

BERDAALE DISTRICT BAY REGION, SOMALIA

**NUTRITION SURVEY
May 2002**

FSAU/IMC



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EXECUTIVE SUMMARY

The population of Berdaale District in Bay Region, Somalia has been highly vulnerable to food insecurity following consecutive seasons of crop performance. The district experienced total crop failure in the last *Deyr* season thus worsening the earlier crises of water shortage, reduced job opportunities, outward livestock movement and general reduction in the population's purchasing power. Malnutrition was identified as a problem and supplementary food distribution through the SRCS sponsored MCH was initiated. Further assessment in March-April 2002 by FSAU confirmed the existence of a problem. In an interagency meeting in Baidoa recommended that a nutrition survey be undertaken in Berdaale District. The recommendation was endorsed by the Nutrition Working Group of SACB. Previous surveys for the district indicated low malnutrition rates and knowledge of the situation in the midst of the current food security crises was necessary. In May 2002, FSAU and International Medical Corps (IMC) jointly carried out the survey.

The survey aimed to determine the levels of malnutrition in the district establish significant influencing factors and make appropriate and feasible recommendations. A two-stage random cluster sampling methodology was used to survey 911 children aged 6-59 months. Weight-for-height indicator was used in the nutrition status determination with additional information on common child illnesses, child immunization status as well as socio-economic welfare of the household being collected. Through focus group discussions, additional contextual information was also collected. The data collection took place between 9th and 14th May 2002. The nutrition information was analysed using relevant information related to the food security and health status of the population.

The prevalence of global acute malnutrition defined as W/H<-2z-score or oedema was 17.1% (95% C.I. 14.8-19.8) and severe acute malnutrition, defined as W/H<-3 z-score or oedema was 3.5% (95% C.I 2.5-5.0). A high prevalence of ARI (67%), malaria (27%) and diarrhoea (21%) in the two weeks prior to the survey was seen but measles cases were very few. The Vitamin A supplementation was high and was attributed to the recently concluded WHO-sponsored polio immunization campaign. Most of the children were fed three or more times a day (91.7%), although limited food variety in the district was noted during the dry period (before the survey). Use of locally available vegetables, *kable*, is on the increase since the start of the Gu rains. Exclusive breastfeeding was uncommon with about 94% of the children being introduced to other foods before they were six months old. Crop production (80%) and purchasing (14%) are some of the common sources of food while casual work (41%) and the sale of crop produce (41%) are some of the main income sources. Only 17% of the population have access to toilets. The agricultural activities in the farms have led to delegation of childcare to the siblings. This has obvious negative implications for childcare.

The current food insecurity increases the vulnerability of the Berdaale community which also carries the burden of a high prevalence of communicable diseases. Though there are signs of improvement with the onset of the 2002 *Gu* rains, households don't have stocks and their income levels are generally low. Coping through the maintenance of a high level of purchasing in this dominant agro-pastoral community may not be sustainable, if the income levels remain low. The limited access to health services in addition to the high incidence of communicable diseases continues to exacerbate the situation. Access to water has also been problematic but has recently improved.

The organisations involved in the survey analysed the survey results with partners and made a number of recommendations. These included continuing and intensifying the current food for work activities and reviving the supplementary feeding programme. The means of improving access to both preventative and curative health services for all the main villages needs to be determined and addressed by interested NGOs. The population of Berdaale District needs to be able to access treatment for severely malnourished children within Bay Region Nutrition and disease surveillance in the district needs to be maintained and intensified.

Finally, it is important that partners are made aware of the fact that although Berdaale is in a high potential agricultural area, it has been unfortunate climatically and needs focussed attention. Links need to be established with organisations interested in longer term approaches to addressing malnutrition and vulnerability.

SUMMARY OF FINDINGS

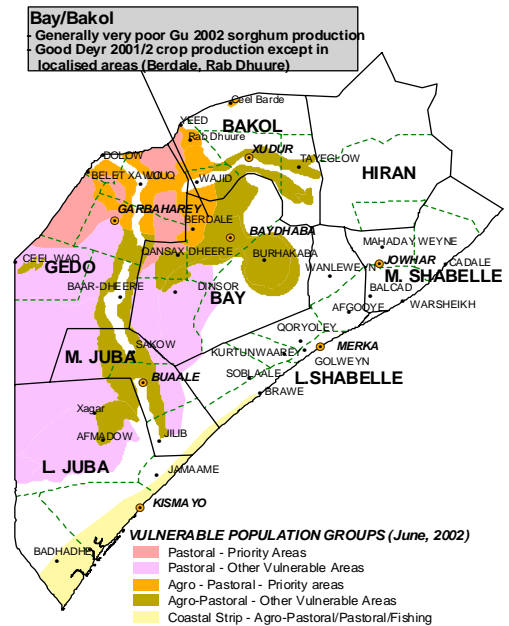
NUTRITION SURVEY FOR BERDAALE DISTRICT, MAY 2002

Indicator	Number	Percentage
Children under five years screened during the survey	911	100
Number of boys in the sample	463	50.8
Number of girls in the sample	448	49.2
Global acute malnutrition - Weight for Height <-2 Z-score or presence of oedema	156	17.1
Severe acute malnutrition - Weight For Height <-3 Z-score or presence of oedema	32	3.5
Global acute malnutrition - Weight For Height <80% of median or presence of oedema	107	11.7
Severe acute malnutrition - Weight For Height <70% of median or presence of oedema	17	1.9
Children with diarrhoea in two weeks prior to the survey.	191	21
Children with acute respiratory infections in two weeks prior to the survey.	608	66.7
Children with malaria in two weeks prior to the survey	245	26.9
Children supplemented with Vitamin A in six months prior to the survey.	802	88
Children immunised against measles	497	54.6
Frequency of feeding in a day		
➤ Once	5	0.5
➤ Twice	70	7.7
➤ 3-4 times	505	55.4
Five and above	331	36.3
Age of stopping breastfeeding (N=645)		
Less than 6 months	15	2.3
6-11 months	19	2.9
12-18 months	188	29.1
Above 18 months	423	65.6
Age introduced foods other than breast milk		
Less than 3 months	763	83.8
Less than 6 months (inclusive of less than 3 months)	854	93.7
Children from displaced and returnee households	21	2.3
Main food source		
Crop production	729	80
Purchasing	125	13.7
Main income source		
Casual work	376	41.3
Sale of crops	375	41.2

1.0 INTRODUCTION

Bay Region and Berdaale District in particular faced the challenge of food insecurity in the second half of 2001. The situation in Bay improved with the good Deyr 2001/2002 crop season *except* in Berdaale which underwent another crop failure (FSAU, food security report March 2002 and the Focus on the *Deyr* Assessment released in April 2002). Water shortage, reduced job opportunities, outward livestock movement and general reduction in the population's purchasing power was noted. In view of that, investigation on the impact of drought in Berdaale District was considered. The district was regarded as the district in Bay Region most seriously affected by the drought (see the map indicating the vulnerable populations-beside). In November, 2001, WFP commenced family ration distribution to families with malnourished children through the Berdaale SRCS sponsored MCH.

FSAU in collaboration with International Medical Corps (IMC) jointly carried out a nutrition survey in May 2002. FSAU planned, managed and supervised the survey; trained the enumerators, analysed data and prepared the draft report. IMC funded the entire field component of the survey, mobilised the community and selected the enumerators.



1.1 Survey Justification

An increase in food insecurity vulnerability coupled with high numbers of malnourished children seen in 2001 at Berdaale MCH, led Berdaale District to become an area of concern to the agencies operating in the area. Water shortage that led to increased population movement in addition to generally low income levels worsened the poor situation of the population in the 2001 *Gu* and *Deyr* seasons. FSAU highlighted the presence of many pockets of crop failure in the district after the *Deyr* harvest assessment indicating heightened vulnerability. UNICEF through Somali Red Crescent Society (SRCS) supported the community with supplementary food supply. The need for better information on the nutritional status of the population was identified and an interagency meeting in Baidoa recommended that a nutrition survey be undertaken. The recommendation was endorsed by the Nutrition Working Group of SACB.

The two previous surveys conducted in Berdaale have shown significant differences in the prevalence of malnutrition (4.6% in August 1996 and 12.4% in December 2000). Though the surveys were not undertaken in similar seasonal period, the difference is quite noticeable, indicating a need to understand the situation better, determine the prevailing magnitude of malnutrition, its possible causes as well as likely interventions to address these problems.

1.2 Survey Objectives

- To determine the levels of malnutrition in Berdaale District through the anthropometric measurement using the Weight for Height of children between 6-59 months or 65-110cm.
- To determine the coverage of measles vaccination and Vitamin A supplementation in Berdaale District.
- To determine the incidence of diarrhoea, malaria, measles and ARI two weeks prior to the survey.
- To establish the effect of household movements on nutritional status
- To describe the possible causes of malnutrition in Berdaale District.
- To identify interventions likely to impact on the causes of malnutrition in the district

2.0 BACKGROUND INFORMATION

2.1 General background

Berdaale District in Bay Region has an estimated population of 101,818 (April 2002, WHO/NID figures). It neighbours Gedo Region (Luuq District) to the west, Qansax Dheere District to the south-west, Baidoa District to the south and Wajjid District to the north.

The population of the district can be broken down in the food economy groups shown on the table on the right. Most of the people are agro-pastoral and are heavily dependent on sorghum production.

Table 1: Berdaale Population by food economy

Food economy	Population	Proportion
Agro-pastoral	50909	50%
Bay-Bakool high potential sorghum	30545	30%
Pastoral (camels and shoats)	11200	11%
Pastoral (cattle and shoats)	9164	9%
Total estimated population	101818	100%

2.2 Food Security and Nutrition – Historical

The district was considered food secure in the year 2000 following good harvests in both *Gu* and *Deyr*. However, poor rains in terms of amount and distribution caused very poor *Gu* harvest for 2001. The drought spread from *Jilal* through *Deyr* seasons for 2001. Significant food deficits were reported after the *Gu* 2001 and this was followed by a total crop failure in the *Deyr* season. The livestock in the area also moved towards Baidoa District season mainly due to water shortage and depletion of pastures. With the escalation of drought, population concentrated into major urban centres such as Berdaale town, which have reliable water points and job opportunities while some household members left the district in search of alternative livelihoods in Baidoa and the Shabelow area of Qansax Dheere.

With the poor harvests in both *Gu* and *Deyr* seasons for 2001, there was slight price increase of locally produced foods. Because the income of the poor was greatly reduced in the last *Gu* due to lack of farm labour opportunities, the consequence of these two factors was a reduction in food access in many poor households. These negative influences were repeated with the *Deyr* crop failure.

Table 2: Main events affecting food security in Berdaale district

Period	Major event
Early May 2002:	Milk availability improved. Casual farm labour opportunities improve though with low net pay per day implying relatively low income to the labourers. Water and pasture availability improves. Low household cereal stocks availability
April 2002	Timely onset of <i>Gu</i> rains, good distribution and amount (in April 2002)
March 2002	Return of active labour in preparation of land and planting
Feb/March 2002	Cereal availability improves in the market from the neighbouring district of Baidoa
Feb 2002	Increased milk prices due to scarcity
Jan 2002	Stopping of SFP following looting of food towards end of Jan 2002. Total <i>deyr</i> crop failure in almost all parts of Berdaale; 10-40% for approximately 50% of the population having food deficits (FSAU, March 2002). Good <i>Deyr</i> harvest in other parts of Bay Region.
Nov 2001	Start SFP/family ration distribution in Berdaale through the district MCH Movement of active people to Baidoa seeking job opportunities plus their livestock
August 2001	Poor <i>Gu</i> crop harvest (whole of Bay Region). Commencement of food for work by WFP
June–August 2001	Severe water shortage and reduced income following poor <i>Gu</i> crop performance as a result of poor rains. Population and livestock movement
Dec 2000	Low immunization coverage reported by IMC
Dec 2000	Berdaale District survey by UNICEF (12.4% <-2 z-score/oedema and 3.7% <-3 z-score/oedema)
July-Aug 2000	Good <i>Gu</i> harvest for sorghum
May-June 2000	Increased availability of milk and green vegetables. Cereal prices slightly increased
July-Aug 1999	Poor crop harvest due to drought. Tension and insecurity hampered food availability and accessibility in the market. Extreme food insecurity:
June 1999	District taken over by Rahanwein Resistance Army- improvement of security
July-Aug 1998	Lowest crop harvest in 6 years (also affected the other districts in the region)
Oct '97-Feb 1998	Elnino rains leading to destruction of underground stores and outbreak livestock disease particularly camels (many camels left dead) died)
August 1996	Berdaale District survey by WHO/IMC (4.6% <-2 z-score/oedema and 0.3% <-3 z-score/oedema)
1994-1995	Good harvests received

Sources: Extracted from previous FSAU food security assessment and UNICEF reports.

2.3 Food Security and Nutrition - Current

Berdaale District has had poor crop harvest related to inadequate rains since mid 2001. The Western (Baygadud zone), Northern (Borama zone) and the Southern (Gelgel zone) parts of the district have been the most seriously affected. This has triggered population movement within the district as well as outside the district with either entire households or individual members moving in search of reliable water points, pastures, food, and/or income opportunities. To an extent, this movement enabled households meet their food needs.

However, some areas to the east received some harvest in the last *Deyr* season. These are mainly areas that neighbour Baidoa district. But, with the drying up of water catchments in last *Deyr* and *Jilaal* season, even some members of these households had to travel for an average ten kilometres or more in search of water for both livestock (few that remained in the district) and domestic use.

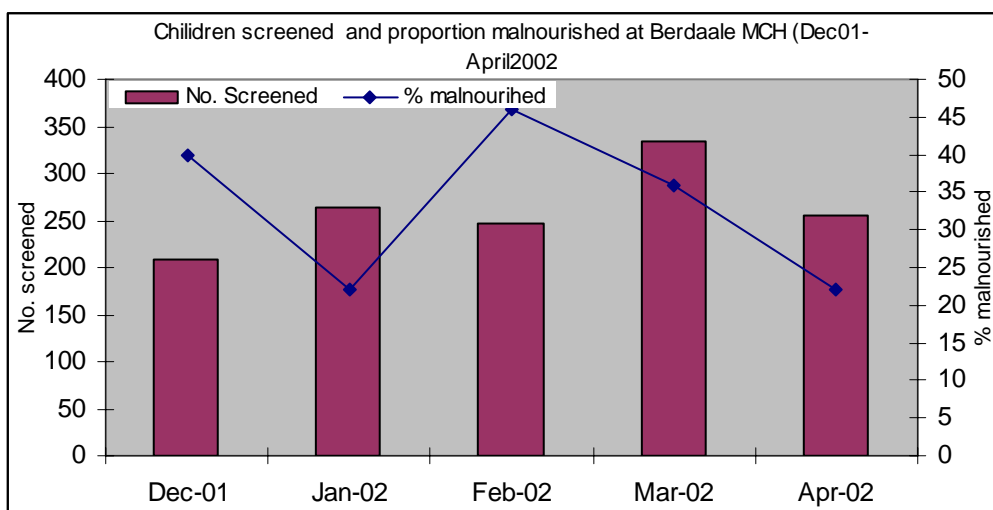
With the onset of 2002 *Gu* rains, return movement to the district, by the population and their livestock, took place for purposes of land preparation and planting. Water catchments and wells are full and the pastures have recovered. People are busy in the farms by the time the survey was conducted. However, households have very little or no stocks for use during this recovery period. A few households in Raar Dowe section of Berdaale town reported ownership of land in Audinley area of Baidoa district, where they had had a good crop harvest in the last *Deyr* season. The milk availability has improved with the return of the livestock and recovery of the pastures within the district. By the end of April, a litre of milk cost 2-3,000Ssh down from 7,000Ssh in February 2002. Wild vegetables like *kable* are readily available and many households are consuming it. Despite that, it is worth noting that many households do not have sufficient stocks for the period between germination and harvesting which is expected in August. Crop establishment has started well but some areas are experiencing heavy insect infestation. Livestock owners are selling very few livestock as pasture is currently available. The available meat is too expensive for many households. Cereal prices are relatively low although there was a slight increase from 700Ssh/kg in February to 900Ssh/kg in April, following a similar price trend in Baidoa.

At the time of the survey, weeding employment was available for farm labourers. Unfortunately, due to reduced income of the farmers, caused by consecutive poor crop performance, the payment rate for casual labour is low in comparison to other neighbouring districts. One *tab* (360M²) earns a labourer 2,000Ssh in Berdaale District while one *tab* in Baidoa District (taken as 240M²) earns the labourer 7,000Ssh. On average, one person does about 3 to 4 tabs per day resulting in an income of about 6-8,000Ssh per day for the casual worker in Berdaale District. As a result, some people are opting to seek job opportunities in Baidoa District. A few cases of reduced cultivation by individual farmers due to lack of labourers were reported or lack of finance to pay the labourers.

Heavy involvement of women on agricultural activities in the farms has led to delegation of childcare to the siblings with the obvious negative implications.

Nutrition

Regarding nutrition situation, data from Berdaale MCH indicate a relatively high malnutrition of over 20% since late last year. Focusing on the last five months for instance, about 40% of the 208 children were malnourished in December, 22% of 263 in January 2002, 46% of 246 in February, 36% of 335 in March and 22% of 256 children were malnourished (see the graph). The consistently high malnutrition rates have been an issue of concern in



Berdaale making UNICEF and SRCS to operate supplementary feeding through the MCH. The SFP operations were temporarily halted in February. Most of the malnourished have disease complication. A heavy presence of mosquitoes has been noted due to stagnant water was noted during this wet season.

However, the start of *Gu* rains brought about improved milk and locally available vegetables consumption.

2.4 Humanitarian operations in Berdaale District

Somali Red Crescent Society, with funding from ICRC, has been operating an MCH/OPD in the district since May 1995. The basic MCH kit and vaccines are provided by UNICEF. On the other hand, IMC supports 17 health posts since 1992, located in the villages of Jiromad Sheikh (Agay), Bulohorgoylow, Baagay Asharaf, Morowarabe, Borama, Jafey, Huwlabaguud, Qasi Omane, Kurtele, Yurkut, Koorar, Erinley, Bulo lidow, Tosweyne, Bulohawa, Taflo and Foolfayle. The health posts in Qanyoray and Sheikh Dheer are currently not functioning. IMC also sponsors a cold chain located in Berdaale town and serves both the health posts (through the IMC mobile team) and the SRCS-MCH/OPD. Through the MCH, supplementary (blended) food from UNICEF has been distributed to malnourished children identified during the regular MCH screening since August 1999. World Food Programme (UN-WFP) commenced support of families with malnourished children in November 2001 through the provision of monthly family rations consisting of 10 kg of pulses, 4.6kg of oil and 50kg of cereals. However, both supplementary feeding programme and family ration has temporarily been stopped since February 2002 following problems related to the storage of the food stuffs in the area. FSAU/FAO supports nutrition surveillance activities through training and feedback to the MCH in Berdaale. WFP occasionally supports food for work activities in the district. SRCS chlorinates the wells within Berdaale town as IMC does it in their villages of operations (with health posts).

2.5 Water and environmental sanitation

During the past seasons, water shortage triggered movement within and outside the district. Although some livestock travelled for long distances (20-30 km) to get water from the wells in Berdaale town by February 2002, the situation even in these places had deteriorated so much with most water catchments reportedly dry and wells at their lowest levels. Saline level was high during the dry 2002 Jilaal season, making the water less palatable. Catchments are common in the crop growing areas while both wells and catchments could be found in the agro-pastoral areas.

Generally the sanitation for Berdaale town is particularly poor and littered everywhere. Animal wastes can also be spotted in drinking water points.

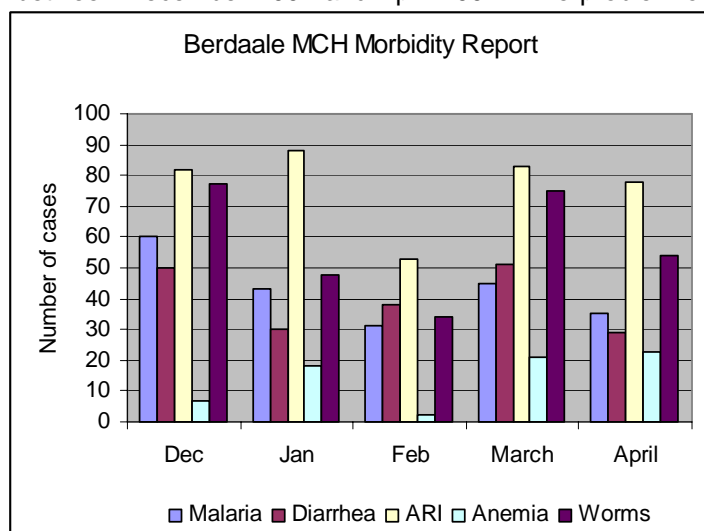
2.6 Morbidity surveillance

According to the SRCS sponsored MCH in Berdaale, the number of cases of acute respiratory infection has been relatively high throughout the reporting period - between December 2001 and April 2002. The problem of intestinal worms is also of concern. Poor sanitation and poor water quality are considered to be contributing to the prevalence of diarrhoea and intestinal worms.

Malaria also appears to be a common cause of morbidity in the area.

With a monthly attendance of over 200 and proportion of children with malnutrition (<-2 z score or with oedema) of over 22%, communicable diseases are also a likely contributory factor in the overall level of malnutrition.

This data reflects the situation in the town and the immediate surrounding village. Distance limits access to health services to the majority rural community.



3 METHODOLOGY

3.1 Study Design

The Berdaale survey was both descriptive and analytical in nature and used cross-sectional data collected through a standard questionnaire (Appendix 5). Additional qualitative data were collected during the study through two focus group discussion sessions and interviews with key informants.

A two-stage cluster sampling methodology was used, in which 30 clusters were randomly selected from Berdaale District. An estimated population of 101,818 (WHO, April 2002) was used to calculate a cluster interval of 3,394. A random number of 234 was chosen within the cluster interval to determine the first cluster. The subsequent clusters were determined by adding the cluster interval (3,394) to the first randomly selected number (Appendix 3). Two clusters had to be replaced with the immediate neighbouring ones due to inaccessibility and reports of landmines in the randomly selected villages. A total of 911 children between the heights/length of 65 – 110cm were screened during the survey.

Data collection took place between 9th and 14th May 2002. The children were screened for weight for height and oedema. Their caretakers/mothers were interviewed as to whether children had received Vitamin A or measles vaccination in the past 6 months, or had suffered from diarrhoea, measles or acute respiratory infection in the two weeks prior to the survey and other questions on child feeding. Socio-economic questions on the household were also included in the questionnaire.

3.2 The sampling procedure

3.2.1 Study population and sampling criteria

The study population consisted of people living in the district and comprised all the children measuring 65-110 cm for height/length which roughly corresponded to children aged 6-59 months. On the visit to each cluster, the centre was identified and a pen was spun to determine the direction to follow in the selection of the households with children aged 6 to 59 months. The total number of the households from the centre to the end was established and given numbers to enable random selection. From the first household with a child aged 6-59 months, the same direction was followed to get the next household. On reaching the edge of the cluster the right-hand direction was followed until details of 30 children were collected from that cluster. If the child or primary caregiver was absent, an appointment was booked for a later visit in the course of survey. In the event of not getting 30 children in one particular village (identified cluster), the survey team moved to the next nearby satellite, identified the centre, spun the pen to determine the direction and select the first household with the child qualifying for the survey and then moved on.

3.2.2 Anthropometric measurements

The anthropometric data was 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: Salter Scale with calibrations of 100g-unit was used. This was adjusted before weighing every child by setting it to zero. The female children would be lightly dressed before having the weight taken while clothes for the male children were removed. Two readings were taken for each child and the average recorded on the questionnaire. Measurements were taken to the nearest 0.1kg. For height/length, a vertical or horizontal measuring board reading a maximum of 132cm and capable of measuring to 0.1cm was used to take the height or length of a child. The child would be barefooted, have hands hanging loosely with feet parallel, 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 device 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.

3.2.3 Child age determination

Difficulties were encountered in determining the exact ages of children. Useful documents like growth monitoring/clinic attendance cards, or any other viable formal card were used when available. Calendars of events were also used as proxies to accurate age determination (Appendix 2). Though not entirely accurate, ages were still regarded as important indicators though not used for anthropometric analysis and were approximate/average pointers. The nutrition indicator employed the weight for height as interest was in wasting status (acute malnutrition).

3.3 Description of survey activities

Table 3: Survey Activities

Major Activity	Period
Preparation of tools and methodology	25 th April-4 th May 2002
Review of secondary data and standardisation of methodology	25 th April – 4 th May 2002
Training of enumerators	5-7 th May 2002
Cluster Identification	8 th May 2002
Collection of cross-sectional data and qualitative survey	9 th -14 th May 2002
Entry of data from cross-sectional survey	11 th -16 th May 2002
Analysis of data and preparation of first draft	17 th May-19 th June 2002

Ten enumerators conducted the survey with five supervisors plus one independent supervisor and a Primary Health Care Specialist from IMC. The teams were supported and supervised by one FSAU nutritionist who also co-ordinated the field exercise. IMC with the help of UNICEF assisted in the identification of the qualified enumerators who were selected on the basis of their experience with previous nutrition surveys and multi-indicator cluster surveys. One supervisor supervised each team of two enumerators and data from at least eleven of the thirty clusters were collected in the presence of the FSAU nutritionist and the IMC's PHC specialist.

3.4 Quality control procedures

A comprehensive training of enumerators and supervisors was conducted covering interview techniques, sampling procedure inclusion and exclusion criteria, sources of errors taking of measurements, standardising the questions in the questionnaire, levels of precision required in measurements, diagnosis of oedema, handling of equipment, interview techniques and the general courtesy during the survey.

Rigorous pre-testing of the questionnaire and equipment was carried out in one of the villages (not selected for data collection). These involved familiarisations in village/cluster entry, exercising the questionnaire, sampling procedure, correct taking of measurements and documentation. After the field exercise, views were exchanged to address the difficulties identified, appropriateness of the questions reviewed and appropriate changes were made.

Quality of data was also ensured through (i) rigorous training of the enumerators and supervisors, subjecting them to measurement standardisation tests (Appendix 1) (ii) close monitoring of fieldwork by FSAU nutritionist, (iii) crosschecking of filled questionnaires on daily basis (iv) daily review undertaken with the enumerators to address any difficulties encountered, (v) progress evaluation was carried out according to the time schedule and progress reports shared with partners on regular basis, (vi) continuous data cleaning after entry in the field that made it easy to detect outliers and mistakes and to replace or repeat households depending on magnitude of error and (vii) monitoring accuracy of equipment through checks by measuring objects of known weights.

3.5 Data analysis

3.5.1 Entry, cleaning, processing and analysis

Data was entered and basic analysis done using EPI2000 computer package. In-depth analysis was carried out using EPIINFO version 6.0 computer based package. Running and tabulating all variable frequencies was carried out as part of data cleaning. The EPINUT programme was used to convert the measurements (weight and height) into nutritional indicators and comparison made with the National Centre for Health Statistics (NCHS) references as designed by WHO (1983).

3.5.2 General characteristics of study population

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

3.5.3 Creation of nutritional status indices

The anthropometric measurement, Weight for Height (WFH) was used to assess the nutritional status of the study 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/serious acute malnutrition
- 3 Z-Scores ≤WFH< -2 Z-Scores or oedema = Moderate acute malnutrition
- <-2 Z-score or oedema=Global/total acute malnutrition
- ≥ -2Z-Scores = Normal

4 SURVEY RESULTS

4.1 Characteristics of the study population

The 911 children surveyed came from 537 households, of which, 50.8% (463) were males and 49.2% (448) were females. About 91% of the children came from male headed households while about 9% were from female headed households. The mean household size in Berdaale is 6.

Table 4. Distribution of the sample population by sex and age groups

Age categories	Males	Females	Total
6-11	65 (52.8%)	58 (47.2%)	123 (13.5%)
12-23	88 (49.4%)	90 (50.6%)	178 (19.5%)
24-35	92 (45.1%)	112 (54.9%)	204 (22.4%)
36-47	96 (57.8%)	70 (42.2%)	166 (18.2%)
48-59	122 (50.8%)	118 (49.2%)	240 (26.3%)
Total	463 (50.8%)	448 (49.2%)	911 (100%)

Most of the surveyed children were from 48-59 age category (26.3%). Most of the children (97.7%) were from households currently staying in their indigenous residential area while 0.3% and 2.0% were from internally displaced and returnees' households respectively. Of the 21 children from IDP or returnees households, 1 came from Elbon area of Wajjid District while the remainder were from within Berdaale District. Movement within the district, from one village to another, is common. A combination of both food and water shortage was the main reason given for movement.

Table 5. Reason for movement to current residential village

Reason	Proportion	Number (N=21)
Food and water shortage	76.2	16
Food shortage	4.8	1
Lack of jobs	19.0	4

4.2 Food sources, income sources and coping strategies

Table 6: Current socio-economic status of the study population

The vast majority of the children came from households normally depending on crop production as their main food source. Only about 2% of the children came from households depending on wild food.

Casual work, particularly the farm labour, and sale of crops are important income sources to Berdaale District residents. About 41% of the children came from households normally depending on casual work as the main income source. Another 41% came from households normally depending on the sale of crops while 7.1% of the children relied on the sale of animals and animal produce. Other sources of income include small business, dependence on relatives and friends for gifts and the sale of bush products.

Purchasing and seasonal movement of the entire household (*locally known as keynaan*) were the popular coping strategies employed by the most households. Increased sale of livestock and/or crop produce (12.6%); collection of wild foods (9.5%); and borrowing (4.8%) follow closely as alternative means of survival during stress. Other ways that households in Berdaale use to meet their food needs during stress period are reliance on remittances/gifts (3.5%), family splitting (1.9%), begging/ food assistance by relatives in other localities (4.0%), sale of bush product collection (4.0%) and casual labour (3.0%).

		Numbers	%
Main food source			
	Crop production	729	80
	Purchasing	125	13.7
	Wild foods	20	2.2
	Animal products from own herd	19	2.1
	Others (borrowing, remittance)	11	1.2
	Begging	7	0.8
Main income	Casual work	376	41.3
	Sale of crops	375	41.2
	Sale of animals & products	65	7.1
	Small business	60	6.6
	Sale of bush products	20	2.2
	Remittances and gifts	15	1.6
Coping strategies-	Purchases	328	36
	Seasonal movement	188	20.7
	Others*	149	16.4
	Increased sale of livestock/crop	115	12.6
	Wild food collection	87	9.5
	Borrowing	44	4.8
Water source-	Catchments	625	68.6
	Open wells	226	24.8
	Borehole	60	6.6
Toilet	With access to toilet	158	17.3
Medical assistance	Seeking medical help	902	99
	Public health facilities	406	45
	Traditional healers	276	30.6
	Private clinic	220	24.4

4.3 Water and sanitation

As indicated in Table 6, the main water source for the Berdaale community is water catchments followed by open unprotected wells. Only 7% of the children used boreholes (Bulla hawa and Tosyene villages have boreholes which provide sufficient water for both domestic and livestock use). The survey was conducted when the Gu rains had already started and the water catchments were full, unlike the previous seasons when the catchments had dried up and water shortage was experienced. Only 17.3% of the children came from households with toilets thus indicating relatively poor sanitary conditions in the district.

4.4 Health services

The majority of the children (99%) sought assistance when sick; with public health facilities (MCH) being chosen by the carers of 45% of the children, traditional healers by 30.6% and the private clinics 24.4% (Table 6). The

distance between the villages and the public health facilities limit access. The private clinics are situated mainly in the main villages/ town which are also not easily accessible to some of the district residents.

4.5 Nutritional status

Table 7 Malnutrition prevalence using W/H Z-score categories

Nutrition status categories	Males		Females		Total	
	Proportion	No.	Proportion	No.	Proportion	No.
Total malnutrition (W/H<-2 z score + oedema)	18.8 (C.I.15.4- 22.7)	87	15.4 (C.I.12.3-19.2)	69	17.1 (C.I. 14.8-19.8)	156
Severe malnutrition (W/H<-3 z score + oedema)	3.7 (C.I. 2.2- 5.9)	17	3.3 (C.I. 2.0- 5.6)	15	3.5 (C.I. 2.5-5.0)	32
Oedema	0.3	3	0.6	5	0.9	8

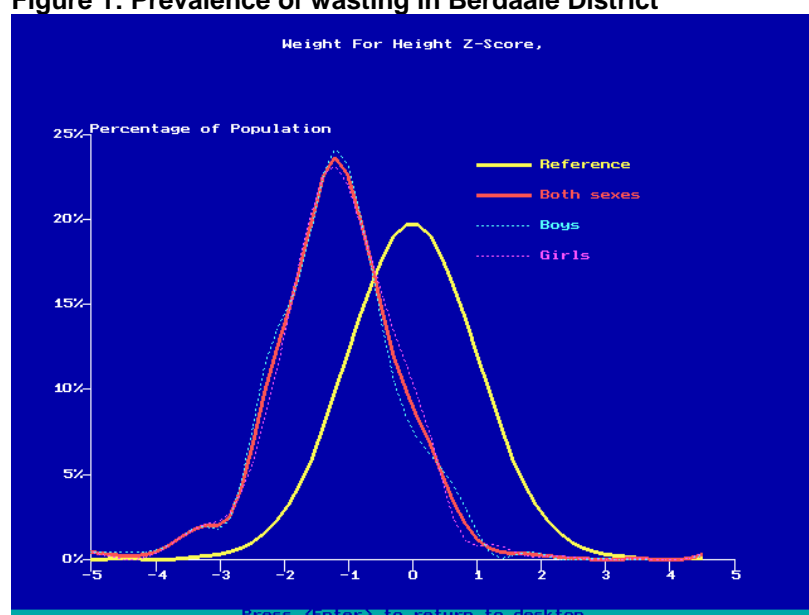
The prevalence of global/total malnutrition defined as W/H<-2 Z score or oedema was 17.1% (95% C.I. 14.8-19.8). The prevalence of severe malnutrition defined as W/H<-3 Z score or oedema was 3.5% (95% C.I. 2.5-5.0).

Table 8 Distribution of nutritional status by sex

	Severe	Moderate	Total malnutrition	Normal
Males	17 (3.7%)	70 (15.1%)	87 (18.8%)	376 (81.2%)
Females	15 (3.3%)	54 (12.1%)	69 (15.4%)	379 (84.6%)
Total	32 (3.5%)	124 (13.6%)	156 (17.1)	755 (82.9%)

The difference in malnutrition between sexes was not statistically significant.

Figure 1: Prevalence of wasting in Berdaale District



There is a near-total shift in nutritional status of the Berdaale children (N=911) to the left indicating poor nutrition status on comparison to the reference population. It is significant to note that the median has slipped to less than -1.

Table 9: Nutrition status according to age groups

Age groups	Severe	Moderate	Total malnourished	Normal
6-11 months	7 (5.7%)	16 (13.0%)	23 (18.7%)	100 (81.3%)
12-23 months	15 (8.4%)	34 (19.1%)	49 (27.5%)	29 (72.5%)
24-35 months	6 (2.9%)	24 (11.8%)	30 (14.7%)	174 (85.4%)
36-47 months	3 (1.8%)	17 (10.8%)	20 (12.0%)	146 (88.0%)
48-59 months	1 (0.4%)	33 (13.8%)	34 (14.2%)	206 (85.8%)
Total	32 (3.5%)	124 (13.6%)	156 (17.1%)	755 (82.9%)

The 12-23 months age category were significantly more malnourished as compared to other age categories ($p=0.00013$) at 95% level of confidence. .

4.6 Health, feeding practices and immunisation coverage

Table 8: Disease prevalence, immunisation and childcare in Berdaale District

Characteristics	Proportion	Number
Disease prevalence & immunisation		
Children with acute respiratory infection in past two weeks	66.7	608
Children with diarrhoea in past two weeks	21	191
Malaria in the past two weeks	26.9	245
Measles cases in the past two weeks	1.2	11
Vitamin A supplementation in past 6 months		
Vitamin A supplementation in past 6 months	88.0	802
Measles immunisation	54.6	497
Child feeding		
Frequency of feeding in a day		
➤ Once	0.5	5
➤ Twice	7.7	70
➤ 3-4 times	55.4	505
➤ Five and above	36.3	331
Age of stopping breastfeeding (N=645)		
Less than 6 months	2.3	15
6-11 months	2.9	19
12-18 months	29.1	188
Above 18 months	65.6	423
Age introduced foods other than breast milk		
Less than 3 months	83.8	763
Less than 6 months (inclusive of less than 3 months)	93.7	854

A relatively high prevalence of communicable diseases was noted in the study group. Acute respiratory infection¹ The district had a high Vitamin A supplementation coverage of 88% and relatively low measles immunisation coverage of about 55%.

Frequency of feeding appeared to be generally low, with only 36% of young children receiving food five or more times a day. However, further studies need to be undertaken to better understand this issue. Significant proportions (8.3%) were fed once or twice in a day implying an element of inadequate feeding. Exclusive breastfeeding in the first six months of the children is not common with about 94% of the children being introduced to other foods while below six months of age. This practice is unfortunately very common throughout Somalia. Over 5% of children stopped breastfeeding entirely before they were one year old. At the time of the survey, 29.2% of the total children surveyed were breastfeeding.

Relationship between malnutrition and other factors

The data indicated a statistically significant association between malnutrition and both diarrhoea and malaria. A children with diarrhoea was 1.8 more likely to be malnourished than a child without diarrhoea ($p=0.002$) while a child with malaria was about 2.2 more likely to be malnourished than a child without ($p=0.000007$). It was further revealed that children not exclusively breastfed were 1.6 more likely to be malnourished than those given breast milk, though not significant. The relationship between malnutrition and number of times the child is fed was also statistically significant ($X^2=14.1$, $p=0.0027$) with the likelihood of malnutrition declining with increase in the frequency of feeding. There was no statistically significant relationship between malnutrition and acute respiratory infection, measles, vitamin A supplementation, household income as well as food sources.

4.7 Qualitative data summary

¹ ARI-referred included coughs, colds, pneumonia, bronchitis and any other respiratory complication the child suffered from while malaria referred to a combination of fever, loss of appetite, suspected fatigue and others symptoms.

Cereals, usually locally produced, make an important constituent to the Berdaale population's diet. Generally sorghum is consumed during each of the three meals in a day by most adults. Some cereal food plus milk are consumed by children. Porridge from sorghum flour with some milk is the common weaning food in Berdaale. However, milk consumption varies with season and the household income. Children less than one year rely on breast milk, animal milk, and tea. During the Gu and the deyr seasons, when the milk is usually readily available, livestock milk consumption increases particularly to the children not breastfeeding. Towards end of the Gu and the deyr seasons, the consumption of pulses (cowpea) is also relatively high (twice in a day). Sugar consumption, in tea, is generally high and there is always a noticeable increase during dry weather conditions when the milk is scarce. In the just ended Jilaal season, which had followed a poor deyr season, the consumption of most items was far below normal and the food variety was quite limited. With the onset of the Gu rains and resulting rejuvenation of pastures, milk availability has improved.

During the 2001-2002 dry periods, there was outward population movement in search of job opportunities and food. Though the population has returned back to the district they have little or no food stocks and thus rely on purchasing. There is heavy reliance on the wild vegetables (*kable*). The survey period was very crucial as it was between the germination and crop maturation, normally referred as the hunger gap.

Regarding breastfeeding practices, mothers stop breastfeeding abruptly when another pregnancy is recognised. During the weeding period, mothers engaged as farm labourers leave young children in the care of siblings thus limiting breastfeeding on demand and greatly compromising many other aspects of childcare. Most mothers breastfeed for at least one year. Early introduction of foods other than breast milk is common. Sugar solution and animal milk are usually given to children in their first two days of life, and so few children benefit from their mothers colostrums.

Prior to the 2002 Gu rains, most villages experienced water shortage and the little available being of poor quality. Sometimes household members, particularly women, spend much time fetching water for domestic use.

5 DISCUSSION

Berdaale District experienced shortage of rains in the 2001 Gu and Deyr seasons causing crop failure and ultimately worsening food security for a significant proportion of the population. A reasonably good household asset base (mainly livestock and the cereal stock) and some existing food stocks from the past seasons alleviated the acute shortage for many households. As stocks were lowered and for poorer households without stocks, a number of other coping strategies were employed, including movement to neighbouring districts (Baidoa and Qansax Dheere). Thus a combination of both food and water shortage prompted the movement of a number of households. Until February 2002, blended food was given to the malnourished children through the SRCS sponsored MCH in Berdaale town.

Food sources, income and coping mechanisms

With the agro-pastoral food economy being the dominant group (80%) in the district and some depending more on sorghum production than others, rainfall conditions greatly determine the wellbeing of the Berdaale population. Crop production is the main source of food in Berdaale District with most children coming from households relying on production as the main food source while 14% of the children come from households relying mainly on purchasing as food source. Other sources of food include animal products from household herds, wild foods and borrowing and receiving remittances from friends and relatives.

Though the households are relying on crop production for food supply, poor and/or no harvest in the recent past seasons has placed the population in a very vulnerable food security position. The households have been in a compromised livelihood position forcing them to turn to movement and purchasing among other coping strategies for survival. The movement was mainly of the entire household (locally known as *keynaan*) with the other reported movement being that some member of the household travel to the neighbouring districts of Qansax Dheere (mainly Ufurow areas) and Baidoa in search of food.

Casual labour and the sale of crops are the main income sources, during normal times, for the Berdaale population. About 41% of the children came from household relying on casual labour while another 41% were from households selling crops from their farms. Sale of animals and their products as well as small business operations count for 7.1% and 6.6% of the population relying on them respectively. Though farm labour is available, the payment rate is quite low with the current rate of 2000Ssh per *tab* (about 8,000 per day if someone does about 4 *tabs* in a day). Much of these income sources directly or indirectly rely on rains hence the just ended dry seasons had greatly reduced the peoples' income opportunities.

During the dry season when food security situation was especially bad, the population made effort to exploit any opportunity available for survival leading to employment of a wide range of coping strategies (sale of livestock and/or crop produce, collection of wild foods, borrowing, remittances/gifts, family splitting, begging/ food

assistance by relatives in other localities, sale of bush product collection, and casual labour. Despite all these efforts, most households have very little or no stocks for use during this recovery period and are relying on purchasing from the market, and faced with limited food variety caused by unfavourable weather condition over the two or three seasons. The population had their purchasing power reduced hence poor food access with coping strategies getting increasingly suppressed (through reduced income opportunities, lack of food stocks they can sell among others). The survey noted frequency of food intake to be significantly and positively related to stable nutritional status just as is exclusive breastfeeding. But with the reported food insecurity, households were reportedly not able to feed their children as many times as should be the case in a day. Thus, high malnutrition rate (17%) can therefore be partly attributed to food insecurity among other factors. Purchasing being one of the main coping mechanisms in this dominant agro-pastoral community may not be sustainable, if the income levels remain low.

It is however, notable that with the onset of the Gu 2002 rains (late March/early April), the population is in the recovery stage. Pastures have improved with resultant return of the livestock back into the district, farm labour is available and milk availability has also improved. However, the slight improvement in food security, as signalled by the milk availability and labour opportunities, has not yet impacted on the nutritional status of the population at the survey time, and in view of no food/cereal stocks, the population is still vulnerable. This is also a period of increased energy requirements at the household level to work in the farms.

Health

Relatively high prevalence of diseases, especially for acute respiratory infections was noted in the survey. Diseases have profound effect on food security and health status and there relevance to the observed high levels of malnutrition. High number of cases for acute respiratory infection, malaria and diarrhoea were also reflected by facility data from the SRCS-supported Berdaale MCH. Although questions on case definition are abound as regards the authenticity of ARI and could partly explain the high prevalence, an observation of high cases of ARI is also noted at facility level, something corresponding well with the survey results. Arguably therefore, ARI is the comment disease among children in Berdaale. Of the total children surveyed, 67% had suffered from acute respiratory infection two weeks prior to the survey, 21% from diarrhoea and 27% from malaria. There was a statistically significant association between malnutrition and both diarrhoea and malaria, with children suffering from these illnesses having higher likelihood of malnutrition than those without the illnesses (diarrhoea, 1.8 times more likely and malaria, 2.2 times more likely to be malnourished). This is relevant to the synergistic causal linkage between malnutrition and disease prevalence with the occurrence of one aggravating the other. The diseases affected the already food insecure population, resulting in poor health and nutrition status of the population. The high prevalence of malaria was, however, explained by the increases in mosquitoes following the start of Gu rains.

The survey results indicate that almost all children (99%) sought some kind of health care assistance outside the home when sick. However, less than half (45%) were taken to public facilities (MCH and the health posts) while a significant proportion was taken to the traditional healers (31%) for attention. About 24% were taken to private clinics. Visits to the traditional healers were attributed to poor access to the public facilities. Qualitative information further reveals that distance travelled to access health services in villages with and those without health posts. With only 17 operational health posts and one MCH centre in the district, there is a significant population which does not easily access health services. Out of the 30 randomly selected clusters, twelve had health posts while three were from the Berdaale town where the MCH is located. Reports of slightly higher cases of measles, tuberculosis, whooping, malaria and diarrhoea in the villages without health posts were made, in the process of quantitative data collection. The low coverage of measles immunization coverage was mainly in villages with poor accessibility to health services. IMC operates in a few villages in comparison to the area covered by the survey. Additional information on immunisation coverage in areas with services would be indicated in an EPI coverage survey conducted by UNICEF and IMC at the same time of this nutrition survey.

Child care practices

The poor access to health services compromises childcare. Substantial proportion of mothers and children cannot easily access the health services just like in many other parts of Somalia. This implies delayed healthcare provision in case of sickness. With the high reports of disease prevalence and the existing gaps in the health service provision, particularly where there are no health posts and mobile teams does not visit; there is increased risk to disease. With the engagement of the mothers in the farming activities (weeding mainly), caring responsibilities is sometimes left in the hands of the siblings. Breastfeeding on demand is therefore not possible all the time. This implies inadequate breastfeeding to children as mothers might not be available. Though many children breastfeed until they are over one year (94.7% of 645), an equally high proportion (93.7%) is introduced to complementary foods while less than 6 months. Exclusive breastfeeding seem unpopular with the caretakers portraying inadequate knowledge on the benefits of breast milk. The statistically significant association between malnutrition and both lack of adequate breastfeeding and frequency of feeding indicates that element of poor care practices could also be important in explaining malnutrition in the district. Although 91.7% of the surveyed children report eating at least thrice a day, quality and even quantity of the food may not be assured. Qualitative

findings reported limited food diversity with mainly cereals prepared for meals as milk was very scarce in the district over the past few seasons.

Nutritional status

With the poor crop harvest in the 2001 *Gu* season followed by crop failure in the *Deyr*, the population was in a precarious food security position with acute milk shortage which might have exposed them to high risks of malnutrition. Towards the end of 2001 and in the early part of 2002, milk principally was not available at the household level. Other animal products (like meat) were also scarce. This implied reduced protein intake as well as limited food diversity for the children. The search for water, during the dry period just before the onset of 2002 *Gu* rains, by the mothers or the care takers compromised childcare hence increased risk of malnutrition.

The survey revealed a high and unacceptable global acute malnutrition rate of 17.1% and a severe acute malnutrition rate of 3.5%. This survey results was substantial rise in the level of malnutrition when compared to a global rate of 12.4% reported barely two years ago in a district survey conducted by UNICEF in collaboration with IMC in December 2000. Clearly, the nutrition situation had slipped considerably in a negative direction. Data from SRCS-sponsored MCH had also been indicating relatively high levels of malnutrition since late 2001 (reported in the elsewhere in this report). For example of the over 330 children screened at the facility in March 2002, at least 35% were malnourished. Though not statistically significant, slightly more males were malnourished than females. This may need further investigation in the context of gender activities and roles. There was an overall shift of the Berdaale population to the left of the reference population (the reference curve) indicating a poorer nutritional situation of the whole population in comparison to the reference population (Figure 1).

Younger children (less than two years) were significantly more malnourished than older children (the more than two years of age). Specifically, children aged 12-23 months were significantly more malnourished when compared to other age categories. It is worth noting that this age group is quite critical as it is when children stop breastfeeding and increasingly depend on family foods which are in most cases inadequate in both quantity and quality. Childcare is also a major issue in this age group as incidences of childhood diseases is normally higher at this tender age. Weaning practices are particularly poor especially when households are not food secure. Limited accessibility to health care services only exacerbates poor child caring aspects. These problems were acute during the previous *jilaal* as water and food was inadequate to ensure the basic upkeep in most households. The possibility of reduced time the child stays with the mother/caretakers as they struggle to get food for the other family members compromise childcare considerably increased. While children in this age group mainly depend on what is available at household level, their counterparts in the older age category do normally have opportunity to eat in neighbour's household intently or through adventures and interaction with others in the neighbourhood. This is also a crucial period in child growth when adjusting to the family diet.

Qualitative data furthers indicated feeding of the newborns with sugar solution and animal milk. This has negative implication on the immunity of the newborns that could be falling ill quite often. By discarding the colostrum, mothers deny children a boost to their immunity. The high prevalence of diseases particularly the ARI, malaria and diarrhoea pose a health challenge to the population of Berdaale hence malnutrition. Same diseases, among others, are reported at the MCH on regular bases. High malnutrition especially in the younger age group was therefore bound with these negative child care practices.

Most of the water catchments were empty during the dry seasons and the wells had little or no water. During that last dry season, the water quality and quantity in the district was low. The quantity of water utilised by the household reduced implying lowered hygienic standards at the household level. With the onset of the rains, sanitation in the villages particularly those with little access to toilet might have further deteriorated. About 83% of the children came from households without toilet facilities hence possibility of sanitation related diseases like diarrhoea could be there. Though, wells are not the main water source, water chlorination in the wells is done in the district. Catchments are the main water points and are usually filled by run off during wet seasons. Run offs carry along with it dirt and other contaminants hence water quality utilized cannot be guarantee.

Malnutrition in Berdaale is indirectly related to food insecurity through the additional stresses placed on households, the economic hardships resulting economic slowdown witnessed in Somalia following the September 1st incident (closure of banks), reduced employment opportunities, population movement and reduced access to adequate health services and supplies of clean water. The cause of malnutrition in Berdaale is multi-factorial and thus requires combined strategies to address.

5 RECOMMENDATIONS

The current situation in Berdaale warrants intervention and it is recommended for action to be taken for mitigation purposes. Some of the recommendations include:

- The suspended supplementary feeding programmes through the MCH need revived.
- Consulted efforts to render health services (medication and EPI) to all the main villages in the district

need to be considered.

- Emphasize on health and nutrition education component at the MCH level.
- The international community need to be made aware that, though Berdaale is in a high potential agricultural area, it has been unfortunate climatically and has vulnerable population that needs attention.
- There is need for a therapeutic centre within Bay Region where the severely malnourished children identified in the area can be referred.
- There is need for intensified nutrition and disease surveillance in the district.
- Food processing and preservation technology need to be employed and made available to the community to improve storage of food during good harvest season.
- Further study to increase understanding on the feeding habits for the children is needed.

Appendix 1: Standardizations tests summary

		Children													
		A		B		C		D		E		F		G	
		1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2nd	1st	2 nd
Team 1	Cm	75.1	75.3	68.0	67.0	102.0	102.1	89.4	89.0	83.4	83.2	86.1	86.3	69.3	69.7
	Kg	6.9	6.9	5.9	5.9	15.4	15.5	10.6	10.6	10.5	10.6	10.2	10.3	7.0	6.9
Team 2	Cm	75.2	75.2	67.6	67.6	102.0	102.0	89.0	89.1	83.3	82.2	86.0	86.2	69.4	69.5
	Kg	6.9	6.7	5.9	5.9	15.4	15.4	10.6	10.7	10.4	10.2	10.1	10.2	7.0	6.8
Team 3	Cm	74.9	74.8	67.7	67.7	101.0	102.3	88.7	88.8	83.4	83.3	86.1	85.5	69.8	69.3
	Kg	6.9	6.9	5.9	6.0	15.6	15.4	10.7	10.9	10.3	10.4	10.2	10.2	6.8	6.7
Team 4	Cm	74.5	74.9	67.7	67.7	102.0	102.0	87.5	88.5	83.3	82.3	85.2	86.2	69.4	70.3
	Kg	6.9	6.9	Mother refused		15.2	15.4	10.5	10.7	10.4	10.5	10.1	10.2	6.9	6.8
Team 5	Cm	74.9	74.9	67.9	67.8	102.0	102.2	88.9	88.8	83.0	82.0	86.1	86.3	69.5	69.7
	kg	6.8	6.7	6.0	5.9	15.4	15.5	10.4	10.6	10.5	10.7	10.2	10.1	6.7	6.9

Appendix 2

Traditional calendar for Berdaale District Nutrition Survey

Month	Events	1997	1998	1999	2000	2001	2002
Jan.	Beginning of Jiilal		52 Soonfur	40 Soonfur	28 Soonfur	16 Soonfur	4 Soonfur
Feb.	Mid of Jiilaal		51 Siditaal	39 Siditaal	27 Siditaal	15 Siditaal	3 Siditaal
Mar.	End of Jiilaal		50 Arafo/Dul-Xaj	38 Arafo/Dul-Xaj	26 Arafo/Dul-Xaj	14 Arafo/Dul-Xaj	2 Arafo/Dul-Xaj
Apr.	Beginning of Gu'		49 Sako	37 Sako	25 Sako	13 Sako	1 Sako
May	Mid of Gu'		48 Safar	36 Safar	24 Safar	12 Safar	
Jun.	End of Gu'	59 Mawliid	47 Mawliid	35 Mawliid	23 Mawliid	11 Mawliid	
Jul.	Beginning of Xagaa	58 Malmadoone	46 Malmadoone	34 Malmadoone	22 Malmadoone	10 Malmadone	
Aug.	Mid of Xagaa	57 Jamadul-Awal	45 Jamadul-Awal	33 Jamadul-Awal	21 Jamadul-Awal	9 Jamadul-Awal	
Sep.	End of Xagaa	56 Jamadul-Akhir	44 Jamadul-Akhir	32 Jamadul-Akhir	20 Jamadul-Akhir	8 Jamadul-Akhir	
Oct.	Beginning of Deyr	55 Rajab	43 Rajab	31 Rajab	19 Rajab	7 Rajab	
Nov.	Mid of Deyr	54 Shacbaan	42 Shacbaan	30 Shacbaan	18 Shacbaan	6 Shacbaan	
Dec.	End of Deyr	53 Ramadan	41 Ramadan	29 Ramadan	17 Ramadan	5 Ramadan	

Jiilaal
GU'
Xagaa
Deyr

Appendix 3

Population Estimates from WHO NIDS, April 2002 used in Berdaale survey

Permanent settlement	Berdaale Population Figures, April 2002			Clusters
	Temporary settlement	Total population	Cumulative Population	
SARMAANDHEER		200	200	
B/JAABOY/MORAWARABEY		800	1000	1
BUULOJADID		500	1500	
BULOFAMO		600	2100	
BIYOGUUR		500	2600	
HARANKA		400	3000	
AWBEERE		500	3500	
DUGSILOW		200	3700	2
LUUG GUDEY		200	3900	
SHINIMAAL		200	4100	
BARAYBARAY		200	4300	
MADABIIKUR		150	4450	
BAKAARO		200	4650	
IDINTA		300	4950	
BULOGADUUD		300	5250	
MOROBUS		900	6150	
	BULO ODEY	20	6170	
BULOGADUUD		500	6670	
JIROMADSHEG		400	7070	3
BULOKER		500	7570	
	WARAABALE	300	7870	
BUSLEY		300	8170	
BULOTUBAKO		400	8570	
EDEEDDA		480	9050	
GUREY		500	9550	
BAKALLE		400	9950	
GADUUDEY		400	10350	
BAGEY ASHRAF		200	10550	4
BAYOW		200	10750	
GARASKA		300	11050	
HAGARDHERE		200	11250	
BAGEY HORGOPYLOW		600	11850	
BULOSHID		200	12050	

HARERIDHERE		200	12250	
BAKAL SHELE		800	13050	
DHAYAAL		700	13750	
GALOLFUUJI		38	13788	
SUULDHEERE/GUBEY		200	13988	5
BUULOTUGEERE		200	14188	
	MADMAD	160	14348	
	BULOBAROW	100	14448	
HAWAALBILAAN		200	14648	
WARUMUROW		200	14848	
WEDIHIR		200	15048	
SARIIRTO		400	15448	
KURTEELE		200	14648	
AFWIINE		180	15828	
RAYDABA		600	16428	
ABUUROW		150	16578	
KIDHIKOY		100	16678	
BUULOGEBIR		100	16778	
TOSILOW		600	17378	6
BULO ODDO		400	17778	
AMALKA		150	17928	
KORMARI		300	18228	
BULO YUSUF		500	18728	
LOWI BIYOLE		220	18948	
TOSWEYNE		4000	22948	7
FOLFEYLE		500	23448	
QURAALOW		200	23648	
DAANIYA		600	24248	8
MAJIDO		500	24748	
BULOJADID		300	25048	
KURTUN		900	25948	
HABARWANOOD		500	26448	
GURRUNLE		500	26948	
BUULONUROW		0	26948	
TAFLAW		500	27448	9
DAANJERE		400	27848	
MOOROABIGOW		800	28648	
SANJUUREY		300	28948	
RERAWUMUROW		200	29148	
QASAALOW		500	29648	

EDED WANLE		200	29848	
BUSLEY		400	30248	
	ISAKMALIN	300	30548	
WARYUNYOW		300	30848	10
KIDHIKOY		200	31048	
EEDINLOOLI		600	31648	
BULOQURUNLE		500	32148	
UBURWIINE		500	32648	
WARGARASLE		400	33048	
REYDABAA		500	33548	
	ABDIYUUSUF	500	34048	
JIROW/ B/IDOW		150	34198	11
	WARABIKUR	500	34698	
GURUBOY		800	35498	
BULOIDOW		800	36298	
DHEJILE		600	36898	
WARGALOLE		500	37398	
KAYOW		600	37998	12
GALOLKA		300	38298	
DHAYBE		500	38798	
BULOAMIN		600	39398	
ABRANE		600	39998	
DHURSHEYNTA		300	40298	
R/AWUBREYNIBDIRAN		200	40498	
BULOABORE		30	40528	
GALOOLSAGIIR		20	40548	
BUULODUGSI		200	40748	
GOOMODI		200	40948	
ISKIRIH		100	41048	13
BUULOGARIBEY		100	41148	
BULOABIG		200	41348	
BELIDOW		200	41548	
BULODODOW		200	41748	
BULOREYDABALE		700	42448	
BULOHARERE		80	42528	
	BAKTILE	110	42638	
BULOTUGEER		200	42838	
BULOJADID		300	43138	
BUULOFIIDEY		300	43438	
DOGTUMEY		240	43678	

DAANJEREY		210	43888	
BUULOKAABEY		100	43988	
BULOHAWO		600	44588	14
BULOHUSEN		210	44798	
BULO ONJIRE		200	44998	
ISMOGAMOGEY		200	45198	
BULOQARIB		400	45598	
URUNDAHALE		100	45698	
BULOBISIG		800	46498	
BULOYAROY		300	46798	
BORAMO		200	46998	
BOGONGOOYE		300	47298	
BULOKAGOW		500	47798	15
BULOYUNIS		200	47998	
BULOGALOL		300	48298	
SHIIDLE		100	48398	
MARAAYLE		100	48498	
QASAAGI		300	48798	
HUMBOOWE		1000	49798	
LAANGARAS		50	49848	
BULOYUSUF		400	50248	
TUBO		600	50848	
ROOBEY		700	51548	16
BAGDAAD		300	51848	
BAKTIILE ****		100	51948	
BILOOSHE		60	52008	
EDEDLOW		400	52408	
BULOMADMAMUD		300	52708	
BOONYAROOY		500	53208	
DHURBIILE		500	53708	
BULOEDINDAUD		300	54008	
HAWALKALIFOW		500	54508	
BOORAMOLOWIILE		500	55008	17
BUULOQURIN 2		300	55308	
SHABEELIWIIN		300	55608	
	SHABEELIYAREY	400	56008	
WARYJUNIS		500	56508	
BULOSHEGOW		400	56908	
GUBO		500	57408	
GALLOLFUUJI		500	57908	

BIILILLE		500	58408	18
ISBILLE		200	58608	
DHALOOL		150	58758	
KORMARI		200	58958	
GADUUEY		300	59258	
ALI BAADI		300	59558	
BULOFAREY		100	59658	
SHOWKA		100	59758	
RAYDABLE		30	59788	
QASAALEY		100	59888	
UDUREY		600	60488	
SHIIDALOW 1		500	60988	
SAFARNOOLAY		200	61188	
GUUNSI		200	61388	19
ABAQGADUUD		400	61788	
MOROQASALE1		600	62388	
MOROQASALE2		600	62988	
BULOYAQUB		100	63088	
	BAYOW	120	63208	
SHIIDOLOW 2		100	63308	
KOORAR		700	64008	
TALWU		500	64508	
LIIMEY		600	65108	20
	BULOEDINKULOW	500	65608	
QANYAREY		600	66208	
JEENOLEY		150	66358	
BULOQAYLOY		160	66518	
	JAFEY YAREY	180	66698	
	GUUDIQODEEN	400	67098	
KULMIYE		500	67598	
BIYIFIDHI		80	67678	
DAAROW		450	68128	21
	QASAHOOSLE	430	68558	
BULOABAY		420	68978	
DHAAYAROY		600	69578	
	DHARGUBAAY	500	70078	
	GARASDUUFI	20	70098	
	BAKAYOW	20	70118	
BUULOENEENEY		200	70318	
HAWAALSHARIIF		100	70418	

DOODEY		100	70518	
BASHAGOW		300	70818	
GUBIDI		300	71118	
	LOWITAAG	200	71318	
SARMALABLE		200	71518	22
MUNDULSHELE		200	71718	
	ALOWMADIBDOW	200	71918	
	WEELBOOR	200	72118	
BUURYAREY		200	72318	
KIBRA		200	72518	
BIILILDAAWUD		200	72718	
HABRIIROW		500	73218	
	BANDHUUNJALE	200	73418	
	ELGARWAAL	200	73618	
TUUTES		700	74318	
KAYOW		200	74518	
DHAREENYO		200	74718	
RERAWEDIN		200	74918	23
DAAROW		200	75118	
QASALOW		200	75318	
ISDUUGDO		200	75518	
JAFEY WIINEY		800	76318	
	MALMAL	250	76568	
HOWLAHAGUUD-replaced Sumbul		1000	77568	27
EELDHEERE		450	78018	
BUULOJAFEY		450	78468	24
KURTEELE- replaced Dhuurole		800	79268	26
	MOOROSHEEB	200	79468	
QASIOOMANE		200	79668	
	SHANFARYAAD	200	79868	
DHOOBITE		400	80268	
	EDEEDRAAR	200	80468	
ALIHOOBAL		200	80668	
YURKUD		1200	81868	25
	TOORTOOROW	400	82268	
	BARBAAREES	400	82668	
QOONDHODA		400	83068	
	DUDUN	800	83868	
BEYLEY		800	84668	
DHUUROLE- replaced by Kurteele		800	85468	(26)

HAREERABOOR		800	86268	
EELDAMEER		1200	87468	
LAFMAKIDO		850	88318	
SUMBUL -replaced by Howlahaguud		800	89118	(27)
HABRIIROW 2		700	89818	
BERDALE(HORSED)		2000	91818	
BERDALE(ISHA)		2000	93818	28
BERDALE(A.GUREY)		2000	95818	29
BERDALE(WABERI)		2000	97818	
BERDALE(RAAR DOWE)		2000	99818	30
BERDALE (KORMARI)		2000	101818	
		101818		
C. I = 3394				
Random Number = 234				

Appendix 4

Malnutrition prevalence using W/H percentage of the median categories

	Males	Females	Total
GAM <80% + oedema)	10% n=48 (C.I. 7.8-13.6)	13.2% n=59 (C.I.10.2-16.7)	11.7% n=107 (C.I. 9.8-14.1)
SAM (<70% + oedema)	1.9% n=9 (C.I. 1.0-3.8)	1.8% n=1.8 (0.8-3.6)	1.9% n=17 (C.I. 1.1-3.0)
Oedema	0.3% n=3	0.6 n=5	0.9 n=8

Appendix 5: Questionnaire