest millimetre (0.1cm), using a flexible non-elastic tape, midway on the upper left arm; with the arm hanging freely by the child's side
- **BCG vaccination:** assessed by checking on the child's card or questioning the mothers and caretakers
- **Vitamin A supplementation:** asking the mother if the child received vitamin A tablet in the past 6 months or checking on the child's card
- **Measles immunisation:** assessed by checking on the child's EPI cards or asking the mothers and caretakers

#### *2.6.2 Causes of acute malnutrition*

Key variables included in the child and household questionnaire and measured in this survey were as follows:

- **Child feeding practices:** assessed by asking the mother about breast and complementary feeding, meal frequencies, food diversity and child care
- **Retrospective morbidity:** asking the mother whether or not the child suffered from any of the nutrition-related diseases such as malaria, diarrhoea, acute respiratory infections (ARI), 2 week prior to the survey
- **Water, sanitation and hygiene (WASH):** information elicited include sources of drinking water, water treatment practices, latrines, rubbish pits, dish drying racks, and hand washing behaviours
- **Food and livelihood security:** assessed by asking the mothers about food access, food and livestock production, sources of income as well as coping risks and strategies

#### *2.6.3 Retrospective mortality data*

Retrospective mortality data was gleaned by asking the following questions to the mother or any other adult member of the homestead:

- ***Current household members*** – Total and under 5 years  
(All household members who slept in the household the night before the interview)
- ***Current household members who arrived during the recall period*** – Total and under 5 years (excluding births)
- ***Past household members who left during the recall period*** – Total and under 5 years  
(Anybody who was part of the household at the beginning of the recall period, but was no longer part of the household – excluding deaths)
- ***Births*** – number of infants born during the recall period
- Deaths during the recall period – Total and under 5 years

The recall period or the time interval over which to count deaths was 90 days, which matched perfectly well with the start of floods in Duk County: 16<sup>th</sup> August 2010. Deaths that occurred before the floods were responded to sympathetically, but were not recorded as deaths.

As such, deaths recorded in this assessment were those that occurred from second week of August to 23<sup>rd</sup> of November, the last date of the survey.

#### *2.6.4 Key Informant data*

Interviews with key informants were undertaken to collect qualitative information and triangulate the quantitative data. Issues covered related to the objectives of this survey. A checklist was formulated and used to guide the interviews. A deliberate effort was made to engage people with experience of livelihoods in Duk County. They included the local clinic staff, head teachers and civil leaders (Annex H).

#### *2.6.5 Simple observations*

Direct and simple observations were made to confirm some of the quantitative and qualitative data. Among other things, observations centred on sanitary behaviours and facilities, sources of water in the area, service facilities available (clinics, schools and markets), cases of severe malnutrition, food consumption behaviours as well as livestock and asset ownership.

### **2.7 Data entry, analysis and presentation**

The anthropometric data were entered and analysed in ENA software. Data entry was done simultaneously with data collection. Plausibility checks were performed as data were entered. This helped to identify any out of usual range values (flags) and re-undertake measurements, if necessary, before leaving the clusters. Moreover, double entry of anthropometric data was done to check and correct errors. Like anthropometric data, the mortality data were entered and analysed in ENA. SPSS computer software package was used to analyse MUAC data and the non-anthropometric data from the child health questionnaire. Qualitative data from key informant interviews and simple observations were analysed manually through content analysis and have been presented as a narrative summary. Conversely, for quantitative data, graphs and tables have been used as a matter putting illustrations in the survey report.

### 3.0 Results

#### 3.1 Homesteads and children engaged in this survey

The survey engaged 400 homesteads with a population of 2237 people. In total, 56 houses were submerged and, therefore, deserted. All children in the latent households (n=564) were measured in the anthropometric survey. Twelve children were permanently absent from the surveyed villages as they joined their relatives elsewhere, while 57 homesteads had no children aged 6-59 months. Although these households contributed zero children to the anthropometric survey, they remained part of the sample and participated in the mortality survey.

#### 3.2 Anthropometric results (based on WHO standards 2005)

##### 3.2.1 Definitions of acute malnutrition

Table 1: Cut-off points for acute malnutrition – based on WHZ, % of Median and MUAC

|                                   | Definition using z-score | Definitions using % of median | Definition using MUAC                   |
|-----------------------------------|--------------------------|-------------------------------|---|
| Normal Nutritional Status         | $\geq -2.0$              | $\geq 80\%$                   | $\geq 135$ mm                           |
| Moderate Acute Malnutrition (MAM) | $\geq -3.0$ but $< -2.0$ | $\geq 70\%$ but $< 80\%$      | $\geq 110$ and $< 120$ mm and no oedema |
| Severe Acute Malnutrition (SAM)   | $< -3.0$ and/or oedema   | $< 70\%$ and/or oedema        | $< 110$ mm and/or oedema                |
| Global Acute Malnutrition (GAM)   | $< -2.0$ and/or oedema   | $< 80\%$ and/or oedema        | $< 120$ mm and oedema                   |

##### 3.2.2 Age and gender breakdown of surveyed children

Table 2: Distribution of age and sex of sample

|              | Boys |      | Girls |      | Total |       | Ratio      |
|--------------|------|------|-------|------|-------|-------|------------|
|              | N    | %    | n     | %    | N     | %     | Boy : girl |
| 6-17 months  | 65   | 47.8 | 71    | 52.2 | 136   | 24.1  | 0.9        |
| 18-29 months | 56   | 41.5 | 79    | 58.5 | 135   | 23.9  | 0.7        |
| 30-41 months | 65   | 56.0 | 51    | 44.0 | 116   | 20.6  | 1.3        |
| 42-53 months | 47   | 40.5 | 69    | 59.5 | 116   | 20.6  | 0.7        |
| 54-59 months | 35   | 57.4 | 26    | 42.6 | 61    | 10.8  | 1.3        |
| Total        | 268  | 47.5 | 296   | 52.5 | 564   | 100.0 | 0.9        |

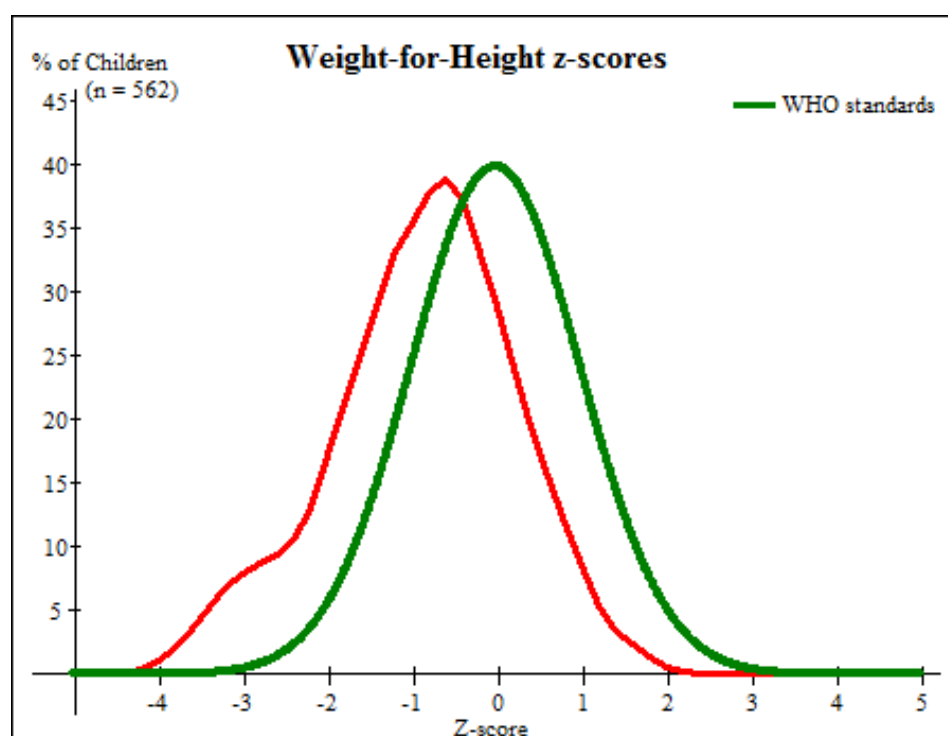
### 3.2.3 Prevalence of acute malnutrition in under-fives

Table 3: Prevalence of acute malnutrition based on WFH z-scores (and/or oedema) and by sex – WHO 2005 reference

|   | All<br>n = 564                          | Boys<br>n = 268                         | Girls<br>n = 296                        |
|---|---|---|---|
| Prevalence of global acute malnutrition (GAM)   | 15.2 %<br>n=86<br>(9.8 - 20.6 95% C.I.) | 14.9 %<br>n=40<br>(7.3 - 22.5 95% C.I.) | 15.5 %<br>n=46<br>(8.8 - 22.3 95% C.I.) |
| Prevalence of moderate acute malnutrition (MAM) | 10.3 %<br>n=58<br>(6.9 - 13.7 95% C.I.) | 10.1 %<br>n=27<br>(4.9 - 15.2 95% C.I.) | 10.5 %<br>n=31<br>(6.2 - 14.7 95% C.I.) |
| Prevalence of severe acute malnutrition (SAM)   | 5.0 %<br>n=28<br>(2.1 - 7.8 95% C.I.)   | 4.9 %<br>n=13<br>(-0.5 - 10.2 95% C.I.) | 5.1 %<br>n=15<br>(1.4 - 8.7 95% C.I.)   |

The prevalence of oedema is 0.4 %

Figure 1: Weight-for-height z-scores distribution



Mean  $\pm$  SD of WHZ:  $-0.88 \pm 1.08$

*Table 4: Prevalence of acute malnutrition based on WFH z-scores (and/or oedema) and by Payam – WHO 2005 reference*

|   | <b>All</b><br>n = 564                   | <b>Duk Payuel</b><br>n = 327             | <b>Ageer</b><br>n = 237                |
|---|---|--|--|
| Prevalence of global acute malnutrition (GAM)   | 15.2 %<br>n=86<br>(9.8 - 20.6 95% C.I.) | 20.2 %<br>n=66<br>(13.6 - 26.8 95% C.I.) | 8.4 %<br>n=20<br>(2.0 - 14.9 95% C.I.) |
| Prevalence of moderate acute malnutrition (MAM) | 10.3 %<br>n=58<br>(6.9 - 13.7 95% C.I.) | 14.1 %<br>n=46<br>(10.0 - 18.2 95% C.I.) | 5.1 %<br>n=12<br>(1.1 - 9.1 95% C.I.)  |
| Prevalence of severe acute malnutrition (SAM)   | 5.0 %<br>n=28<br>(2.1 - 7.8 95% C.I.)   | 6.1 %<br>n=20<br>(2.3 - 9.9 95% C.I.)    | 3.4 %<br>n=8<br>(0.6 - 6.1 95% C.I.)   |

*Table 5: Distribution of acute malnutrition and oedema based on WFH z-scores (n=564)*

|                       | <b>&lt;-3 z-score</b>                  | <b>&gt;=-3 z-score</b>        |
|-----------------------|--|-------------------------------|
| <b>Oedema present</b> | Marasmic kwashiorkor<br>n=0<br>(0.0 %) | Kwashiorkor<br>n=2<br>(0.4 %) |
| <b>Oedema absent</b>  | Marasmic<br>n=26<br>(4.6 %)            | Normal<br>n=536<br>(95.0 %)   |

*Table 6: Prevalence of acute malnutrition based on the percentage of the median and/or oedema (n=564)*

| <b>Acute Malnutrition</b>                                      | <b>Prevalence</b>                   |
|--|-------------------------------------|
| Global acute malnutrition (GAM) (<80% and/or oedema)           | (41) 7.3 %<br>(3.9 - 10.6 95% C.I.) |
| Moderate acute malnutrition (MAM) (<80% and >= 70%, no oedema) | (39) 6.9 %<br>(3.5 - 10.3 95% C.I.) |
| Severe acute malnutrition (SAM) (<70% and/or oedema)           | (2) 0.4 %<br>(0.0 - 0.7 95% C.I.)   |

Table 7: Prevalence of acute malnutrition based on mid-upper arm circumference (n=563)

| MUAC   | Statistics                          |
|--|-------------------------------------|
| Severe Acute Malnutrition (<110mm)           | (3) 0.5%<br>(-0.07-1.13 95% C.I.)   |
| Moderate Acute Malnutrition (110mm-<120mm)   | (5) 0.9%<br>(0.11-1.67 95% C.I.)    |
| Global Acute Malnutrition (<120mm)           | (8) 1.4%<br>(0.42-2.38 95% C.I.)    |
| At Risk of Acute Malnutrition (120mm-<135mm) | (61) 10.8%<br>(8.4-13.6 95% C.I.)   |
| Normal Nutritional Status ( $\geq$ 135mm)    | (494) 87.7%<br>(85.2-90.8 95% C.I.) |

### 3.3. BCG, Vitamin A and Measles immunisation coverage

Figure 2: BCG vaccination coverage by child's card or mother's memory (n=561)

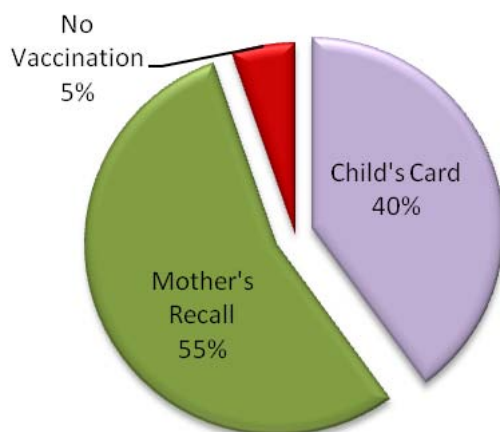


Figure 3: Vitamin A coverage in the 6 months prior to the survey (n=557)

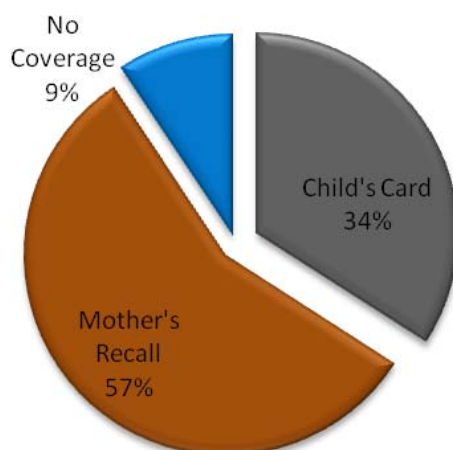
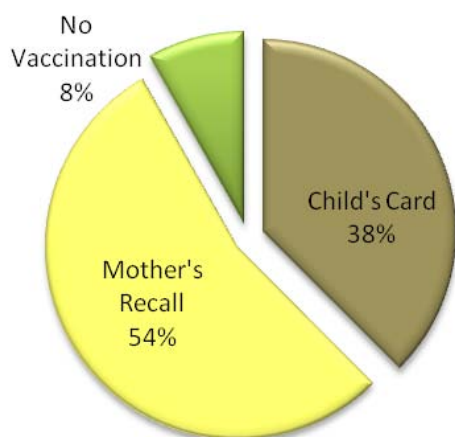


Figure 4: Measles immunisation coverage (for children aged  $\geq 9$  months,  $n=522$ )



### 3.4 Children's morbidity

Figure 5: Prevalence of reported illness in children 6–59 months in the 2 weeks prior to the survey ( $n=564$ )

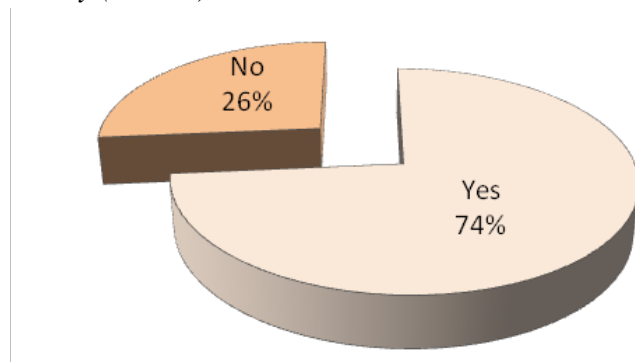


Table 8: Breakdown of nutrition-related diseases in the children in the two weeks prior to interview ( $n=415$ )

| Disease   | n   | %    |
|---|-----|------|
| Diarrhoea ( $\geq 3$ loose or watery stools/day)                    | 140 | 33.7 |
| Malaria (fever with chills)   | 180 | 43.4 |
| Acute respiratory infection (fever, cough and difficulty breathing) | 95  | 22.9 |

### 3.5 Mortality results (retrospective over 90 days prior to interview)

*Table 9: Mortality rates*

| CMR/U5MR  | Prevalence                    |
|---|-------------------------------|
| CMR (total deaths/10,000 people/day)                                  | 0.83<br>(-0.07-1.74 95% C.I.) |
| U5MR (deaths in children under five/10,000 children under five / day) | 0.61<br>(-0.34-1.55 95% C.I.) |

*Table 10: Demographics changes and migration over 90 days prior to the mortality survey*

| Demographics and migration                             | Total | <5  |
|--|-------|-----|
| Current household members                              | 2237  | 629 |
| Household members who arrived during the recall period | 24    | 3   |
| Household members who left during the recall period    | 82    | 12  |
| Number of births during the recall period              | -     | 18  |
| Number of deaths during the recall period              | 20    | 3   |

*The average household size was 5.6*

## 4.0 Discussion

### 4.1 Acute malnutrition (WFH z-scores- WHO 2005 reference standards)

This survey found the GAM rate of 15.2% and SAM of 5.0% in children under five in Duk Payuel and Ageer. These rates are higher than the WHO's emergency threshold for severity of malnutrition, which are 15% for GAM and 4% for SAM. The prevalence of acute malnutrition was particularly high in Duk Payuel: 20.2% for GAM and 6.1% for SAM. Compared to Ageer, the floods in Duk Payuel were worse. Conversely, in a nutrition survey conducted by ACF-USA in July 2004, the prevalence of GAM and SAM were 22.7% and 4.1%, respectively. Considering that the present survey and the one by ACF were conducted around harvesting time, the lower GAM rates in the present survey may be attributed to the positive impact of primary health care and relief food services provided by the Duk Lost Boys Clinic and WFP. In this regard, we speculate that the available services have prevented new cases of malnutrition from emanating, but they have not been able to rehabilitate moderate and severe malnourishment in children. Arguably, therefore, cases of severe malnutrition have kept on increasing since ACF survey in 2004. Aside from these comparisons, studies from other regions of Jonglei state show worst finding of acute malnutrition. For instance, in a nutrition survey they conducted in Akobo County in February 2010, Medair and Save the Children reported a 15.5% SAM rate among children under five (WHZ<-3SD, WHO 2006) and GAM of 45.7% (WHZ<-2SD, WHO 2006), compared to 9.8% SAM and 39.9% GAM recorded in 2002.

#### 4.1.2 Acute malnutrition classification by MUAC

MUAC findings of this survey show a GAM rate of 1.4%: 0.5% for SAM and 0.9% for MAM. On the whole, 10.8% of the U5 children were at risk of acute malnutrition, while 87.7% had a normal nutritional status. The huge discrepancy in the classification of GAM and SAM by MUAC and WFH z-scores found in the present survey have also been reported in previous studies in Southern Sudan and elsewhere in Africa<sup>5</sup>. Actually, MUAC and WFH are somehow different indices, despite being compared in different studies. Put differently, while MUAC measures wasting (thinness or fatness) based on soft tissue in the upper part of the left arm, WFH relates wasting to an individual's height. Moreover, MUAC is widely recognised as a better predictor of mortality risk than WFH and, therefore recommended for screening malnourished children for referral and further treatment. At present, the relationship between WFH and MUAC remains elusive and an important area of investigation particularly among pastoralists whose sitting-to-standing height ratios are different when compared to people in agrarian populations.

## 4.2 Causes of acute malnutrition

### 4.2.1 Food security situation

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<sup>5</sup> Discrepancies in MUAC and WHZ findings were also found and reported in rapid assessments by ACF-USA in Duk Payuel (2004), Medair & Save the Children in Akobo County (2010) and Myatt *et al* in Mali (2008)

In Duk County and Payuel, the year 2010 is characterised by floods which occurred as a result of continuous rains from the month of August through November. Many described the floods as the worst in the history of County and Payam. Crops were in water in August and September, and some were destroyed and washed away which affected yields. In addition, the floods destroyed some of the small livestock such as goats and chickens, particularly in the households that were submerged and destroyed. Of the 400 homesteads engaged, 33.5% harvested 1-3 bags of sorghum (50kgs) compared to 4-7 bags which they said they harvest in a normal year such as 2008. Nine point six percent (9.6%) of the households harvested less than one bag of the staple food and 40.8% realised no harvests. Those with food deficits and no food stocks were relying on food gifts from their relatives, which put the latter at risk of food shortage. The floods did not only reduce crop harvests, but also shocked and destroyed wild foods that are typical of rainy season. Moreover, food supplies were depleted in the markets in Duk and Ageer as there were no goods coming from Bor and Poktap due to impassability of roads.

Conversely, very few homesteads had kitchen gardens in which pumpkin leaves and okra were seen growing. Sources of income were limited to beer brewing, livestock and livestock products and, to a lesser extent, fishing, which was done in the flood water in the surrounding swampy areas. The majority reported coping up by reducing the number of meals to one or two per day. Meal portion sizes were also reduced in a bid to prolong the limited food stocks. Children under five were solely fed on sorghum meals and, occasionally, on cow's milk. Consumption of milk was less common particularly among the poor and very poor who own few (0-6) cows: 64.7% of the respondents in this survey. On the whole, the food security situation and outlook for the coming months were poor during the time of the survey. In addition, there were heightened concerns about the crop production capacity of most households for the coming cropping season in view of the current food shortages. When asked to recommend on possible interventions, nearly all respondents cited general food rations by WFP which they preferred to commence not later than January and hoped other organisations would complement WFP's best efforts.

#### *4.2.2 Water, sanitation and hygiene*

Aside from food insecurity, the sanitation and hygiene of the surveyed areas were generally very poor. While 96.2% of the mothers reported using water from boreholes for drinking and domestic use, the majority had no toilets (91.8%) and rubbish pits (65.2%) in their homesteads particularly in Duk Payuel. Inevitably, therefore, they used the surrounding bushes, which were flooded, for defecation and disposal of kitchen and household waste. For this reason, the flooded water was not only stagnant, but also contaminated and, therefore conducive for malaria and diarrhoeal diseases which were common at the time of the survey. These diseases pose effects on nutritional status by interfering with food intake, digestion, absorption, metabolism or causing excretion of nutrients. When asked about what they think was the cause of diarrhoea, most mothers cited flies (87.8%); showing that the flies were common and seen - attracted by the poor sanitation. In actuality, the sandy soils were water logged at the time of the survey and could not therefore support the traditional toilets in a

sustainable manner. Worse still, construction of improved toilets requires resources such as cement, wire mesh, plumps and bricks which are costly and were not available in the markets.

#### *4.2.3 Health care services*

At present, the Duk Lost Boys Clinic is the only functional primary health care facility and serves patients from villages in a radius of 50Km. In this regard, it is possible that some patients are not able to come to the clinic due to long walking distances. As such, their illnesses are not diagnosed and treated in time, which aggravate malnutrition cases in Duk County and Payuel Payam. Visiting the clinic becomes problematic particularly in the rainy season when the muddy roads become impassable. For example, during the survey, it took surveyors about 1½ hours to walk in flood water from Patuenoi in Ageer to the Clinic in Duk Payuel where they were based. This implies that patients could spend more than 3 hours of walking to reach the clinic and return home. Apart from the fatigue, people are afraid to walk long distances because of Murle cattle raiders who, at times, attack people especially women and children. However, such attacks were not reported during the time of the survey and in the recent past prior to the survey. Equally important, the Duk Lost Boys Clinic is currently running short of medical supplies, a problem that emanates from logistical support constraints and a large number of patients served on a daily basis. For this reason, the clinic cannot afford to prescribe and ascribe the required medication for each and every illness.

### **4.3 Intervention programs**

At present, despite the need, there are no supplementary or therapeutic feeding programmes to rehabilitate malnourished children in Duk and Ageer, or elsewhere in Duk County. As such, when the Duk Lost Boys clinic receives children who are malnourished, clinicians treat them with de-worming, folic acid, oral rehydration salts (ORS), and vitamin A supplements. According to key informants, WFP distributes general food rations every quarter, which are composed of cereals (sorghum), pulses (lentils), vegetable oil and salt. The last distribution occurred in July 2010. However, in September, WFP did a brief emergency food distribution to people displaced by floods following a rapid assessment it conducted in Duk Payuel Payam<sup>6</sup>. During the survey, the time for the next distribution was not known. Moreover, WFP supports an inpatient feeding programme, at Duk Lost Boys Clinic, with similar food stuffs as those for general food rations. Under the programme, 30 patients are served per day, and these include routine patients and the chronically ill: TB and kala azar patients and PLWHA (people living with HIV/AIDS).

#### *4.3.1 Immunization programs*

The Duk Lost Boys Clinic embarks on mass immunisation campaigns and gives vitamin A tablets, de-worming drugs as well as measles and BCG vaccination to children under five. This survey found that the majority of the children under five received different vaccinations based on the health cards and reports by their mothers.

### **4.4 Mortality**

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<sup>6</sup> WFP conducted a rapid assessment in September 2010 in Duk Payuel Payam, and found that 1,720 people were displaced by the floods and had no food stock, which prompted WFP to intervene

The mortality survey found CMR of 0.83 (-0.07-1.74 95% C.I.) and U5MR of 0.61 (-0.34-1.55 95% C.I.) deaths per 10,000 per day. These figures fall below the alert and emergency thresholds for mortality according to Sphere, and are 1.6 times lower than the figures found by ACF-USA six years ago. In the mortality survey conducted in Duk Payuel Payam in July 2004, ACF-USA found CMR of 1.36/10,000/day- 82% of these deaths occurred in children under five. Malnutrition and bloody diarrhoea were found to be the main causes of death in under-fives. The survey reported GAM of 22.7% and SAM of 4.1%. The present survey was not able to probe into the causes of death in order to avoid lengthy discussions on this subject matter. Culturally, according to key informants, Dinka and Nuer people in the survey area, regard discussions on death as a taboo. In spite of this, low CMR and U5MR found in this survey suggest improvement in general health and welfare of the people. In other words, it seems logical to say that the services and interventions by the Duk Lost Boys Clinic and WFP have contributed to reduced morbidity, hunger and malnutrition which have resulted in the decline in mortality among the Duk and Ageer population. Aside from this, one may partially attribute the low mortality rates to the decline in inter-tribal and clan-based conflicts, which are sometimes significant causes of death in Southern Sudan as a whole.

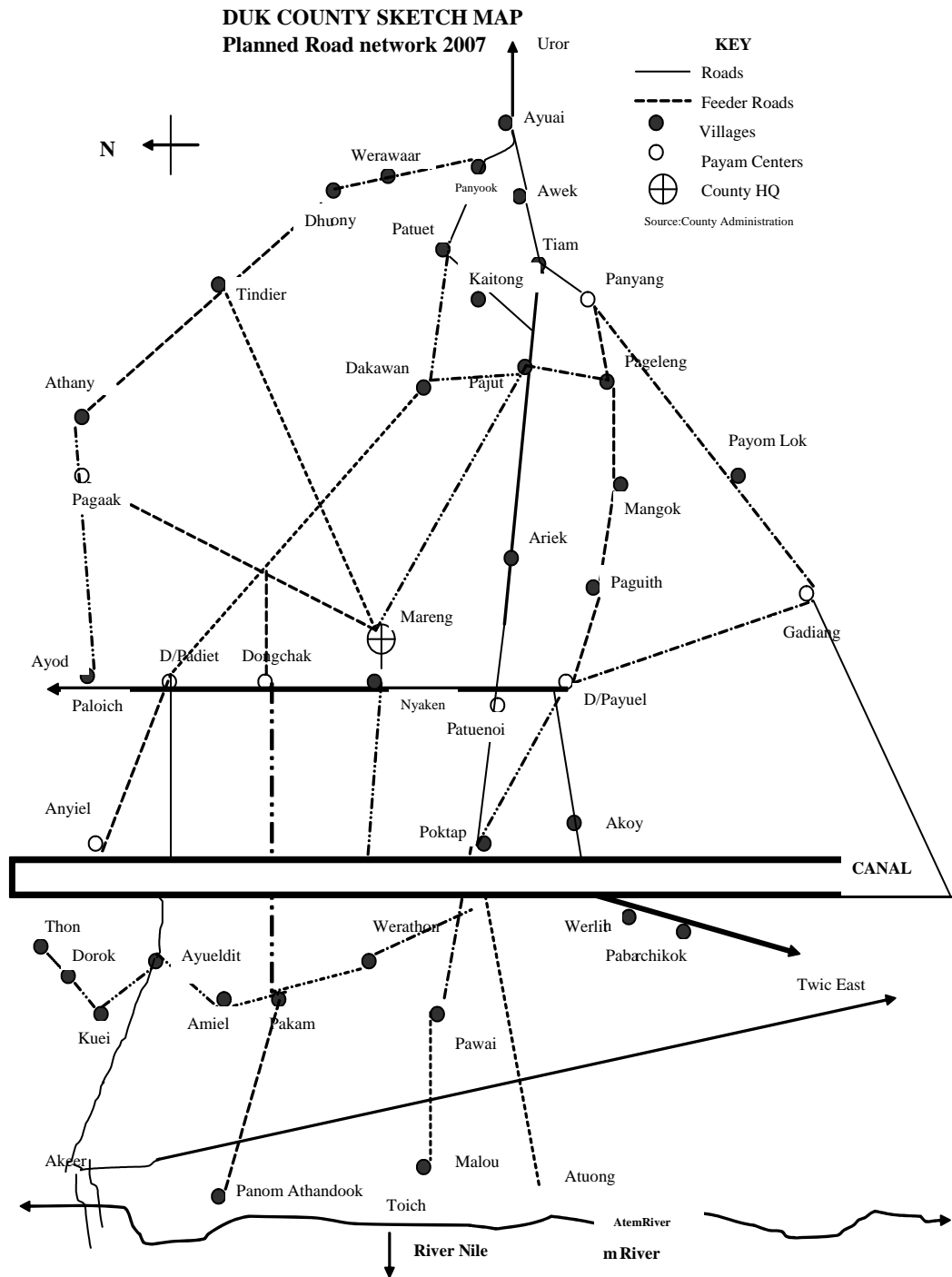
## 5.0 Conclusions

This survey found GAM of 15.2% and SAM of 5.0%, figures which are higher than the WHO threshold of 15% and 4% for severity of acute malnutrition, respectively. Of the malnourished, 10.2% were moderately wasted and in danger of becoming severely malnourished. The prevalence of acute malnutrition was particularly high in Duk Payuel (20.2% for GAM and 6.1% for SAM). In general, the number of households with little or no food stocks was higher than anticipated. In addition, sanitation and hygiene were very poor particularly in Duk Payuel- aggravated by recent flooding and non-use of latrines by the people. As such, incidences of malaria and diarrhoeal diseases were common. Not surprisingly, coupled with lack of basic infrastructures, the prevalence of acute malnutrition was high. The very poor and poor, who comprise 60-75% of the population, are particularly affected and hard-pressed. Interestingly, however, the survey found CMR (0.83 deaths/10,000/day) and U5MR (0.61 deaths/10,000/day) which are below the alert and emergency threshold levels according to Sphere, and 1.6 times lower than figures recorded in the 2005 ACF-USA survey of Duk Payuel. Arguably, this reflects the positive impact of the health care and relief services provided by the Duk Lost Boys Clinic and WFP, respectively. Nevertheless, despite this progress, the need for regular humanitarian assistance continues in order to sustain low mortality rates in the survey area, and bring malnutrition rates to levels below the emergency thresholds.

## 6.0 Recommendations

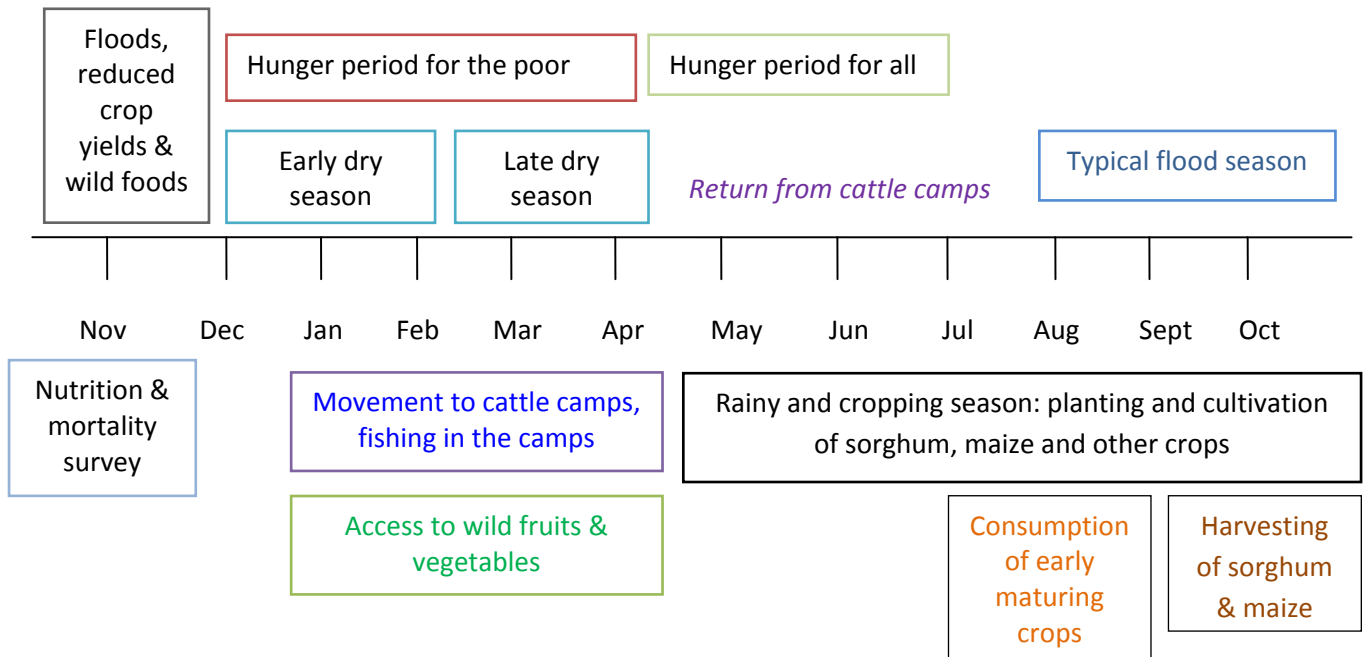
- Provide general food distributions to the entire population during the dry and pre-harvest season (January-August 2011). Early planning of relief food is needed to ensure timely intervention. Proper coordination and close monitoring are also vital to shun any malpractices in the food storage and distribution exercise
- Start SFP for children under five and TFP for severely malnourished children. In this regard, sufficient qualified staff are needed for the recently introduced growth monitoring at Duk Lost Boys Clinic to ensure that eligible children are diagnosed and rehabilitated of malnutrition
- Promotion of sanitation and hygiene. Health education and support for construction of improved latrines are central to the success of this intervention
- Continued provision and support of health care services at Duk Lost Boys Clinic to curb morbidity and mortality
- Food for recovery programmes are needed to improve infrastructure and road network which would in turn enhance the social and economic progress of the people (e.g. by opening up market, trade and employment opportunities)
- Distribution of seeds and tools before the start of the next cropping season, April-November 2011. Consider including sweet potato vines and cassava cuttings bearing in mind that Duk County is climatically challenging. These crops are culturally acceptable and would bring in the much desired food diversification and security
- Plan and undertake a nutrition survey of the other Payams and Bomas in Duk County, preferably during the dry season (January-April, for easy mobility), to paint a comprehensive, holistic and better picture of malnutrition and food insecurity

# Appendix A: Map of Duk County



Source: Duk County Commissioner's Office

## Appendix B: Seasonal calendar of events



### Appendix C: Survey Bomas, villages and clusters

| Boma   | Village   | No of Homesteads | Population at the time of survey | Clusters      |
|--------|-----------|------------------|----------------------------------|---------------|
| Duk    | Payuel    | 392              | 1469                             | 1,2,3,4,5,6,7 |
|        | Akoy      |                  |                                  | 8,9,10,11     |
|        | Ariek     |                  |                                  | 12,13,        |
|        | Wunariiek |                  |                                  | 14,15         |
|        | Bathens   |                  |                                  | 16            |
|        | Mapatic   |                  |                                  | 17            |
|        | Kaetang   |                  |                                  | 18            |
|        | Akey      |                  |                                  | 19            |
|        | Yeen      |                  |                                  | 20            |
|        | Mareng    |                  |                                  | 21            |
|        | Bathens   |                  |                                  | 22            |
|        | Matkuel   |                  |                                  | 23            |
|        | Ageer     |                  |                                  | Patuenoi      |
| Nyakan |           | 32,33,34,35      |                                  |               |

### Appendix D: Consultants and survey teams

|             | Name                     | Profession / Description | Survey Responsibility   |
|-------------|--------------------------|--------------------------|-------------------------|
| Supervision | William Kasapila         | Nutritionist             | Lead Consultant         |
|             | Bibiana Jumwa            | Nutritionist             | Consultant              |
| Team 1      | Abraham Ring Kuol        | Nurse                    | Measurer (Team leader)  |
|             | Samuel Long Madhier      | Local Hire               | Measurer (Assistant)    |
|             | Goi Deng Kachoul         | Local Hire               | Interviewer             |
|             | Malou Deng Thon          | Local hire               | Interviewer (Assistant) |
| Team 2      | Rabecca Akech Aleer      | Midwife                  | Measurer (Team leader)  |
|             | Rabecca Kuany Deng       | Local hire               | Measurer (Assistant)    |
|             | Atem Mayen Atem          | Local hire               | Interviewer             |
|             | Emmanuel Kuir Deng       | Local hire               | Interviewer (Assistant) |
| Team 3      | Lim Peter Mayak          | Clinical staff           | Measurer (Team leader)  |
|             | Akuot Aleer Leek         | Local hire               | Measurer (Assistant)    |
|             | Samuel Kuol Dengdit Abot | Local hire               | Interviewer             |
|             | Bol Maching Deng         | Local hire               | Interviewer (Assistant) |
| Data Entry  | Victor Njogu             | Clinical staff           | Data entry clerk        |
|             | Peter Thiongo            | Clinical staff           | Data entry clerk        |
|             | Jacob Jok Abraham        | Clinical staff           | Data entry clerk        |
|             | Newton Kinathis          | Clinical staff           | Data entry clerk        |

### Appendix E: Child anthropometric data and program coverage form

Village \_\_\_\_\_

Date \_\_\_\_/\_\_\_\_/2010

Cluster No |\_\_\_\_|\_\_\_\_|

Team No |\_\_\_\_|

| Child No | HH No | Name | Sex | Birth date (dd/mm/yy) | Age in months | Weight (in Kg) ±100g | Height (in cm) ± 1mm | Oedema Y=Yes N=No | MUAC (in cm) | BCG vaccine? R= Yes (Recall) C=Yes (Card) N=No | Vitamin A in last 6 months? R= Yes (Recall) C=Yes (Card) N=No | Measles vaccine? R= Yes (Recall) C=Yes (Card) N=No |
|----------|-------|------|-----|-----------------------|---------------|----------------------|----------------------|-------------------|--------------|--|---|--|
| 1        |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 2        |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 3        |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 4        |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 5        |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 6        |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 7        |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 8        |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 9        |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 10       |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 11       |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 12       |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 13       |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 14       |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |
| 15       |       |      | M/F |                       |               |                      |                      | Y/N               |              | R/C/N  | R/C/N   | R/C/N  |

## Appendix F: Mortality survey questionnaire

Village \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/2010 Cluster No |\_\_\_\_|\_\_\_\_| Team No |\_\_\_\_|

HH No |\_\_\_\_|\_\_\_\_|

| ID | Name of household member | Sex   | Age<br>< 5 / >5<br>years | Currently<br>present? | Present<br>at<br>beginning<br>of recall<br>period? | Born<br>during<br>recall<br>period? | 'Died'<br>during<br>recall<br>period? |
|----|--------------------------|-------|--------------------------|-----------------------|--|-------------------------------------|---------------------------------------|
| 1  |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 2  |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 3  |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 4  |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 5  |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 6  |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 7  |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 8  |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 9  |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 10 |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 11 |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 11 |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 12 |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 13 |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |
| 14 |                          | M / F | < 5 / >5                 | Y / N                 | Y / N  | Y / N                               | Y / N                                 |

## Appendix G: Child health and household questionnaire

### Q1-Q8 IDENTIFICATION

|    |   |    |                         |
|----|---|----|-------------------------|
| Q1 | Date:  __   __  /  __   __  / 2010<br>Day month | Q5 | Cluster No  __   __     |
| Q2 | Payam Name:                                     | Q6 | Household No  __   __   |
| Q3 | Boma:   | Q7 | Team No  __             |
| Q4 | Village Name:                                   | Q8 | No of <5s in the HH  __ |

### Q9-Q18 INFANT/CHILD FEEDING

(for the youngest <5 child in the Household)

|     |   |   |
|-----|---|---|
| Q9  | Youngest <5 child name:   |   |
| Q10 | Child date of birth   | ____/____/20____<br>1 = Child's card used<br>2 = Mother's Recall<br>3 = Height measurement (65-110cm)   |
| Q11 | Child's age in months   | ____ months   |
| Q12 | Are you breastfeeding the child?  | 1 = Yes 2 = No  |
| Q13 | If yes, how many times do you breast the child/day?   | 1=<3 times 2=3-6 3=on demand  |
| Q14 | If no, how old was the child when you stopped breastfeeding her?  | 1 = Less than 6 months<br>2 = 6-11 months<br>3 = 12-18 months<br>4 = 18 months or more<br>5 = Never breastfed   |
| Q15 | At what age was child given water/milk/foods other than breast milk   | 1 = 0-3 months<br>2 = 4-5 months<br>3 = 6 months or more  |
| Q16 | How many times do you feed the child in a day (solid, semi-solid or soft foods)?                            | 1 = 2 times<br>2 = 3 times<br>3 = 4 times   |
| Q17 | What kind of food did the child receive yesterday?<br>Received the food = 1<br>Did not receive the food = 2 | Grains, roots and tubers _____<br>Legumes and nuts _____<br>Dairy products _____<br>Meats _____<br>Eggs _____<br>Fruits & vegetables (Vit A rich) _____<br>Other Fruit & Vegetable _____  |
| Q18 | If the mother stopped breastfeeding the child what are the reasons?   | 1 = Age of the child<br>2 = Child stopped on his/her own<br>3 = No breast Milk<br>4 = Child was sick<br>5 = Mother was sick<br>6 = Mother became pregnant<br>7 = Mother working<br>8 = Nipple or breast problems<br>9 = Other (specify) _____ |

### Q19-Q23 CHILD MORBIDITY

|     |   |   |
|-----|---|---|
| Q19 | In the past 2 weeks, did any children between 6-59 months have any of the following illnesses?<br>1 = Yes    2 = No | Diarrhoea   ____  <br>Malaria   ____  <br>ARI   ____  <br>Others (specify) _____  |
| Q20 | If yes, where did you seek healthcare assistance or treatment when the child was sick?                              | 1= No assistance sought<br>2 = Own medication<br>2 = Traditional healer<br>3 = Private clinic/ Pharmacy/Store<br>4= Public health facility<br>9 = Not Applicable                                |
| Q21 | If you did not seek healthcare assistance or treatment what was the reason?   | 1 = The problem was not serious<br>2= Too far / lack of transport<br>3= Lack of money<br>4= Used traditional treatment at home<br>6 = Inaccessibility due to floods<br>9= Other (specify) _____ |
| Q22 | Have any of your <5 children ever received growth monitoring?   | 1 = Yes<br>2 = No   |
| Q23 | Which members of the household slept under a bed net last night? 1 = Yes    2 = No                                  | <5 children   ____  <br>Pregnant women   ____  <br>Lactating women   ____   |

*Diarrhoea (≥3 loose or watery stools/day); Malaria (fever with chills); ARI (fever, cough & difficulty breathing)*

### Q24-Q27 ACCESS TO WATER

|     |  |   |
|-----|--|---|
| Q24 | What is the main source of drinking water for members of your household?   | 1 = Household tap<br>2 = Public tap<br>3 = Borehole with pump<br>4 = Protected well or spring<br>5 = Unprotected well or spring<br>6 = Standing (flood) water<br>7 = Rain water (collected)<br>8 = Others (specify) _____ |
| Q25 | How long does it take to collect water from the main source for your HH? (includes walking and waiting time) <i>(Record the time to go and return ; write 888 if water on premises; but 999 if don't know)</i> | _____ minutes   |
| Q26 | Number of clean water collecting and storage containers of 10-20 litres  | 1 = 1-2 containers<br>2 = 3-4 containers<br>3 = 4-5 containers<br>4 = more than 5 containers  |
| Q27 | How do you ensure that drinking water is safe?   | 1 = Boil<br>2 = Filter<br>3 = Boil and filter<br>4 = Add chemicals (e.g. chlorine)<br>5 = Do nothing<br>6 = Others (specify) _____  |

**Q28-Q32 SANITATION AND HYGIENE**

|     |  |   |
|-----|--|---|
| Q28 | What type of toilet does your household use?   | 1=Improved pit latrine<br>2=Traditional pit latrine<br>3=Open pit<br>4= Designated area<br>5= No toilet / bush<br>6 = Others (specify)_____ |
| Q29 | Number of people who use the same toilet   | 1 = 1-5 people<br>2 = 6-10 people<br>3 = 11-15<br>4 = 16 – 20 people<br>5 = More than 20 people<br>6 = Don't know                           |
| Q30 | What is the distance between toilet and water source   | 1 = 0 – 5 metres<br>2 = 6 – 10 metres<br>3 = 11- 20 metres<br>4 = 21 - 29 metres<br>5 =30 metres or more                                    |
| Q31 | Does the toilet that your HH use have a hand washing facility nearby?                            | 1 = Yes<br>2 = No   |
| Q32 | What agent(s) do you use to wash your hands after visiting the toilet or changing child nappies? | 1 = Soap<br>2 = Ash<br>3 = Plant extracts<br>4 = None (just water)<br>5 = Does not wash<br>6 = Other _____                                  |

**Q33-Q41 HOUSEHOLD FOOD SECURITY INDICATORS**

|     |  |   |
|-----|--|---|
| Q33 | What is the <u>main source</u> of food for your household?   | 1 = own food production<br>2 = market purchase<br>3 = livestock and animal products<br>4 =fishing and hunting<br>5 = relief food<br>6 = casual employment<br>7 = food gifts or remittances<br>8 = food for work program<br>9 = collection of wild foods<br>10 = Other (specify)_____                            |
| Q34 | What is the <u>main source</u> of income for your household? | 1 = cash or food crops<br>2= livestock & livestock products<br>3 = forestry products e.g. firewood<br>4= fishing<br>5 = wild food sales<br>6 = handcraft (weaving, pots)<br>7 = wage/permanent employment<br>8 = casual employment<br>9 = skilful work (tailoring, building)<br>10 = trading<br>11= Other _____ |
| Q35 | Does your household have livestock?                          | 1 = Yes<br>2 = No   |

|     |   |  |
|-----|---|--|
| Q36 | If yes, how many livestock do you have?<br>1 = 0-3    2 = 4-6    3 = 7-12    4 = 13-20    5 = 21+ | Cattle  ____ <br>Goats  ____ <br>Sheep  ____ <br>Poultry  ____ <br>Other _____   |
| Q37 | What is the size of your cultivatable land  | _____ acres Or<br>_____ feddans  |
| Q38 | How much do you harvest (in 50 Kg bags) for staples in a normal year?                             | Sorghum _____ bags<br>Maize _____ bags   |
| Q39 | How much of the staples have you harvested this year or you anticipate to harvest?                | Sorghum _____ bags<br>Maize _____ bags   |
| Q40 | What coping strategies (a variety of ways) are you currently using to maintain your food supply?  | 1 = Increasing use of wild foods<br>2 = Seasonal labour migration<br>3 = Selling livestock and other assets<br>4 = Casual employment<br>5 = Out migration<br>6 = Wild food sales<br>7 = Reduce portion sizes<br>8 = Reduce number of meals/day<br>9 = Relying on food gifts<br>10 = Relying on relief food<br>11 = Relying on food stocks<br>12 = Reducing non-food expenditures<br>13 = Other _____ |
| Q41 | How have the floods affected your livelihood?   | 1 = Crop failure<br>2 = Livestock destruction<br>3 = Destruction of livestock forage<br>4 = Increased commodity prices<br>5 = Limited access to markets<br>6 = Loss of job opportunities<br>7 = Other _____  |

## Appendix H: Food security and livelihood key informant checklist

Date \_\_\_\_\_ November 2010

Payam.....

Boma.....

Village.....

Name of Respondent.....

Responsibility.....

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### Questions

1. How do you describe the residents of this area?
2. Describe the different wealth groups that are in this area? Who are the rich and who are the poor and very poor?
3. What are the main economic activities for each wealth group?
4. What are the main crops that people cultivate for food in this area?
5. What are the main crops that people cultivate for cash in this area?
6. Which markets are of greatest importance to people in terms of selling their goods e.g. crops, livestock and livestock products?
7. Where do people buy food and non-food items in this area?
8. Where do these food and non-food items come from?
9. How do prices for key commodities change from season to season- rainy and dry seasons?
10. In which months do people prepare feddans, plant, weed and harvest?
11. In which month do people start consuming early maturing crops from own crop production
12. Where do people from this area go for cattle camping?
13. In which month(s) do they go and come back from cattle camps?
14. Where do people go or come from to look for work (e.g. casual and permanent work)?
15. What are the casual labour rates of pay, duration of work in a year and the number of people seeking employment over the year?
16. What strategies are people currently using to sustain their food supply and income?
17. How do people rank the strategies (in order of use and importance) e.g. early and late, and most important & less important strategies?
18. What are the people's feelings about the outlook for the coming months? What problems are they likely to come across which are worrying and concerning?
19. What are the people's wishes and suggestions of what needs to be done?