



South Sudan

**NUTRITIONAL ANTHROPOMETRIC SURVEY
CHILDREN UNDER FIVE YEARS OLD**

**FINAL REPORT
ATAR/ KHORFULUS COUNTY, JONGLEI STATE**

6th - 30th MAY, 2006

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.I. EXECUTIVE SUMMARY

.I.1. Introduction

Atar/Khorfulous County, in Jonglei state, comprises of nine payams namely: Chuei, Duk, Pijee, Wunangui, Alela, Alam, Nyithok, Wunlam and Belawich. Atar County borders Shilluk kingdom to the north, Ayod County to the south, Fangak County to the west, and Baliet County to the northeast. According to SRRC, Chuei, Duk, Pijee, Wunangui, Alela, Alam, Nyithok, Wunlam and Belawich payams have an estimated total population of 79,337. SRRC, also, reported 1,356 IDP's and 6,671 returnees in Atar.

The area is generally flat and made of fertile black cotton loamy soils. The Nile, Atar and Khorfulous rivers traverse the County, and provide grazing pastures, drinking water and fishing points.

ACF-USA has conducted three nutritional surveys in Atar/Khorfulous County; In April 2002, the survey revealed a GAM of 31.0% [26.7%– 35.6%]¹, November 2002 recorded a GAM of 33.1% [28.5%-38.0%], while November 2003 had a GAM of 12.1% [9.3 – 15.6%] Z- Scores.

In the period covering January to April 2006, MEDAIR assessed the malnutrition situation using MUAC measurements, and reported 35 severe cases of malnutrition. In April 2006, MEDAIR PHCU treated 75 cholera cases. At the beginning of the year, SRRC had also reported to MEDAIR the severe food shortage as a result of IDP's and returnees, who put pressure on limited food stocks of the host community.

Taking into consideration the poor food security, cholera outbreak and severe malnutrition cases reported, ACF-USA decided to implement a nutritional survey in the region in order to detect the actual nutritional situation.

.I.2. Objectives

An anthropometric nutritional survey was carried out in Atar/Khorfulous County by ACF-USA from 6th to 30th May 2006, with the following objectives:

- To evaluate the nutritional status of children 6 to 59 months of age.
- To estimate the measles immunization coverage of children 9 to 59 months of age.
- To identify groups at higher risk to malnutrition: age group and sex.
- To estimate the crude mortality rate through a retrospective survey.

.I.3. Methodology

A two-stage 30 by 30 cluster survey methodology was applied. 900 children were to be measured. This sample size provides the estimate for the prevalence of malnutrition with a 95 % confidence interval. The sampling frame covered all accessible villages within Chuei, Duk, Pijee and Wunangui payams. In each cluster, households were randomly selected and surveyed. All the children 6 to 59 months of age belonging to the same family, defined as a woman and her children, were included in the survey. Retrospective mortality survey (over the past three months) using SMART methodology, Qualitative survey and observations were also conducted alongside the anthropometric survey.

¹ Results expressed in Z-scores, with a confidence interval at 95% between brackets.

.I.4. Summary of Findings

Chuei, Duk, Pijee and Wunangui payams are inhabited by the Dinka Pandang tribe. According to the community, security has been stable since the comprehensive peace agreement (CPA) was signed in January 2005.

The NGO's operating in the location are MEDAIR and Serving in Mission (SIM). NCDS (an indigenous NGO) also, has programs running on ground. MEDAIR operates two functional Primary Health Care Units (PHCU's) located in Chuei and Wunlam payams. Wunangui PHCU is not operational at the moment. Each of the health units are managed by 1 Medical Assistant, 3 Community Health Workers (CHW's) and 2 Kalazaar assistants. The health units provide preventive (hygiene promotion) and curative services. SIM, on the other hand, is in the process of implementing evangelism, teacher-training programs and Adult learning programs (ALP's). NCDS supervises primary education program already running on ground.

Although there is health education and PHCU services by the NGO in the area, the hygiene practices of majority of the population is still unsatisfactory. However, there is significant improvement in seeking medical attention from the health facilities rather than traditional healers.

The river is the main source of water for the population in the areas assessed. There are also two functional boreholes in Wunakot and Chuei villages. Most of the households surveyed still consume untreated drinking water. Latrines were observed in a few households, and majority of the population indiscriminately disposes human waste.

Food security assessment revealed that most households had exhausted the sorghum harvested in October 2005. The previous harvest was poor due to the floods and attack of the crops by insects and birds. The most predominant coping mechanism by households was purchase of food using income obtained from sale of firewood and charcoal. Majority of the households last received WFP food relief in September 2005 and had exhausted the rations received.

A total of 932 children were measured during the nutritional survey, but only 921 children were finally included in the analysis due to aberrant data in 11 records.

The result of the anthropometrics survey, shown in the table below, indicates a GAM rate above the emergency level.

Table 1 Results of the Anthropometrics Survey

AGE GROUP	INDICATOR		RESULTS
6-59 months (n = 921)	Z-score	Global Acute Malnutrition W/H < -2 z and/or oedema	27.0% [23.0%-31.5%] ²
		Severe Acute Malnutrition W/H < -3 z and/or oedema	3.0% [1.7%-5.2%]
	% Median	Global Acute Malnutrition W/H < 80% and/or oedema	17.3% [13.9%-21.2%]
		Severe Acute Malnutrition W/H < 70% and/or oedema	0.8% [0.2%-2.2%]
6-29 months (n = 374)	Z-score	Global Acute Malnutrition W/H < -2 z and/or oedema	32.1% [25.5%-39.5%]
		Severe Acute Malnutrition W/H < -3 z and/or oedema	4.3% [1.9%-8.6%]
	% Median	Global Acute Malnutrition W/H < 80% and/or oedema	19.5% [14.1%-26.2%]
		Severe Acute Malnutrition W/H < 70% and/or oedema	0.8 % [0.0%-3.8%]
Total crude retrospective mortality (last 3 months) /10,000/day			2.19 [1.18 – 3.20]
Under five crude retrospective mortality /10,000/day			1.14 [0.48 – 1.80]
Percentage of children under five amongst deaths recorded			17.9%
Measles immunization coverage	By card		4.7%
	According to caretaker ³		25.4%
	Not immunized		69.9%

.I.5. Recommendations

- WFP to distribute food aid to the community to cushion vulnerable groups (mainly the returnees who have settled in the villages) from the deteriorating food security situation.
- ACF-USA, MERLIN and MoH to support the establishment of the nutritional treatment program within the health facilities or creation of separate therapeutic/supplementary feeding centers to prevent likely mortalities arising from acute malnutrition.
- MERLIN to maintain the health intervention activities, and consider increasing the coverage and access to its services, more so to primary health care package, health education, growth monitoring as well as nutritional monitoring while ensuring full implementation of the same. Also, to introduce EPI services.
- MERLIN to consider expanding on the already existing water treatment services to a sustainable level where all water used in all households is treated at the point of collection. Also, to continue water exploration assessments in the County.
- MERLIN to intervene to consider supporting the construction of latrine facilities, and in addition, offer education regarding the importance of the same.

² The data into brackets are the Confidence Interval at 95%.

³ When no EPI card was available for the child at the household, measles vaccination information was collected according to the caretaker

- FHI international or other agencies to explore modalities of diversified cropping and explore the possibility of countering flooding to minimize its negative effects on cultivation fields to bolster food security.
- ACF-USA or other capable agency to distribute appropriate fishing gear and feasible ways of expanding or opening up a new fish market.

.II. INTRODUCTION

Atar/ Khorfulous County, in Jonglei state, comprises of nine payams namely: Chuei, Duk, Pijee, Wunangui, Alela, Alam, Nyithok, Wunlam and Belawich. Atar County borders Shilluk kingdom to the north, Ayod County to the south, Fangak County to the west, and Baliet County to the northeast. According to SRRC, Chuei, Duk, Pijee, Wunangui, Alela, Alam, Nyithok, Wunlam and Belawich payams have an estimated total population of 79,337. SRRC also reported 1,356 IDP's and 6,671 returnees in Atar.

The area is generally flat and made of fertile black cotton loamy soils. Nile, Atar and Khorfulous rivers traverse the county and provide grazing pastures, drinking water and fishing points.

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ACF-USA had conducted three nutritional surveys in Atar/Khorfulous County; In April 2002, the survey revealed a GAM of 31.0% [26.7%– 35.6%]⁴, November 2002 recorded a GAM of 33.1% [28.5%-38.0%] while November 2003 had a GAM of 12.1% [9.3 – 15.6%] Z- Scores.

In the period covering January to April 2006, MEDAIR assessed the malnutrition situation using MUAC measurements, and reported 35 severe cases of malnutrition. In April 2006, MEDAIR PHCU treated 75 cholera cases. At the beginning of the year, SRRC had also reported to MEDAIR the severe food shortage as a result of IDP's and returnees, who put pressure on limited food stocks of the host community.

Taking into consideration the poor food security, cholera outbreak and severe malnutrition cases reported, ACF-USA decided to implement a nutritional survey in the region in order to detect the actual nutritional situation.

An anthropometric nutritional survey was carried out by ACF-USA in Atar/Khorfulous County from 6th to 30th May 2006.

⁴ Results expressed in Z-scores, with a confidence interval at 95% between brackets.

.III. METHODOLOGY

.III.1. Type of Survey and Sample Size

The target population of the survey was made up of children 6-59 months of age.

The total population of the 22 accessible villages in Chuei, Duk, Pijee, and Wunangui Payams was estimated at 25,942 (SRRC population figures), giving a target population of 5188, children (calculated as 20% of the total population). A two-stage cluster sampling methodology was used. The sample size was made up of 30 children per cluster.

Qualitative information collection was carried out along side anthropometric survey to capture food security, childcare practices, nutrition, health and sanitation. This was through individual household interviews, and observations. A retrospective mortality survey (over the past three months) was also conducted, alongside the anthropometric survey.

.III.2. Sampling Methodology

A two-stage cluster sampling was used:

- At the first stage, 30 clusters were randomly selected. Using a random draw, villages were chosen from a list of accessible villages, and the clusters assigned accordingly. (See appendix 1 for village list and estimated population). The probability of selection was proportional to the village population size. Each cluster included a minimum of 30 children.
- At the second stage, that is, the selection of the households within each cluster, the standard WHO methodology was used: a pen was spun while being at the central point of the selected cluster, defining a random direction. All the children 6-59 months of age belonging to the households encountered in that direction were measured.

.III.3. Data Collection

During the anthropometric survey, for each selected child ages 6 to 59 months, the following information was recorded (See appendix 2 for anthropometric questionnaire):

- **Age:** recorded with the help of a local calendar of events (See appendix 5 for calendar of events).
- **Gender:** male or female
- **Weight:** children were weighed without clothes, with a SALTER balance of 25kg (precision of 100g).
- **Height:** children were measured on a measuring board (precision of 0.1cm). Children less than 85cm were measured lying down, while those greater than or equal to 85cm were measured standing up.
- **Mid-Upper Arm Circumference:** MUAC was measured at mid-point of left upper arm for measured children (precision of 0.1cm).
- **Bilateral oedema:** assessed by the application of normal thumb pressure for at least 3 seconds to both feet.
- **Measles vaccination:** assessed by checking for measles vaccination on EPI cards and asking caretakers.
- **Household status:** for the surveyed children, households were asked if they were permanent residents, temporarily in the area, displaced or returnee.

.III.4. Indicators, Guidelines, and Formula's Used

.III.4.1. Acute Malnutrition

➤ Weight for Height Index

For the children, acute malnutrition rates were estimated from the weight for height (WFH) index values combined with the presence of oedema. The WFH indices are compared with NCHS (5) references. WFH indices were expressed in both Z-score and percentage of the median. The expression in Z-score has true statistical meaning, and allows inter-study comparison. The percentage of the median on the other hand is commonly used to identify eligible children for feeding programs.

Guidelines for the results expressed in Z-score:

- Severe malnutrition is defined by WFH < -3 SD and/or existing bilateral oedema on the lower limbs of the child.
- Moderate malnutrition is defined by WFH < -2 SD and ≥ -3 SD and no oedema.
- Global acute malnutrition is defined by WFH < -2 SD and/or existing bilateral oedema.

Guidelines for the results expressed in percentage of median:

- Severe malnutrition is defined by WFH < 70 % and/or existing bilateral oedema on the lower limbs
- Moderate malnutrition is defined by WFH < 80 % and ≥ 70 % and no oedema.
- Global acute malnutrition is defined by WFH <80% and/or existing bilateral oedema

➤ Children's Mid-Upper Arm Circumference (MUAC)

The weight for height index is the most appropriate index to quantify wasting in a population in emergency situations where acute forms of malnutrition are the predominant pattern. However the mid-upper arm circumference (MUAC) is a useful tool for rapid screening of children at a higher risk of mortality. The MUAC is only taken for children with a height of 75 cm and more. The guidelines are as follows:

MUAC < 110 mm	severe malnutrition and high risk of mortality
MUAC ≥ 110 mm and <120 mm	moderate malnutrition and moderate risk of mortality
MUAC ≥ 120 mm and <125 mm	high risk of malnutrition
MUAC ≥ 125 mm and <135 mm	moderate risk of malnutrition
MUAC ≥ 135 mm	adequate' nutritional status

.III.4.2. Mortality

Mortality data was collected using Standardized Monitoring and Assessment of Relief and Transitions (SMART) methodology. The crude mortality rate (CMR) is determined for the entire population surveyed for a given period. The CMR is calculated using Nutrisurvey for SMART software for Emergency Nutrition Assessment.

The formula below is applied:

Crude Mortality Rate (CMR) = $10,000/a*f / (b+f/2-e/2+d/2-c/2)$,

where:

- a** = Number of recall days (90)
- b** = Number of current household residents
- c** = Number of people who joined household
- d** = Number of people who left household
- e** = Number of births during recall
- f** = Number of deaths during recall period

⁵ NCHS: National Center for Health Statistics (1977) NCHS growth curves for children birth-18 years. United States. Vital Health Statistics. 165, 11-74.

The result is expressed per 10,000-people / day.
The thresholds are defined as follows⁶:

Total CMR:

Alert level: 1/10,000 people/day
Emergency level: 2/10,000 people/day

Under five CMR:

Alert level: 2/10,000 people/day
Emergency level: 4/10,000 people/day

.III.5. Field Work

Three teams of three surveyors each executed the fieldwork. All the surveyors participating in the survey underwent a 4-day training, which included a pilot survey. ACF-USA staff supervised all the teams in the villages. The survey (including training, data collection and traveling) lasted for a period of 25 days.

.III.6. Data Analysis

Data processing and analysis were carried out using EPI-INFO 5.0 software, EPINUT 2.2 program and Nutrisurvey for SMART software. Qualitative data was analyzed using SPSS (Statistical Package for Social Sciences).

.IV. RESULTS OF THE QUALITATIVE ASSESSMENT

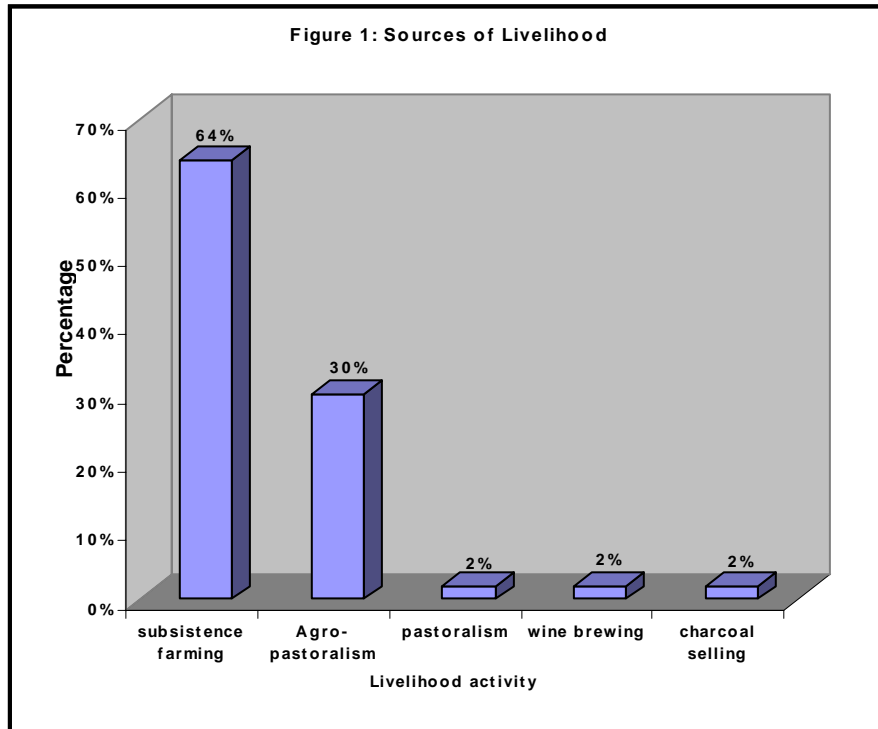
.IV.1. Social Demographic Characteristics of the Respondents

According to the SRRC, a total number of 6,671 returnees and 1,356 IDP's were reported to have arrived. The IDP's, mainly running from militia conflict in Shilluk Kingdom arrived in Atar, and most of them camped at the Atar School in September 2004. The returnees, mainly from Khartoum, also, arrived between August 2005 and May 2006 and settled in Chuei as a result of the recent signing of the Comprehensive Peace Agreement (CPA). More returnees are expected in the coming months as most continue receiving assistance from humanitarian agencies in form of transportation to join their families. South Sudan food security and livelihood update (April, 2006) estimates the number of returnees who have returned to Malakal town (transit town for people coming to Atar) was 520 in the month of April alone.

Qualitative information was collected during the period of survey and 50 households were interviewed comprehensively on food security, hygiene and sanitation, nutrition and health. Among the respondents that were interviewed, 72% were residents, 24% temporary residents and 4% were returnees.

Most of the households interviewed had subsistence farming (64.0%) as a major livelihood activity. This was followed by agro-pastoralism (30.0%). Low agro-pastoralism in the community could be attributed to the declining number of livestock in the community. The figure below illustrates different livelihood activities in the community.

⁶ Health and nutrition information systems among refugees and displaced persons, Workshop report on refugee's nutrition, ACC / SCN, Nov 95.

Figure 1 Sources of Livelihood

.IV.2. Food Security

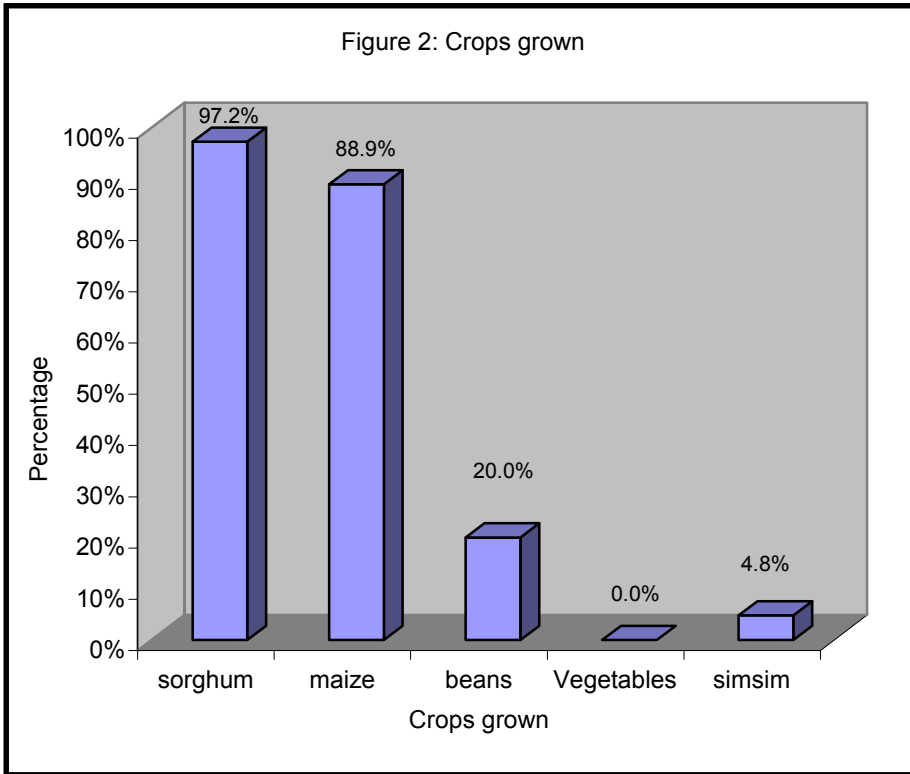
It was evident during the survey period that the Dinka community in Atar is predominantly agro-pastoralist. They keep livestock and grow crops at the same time. However, observation revealed that declining livestock herds leave households with the option of cultivating crops as a major livelihood activity. 90% of the households interviewed planted crops in the last growing season, which was between June and August 2005. The land cultivated by each household depended on available farm labor, seeds and tools. The major crop cultivated was sorghum, thus, 97.8% of the households grew Sorghum, 88.9% of them grew maize, 20% grew beans, and 4.8% grew sim-sim while no households grew vegetables as shown in the figure below.

Planting season commenced in the months of June and July for sorghum and maize. Green maize was harvested in late August and early September while sorghum was harvested in November.

Most households (97.8%) reported that last season's harvest performed poorly compared to previous season's and, therefore, below their expectations. Food for Hungry international (FHI-Sudan) reported that they had distributed seeds and tools (Malodas) in Atar in July 2005 (planting season) and trained NCDS (indigenous NGO) staff who would be used to guide farmers to use appropriate farming practices as an effort to improve productivity. However, it emerged during the survey that the Major problem which caused below par performance of the harvest was floods. In the survey, 84.1% of the households that cultivated reported floods as cause of their poor harvest, 75% and 11.4% of them reported insect pests and birds' attack on crop, respectively. Among the interviewed households 89.1% of them had already exhausted stocks of the last harvest.

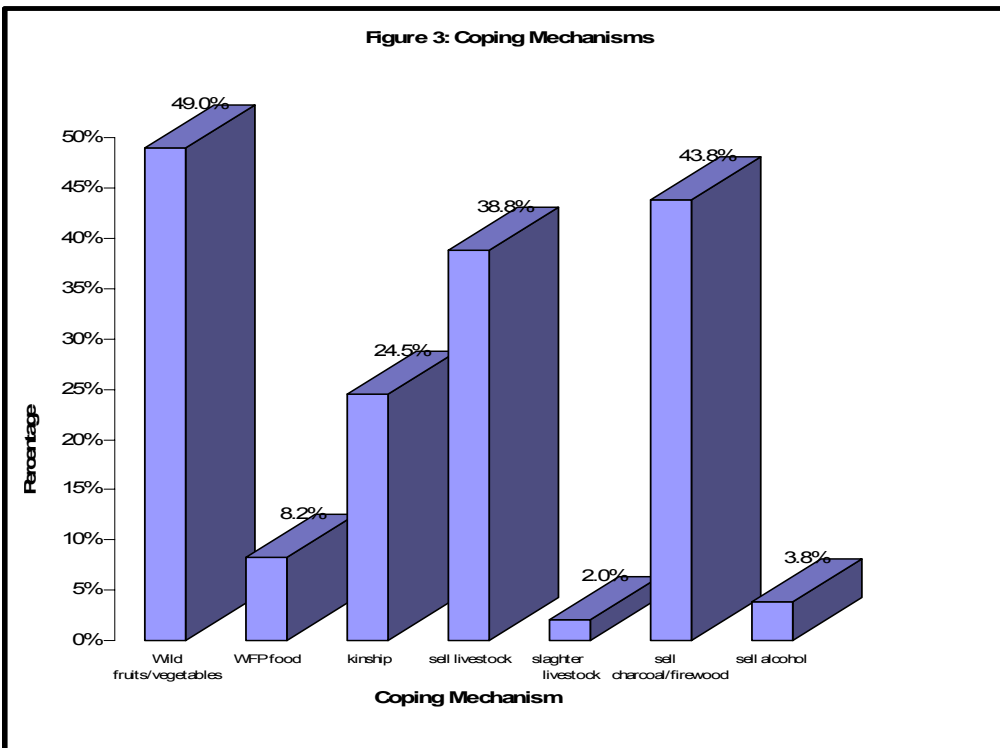
According to key informants, the normal years were 2000, 2002 and 2003. During this time fish was abundant in July, rains started timely in May and June, livestock had not significantly reduced and did not suffer largely on diseases and could produce enough milk, and prices of sorghum were about 6,000 Dinnar per 90kg bag while average price of goat was 2500 Dinnar. The bad years were 1999, 2001, 2005, mainly attributed to attack of crops by birds, upward shift of prices of sorghum and goats and low fish availability at fishing points.

Figure 2 Crops Grown



Just as the SRRC secretary had reported, it was presumed that effects of the poor performance for the year 2005, precipitated the severity of the hunger gap period that started at the beginning of year 2006. It was also observed during the time of survey, that the community used multiple coping strategies to close the hunger gap. The main coping strategies were selling charcoal, and firewood to buy food stocks, reliance on kinship support, selling of livestock and collection of wild fruits and vegetables as shown in the figure below.

Figure 3 Coping Mechanisms



Most of the households had already exhausted the last WFP food. The last WFP distribution in Atar was done in the month of September 2005. The effect of charcoal burning and selling (which helped obtain money to buy food) is being felt as more areas of land continues to be cleared of trees without more being replanted and leaving no more wood for burning. The livelihood of the community is also, gradually being lost when they continue to sell their livestock, as an alternative to decreasing wood for charcoal burning, which has been predominantly practiced

to raise income to buy food and cushion against dwindling food stocks. Severe effects of food shortage are likely to be felt as number of returnees who depend on their kin increases, and the communities resources slide lower. The FEWSNET report of March 2006 indicated that major food insecurity was expected in the Eastern flood plain zone during the hunger gap period, mainly due to pressures resulting from returning populations. Similarly, environmental concerns were voiced over charcoal burning in Zeraf Island (old Fangak) and its adjoining areas (Atar). Cutting of trees was likely to continue at an alarming rate and for this reason agencies would be relevant to design activities that will mitigate this problem.

Currently, the food eaten within majority of households is obtained through buying from the market and collected wild foods. The community buys its food from a market located in a small town called Atar School, which is relatively inaccessible to the community due to its physical location, as majority has to walk for 2 hours or more to buy food. Equally, walking to the market can be hampered by fact that community crosses the Atar River in order to continue walking to the town. The river becomes almost impossible to cross during the rainy season. The food available at the market at the time of survey includes sorghum, beans, wheat, fish, oil, fruits (watermelons) and sugar. Livestock are also sold through Atar market and transported to Malakal. Assessment of commodity prices in the market revealed upward trend with average prices of sorghum, sugar, goat, and charcoal increasing by 20%, 25%, 66%, and 50% respectively between 2005 and 2006. This is indicative of the increased market prices of food in the market.

The major foods that are available in the community's diet consist of sorghum, wild fruits and vegetables, milk, fish, and maize. Majority of community derived milk as direct benefit of livestock and forms major part of children's' diet. *Atiep tiep* (a variety of wild grass), *Lalop* leaves and fruits are major part of the community's diet.

Majority of the household interviewed (52.0%) fish from the river Nile and its distributaries (Atar River). Key informants reported that the Khorfulous River serves the community proximate to it. Of the three rivers, Atar and

Khorfulous, which traverse most of the County, are most accessible and so are the available fishing grounds where the community fishes. Fishing is practiced throughout the year, but commonly done between June and September when rivers have over flooded their banks and fish is abundant in the rivers and their discourses. However, more than half (56.0%) of the interviewed households who did fishing, did not harvest enough fish. Among the people who did not harvest enough fish, 80.6% attributed it to lack of fishing equipment. The common methods used for fishing are by use of locally made fishing nets and fishing hooks. 92.0% of the households interviewed and doing fishing used nets, 64.0% used fishing hooks while 8.0% used spears as illustrated in the figure below. Households who did not fish at all attributed it to lack of fishing equipment and lack of capable labor to do fishing.

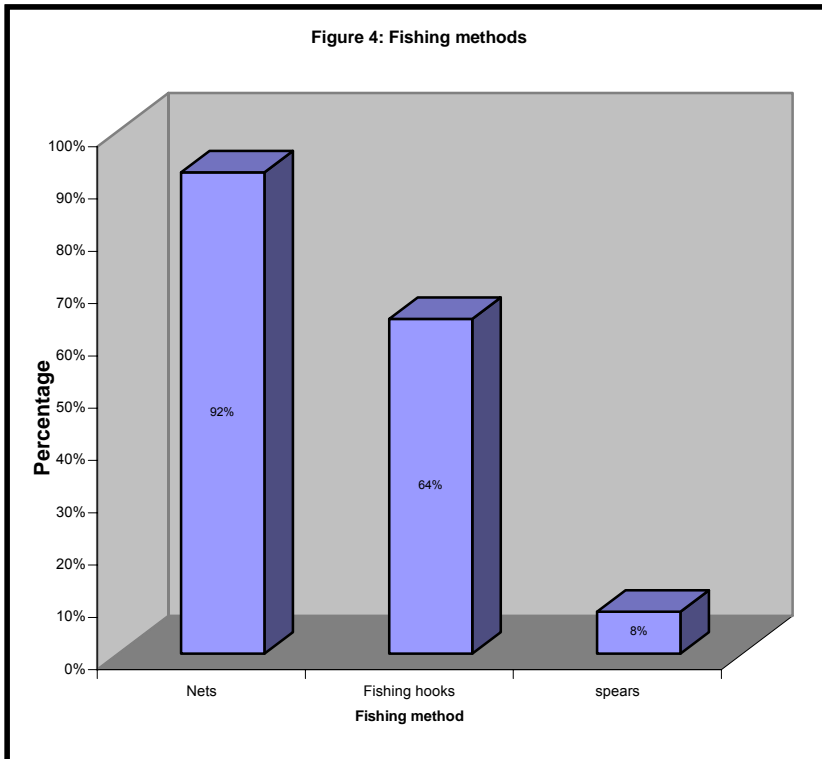


Figure 4 Fishing Methods

Goats, cows and chicken are the major livestock kept by the community. During survey, majority of the cattle (mainly goats) were kept at home, and only went to graze along the river during the day. Some households reported that their cattle were in cattle camps and would be brought around month of June. 66.7% of the interviewed household reported that their livestock had declined in the last five years. This was mainly attributed to selling of livestock in the market as a coping mechanism of the food shortages and prolonged hunger gaps, low reproduction rates and loss of animals through cattle raids orchestrated by militias before peace agreement. Livestock are sold in the Atar school market or among the community and act as a source of income to buy food stocks and bridge the hunger gap period. Livestock, which are not only a symbol of wealth, dowry payment, and determinants of livelihood, have declined tremendously over the last five years. The average production of milk per household interviewed was 2.6 liters. Quite a number of households interviewed slaughter livestock, mainly goats and chicken as food for special occasions. Currently, there is no agency that supports the community on better methods of livestock breeding, and care.

.IV.3. Health

MEDAIR (has handed over to MERLIN) is an NGO which operates two Primary Health Care Units (PHCU's) located in Chuei and Wunlam Payams. Since 1996, MEDAIR operated a Kalazaar clinic in Wunangui Payam till December 2005, when it was moved to operate from Chuei. Besides the community residing in Chuei, the clinic also serves Pachod, Jueny and Bogo communities which are 3-4 hours away. The health units are managed by 1 medical assistant (MA), 3 Community Health Workers (CHW's) and 2 Kalazaar assistants. They also have 1 female assistant and 3 volunteers. MEDAIR clinic has trained 11 Traditional Birth Attendants (TBA's). The clinics provide curative services, growth monitoring for children, antenatal services for expectant mothers, Hygiene promotion and also Malnutrition screening to children. The common illnesses treated at the clinics are Malaria, Diarrhea, Respiratory Tract Infections (RTI's), skin and eye infections. Prevalence of diarrhea and RTI's is high during the wet season. This occurs when it rains, and the river overflows. Its banks form numerous discourses, and pools of water collect inland, where it gets contaminated easily. The community fetches water for drinking from these sources escalating diarrhea and other waterborne diseases. Mosquito breeding grounds also increase raising Malaria cases. Although cases of Kalazaar are not frequently reported they are common in the months of November and December. According to MEDAIR MA, 3 common causes of mortality are diarrhea, RTI's especially among children aged below five years and Malaria. There was a cholera outbreak in the month of April, which escalated rate of mortality with 75 cases being treated and discharged. Three deaths were reported in the clinic arising from the outbreak but most deaths were reported to have occurred in the villages. This information concurred with what was observed during the time of the retrospective mortality survey. MA reported that Mortality in children is likely to be high in rainy season when Pneumonia is prevalent. The community does not respond well to Growth monitoring of children and expectant mothers are lax in attending antenatal visits. In the period covering January to April 2006, MEDAIR assessed the malnutrition situation using MUAC measurements, and reported 35 severe cases of malnutrition. 25 hygiene promoters have been engaged and serve all the community in Atar, however, Laboratory services are not offered at the clinics and tests are referred to Malakal town. There are no EPI services run by the clinics, thus, the low immunization rate (4.7%: see measles coverage in anthropometric results) in the area. Availability of EPI services is an indicator of availability of health services to a community. Chuei clinic is over-utilized by the community and drugs are consistently supplied, although, they are not enough for the population, which increases gradually as a result of incoming returnees.

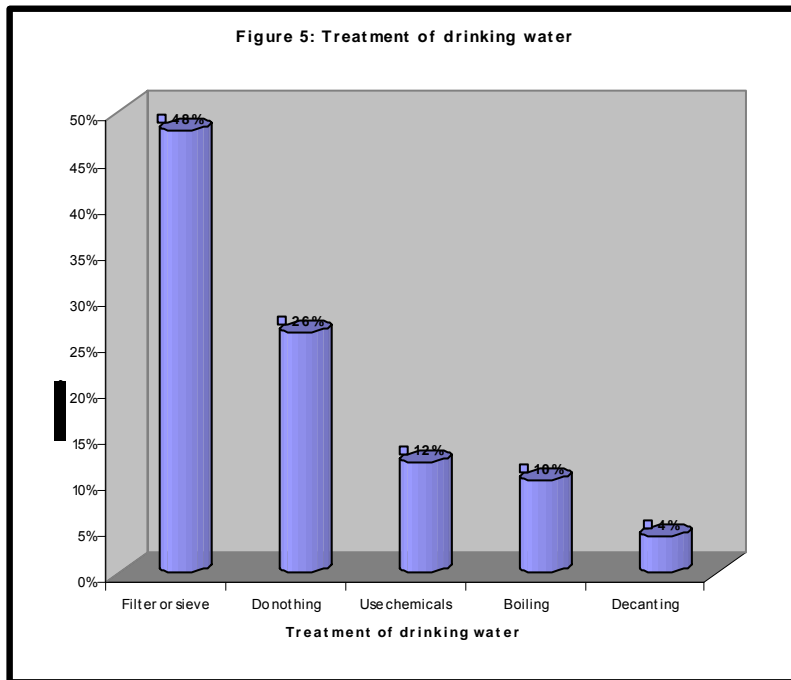
Although there is health education services in the area, the hygiene practices of majority of the population are still unsatisfactory. This is partly the determinant of malnutrition in the area. However, there is significant improvement in seeking Medical attention from the health facilities rather than traditional healers.

.IV.4. Water and Sanitation

The river is the main source of water for the population in the areas assessed. There are also two functional boreholes in Wunakot and Chuei villages. However, majority of populace consume river water, and water that collects in pools during the rainy season. The boreholes are used mainly by the communities living far away from the river, and both boreholes serve a population of about 24,190 people (SRRC figures). This falls short of

the sphere standards of water pump to people ratio of 1:500, which recommends that one borehole should ideally serve 500 people. The households that were surveyed, 48% of them sieve water or filter water before drinking, 26% of them do nothing to water, 12% treat it with chemicals, and 10% boil the drinking water as shown in the figure below.

Figure 5 Treatment of Drinking Water



Drinking water is stored in open guards, pots and jerricans which expose it to contamination, and also, most members of the population do washing and bathing in the river where they also fetch drinking water. The practice of treating water with chemical and sieving/filtering could be attributed to MEDAIR campaign of promoting consumption of safe drinking, and as a measure to contain the Cholera outbreak. Most of the households surveyed consumed untreated drinking water, thus, more effort is needed to treat water before it reaches the households. Latrines were observed in a few households, and majority of the population indiscriminately disposes human waste. The waste finds its way back to the river discourses, risking people directly of contracting waterborne diseases, especially during the wet season. Nevertheless, a number of household were in the process of constructing

latrines, while most households would consent to construct one if they have the necessary resources to do so. All the surveyed households admitted to know the importance of washing hands before taking meals.

.IV.5. Mother and Child care practices

Despite the increased nutritional requirements of expectant mothers, the community does not recognize the added nutritional needs of expectant mothers as they are not exempted from doing heavy work in the household, and at the same time are not provided with meals to cater for increased nutritional needs as fulfillment of Daily Nutritional allowances for expectant mothers. The mothers eat the same meals during pregnancy and lactation periods. However, among the households interviewed, 98.0% reported that the mother put the child to breast immediately after birth, and 88% breastfed their youngest children on demand. Most of the children in the community, also, were exclusively breastfed in their first 4 months of life, while most started receiving other food other than breastmilk (complementary foods) when above six months of age.

This is supported by the findings that 72.0% of the households that were interviewed, introduced complementary foods to children when they are above six months of age, while 24.0% introduced the food to children between 4 to 6 months of age. Mothers reported that they exclusively breastfed their youngest children between the time the child is born and 4 months of age. This reflects good practices of breastfeeding in the community. The type of foods given to children ages 6 and 29 months mainly include breastmilk, porridge (mainly made from sorghum), and cow's or goat's milk. Children ages two and a half years and above were mainly fed on *Walwal* (food made from sorghum/wheat and fish soup or milk when available), and family diet that is available. Only children below 18 months of age are assisted in eating; the other children eat from a common bowl. Majority of interviewed households, (92.0%), fed their children twice a day, revealing that the feeding practice is common in the community. Domestic pets (dogs) are found in most households, and there is no caution aimed at preventing risk of cross-contamination from the pets to humans as the pets either lick utensils left on ground by children after eating or are fed using the same utensils that other household members use to eat food. Food is prepared

in an unhygienic environment, and children's food is usually kept uncovered, exposing it to houseflies and thus, risking contamination.

.IV.6. Education

SIM (Serving in Mission) and NCDS (an indigenous NGO) organizations have independent education programs running in Atar base village in Chuei Payam. Only SIM is based on the ground. SIM targets rural communities in giving education and evangelism. Its objectives are to train teachers, and to reduce adult illiteracy. SIM has a similar program running in different counties in South Sudan. The program is divided into teacher training and Adult learning program. The teacher training is undertaken liaising with the government of South Sudan (GoSS), which provides the syllabus and curriculum that is being used. There is total of 30 students registered for teacher training program from the Khorfulous and Atar region, while adult learning program had one student. All the support for running programs comes through the church, who pays the staff used in teaching, and UNICEF which gives learning materials; exercise books, pens, pencils, chalks and dusters. Food for Hungry international (FHI) partnering with NCDS started primary education programs. According to FHI, it channels funds to run the education program through NCDS, which in turn gives incentives to the staff on the ground and learning materials and supervises them. However, all the programs are yet to establish strongly in the area, as they are relatively new, having started in the month of April 2006. Observations revealed the need to construct school buildings, provision of instruction material, and encouragement of enrolment.

.IV.7. Actions Taken by NGO's and Other Partners

The different NGOs and areas of interventions/assistance are listed below:

- MERLIN: Primary Health Care services; Water and sanitation.
- Serving In Mission (SIM): Evangelism, teacher training and Adult Learning (ALP) Programs.
- NCDS: run and supervises education program.

.V. RESULTS OF THE ANTHROPOMETRICS SURVEY

A total of 932 children were measured, and 11 records with errors were excluded from the final analysis.

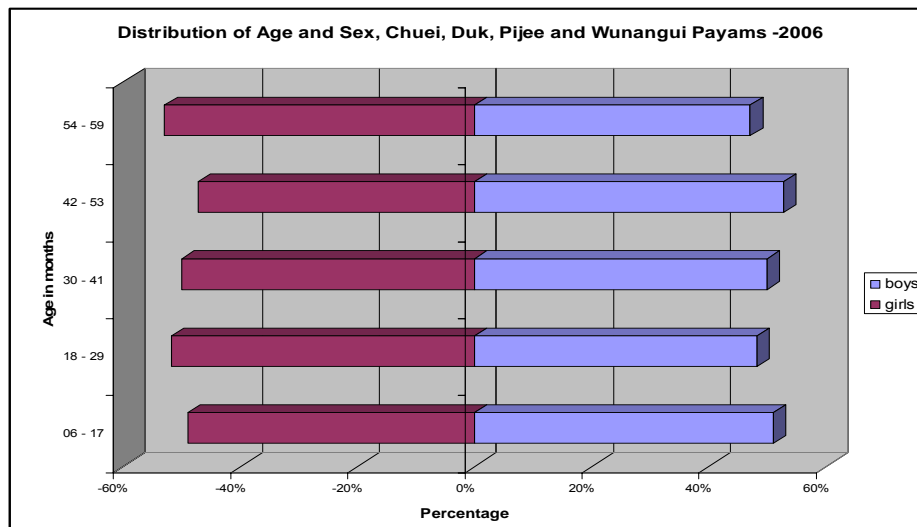
.V.1. Distribution by Age and Sex

Table 2 Distribution by Age and Sex

AGE (IN MONTHS)	BOYS		GIRLS		TOTAL		Sex Ratio
	N	%	N	%	N	%	
06 – 17	103	51.0	99	49.0	202	21.9	1.04
18 – 29	83	48.3	89	51.7	172	18.7	0.93
30 – 41	90	50.0	90	50.0	180	19.5	1.00
42 – 53	94	52.8	84	47.2	178	19.3	1.12
54 – 59	89	47.1	100	52.9	189	20.5	0.89
Total	459	49.8	462	50.2	921	100	0.99

There is only slight variation between males and females in the sample population structure, but the overall sex ratio of 0.99 shows that there is no bias in the gender balance.

Figure 6 Distribution by Age and Sex



Age and sex distribution shows a slight imbalance in age distribution, with a slight over representation of the 54-59 months age groups (20.5% instead of around 10%). This can be attributed to subjectivity of the ages given by parents (caretakers) during the survey, which are subject to strong recall bias. The ages recorded are approximate, as a local calendar of events had to be used to estimate the ages.

.V.2. Anthropometrics Analysis

.V.2.1. Acute Malnutrition, Children 6-59 months of Age

➤ Distribution of Acute Malnutrition in Z-Scores

Table 3 Weight for Height distribution by age in Z-score

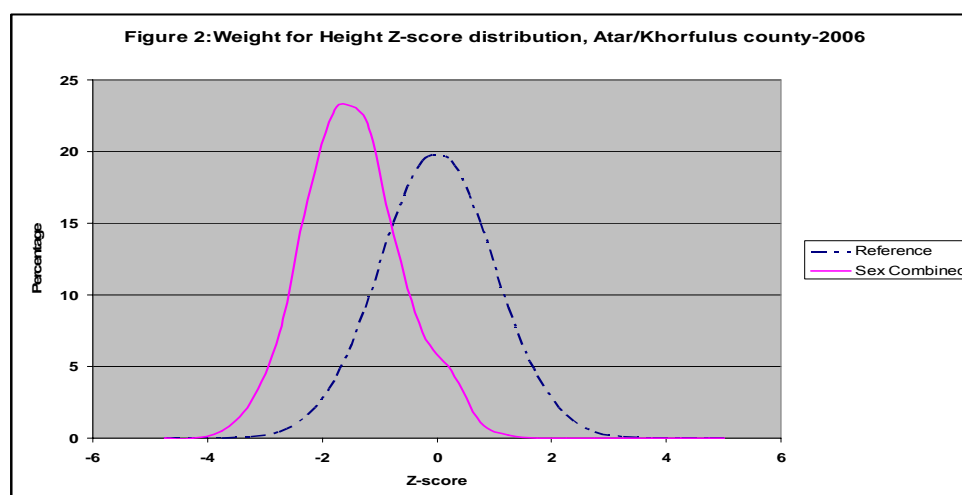
Age group (In months)	N	< -3 SD		≥ -3 SD & < -2 SD		≥ -2 SD		Oedema	
		N	%	N	%	N	%	N	%
06-17	202	12	5.9	62	30.7	128	63.4	0	0.0
18-29	172	4	2.3	42	24.4	126	73.3	0	0.0
30-41	180	4	2.2	25	13.9	151	83.9	0	0.0
42-53	178	4	2.2	41	23.0	133	74.7	0	0.0
54-59	189	4	2.1	51	27.0	134	70.9	0	0.0
TOTAL	921	28	3.0	221	24.0	672	73.0	0	0.0

Table 4 Weight for height vs. Oedema

Weight for height		< -2 SD	≥ -2 SD
Oedema	YES	Marasmus/Kwashiorkor 0 0.0%	Kwashiorkor 0 0.0
	NO	Marasmus 249 27.0%	No malnutrition 672 73.0%

No case of kwashiorkor was found in the sample. The most common type of acute malnutrition found was marasmus.

Figure 7 Z-scores distribution Weight-for-Height, Atar/Khorfulous County



The significant displacement of the sample curve to the left of the reference curve indicates a poorer nutritional situation in this population than in the reference one. The mean Z-score of the sample is -1.47 . The standard deviation of the curve is 0.86 , and lies within the accepted benchmarks ($0.80 - 1.20$). The standard deviation shows that the sample is representative of the population.

Table 5 Global and Severe Acute Malnutrition by age group in Z-score

	6-59 months (n = 921)	6-29 months (n =374)
Global acute malnutrition	27.0% [23.0% - 31.5%]	32.1% [25.5% - 39.5%]
Severe acute malnutrition	3.0% (1.7% - 5.2%)	4.3% [1.9% - 8.6%]

Statistical comparative analysis of malnutrition rates for children ages 6-29 months and 30-59 months indicate a significant difference (Chi square= 8.14, $p < 0.05$). The risk of being malnourished for the 6-29 months age group is 1.36 (1.10-1.68) times high than for the 30-59 months age group.

Table 6 Nutritional Status by Sex in Z-score

Nutritional status	Boys		Girls	
	N	%	N	%
Severe malnutrition	14	3.1	14	3.0
Moderate malnutrition	126	27.5	95	20.6
Normal	319	69.5	353	76.4
TOTAL	459	49.8	462	50.2

The statistical analysis shows that there is a significant difference in the prevalence of malnutrition between boys and girls (Chi square = 5.57, $p < 0.05$). Boys have a relative risk of 1.29 (1.04 – 1.60) times higher than girls to be malnourished.

➤ **Distribution of Malnutrition in Percentage of the Median**

Cut-offs for acute malnutrition expressed in percentage of the median are commonly used in determining admission criteria in feeding centers.

Table 7 Distribution of Weight/Height by age in percentage of the median

Age (In months)	N	< 70%		≥ 70% & < 80%		≥ 80%		Oedema	
		N	%	N	%	N	%	N	%
06-17	202	2	1.0	47	23.3	153	75.7	0	0.0
18-29	172	1	0.6	23	13.4	148	86.0	0	0.0
30-41	180	2	1.1	17	9.4	161	89.4	0	0.0
42-53	178	0	0.0	28	15.7	150	84.3	0	0.0
54-59	189	2	1.1	37	19.6	150	79.4	0	0.0
TOTAL	921	7	0.8	152	16.5	762	82.7	0	0.0

Table 8 Weight for height vs. oedema

Weight for height		< -2 SD	≥ -2 SD
Oedema	YES	Marasmus/Kwashiorkor 0 0.0%	Kwashiorkor 0 0.0%
	NO	Marasmus 159 17.3%	No malnutrition 762 82.7%

Table 9 Global and Severe Acute Malnutrition by age group in percentage of the median

	6-59 months (n = 921)	6-29 months (n = 374)
Global acute malnutrition	17.3% [13.9% -21.2%]	19.5% [14.1% -26.2%]
Severe acute malnutrition	0.8% [0.2% -2.2%]	0.8% [0.0% -3.8%]

Table 10 Nutritional Status by Sex in percentage of median

Nutritional status	Boys		Girls	
	N	%	N	%
Severe malnutrition	2	0.4	5	1.1
Moderate malnutrition	79	17.2	73	15.8
Normal	378	82.4	384	83.1
TOTAL	459	49.8	462	50.2

.V.2.2. Risk of Mortality: Children's MUAC

All children measured were included in the analysis.

Table 11 MUAC Distribution

MUAC (mm)	< 75 cm height		≥75 – < 90 cm Height		≥ 90 cm height		Total	
< 110	9	6.0%	1	0.4%	0	0.0%	10	1.1%
110 ≥ MUAC < 120	22	14.7%	10	3.9%	2	0.4%	34	3.7%
120 ≥ MUAC < 125	37	24.7%	20	7.8%	16	3.1%	73	7.9%
125 ≥ MUAC < 135	44	29.3%	67	26.0%	73	14.2%	184	20.0%
MUAC ≥ 135	38	25.3%	160	62.0%	422	82.3%	620	67.3%
TOTAL	150	100.0%	258	100.0%	513	100.0%	921	100.0%

MUAC measurement results show that 1.1% of the children were severely malnourished, and therefore, at high risk of mortality.

.V.2.3. Nutritional Status of the Children below 6 months of Age

80 children aged below 6 months were present in the households at the time of the survey, 46.3% (37) were boys and 53.8% (43) were girls.

Table 12 Age distribution of the under 6 months

Age in month	N	%
1	32	40.0
2	20	25.0
3	10	12.5
4	10	12.5
5	8	10.0
Total	80	100

Half of the children (40 children) of the total 80 children making up the sample population could not be measured, as their caretakers did not allow it. Due to few children, the anthropometric analysis is not representative, but is given as an indicator.

In both Z-score and percentage of the median, no case was found to be severely malnourished, and only one case (2.5%) was found to be moderately malnourished.

➤ Feeding Practices

62% of the mothers interviewed practiced exclusive breastfeeding for their infants, 18% practiced mixed feeding of breast milk and cows or goats milk. Other foods other than breast-milk were introduced at 4-6 months of age.

.V.3. Measles Vaccination Coverage

Measles vaccination is often administered to children at 9 months of age, hence, 869 children in the sample aged 9-59 months were included in the analysis. The results showed low coverage of measles immunization in the villages surveyed as illustrated in table below.

Table 13 Measles Vaccination Coverage

Measles vaccination	N	%
Proved by Card	41	4.7
According to the mother/caretaker	221	25.4
Not immunized	607	69.9
Total	869	100

.V.4. Household Status

Table 14 Household Status

Status	N	%
Residents	427	78.5
Internally Displaced	4	0.7
Temporary Residents (on transit)	74	13.6
Returnee	39	7.2
Total	544	100

The larger proportion of the surveyed families were residents, 427 (78.5%), while 4 (0.7%) were internally displaced. 74 (13.6%) of the households were temporarily residing in the location, while 39 (7.2%) were returnees. There was minimal movement of the population during the time of the survey.

.V.5. Composition of the Households

Table 15 Household Composition

Age group	N	%
Under 5 years	1011	36.2
Adults	1780	63.8
Total	2791	100.0

567 households were visited during the survey. The mean number of children under 5 years of age per household is 1.8 and the mean number of children over 5 years of age per household is 3.1.

.VI. RESULTS OF THE RETROSPECTIVE MORTALITY SURVEY

.VI.1. Mortality Rate

The crude mortality was calculated from the figures collected from families with or without children under 5 years, on the past 3 months.

In the households interviewed, there were 1011 children under 5 years old and 1780 persons above 5 years alive at the time of the survey.

Over the three months preceding the survey, the following demographic changes were observed:

- 60 births
- 107 persons had arrived in the location
- 203 people had left the location in the same period
- 56 deaths were reported within the last 3 months. There were 10 deaths among children less than 5 years.

The crude mortality rate is 2.19 [1.18- 3.20] /10,000/day.
The under five mortality is 1.14 [0.48-1.80] /10,000/day.

.VII. CONCLUSION

This anthropometric nutritional survey was implemented by ACF-USA in Atar/Khorfulous County from 6th to 30th May 2006. It covered 4 out of 9 payams in the County namely: Chuei, Duk, Pijee, and Wunangui.

The anthropometric data for 921 children ages 6-59 months assessed during the survey was analyzed in both Z- score and percentage of the median.

The Z- score analysis of the anthropometric data unveiled a global acute malnutrition (GAM) of 27.0% [95% CI: 23.0%-31.5%] and severe acute malnutrition (SAM) of 3.0%.

The statistical analysis shows that boys present a higher risk of getting malnourished than girls, and the 6-29 months age group is at higher risk than the 30-59 months age group.

The last survey results (November 2003) showed GAM rate of 12.1% (95% CI: 9.3% – 15.6%). The results of the present survey show a deterioration of the nutritional situation.

This result is to be put in parallel of the crude death rate (2.19, 95%CI: 1.18-3.20), which is above emergency level of 2/100000/day. This high mortality is linked with the cholera outbreak that occurs during the recall period of the retrospective mortality survey.

Since the beginning of 2006, the Atar community has been facing hunger during this period with little food stocks. The community is yet to recover from the cholera outbreak that mainly affected the adult population which is engaged in farming and other livelihood activities to take care of the young children. The effect of charcoal burning and selling (which helped obtain money to buy food) is being felt as more areas of land continues to be cleared of trees without more being replanted and thus, leaving no more for burning. The livelihood of the community is gradually being lost as they continue to sell their livestock more than the charcoal, which has been predominantly used to buy food, and cushion against dwindling food stocks.

The community does not have diversified crop cultivation, and expect to harvest green maize in August if the crop does well, which is highly unlikely as the planting fields easily become flooded in the rainy season after planting. This also applies to sorghum, which is the only other major crop cultivated.

The last harvest of maize in November 2005 was poor due to mainly flooding, and attacks by pests. Last year's harvest had been depleted during the time of the survey, and the households reported to have received last WFP rations in September 2005 which is already depleted.

These reasons coupled with trickling in of returnees who depend on their kin increases chances of having malnutrition rate increase.

Regarding the reasons of the higher vulnerability of the younger children toward malnutrition, the following hypothesis can be given.

The community does not recognize the added nutritional needs of expectant mothers as they are not exempt from doing heavy work in the household, and at the same time are not provided with meals to cater for the increased nutritional needs for the fulfillment of the Daily Nutritional allowances for expectant mothers.

Most of the Infants were reported to be put to breast immediately after birth, and to be exclusively breastfed in their first 4-6 months. The infants are breastfed on demand, while older children are fed twice in a day. The type of foods given to children between 6 and 29 months of age mainly include breast milk, porridge (mainly made from sorghum), and cow's or goat's milk. Children two and a half years of age and above were mainly fed on *Walwal* (food made from sorghum/wheat and fish soup or milk when available), and family diet usually sorghum diet. Only Children below 18 months are assisted to eat; the other children eat from a common bowl. Food was

eaten in dusty environment, and afterwards cooking pots, bowls and spoons would be left on the ground, where they are accessible to household pets (dogs), who lick them exposing them to contamination, and consequently, children to infection.

The river is the main source of water for the population in the areas assessed. There are also two functional boreholes in Wunakot and Chuei villages. However, majority of populace consumes river water, and water that collects in pools during the rainy season. The boreholes are used by the communities mainly living far away from the river. Some households filtered water before drinking, but only few treated or boiled water before drinking. Drinking water is stored in open guards, pots and jerricans which expose it to contamination, and also, most members of the population do washing and bathing on the river where they also fetch drinking water. The practice of treating water with chemical and sieving/filtering could be attributed to MEDAIR campaign of promoting consumption of safe drinking, and as a measure to contain the Cholera outbreak. Latrines were observed in a few households, and majority of the population indiscriminately disposes human waste in open fields. This finds its way back to the river and put people directly on the risk of contracting waterborne diseases especially during the wet season. Nevertheless, a number of household were in the process of constructing latrines, while most household would consent to construct one if they have the necessary resources to do so. All the surveyed households admitted to know the importance of washing hands before taking meals.

MEDAIR now handed over to MERLIN operates two Primary Health Care Units (PHCU's) located in Chuei and Wunlam Payams. The clinic is far from some villages, which it serves (3-4 hours away). The clinics give curative services, growth monitoring for children and antenatal care for expectant mothers, Hygiene promotion, and also nutrition screening among children are also performed. The common illnesses treated at the clinics are malaria, diarrhea, Respiratory Tract Infections (RTI's), and skin and eye infections. Major causes of mortality are diarrhea and malaria. There was a cholera outbreak in the month April, and 75 cases were treated and discharged, which is presumed to have led to the death rates above the emergency level. Three deaths were reported in the clinic arising from the outbreak but most deaths occurred in the villages. This concurred with what was observed during the time of the survey. Mortality in children is likely to be high in rainy season when pneumonia is prevalent. Diarrhea and malaria are also leading causes of mortality. The community does not respond well to the growth monitoring of children services and expectant mothers are lax in attending antenatal visits. In the period covering January to April 2006, MEDAIR assessed the malnutrition situation using MUAC measurements, and reported 35 severe cases of malnutrition. There are 25 hygiene promoters who serve all the community in Atar, however, laboratory services are not offered at the clinics and tests are referred to Malakal town. There are no EPI services run by the clinics, and most children have not been immunized. Chuei clinic is over-utilized by the community, and drugs are consistently supplied, although, they are not enough for the population which increases gradually as a result of incoming returnees.

There is health education offered besides other services in the area, but the hygiene practices of majority of the population are still unsatisfactory. Nevertheless, there is significant improvement in seeking medical attention from the health facilities rather than traditional healers.

.VIII. RECOMMENDATIONS

In the light of the above situation ACF-USA recommends the following:

- WFP to distribute food aid to the community to cushion vulnerable groups (mainly the returnees who have settled in the villages) from the deteriorating food security situation.
- ACF-USA, MERLIN and MoH to support establishment of nutritional treatment program within the health facilities or the creation of separate therapeutic/supplementary feeding centers to prevent likely mortalities arising from acute malnutrition.
- MERLIN to maintain the health intervention activities, and consider increasing the coverage and access to its services, more so to the primary health care package, health education, growth monitoring as well as nutritional monitoring while ensuring full implementation of the same. Also, to introduce EPI services.
- MERLIN to consider expanding on the already existing water treatment services to a sustainable level where all water used in all households is treated at the point of collection. Also, to continue water exploration assessments in the County.
- MERLIN to intervene to consider supporting the construction of latrine facilities, and in addition, offer education on the importance of the same.
- FHI international or other agencies to explore modalities of diversified cropping, and explore the possibility of countering flooding to minimize its negative effects on cultivation fields to bolster food security.
- ACF-USA or other capable agency to distribute appropriate fishing gear and feasible ways of expanding or opening up a new fish market.

.IX. APPENDIX

.IX.1. Sample Size and Cluster Determination

PAYAM	VILLAGE	TIME	TOTAL POPULATION	TARGET POPULATION	CUMULATIVE POPULATION	NUMBER ASSIGNED	CLUSTERS	NO. OF CLUSTERS
CHUEI	Atar base	10MIN	2872	574	574	1-574	1,2,3	3
	Dengak	4HR 20MIN	861	172	746	575-746	4	1
	Wunakot	4HR 30MIN	1270	254	1000	747-1000	5	1
	Wundengmalith	2HRS	372	74	1074	1001-1074	6	1
	Nyinabek	4HRS	984	197	1271	1075-1271	7	1
DUK	Akamel	2HRS	557	111	1382	1272-1384	0	0
	Marchardit	2HRS 30MIN	738	147	1529	1383-1529	8	1
	Wuntor	1HR 30MIN	1826	365	1894	1530-1894	9, 10	2
PIJEE	Anyang	20MIN	1761	352	2246	1895-2246	11, 12	2
	Agiek	50MIN	1643	328	2574	2247-2574	13, 14	2
	Wunawath	20MIN	1525	305	2879	2575-2879	15, 16	2
WUNANGUI	Agaak	3HRS30MIN	982	196	3075	2880-3075	17	1
	Bokdit	3HRS	1322	264	3339	3076-3339	18, 19	2
	Gung	2HR 30MIN	1307	261	3600	3340-3600	20	1
	Wundengach	2HRS	756	151	3751	3601-3751	21	1
	Nyingun	2HRS	1552	310	4061	3752-4061	22, 23	2
	Wunkon	1HR 30MIN	855	171	4232	4062-4232	24	1
	Wunmiyom	2HR 30MIN	901	180	4412	4233-4412	25	1
	Kholang	1HR 40MIN	1201	240	4652	4413-4652	26	1
	Wundengwol	1HR	945	189	4841	4653-4841	27	1
	Ngenyakol	2HR 30MIN	872	174	5115	4842-5015	28	1
	Wunkiir	1HR	1397	189	5294	5016-5294	29, 30	2
TOTAL			27,942	5294				30

The sampling interval is equal to total target population divided by number of clusters i.e. $5294/30 = 176$.

Villages included in the clusters are shown in the table above. The random number drawn was 162 and between 001 and 176.

The target population was more than 4500 hence the sample size was 900 children. A total of 921 children were included in the survey. The minimum number of children included in each cluster is sampling size/ number of clusters, which was $900/30 = 30$

.IX.2. Anthropometric Survey Questionnaire

DATE:
VILLAGE:

CLUSTER No:
TEAM No:

N°.	Family N°.	Status (1)	Age Mths	Sex M/F	Weight Kg	Height Cm	Sitting Height cm(2)	Oedema Y/N	MUAC Cm	Measles C/M/N (3)
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										

- (1) Status: 1=Resident, 2=Displaced (because of fighting, length < 6 months), 3=Family temporarily resident in village (cattle camp, water point, visiting family...), 4= Returnee.
- (2) Sitting Height is optional. To apply for ACF-USA survey. This data is for research.
- (3) Measles*: C=according to EPI card, M=according to mother, N=not immunized against measles.

.IX.3. Appendix 3. Household enumeration data collection form for a death rate calculation survey (one sheet/household)

Survey Payam: _____ Village: _____ Cluster number: _____

HH number: _____ Date: _____ Team number: _____

	1	2	3	4	5	6	7
ID	HH member	Present now	Present at beginning of recall (include those not present now and indicate which members were not present at the start of the recall period)	Sex	Date of birth/or age in years	Born during recall period?	Died during the recall period
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

Tally (these data are entered into Nutrisurvey for each household):

<input checked="" type="checkbox"/> Current HH members – total	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Current HH members - < 5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Current HH members who arrived during recall (exclude births)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Current HH members who arrived during recall - <5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Past HH members who left during recall (exclude deaths)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Past HH members who left during recall - < 5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Births during recall	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Total deaths	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Deaths < 5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

.IX.5. Calendar of events in Atar/Khorfulous County

MONTHS	SEASONS	2001	2002	2003	2004	2005	2006
JANUARY AKOCHTHII	Thresh dura, move to riverside, build houses and go to cattle camps.		52 Medair distributed NFIs	40 GoS Militia killed Comander Machok.	28 Construction of Chuei, (Atar base) starts.	16 CPA is signed in Naivasha. Aniek appointed to explain CPA.	4
FEBRUARY ADUONG'	fishing Holiday month.		51 Rebels captured Nyongbek and took cattle	39 SPLA send CDR Diar Atem to investigate Machoks death.	27 Polio vaccination by WHO.	15 Aniek calls meeting to discuss CPA n Wunkir.	3
MARCH ALEKBOR	Visit places and burn charcoal.		50 .	38 Hunger period.	26 Measles outbreak	14 Medair brought vehicle to drill water on ground.	2
APRIL AKOLDIT	Prepare land for cultivation (burning the bushes).		49 Construction of airstrip in Wunangui	37 WFP distributes food in Wunang'ui	25 Medair intervention of measles. They set up base in Wunamg'ui.	13 Goat climbed up Chuei tree. Elders make rituals to persuade it to climb down.	1
MAY BILDIT	Planting maize, sorghum, and kra. Starting of the rains.		48 FAO distributed seeds and tools and fishing equipment.	36 Commander Diar returns to Bor.	24 Drilling of boreholes in Wunangui.	12 SPLA commanders meet community. Medair make compound in Chuei	
JUNE BILTHI	Weeding, and coming from the cattle camp.	59 Commander Machok Atem came to monitor atar.	47 SPLAmeeting between commander Machok and Geny.	35	23	11 Medair stops water drilling and succeeded in drilling of water in Wunakot and Chuei villages.	
JULY LAL	Thinning of crops and continued weeding.	58 Hunger due to fighting.	46 ACF-USA nutrition survey.	34	22	10 Celebrate visit of Garang to Khartoum. Death of Garang same month.	
AUGUST HOR	Eating of green maize, open school and celebrate Idd Mary.	57 WFP distribute food.	45	33 Malual commission called meeting in Atar.	21 SPLA military recruitment in Atar.	9 Tonjak comforts community after Garangs death.	
SEPTEMBER KONGAK	Collet fallen Dura, make store for Dura.	56 Fighting ends and hunger reduces.	44 All dura (sorghum) attacked by birds resulting in hunger	32	20 Hunger causes lack of labor to farm as a result of recruitment of young people to military.	8	
OCTOBER NYIETH	Harvest dura.	55	43 Serious hunger, people moved and sell livestock to buy food	31	19 WFP distributes food.	7 Commander Pokong took soldiers to Canal town.	
NOVEMBER KOL	Cut trees and bushes to prepare new gardens.	54	42 Disease outbreak with vomiting diarrhoea/cholera	30 ACF-USA nutrition survey, flooding.	18 SPLA relases former soldiers recruited from the villages.	6 SPLA sent police officer to recruit plice.	
DECEMBER AKOCHDIT	Christmas, mariege time and school closed.	53 GoS allows civilians to enter town and other movements.	41 Disease out break ends. People hold thanks giving to God.	29 Ajach call community's meeting to open Chuei Payam.	17 People gather in Wunkir to celebrate Christmas and peace.	5	

.IX.6. Anthropometric Survey Questionnaire for Children less than 6 months of Age

DATE:
VILLAGE:

CLUSTER No:
TEAM No:

N°.	Family N°.	Age Mths	Sex M/F	Weight Kg	Height cm	Feeding practices*
1						
2						
3						
4						
5						
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27						
28						
29						
30						
31						

* Exclusive breast feeding= 1; mixed feeding (breast-milk and weaning food) =2; exclusive weaning food =3.

.IX.7. Food market prices in Atar/Khorfulous County, May, 2006.

COMMODITY	QUANTITY	PRICES IN DINNAR
Sugar	1 Kilogram	270
Oil	1 Liter	200
Beans	1 kilogram	300
Sorghum	1 kilogram	100
Fish	3 medium size pieces	100
Chicken	1 Medium size	500
cow	1	30000
Goat	1 average goat	7000
Charcoal	50kg	1500