Nutritional Anthropometric and Mortality survey

Mandera Central District

1st – 6th March 2008.

Final report

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Abbreviations

ALRMP	Arid Lands Resource Management Project
ANOVA	Analysis Of Variance
ARTI	Acute Respiratory Tract Infection
ASAL	Arid and Semi Arid Lands
CBPP	Contagious Bovine Pluro Pneumonia
CCPP	Contagious Caprine Pluro Pneumonia
CDC	Centre for Disease Control
CHW	Community Health Workers
CI	Confidence Interval
CMD	Crude Mortality Rate
COCOP	Consortium of Cooperating Partners
CSB	Corn-Soya Blend
CTC	Community-based Therapeutic Care
DSG	District Steering Group
ENA	Emergency Nutrition Assessment
EPI	Expanded Program on Immunizations
FFA	Food For Asset
GFD	General Food Distribution
GoK	Government of Kenya
HEA	Household Economy Approach Assessment
HH	Household
IDP	Internally Displaced Person
ITNs	Insecticide-treated Nets
KEPI	Kenya Extended Programme of Immunisation
KFSSG	Kenya Food Security Steering Group
MoH	Ministry of Health
MSF-B	Medecins Sans Frontieres-Belgium
NCA	Nutrition Causal Analysis
NCHS	National Centre for Health Statistics
OTP	Outpatient Therapeutic Programme
PHC	Primary Health Centre
PLM	Pregnant and Lactating Mothers
PPS	Probability proportional to size
SFP	Supplementary Feeding Programme
SMART	Standardized Monitoring and Assessment of Relief and Transitions
TFP	Therapeutic Feeding Programme
U5	Under Five Years Old
UMR	Underfive Mortality Rate
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
URTI	Upper Respiratory Tract Infection
WFP	World Food Programme
WHO	World Health Organisation
WFH	Weight for Height
WHM	Weight for Height Median

Summary

SURVEY OBJECTIVES

The specific objectives of this survey were to estimate;

- The prevalence of acute and chronic malnutrition in children aged 6-59 months
- The Crude and under five mortality rate and causes of death
- Coverage of the Supplementary Feeding Program and Outpatient Therapeutic Program
- Coverage of the General Food Distribution
- Measles and BCG vaccination coverage rates and the rate of Vit. A supplementation
- Morbidity status of children 6-59 months 2 weeks prior to the survey

AREA COVERED

Save the Children UK's intervention area covers 4 divisions of Mandera Central District namely: Elwak, Shimbir Fatuma, Kotulo and Wargadud and consequently the survey covered these areas. The total population in the surveyed area is estimated as 53,620[1] with an estimated under-5 target population of 10,724[2].

The survey ran from 1st -6th March 2008 preceded by a 4-day training period.

SURVEY METHODOLOGY

The 2-stage 30x30 cluster survey methodology was employed in accordance with the National Guidelines for Nutrition and Mortality assessments in Kenya. The target population for the anthropometric survey was children aged 6-59 months. The tools used were standard SMART anthropometry and mortality questionnaires modified to collect additional information required. Data was collected on anthropometry, morbidity, vaccination status, Vitamin A supplementation, coverage of SFP and OTP, and GFD. Retrospective information on mortality was collected using the current household census method, with a recall period of 90 days, from all households visited including those without children. Data on **927** children was analyzed for anthropometry and **649** households participated in the mortality survey.

MAIN RESULTS

Acute malnutrition

Acute Malnutrition Rates		**NCHS 1977 reference** N: 915	**WHO** 2005 reference N: 915
Z-scores	***Global Acute Malnutrition:*** *W/H < -2 Z-score and/or oedema*	**24.3%** (21.1-27.4 95%CI)	**25.1%** (22.0-28.3 95%CI)
	Severe Acute Malnutrition: *W/H < -3 Z-score and/or oedema*	**2.0 %**(1.2-2.8 95%CI)	**4.0%** (2.8-5.3 95%CI)
% median	***Global Acute Malnutrition:*** *W/H < 80% and /or oedema*	**11.4%** (9.3-13.5 95%CI)	**6.6%** (4.9-8.2 95%CI)
	Severe Acute Malnutrition: *W/H < 70% and /or oedema*	**0.4%** (0.0-0.9 95%CI)	**0.4%** (0.0-0.9 95%CI)

[1] Current population figures from DC's office-Elwak

[2] Under five population estimated at 20% of the total population

Risk of mortality: Children's ***MUAC***

MUAC Criteria	**Nutritional status**	**Total N (%)**
< 11.0 cm	Severe malnutrition	**2** (0.2%)
≥11.0 cm and < 12.5 cm	Moderate malnutrition	28 (3.0%)
≥ 12.5 cm and < 13.5 cm	Moderate risk of malnutrition	**161** (17.3%)
≥ 13.5 cm	Satisfactory nutritional status	**738** (79.3%
TOTAL		**930**

Mortality, 91 days prior to the survey

	CMR N: 3619	**U5MR** N: 1025
Deaths per 10,000 per day	**0.34** (0.04-0.64 95% CI)	**0.23** (0.00-0.54 95%CI)

Morbidity

Prevalence of reported illness	N: 306	**38.2%**

Symptoms of reported episodes of illness

	N: 306	**%**
Malaria	109	**35.6 %**
Diarrhoea	41	**13.4 %**
Respiratory infection	142	**46.4 %**
Other	13	**4.2 %**

Vaccination coverage

	Measles (with card) 9-59 months, N: 896	**Measles (with card or confirmation)** 9-59 months, N: 896	**BCG** 6-59 months, N: 934
Yes	n: 295 **31.6%**	n: 806 **90.0 %**	n: 854 **91.4%**

Primary causes of death

	Total population N= 11	**< 5 years** N = 5
Respiratory infection	**33.3%**	**0** %
Other	**33.3**%	**80.0%**
Unknown	**33.3**%	**20.0%**

Feeding Program coverage (period coverage: January- March 2008)

Program Type	**Coverage %**
Supplementary Feeding Program	38%
Therapeutic Feeding Program	50%

General food distribution per household

GFD per HH	N:	% HH
% of population surveyed that are registered for GFD	394	**65.6 %**

Demography of households

	Averages or % N:649
Origin	
% HH with residents	**73.8%**
% HH with internally displaced	**21.0%**
% HH with refugees	**1.5%**
% HH with Nomads	**3.7%**

DISCUSSION

The rate of Global Acute Malnutrition (GAM) in Z- scores is above the emergency threshold of >15%. The daily Crude Mortality rate (CMR) and Under 5 mortality rates (U5MR) are below the 'alert' benchmarks of 1/10,000/day and 2/10,000/day respectively[3]. The nutrition situation in the 4 divisions of Mandera Central is considered as serious although the MUAC results are low and mortality rates reported in this survey are at acceptable levels and do not predict future mortality. However, it should be understood that this Survey was carried out in the beginning of the hunger gap period, and elevated rates of malnutrition can be expected at this time.

The high rates of malnutrition noted are despite nutrition intervention programs that have been targeting children under 5 years since August 2007. It is worth noting that the majority of the population in Mandera central are pastoralists and hence rely heavily on healthy herds as well as availability of pasture and water for livestock. It was reported that milk production, which is a major source of food for young children had reduced partly due to poor livestock health conditions and also due to drought and water scarcity. At the time of the survey, many of the surveyed areas were experiencing water stress and a lot of livestock had migrated to areas close to bore holes hence reducing milk availability for those left at home and especially young children. The population in Mandera in general is

[3] The Sphere Standards, 2004. Under Five Mortality Rate (U5MR): emergency threshold is 2.3/10,000/day, Alert 1.0/10000/day

highly dependent on food aid and delays in supply of food in the months of December and January may have contributed to a reduction in food available at household level. Also, with the reduction of numbers of families targeted for GFD owing to perceived good rainfalls in 2007, many families may have become food insecure and hence the high levels of malnutrition seen. Other aggravating factors that could contribute to the underlying causes of malnutrition include poor hygiene and sanitation, poor child care and feeding practices and the high prevalence of respiratory illness. Worth mentioning is that at the time of the survey, there was a cholera outbreak with over 90 cases treated and 1 death.

RECOMMENDATIONS:

Nutrition:

Immediate

- Implement blanket supplementary feeding for all children 6-59 months for 3 months as a safety net measure to prevent further deterioration of nutritional status.
- Strengthen or initiate new case finding strategies in order to identify both severely and moderately malnourished children for admission into OTP and SFP respectively. Nutritional status is highly sensitive to changes in the risk factors and therefore a child's nutritional status is likely to fluctuate considerably with seasonal changes.

Long-term

- Assess and strengthen knowledge, attitudes and practices on optimal infant feeding and caring practices (IYCF) of women
- Establish regular nutrition surveillance through nutrition surveys

Education

- Initiate nutrition education targeting women and the communities and alongside develop local nutritional education materials for the CHW.

Health:

- Continue treatment of the severely malnourished.
- The high prevalence of LRTI and diarrhoea highlights the need for more intensive health education
- Strengthen outreach vaccination services by providing vaccine carriers and transportation to periphery areas. Also more intensive community outreach services to all areas would encourage caregivers to seek health services and reduce the severity and duration of illness
- Expand primary health care to cover remote areas by establishment of mobile clinics
- Promote improved access to safe water in all impact areas by provision of water purification chemicals

Water and Sanitation:

- Emergency repairs of boreholes and facilitation of rapid repair teams and spare parts
- Continue water trucking to all areas affected by water stress and provide fuel subsidies for community owned boreholes to support free water distribution
- Distribute water tanks to identified areas of need, especially schools
- Strengthening of hygiene practices to reduce the incidence of diarrhoeal diseases associated with insufficient water in the household

Long-term:

- Continue support of the construction of boreholes and water reservoirs to increase

access to water

- Provide continuous training on technical know how to enable effective management of water points

Food distribution, Food security and Livelihood rehabilitation:

- Continue regular general food distribution. WFP should continue to maintain the caloric value of the food basket at 2,166 Kcal/day.
- Strengthen monitoring of food storage and use at the household level, promotion of food preparation (particularly for the use of CSB) and food hygiene promotion
- Vaccination and mass treatment of CCPP and CBPP diseases that has affected cattle and shoats

Long-term

- Investing in drought management and preparedness to curb the effects of the cyclical nature of drought.
- Livelihoods programmes that help the people adopt sustainable coping strategies during the lean times
- Improve the infrastructure to open up markets.

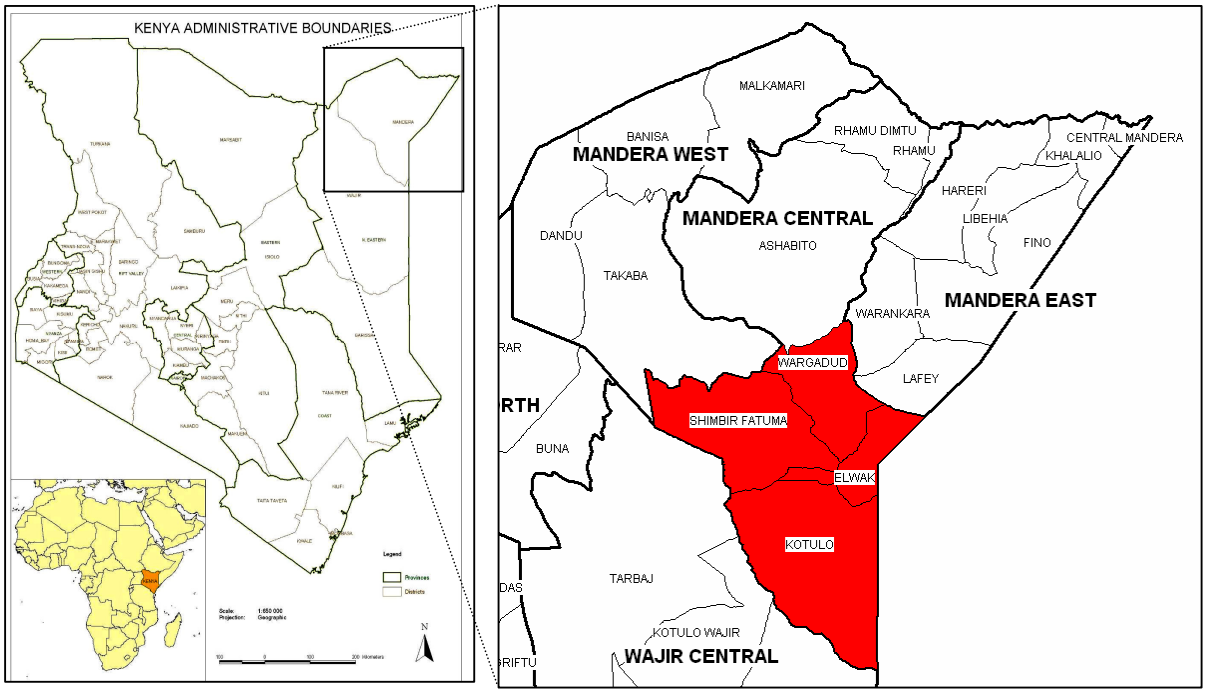
1. Introduction

This report summarizes the outcomes of a nutrition survey whose aim was to assess the nutritional status of children 6 months to less than 5 years of age and determine the prevalence of global and severe acute malnutrition within four divisions of Mandera Central District. The survey was undertaken from 1st – 6th March 2008 and was carried out in partnership with Ministry of Health (MoH). Data on nutrition, public health, care practices and food security exists from both the Nutrition Causal Analysis (NCA) and Household Economy Assessment (HEA) conducted by SCUK in October 2007 and these were used as secondary data to aid with interpretation of results.

1.1 Background

Mandera Central District is located in the North West horn of Kenya bordered by Mandera East district and Somalia to the east, Mandera West district and Wajir North district to the west, Wajir District to the south and Ethiopia to the north. The district, measuring approximately 11,648 km², is one of the 18 districts gazetted as part of the Arid and Semi-Arid Lands of Kenya (ASAL). The district is divided into 7 divisions namely Wargadud, Shimbir Fatuma, El wak, Kotulo, Rhamu, Rhamu Dimtu and Ashabito. El Wak town is the district headquarters and is the second largest urban town in the greater Mandera District, after Mandera town. It lies around 5° north of the Equator.

Figure 1.1: Map of Mandera Central district *Map of SCUK geographical coverage*



The survey area consists of the four divisions- Wargadud, Shimbir Fatuma, El wak and Kotulo (Fig 1). The current estimated population living in this area is 53,620[4].

The population is of Somali ethnicity and is predominantly Muslim. The community is structured along clan lines with Garre being the predominant clan. Other clans include

[4] Current Estimates from DC's Office- Elwak Town

Degodia, Murule and Leisan.

Geography
The topography consists of lowland plains between 400 and 970 metres above sea-level, with some rocky hills. The region is hot with temperatures ranging from 24°-42°C. There are a number of perennial river beds ('laga') that flow during the rainy seasons. The area receives bimodal rains – the long rains are experienced from March/April to June and the short rains fall from September/October to December. The average annual rainfall is 255mm and quantitatively, it rains more during the short rains than during the long rains.

Livelihoods
In Central Mandera District the population is traditionally mainly nomadic/semi nomadic pastoralist, herding camels, cattle, sheep and goats in search of water and pasture. There are also a number of semi-urban/urban settlements that have emerged as a result of people who have 'dropped out' of the pastoralist lifestyle following recurrent shocks[5]. Due to persistent drought, large livestock losses forced a number of families to settle in search of other economic means of earning an income to feed and look after their families. These include formal/informal employment, small businesses and casual labour activities. Pull factors that have also encouraged settlement include access to schooling for children, access to healthcare for the family and access to water and markets in urban/semi-urban settings.

Current climatic conditions and Food Security

Since the El Ninõ phenomenon of 1997 the rains have been more unpredictable in time and quantity. Except for the years 2002 and 2003, the rainfall has been below normal resulting in the need for an emergency response combining food aid with other interventions. From 2004 to 2006 the rainfall was extremely low leading to drought conditions, and extremely high livestock mortality. It is estimated that during this period 2004-2006 up to 25% of camel and goats and 50% of cattle died from the consequences of the poor rains. The combination of loss of livestock and migration lead to serious negative implications for milk production and availability. In addition to this already dire situation, there were unseasonably heavy rains during the short rains (Nov/Dec 2006) leading to flooding[6]. The long rains of 2007 were adequate but the short rains ended early (end of November 2007).

As a consequence, the dry spell has been longer than usual and the pasture quantity and quality has deteriorated. Water strain has necessitated livestock migration and most water sources have dried up[7]. By mid-March 2008, the long rains were yet to begin. This rain delay has placed the region in the 'alert' warning stage for drought and the trend is worsening with the water situation being on the fast decline[8]. Although most food security indicators are within limits that are considered normal for this time of year ('hunger gap' period), the migration of livestock is likely to deteriorate their body condition and further reduce the milk availability at household level.

[5] SC UK Rapid Health, Nutrition and Food Security & Livelihood Assessment, February 2007
[6] A Causal Analysis of Malnutrition, El Wak, North Eastern Province – Save The Children, October 2007
[7] Mandera District KFSSG Short Rains Assessment 2008 Report
[8] ALRMP Drought Monthly Bulleting for February 2008

Food Distribution

Food aid (including school feeding) is the single largest component of the Mandera Central Mixed Livelihood Zone food basket, with the very poor receiving the majority of their food needs from this source. Even within the middle income group there is a high dependence on food aid. The greater Mandera District has been under emergency food aid since October 2004[8] through WFP and its implementing partner COCOP. Following improvements in the food security situation in 2007, there was a downscaling of GFD in July 2007 and the number of beneficiaries reduced from 141,000 to 104,000 as shown in table 1.1 below. A Food for Asset modality was introduced as a pilot phase at this stage and by March 2008, a further 4167 beneficiaries were due to shift to the FFA projects[9].

Table 1.1: GFD beneficiaries in survey area since 2006

Divisions	Beneficiaries Targeted (n) SEPT 2006	Beneficiaries Targeted (n) Feb 2007	Beneficiaries Targeted (n) FEB 2008
Wargadud	9702	8372	3663
Shimbir Fatuma	9102	7279	4440
Elwak	21583	19290	6790
Kotulo	15835	12954	6777
TOTAL	56222	47895	21670

The food aid commodities are provided at a 75% ration scale and targeted households receive a food basket containing cereals (10.3kg), pulses (1.8kg), CSB (1.2 kg) and vegetable oil (0.6l) per person per month.

Security Information

The security situation has been stable in the region during the past year with minimal incidents reported. However, the inward migration of livestock into Shimbir Fatuma, Elwak and Wargadud has caused strain at water sources and disputes about access to water between clans are being closely monitored by GoK.

Health

Each division in the survey area is covered by a primary health centre (PHC) or dispensary, except Elwak township which has a district hospital that was recently up graded. Referrals for surgery and complicated cases are still being made to Mandera District Hospital in Mandera East as the hospital has not yet received adequate staff and equipment to manage complications.

In the past, health services have been augmented by MSF-B (2006-2007), DANIDA supported MoH in drug supplies, and ADRA-Kenya (2006) with an out-patient clinic and nutrition service support.

Vaccination coverage has picked up considerably due to vaccination campaigns which take place about twice annually and outreach vaccination services now available in PHC with the availability of cold chain facilities. However, it still remains a major challenge to reach peripheral and nomadic populations because of lack of transport[10].

[9] WFP/COCOP reports 2008 for Mandera Central District
[10] Discussions with Clinical Officer Borehole 11 PHC

The most prevalent diseases in the greater Mandera region have been Upper Respiratory Tract Infection (URTI), malaria and diarrhoeal diseases, in order of prevalence. Currently, the trend remains the same in Mandera Central with the SC-UK nutrition program February 2008 health report indicating that morbidity and treatment were highest for these three illnesses among program beneficiaries.

The HIV prevalence rate in greater Mandera district stands at 2.3% compared to 6% national rate.

A cholera outbreak was reported in January 2008 and one death had been reported in El Wak District hospital by February 2008.

Education

In addition to the formal state school system (Primary and Secondary schools), there are unofficial schools that have been opened and Koranic schools ('Madrasa') that sometimes substitute or augment formal school attendance.

In Mandera Central District, post-election disturbances (January 2008) affected school enrolment and attendance in the formal school system. There was a slight increment in primary school enrolment attributed to transfers from affected areas. In areas like Elele (Wargadud division), there have been higher reported cases of absenteeism as children migrate with families and livestock to areas with water. There is currently an imminent threat of schools closure due to water shortage in affected areas.

Markets and Roads

The more peripheral the settlements, the poorer the services available, in particular health, education, access to water and sanitation infrastructure. Markets are limited, mainly due to poor road infrastructure. During the rainy season, transportation of foods and medicines is difficult, limiting availability of a varied food basket in villages. In particular, poor road access between the dispersed settlements affects the sale of dairy products from rural areas, as transportation to the larger semi-urban areas is extremely limited and expensive during the rainy season when commodities such as milk and eggs are more plentiful.

Water access and availability

Water is pivotal to the viable sustainability of this whole semi arid region. In Central Mandera District, there are no rivers and water has to be sourced actively. There are a number of boreholes that support both the human population and livestock, especially during the dry seasons. Water pans have been dug where underground water has not been available or in new settlements.

During prolonged dry periods the water often dries up and tankering of water is necessary, but also expensive. During the survey period in March, all water pans had dried up and the shallow well water table had gone down[11]. The migration caused by water stress has led to increased human and livestock congestion, land degradation and borehole breakdowns due to over use. Currently, water trucking is being carried out by both Ministry of Water (through ALRMP) and CARE Kenya in 18 sites within the district.

[11] CARE Kenya Mandera Central Water Assessment Report- February 2008

Nutrition
In August 2007, SC UK set up an emergency nutrition program to address the effects of the prolonged drought and subsequent floods.
The nutrition program in El-wak is now well established using the Community-based Therapeutic Care approach to treat acute malnutrition. Twenty (20) decentralized distribution sites were set up in 4 divisions of Mandera Central district and following an improved nutrition situation and a reduction in beneficiary numbers, 8 sites were closed in December 2007. As at the time of the survey, the program in its 7 months of implementation had admitted 739 under fives and 356 pregnant and lactating mothers (PLM) in SFP and 52 under fives in OTP.

Relief Programmes Currently in the Area:

CARE:	Water, hygiene and sanitation;
Northern Aid:	WATSAN, HIV/AIDS
Kenya Red Cross:	Emergency relief, WATSAN;
COCOP/WFP:	Food Aid
ADRA:	Primary Health Care

1.2 Survey Objectives
The survey objectives were to estimate:

- The prevalence of acute and chronic malnutrition in children aged 6-59 months
- The Crude and under five mortality rates and causes of death
- Coverage of the Supplementary Feeding Program and Outpatient Therapeutic Program
- Coverage of the General Food Distribution
- Measles and BCG vaccination coverage rates, and the rate of Vit A supplementation
- Morbidity status of children 6-59 months 2 weeks prior to the survey

2. Methodology

2.1 Survey Methodology
A two stage random 30x30 cluster survey, including anthropometry, morbidity and mortality data, and household information was conducted in 4 divisions of Mandera Central district. Data were collected from March 1st – 6th on **927** children aged 6 to 59 months and **649** households for the mortality data.

2.2 Sampling procedure and sample size for anthropometric data
A sample size of 900 (30x30) was adopted as agreed with the MOH and in line with the National nutrition survey guidelines.

Population figures
A total population of 53,620 was estimated for the survey area covering the four divisions. Information on population figures had been obtained from the DC's office in Elwak township based on the same estimates used by KFSSG. The sampling frame (Appendix 2)

was constructed using location, sub-location and village level population figures. The estimated number of households in every village was verified by area chiefs and the estimated number of U5 calculated at 20% of the total population.

The nutrisurvey for SMART software generated a sampling interval automatically using the villages entered as the geographical unit and the estimated population size of each village. The clusters were then generated automatically, based on assigning probability proportional to population size (PPS). The resultant assignment of clusters is shown in Appendix 3.

In accordance with the SMART methodology and the draft Guidelines for Nutrition and Mortality Assessments in Kenya, this survey was planned to have *at least* 30 clusters. Due to the high migration taking place during the survey period, it was decided that 35 clusters, instead of 30 would be assigned so that in the event that a team visited a deserted cluster, an alternative cluster could be chosen from the extra five clusters. However, during the course of the survey, the 30 clusters visited were all occupied and thus the contingency measure was not utilized. This is an acceptable deviation from the standard as deserted settlements can legitimately be omitted from the sampling frame when the population is very mobile.

Data from two of the clusters selected indicated consistent anomalies in measurements of height and thus these clusters were repeated on the sixth day of the survey.

2.3 Sampling procedure and sample size for the mortality data

The Nutrisurvey for SMART was able to compute a sample size calculation for mortality on the planning page when the following variables were included:

The anticipated Crude Death Rate (CDR): 1.0 per 10,000 per day
This rate was chosen as it is the CDR level that is used to 'alert' an emergency and it would be the highest level expected.

The desired precision: A precision that would yield a 95% CI was selected i.e. 0.5

The recall period: A recall period of 91 days was selected to enable the respondent recall the number of deaths without bias. The retrospective data was obtained within a period of exactly 3 months, specific dates being; 1st of December 2007 (1st day of Arafa 2007) to 1st of March 2008.

The formula used for calculating the CMR according to Nutrisurvey is as follows:
CMR = 10,000/a*f/ (b+f/2-e/2+d/2-c/2)

Where: a = Number of recall days (period corresponds to 3 months (90 days) preceding the survey)
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 the recall period
f = Number of deaths during recall period
Therefore, CMR is expressed per 10,000 people / day.

2.4 Selection of households and children

In the second stage of sampling, the EPI (Expanded Programme on Immunization) method was used, whereby households were randomly selected within the selected cluster.

Definition of household:
A household was defined as "members of a house who sleep under the same roof and that eat from the same cooking pot" even if they were not necessarily related.

Selection of households and children:
In each cluster, a village elder or area chief was contacted and introduced to the survey. He was then asked to determine the centre of the village. Once at the centre, the team randomly selected a direction by spinning a pen on the ground and noting the direction the pen pointed once on the ground. The team listed all the households from the centre to the edge of the village along the chosen direction. The first household to be visited was randomly selected by drawing a random number from the random number tables between zero and the total number of houses counted when walking to the periphery. The subsequent households were selected by proximity always selecting households to the right. In villages with more than one cluster, the village was subdivided and the centre of each subdivision determined and households selected as described above. In a cluster that was sparsely populated, all the households in the cluster were visited. If 30 children were not found in the selected cluster, the team went to the next village adopting the same methodology until the sample was completed.

If no one was at home at a selected house, a neighbour was consulted concerning the whereabouts of members of the household. If the members had left permanently or were not expected to return before the survey team left the village, the household was skipped and not replaced. If household members were expected to return, the survey team revisited the house at least once more before leaving the cluster.

All children between the ages 6-59 months were measured in each selected household and recorded in the anthropometry questionnaire until 30 children had been assessed in each cluster.

In the last household, all the children within the defined parameter were included in the survey, even if 30 children had already reached. When the caretakers or any of the children were absent, the houses were revisited up to two times before leaving the cluster. If the children could not be reached, they were marked as absent in the 'Absentee form' and not replaced.

A retrospective mortality questionnaire using the current household census method was conducted for all the households visited in each cluster, regardless of whether a child under five years was present. The recall period counted 91 days from the beginning of *Arafa* (December) to the 1st day of the survey.

2.5 Training and supervision

The survey was coordinated and supervised by an external consultant with technical oversight by the Nutrition Coordinator for SCUK Nutrition Programme.

For data collection, a total of 4 teams of 3 people each were recruited and trained for the survey. Each team comprised of a team leader and two enumerators. The consultant carried out the training and was assisted by the Mandera District Nutrition Officer (DNO)

who was also the survey supervisor. This was to ensure that quality of fieldwork was closely monitored during the duration of the survey.

The local events calendar was developed jointly with the survey team and translated, using the local terms for months, seasons and other events (Appendix 5).

The anthropometric standardization exercise[12], as recommended by the SMART methodology, was used as an assessment of the team members' anthropometry techniques. Each team member was given a score of competence based on performing measurements with accuracy and precision. The results of the training exercise were analyzed by entering the data in Nutrisurvey for SMART and training report generated (Appendix 6).

After the class room training, the team were equipped with a 'Surveyor's Manual' for reference during fieldwork. Practical field experience was conducted on the last day of training, in one of the unselected clusters to take anthropometric measurements of children and caretakers, conduct interviews and fill questionnaires. The pre-testing exercise was performed on 16 households. This exercise was useful for planning the time taken to complete the questionnaires at each household. It also facilitated some changes to the structure of the questionnaire and calendar of events.

Each team was supervised at least once a day throughout the data collection by either the survey consultant or supervisor. At the end of each day, there was a de-briefing session and review of questionnaires. The survey, including the training, lasted for a period of 10 days.

Overall the survey consultant trained and closely supervised all the teams and offered technical support accordingly.

2.6 Data collected

2.6.1 Children's data

Anthropometric data

The data collected for the anthropometric survey in children aged 6-59 months was as follows:

- Age, in months
- Gender
- Presence of bilateral pitting oedema
- Weight, in kg (to the nearest 100 grams)
- Height, in cm, measured to the nearest mm
- MUAC (cm)
- Weight-for-height % of the median of the reference population

Age, in months

If the child's vaccination card or birth certificate was available, the age indicated was used as entry criteria and recorded. When the birth date was unknown, the age was determined using the local events calendar (see appendix 5.).

Weight, in kg, measured to the nearest 100 grams

[12] FANTA Anthropometric Indicators Measurement Guide- Revised Edition 2003

The weight of the child was measured using the UNICEF Uniscale[13] (Electric Mother and Child scale) with the caretaker if they are under 24 months. If they were old enough to stand still, the child was weighed without shoes and only light clothing. In the event that the caretaker would not allow undressing, a subtraction of 0.1kg/100g from the weight observed was made when the child had heavy clothing on.

A Salter hanging scale (25kg) was also assigned to each team to take the child's weight in the event that there was an a mechanical failure of the Uniscale in the field.

The teams were trained to use both the Uniscale and Salter scale so they were competent in use of both instruments.

Height, in cm, measured to the nearest mm
UNICEF height boards were used for measuring the length of children under 85 cm (recumbent position) and the height of children of 85 cm or above (standing position). Height rods with a marking at 85cm were used to assist in determining the measuring position. A precision of 0.1cm was used for recording measurements.

Presence of bilateral pitting oedema
The presence of bilateral pitting oedema was assessed for all children, by applying pressure on the dorsal side of both feet for at least 3 seconds. If the pit remained after removing the pressure, the outcome was considered to be positive.

Mid-Upper Arm Circumference
The Mid-Upper Arm circumference (MUAC) was measured at the mid-point of the left upper arm (precision of 0.1 cm), using standard MUAC tapes.

WHM
Weight-for-height as % of the median (WHM) was calculated on site using the international reference population tables (WHO/NCHS 1977). The results were used to decide if referral to the SFP/OTP program was needed or not. If the WHM was below 80% or presence of oedema, the caretaker received a referral slip. In the analysis, the WHM was recalculated for all children analyzed by Nutrisurvey for SMART software.

Feeding Programme Coverage
For all children 6-59 months of age, the caretakers were asked whether the child had been registered in the supplementary feeding programme (SFP) or Outpatient therapeutic programme (OTP) between January 2008 and the date of the survey. This was verified using the SFP/OTP card when available.

In the analysis, the coverage for the SFP was calculated using the direct method which required the recording of the proportion of children in SFP. The coverage rate for OTP was similarly calculated using the proportion of severely malnourished children registered in the programme.

Retrospective morbidity of children
Caretakers were asked for episodes of illness in the last 2 weeks (14 days) prior to the survey. The cause of illness and whether assistance had been sought was recorded. The following case definitions were used:

- Malaria (fever with chills);

[13] Recommended as a valid weighing instrument in Guidelines for Nutrition and Mortality Assessments in Kenya

- Diarrhea (watery stool >3/24H);
- Respiratory infection (fever with difficulty breathing or cough);
- Measles (fever with red rash);
- Other (specify);
- None

Vaccination status/Vitamin A supplementation:

Measles vaccination: assessed by checking for measles vaccination on EPI cards and/or verbal confirmation from the caretakers.
BCG vaccination: assessed by checking for the characteristic BCG scar on the child's left arm.
Vitamin A supplementation: this data was assessed but since time period was not given for recall, this data was not analysed.

2.6.2 Mortality data

Retrospective mortality data was collected using the current household census method in all the visited households, including those with no children aged less than five years old. The recall period was 91 days starting from *Arafa* (1st December). Information was collected on the age and sex of the household members, their residence status, the number of household members present within the recall period, the number of persons who arrived or left, and the number of births and deaths over the recall period. The presumed causes of death were recorded based on the following case definitions:

- Diarrhea (watery stool >3/24H);
- Bloody diarrhea;
- Measles (fever with rash);
- Fever;
- Lower respiratory tract infection (fever, cough, chest pin, difficulty breathing);
- Malnutrition;
- Injury;
- Other (specify);
- Unknown;

General Food Distribution
For all the surveyed households, information was collected on General Food distribution registration status.

2.6.3 Causes data

Secondary data on the causes of malnutrition was obtained from the SCUK Nutrition Causal Analysis (NCA)-October 2007 and Household Economy Assessment (HEA)-September 2007 that were carried out within 5 months of the survey and thus still valid. Additional data required was obtained from government administrative offices and agencies working in the area. Gaps on information collected from secondary sources were explored by conducting Key informant interviews and recording observations. These were used to collect current contextual information on the water situation, food security, access/use of healthcare facilities and the public health environment. Other useful sources of secondary information particularly concerning the most current situation was the ALRMP Drought Monthly bulletin, KFSSG Short Rains Assessment 2008 Report and the monthly DSG meeting attended by administrative and public health officials. The information gathered was triangulated to establish patterns, trends and relationships and formed the basis for discussion.

2.7 Data analysis

Data processing and analysis were carried out using Nutrisurvey for SMART and SPSS 15.0 software.
The calculation and analysis of anthropometric data and mortality was done using Nutrisurvey, with the NCHS 1977[14] and the WHO 2005 sex averaged reference standards selected for the calculation of nutritional indices and cut-off points for malnutrition.

The software flagged off any extremes, potentially incorrect or out of range values. The following lower and upper bounds are fixed to identify these extremes or potentially incorrect z-score values. All flagged off z-scores were excluded from the analysis.

Table 2.1:NCHS flag limits

Indicator	Lower bound	Upper bound
WHZ	-4	+6
HAZ	-6	+6
WAZ	-6	+6

To determine the nutritional status the following variables were considered for analysis: sex, age, weight, height or length and oedema. The cluster number was also included for segregation purposes and to allow for smooth merging up of data with the other household variables in the SPSS software. During the z-score calculations the following facts were taken into consideration:

1. If Sex is missing the observation is excluded from analysis.
2. If Weight is missing, no WHZ and WAZ are calculated, and the programme derives only HAZ.
3. If Height is missing, no WHZ and HAZ are calculated, and the programme derives only WAZ.
4. To calculate age the following procedure is applied: If both, date of birth (DoB) and date of visit (DoV) are valid, then the software calculates: Age (in days) =DoV-DoB and the result is used for obtaining z-scores.
5. For any child records with missing age only WHZ will be calculated.
6. If a child has oedema only his/her HAZ is calculated.

Additional analyses for frequencies, descriptives, correlations and cross – tabulations were conducted using SPSS 15.0 for Windows and Excel. Programme coverage, Immunization/Supplementation, Morbidity, Household origin and GFD Registration was also analyzed using SPSS.

Nutritional Indices

Acute Malnutrition Indices:

Weight-for-height (WFH) index

Acute malnutrition rates are estimated from the weight for height (WFH) index values and oedema. The WFH indices obtained were derived from comparison of children in the

[14] National Centre for Health Statistics (1977) NCHS growth curves for children, birth – 18years. United States Vital Health Statistics. 165, 11-74.

survey to the NCHS[15] references and are reflective of current nutritional conditions. WFH indices were expressed both in Z-scores and percentage of the median, producing slightly different estimates in the prevalence of wasting. The expression in Z-scores is more statistically valid than the % of the median as it takes into account the standard deviation of the specific measurements[16]. This gives it true statistical meaning and allows for inter-study comparisons. The percentage of the median is also commonly used to identify eligible children for feeding programs. Both indices were recorded.

Indicators of acute malnutrition using WFH z-scores and Percentage of the Median of the reference population:

Table 3: Acute Malnutrition indicators

	WFH z-score	WFH% of the median
Global Acute Malnutrition	<-2 SD and/or oedema	< 80% and/ or oedema
Moderate Acute Malnutrition	<-2 SD and ≥ -3 SD	< 80% and ≥ 70%
Severe Acute Malnutrition	<-3 SD and/or oedema	< 70% and/or oedema

Global acute malnutrition (GAM) is therefore defined as 'the proportion of children presenting with a weight for height index less than -2 Z scores or less than 80% percent of the median and/or oedema'

Mid-Upper Arm Circumference (MUAC)

MUAC, like weight for height, is used to quantify wasting in a population. MUAC is easier to measure than Weight for Height and there are no internationally agreed cut-offs. MUAC is used as a tool for rapid screening at community level and for admission in to feeding programmes as it is the best predictor of the risk of mortality amongst the anthropometric indices.

The guidelines used are as follows:

MUAC < 11.0 cm	severe malnutrition and high risk of mortality
MUAC ≥ 11.0 cm and <12.5cm	moderate malnutrition
MUAC ≥ 12.5 and < 13.5 cm	moderate risk of malnutrition
MUAC ≥ 13.5 cm	satisfactory nutritional status

Chronic Malnutrition Index:

Height-for-Age (HFA) - Stunting

Chronic malnutrition rates are estimated from the height-for-age (HFA) index values. The HFA indices were compared with NCHS references and are reflective of long-term malnutrition. HFA indices are expressed in Z-scores and HFA % of median.

Table 4. WFA indices

	Height for Age z-score	Height for Age % of the median
Global Chronic Malnutrition	<-2 SD and/or oedema	< 90% and/ or oedema
Moderate Chronic Malnutrition	<-2 SD and ≥ -3 SD	< 90% and ≥ 80%
Severe Chronic Malnutrition	<-3 SD and/or oedema	< 80% and/or oedema

[15] NCHS/WHO/CDC: Reference Tables, WHO, 1977.

[16] A larger number of taller children will be defined as malnourished because at greater heights, the variation of weight is greater.

Global chronic malnutrition is therefore defined as 'the proportion of children presenting with a weight for age index less than -2 Z scores or less than 90% percent of the median and/or oedema'.

Weight-for-Age (WFA)-Underweight
WFA is a composite index that reflects both wasting and stunting. It is not a good indicator of current nutritional stress but can be used to follow individual children longitudinally in the community. The HFA indices were compared with NCHS references. WFA indices are expressed in Z-scores and WFA % of median.

	Weight for Age z-score	Weight for Age % of the median
Global Underweight	<-2 SD and/or oedema	< 90% and/ or oedema
Moderate Underweight	<-2 SD and ≥ -3 SD	< 90% and ≥ 80%
Severe Underweight	<-3 SD and/or oedema	< 80% and/or oedema

Mortality Indices
The crude mortality rate (CMR) is determined for the entire population surveyed for a given period. The CMR using the current census method is calculated as follows[17]:

$$\text{CMR} = \frac{10{,}000 \text{ people}}{\text{Number of recall days}} \times \frac{\text{number of deaths during recall}}{\text{number of current residents} + 1/2\,(\text{No. of deaths during recall}) - 1/2\,(\text{No. of births during recall})} = \text{Deaths/10,000/day}$$

The proportion of deaths among children under-five years of age (U5MR) is also calculated the same way using the under five population data. The thresholds are defined as follows[18]:

Table 5:Proportion of deaths among children U5

	Total population CMR	Under-five population U5MR
Alert level:	1/10,000 people/day	2/10,000 children/day
Emergency level:	2/10,000 people/day	4/10,000 children/day

Survey data validation process
There was close monitoring and supervision of the survey teams throughout the survey period. All anthropometric measurements were checked twice before recording. At the end of every day during the de-briefing session, all the questionnaires were checked and any errors or omissions in data recording were sorted out and if information was missing the particular households were revisited.

Close supervision of data entry was done on daily basis and data cleaned and validated at the end before actual analysis. Age of children was verified by EPI health cards- in the absence of cards, the local calendar of events formulated was used to give estimates of the birth month and year. During data analysis, the Nutritsurvey for SMART software flagged

[17] Save the Children (November 2004) "Emergency Nutrition Assessment Guidelines for field workers"
[18] The Sphere Standards, 2004

any missing data, extremes or potentially incorrect z-scores values. All flagged off z-scores were excluded from the analysis. A triangulation of information was done to verify the findings of the quantitative data; information was collected through key informants, secondary data and observation.

Survey Limitations

- There were inherent difficulties in determining the exact age of some children (even with use of the local calendar of events). This may have led to inaccuracies when analysing chronic malnutrition
- A number of caretakers refused to allow recumbent height of their children to be taken. This was due to a taboo that associated lying down prostate with death. As a result, the anthropometric data of these children could not be used for analysis of malnutrition
- Data entry did not begin immediately after data collection. As a consequence of the delay, it was noted that two teams had recorded faulty height data (rounding off to the nearest 0.5 cm) and data collection had to be repeated independently for these two clusters. An extra day for data collection was added to overcome this limitation.

Good Practice

- It was noted that use of the Uniscale (rather than Salter Hanging Scale) was beneficial in a community that is conservative and does not allow the undressing of children. A further advantage of the Uniscale is that children were more compliant in having their weight taken and for this particular environment (no trees in the vicinity of households and absence of roof beams), it was more appropriate than the Salter scale.
- It was observed that when the mortality questionnaire was administered before the anthropometry questionnaire, this helped to verify the age of under >5s given beforehand and thus reduced the margin of error of wrong age recorded.

3. Results

3.1 Description of the survey sample

Table 6: Sample characteristics, Mandera Central Survey- March 2008

Number of children 6-59 months surveyed	936
Number of children 6-59 months analysed	927
Number of children recorded as absentees	7
Number of anthropometry data excluded due to erroneous values	2

Household Census:

Number of total population surveyed for mortality	3,619
Number of children under five surveyed for mortality	1,025
Number of HH covered in the mortality survey	649
Number of persons who joined the household during the recall period	94
Number of persons who left the household during the recall period	86
Number of under five children who joined the household during the recall period	28
Number of under five children who left the household during the recall period	12
Number of births during the recall period	76

Number of persons per HH (N: 649)	3,619/649= 5.58
Number of children per HH (N: 649)	1024/649= 1.58
% of children under five in the population	28.3%
Number and % of IDP households (N: 649)	136, 21.0%
Number and % of refugee households (N: 649)	10, 1.5%
and % of nomad households (N: 649)	24, 3.7%
Number and % of General Food Distribution coverage (N: 649)	394, 65.6%
Number and % of children referred to SFP (WHM<80%)	77, 8.2%

Sample population and size

Children between the ages of 6 and 59 months were included in the assessment. In the 30 clusters, 936 children were measured and 927 records had valid values that have been used in the data analysis. The mortality data was recorded for 3,619 persons in 30 clusters where a total of 649 households were visited, regardless the presence of U5 children.

Absentees and refusals

Of all selected households with children between 6 and 59 months of age, 7 children were absent. In most cases, the child had been taken 'to the bush' or was herding with siblings and returned very late or they were residing temporarily with a family member elsewhere. Caretakers of 7 children refused to have the children's heights and MUAC taken. These children were analysed for WFA (underweight) only.

3.2 Anthropometric results: children (based on NCHS reference 1977)

Acute malnutrition was defined based on the following indices:

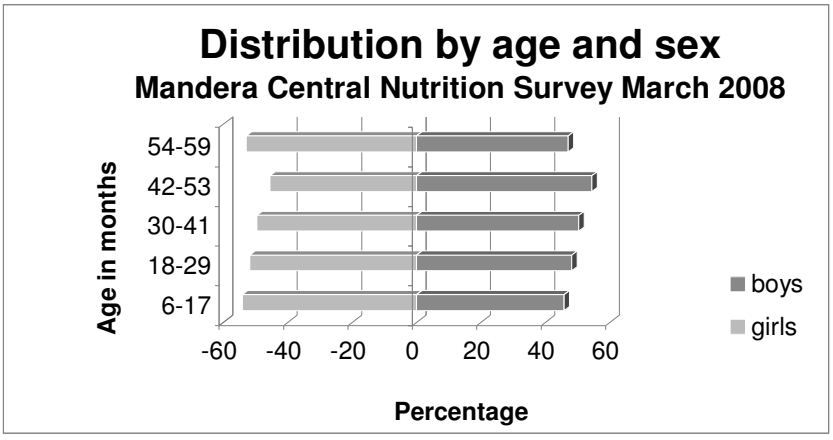
	WFH z-score	WFH% of the median	MUAC
Global Acute Malnutrition	<-2 SD and/or oedema	< 80% and/ or oedema	<12.5cm and/or oedema
Moderate Acute Malnutrition	<-2 SD and ≥ -3 SD	< 80% and ≥ 70%	≥11.0cm and <12.5cm
Severe Acute Malnutrition	<-3 SD and/or oedema	< 70% and/or oedema	<11.0cm and /or oedema

Table 7: Distribution of age and sex of sample

	Boys		Girls		Total		Ratio
	no.	%	no.	%	no.	%	Boy:girl
6-17 months	84	45.9	99	54.1	183	19.6	0.8
18-29 months	122	48.2	131	51.8	253	27.1	0.9
30-41 months	117	50.4	115	49.6	232	24.9	1.0
42-53 months	97	54.5	81	45.5	178	19.1	1.2
54-59 months	41	47.1	46	52.9	87	9.3	0.9
Total	461	49.4	472	50.6	933	100.0	1.0

Of the children measured, 49.4% were boys and 50.6% were girls (Table 3.1). Despite the fact that there were more girls than boys in the sample, the overall sex ratio (calculated by dividing the total number of boys with the total number of girls) was 1.0 which is within the recommended range of 0.8 – 1.2[19] demonstrating an unbiased sample as a whole. The sex ratio across all the child age groups was also within the expected range. The age and sex distribution of the study group is graphically shown in Figure 2 below.

Figure 2: Population age and sex pyramid



[19] Assessment and Treatment of Malnutrition in Emergency Situations, Claudine Prudhon, Action Contre la Faim (Action Against Hunger), 2002.

Table 8: Prevalence of acute malnutrition based on weight-for-height-z-scores (and/or oedema) and by sex

	All n = 915	**Boys** n = 451	**Girls** n = 464
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(222) 24.3 % (21.1 - 27.4 95% C.I.)	(117) 25.9 % (21.4 - 30.5 95% C.I.)	(105) 22.6 % (18.3 - 26.9 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(204) 22.3 % (19.2 - 25.4 95% C.I.)	(105) 23.3 % (19.1 - 27.5 95% C.I.)	(99) 21.3 % (17.1 - 25.5 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(18) 2.0 % (1.2 - 2.8 95% C.I.)	(12) 2.7 % (1.2 - 4.1 95% C.I.)	(6) 1.3 % (0.0 - 2.6 95% C.I.)

Table 8 shows that the prevalence of Global Acute Malnutrition (GAM) among all children was 24.3% (21.1 - 27.4 95% C.I.) indicative of a serious nutritional situation based on the WHO standards[20]. The prevalence of Severe Acute Malnutrition (SAM) is 2.0% (C.I 1.2-2.8). Analysis of the data by sex shows that a higher proportions of boys 25.9 %(21.4 - 30.5 95% C.I.) are malnourished than girls 22.6 %(18.3 - 26.9 95% C.I.). However the overlapping confidence limits and a chi-square analysis indicate that the difference in malnutrition between the boys and girls is NOT statistically significant (p=0.07) - both genders are at equal risk of malnutrition.

Table 9: Prevalence of acute malnutrition by age based on weigh-for-height z-scores and/or oedema

		Severe wasting (<-3 z-score)		**Moderate wasting (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**		**Oedema**	
Age (mths)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	173	3	1.7	35	20.2	135	78.0	0	0.0
18-29	249	8	3.2	54	21.7	187	75.1	0	0.0
30-41	228	4	1.8	55	24.1	169	74.1	0	0.0
42-53	176	3	1.7	34	19.3	139	79.0	0	0.0
54-59	86	0	0.0	24	27.9	62	72.1	0	0.0
Total	912	18	2.0	202	22.1	692	75.9	0	0.0

The above table categorizes the distribution of the acute malnutrition rate by age group based on weight and height in z-scores and or oedema. No consistent trend is evident for either severe or moderate wasting but analysis of variance (ANOVA) revealed that there were significant differences (p=0.001) in group means.

[20] WHO cut off points for wasting using Z scores (<-2 Z scores in populations: <5% acceptable; 5-9% poor; 10-14% serious; >15% critical).

Figure 3: Comparative graph of GAM and NCHS reference population

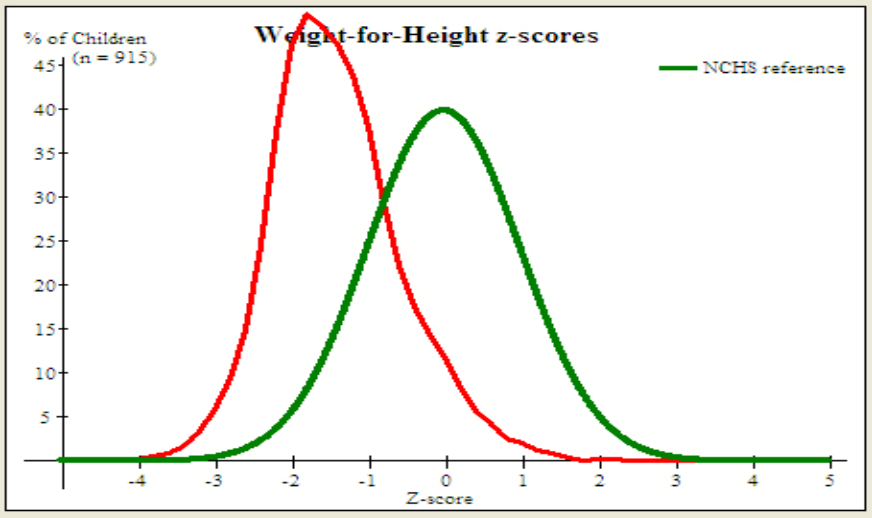


Table 10: Distribution of acute malnutrition and oedema based on weight-for-height z-scores

	<-3 z-score	**>=-3 z-score**
Oedema present	Marasmic kwashiorkor No. 0 (0.0 %)	Kwashiorkor No. 0 (0.0 %)
Oedema absent	Marasmic No. 18 (2.0 %)	Normal No. 897 (98.0 %)

This table shows that though no oedema was observed in the survey sample, there are 18 children (2%) who are severely wasted (marasmus).

Table 11: Prevalence of malnutrition based on NCHS and WHO standard references

	NCHS 1977 n=915	WHO 2006 n = 915
Prevalence of global acute malnutrition **(<-2 z-score and/or oedema**	(222) **24.3%** (21.1-27.4 95%CI)	(230) **25.1** % (22.0 – 28.3 95% C.I.)
Prevalence of moderate acute malnutrition **(<-2 z-score and >=-3 z-Score, no oedema)**	(204) **22.3%** (19.2-25.4 95%CI)	(193) **21.1 %** (18.5-23.7 95% C.I.)
Prevalence of severe acute malnutrition **(<-3 z-score and/or oedema)**	(18) **2.0%** (1.2-2.8 95%CI)	(37) **4.0 %** (2.8 – 5.3 95% C.I.)

Table 12: Prevalence of acute malnutrition (weight- for- height z-scores) by comparison of age

		6-59months n = 915	6-29 months n = 425
Z - Scores	Global Acute Malnutrition: W/H < -2 Z-score and/or oedema	(222) **24.3 %** (21.1 - 27.4 95% C.I.)	(102) **24.0 %** (19.6 - 28.4 95% C.I.)
	Severe Acute Malnutrition: W/H < -3 Z-score and/or oedema	(18) **2.0 %** (1.2 - 2.8 95% C.I.)	(11) **2.6 %** (0.9 - 4.3 95% C.I.)

To analyze the effect of age on nutritional status, the whole sample was compared to a

sub-sample of children (6-29 months). This sub-sample would coincide approximately with the weaning period in a child's life cycle and thus highlight the effect of infant and young child feeding practices.

The GAM of the younger children was slightly lower than the overall GAM but the burden of severe wasting was higher. There is no statistically significant difference between acute malnutrition rates observed among children aged 6-29 months and the whole sample ($p<0.05$). In this in this sample, age is not a risk factor for malnutrition. While older children have a higher rate of moderate malnutrition, children at the weaning stage are more vulnerable to severe malnutrition. This is a useful observation as it assists to guide the type of intervention necessary - taking into account this particular vulnerability.

Prevalence of acute malnutrition based on the percentage of the median and/or oedema

Table 13: Prevalence of malnutrition based on the percentage of the median and/or oedema

	NCHS 1977 n = 915	WHO 2006 n=915
***Prevalence of global acute malnutrition* (<80% and/or oedema)**	(104) 11.4 % (9.3 - 13.5 95% C.I.)	(60) 6.6 % (4.9-8.2 95% C.I.)
***Prevalence of moderate acute malnutrition* (<80% and >= 70%, no oedema)**	(100) 10.9 % (8.8 - 13.1 95% C.I.)	(56) 6.1 % (4.5-7.7 95% C.I.)
***Prevalence of severe acute malnutrition* (<70% and/or oedema)**	(4) 0.4 % (0.0 - 0.9 95% C.I.)	(4) 0.4 % (0.0 – 0.9 95% C.I.)

As expected, the prevalence of acute malnutrition by the Percent of the Median (Table 13) was lower than by the Z scores with Global Acute malnutrition of 11.4 % (9.3 - 13.5 95% C.I.).

Table 14: Prevalence of malnutrition by age, based on weight-for-height percentage of the median and oedema

		Severe wasting (<70% median)		Moderate wasting (>=70% and <80% median)		Normal (> =80% median)		Oedema	
Age (mths)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	173	0	0.0	20	11.6	153	88.4	0	0.0
18-29	249	3	1.2	34	13.7	212	85.1	0	0.0
30-41	228	1	0.4	21	9.2	206	90.4	0	0.0
42-53	176	0	0.0	16	9.1	160	90.9	0	0.0
54-59	86	0	0.0	9	10.5	77	89.5	0	0.0
Total	912	4	0.4	100	11.0	808	88.6	0	0.0

Table 15: Prevalence of acute malnutrition based on percentage of the median and by age group

		6-59months n = 915	6-29 months n = 425
% Median	Global Acute Malnutrition: W/H < 80% and /or oedema	(104) **11.4 %** (9.3 - 13.5 95% C.I.)	(57) **13.4 %** (10.4 - 16.4 95% C.I.)
	Severe Acute Malnutrition: W/H < 70% and /or oedema	(4) 0.4 % (0.0 - 0.9 95% C.I.)	(3) 0.7 % (-0.6 - 2.0 95% C.I.)

Based on percentage of the median, the younger age group (6-29months) has a higher rate of both GAM and SAM. However, a chi-square analysis revealed no statistically significant difference between malnutrition rates observed among children aged 6-29 months and the whole group ($p<0.05$).

Risk of mortality: Children's MUAC

Table 16: Distribution of MUAC

Nutritional Status	MUAC Criteria	N	Percentage %
Severe malnutrition	<110mm	2	0.2%
Moderate malnutrition	>=110 and <125mm	28	3.0%
Moderate risk of malnutrition	>=125 and <135mm	161	17.3%
Satisfactory nutritional status	>=135mm	738	79.3%
	TOTAL	930	100%

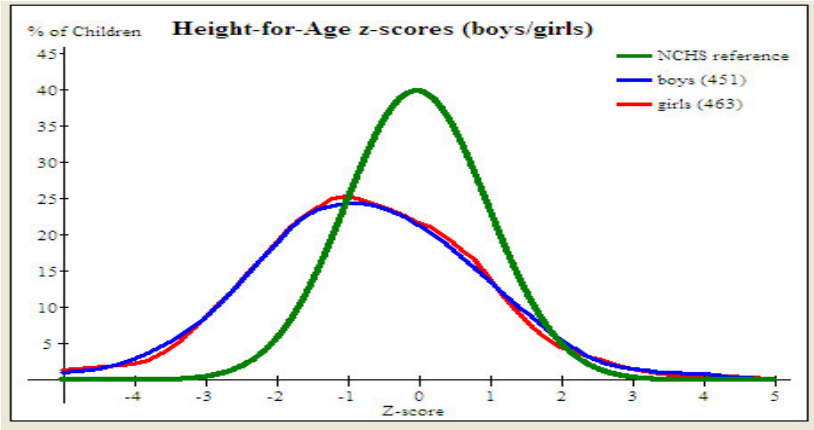
According to the MUAC index, prevalence of malnutrition (MUAC < 125mm) was 3.2% with severe malnutrition (MUAC <110mm) at 0.2% (no oedema).

Table 17: Prevalence of Chronic malnutrition (stunting) expressed in z-scores

Level of malnutrition	Males n=451	Females n=463	Total N=914
Global CM (<2SD and/or oedema) 95% CI	91(20.2%) 15.3-25.0	96(20.7%) 15.7-25.8	187 (20.5%) 16.1-24.8
Moderate CM (<-2- ≥ -3 SD) 95% CI	58(12.9%) 8.7-17.0	65(14.0%) 10.1-18.0	123 (13.5%) 10.2-16.7
Severe CM (<-3SDand/or oedema) 95% CI	33(7.3%) 4.4-10.3	31(6.7%) 3.7-9.7	64 (7.0%) 5.0-9.0

Height for age (stunting) is an indicator of long term malnutrition arising from deprivation related to persistently poor food security situation, micronutrient deficiencies and recurrent illnesses and other factors which interrupt normal growth. A high rate of stunting, 20.5% (16.1-24.8 95%CI) was reported. There was no difference in the level of stunting (Figure 4) between the boys and girls, as judged by the overlap in the Confidence Intervals.

Figure 4: Height- for - age Z-scores



3.3 Mortality results (retrospective over 91days prior to interview)

Mortality was assessed using the current household census method. There were 3619 individuals alive at the time of the survey, 1025 of who were children under-five years old.

For all the deaths recorded, 6 (54.5%) occurred in persons greater than 5 years and 5 (45.6%) occurred among children less than five years of age.

Table 18: Mortality rates

CMR (total deaths/10,000 people / day): 0.34 (0.04-0.64) (95% CI)
U5MR (deaths in children under five/10,000 children under five / day): 0.23 (-0.08-0.54) (95% CI)

Out of 649 households sampled for mortality data, a total of 5 children under five years and 6 adults were reported to have died since first of December (*'Arafa'*) 2007, thus yielding a specific under five mortality rate of 0.23/10,000/day and crude mortality rate of 0.34/10,000/day respectively. Both the mortality rates are within the acceptable levels for emergency situations[21]; under five mortality rate <2 deaths/10,000/day and crude mortality rate <1 death/10,000/day.

However, though the mortality rates reported in this survey are at acceptable levels and do not predict future mortality, with the high levels of malnutrition, this may be expected to increase if the conditions do not improve.

Table 19: Causes of death

	Cause of Death	<5 (n=5)	>5 (n=6)
1	Diarrhoea	0%	0%
2	Lower Respiratory Infection	0%	33.3%
3	Fever	0%	0%
4	Measles	0%	0%
5	Injury	0%	0%
6	Unknown	80.0%	33.3%
7	Others	20.0%	33.3%

[21] The Sphere Standards, 2004. Under Five Mortality Rate (U5MR): emergency threshold is 2.3/10,000/day, Alert 1.0/10000/day

The main presumed causes of death among children under-five years were 'unknown' and 'other'. Four of the unknown deaths occurred a few weeks after birth.

For deaths over 5 years, there were two deaths presumed to be caused by lower respiratory infection, two were unidentified and two due to 'other' causes, both classified as natural death.

Two of the main causes of death in the area, given by the health officials are perinatal (30 weeks pregnancy-4 weeks after birth) deaths and upper respiratory tract infections, so survey causes of death compare well with statistics from MoH.

3.4 Children's morbidity

Table 20: Prevalence of reported illness in children in the two weeks prior to interview

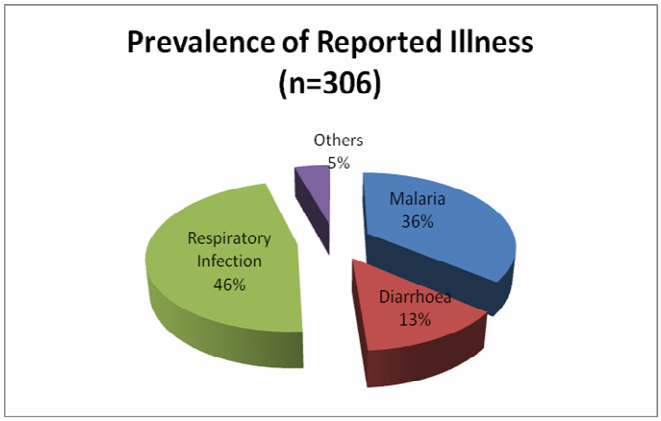
	6-59 months
Prevalence of reported illness	32.8% (n=306)

Table 21: Symptoms breakdown in the children in the 2 weeks prior to interview

Symptoms of reported episodes of illness	**n**	**%**
Malaria	109	35.6%
Diarrhoea	41	13.4%
Respiratory Infection	142	46.4%
Other	14	4.2%

The 'other' symptoms included skin conditions, constipation/impacted bowel, eye infections and epilepsy

Figure 5: Prevalence of reported illness



The prevalence of reported illness was determined based on a two-week recall period (inclusive of the day of the survey). The proportion of children reported sick was 32.8% indicating that a third of the surveyed children reported illness. Figure 5 illustrates that most of the children suffered from malaria and acute respiratory infections (ARIs) and to a lesser extent diarrhoeal diseases.

3.5 Vaccination Results

Table 22: Vaccination coverage: BCG for6-59 months and measles for 9-59 months

	BCG n= 934	Measles (with card) n= 896	Measles (with card or confirmation from mother) n= 896
YES	(N: 854) 91.4 % (88.0-94.8 95% C.I.)	(N: 295) 32.9 % (22.7-43.2 95% C.I.)	(N:806) 90.0 % (85.9 – 94.1 95% C.I.)

For all children 6-59 months, information on BCG and measles vaccination was collected using EPI health cards and recall from caregivers. When estimating measles coverage, only children 9 months of age or older were taken into consideration as they are the ones who were eligible for the vaccination so the coverage was calculated as the proportion of children 9 months and above who had received measles vaccination. The vaccination coverage was calculated as the proportion of children immunized based on records and recall.

There is a very good coverage rate for both BCG (91.4%) and measles (90.0%) vaccinations - above the recommended KEPI coverage cut-off point of 80%. This was raised with health officials in MoH to establish the possible reasons for this. For BCG this was attributed to two factors: it is the first vaccination given and many mothers (a bigger number than previous years) tend to take their children to the PHC or hospital shortly after birth following mass sensitization on the role BCG plays in preventing TB, a major disease in the area. Secondly, the incentive of a free insecticide-treated net (ITN) given after BCG vaccination and the general fear of TB among the community.

According to the Health and Nutrition assessment (February 2007), the measles vaccination coverage in Elwak was 87.7% (Card and confirmation) in 2007, so the current rate at 90% is an improvement. The good coverage rate of measles vaccinations is attributed to presence of NGOs who facilitate outreach services and vaccination campaigns which take place about twice annually.

3.6 Feeding Programme coverage

Programme type	
Supplementary feeding programme coverage	38.0 % (36.4-39.6 95% C.I.)
Therapeutic feeding programme coverage	50.0 % (49.6-50.4 95% C.I.)

The currently accepted methods[22] of estimating the coverage of selective feeding programmes includes a direct method included during nutrition surveys and the CSAS method that is good for programs addressing severe malnutrition. Coverage is estimated either directly or indirectly using different formulas.

A direct method was used to estimate period coverage in this survey. The period assessed

[22] Save the Children (November 2004) "Emergency Nutrition Assessment Guidelines for Field Workers"

was January and March 2008.

Cumulative number of children registered in SFP: 38
Cumulative number of children registered in OTP: 2
Cumulative number of children referred for SFP/
(Children with WHM<80% and >= 70% that are not enrolled): 62
Cumulative number of children referred for OTP/
(Children with WHM<70% that are not enrolled): 2
SFP coverage = Children registered in SFP /Children registered in SFP+ children with WHM<80% and >= 70% that are not enrolled x 100
= 38/38+62 x 100 = 38.0%
OTP coverage = Children registered in OTP /Children registered in OTP + children with WHM<70% that are not enrolled x 100
= 2/2+2 x 100 = 50.0%
This formula includes children who may not be eligible for entry into the programme on the day of the survey (children who are in the recovery phase and whose weight-for-height is higher than that required for entry into the programme or who no longer exhibit nutritional oedema). These children, now in recovery, were recently undernourished.

This formula is therefore an estimator of RECENT coverage in a given period (PERIOD COVERAGE).
This limitation has been minimised in this survey by inclusion of children recently discharged from the SFP/OTP i.e. those discharged in the last 2 months since January 2008. This gives a more accurate picture of the programme impact in the survey area without logistical bias given that this is a difficult area to operate in due to huge distance between centers and population movement in search for water and pastures.
The SFP coverage rate (38%) calculated using the formula above is below the recommended levels of ≥50.0% in rural areas according to the SPHERE Standards (2004). The OTP coverage, on the other hand, was 50% and is within acceptable standards.
According to the nutrition survey, the GAM in % of the median was 11.4% and hence, 611 children were expected to be enrolled in the program at the time of the survey, assuming coverage of 50%. At the time of the survey, there were 253 children enrolled in SFP and 19 in OTP

3.7 Household status

Table 23: General food distribution per HH

GFD per HH	%HH	n
% of population surveyed that received GFD	65.6%	394

About two-thirds (65.6%) of all the households visited were registered and receiving general food distribution.

Table 24: Distribution of households

DEMOGRAPHY	Percentage (%)	TOTAL HH : 649
Origin		
% HH with residents	73.8%	479
% HH with internally displaced	21.0%	136

% HH with refugees	1.5%	10
% HH with nomads	3.7%	24

Almost three quarters (73.8%) of the households contain residents (defined as people who have resided in the same location for 5 years or longer) and only 3.7% are nomads. Through probing, it was established that the bulk of internally displaced households were not newly displaced and had integrated in their areas of settlement.

A majority of the surveyed population have settled (urban/semi-urban settlements) and 'dropped out' of the nomadic lifestyle. This is indicative of a change in the traditional pastoralist livelihoods.

The mean number of children under five (U5) per household is 1.58. Children under five years comprised **28.3%** of the total surveyed population.

4. Discussion

4.1 Nutritional status

The overall sex ratio of the survey sample was 1.0 which indicates that boys and girls were equally represented as a whole. The sample was also within the acceptable ranges between all age groups and thus this survey used a valid and unbiased sample.

The results indicate **serious levels of acute malnutrition** because they are way above the WHO emergency thresholds of 15%. The levels of underweight (WFA) of 37.4% (34.0-40.8) and stunting (HFA) of 20.5% (16.1-24.8) are also alarming. The reported high rates of stunting, at 20.5% (16.1-24.8 95%CI) shows the effects of cumulative chronic food insecurity and recurrent illnesses overtime (Table 3.10). No incidence of oedema was reported in the survey.

There is a significant increase in acute malnutrition levels (Weight for Height Z-score) when compared to the MSF-B October 2006 survey that reported Global Acute Malnutrition (GAM) at 15.3% (CI=12.6-18.1) and Severe Acute Malnutrition (SAM) at 1.0% (CI=0.4-1.7) among children aged 6-59 months. However, the two surveys are not comparable due to different timings as well as geographical coverage.
The figure below gives malnutrition trends over time in z-scores.

Divisions covered		March 2006	October 2006	March 2008
Elwak, Wargadud, Kotulo, Shimbir Fatuma, Lafey	**GAM**	29.8%(25.9-33.6 95%CI)	15.3% (12.6-18.1 95% CI)	-
	SAM	2.3% (1.3-3.3 95%CI)	1.0% (0.4-1.7 95% CI)	-
El wak, Wargadud, Kotulo, Shimbir Fatuma,	GAM	-	-	24.3% (21.1-27.4 95% CI)
	SAM	-	-	2.0 (1.2-2.8 95% CI)

Current results are best compared against the survey conducted in March 2006 by MSF-B covering the same areas which indicated GAM of 29.8% (25.9-33.6 95% CI) and SAM of 2.3% (1.3-3.3 95% CI).

Though this prevalence cannot be quantified as typical, it is important to note that malnutrition rates seem to vary widely in this region, depending on the time of year. This survey coincided with the hunger gap period, when elevated malnutrition rates may be expected to rise.
Looking at the MUAC rates which are a better predictor of mortality, the GAM is 3.2% while the SAM is 0.2%. The prevalence of malnutrition using MUAC is very low compared to WFH Z-scores and % median. The population is typically long limbed and lean and hence WFH indices return higher prevalence rates than in other populations. However, MUAC which is closely related to muscle mass remains the better predictor for risk of mortality. Previous surveys conducted in the same geographical area did not collect MUAC data and hence no data available for comparison.

4.2 Mortality

The recall period for questions relating to the mortality questionnaire was 91 days (3 months) from the start date of the survey. This minimised information recall bias and the reported events would have been sufficiently accurate. In addition, data collection and analysis were done using SMART methodology and software so no bias is suspected in the findings.

The survey reported an under-five mortality rate of 0.23/10,000/day and crude mortality rate of 0.34/10,000/day. Both the mortality rates are within the acceptable levels for emergency situations[23]; U5 mortality rate <2deaths/10,000/day and crude mortality rate <1 death/10,000/day. The under-five mortality rate reported is also lower than the Health and Mortality Assessment rate (0.8/10,000/day) in February 2007.

Though the mortality rates reported in this survey are at acceptable levels and do not predict future mortality, with the high levels of malnutrition, this may be expected to increase if the conditions do not improve.

4.3 Causes of malnutrition

When interpreting the observed Malnutrition rates in relation to the current food security situation several factors need to be considered;

- The short rains (Oct – Dec 2007) were below normal hence an early start of the dry spell and the impact on the animals and food security in terms of foods available and market prices, is already taking its toll.

- The GFD has been undergoing a gradual phase out process and targeted HH have been reduced in Mandera Central district and will be reduced further with change to FFA modality.

It is important to note that the survey was conducted at the beginning of the hunger gap (January-April/May) after a prolonged dry spell in January. The effect of the ongoing hazards is likely to further lower the resilience of vulnerable groups and malnutrition rates are likely to rise. 1 in every 4 children is already wasted (≈25% GAM). The early drought and water stress being experienced in the area is likely to impact negatively on the

[23] The Sphere Standards, 2004. Under Five Mortality Rate (U5MR): emergency threshold is 2.3/10,000/day, Alert 1.0/10000/day

nutrition of children due to a reduction in milk production and availability, given that milk forms the main part of children's diet in this community. In addition the livestock has not fully recovered from the combined stress of diseases and drought experienced between 2006-2007 hence impacting on the productivity of livestock as well as livestock herds.

An adequate hunger 'safety net' is therefore crucial to mitigate further deterioration of the food security situation while at the same time building resiliency of the communities. Of paramount importance is rapid response to the impending water crisis. Partners from all sectors need to coordinate effectively to buffer the community until the start of the long rains. Any further water stress may tilt the balance into even greater malnutrition and morbidity.

Looking beyond the seasonal shifts, it is important to address the causes of chronic malnutrition. To put it in context 1 in every 5 children is stunted (20%GCM). Adequate food alone does not result to improved nutritional status if child care practices such as hygiene and child feeding practices are poor. Though the findings of the survey did not support 6-29 age-group as the most vulnerable, they suffered a higher burden of severe wasting (2.6% SAM). Analysis of SCUK OTP admissions revealed that 78% of the total admissions were children less than 24 months old. Protecting optimal infant and young child feeding practices by education of caregivers will go a long way in buffering the malnutrition risk facing the U5. Also, the high levels of malnutrition across all the age groups, demonstrates the influence of factors beyond poor child caring practices on the nutritional status of the children. Increased knowledge on dietary diversity for caregivers would benefit the whole family.
Given that the availability and accessibility of water in Mandera Central is dire and below the SPHERE standards, the problem may also be related to hygiene practices and inadequate sanitation.

Community concerns were mostly related to water shortage. Key informant interviews and observations corroborated this view. CARE Kenya has a water and sanitation program in Elwak and at the time of the survey, they had started water trucking to areas with water stress. Ministry of Water and ALRMP were also facilitating this and also provided fuel subsidies so that residents of boreholes would get free water. Rapid response teams for repair of boreholes were also dispatched. Mass vaccinations of shoats and cattle were also being planned - there were already observable deterioration in animal conditions. Evidently, partners are already making efforts to contain the situation.

In the long term, Drought preparedness systems need to be backed by government policy so that the community becomes better able to cope with persistent droughts, a basic cause of chronic malnutrition. The key is to help the community 'bounce back' from shock as painlessly as possible.

Immunization and vitamin A coverage are basic health services and are a reflection of how the population accesses health services. The high immunization and supplementation coverage rate (over 90%) is commendable. But only 32.9% of caretakers had the EPI immunization cards to confirm the coverage.

4.4 Feeding Programme coverage

The SFP coverage at 38.0% in the survey is below the SPHERE standards although at the

time of the survey, SCUK had reduced its geographical coverage from 20 sites to 9 sites. This was occasioned by the decrease in admissions between October-December owing to improved food security situation following favorable short rains and unseasonal rains between July and September 2007.
Referral of children from the community is based on MUAC screening and hence not the same children would be referred if assessed by both MUAC and WFH criteria. Although focus group discussions conducted by SCUK nutrition program indicate a good understanding of the program and its aims, mobility of the population in search for pasture and water affects attendance. It is also important to note that women have heavy workloads that affect proper utilization of available services. On the other hand, the identification of 62 new SFP referrals during the six-day survey period indicates that active case finding for the malnourished needs to be accelerated.

5. Conclusions

The rate of Global Acute Malnutrition (GAM) in Z- scores is above the emergency threshold of >15%. The daily Crude Mortality rate (CMR) and Under 5 mortality rates (U5MR) are below the 'alert' benchmarks of 1/10,000/day and 2/10,000/day respectively[24]. The nutrition situation in the 4 divisions of Mandera Central is considered as serious although the MUAC results are low and mortality rates reported in this survey are at acceptable levels and do not predict future mortality. However, it should be understood that this Survey was carried out in the beginning of the hunger gap period, and elevated rates of malnutrition can be expected at this time.

The high rates of malnutrition noted are despite nutrition intervention programs that have been targeting children under 5 years since August 2007. It is worth noting that the majority of the population in Mandera central are pastoralists and hence rely heavily on healthy herds as well as availability of pasture and water for livestock. It was reported that milk production, which is a major source of food for young children had reduced partly due to poor livestock health conditions and also due to drought and water scarcity. At the time of the survey, many of the surveyed areas were experiencing water stress and a lot of livestock had migrated to areas close to bore holes hence reducing milk availability for those left at home and especially young children. The population in Mandera in general is highly dependent on food aid and delays in supply of food in the months of December and January may have contributed to a reduction in food available at household level. Also, with the reduction of numbers of families targeted for GFD owing to perceived good rainfalls in 2007, many families may have become food insecure and hence the high levels of malnutrition seen. Other aggravating factors that could contribute to the underlying causes of malnutrition include poor hygiene and sanitation, poor child care and feeding practices and the high prevalence of respiratory illness. Worth mentioning is that at the time of the survey, there was a cholera outbreak with over 90 cases treated and 1 death.

The Kenya Health Policy Framework (KHPF) of 1994 aims to reverse the downward trend in health indicators such as reduction of mortality, common infections and malnutrition. In order for the government to attain this objective the Kenya Essential Package for Health (KEPH) was formulated. One of the key characteristics of KEPH is a focus at the community level, specifically on the promotion of family practices which preserve and promote health.

[24] The Sphere Standards, 2004. Under Five Mortality Rate (U5MR): emergency threshold is 2.3/10,000/day, Alert 1.0/10000/day

With the nutrition situation being at such a critical level, improving nutritional status of the community is an urgent need. The mortality rates could easily escalate to unacceptable levels if the situation for U5 (high morbidity and high level of malnutrition) does not improve in the short-term. With the planned phasing out of the GFD in the district, the underlying causes of malnutrition need to be addressed and the nutritional status of the population closely monitored. SCUK is determined to implement programs that address the underlying causes of malnutrition as well as rebuilding livelihoods, while at the same time addressing acute malnutrition rates through feeding programs. It is through an integrated approach that Mandera Central District can move from emergency to rehabilitation and ultimately development.

6. Recommendations and priorities

Nutrition:

Immediate

- Implement blanket supplementary feeding for all children 6-59 months for 3 months as a safety net measure to prevent further deterioration of nutritional status.
- Strengthen or initiate new case finding strategies in order to identify both severely and moderately malnourished children for admission into OTP and SFP respectively. Nutritional status is highly sensitive to changes in the risk factors and therefore a child's nutritional status is likely to fluctuate considerably with seasonal changes.

Long-term

- Assess and strengthen knowledge, attitudes and practices on optimal infant feeding and caring practices (IYCF) of women
- Establish regular nutrition surveillance through nutrition surveys

Education

- Initiate nutrition education targeting women and the communities and alongside develop local nutritional education materials for the CHW.

Health:

- Continue treatment of the severely malnourished.
- The high prevalence of LRTI and diarrhoea highlights the need for more intensive health education
- Strengthen outreach vaccination services by providing vaccine carriers and transportation to periphery areas. Also more intensive community outreach services to all areas would encourage caregivers to seek health services and reduce the severity and duration of illness
- Expand primary health care to cover remote areas by establishment of mobile clinics
- Promote improved access to safe water in all impact areas by provision of water purification chemicals

Water and Sanitation:

- Emergency repairs of boreholes and facilitation of rapid repair teams and spare parts
- Continue water trucking to all areas affected by water stress and provide fuel subsidies for community owned boreholes to support free water distribution
- Distribute water tanks to identified areas of need, especially schools

- Strengthening of hygiene practices to reduce the incidence of diarrhoeal diseases associated with insufficient water in the household

Long-term:

- Continue support of the construction of boreholes and water reservoirs to increase access to water
- Provide continuous training on technical know how to enable effective management of water points

Food distribution, Food security and Livelihood rehabilitation:

- Continue regular general food distribution. WFP should continue to maintain the caloric value of the food basket at 2,166 Kcal/day.
- Strengthen monitoring of food storage and use at the household level, promotion of food preparation (particularly for the use of CSB) and food hygiene promotion
- Vaccination and mass treatment of CCPP and CBPP diseases that has affected cattle and shoats

Long-term

- Investing in drought management and preparedness to curb the effects of the cyclical nature of drought.
- Livelihoods programmes that help the people adopt sustainable coping strategies during the lean times
- Improve the infrastructure to open up markets.

7. References

1. AAH Nutrition Anthropometric Survey- March 2002 (Elwak-Mandera District)
2. Arid Lands Resource Management Project- Drought Monthly Bulletin for February 2008
3. BMZ/UNHCR Dadaab Nutrition Survey-August 2006
4. CARE Kenya Water Assessment Central Mandera- February 2008
5. Guidelines for Nutrition and Mortality Assessments in Kenya (Draft-2007)
6. KFSSG Short Rains Assessment 2008 Report
7. Merlin Integrated Nutritional Survey Report Wajir District-March 2007
8. MSF-B Nutritional and baseline Health Survey& Retrospective Mortality Assessment- Mandera District (October 2006)
9. Rapid Assessment Findings (SCUK/DEO Education)- February 2008
10. Save the Children (November 2004) "Emergency Nutrition Assessment Guidelines for field workers"
11. SC UK Rapid Health, Nutrition and Food Security & Livelihood Assessment February 2007
12. SCUK 'A Causal Analysis of Malnutrtion, Including the Minimum Cost of a Healthy Diet- Elwak Northern Kenya' (NCA)-October 2007
13. SCUK CTC Field Reports
14. SCUK CTC Health Report-February 2008
15. SCUK Household Economy Approach (HEA) Assessment- September 2007
16. SCUSA Fur Baranga Nutrtional Anthropometric Survey-January 2005
17. SCUSA Sirba Nutritional Anthropometric Survey-June 2005

8. Appendicies

APPENDIX 1: Causal Framework for malnutrition

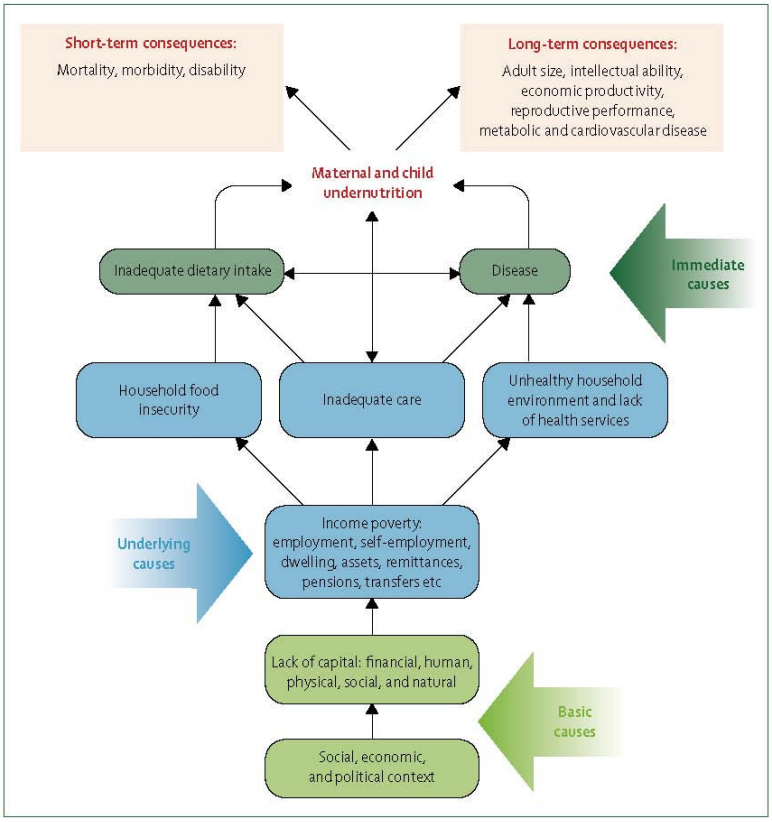


Figure 1: Framework of the relations between poverty, food insecurity, and other underlying and immediate causes to maternal and child undernutrition and its short-term and long-term consequences

APPENDIX 2: CALENDAR OF EVENTS AND CHILDS' AGE IN MONTHS

	Annual Events	2003	2004	2005	2006	2007
January *Zaka*	-School opening -Zhakat collection **BIRAA**	**NARC Government came into power**	**50**	**38 MSF-Belgium initiated its project**	**26**	**14 Flooding in Elwak**
February *Ragal*	**BIRAA (Hot season)**		**49**	**37 Massacre in Kobo Nne**	**25**	**13 MSF-B closed its program**
March *Moulid*	**Biraa (Hot season)**		**48**	**36**	**24**	**12**
April *Bilku 1*	**GAAN (long rains)**	**59**	**47**	**35 Clash between Gari & Maryan**	**23**	**11**
May *Bilku 2*		**58**	**46**	**34**	**22**	**10**
June *Bilku 3*		**57**	**45**	**33**	**21**	**9**
July *Sondeer 1*	**ADOLEES (Dusty cloudy season)**	**56**	**44**	**32**	**20**	**8**
August *Sondeer 2*		**55**	**43**	**31 Massacre in El golicha**	**19 A boy kidnapped and killed**	**7**
September *Soom*		**54**	**42 (AAH driver killed)**	**30**	**18**	**6**
October *Furan*	Ramadhan	**53**	**41**	**29**	**17**	
November *Sigitaal*	**AGAAY (short rains)**	**52**	**40**	**28 -Referendum -landmine exploded**	**16**	
December *Arafa*	Idd Ul Hajj	**51**	**39**	**27 Start of the floods**	**15**	

APPENDIX 3: CLUSTER ALLOCATIONS FOR MANDERA CENTRAL SURVEY MARCH 2007

El wak	Cluster(s)
Bula Afya	1
Town	2,3,4,5,6
Korobo Shana	7,8,9
El Hache	10,11,12,13,14
El Hagarsu	15

Shimbir Fatuma	Clusters (s)
Shimbir Fatuma	16,17,18
Fincharo	19
Kalenkalesa	20
Burmayo North	21
Burmayo South	22

Kotulo	Cluster(s)
Kotulo	23, 24
Kutayu	25
Dabacity	26
Borehole 11	27, 28

Wargadud	
Wargadud	29, 30

Cluster Allocations Per Team

	Day 1	***Day 2***	***Day 3***	***Day 4***	***Day 5***
Team 1	2	6, 1	10	23, 24	25, 26
Team 2	11	3	7	21, 22	27, 28
Team 3	12	4	8, 9	16, 17	18
Team 4	13	5	14, 15	19, 20	29, 30

APPENDIX 4

ANTHROPOMETRY QUESTIONNAIRE of CHILDREN 6-59 MONTHS , MANDERA CENTRAL SURVEY – MARCH 2008

Date:_____ Village:_____ Cluster : _____ Team Number: _____

HH no.	Child no.	Child Name	Age (m)	Sex 1=M 2=F	Oedema 1=Yes 2=No	Weight (kg)	Height Length (cm)	MUAC (cm)	WFH (%)	Registered in 1= SFP 2= OTP 3= TFC 4= N/A	Need referral 1=Yes 2=No	BCG mark 1=Yes 2=No	Measles vacc. 1=Yes, card 2=Yes, no card 3=No	Vitamin A suppl 1= Yes 2=No	Illness in <2 weeks (14days)
	1														
	2														
	3														
	4														
	5														
	6														
	7														
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ILLNESS: 1= Malaria (fever with chills) 2= Diarrhoea (watery stool>3/24Hrs) 3= Respiratory Infection (fever, difficulty breathing or cough) 4= Measles (fever with red rash) 5= Other (specify) 6= None

MORTALITY QUESTIONNAIRE
MANDERA CENTRAL SURVEY, MARCH 2008

HH Number _____ Cluster: _____Village: _____ Team Number: _____ Date: _____

ID	Name	Age (y) (circle when <5)	Sex 1=Male 2=Female	Origin 1=residence 2=IDPs 3= Refugees 4= Pastoralist	Present in HH (Tick=YES)	Birth since Arafa (Tick=YES)	In- migration since Arafa (Tick=YES)	Out- migration since Arafa (Tick=YES)	Died since Arafa Tick=YES	Cause of death*	General Food Distribution Registration 1=Yes 2=No
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											

SUMMARY DATA SECTION

Current HH members total	
Current HH members <5y	
Births Since Arafa	
Current HH members in-migration total	
Current HH members in-migration <5y	
Past HH members out-migration total	
Past HH members out-migration <5y	
Deaths total	
Deaths <5y	

*CAUSES OF DEATH:
1= Diarrhoea (minimum of 3 watery stools/24hrs)
2= Bloody Diarrhoea;
3= Measles (fever with rash);
4= Fever;
5= Lower respiratory tract infection (fever, productive cough, chest pain, difficulty breathing)
6= Malnutrition;
7= Injury;
8= Other;
9= Unknown

SCUK
Mandera central district
Population figures

Division	Location	Sub location	Village	# HH	< 5
El wak	Town	Elwak	Udole	120	144
	B/Afya	B/Afya	B/Afya	300	360
	Wante	El kala	El kala	240	288
	Town	Town	Town	1900	2280
	Town	Eladi	Korobo shana	1000	1200
	Wante	El golicha	El golicha	280	336
	El wak south	Elwak south	El hache	1800	2160
	Elwak south	Elwak south	El hagarsu	320	384
	Wante	Wante	wante	75	90
	Wante	Alango D	Alango D	10	12
Shimbir Fatuma	S/Fatuma	S/Fatuma	s/fatuma	1200	1440
	Fincharo	Fincharo	Fincharo	600	720
	Fincharo	kalankelesa	kalankelesa	200	240
	S/fatuma	S/fatuma	Dawder	200	240
	S/Fatuma	S/Fatuma	Kobadadi	120	144
	Burmayo N.	Burmayo N.	Burmayo N.	300	360
	Burmayo S	Burmayo S	Burmayo S.	300	360
	Fincharo	Fincharo	Dololo	52	62
Kotulo	Kotulo	Kotulo	Kotulo	580	696
	Kotulo	Kotulo	Harwale	85	102
	El ram	Elram	Elram	180	216
	Kutayu	Kutayu	Kutayu	380	456
	Garsesala	Garsesala	Garsesala	110	132
	Dabacity	Dabacity	Dabacity	120	144
	Borehole11	Borehol11	Borehole11	1030	1236
Wargadud	Wargadud	Wargadud	Wargadud	1300	1560
	Wargadud	Elele	Elele	180	216
	Quramudow	Quramudow	Quramudow	90	108
	Quramudow	S/tinfa	S/tinfa	15	18
	Wargadud E	Wargadud E	Wargadud E	300	360