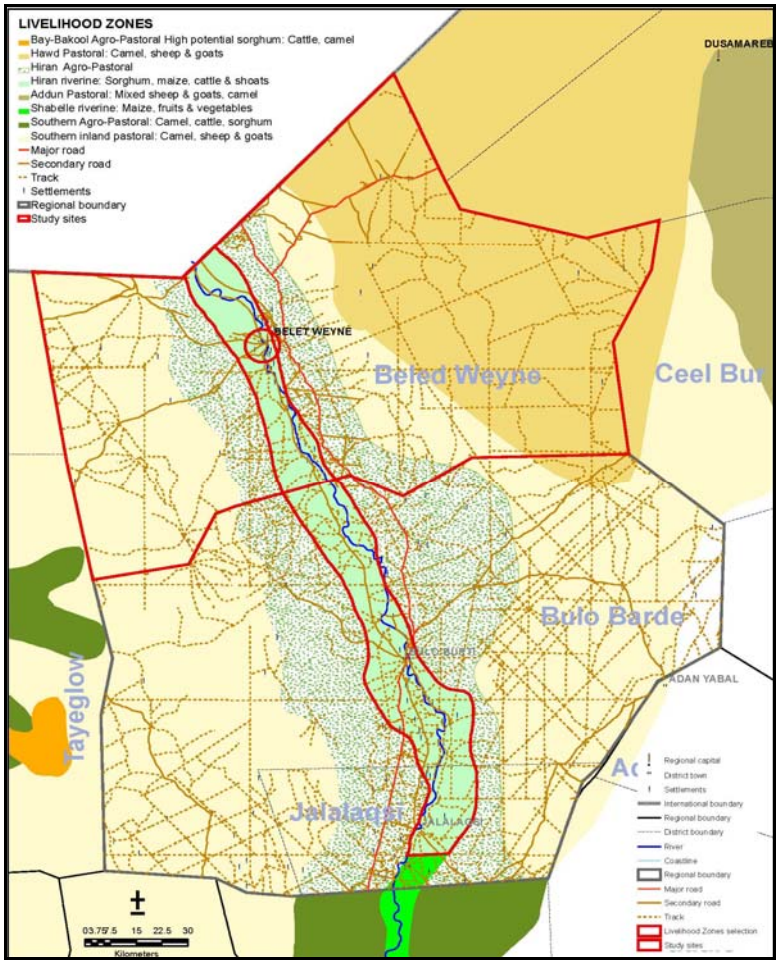
NUTRITION ASSESSMENT

BELET WEYNE TOWN, HIRAN REGION



Food Security Analysis Unit (FSAU/FAO)
United Nations Children's Fund (UNICEF)
International Medical Corps (IMC)

MARCH 2007

FSAU

unicef
United Nations Children's Fund

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Abbreviations and acronyms

ARI	Acute Respiratory Infections
FAO	Food and Agriculture Organisation
FSAU	Food Security Analysis Unit
GAM	Global Acute Malnutrition
GIT	Gastrointestinal Tract
HAZ	Height- for- Age Z scores
HDDS	Household Dietary Diversity Score
HFA	Height for Age
IDA	Iron Deficiency Anaemia
IDP	Internally Displaced Person
KM	Kilo Metres
MCH	Maternal and Child Health
MOH	Ministry of Health
MOHL	Ministry of Health and Labour
MT	Metric Tonnes
MUAC	Mid Upper Arm Circumference
NCHS	National Centre for Health Statistics
NGOs	Non-Governmental Organisations
PWA	Post War Average
LEZ	Livelihood Economic Zones
LNGO	Local Non-Governmental Organisation
INGO	International Non-Governmental Organisation
NIDs	National Immunisation Days
OR	Odds Ratio
RR	Relative Risk
SACB	Somalia Aid Coordination Body
SMART	Standardised Monitoring & Assessment of Relief and Transitions
SVO	Steadfast Voluntary Organisation
UN	United Nations
UNDP	United Nations Development Programme
VAD	Vitamin A Deficiency
UNICEF	United Nations Children's Fund
WAZ	Weight for Age Z Scores
WFP	World Food Programme
WHO	World Health Organisation
WHZ	Weight for Height Z scores

ACKNOWLEDGEMENTS

The nutrition surveillance project of the FSAU acknowledges the participation of UNICEF, IMC, SC-UK, SRCS and CARE in the nutrition assessment. FSAU provided two assessment coordinators and six supervisors, led in the training of the assessment team, coordinated data collection, entry and analysis, funded the cost of data entry clerks, questionnaires and stationery and produced the report. UNICEF provided one supervisor, funded assessment vehicles and provided anthropometric equipment. IMC provided three supervisors and funded enumerators, supervisors and field guide costs. SC-UK provided three supervisors and a meeting venue. CARE and SRCS each provided two supervisors and enumerators. The contribution of the local authorities for ensuring the survey teams security during the fieldwork is gratefully appreciated.

The data could not have been obtained without the co-operation and support of the communities assessed, especially the mothers and caregivers who took time off their busy schedules to respond to the interviewers. Their involvement is highly appreciated.

FSAU also express their sincere appreciation to the entire assessment team for the high level of commitment and diligence demonstrated during all stages of the assessment.

EXECUTIVE SUMMARY

Belet Weyne town, located in Belet Weyne District Hiran region, has an estimated population of 34,545 (UNDP population estimates, 2005). The town is divided into four main sections namely Koshin, Hawatako, Bundoweyn and Howlwadag and thirty two sub sections. The Shabelle River flows right through the town dividing it into East and West Belet Weyne. The town is a vibrant business centre and serves as a transit point to North Somalia, Mogadishu and Ethiopia. Most residents have what might be described as a diversified urban economy with close links with rural areas, either through direct livestock or crop production activities or through trade with rural areas or with close links with relatives in those areas.

In March 2007, FSAU in collaboration with UNICEF, IMC, SC-UK and CARE conducted a nutrition assessment in Belet Weyne town. The assessment was conducted concurrently with other three nutrition assessments in Hiran region namely Belet Weyne District, Hiran riverine and Hiran agropastoral/pastoral. Using a two stage cluster sampling methodology, 903 children aged 6 – 59 months from 477 households were assessed. Mortality data was collected from 906 households.

Findings indicate a global acute malnutrition rate of **12.6% (9.6 – 15.5)** and a severe acute malnutrition rate of **1.1% (0.3 – 1.8)**. The results indicate a serious nutrition situation according to WHO classification. However these results were the lowest of the four nutrition assessments conducted in the region at the same time, though with statistically significant difference only with the Riverine assessment. This is possibly due to comparatively better access to basic services such as health services, clean water and education.

Overall, about 40% of the children had reportedly suffered from one or more diseases during the two weeks prior to the assessment. As shown in *Table 1,* ARI was the most prevalent reported communicable disease among the assessed children. Although the outbreak of acute watery diarrhoea (AWD) continues in the town, the cases were declining at the time of assessment. Of concern was the reported Under five mortality rate (U5MR) of **2.19** which is above alert levels set by WHO. The crude mortality rate (CMR) was at acceptable levels.

Dietary diversity was good with the majority (97.3%) of the households reportedly consuming four or more food groups in the twenty four hours prior to the assessment. Purchase was the main food source for nearly all (93.8%) households with the main source of income for about 68% of the households being casual labour.

Slightly more than half (56.3%) of the children aged 6 – 24 months were reportedly still breastfeeding at the time of assessment with nearly 78% of the children introduced to foods other than breast milk before the age of 6 months indicating sub optimal childcare practices. With the exception of polio vaccination, the coverage of other health services (measles and vitamin A supplementation) fell below the SPHERE recommendation of 95%.

The global acute malnutrition levels reported indicate a serious nutrition situation in Belet Weyne Town according to WHO classification. When compared to the typical malnutrition levels for the area especially the riverine livelihood, the situation is better within the town. The crude mortality rate shows an acceptable level while the underfive mortality rate indicates an alert situation. The AWD outbreak in the town prior to the assessment contributed to the reported mortality. Water quality and the sanitation situation in Belet Weyne town still remains a concern and contributes to diarrhoeal diseases and serves as an underlying cause to malnutrition. Promoting consumption of micronutrient rich foods and improved vaccination coverage will improve the overall well being of the population in Belet Weyne town.

The ongoing delivery of health related interventions, food aid delivery, support of food security projects in the outskirts of the town and supplementary feeding programmes continue to ameliorate the situation. However, there is need to step up and improve the delivery of these services for an acceptable nutrition situation to be realized in the town.

Following discussions held after sharing the results with partners and detailed data analysis, the following recommendations were made:

1) Improve water quality for household level consumption through establishment of a central water purification system and encourage the population to treat drinking water
2) Enhance delivery of basic health services including intensifying EPI services/linking vitamin A supplementation with polio vaccination programmes.
3) Continued & improved provision of health services in the area through increased capacity of community heath workers.
4) Rehabilitation of acutely malnourished children and women through the existing health care centres.
5) Intensify health & nutrition education focussing on care practices and micronutrient issues.
6) Promote the availability and consumption of micronutrient rich foods at household level through kitchen gardens and conducting food preparation demonstrations
7) Improve the quality of maternal health care services in the area.
8) Continued monitoring of the nutritional and food security situation.

Table 1 Summary of Findings

Indicator	**No**	**%**	**95% CI**
Global Acute Malnutrition (WHZ<-2 or oedema)	114	**12.6**	9.6 – 15.5
Severe Acute Malnutrition (WHZ<-3 or oedema)	10	**1.1**	0.3 – 1.8
Oedema	0	**0**	
Children reported to have diarrhoea in 2 weeks prior to study	123	**13.6**	11.3 – 15.8
Children reported to have ARI within 2 weeks prior to study	238	**26.3**	23.5 – 29.4
Children with suspected malaria/febrile illness in 2 weeks prior to study	126	**13.9**	11.8 – 16.4
Suspected measles within one month prior to study (N=)	34	**3.8**	2.9 – 5.3
Children (9-59 months) immunised against measles (N= 835)	590	**70.7**	67.4 – 73.7
Children who have ever received polio vaccine	827	**91.5**	89.4 – 93.2
Children supplemented with vitamin A in last 6 months	667	**73.8**	70.8 – 76.6
Households who consumed ≥4 food groups	440	**97.3**	95.3 – 98.6
Children 6-24 months who are breastfeeding (N=240)	112	**56.3**	40.2 – 53.2
Children introduced to other foods before 6 months (N=240)	186	**77.8**	
Under five Mortality Rate (U5MR) as deaths/10,000/ day	2.19		1.35 - 3.01
Crude Mortality Rate (CMR) as deaths/10,000/ day	0.65		0.42 – 0.8

1.0 INTRODUCTION

1.1 Overview

Belet Weyne town, located in Belet Weyne District Hiran region, has an estimated population of 34,545 (UNDP population estimates, 2005). The town is divided into four main sections namely Koshin, Hawatako, Bundoweyn and Howlwadag and thirty two sub sections (see map 2). The Shabelle River flows right through the town dividing it into East and West Belet Weyne.

Map 1: Map highlighting Belet Weyne

The town is a vibrant business centre and serves as a transit point to North Somalia, Mogadishu and Ethiopia. Most residents have what might be described as a diversified urban economy with close links with rural areas, either through direct livestock or crop production activities or through trade with rural areas or with close links with relatives in those areas.

Over the years Belet Weyne town has grown and has played host to people on transit to Northern Somalia and also a limited number of destitute families.

The nutrition assessment covered all sections of the town.

1.2 Assessment Justification

FSAU in collaboration with partners have closely monitored the nutrition situation of Belet Weyne town. While malnutrition levels have remained within the typical ranges for the area, there are were concerns of a worsening nutrition situation following a recent acute watery diarrhoea outbreak, flooding and limited food stocks for poor households in Hiran region due to a successive crop failure and insecurity in Mogadishu which resulted in movement of populations to various parts of Somalia including Belet Weyne town.

Map 2: Map highlighting Belet Weyne Town

The need to estimate the current malnutrition levels in the town was identified by the existing humanitarian organisations hence the need for a nutrition assessment.

1.3 Assessment Objectives

2. To estimate the prevalence of acute malnutrition and nutritional oedema among children aged 6-59 months or with height/length of 65-109.9cm.
3. To estimate the level of malnutrition among adult women aged 15-49 years in Belet Weyne town.
4. To identify underlying causes of malnutrition in young children in the area of assessment
5. To estimate the prevalence of some common diseases (measles, diarrhoea, malaria, and ARI) in the area of assessment
6. To estimate the dietary diversity status of the population in Belet Weyne town
7. To estimate measles and polio vaccination and Vitamin A supplementation coverage among children in the area of assessment
8. To estimate the crude and under-five mortality rates in the area of assessment

2.0 BACKGROUND INFORMATION:

2.1 General overview

Belet Weyne town, located in Belet Weyne District Hiran region, has an estimated population of 34,545 (UNDP population estimates, 2005). The town is divided into four main sections namely Koshin, Hawatako, Bundoweyn and Howlwadag and thirty two sub sections. The Shabelle River flows right through the town dividing it into East and West Belet Weyne. The town is a vibrant business centre and serves as a transit point to North Somalia, Mogadishu and Ethiopia. Most residents have what might be described as a diversified urban economy with close links with rural areas, either through direct livestock or crop production activities or through trade with rural areas or with close links with relatives in those areas.

2.2 Humanitarian Interventions

Humanitarian organizations working in Belet Weyne town include IMC, CARE, FSAU, WHO, UNICEF, DRC and SRCS. UNICEF, WHO, IMC and SRCS supports health related interventions, CARE undertakes food aid related interventions while DRC supports food security related projects. FSAU undertakes nutrition and food security surveillance.

2.3 Nutrition

According to FSAU analysis, malnutrition rates for Belet Weyne town are estimated at 15% - 19.9% according to weight for height Z scores. This is based on nutrition assessments (see table 2) conducted in Belet Weyne District of which Belet Weyne town was included.

Table 2: Summary of results of nutrition assessments conducted in Belet Weyne District

Date	Agency	< -2 z-score or oedema	<-3z-score or oedema
April 2000	UNICEF/FSAU/IMC/SRCS	17.0%	2.3%
May 2002	UNICEF/FSAU/IMC/SRCS	21.0%	2.7%
July 2003	UNICEF/FSAU/IMC/SRCS/ ADRA/SC-UK/WFP/UNCU	17.1%	2.3%

Although no specific nutrition assessment has been conducted in Belet Weyne town alone, there are indications that the nutrition situation could be equally poor. In the supplementary feeding centre run by IMC, a significant number of beneficiaries come from within the town. Rapid nutrition assessments conducted in vulnerable pockets of the town have indicated malnutrition rates of >10% using mid upper arm circumference. Morbidity particularly diarrhoea was found to be significantly linked to child nutritional status in the May 2002 and July 2003 nutrition surveys.

2.4 Water and Environmental Sanitation

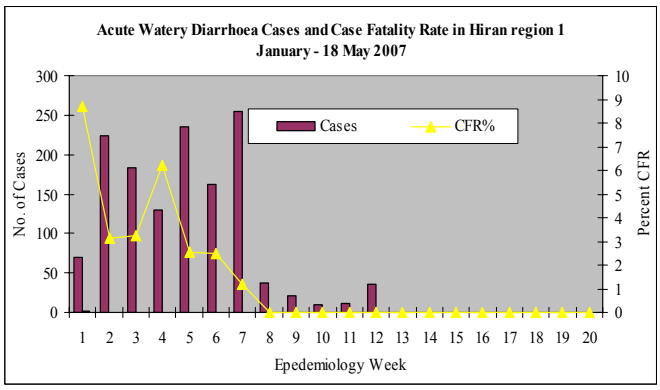
Accessing safe drinking water is a long standing problem for the majority of the population in Belet Weyne town. There are several open hand dug wells in Belet Weyne town, and a few protected wells in public places such as the hospital, the school, and mosques. Donkey carts collect water from wells for sale to households, business centres etc. Some households rely on the Shabelle river for a water source. The river water is of poorer quality. Some residents along the upper levels of the river have constructed pit latrines which discharge effluent underground directly into the river which affects the quality of the water downstream.

Better-off households have their own pit latrine (some have "flush" toilets), but poorer households use those of their neighbours, or the bush. Few of the existing pit latrines have septic tanks lined to protect

seepage of effluent sewage into the water layer. In addition, drainage is poor resulting in numerous stagnant waters. Garbage disposal is not well structured and is considered a household function, and there is no effective administrative machinery to prevent indiscriminate disposal of refuse particularly in market areas.

2.5 Health issues

UNICEF in collaboration with IMC and SRCS implements health programme that includes essential drug supplies to four MCHs in the town and related iron/folic acid supplementation to pregnant women, immunisation of under five children against the immunisable childhood diseases (measles, polio, BCG, diptheria and tetanus), antenatal care services and provision of health and nutrition education on child feeding and environmental hygiene. Additionally, UNICEF together with CARE supports an IMC managed supplementary feeding programme.



Usually, during the Gu season, the river level rises and overflows along the lower stretches of the riverbanks. This is normally associated with the recurrent outbreak of cholera in the town. The incidences of diarrhoea in children also increases at this time of the year. This year, an out break of acute watery diarrhoea occurred in January 2007. At the time the assessment in March 2007, WHO reported 1,371 cases in Hiran region and an overall case fatality rate of 2.92% which was above the expected threshold of 1%. As shown on figure 2, the cases of AWD gradually declined in March and the situation was fully controlled by April 2007. UNICEF in collaboration with partners set up cholera treatment centres to address the AWD outbreak in Belet Weyne, Jalalaqsi and Buloburti areas.

2.6 Food security

The population in Belet Weyne district is categorised into four main food economy groups, namely: pure pastoralists, agro-pastoralists, pure farmers, and urban dwellers. The pastoralists keep cattle, camels, sheep and goats, while the agro pastoralists are engaged in both livestock and rain fed crop production. The pure farmers are found along the Shabelle river and depend on both rain-fed and irrigated crop production, mainly sorghum, maize and, cowpeas. Cash crops include sesame, onions, tomatoes, green peppers, watermelon, and mangoes. They sell cowpea leaves, sorghum and maize stalks for fodder to augment household income. This group also own a small number of cattle.

Belet Weyne town has become an important market for livestock, cereals, vegetables, fruits and other basic commodities, with strong market links with Ethiopia, Mogadishu, and the north-eastern settlements in Bay and Bakol due to it's strategic position along the Mogadishu – Galcayo road. The growth of Belet Weyne town has provided additional job and market opportunities for the town and the surrounding population.

3.0 METHODOLOGY

3.1 Assessment Design

A cross-sectional study was conducted among the population of Belet Weyne town. Both qualitative and quantitative data collection techniques were used. Quantitative data was collected through a standard household questionnaire for nutrition assessments in Somalia (see appendix 2). Retrospective mortality data for 90 days prior to the assessment and Rapid Diagnostic Test (RDT) for malaria was also collected among the study households using the standard mortality questionnaire (see appendix 3 and 4 respectively). Qualitative data was collected through focus group discussions and key informant interviews to provide further understanding of possible factors influencing nutritional status.

3.2 Sampling procedure

Using a two-stage cluster sampling methodology, 30 clusters were randomly selected based on population proportional basis from Belet Weyne town. Initially a sampling frame was constructed from which a representative sample could be drawn. Using UNDP population estimates 2005 and an input from key informants, a list of all subsections in the town with their respective populations was used to construct cumulative population figures.

An estimated population of 34,545 was used from which a cluster interval of 1152 was calculated. Using Nutrisurvey software a random number, 854 was chosen within the cluster interval to determine the first cluster. The subsequent clusters were determined systematically by adding the cluster interval (1,152) to the first randomly selected number (see appendix 1). From the 30 randomly selected clusters, a total of 913 children between the heights/length of 65 and 110cm and 6-59 months old were randomly surveyed.

In each of the clusters, mortality questionnaires were exercised to 30 households. Same sampling frame was used in cluster selection hence the same clusters selected for the nutrition data were also used for the mortality data. In total, mortality data was collected from 905 households irrespective of whether with an under-five or not (see section 3.2.1 for details of household selection).

1.1.1 Study population and sampling criteria

The study population consisted of people living in Belet Weyne town and comprised all the children aged 6-59 months or measuring 65-109.9 cm for height/length. Sampling procedure as outlined in the SMART Guidelines was followed in this assessment. On the visit to each cluster, the centre was identified and a pen was spun to determine the direction to follow in moving to the edge of the cluster. On reaching the edge of a cluster, a pen was spun a second round, until the pen pointed inward the cluster/village to determine the direction to follow in the systematic selection of the households with children aged 6 to 59 months. The households in this direction were counted / established, as the team crossed to the other edge, and given numbers. A random number within the total number of households encountered was drawn to enable random selection of the first household to be visited. From the first household, the team always moved to the right for the next household. This procedure was followed until the required 30 children were obtained in a cluster. All sampled households were visited, the supervisor noting whether children in the target age group were present or not. In households with children in the target age group, the household and mortality questionnaires were administered, while for households with no children of the target age group only the mortality questionnaire was administered. All eligible children in the households were measured and if a child or primary caregiver was absent, an appointment was booked for a later visit in the course of the assessment.

3.3 Data Collection

3.3.1 Anthropometric Measurements

The anthropometric data were collected using the procedure stipulated by the WHO (1995) for taking anthropometric measurements. Adherence to this procedure was ensured. The protocol used was as follows:

Weight: Weight measurements were taken using electronic scales also known as UNISCALES. The scale was placed on a flat surface and activated by passing a foot or hand close to the top of the switch window. Once activated, the child was asked to step on the scale and the weight reading taken. The female children would be lightly dressed before having the weight taken while clothes for the male children were removed. For a child who could not stand on his or her own or was uncooperative they were weighed together with the caretaker following the necessary operational procedures on the scale. This involved first taking the weight of the caretaker, passing a hand or foot on the switch window and when a symbol for the child appeared, the child was handed over to the caretaker and the child's weight recorded.

Height: For height, a vertical or horizontal measuring board reading a maximum of 175cm and accurate to 0.1cm was used to take the height or length of a child. The child would stand on the measuring board barefooted; have hands hanging loosely with feet parallel to the body, and heels, buttocks, shoulders and back of the head touching the board. The head would be held comfortably erect with the lower border of the orbit of the eye being in the same horizontal plane as the external canal of the ear. The headpiece of the measuring board was then pushed gently, crushing the hair and making contact with the top of the head. Height/length was then read to the nearest 0.1cm. Two readings were recorded and the computed average used in the analysis.

Length: For children aged 6 to 24 months or between 65cm to 84.5cm length instead of height was taken. The child was made to lie flat on the length board. The sliding piece was placed at the edge of the bare feet as the head (with crushing of the hair) touched the other end of the measuring device. Then two readings were taken and the average computed.

Arm Circumference: The Mid Upper Arm Circumference was measured using a MUAC tape to the nearest 0.1 cm on the left arm. Two readings were taken and the average recorded for each child.

3.3.2 Child Age Determination

Where useful documents like growth monitoring/clinic attendance cards and birth certificates were available, they were used to determine the child's age. Calendars of events (appendix 6) were also used as proxies to age determination. Though not entirely accurate, ages were still regarded as important indicators and were approximate/average pointers for identification. The nutrition indicator employed as preference was *weight for height* as the best nutrition status (acute malnutrition) for emergency and transitory populations.

3.3.3 Oedema

Oedema, defined as bilateral oedema on the lower limbs was assessed by gently pressing the feet to check if a depression is left after at least three seconds of pressing and was confirmed if present by the supervisor and then recorded.

3.3.4 Morbidity

Morbidity pattern was assessed by asking about incidences of common communicable diseases i.e. diarrhoea, acute respiratory infection, serious febrile illness in the two weeks and suspected measles in one month prior to the assessment.

- Diarrhoea is defined for a child having three or more loose or watery stools per day

- ARI asked as *oof wareen or wareento*. Three signs asked for are cough, rapid breathing and fever
- Suspected malaria/acute febrile illness: - the three signs to be looked for are periodic chills/shivering, fever, sweating and sometimes a coma.
- Measles (*Jadeeco*): a child with more than three of these signs– fever and, skin rash, runny nose or red eyes, and/or mouth infection, or chest infection

3.3.5 Mortality

The mortality assessment was done concurrently with nutrition assessment in which a 30 by 30 cluster sampling methodology was used. The assessment methodology used for the nutrition assessment was adopted with the exception that households were selected as the second sampling unit. At least 30 households were randomly selected in each cluster and the mortality questionnaire administered to a responsible member of that household. All households within the selected cluster were eligible for inclusion in the mortality assessment, whether there was a child under the age of five or not. Households were systematically assessed until the 30th household. Each household assessed was asked the composition of their members in two parts- those members less than 5 years and the total number of household members. The household was then asked how many if any of the household members had died, left or arrived in the last three months (appendix 3). A total of 902 households were included in the assessment.

The crude and under-five mortality rates were generated automatically by the Nutrisurvey software as deaths per 10,000 persons per day using a recall period of 90 days. If a member had died, the respondent was asked to describe the signs and symptoms of the illness likely to have caused the death.

Mortality rates can be interpreted according to the following reference

- For under-five years old children
  -Under-five mortality rates >= 2 deaths/10,000/day indicate a situation of alert
  -Under five mortality rates >=4 deaths/10,000 children/day indicate an emergency
- For the total population
  -Crude Mortality rates >=1 deaths/10,000 persons/day indicate an alert situation
  -Crude Mortality rates >=2 deaths/10,000 persons/day indicate an emergency.

3.3.6 Dietary Diversity

Dietary diversity as household dietary diversity score (HDDS) was determined by taking a simple count of various food groups consumed in a given household over the past twenty four hours. A total of 12 FAO recommended food groups were considered which included Cereals & cereal products; Roots & tubers; Vegetables; Fruits; Meat and meat products, Eggs; Fish; Legumes; Milk & its products; Fats & oil; Sugar & honey and Miscellaneous.

3.3.7 Vitamin A Deficiency

During the assessment, Vitamin A deficiency (VAD) prevalence was estimated by assessing if any member(s) of the households experienced night blindness.

3.4 Description of assessment activities

Table 1: Chronology of activities for the Belet Weyne Town Nutrition Assessment

Major Activity	Dates. 2006
Preparation of tools, methodology & review of secondary data, resource mobilization; Joint planning meetings with partners in Nairobi and Enumerators identification	1st – 13th March 2007
Training of enumerators in Wajid	15th – 18th March 2007
Cluster Identification	17th March 2007
Pre-testing	18th March 2007
Collection of data	22nd – 30th March 2007
Data entry and cleaning	22nd – 30th March 2007
Data analysis and preliminary report writing	11th – 30th April 2007
Preparation of draft report	1st – 29th May 2007
Circulation of draft report to partners	20th June 2007
Circulation of final assessment report	25th June 2007

Ten teams each consisting of two enumerators, a team leader and supervisor conducted the assessment with each team handling one cluster in a day. An elder from each cluster assisted the teams in identification of the cluster, its centre and boundaries. Supervisors were from FSAU, UNICEF, IMC, CARE and SRCS while the enumerators were from the MCHs in Hiran region. Enumerators were selected on the basis of their experience with previous assessments, familiarity with health issues, need for participation in future nutrition activities and ability to learn nutrition assessment procedures during training. Overall support, supervision and co-ordination were done by three FSAU Staff.

3.5 Quality Control Procedures

A comprehensive training of enumerators and supervisors was conducted covering interview techniques, sampling procedure, inclusion and exclusion criteria, sources and reduction of errors, taking of measurements, standardisation of questions in the questionnaire, levels of precision required in measurements, diagnosis of oedema and measles, verification of deaths within households, handling of equipment, and the general courtesy during the assessment.

Standardisation of measurement and pre-testing of the questionnaire and equipment was carried out in Wajid Town. Pre-testing involved familiarising assessment teams with village/cluster entry; administering the questionnaire, sampling procedure, correct taking of measurements and recording. After the field exercise, views were exchanged to address the difficulties identified; appropriateness of the questions reviewed and necessary changes made.

Quality of data was also ensured through (i) monitoring of fieldwork by assessment coordinators, (ii) crosschecking of filled questionnaires on daily basis and recording of observations and confirmation of measles, severe malnutrition and death cases by supervisors. All households sampled were visited and recorded including empty ones (iii) daily review undertaken with the teams to address any difficulties encountered, (iv) progress evaluation was carried out according to the time schedule and progress reports shared with partners on regular basis, (v) continuous data cleaning upon and after entry which made it easy to detect any outliers/ mistakes and to replace or repeat households depending on magnitude of error (vi) monitoring accuracy of equipment (weighing scales) by regularly measuring objects of known weights and (vii) continuous reinforcement of good practices. All measurements were loudly shouted by both the enumerators reading and recording them to reduce errors during recording. Data quality was also checked using the Nutrisurvey plausibility check, see appendix 7 for details.

3.6 Data Processing & Analysis

3.6.1 Data entry, Cleaning, Processing and Analysis

Data was entered and analysed using Nutri survey and EPIINFO computer based packages. Running and tabulating all variable frequencies was carried out as part of data cleaning. The EPINUT component of EPIINFO was used to convert the measurements (weight, age and height) into nutritional indicators and comparison made with the National Centre for Health Statistics (NCHS) references as designed by WHO (1983). The C- Sample was used for detailed data analysis. Analysis of certain variables e.g. total food groups consumed was also counterchecked in Microsoft Excel.

3.6.2 General Characteristics of Study Population

Frequencies and cross-tabulations were used to give percentages, confidence intervals, means and standard deviations in the descriptive analysis and presentation of general household and child characteristics.

3.6.3 Creation of Nutritional Status Indices

The anthropometric measurement of weight and height were used to compute the WFH nutritional status indicators of the studied children. Weight for Height (WFH) expressed the weight of the child as a percentage of the expected weight for the standard child of that height as given by NCHS. WFH measures acute malnutrition or wasting. Using EPINUT, Z-scores were generated and the anthropometric indicator, WFH, was used to classify children into categories of nutritional status as follows:

<-3 Z-Scores or oedema	= Severe acute malnutrition
≥-3 Z-Scores and <-2 Z-Scores	= Moderate acute malnutrition
≥ -2Z-Scores	= Normal
<-2 Z-score or oedema	= Global/total acute malnutrition

Similarly, MUAC measurements were also used to classify children into categories of nutritional status and mortality risks as follows according Somalia Nutrition Working Group assessment guidelines:

<11.0 cm or oedema	= Severe malnutrition
≥11.0 and < 12.5	= Moderate malnutrition
≥12.5 and < 13.5	= At risk of Malnutrition
≥13.5	= Normal
<12.5 cm or oedema	= Total acute malnutrition

For adults, the following categories were used:

a) For non pregnant/adult women[1]:

<16.0 cm plus Bilateral oedema	= Severe Acute malnutrition
≥16 cm and < 18.5 cm	= Moderate Acute Malnutrition
≥18.5 cm	= Normal
<18.5 cm plus Bilateral oedema	= Global Acute Malnutrition

b) For pregnant women[2]:

<20.7 cm	= Severe acute malnutrition
≥20.7cm and <23 cm	= Moderate acute malnutrition
≥23.0 cm	= Normal
<23.0 cm	= Global acute malnutrition

[1] UN ACC/SCN
[2] SPHERE Guidelines

4 ASSESSMENT RESULTS AND DISCUSSIONS

4.1 Household Characteristics of Study Population

The nutrition assessment covered a total of 452 households with a mean household size of 6.5 (SD= 2.7) persons with number of persons in the household ranging from 2 to 16. Most of the households had a mean of 2 under fives in each household (mean= 2.2 ± 1.0) which is comparable to other areas in Somalia.

Table 3: Household Characteristics

Characteristics	*n*	*%*	*95% CI*
Total number of HHs assessed	903	100	
Household Size	Mean= 6.5		SD=2.7
Number of Underfives	Mean= 2.18		SD= 0.96
Residential status:			
Residents	426	94.2	91.6 – 96.1
IDPs	24	5.3	3.5 – 7.9
Returnee	2	0.4	0.1 – 1.8
Origin (N=26)			
Within Hiran region	2	7.7	0.9 – 25.1
Within Somalia	24	92.3	74.9 – 99.1
Duration of Stay (N=26)			
1 month	14	53.8	33.4 – 73.4
2 months	3	11.5	2.4 – 30.2
3 months	6	23.1	9.0 – 43.6
4 or more months	3		
Reason for Migration (N=26)			
Civil insecurity	17	65.4	44.3 – 82.8
Seeking employment	5	19.2	6.6 – 39.4
Food shortage	3	11.5	2.4 – 30.2
Food/pasture/water shortage	1	3.8	0.1 – 19.6

As expected, most (94.2%) of the households were residents. Non residents comprised mainly of IDPs (5.3%) and returnees (0.4%) who had mainly originated from other parts in Somalia especially Mogadishu. The reason why most of the non residents had moved was civil insecurity (65.4%).

At the time of assessment, there was civil unrest in Mogadishu that led to displacement of an estimated 400,000 persons to other regions in South Central Somalia. This insecurity coupled with the fact that Belet Weyne town serves as a transit point to North Somalia and a vibrant business centre makes it attractive for persons seeking employment or in search of refuge temporarily.

Table 4: Distribution of households by means of livelihood and Source of Income

	n	% (CI)
Livelihoods (N=452)		
Urban	421	93.1 (90.3 – 95.2
Agropastoral	24	5.3 (3.5 – 7.9)
Pastoral	3	0.7 (0.2 – 2.1)
Agriculture	3	0.7 (0.2 – 2.1)
Fisheries	1	0.2 (0.0 – 1.4)
Main Source of Income (N=452)		
Casual labour	313	69.2 (64.7 – 73.4)
Petty trade	100	22.1 (18.4 – 26.3)
Salaried employment	14	3.1 (1.8 - 5.3)
Crop sales	11	2.4 (1.3 – 4.4)
Remittances/Gifts	9	1.9 (0.9 – 4.9)
Sale of animals (& products)	5	1.1 (0.4 – 2.7)

About 93% of the households reported urban as the main form of livelihood while for the rest it was Agropastoral (5.3%), pastoral (0.7), Agriculture (0.7) and fisheries (0.2%). Casual labour and petty trade were the main sources of income reported by 69.2% and 22.1% respectively. Only a minority 3.1% relied on salaried employment as a main income source.

4.2 Water Access and Quality

About 43% of the households obtained drinking water from piped water while about 36% used unprotected water sources like river or open wells. The distance to the nearest water point for more than half (55.1%) of the households was more than the recommended 500 metres (SPHERE, 2004). About 16% of the households travelled for more than a kilometre to access water.

Table 5: Water Access and Quality

Water access and Quality	*N*	*% (CI)*
Main source of drinking water (N=452):		
Tap/ pipe	194	42.9 (38.3 – 47.6)
Protected wells	91	20.1 (16.6 – 24.2)
River	86	19.0 915.6 – 23.0)
Unprotected wells	81	17.9 (14.6 – 21.8)
Distance to nearest water point (N=452):		
≤ 500 meters	203	44.9 (40.3 – 49.6)
501m - <1 km	176	38.9 (34.4 – 43.6)
1 – 3 km	60	13.3 (10.4 – 16.8)
≥4 km	13	2.9 (1.6 – 5.0)
Number of clean water containers:		
1 - 2 containers	108	23.9 (20.1 – 28.2)
3 - 5 containers	129	28.6 (
6 or more containers	215	47.6 (42.9 – 52.3)
Method of water storage:		
Covered containers	343	75.9 (71.6 – 79.7)
Open containers	88	19.5 (16.0 – 23.5)
Constricted neck (*Ashun*)	21	4.6 (3.0 – 7.1)

A relatively high proportion of households owned two or more 10 – 20 litres water containers for water collection. SPHERE recommends a minimum of two (10-20 litres) water containers for water collection alone and enough for storage. Compared to other populations in region especially in rural areas where even longer distances are covered to access water, Belet Weyne town has better access to water containers. The same case applies to methods of water storage where majority (76%) use covered containers.

However, there remains a concern on the quality of water consumed which is affected by proximity of sanitation facilities, use of unprotected water sources by about 36% households and consumption of water that is not always treated or purified. Results from water quality tests conducted by SC-UK Watsan Project in 2003 showed E-Coli contamination way above the WHO's maximum safe level for human consumption. Although this was long ago, it highlights the poor quality of water in Belet Weyne town. Even in cases where wells are protected, contamination occurs below ground level due to close proximity of water sources and sanitation facilities (see section 4.3). Chlorination of wells which supply water sold to the public is done by SC-UK mainly during the Cholera season. The system is not always very effective due to the severity of the contamination and inadequate chlorination practices among well owners or where families use the river as the main water source.

4.3 Sanitation and Hygiene Practices

Majority (91.8%) of the assessed households had access to a sanitation facility in the form of traditional pit latrine (66.4%), VIP latrines (22.3%) and flush toilets (3.1%). However, a relatively high (37.4%) of these facilities were less than 30 meters away from the water source.

Table 6: Distribution of households by sanitation & Hygiene

Sanitation and hygiene	N	% (CI)
Access to Sanitation facility (N=452)		
Traditional pit latrine	300	66.4 (61.8 – 70.7)
VIP latrines	101	22.3 (18.6 – 26.5)
Bush/Designated area/Open pit	37	8.2 (
Flush toilets	14	3.1 (1.8 – 5.3)
Distance from latrine to water source (N=452)		
< 30meters	160	37.4 (32.8 – 42.2)
≥ 30 meters	292	64.6 (
Washing agent (N=452)		
Soap	413	91.4 (88.3 – 93.7)
Shampoo	20	4.4 (2.8 – 6.9)
Ash	6	1.3 (0.5 – 3.0)
Plant Extracts	4	0.9 (0.3 – 2.4)
None	9	2.0 (1.0 – 3.9)
Method of Food Storage (N=452)		
Don't store	222	49.1 (44.4 – 53.8)
Put in covered containers	179	39.6 (35.1 – 44.3)
Put in pots beside fire	40	8.8 (6.5 – 12.0)
Suspended in hooks/ropes	11	2.4 (1.3 – 4.4)

The distance from latrine to water source is crucial in influencing water quality. SPHERE recommends that this should be 30 metres or more. Qualitative data indicates that /few of the existing pit latrines have septic tanks lined to protect seepage of effluent sewage into the water layer. This results in contamination of water sources.

Quite encouraging, nearly all (98%) households used some form of washing agent in their households with soap being commonly used (91.4%).

4.4 Health Seeking Behaviour

A relatively high (40%) proportion of the assessed children reportedly fell sick during the two weeks prior to the assessment. Majority of caregivers of these sick children sought health care assistance as follows: private clinic/pharmacy (66.4%); public health facility (15.6%); traditional healer (3.3%) and own medication (1.9%). No medical assistance was sought for about 13% of the children who fell ill.

Table 7: Health seeking behaviour (N=904)

	n	% (CI)
Child fell sick?		
Yes	361	39.9 (36.7 – 43.2)
No	543	60.1 (56.8 – 63.3)
Where assistance was sought (N=361)		
Private clinic/ pharmacy	239	66.4 (61.2 – 71.2)
Public health facility	56	15.6 (12.1 – 19.8)
Traditional healer	12	3.3 (1.8 -5.9)
No assistance sought	46	12.8 (9.4 – 16.5)
Own medication	7	1.9 (0.9 – 4.1)

4.5 Formal and informal humanitarian support

Table 8: Formal and informal support

	N	% (CI)
Received informal Support (N=452):		
Yes	25	5.5 (3.5 -7.9)
No	427	94.5 (91.8 – 96.3)
Type of support (N=25)		
Remittances from abroad	8	32
Loans	8	32
Remittance from within	5	20
Gifts	3	12
Received formal Support (N=452):		
Yes	49	10.8 (8.2 – 14.2)
No:	403	89.2 (85.8 – 91.8)
Type of support (N=49)		
Free food	41	83.7
Cash for work	6	12.2
Supplementary food	1	2.0

Only a small proportion (5.5%) of households reported to have received some form of informal humanitarian support in three months prior to the assessment. Remittances from abroad (61.8%) and loans (21.8%) were the common forms of support received.

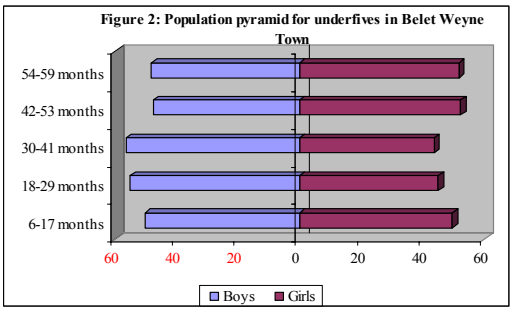
About 11% households had received any formal humanitarian support in three months prior to the assessment and this was mainly in the form of free food. These results are rather surprising considering that CARE had undertaken a general food distribution in the town, two weeks prior to the study.

4.6 Characteristics of assessed children.

A total of 903 children aged 6 – 59 months were assessed of whom 47.9% were girls and 52.1% were boys. The sex ratio of boys to girls was 1.1[3] indicating a non biased sample selection. There were more children in the younger agegroups than in the older ones for both sexes as expected.

Table 9:Distribution of children according to age and sex

Age	Boys		Girls		Total		Ratio
	n	*%*	*n*	*%*	*n*	*%*	
6-17 months	97	50.2	96	49.7	193	21.3	1.0
18-29 months	121	55	99	45	220	24.3	1.2
30-41 months	120	56.3	93	43.7	213	23.6	1.2
42-53 months	79	47.6	87	52.4	166	18.4	0.9
54-59 months	54	48.2	58	51.8	112	12.4	0.9
Total	471	52.1	433	47.9	903	100	1.1



As shown on table 9, the sampled children indicated a typical distribution according to age group with the 54 – 59 months category reporting the lowest (10.7%) proportion. Further, the population pyramid (figure 2) is typical for a normal population indicating that there was no bias in the selection of children.

[3] Ideally the sex ratio should be 1, but any value from 0.8 to 1.2 is acceptable (CDC/WHO).

4.7 Nutritional status of assessed children using anthropometry

Table 10: Summary of Global Acute malnutrition and Severe Acute Malnutrition

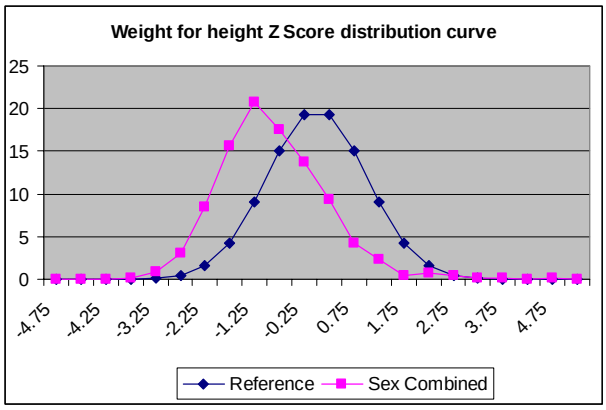
Malnutrition Rates	*No*	*Proportion*
Global Acute Malnutrition (<-2 Z score or oedema)	114	12.6 (9.6 – 15.5)
Severe Acute Malnutrition (<-3 Z score or oedema)	10	1.1 (0.3 – 1.8)
Oedema	0	0

Using weight for height indicator, the global acute malnutrition (WFH <-2 Z scores or oedema) was 12.6% (CI: 9.6 – 15.5) while severe acute malnutrition (WFH <-3 Z scores or oedema) was 1.1% (CI: 0.3 – 1.8). No oedema cases were reported.

Table 11: Distribution of children by nutritional status (WHZ-score or oedema) and child sex

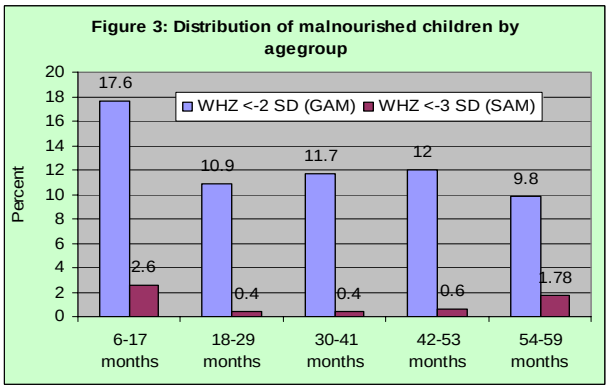
Nutrition status categories	*Males*		*Females*		*Total*	
	No	*% (CI)*	*No*	*% (CI)*	*No*	*% (CI)*
Global acute malnutrition (WFH<-2 z score/oedema)	73	15.5 (12.0 – 19.0)	41	9.5 (6.3 – 12.7)		12.6 (9.6 – 15.5)
Severe acute malnutrition (WFH <-3 z score/oedema)	9	1.9 (0.7 – 3.1)	1	0.2 (0.2 – 0.7)	10	1.1 (0.3 – 1.8)
Oedema	0	0	0	0	0	0

About 15.5% of the boys were malnourished while 9.5% of the girls were malnourished. There was a statistically significant (p value = 0.006) difference in malnutrition between the sexes. Boys were 1.64 times more likely to malnourished than girls. This finding is consistent with other studies in Somalia and may need further investigation on possible cultural attributes.



As shown on figure 3, the distribution of the weight-for-height Z scores were skewed towards the left of the normal distribution curve indicating a poorer nutrition situation according to international (WHO) standards. The mean WHZ was -0.91 and the standard deviation 1.05. The standard deviation of WHZ was within the expected range of 0.8 to 1.2 indicating that there were no substantial random errors in the measurements.

The Skewness of WHZ was 0.821 and was within the acceptable range of plus or minus one. The observed skewness indicates that there was a symmetrical distribution of the curve around the mean as observed in normal distributions. The graph is quite peaked as reflected by the kurtosis figure of 2.05. The kurtosis figure is higher than the expected values of plus or minus one indicating there could be a probable kurtosis problem and that the graph is too peaked.



As shown on Figure 3, the age group with the youngest children recorded the highest (17.6%) proportion of malnourished children while that with the oldest children recorded the lowest (9.8%) GAM. Usually, malnutrition tends to be higher in younger agegroups than in the older ones since the children are usually being introduced to complementary foods and also more susceptible to diseases. Although there was no statistically significant association between nutritional status and children's age, the data indicates that younger children were more affected than older ones. This

is probably related to childcare and diseases.

Table 13: Malnutrition prevalence using WFH percentage of median categories

Nutrition status categories	Males (n = 470)		Females (n = 433)		Total (N = 903)	
	No	*Proportion (%)*	*No*	*Proportion (%)*	*No*	*Proportion (%)*
Global acute malnutrition (WFH<80% or oedema)	46	9.8 (6.4 – 14.5)	27	6.2 (3.5 – 10.5)	73	8.1 (5.8 – 11.1)
Severe acute malnutrition (WFH<70% or oedema)	2	0.4 (0.0 – 1.0)	1	0.2 (0.0 – 0.6)	3	0.3 (0.0 – 0.8)

The global acute malnutrition among children aged 6 – 59 months using weight for height <80% of median or presence of oedema was 8.1% (CI: 5.8 – 11.1), while severe acute malnutrition <70% of median or presence of oedema was 0.3% (CI: 0.0 – 0.8).

Table 14: Nutrition status of Children (12-59 months) by MUAC

Malnutrition	*Males*		*Females*		*Total (N=903)*	
	N	%	N	%	N	% (95% CI)
Severe (MUAC <11 cm/ oedema)	11	2.3 (0.6 – 3.9)	2	0.4 (0.0 – 1.1)	13	1.4 (0.5 – 2.3)
Moderate (11≤MUAC<12.5 cm)	16	3.4 (1.7 – 5.1)	20	4.6 (2.6 – 6.6)	36	3.9 (2.5 – 5.4)
Total (MUAC<12.5 cm or oedema)	27	5.7 (3.3 – 8.1)	22	5.0 (2.9 – 7.2)	49	5.4 (3.6 – 7.2)-
At risk (MUAC 12.5- <13.5 cm)	67	14.2 (10.0– 18.5)	50	11.5 (7.1 – 15.9)	117	12.9 (9.2 – 16.7)
Normal (MUAC >=13.5 cm)	376	57.2	361	42.7	737	81.6 (76.8 – 86.3)
Total	470	80.0 (74.4-85.5)	433	48.9 (77.8 – 88.8)	903	100

Using mid upper arm circumference (MUAC) measurements for children aged 12-59 months, 5.4% (CI: 3.6 – 7.2) of the children were identified as acutely malnourished (MUAC<12.5 cm or oedema). About 1.4% (CI: 0.5 – 2.3) were identified as severely malnourished (MUAC<11.0 cm or oedema) while an additional 12.9% (CI: 9.2– 16.7%) were at risk (MUAC 12.5-<13.5 cm) of malnutrition. Therefore MUAC measurements showed a lower prevalence of acute malnutrition compared to weight for height measurements.

Table 15: Prevalence of underweight based on weight for age Z-score by sex

	Males (n=470)		*Females (n=433)*		*Total (N=903)*	
	% (95% CI)	*No*	*% (95% CI)*	*No*	*% (95% CI)*	*No*
Total chronic malnutrition (HFA<-2 z score)	21.4 (15.3 – 27.6)	101	19.8 (15.2 – 24.4)	86	20.7 (16.2 – 25.1)	187
Severe chronic malnutrition (HFA<-3 z score)	7.8 (4.7 – 10.9)	37	6.9 (4.3 – 9.5)	30	7.4 (5.0 – 9.8)	67

The prevalence of chronic malnutrition defined as height for age <-2 Z score was 20.7% (16.2% - 25.1%) and severe chronic malnutrition, defined as height for age <-3 Z score, was 7.4% (5.0% - 9.8%).

Table 16: Prevalence of underweight based on weight for age Z-score

	Males (n=470)		*Females (n=433)*		*Total (N=903)*	
	% (95% CI)	*No*	*% (95% CI)*	*No*	*% (95% CI)*	*No*
Total Underweight Malnutrition (W/A<-2 z score)	14.2 (10.0 – 19.6)	64	9.9 (6.5 – 14.6)	46	12 0 (9.2 – 15.4)	110
Severe Underweight Malnutrition (W/A<-3 z score)	5.7 (3.2 – 8.2)	27	4.6 (2.3 – 6.9)	20	5.2 (3.2 – 7.1)	47

The prevalence of underweight malnutrition defined as weight for age <-2 Z score was 12% (9.2 – 15.4%) while the prevalence of severe underweight malnutrition, defined as weight for age <-3 Z score, was 5.2% (3.2% - 7.1%).

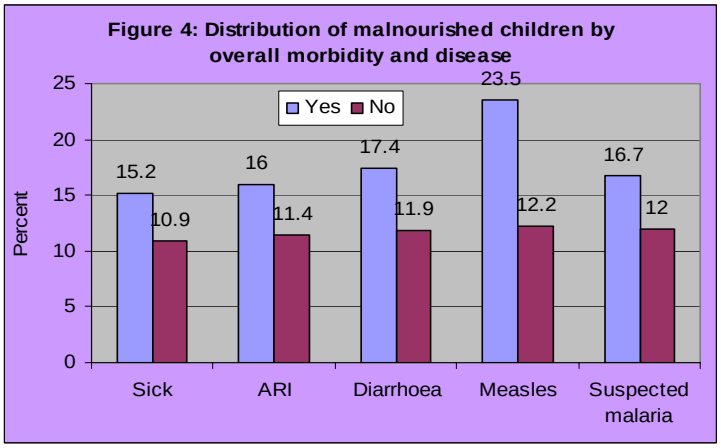
4.8 Morbidity, measles immunisation, polio vaccination and vitamin A supplementation

Overall, about 39.9% of the children had reported to have suffered from one or more communicable childhood diseases during the two weeks prior to the assessment. The prevalence of the reported diseases was as follows: ARI (26.3%), diarrhoea (13.4%), suspected malaria (13.9%) and suspected measles (3.6%). Although, there was an AWD outbreak in the town from January, 2007, the disease had gradually declined at the time of assessment as shown on the figure on page 9.

Table 17: Morbidity, measles immunisation, polio vaccination and vitamin A supplementation

	No.	*%(CI)*
Diarrhoea within two weeks prior to assessment	121	13.4 (11.3 – 15.8)
ARI within two weeks prior to assessment	238	26.3 (23.5 – 29.4)
Febrile illness/suspected malaria) within 2 weeks prior to assessment	126	13.9 (11.8 – 16.4)
Suspected measles within one month prior to the assessment (N=844)	30	3.6 (2.5 – 5.1)
Children (9-59 months) immunised against measles (N=844)	595	70.5 (67.3 – 73.5)
Children who have ever received Polio dose (N=903)	827	91.5 (89.4 – 93.2)
Children who received Vitamin A supplementation in past 6 months or before	667	73.8 (70.8 – 76.6)
Households who reported night blindness Among 24 – 71 Among ≥6 years	10 1 9	 0.2 (0.0 – 1.4) 2.0 (1.0 – 3.9)

Although there was no significant association (p value >0.05) between children's nutritional status and disease, the proportion of malnourished children was higher among children who had suffered from any of the communicable diseases as shown on figure 4.



Measles immunization coverage for eligible children (9 – 59 months old) was 70.5% based on mothers recall. Vitamin A supplementation in the past 6 months or before and polio immunization coverage were 73.8% and 91.5% respectively based on mothers recall. Coverage for all these health programmes fell far below the recommended 95% level (Sphere, 2004).

4.9 Vitamin A Deficiency

As shown on table 17, night blindness was reported in 10 households mainly among persons aged six or more years. While the study does not allow for computation of actual night blindness prevalence, the data indicates that vitamin A deficiency exists in the community.

4.10 Feeding practices

About 41% of the assessed children were breastfeeding at the time of assessment. Among the breastfeeding children, 73% were breastfed on demand as recommended. Of those who had stopped breastfeeding, 19% had stopped breastfeeding before six months of age, 51.7% before their first birthday (but after 6 months) and about a quarter within their second year of life.

Table 18: Children feeding practices

Children aged 6-24 months (N=292)	N	% (CI)
Is child breastfeeding?		
Yes	121	41.4 (35.7 – 47.3)
No	171	58.6 (52.7 – 64.3)
Breastfeeding frequency (N=121)		
1-2 times	5	4.2 (1.4 – 9.5)
3-6 times	42	35.0 (26.5 – 44.2)
On demand	74	73.0 (51.5 – 69.6)
Duration of breastfeeding (N=171):		
0 - 5 months	33	19.2 (13.6 – 25.9)
6 - 11 months	89	51.7 (44.0 – 59.4)
12 – 18 months	42	24.4 (18.2 – 31.5)
More than 18 months	8	4.7 (2.0 – 9.0)
Introduction of Complementary feeding (N=292)		
0 - 3 months	149	51.0 (45.1 – 56.9)
4 – 5 months	71	24.3 (19.5 – 29.7)
6 months	60	20.5 (16.1 – 25.6)
7 or more months	12	4.1 (2.1 – 7.1)
Feeding frequency (n=292):		
Once	17	5.8 (3.4 – 9.2)
2 times	77	26.4 (21.4 – 31.8)
3 – 4 times	137	46.9 (41.1 – 52.8)
5 or mores times	61	20.9 (16.4 – 26.0)

About three quarters (75.3%) of the children aged 6-24 were prematurely introduced to foods other than breast milk between the time of birth and the fifth month of life. A significant (51%) proportion was introduced to complementary feeding at 0 -3 months. Only 20.5% of the children were correctly introduced to complementary feeding at the recommended 6 months of age. About 4% were introduced to complementary feeding late at 7 months or more.

The aforementioned complementary feeding and breastfeeding practices indicate sub optimal childcare practices in Belet Weyne town. Qualitative data shows that water and sugar solution are commonly given to children on their first day of life. Breast milk alone is sufficient for a baby for 6 months and any food/fluid other than medicine given before this age does not increase caloric intake and only displaces milk from the diet (UNICEF/WHO) and should therefore be discouraged. Further, Facts for Life (2002) recommends that children aged 6 – 24 months are fed 5 or more times a day. This recommendation was met by only a minority (20.9%) of the assessed children.

4.11 Dietary Diversity

Nearly all (97.3%) of the households had consumed a diversified[4] diet in the past twenty four hours prior to the assessment. The average number of food groups consumed was 7 (SD=1.8) with the number of food groups consumed ranging from 2 to 12. The most commonly consumed food groups were cereals, sugars/honey, oils/fats, milk/milk products and meats (Table 17). Purchase was the main source of food for 94.2% of the households.

Table 17: Distribution of dietary diversity among households

No of food groups consumed (N=452)	N	% (CI)
2 food groups	4	0.9 (0.3 – 2.4)
3 food groups	8	1.8 (0.8 - .6)
4 food groups	24	5.3 (3.5 – 7.9)
5 food groups	54	12.0 (9.2 – 15.4)
6 food groups	77	17.1 (13.8 – 20.9)
7 food groups	94	20.8 (17.2 – 24.9)
8 food groups	89	19.7 (16.2 – 23.8)
9 food groups	69	15.3 (12.2 -19.0)
10 food groups	25	5.5 (3.7 – 8.2)
11.food groups	5	1.1 (0.4 – 2.7)
12 food groups	2	0.4 (0.1 – 1.8)
1-3 food groups	12	2.7 (1.4 – 4.7)
≥ 4 food groups	440	97.3 (95.3 – 98.6)
Main source of food (N=452)		
Purchasing	426	94.2 (91.6 – 96.1)
Gifts/donations	14	3.1 (1.8 – 5.3)
Food Aid	7	1.5 (0.7 – 3.3)
Borrowing/Bartering	5	1.1 (0.3 - 3.9)

Despite, the positive contribution of micronutrients to the growth and development of individuals, consumption of micronutrient rich foods like fruits, vegetables, eggs, fish and pulses remained low. This was attributed to limited access and knowledge on the importance of consuming the micronutrients. Limitation in access was attributed to low income levels and limited production of micronutrient rich foods by nearly all households.

4.12 Adult Malnutrition by MUAC

About 7% of non-pregnant women (aged 15-49 years) were identified as acutely malnourished (MUAC<18.5cm) while none were identified as at severe risk of acute malnutrition (MUAC<16.0 cm) (N=332).

Table 18: Adult nutrition status by MUAC

	n	%	95% CI
Total mothers assessed	409	93.8	89.5 – 96.5
Total non mothers assessed	27	6.2	3.5 – 10.5
Total women assessed	436	100	
Non Pregnant (N=332)			
Severe acute malnutrition (MUAC<16.0 cm)	0	0	0
Total acute malnutrition (MUAC<18.5)	23	6.9	4.5 – 10.4
Normal	309	93.1	89.6 – 95.5
Pregnant women (N=105)			
Severe Risk (MUAC≤20.7 cm)	10	9.5	4.7 – 16.8
Total at risk (MUAC≤23.0 cm)	13	12.4	6.8 – 20.2
Normal	82	78.1	69.0 – 85.6

About 12% of pregnant women (N=105) were classified as acutely malnourished (MUAC<23.0cm) with 9.5% at severe risk of acute malnutrition (MUAC<20.7cm). The high nutritional risk in the pregnant women is possibly attributable to dietary intake to meet increased nutrient demands.

[4] A household was considered to have consumed a diversified diet when four or more food groups were consumed.

4.13 Summary on relationship between acute malnutrition and other factors

Table 19: Risk factors and relation to global malnutrition (WHZ<-2)

Exposure variable	***N***	***(%)***	***Crude RR***	***95% CI***	***p-value***
Child sex:					
Male	73	15.5	1.64	1.14 – 2.35	0.006
Female	41	9.5			
Age group					
6-24 months	44	15.0	1.31	0.92 – 1.86	0.13
25-59 months	70	11.5			
Morbidity patterns					
Illness					
Yes	55	15.2	1.40	1.00 – 1.97	0.05
No	59	10.9			
ARI					
Yes	38	16.0	1.40	0.98 – 2.01	0.06
No	76	11.4			
Diarrhoea:					
Yes	21	17.4	1.46	0.95 – 2.25	0.09
No	93	11.9			
Malaria:					
Yes	21	16.7	1.39	0.90 – 2.15	0.13
No	93	12.0			
Measles:					
Yes	8	23.5	1.93	1.03 – 3.63	0.05
No	106	12.2			
Health programmes					
Vitamin A Supplement:					
Yes	84	12.6	0.99	0.67 – 1.47	0.97
No	30	12.7			
Measles vaccine (N=844)					
Yes	73	12.3	1.17	0.77 – 1.79	0.45
No	26	10.4			
Dietary & feeding patterns (N=292)					
Breastfeeding					
Yes	24	19.8	1.70	0.98 – 2.93	0.05
No	20	11.7			
Breastfeeding frequency					
On demand	14	19.2	1.41	0.79 – 2.50	0.25
Infrequently	30	13.6			
Breastfeeding stoppage					
Before 12 months	38	15.6	1.30	0.58 – 2.92	0.51
At ≥ 12 months	6	12.0			
Complementary foods					
Less than 6 months	33	14.9	0.98	0.52 – 1.83	0.94
6 or more months	11	15.3			
Feeding frequency					
5 or more times/day	6	9.8	0.60	0.27 – 1.35	0.20
< 5 times/day	38	16.4			
Dietary diversity					
≤ 3 food groups	0	0	0.00	0.00	0.26
≥ 4 food groups	44	15.4			

Analysis on possible risk factors associated with children's nutritional status was undertaken with results as shown in table 19.

Child sex was significantly associated with malnutrition. Boys were 1.6 times more likely to be malnourished than girls (p = 0.006).

Further analysis revealed no significant association between malnutrition and other factors like age group, morbidity, vitamin A supplementation, measles vaccination, breastfeeding and dietary diversity among others (see table 19).

4.14 Mortality rates

A total of 906 households were assessed for mortality indicator with a recall period of 90 days prior to the assessment being used. The results generated by the Nutrisurvey software were as presented below:

Mortality rates;
For children aged 0-59 months (under-five mortality or death rate)

$$\text{0-5DR} = \frac{\text{Number of deaths of children 0-5 years}}{\left(\frac{\text{Mid point Population* no. of children 0-5}}{\text{10, 000}}\right) \times \text{Time interval}} = \text{Deaths/10,000/day}$$

* Mid point population = (Population at present + Population at beginning of recall)/2
Population at beginning of recall = (population present + left + deaths) – (joined + births)

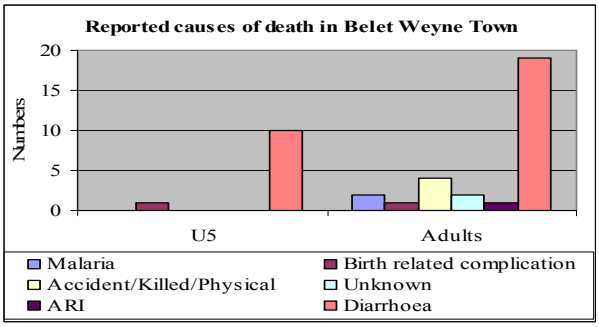
Under five population (mid point) in assessed households	=1381
Number of under fives who joined the households	= 3
Number of under fives who left the households	= 8
Number of births	= 35
Number of under five deaths	= 18
Under five mortality rate (deaths /10,000 children per day)	= **2.19** (CI: 1.35 – 3.01)

For the total population (Crude mortality/death rate):

$$\text{CMR} = \frac{\text{Number of deaths}}{\left(\frac{\text{Total Mid point Population}}{\text{10, 000}}\right) \times \text{Time interval}} = \text{Deaths/10,000/day}$$

Total population in assessed households	= 5386
Total people who joined the households	= 6
Total people who left the households	= 79
Total number of births	= 35
Total number of deaths in the households	= 49
CMR as deaths per 10,000 persons per day	= **0.65** (CI: 0.42 – 0.8)

The crude mortality rates indicate an acceptable situation while the underfive mortality rate indicates an alert situation according to the international standards (WHO classification).



Reported **causes of mortality**

As shown on the figure, diarrhoeal diseases and birth related complications (poor birth outcome) were the main reported factors associated with under-five mortality.

Diarrhoeal diseases, accidents/physical injury and malaria were the main reported causes of death among persons aged more than five years.

As indicated on page 9, WHO reported an overall case fatality rate related to AWD of 2.92% which was above the normal rate of 1%. This was within the recall period (90 days) used for the nutrition assessment. The assessment findings show that diarrhoeal diseases was the leading cause of death and this could closely be linked to the AWD outbreak.

6.0 CONCLUSION AND RECOMMENDATIONS

The global acute malnutrition levels reported indicate a serious nutrition situation in Belet Weyne Town according to WHO classification. When compared to the typical malnutrition levels for the area especially the riverine livelihood, the situation is better within the town. The crude mortality rate shows an acceptable level while the underfive mortality rate indicates an alert situation. The AWD outbreak in the town prior to the assessment contributed to the reported mortality. Water quality and sanitation situation in Belet Weyne town still remains a concern and contributes to diarrhoeal diseases and serves as an underlying cause to malnutrition. Consumption of micronutrient rich foods and improved vaccination coverage will improve the overall well being of the population in Belet Weyne town.

The ongoing delivery of health related interventions, food aid delivery, support of food security projects in the outskirts of the town and supplementary feeding programmes continue to ameliorate the situation. However, there is need to step up and improve the delivery of these services for an acceptable nutrition situation to be realized in the town.

Following discussions held after sharing the results with partners and detailed data analysis, the following recommendations were made:

1) Improve water quality for household level consumption through establishment of a central water purification system and encourage the population to boil drinking water
2) Enhance delivery of basic health services including intensifying EPI services/linking vitamin A supplementation with polio vaccination programmes.
3) Continued & improved provision of health services in the area through increased the capacity of community heath workers.
4) Rehabilitation of acutely malnourished children and women through the existing health care centres.
5) Intensify health & nutrition education focussing on care practices and micronutrient issues.
6) Promote the availability and consumption of micronutrient rich foods at household level through kitchen gardens and conducting food preparation demonstrations
7) Improve the quality of maternal health care services in the area.
8) Continued monitoring of the nutritional and food security situation.

7.0 APPENDICES

Appendix 1: Sampling Frame for Belet Weyne Town Nutrition Assessment, March 2007

	Sub section	Estimated population	Cummulative Population	Clusters
1	Heegan 1	1200	1200	**1**
2	Heegan 2	1200	2400	**2**
3	Heegan 3	1200	3600	**3**
4	Heegan 4	1200	4800	**4**
5	Hilaal 1	1200	6000	**5**
6	Hilaal 2	1200	7200	**6**
7	Hilaal 3	1200	8400	**7**
8	Sigalow IDP	930	9330	**8**
9	Wodajir 1	1000	10330	**9**
10	Wodajir 2	1000	11330	**10**
11	Horseed 1	1000	12330	
12	Horseed 2	1000	13330	**11**
13	Hantiwadag 1	1000	14330	**12**
14	Hantiwadag 2	1000	15330	**13**
15	Hantiwadag 3	1000	16330	**14**
16	Doon sahage 1	1000	17330	**15**
17	Doon sahage 2	490	17820	
18	Bulo kheyr 1	750	18570	**16**
19	Bulo kheyr 2	705	19275	
20	Sahan	1500	20775	**17, 18**
21	Kalaew	3000	23775	**19, 20**
22	Irtin	2500	26275	**21, 22, 23**
23	Hormarka 1	1150	27425	**24**
24	Hormarka 2	1150	28575	**25**
25	Rid Amin 1	600	29175	
26	Rid Amin 2	600	29775	**26**
27	Hodon 1	1400	31175	**27**
28	Hodon 2	1400	32575	**28**
29	Waberi 1	400	32975	
30	Waberi 2	300	33275	**29**
31	Radar 1	670	33945	
32	Radar 2	600	34545	**30**

Cluster Interval = 1152
Random number = 854

Appendix 2: Belet Weyne Town Nutrition Assessment Household Questionnaire, March 2007

Date_____ Team Number _____ Cluster Name _____ Cluster Number _____ Name of Supervisor_____ Name of enumerator _____

Name of Village/Town _____ Household Number _____ Name of the Respondent _____

Q1-14 Characteristics of Household

Q1 Household size[5] _____

Q2 Number of < 5 years (U5s)? _____

Number of children aged 24-71 months (2 - <6 years): _____

Q3 Household residence status: 1= Resident[6] 2=Internally displaced[7] 3=Returnees[8] 4=Internal immigrant[9] 5=Destitute 6=Other (specify) _____

If answer to the above is 1, then move to Question 8.

Q4 Place of origin (categorize during questionnaire design) 1=Within Hiran region 2= Outside Hiran (within Somalia) 3= Ethiopia 4= other (specify)_____

Q5 Duration of stay _____

Q6 Reason for movement: 1= Civil insecurity/ fighting 2=Seeking jobs 3= Food shortage 4= Food/pasture/water shortage 5= Seasonal/climatic 6= Others; specify_____

Q7 What is the main livelihood systems used by this household? 1= Pastoral 2=Agro- pastoral 3=Urban 4=Fisheries 5=Agriculture

Q8 Main Source of income? 1= Animal & animal product sales 2= Crop sales 3= Petty trade 4= Casual labour 5= Salaried employment 6= Remittances/gifts 7= Others, specify _

Q9-17Feeding and immunization status of children aged 6 – 59 months (or 65 – 109.9cm) in the household.

First Name	**Q9** **Age** (months) *(**if** child is more than 24 months old, **skip** to **Q21**)*	**Q10** **(If 6-24 months)** Are you breastfeeding[10] the child? *(**if** no, skip to **Q18**)* *1=Yes* *2=No*	**Q11** **(If 6-24 months)** If breast feeding, how many times/day? *1=2 times or less* *2=3-6* *3=On demand*	**Q12** **(If 6-24 months)** If not breast feeding, how old was the child when you stopped breast-feeding? *1= less than 6 months* *2=6-11 months* *3=12 – 18 months* *4=≥18 months* *5= Never breastfed*	**Q13** **(If 6-24 months** At what age was child given water/ foods other than breast milk? *1=0-3 months* *2=4-5 months* *3=6 months* *4=7 months or more.*	**Q14** **(If 6-24 months)** How many times do you feed the child in a day *(besides breast milk)*? *1= Once* *2= Twice*	**Q 15** Has child been provided with Vitamin A in the last 6 months? *(show sample)* *1=Yes*	**Q16** **(Only if≥9 months old)** Has child been Vaccinated against	**Q17** Has the child ever been given polio vaccine orally? *1=Yes* *2=No*

[5] *Number of persons who live together and eat from the same pot at the time of assessment*
[6] *A person who dwells in a particular place permanently or for an extended period*
[7] *A person or groups of persons who have been forced or obliged to flee o to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights, or natural or human-made disasters, and who have not crossed an internationally recognized State Border" source, guiding principles on internal displacement*
[8] *Refugees who have returned to their country (Somalia) or community of origin, Somalia, either spontaneously or through organized repatriation [UNHCR definition*]
[9] *A person who moves (more or less permanently) to a different administrative territory due to a wide range of reasons (e.g. job related, security)*
[10] *Child having received breast milk either directly from the mothers or wet nurse breast within the last 12 hours*

						3= 3-4 times *4= 5 or more times*	*2=No*	measles in the last 6 months? *1=Yes* *2=No*	
1									
2									
3									

Q18-27 Anthropometry and morbidity for children aged 6 – 59 months or (65 – 109.9cm) in the household

First Name *Follow same order as per preceding table (on page 1)*	**Q18** **Child Sex** *1=Male* *2=Female*	**Q19** **Oedema** *1=yes* *2=no*	**Q20** **Height (cm)**	**Q21** **Weight (kg)**	**Q22** **MUAC (cm)**	**Q23** Diarrhoea[11] in last two weeks *1= Yes* *2= No*	**Q24** Serious ARI[12] in the last two weeks *1=Yes* *2=No*	**Q25** Febrile illness/ suspected Malaria[13] in the last two weeks *1=Yes* *2=No*	**Q26** **(If ≥9 month)** Suspected Measles[14] in last one month *1=Yes* *2=No*	**Q27** [Applicable for a child who suffered any of the diseases in Q29 – 32) Where did you seek healthcare assistance when (Name of child) was sick? *1=No assistance sought* *2=Own medication* *3=Traditional healer* *4=Private clinic/ Pharmacy* *5= Public health facility*
1										
2										
3										
4										

[11] Diarrhoea is defined for a child having three or more loose or watery stools per day
[12] *ARI asked as oof wareen or wareento. The three signs asked for are cough, rapid breathing and fever*
[13] *Suspected malaria/acute febrile* illness: - the three signs to be looked for are periodic chills/shivering, fever, sweating and sometimes a coma
[14] *Measles (Jadeeco): a child with more than three of these signs– fever and, skin rash, runny nose or red eyes, and/or mouth infection, or chest infection*

28: Anthropometry (MUAC) for adult women of childbearing age (15-49 years) present at the household

Sno	Name	Age (years)	MUAC (cm)	Physiological status *1=Pregnant 2=Non pregnant*	Illness in last 14 days? If yes, what illness?
1	*Mother:*				
2					
3					

Codes** for adult **illnesses	
0= None	1= ARI
2=Diarrhoeal	
3=Malaria/febrile	
4=Joint ailments	5=Urinal
6=Internal organ ailments	7=Anaemia
8= Reproductive	9=Other, specify

Q29 Does any member of the household have difficulty seeing at night or in the evening when other people do not? 1= 24- 71 months (U6 years) 2= ≥ 6 years 3= None

Q30-33 Access to water (quality and quantity)

Q30 Main source of drinking water 1 = Tap/ piped water 2= Protected wells, boreholes 3 = Unprotected shallow wells or berkads 4=Others, specify _____

Q31 Average distance to the nearest water point 1= ≤500 meters 2=501m – 1 km 3= 1-3 km 4= more than 3 km

Q32 Number of water collecting and storage containers of 10-20 litres in the household: 1=1-2 containers 2= 3-4 containers 3=4-5 containers 4= more than 5

Q33 What is the method of water storage in the household? 1=Covered containers 2=Open containers 3=Constricted neck/end *(Ashuun)*

Q34-37 Sanitation and Hygiene (access and quality)

Q34 Type of toilet used by most members of the household: 1=Flash toilet 2=Improved pit latrine (VIP) 3=Traditional pit latrine 4=Open pit 5= designated area 6=Bush ***(If** Bush skip to **Q43)*** 7=Others (specify) _____

Q35 Distance between toilet and water source 1= less than 30 metres 2= 30 metres or more

Q36 What washing agents do you use in your household? 1=soap 2=shampoo 3=ash 4=plant extracts 5=None

Q37 How do you store prepared food? 1= Suspend in ropes/hooks 2=Put in pots beside the fire 3= Put in covered containers 4= Don't store 5= Other, specify _____

Q 38. Food Consumption & Dietary Diversity

Twenty four-hour recall for food consumption in the households: The interviewers should establish whether the previous day and night was usual or normal for the households. If unusual- feasts, funerals or most members absent, then another day should be selected.

Food group consumed: What foods groups did members of the household consume in the past 24 hours (from this time yesterday to now)? Include any snacks consumed.	Did a member of your household consume food from any these food groups in the last 24 hours**?** *1=Yes 0=No*	**Codes:* 1= Own production 2=Purchases 3=Gifts from friends/families 4=Food aid 5=Bartered 6=Borrowed 7=Gathering/wild 8=Others, specify_____ 9=N/A
Type of food		**What is the main source of the dominant food item consumed? (Use codes above)?**
7. Pulses/legumes, nuts *(e.g. beans, lentils, green grams, cowpeas)*?		
8. Milk and milk products *(e.g. camel milk (fresh), tea with milk, milk powder)*?		
9. Oils/fats *(e.g. cooking fat or oil, butter, ghee, margarine)*?		
10. Roots and tubers *(e.g. potatoes, arrowroot)*?		
11. Vegetables *(e.g. green leafy vegetables, tomatoes, onions)*?		
12. Miscellaneous *(e.g. spices, mangoes, grapes, banana, lemon)*?		

Q39 In general what is the <u>main</u> source of food in household? *(*Use codes above)* _____	
Q40 Total number of food groups consumed *(filled by enumerator)***:** _____	

Q41 - 42 Informal and formal Support or Assistance after Ramadhan *(circle all options that apply)*

Q41 Which of these informal supports did you receive within the last three months if any? [***optional/tailored to region]***

1=Zakat from better-off households 2=Remittances from Abroad 3=Remittances from within Somalia
4=Gifts 5=Loans 6=None 7= Other (specify) _____

Q42 Which of this formal international or national aid support did you receive within the last three months if any?

1= Free cash 2=Free food 3=Cash for work 4=Food for work 5=Supplementary food
6=Water subsidy **7 Transportation of animals subsidy** **8=Veterinary care** **9=None** **10= Other (specify) _____**

Checked by supervisor *(signed)*:

Appendix 3: Belet Weyne Town Nutrition Assessment : Mortality Questionnaire

Household No: _____ Date: _____ Team No: ____ Cluster No: ____ Enumerator's Name: _____

No.	**1**: First Name	**2**: Sex *(1=M; 2=F)*	**3**: Age (yrs)	**4**: Born since **__ / 1/ 2007**	**5**: Arrived since **__ / 1/ 2007**	**6**: Reason for leaving	**7**: Cause of death
a) How many members are present in this household now? List them.							
b) How many members have left this household (out migrants) since **August __, 2006**? List them							
c) Do you have any member of the household who has died since **August __, 2006**? List them							

Codes

Reason for migration

1= Civil Insecurity
2= Food Insecurity
3= Employment
4=Divorce
5=Visiting
6= Hospitalised
7= In boarding school
8= Grazing/herding
9= Other, specify

Cause of death

1= Diarrhoeal diseases
2= ARI
3= Measles
4= Malaria
5= STD/ HIV/AIDS
6= Anaemia
7= Birth complications
8= Accident/ killed/ physical injuries
9= Hunger/starvation
10= Other, specify

Summary*

	Total	**U5**
Current HH Members		
Arrivals during the Recall period		
Number who have left during Recall period		
Births during recall		
Deaths during recall period		

Appendix 4: Traditional Calendar of Events

Month	2002	2003	2004	2005	2006
Jan		48 (Soon)	36 (Soon)	26	14
Feb	59 (Sonfur)	47 (Sonfur)	35 (Sonfur)	25	13
March	58 (sidatal)	46 (sidatal)	34 (Sidatal	24	12
Apr	57 (Arafo) **XAJ**	45 (Arafo) **XAJ**	33 (Arafo)	23	11
May	56(Dago)	44 (Dago) **Dagalkii Ciraq**	32 (Dago)	22	10
Jun	55 (Safar)	43 (Safar) **Doorashadii Madaxweynah a**	31(Safar)	21	9
Jul	54(Mawliid)	42 (Mawliid)	30(Mawliid)	20	8
Aug	53 (Rajal-hore)	41 (Rajal-hore)	29	19	7
Sep	52 (Rajal dhexe)	40 (Rajal dhexe)	28	18	6
Oct	51 (Rajal dame)	39 (Rajal dame)	29	17	
Nov	50 (Sabuux)	38 (Sabuux)	28	16	
Dec	49 (Soon-eri)	37 (Soon-eri)	27	15	

Appendix 5: Team formation for the Belet Weyne Town Nutrition Assessment.

Team number	Supervisor/team leader	Enumerators
1.	Khalif Nouh Mumin Mohammed	Hassan Haji Abdullah Galbeed
2.	Osman Warsame Omar Hassan	Hibo Jama Hassan Mohammed Gureh
3.	Abdilahi Warsame Mohammed Omar	Ali Omar Hassan Nur
4.	Moalim Hussein Mohammed Abdullahi	Mohammed Abdi Faadumo Ali
5.	Omar Farah Adbikarim Jama	Abdirahman Abdulle Abdillahi Ahmed
6.	Abdikarim Dualle Mohammed Hussein	Qadro Dahil Abukar Hassan
7.	Hassan Odawa	Abdi Amin Makul Osman Adow
8.	Ahmed Ugas	Hassan Sugow Ali Osman
9.	Abdurrahman Mohamed	Yusuf Abdillahi Omar Farah
10.	Hared Farah	Ali Mohammed
	Coordination and Report Writing 1. Sicily Matu – FSAU Senior Project Officer, Nutrition 2. Peter Kingori - FSAU Project Officer, Nutrition 3. Abukar Yusuf Nur – FSAU Nutrition Focal Point	

Appendix 6: Child Referral Form

REFERRAL FORM FOR MALNOURISHED CHILDREN

Name of the village: _____ Date:_____

Name of the child:_____ Sex of child: _____

Age of child: _____ Name of caretaker: _____

Child diagnosed with (state the condition): _____

Child referred to: _____

Child referred by: _____

……

REFERRAL FORM FOR MALNOURISHED CHILDREN

Name of the village: _____ Date:_____

Name of the child:_____ Sex of child: _____

Age of child: _____ Name of caretaker: _____

Child diagnosed with (state the condition): _____

Child referred to: _____

Child referred by: _____

Appendix 7: Data Plausibility Check Using Nutrisurvey Software

Anthropometric Indices out of usual range (mean -4.0, mean +4.0):

Line 28: WAZ (2.984), HAZ (5.339), probably age is incorrect
Line 85: WAZ (2.983), HAZ (4.423), probably age is incorrect
Line 213: HAZ (4.666), probably age is incorrect
Line 248: HAZ (-5.283), probably age is incorrect
Line 310: HAZ (5.809), probably age is incorrect
Line 439: HAZ (-5.803), probably age is incorrect
Line 481: HAZ (3.632), probably age is incorrect
Line 586: HAZ (-5.337), probably height is incorrect
Line 613: HAZ (-5.231), probably age is incorrect
Line 614: HAZ (-5.231), probably age is incorrect
Line 675: WHZ (4.621), probably weight is incorrect
Line 680: HAZ (-5.068), probably age is incorrect
Line 685: HAZ (-4.798), probably age is incorrect
Line 714: WAZ (2.950), WHZ (4.664), probably weight is incorrect
Line 717: WHZ (3.413), probably weight is incorrect
Line 745: HAZ (-5.990), probably age is incorrect
Line 811: HAZ (3.674), probably height is incorrect
Line 815: HAZ (4.293), probably age is incorrect
Line 818: HAZ (3.864), probably age is incorrect
Line 819: WHZ (3.385), probably weight is incorrect
Line 846: HAZ (4.567), probably age is incorrect
Line 899: HAZ (-4.861), probably age is incorrect

Age distribution:

Month 6 : ############
Month 7 : ####################
Month 8 : ############################
Month 9 : ####################
Month 10 : ##########
Month 11 : ##########
Month 12 : ####################
Month 13 : ########################
Month 14 : ############
Month 15 : ##############
Month 16 : #######
Month 17 : ############
Month 18 : ############################
Month 19 : ##########
Month 20 : #########
Month 21 : ########
Month 22 : #########
Month 23 : ############
Month 24 : ####################
Month 25 : ##
Month 26 : ###################################
Month 27 : ##############
Month 28 : ############
Month 29 : ############
Month 30 : ########################
Month 31 : #####

Month 32 : ######
Month 33 : #######
Month 34 : ###############
Month 35 : ####################
Month 36 : ##########################
Month 37 : ##
Month 38 : ####################
Month 39 : ####################
Month 40 : ##########
Month 41 : ########
Month 42 : ################
Month 43 : ##############
Month 44 : ###
Month 45 : ########
Month 46 : ############
Month 47 : ##################################
Month 48 : ####################
Month 49 : ########################
Month 50 : #######
Month 51 : #######
Month 52 : #########
Month 53 : #######
Month 54 : ##############
Month 55 : ########
Month 56 : ################
Month 57 : ################
Month 58 : ##############################
Month 59 : ########################

Digit preference Weight:

Digit .0 : ##
Digit .1 : ##
Digit .2 : ######################################
Digit .3 : ##
Digit .4 : ##
Digit .5 : ##
Digit .6 : ##
Digit .7 : ######################################
Digit .8 : ##
Digit .9 : ##

Digit preference Height:

Digit .0 : ####################################
Digit .1 : ###################
Digit .2 : ##############################
Digit .3 : ##############################
Digit .4 : ##########################
Digit .5 : ##
Digit .6 : ##############################
Digit .7 : ####################
Digit .8 : ###################
Digit .9 : ##############################

Standard deviation of WHZ:

Standard Deviation SD: 1.047 (The SD should be between 0.85 and 1.10)
Prevalence (< -2) counted: 9.5%
Prevalence (< -2) calculated with current SD: 12.0%
Prevalence (< -2) calculated with a SD of 1: 10.9%

Standard deviation of HAZ:

Standard Deviation SD: 1.559 (The SD should be between 1.10 and 1.30)
Prevalence (< -2) counted: 18.1%
Prevalence (< -2) calculated with current SD: 19.5%
Prevalence (< -2) calculated with a SD of 1: 9.0%

Skewness and Kurtosis of WHZ:

Skewness of WHZ: 0.821 => probably skewed (value > 2*(6/n)½)
(Skewness characterizes the degree of asymmetry around the mean, positive skewness indicates a long right tail, negative skewness a long left tail)
Kurtosis of WHZ: 2.049 => probably kurtosis problem (value > 2*(24/n)½)
(Kurtosis characterizes the relative peakedness or flatness compared with the normal distribution, positive kurtosis indicates a relatively peaked distribution, negative kurtosis indicates a relatively flat distribution)

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