NUTRITIONAL ANTHROPOMETRIC AND MORTALITY SURVEY

FINAL REPORT

MANDERA CENTRAL DISTRICT

MANDERA COUNTY, KENYA

APRIL 2013

By Save the Children International

Acknowledgements

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List of abbreviations and acronyms

ADRA	-	Adventist Development Relief Agency
ALRMP II	-	Arid Lands Resource Management Project II
APHIA	-	Aids Population Health Integrated Assistance Project
ASAL	-	Arid and Semi-Arid Lands
CDR	-	Crude Death Rate
COCOP	-	Consortium of cooperating partners
CI	-	Confidence Interval
CMR	-	Crude Mortality Rate
CSB	-	Corn Soya Blend
ENA	-	Emergency Nutrition Assessment
EPI	-	Extended Programme of Immunization
GAM	-	Global Acute Malnutrition
GFD	-	General Food Distribution
HAZ	-	Height-for-Age Z-score
HINI	-	High Impact Nutrition Interventions
HSNP	-	Hunger Safety Net Project
KFSSG	-	Kenya Food Security Steering Group
L/HAZ	-	Length/ Height for Age –Z-score
MOH	-	Ministry of Health
MUAC	-	Mid-Upper Arm Circumference
NEP	-	North Eastern Province
OPV	-	Oral Polio Vaccine
OTP	-	Out-patient Therapeutic Program
PPS	-	Population proportional to Size
SAM	-	Severe Acute Malnutrition
SC	-	Stabilization Centre
SD	-	Standard Deviation
SFP	-	Supplementary Feeding Programme
SMART	-	Standardized Monitoring and Assessment of Relief and Transitions
U5MR	-	Under Five-Mortality Rate
UNICEF	-	United Nations Children's Fund
URTI	-	Upper Respiratory Tract Infection
WAZ	-	Weight-for-Age Z-score
WFP	-	World Food Programme
WHM	-	Weight for Height Median
WHO	-	World Health Organization
WHZ	-	Weight-for-Height/length Z-scores

Executive summary

Mandera Central is one of the districts that form part of the Mandera county and is one of the 19 districts gazetted as part of the Arid and Semi-Arid Lands of Kenya (ASAL). The district is located in the North West horn of Kenya bordered by Mandera East District and Somalia to the east, Mandera West District and Wajir North District to the west, Wajir District to the south and Ethiopia to the north. The town of El Wak is the District headquarter, which administratively consists of 5 divisions including El Wak, Qalanqalesa, Shimbir Fatuma, Wargadud and Kotulo.

The district experiences chronic food insecurity and high incidences of malnutrition. Predictable rainy and dry seasons can no longer be counted upon to provide adequate dry season grazing and water for pastoral populations, whose resilience is increasingly eroded by broader economic factors in the region. Food aid continues to be a key source of food for a majority of the population. Estimated population size for the district is 63,025 with the people being sparsely populated.

Residents are mainly from the Somali community speaking the Garre language. The main livelihood activity in the district is pastoralism with a number of Peri-urban destitute (PUDs) who have dropped out of pastoralism due to loss of livestock to shocks and settled near urban centres.

Since 2007, Save the Children (SC) operates in all the 5 divisions. Within the divisions, there are a total of 7 GOK health facilities including El Wak district hospital. Save the Children is currently supporting the MOHto deliver health packages to the community. This support is mainly through system strengthening and capacity building with the aim of contributing to the reduction of the incidence of malnutrition and related morbidity and mortality in the county. Water, Sanitation and Hygiene (WASH) is also a component of the Health and Nutrition funded projects targeting mainly the health facilities by rehabilitation of the water and sanitation facilities.

Area covered

Save the Children in conjunction with the Ministry of Health have been carrying out nutrition activities in Elwak, Shimbir Fatuma, Qalanqalesa, Wargadud and Kotulo divisions in Mandera Central District since August 2007. Recent nutrition surveys have been conducted in the District around the same period (March and April) since 2006 in order to evaluate impact of programing and as well serve as a surveillance system. This particular survey was conducted between 15th and 25th April 2013.

Goals and objectives

Overall Goal

The overall goal of this survey was to assess the health and nutritional status of children less than 5 years of age. The survey results will constitute the nutrition surveillance system as well as provide information for program planning.

Specific Goal

The survey aimed at estimating;

- The prevalence of acute and chronic malnutrition in children aged 6-59 months;
- The nutrition status pregnant women and mothers with children <5 years ;
- The proportion of households with access to improved water and sanitation;
- The coverage of the general food distribution in terms of frequency and content;
- The food availability and access at HH level;
- The coverage of measles and BCG vaccination among target children;
- The coverage rate of Vitamin A. capsules distribution;

- The morbidity rates children 6-59 months and pregnant women and mothers with <5 years children 2 weeks prior to the survey;
- Data on child care and feeding practices;
- To recommend appropriate interventions based on the survey findings;

Methodology

Two different sampling methodologies were applied. Emergency Nutrition Assessment (ENA) for Standardized monitoring of Relief in Transitions (SMART) was used to calculate anthropometry samples while IYCF multi survey sampling calculator was used to calculate IYCF sample. Proportion to Population Size (PPS) was used to identify clusters within a study area after collecting population data from all villages/ sub locations that were considered as clusters.

The target children for the anthropometric survey were children aged 6-59 months while that for IYCF was children aged 0-24 months. The total sample size of households was arrived at by collating both the Anthropometry and IYCF Samples. The final sample size was 518 households from 35 clusters.

Data was collected on anthropometry, morbidity, vaccination and de-worming status, Vitamin A supplementation, hygiene and sanitation practices, IYCF, food security and livelihoods. This data was triangulated with feeding programme data to help in the interpretation of results. A total of 331 households were visited and 409 children from 6-59 months were assessed for anthropometry and other indicators.

Anthropometric data was analysed using ENA software beta Version 24th November 2012. IYCF data was analysed on Excel while qualitative and quantitative data was analysed using the EPIINFO software.

Main survey results

Table 1: Results Summary

Characteristic	N	n	% (95% CI) 2013	%(95%CI) 2012
GAM (WFH <-2 Z score or presence of oedema) - WHO 2006	408	84	20.6%(16.2-25.8)	17.9% (14.9-21.4)
SAM (WFH <-3 Z score or presence of oedema) - WHO 2006	408	16	3.9 % (2.0-7.6)	3.5% (2.1- 5.3)
Prevalence of GAM by MUAC (<12.5cm)	409	35	8.6%(6.0-12.1)	10.1% (7.7-13.1)
Proportion of children sick two weeks prior to survey	406	135	33.3%	38.6%
Proportion of caretakers seeking medical care when child is ill	120	90	75.0%	94.8%
BCG Scar	409	406	99.3%	94.0%
Measles immunization (card and confirmation)	409	359	87.8%	96.0%
OPV1 immunization (card and confirmation)	409	408	99.8%	97.0%
OPV3 immunization (card and confirmation)	406	402	99.0%	94.0%
Vitamin A supplementation coverage (>12 month) -1 time		125	57.6%	47.0%

Vitamin A supplementation coverage (>12 month) -2 times		157	49.5%	38%
Vitamin A supplementation coverage (6-11 months)- 1 time	75	56	74.6%	82%
Proportion of children >1 year de-wormed 1 time	409	100	25.1%	38%
Proportion of children >1 year de-wormed 2 time2	409	67	16.8%	37%
Iron-folate Supplementation for pregnant mothers	228	23	38.3%	46.5%
Appropriate hand-washing with soap/ash	508	210	26%	47.5%
Proportion of children 6-59 months supplemented with Zinc the last time they had diarrhoea	22	1	4.5%	1.2%
IYCF Key Indicator – Timely Breast-feeding Initiation	419	383	91.4%	86.1%
IYCF Key Indicator - Exclusive Breastfeeding	207	120	57.9%	51%
IYCF Key Indicator - Minimum Dietary Diversity 6-23 BF >3 foods	147	13	8.8%	54%
IYCF Key Indicator - Minimum Dietary Diversity >4 foods NBF	147	13	18.5%	35%
IYCF Key Indicator – meal frequency 6-8 months 2 times	41	14	34.1%	70%
IYCF Key Indicator – meal frequency 9-23 months >3 times	106	56	52.8%	69.2%
IYCF Key Indicator – meal frequency 6-23 months NBF >4 times	65	12	44.6%	60%

Results summary for water, hygiene and sanitation

Table 2: Water, Hygiene and Sanitation result summary

Sources of Water	**2013**	**2012**
Borehole	30.8%	33.9%
Unprotected well	25.1%	29.1%
Dam	9.9%	18.3%
Protected well	15.9%	7.3%
Water tap	10.5%	6.3%
Water tracking	0.9%	4.9%
Laga	2.7%	
Public Pan	4.2%	
WATER TREATMENT		
Nothing	92%	94.3%
Use of chemicals	6%	6.6%
Boiling	2%	1.9%
ACCESS TO A TOILET FACILITY		
Yes	43.8%	48.5%

IF NO TOILET WHAT WAS USED		
Bush	90.6%	78%
HANDWASHING PRACTICES		
Before eating food	57.5%	83.2%
After visiting toilet	38.4%	75%
After cleaning children's bottoms	16.5%	64.5%
Before preparing food	49.8%	66%

The prevalence of malnutrition in Mandera Central is still above the emergency threshold with Global Acute Malnutrition (GAM) of 20.6% (16.2-25.8 95% C.I.) and Severe Acute Malnutrition (SAM) of 3.9 % (2.0-7.6 95% C.I.). The malnutrition prevalence rates are higher than they were in 2012 which indicated GAM prevalence of 17.9% (14.9-21.4 95% C.I.) and SAM rate of 3.5% (2.1- 5.3 95% C.I.). This increase was however insignificant in the GAM rates since the p value is (p=0.457) while that of SAM was (p=0.74) indicating an insignificant increase.
The levels of immunization (OPV1&3, Measles, BCG) were within the recommended national levels of above 80% both by card and recall. Other HINI indicators like use of zinc in the management of diarrhoea, deworming and vitamin A supplementation for the 12-59 months were however below the recommended HINI thresholds while IYCF practices were poor with high proportions of children not receiving optimal feeding practices apart from initiation of breastfeeding and exclusive breastfeeding practices which met the HINI recommendations of 80% and 50% respectively. Hygiene and sanitation practices were also not up to scale with a decrease in hand washing practices at critical times in the 2013 survey as compared to findings in 2012. .

Recommendations

Table 3: Action points

Issue	Possible causes	Recommendation	By who
GAM levels above emergency threshold of 15%	Poor WASH indicators Poor IYCN indicators (Meal frequency and dietary diversity) Poor dietary diversity at HH level High morbidity especially ARIs and diarrhoea which have a bearing on nutrition status. Lack of staffing in hospitals and health centres (only three nurses currently in the district Poor infrastructure	Community WASH interventions HR issues in the district to be addressed Improvement on the infrastructure to address the issues of access to food in the markets. Explore use of kitchen gardens	GOK SCI MOA
Poor IYCF practices especially meal frequency and dietary diversity	Access and cost of food in the market. Cultural beliefs and practices	Strengthening mother support group linkages for referrals within the communities in order to improve IYCF practices.	MOH SCI

Marginal decline in appropriate hand-washing practices(from 47% to 35%)	Reduced coverage of hygiene promotional messages due to less outreaches and reduced staffing	The promotion of home improvised hand washing stations to sustain hand washing practices (through CHWs)	MOH SCI
Poor water treatment practices about 90% of the respondents did nothing to their drinking water	Dislike of after taste of chemical treatment Impatience during water treatment	Strengthening hygiene promotion awareness on the importance of environmental and personal hygiene. Strengthen Water quality surveillance to identify safety of water in use in the district	SCI MOH
Low toilet coverage (about 44%)	Poverty Ignorance and high dependency on donor funded activities Poor infrastructure	Training and advocacy on CLTS, Sensitization of community leaders on use latrines. This will also include promotion of positive behaviour change	SCI MOH

1.0. Introduction

Geography

Mandera Central is one of the districts that form the Mandera County and is one of the 19 districts gazetted as part of the Arid and Semi-Arid Lands of Kenya (ASAL). The district is located in the North West horn of Kenya bordered by Mandera East District and Somalia to the east, Mandera West District and Wajir North District to the west, Wajir District to the south and Ethiopia to the north. The town of El Wak is the District headquarter, which administratively consists of 5 divisions including El Wak, Qalanqalesa, Shimbir Fatuma, Wargadud and Kotulo.
The district experiences chronic food insecurity and high incidences of malnutrition. Predictable rainy and dry seasons can no longer be counted upon to provide adequate dry season grazing and water for pastoral populations, whose resilience is increasingly eroded by broader economic factors in the region.

The estimated population for the district is 63,025[1] with the people being sparsely populated. Residents are mainly from the Somali community speaking the Garre language. The main livelihood activity in the district is pastoralism with a number of Peri-urban destitutes (PUDs) who have dropped out of pastoralism due to loss of livestock to shocks and settled near urban centers.

The district has one main road connecting the district to other districts in the province (Wajir East and Mandera East) and other minor roads to the divisions and to Mandera West. The roads are however in bad condition rendering them impassible especially during the rainy season.

Save the Children operates in all the 5 divisions. Within the divisions, there are a total of 7 operational GOK health facilities including El Wak district hospital. Worth to note however is that , out of the seven health facilities, currently 3 are not fully operational due to transfer of the skilled staff with only CHWs left to provide minimal services.
In the course of its work, Save the children has supported the MOH in implementing integrated Health and Nutrition programmes, and has also a food security and livelihood support projects to vulnerable households in Mandera and Wajir Districts through DFID funded HSNP project. Under the health and nutrition project there is a component of Water, Sanitation and Hygiene (WASH) mainly targeted at the health facilities by rehabilitation of water and sanitation facilities. The projects utilize integrated approaches to address immediate and underlying causes of malnutrition.

[1] Projected 1999 data

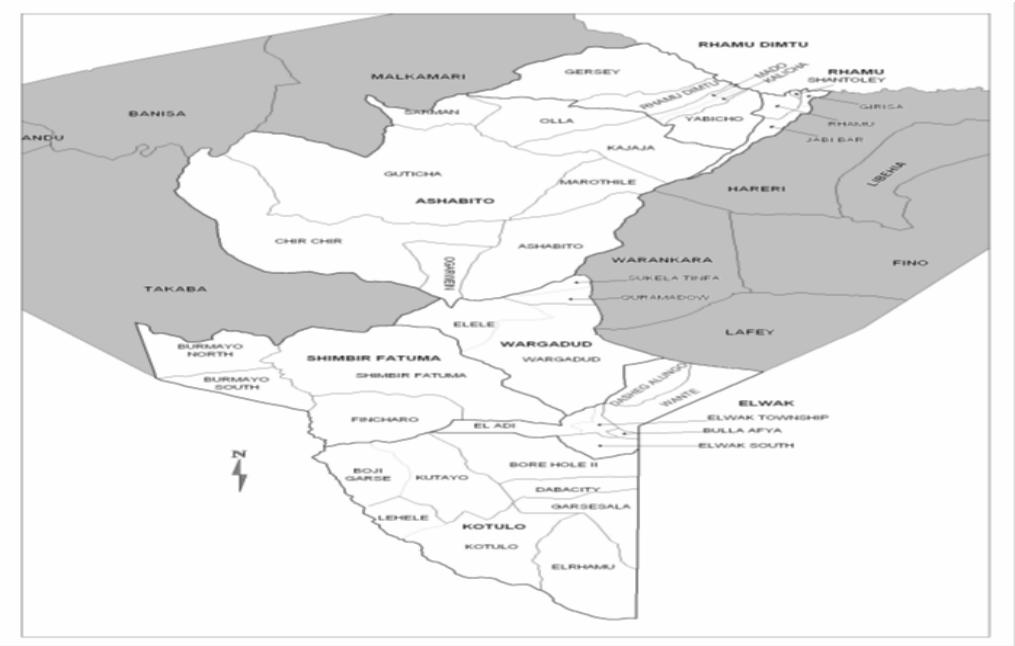

Figure 1: Map of Mandera County indicating 5 divisions of Mandera Central District

Current climatic conditions and food security

Mandera County has been facing perennial food insecurity and high malnutrition rates for the past decade, as a result of extreme and unpredictable climate, characterized by a succession of drought and floods. In the past, drought cycles were every 10 years and now due to climate change, the region has experienced drought nearly every 2-3 years.

The district has been experiencing recurrent droughts which have increased in frequency during the last 10 years with the worst being experienced in 2011 in the Horn of Africa. The droughts have had a devastating impact on the traditional livelihoods of pastoralist populations in the area, resulting in erosion of assets and undermining of the livelihood strategies. This has culminated in chronic levels of acute malnutrition and an increased poverty and food insecurity.

Table 4: Seasonal Timeline

Short Dry Spell (Jilaal)			**Long Rainy season (Gu')**			**Long Dry Spell (Hagai)**				**Short Rainy Season (Deyr)**	
Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Migration, Conflicts, Watering of Livestock, Pressure on boreholes			Pasture Surveys, mating season, Planting			Livestock diseases, Labour Demand			Calving, Kidding Period	Migration, Conflict	

Humanitarian Response in Mandera

SCI has been implementing programmes in Mandera Central district since 2007. SCIs current integrated approach includes; Nutrition, Health, Food security and Livelihoods Support programmes and aim to address the underlying causes of malnutrition through strengthening health systems, treatment for acute malnutrition and enhancement of household food security and livelihoods in the medium term while at the same time linking these to long term livelihood strategies. The World Food Programme (WFP) through Consortium of Cooperating Partner's (COCOP) has been carrying out general food distribution (GFD) in this area. The GFD food basket provides a 75% ration scale of 2,100Kcal/person/day based on UNHCR/UNICEF/WFP/WHO Guidelines for Food and Nutrition Needs in Emergencies. The

Ministry of Special Programmes through the District Commissioner's office occasionally supplies food to the region and this is usually divided equally among the divisions. School feeding programme is also available in all government schools which is run by WFP. Other actors on the ground include: **ADRA** providing health services, **Kenya Red Cross society** undertaking emergency relief operations and **APHIA IMARISHA** who have been supporting the MoH in combating HIV /AIDS and in matters related to reproductive health.

Table 5: WFP Food Basket Commodities

Commodity	Ration Sizes
Cereals	10.35 kg
Pulses	1.8 kg
CSB	1.2 kg
Vegetable Oil	0.6 kg
Salt	0.15 kg

Specific Objectives

The survey aimed at estimating;

- The prevalence of acute and chronic malnutrition in children aged 6-59 months;
- The nutrition status of pregnant women and mothers with children <5 years ;
- The proportion of households with access to improved water and sanitation;
- The coverage of the general food distribution in terms of frequency and content;
- The food availability and access at HH level;
- The coverage of measles and BCG vaccination among target children;
- The coverage rate of Vitamin A. capsules distribution;
- The morbidity rates children 6-59 months and pregnant women and mothers with <5 years children 2 weeks prior to the survey;
- Data on Child care and feeding practices;
- To recommend appropriate interventions based on the survey findings;

2.0. Methodology

2.1. Geographic target area and population group:

The nutrition survey covered the 5 divisions of Mandera Central District. Areas covered included Kotulo, Qalanqalesa, Wargadud, Shimbir Fatuma and El wak divisions. The assessment target was children aged 6-59 months. The survey area forms part of the North Eastern Pastoral livelihood zone where households depend on livestock rearing as their main source of livelihood. Recently due to a decline in livestock numbers, poorer households have had to turn to casual work and bush product sales and the population has become increasingly sedentary. The main sources of income also range from casual work like digging of water pans, herding and construction and self-employment activities like selling firewood and charcoal.

2.2. Survey Sampling:

Two different sampling methodologies were applied; Emergency Nutrition Assessment (ENA) for Standardized Monitoring of Relief and Transition (SMART) was used to calculate anthropometry samples while IYCF multi survey sampling calculator was used to calculate for IYCF sample. A 2 stage cluster sampling method with Probability of Proportion to Population Size (PPS) was used to identify clusters within a study area after collecting population data from all villages that were to be considered as clusters.

2.2.1. Sample size calculation

The sample size for the anthropometric survey was calculated using the SMART survey calculator in the ENA software. The projected population size for 2013 for the district was used as the sampling frame. The population was obtained from the District development officer. For the infant young child nutrition, IYCF sample size calculator recommended in the Kenya Nutrition survey guidelines[2] was used as shown below.

2.2.2. Parameters used in Anthropometry Sample size calculation

The malnutrition/anthropometric sample size will be based on the following parameters:

1) The estimated prevalence of malnutrition is 16.7%[3]
2) The design effect is 1.29[4]
3) Precision of 5%[5]
4) Average household size 5.2[6]
5) Proportion of under-fives 26.7%[7]
6) Population of under-fives per household 1.4[8]

Using the above parameters, the sample for anthropometry was arrived at as shown in the table below;

Table 6: Final sample size

Estimated prevalence	Precision	Design effect	% of none response	Sample size anthropometry	HH anthropometry.	HH based on IYCF sample	No of HH per day	No. of clusters
16.7%	5%	1.29	3%	300	248	518	15	35

[2] Kenya Nutrition Survey Guidelines Final Version 2012
[3] Based on Nutrition November Survey 2012
[4] Based on Nutrition Survey November 2012
[5] Following Kenya National Survey Guideline
[6] Based on Nutrition Survey November 2012
[7] Based on Nutrition Survey November 2012
[8] Based on Nutrition Survey November 2012

2.2.3. IYCF sample Calculation

Table 7:IYCF Sample Calculation

Indicator	Estimated prevalence	± desired precision	Design effect	Sample size in no of children	Average household size	% children under 5	% non-response households	Households to be included
Exclusive breastfeeding	58.67	8	1.29	204	All Children to be included			
Timely initiation of breastfeeding	98.59	8	1.29	12	5.2	26.7	3	22
Minimum dietary diversity	38.74	8	1.29	200	5.2	26.7	3	495
Minimum meal frequency	54.05	8	1.29	209	5.2	26.7	3	518

From the figures above, 204 children were included in the survey for the exclusive breastfeeding indicator. Since 35 clusters were to be covered for the survey, these children were equally distributed per cluster giving rise to 7 children 0-5M per cluster. Initially these children were sought in the houses where anthropometry was undertaken; however, in case they are not found from the selected households, they were selected purposively. On the other IYCN indicators, since minimum dietary frequency had the highest number of children 0-23 sampled (209) it was considered translating to 7 children 0-<24 months per cluster. Comparing the number of HH from the IYCN and anthropometry, the IYCN sample size is higher and therefore this number of HH (518) was considered.

2.3. Sampling Procedure: Selecting household and children

The second sampling stage comprised of the household selection. Only the randomly sampled villages were assessed during data collection. Systematic Random Sampling method was used in the selected villages to select households to be assessed. An updated list of the household heads in the selected villages was obtained from the village chiefs and the recently concluded Hunger Safety Net Program (HSNP) registration exercise data base. A sampling interval was obtained by dividing the total households in the survey area by the household sample size per cluster. The first household was chosen randomly using ENA for SMART and the subsequent households were visited systematically using the sampling interval.

A household was defined as a group of people who lived together and shared a common cooking pot. In polygamous families with several structures within the same compound but with different wives having their own cooking pots, the structures were considered as separate households and assessed separately. All children aged 6-59 in every household visited were included in the anthropometric survey and 0-24 month category included in IYCF survey. In cases where there was no eligible child, a household was still considered part of the sample and its household data was collected. If a respondent was absent during the time of household visit, the teams left a message and re-visited later to collect data for the missing person, with no substitution of households allowed.

2.4. Case definitions and inclusion criteria

2.4.1. Children's data

2.4.1.1. Anthropometric data:

Age: the age of the child was recorded based on a combination of child health cards, the mothers'/caretakers' knowledge of the birth date and use of a calendar of events for the district developed in collaboration with the survey team.
Sex: it was recorded whether a child was male or female.
Bilateral oedema: normal thumb pressure was applied on the top part of both feet for 3 seconds. If pitting occurred on both feet upon release of the fingers, nutritional oedema was indicated.
Weight: the weights of children were taken with minimal or light clothing on, using UNICEF Salter Scales with a threshold of 25kgs and recorded to the nearest 0.1kg.
Length/height: children were measured bareheaded and barefooted using wooden UNICEF height boards with a precision of 0.1cm. Children under the age of two years were measured while lying down (length) and those over two years while standing upright (height). If child age could not be accurately determined, proxy heights were used to determine cases where height would be taken in a supine position (<87cm) or in an upright position (≥87cm). Height rods with a marking at 87cm were used to assist in determining measuring position.
Mid Upper Arm Circumference (MUAC): the MUAC of children was taken at the midpoint of the upper left arm using a MUAC tape and recorded to the nearest 0.1cm.

2.4.1.2. Retrospective morbidity of children:

The caretaker with the child at the time of the survey was asked to recall if the child had any illness in the 2-weeks prior to the survey.

2.4.1.3. Vaccination status and coverage:

For all children 6-59 months, information on Pentavalent 1 and Oral polio Vaccine (OPV) 1 and Pentavalent 3 and OPV 3 and measles vaccination was collected using health cards and recall from caregivers. The vaccination coverage was calculated as the proportion of children immunized based on records and recall.
BCG: For all children 6-59 months, the information was collected by checking whether the characteristic BCG scar was present or not.
Vitamin A supplementation status: For all children 6-59 months of age, information on Vitamin A supplementation was collected using the child welfare cards and recall from caregivers. Information on how many times the child had received supplementation in the last 6 months was collected. Vitamin A capsules were also shown to the mothers to aid in recall.
De-worming status: Information was solicited from the care takers as to whether their child/children 6-59 months had been de-wormed in the last 3 months. A local calendar of events was used to refer to 3 months recall period.

2.4.1.4. Infant and Young Child feeding (IYCF)

Data on IYCF was collected from children aged 0-24 months and was based on mothers recall of feeding practices including a 24 hour dietary recall.

2.5. Causes of malnutrition data

Secondary data on causes of malnutrition was mainly obtained from previous surveys undertaken in the area.
Primary data on the causes of malnutrition was obtained from interviewing mothers/caretakers of children based on the household questionnaire that contained questions of water sources and hand washing practice, main sources of food and income, use of mosquito nets, dietary diversity

and nutritional status of mothers/caretakers. The questionnaires were based on the national guidelines for nutritional assessments in Kenya, and modified slightly to collect context specific data for Mandera Central. Data was collected from 331 households.
Government officials and other NGOs working in the area were visited to provide information on the on-going interventions in the area.

2.6. Nutritional Status Cut-off Points

The following nutritional indices and cut-off points were used in this survey:

2.6.1. Weight-for-height (WFH) and MUAC – Wasting for Children

Wasting reflects the current health/nutritional status of an individual. The results on wasting are presented as Global Acute Malnutrition (GAM) and Severe Acute Malnutrition (SAM):

- Children whose WFH Z scores fell below -2 standard deviations from the median of the NCHS reference population/WHO standards or had bilateral oedema were classified as wasted (to reflect GAM)
- Children whose WFH Z scores fell below -3 standard deviations from the median of the NCHS reference population/WHO standards or had bilateral oedema were classified as severely wasted (to reflect SAM)
- Children whose WFH indices were <80% of the NCHS median or had bilateral oedema were classified as wasted (to reflect GAM)
- Children whose WFH indices were <70% of the NCHS median or had bilateral oedema were classified as severely wasted (to reflect SAM)

2.6.2. Weight-for-age (WFA) – Underweight

The measure of underweight gives a mixed reflection of both the current and past nutritional experience by a population and is very useful in growth monitoring.

- Children whose WFA Z scores fell below -2 standard deviations from the median of the NCHS reference population or had bilateral oedema were classified as underweight
- Children whose WFA Z scores fell below -3 standard deviations from the median of the NCHS reference population or had bilateral oedema were classified as severely underweight.

2.6.3. Height-for-age (HFA) – Stunting

Height-for-age is a measure of linear growth and therefore an unequivocal reflection of cumulative past nutritional inadequacy.

- Children whose HFA Z scores fell below -2 standard deviations from the median of the NCHS reference population were classified as stunted (to reflect Global Stunting)
- Children whose HFA Z scores fell below -3 standard deviations from the median of the NCHS reference population were classified as severely stunted.

2.6.4. Mid upper arm circumference (MUAC)

The guidelines used for < MUAC for under- fives was as follows;
MUAC < 11.5 cm severe malnutrition and high risk of mortality
MUAC _ 11.5 cm and <12.5cm moderate malnutrition
MUAC _12.5cm and < 13.5 cm moderate risk of malnutrition
MUAC _ ≥13.5 cm satisfactory nutritional status
The cut-off point for pregnant women's MUAC was < 23.0 cm and that of non-pregnant women <21.0 cm (as indicators of delineating energy deficiency) according to SPHERE standards[9]

[9] The SPHERE Project Handbook (2004). Humanitarian Charter and Minimum Standards in Disaster Response.

Table 8: Maternal MUAC Cut-off Points

Nutritional status	Pregnant	Non-pregnant
Normal	≥ 23.0cm	≥ 21.0cm
GAM	< 23.0cm	< 21.0cm
Severe wasting	< 20.7cm	< 18.5cm

2.7. Questionnaire, training and supervision

2.7.1. Questionnaire

The standard nutrition survey questionnaire as recommended in the nutrition guidelines was adapted to include additional information on the high Impact nutrition interventions. The IYCF questionnaire as recommended in the CARE IYCF step by step guide was used to collect information on IYCF.

The questionnaire was developed in English and the enumerators trained on the questionnaire. During the training session, the enumerators translated the questionnaires as they would ask during data collection and an agreed way of asking the questions during data collection was agreed upon. The questionnaires were not translated into Somali language however, all interviews were conducted in Somali language. The questionnaire was pre-tested a day before the actual survey began and the final questionnaire used is annexed in the report. Findings from the pretest were used to modify the questionnaire accordingly. The pilot area was not included in the clusters to be surveyed.

2.8. Survey teams and supervision

The survey was executed by 6 teams each comprising of 1 team leader and 2 anthropometric measurers. Three of the team leaders were from Ministry of Health (MOH), one from the District development Office and two from Save the Children.

The survey was led and supervised by trained staff from Save the Children. The anthropometric measurers were recruited from the district and spoke the local language as well as English. The measurers were required to be literate and at least have completed high school to participate in the study. The team leaders were practitioners either in health, food security and nutrition and were sourced from the government and Save the Children. The survey was supervised by the nutrition technical specialist and the Nutrition Coordinator from Save the Children.

2.9. Training

Training for the survey teams was undertaken by Save the Children staff (the nutrition technical specialist). The training was undertaken for 3 days and covered an introduction to nutrition and nutrition assessments, the survey objectives, anthropometric measurements, household selection procedures, data collection and interviewing skills and the survey questionnaire. The anthropometric standardization exercise, as recommended by the SMART methodology was undertaken with 10 children, each measurer taking measurements on each child twice. Each enumerator was closely observed and guided by supervisors and manually given a score of competence based on performing measurements with accuracy and precision. Areas of weakness observed during the standardization test were strengthened to improve the quality of data collection.

After the class room training, practical field experience was conducted to pre-test the questionnaire, take anthropometric measurements of children and caretakers, conduct interviews and fill questionnaires; pre-testing exercise was performed on 12 households. The pre-testing exercise facilitated some changes on the structure of the questionnaire. The prestest was also conducted to assist the enumerators to familiarize themselves more with the data collection process and to conduct the anthropometric measurements. In addition, a team of

data clerks who were trained on the operation of ENA for SMART for the data entry and these were closely supervised by the M&E officer from Save the Children.

2.10. Data analysis

Anthropometric and mortality data entry and processing was done using the ENA for SMART software Beta version 24th November 2012 where the World Health Organization Growth Standards (WHO-GS) data cleaning and flagging procedures were used to identify outliers which enabled data cleaning as well as exclusion of discordant measurements from anthropometric analysis. The SMART/ENA software generated weight-for-height, height-for-age and weight-for-age Z scores to classify them into various nutritional status categories using WHO standards and cut-off points. IYCF data was analysed in Excel using guidance from the Infant and Young Child Feeding Practices collecting and using data: a step- by- step guide. All the other quantitative data were entered and analysed in the EPIINFO 3.5.3 version.

3.0. Results

Table 9: Demographics

Number of children 6-59 months surveyed	409
Number of children 6-59 months analyzed	408
Number of anthropometry data excluded using Plausibility Check	1

3.1. Anthropometric results (based on WHO standards 2006):

Global acute malnutrition is defined as <-2 z scores weight-for-height and/or oedema, severe acute malnutrition is defined as <-3z scores weight-for-height and/or oedema

Exclusion of z-scores from Observed mean SMART flags: WHZ -3 to 3; HAZ -3 to 3; WAZ -3 to 3

Table 10: Distribution of age and sex of sample

	Boys		**Girls**		**Total**		**Ratio**
AGE (mo)	**no.**	**%**	**no.**	**%**	**no.**	**%**	**Boy: girl**
6-17	70	55.1	57	44.9	127	31.1	1.2
18-29	54	50.9	52	49.1	106	25.9	1.0
30-41	50	64.9	27	35.1	77	18.8	1.9
42-53	30	41.7	42	58.3	72	17.6	0.7
54-59	13	48.1	14	51.9	27	6.6	0.9
Total	217	53.1	192	46.9	409	100.0	1.1

The overall sex ratio was 1.13 (p-value = 0.216) indicating that both boys and girls were equally represented. The overall age distribution (p-value = 0.000), meaning there was significant diffrence which was the same for the overall sex/age distribution with a p-value = 0.000. There was an under representation of the children between the ages 42-59 months and this may be attributed to the older children movement with animals in the search for pastures.

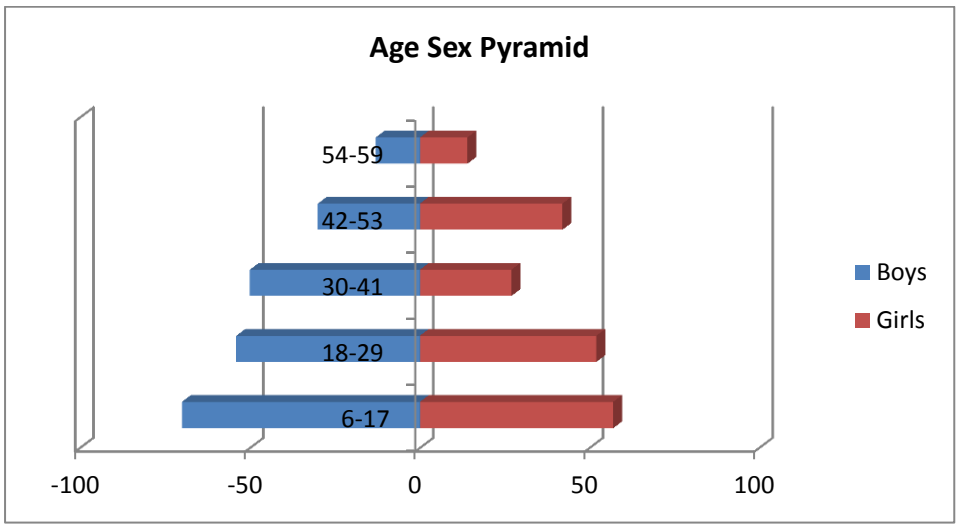

Figure 2: Population age and sex pyramid

Table 11: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 408	**Boys** n = 217	**Girls** n = 191
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(84) 20.6 % (16.2 - 25.8 95% C.I.)	(53) 24.4 % (17.8 - 32.5 95% C.I.)	(31) 16.2 % (11.9 - 21.7 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(68) 16.7 % (13.0 - 21.1 95% C.I.)	(43) 19.8 % (14.5 - 26.4 95% C.I.)	(25) 13.1 % (9.2 - 18.3 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(16) 3.9 % (2.0 - 7.6 95% C.I.)	(10) 4.6 % (1.9 - 10.9 95% C.I.)	(6) 3.1 % (1.5 - 6.6 95% C.I.)

The prevalence of oedema is 0.0 %

Table 12: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

		Severe wasting (<-3 z-score)		**Moderate wasting (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**		**Oedema**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	127	6	4.7	15	11.8	106	83.5	0	0.0
18-29	106	7	6.6	9	8.5	90	84.9	0	0.0
30-41	76	1	1.3	15	19.7	60	78.9	0	0.0
42-53	72	0	0.0	21	29.2	51	70.8	0	0.0
54-59	27	2	7.4	8	29.6	17	63.0	0	0.0
Total	408	16	3.9	68	16.7	324	79.4	0	0.0

Table 13: Distribution of acute malnutrition and oedema based on weight-for-height Z-scores

	<-3 z-score	**>=-3 z-score**
Oedema present	Marasmic kwashiorkor No. 0 (0.0 %)	Kwashiorkor No. 0 (0.0 %)
Oedema absent	Marasmic No. 16 (3.9 %)	Not severely malnourished No. 393 (96.1 %)

There were no marasmic-kwashiorkor nor kwashiorkor cases reported during the survey however, 16 children with marasmus were encountered.

The figures below show the weight for height distribution curves of the surveys sample in Z-scores for comparison with both the WHO and the NCHS reference populations. The weight for height distribution curves of the sample are shifted to the left, with a mean Z-score of -1.19±1.04, which indicates a suboptimal nutrition status compared to the reference population (WHO reference table).

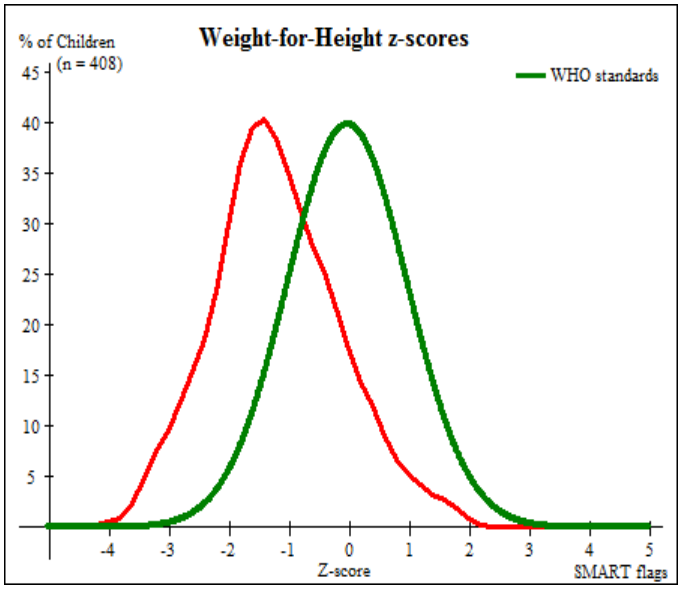

Figure 3: weight for height distribution curves

3.2. Malnutrition by MUAC

Malnutrition rates by MUAC were reported at GAM of 8.6% with SAM of 0.5%.

Table 14: Prevalence of acute malnutrition based on MUAC cut offs (and/or oedema) and by sex

	All n = 409	**Boys** n = 217	**Girls** n = 192
Prevalence of global malnutrition (< 125 mm and/or oedema)	(35) 8.6 % (6.0 - 12.1 95% C.I.)	(16) 7.4 % (4.6 - 11.6 95% C.I.)	(19) 9.9 % (6.4 - 15.0 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(33) 8.1 % (5.6 - 11.5 95% C.I.)	(15) 6.9 % (4.4 - 10.7 95% C.I.)	(18) 9.4 % (5.9 - 14.7 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(2) 0.5 % (0.1 - 1.9 95% C.I.)	(1) 0.5 % (0.1 - 3.2 95% C.I.)	(1) 0.5 % (0.1 - 3.8 95% C.I.)

Table 15: Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema

		Severe wasting (< 115 mm)		**Moderate wasting (>= 115 mm and < 125 mm)**		**Normal (> = 125 mm)**		**Oedema**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	127	1	0.8	23	18.1	103	81.1	0	0.0
18-29	106	0	0.0	10	9.4	96	90.6	0	0.0
30-41	77	1	1.3	0	0.0	76	98.7	0	0.0
42-53	72	0	0.0	0	0.0	72	100.0	0	0.0
54-59	27	0	0.0	0	0.0	27	100.0	0	0.0
Total	409	2	0.5	33	8.1	374	91.4	0	0.0

3.3. Prevalence of Chronic Malnutrition

Table 16: Prevalence of underweight based on weight-for-age Z-scores by sex

	All n = 408	**Boys** n = 217	**Girls** n = 191
Prevalence of underweight (<-2 Z-score)	(125) 30.6 % (24.7 - 37.3 95% C.I.)	(74) 34.1 % (26.5 - 42.7 95% C.I.)	(51) 26.7 % (20.6 - 33.9 95% C.I.)
Prevalence of moderate underweight (<-2 Z-score and >=-3 z-score)	(104) 25.5 % (20.7 - 31.0 95% C.I.)	(64) 29.5 % (23.4 - 36.5 95% C.I.)	(40) 20.9 % (15.5 - 27.7 95% C.I.)
Prevalence of severe underweight (<-3 Z-score)	(21) 5.1 % (3.0 - 8.7 95% C.I.)	(10) 4.6 % (2.3 - 8.9 95% C.I.)	(11) 5.8 % (3.0 - 10.8 95% C.I.)

Table 17: Prevalence of underweight by age, based on weight-for-age Z-scores

		Severe underweight (<-3 z-score)		**Moderate underweight (>= -3 and <-2 Z-score)**		**Normal (> = -2 z score)**		**Oedema**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	126	6	4.8	21	16.7	99	78.6	0	0.0
18-29	106	9	8.5	31	29.2	66	62.3	0	0.0
30-41	77	5	6.5	18	23.4	54	70.1	0	0.0
42-53	72	1	1.4	23	31.9	48	66.7	0	0.0
54-59	27	0	0.0	11	40.7	16	59.3	0	0.0
Total	408	21	5.1	104	25.5	283	69.4	0	0.0

Table 18:Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 397	**Boys** n = 208	**Girls** n = 189
Prevalence of stunting (<-2 z-score)	(97) 24.4 % (19.5 - 30.1 95% C.I.)	(55) 26.4 % (20.6 - 33.2 95% C.I.)	(42) 22.2 % (16.6 - 29.1 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(73) 18.4 % (14.2 - 23.5 95% C.I.)	(43) 20.7 % (15.7 - 26.7 95% C.I.)	(30) 15.9 % (11.1 - 22.2 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(24) 6.0 % (4.1 - 8.9 95% C.I.)	(12) 5.8 % (3.4 - 9.5 95% C.I.)	(12) 6.3 % (3.9 - 10.2 95% C.I.)

Table 19: Prevalence of stunting by age based on height-for-age z-scores

		Severe stunting (<-3 z-score)		**Moderate stunting (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	124	6	4.8	18	14.5	100	80.6
18-29	102	10	9.8	27	26.5	65	63.7
30-41	73	6	8.2	12	16.4	55	75.3
42-53	71	2	2.8	11	15.5	58	81.7
54-59	27	0	0.0	5	18.5	22	81.5

Total	397	24	6.0	73	18.4	300	75.6

Table 20:Mean z-scores, Design Effects and excluded subjects

Indicator	n	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	408	-1.19±1.04	1.37	0	1
Weight-for-Age	408	-1.39±1.06	1.88	0	1
Height-for-Age	397	-1.08±1.28	1.46	0	12

3.4. Children's morbidity

Out of 406 children who participated in the survey, 135 of them reported to having been sick two weeks prior to the survey.

Table 21: Prevalence of reported illness in children in the two weeks prior to interview (n=135)

Prevalence of reported illness	6-59 months
Diarrhoea	14.3%
Cough	34.9%
Fever	25.1%
Vomiting	15.4%
Other	10.2%

Acute Respiratory tract infection was the most common disease reported at 34.9%, fever, vomiting and diarrhoea at 25.1%, 15.4% and 14.3% respectively. Of those who reported to have been sick 62.5% reported to have sought help from the public clinic as shown in the figure 4 below;

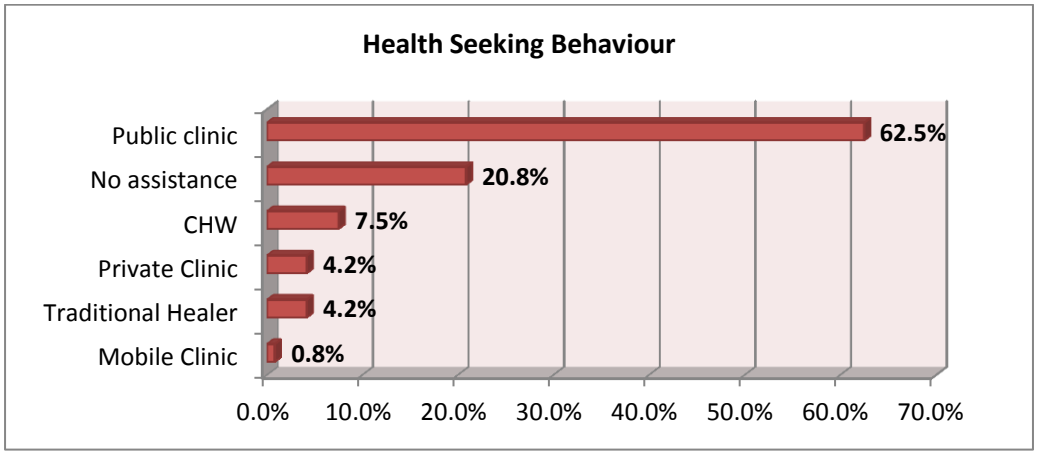

Figure 4: Health seeking Behaviour

3.5. Vaccination Results

3.5.1. OPV 1&3 and BCG for 6-59 months and measles for 9-59 months

Vaccination was reported at above the recommended EPI at >80% for all the antigens as shown in the figure below. The same was seen in the case for BCG which was reported at 99.3%.

Table 22: Vaccination coverage: BCG for 6-59 months and measles for 9-59 months

	BCG scar n= 409	Measles (with card)	Measles (with card or confirmation from

		n=409	mother) n= 409
YES	(No. 409) 99.3% (95% C.I.)	(No. 206) 50.4% (95% C.I.)	(No. 153) 37.4% (95% C.I.)

3.6. Micronutrient supplementation and Deworming

Table 23:Micronutrient and deworming coverage

	Factor	April 2012	April 2013
Vitamin A supplementation (6-11 months)	1 time	82% (68)	74.6%(56)
	>1 time	-	12%(9)
Vitamin A supplementation (≥12months)	1 time	47% (464)	57.6%(125)
	2 times	38% (374)	49.5%(157)
	>2 times	-	0.9%(3)
De-worming Children aged ≥ 12 months	1 time	38% (289)	25.1%(100)
	2 times	37%(284)	16.8%(67)
Iron Folate supplementation Pregnant women	At least 90 days	46.5%	38.3%(23)
Zinc Supplementation in Diarrhea		1.1%(1)	4.5%

From the above table, there was an increase in Vitamin A supplementation for children ≥ 12 months as compared to 2012 from 47% to 57% as well zinc supplementation in diarrhoea from 1.1% to 4.5%. Zinc supplementation in diarrhoea management coverage has however remained low.

4.0. Discussion

4.1. Nutrition Status

The prevalence of Global Acute Malnutrition for Mandera Central is 20.6 % (16.2 - 25.8 95% C.I.) and Severe Acute Malnutrition at 3.9 % (2.0 - 7.6 95% C.I.).These rates indicate deterioration in the nutrition status compared with the rates reported in a survey conducted in the district in April 2012 which showed a GAM of 17.9% (14.9-21.4 95% C.I). Further analysis however with the CDC calculator indicated that the change on the levels of malnutrition was not statistically significant (p=0.457). The Stunting levels were recorded at 24.4% (19.5%-30.1% 95% CI) while underweight was recorded at 30.6% (24.7%-37.3% 95%CI).

Survey Trends

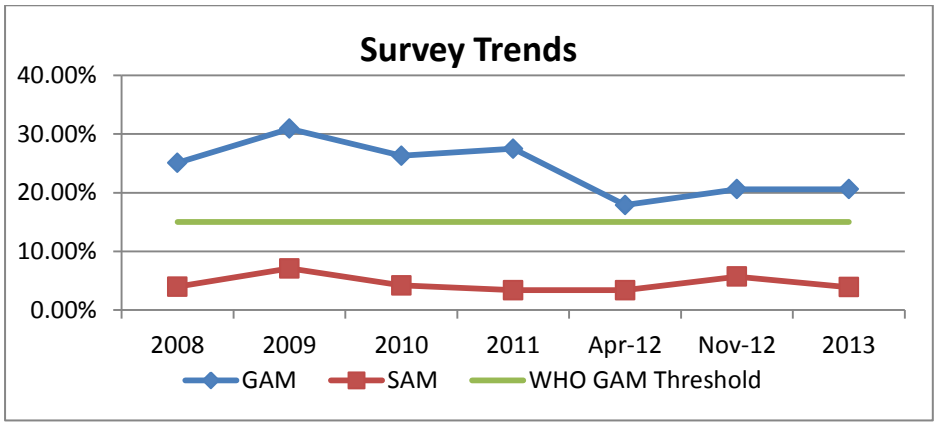

Figure 5: Survey Trends

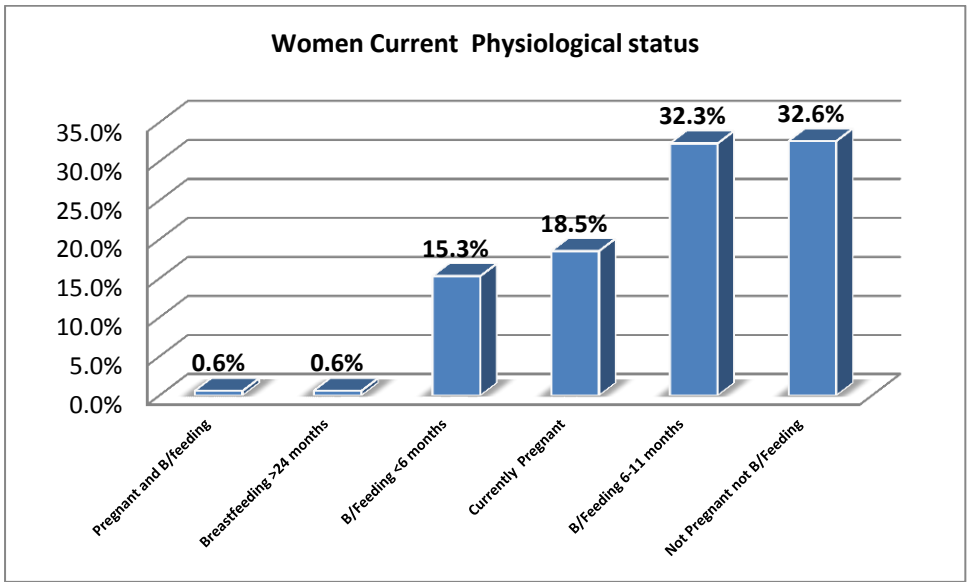

Figure 6: Women current physiological status

Most of the caretakers were either pregnant or lactating (67.4%) of the pregnant and lactating mothers their MUAC data was as follows;

Table 24: Care Takers MUAC measurements

Category	2012 MUAC <21 CM	2013 MUAC <21 CM

All women(15-49 years)	95(14.3%)	17(7.5%)
PLW	28(6.4%)	5(8.3%)

4.2. Causes of malnutrition

The nutrition survey was undertaken during the long rains within the month of April 2013. Malnutrition amongst children in Mandera Central was affected by the following factors:

4.2.1. Health status:

4.2.1.1. Morbidity:

Morbidity rates were high with 33.3% of the children reported to having been sick two weeks prior to the survey. The main causes of morbidity reported were; acute respiratory tract infections (34.9%), followed by, fever with chills like malaria (25.1%) vomiting at 15.4% and diarrhoea (14.3%). The disease patterns in the community were said to be typical for the season.

4.2.1.2. Vaccination, Micronutrient supplementation and De-worming coverage

The immunization coverage for BCG (99.3%), measles (87.8%) and Pentavalent /OPV 3 (99%) both by card and by recall were good and above the MOH target of 80%. These 4 vaccines are used in the survey as proxy for the immunization coverage at population level. The integrated outreaches supported by Save the Children have helped improve the immunization coverage. This strategy together with Malezi bora should continue to be supported to keep the coverage high and should also be used to improve the micronutrient supplementation coverage.
Vitamin A supplementation was suboptimal especially for the group above the age of 12 months (post immunization) reported at 49.5%. Deworming and iron folate supplementation was also low reported at 25.1% and 38.3% respectively.

Worst however was zinc in the management of diarrhoea which was only reported by 4.5% of all the respondents who reported to have had diarrhoea two weeks prior to the survey.

4.2.2. Infant and Young Child Feeding (IYCF)

Infant and young child feeding is a continuum of critical nutrition and health practices that begin during pregnancy and continue through at least the first two years of life. The sharpest increase in malnutrition occurs between 6 and 24 months of age, the time when children grow most rapidly and are introduced to other foods in addition to breast milk. Appropriate IYCF practices include timely initiation of breastfeeding within 1 hour of birth, exclusive breastfeeding for the first 6 months, nutrient dense complementary feeding after 6 months with continued breastfeeding up to 2 years, and improved feeding during and after illness. In this survey, the IYCF practices were considered to be sub-optimal and likely to contribute to the high malnutrition rates except for timely initiation and exclusive breastfeeding.

4.2.2.1. Timely initiation of breastfeeding:

This relates to putting an infant to the breast within one hour of birth. Of the 419 children aged 6-23 in the survey, 383 (91.4%) reported to have put their infants on the breast within one hour of birth as shown in the figure below;

Figure 7: Timely initiation of breastfeeding (n=419)

4.2.2.2. Exclusive Breastfeeding:

Exclusive breastfeeding was reported at 58% which is within the recommended HINI targets of 50% and the national rate which is currently 32%. The rates were however slightly higher in boys than in girls at 60% and 55% respectively.

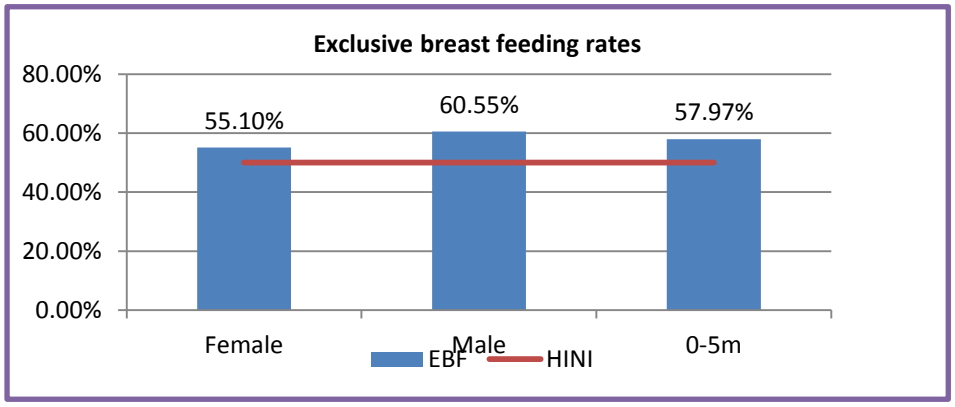

Figure 9: Exclusive Breastfeeding rates (n=98

4.2.2.3. Dietary Diversity

Dietary diversity and meal frequency of feeding were all less than optimal with the worst being minimum dietary diversity for 6-23 months with 8.8% reporting to eating food from more than three food groups as shown below.

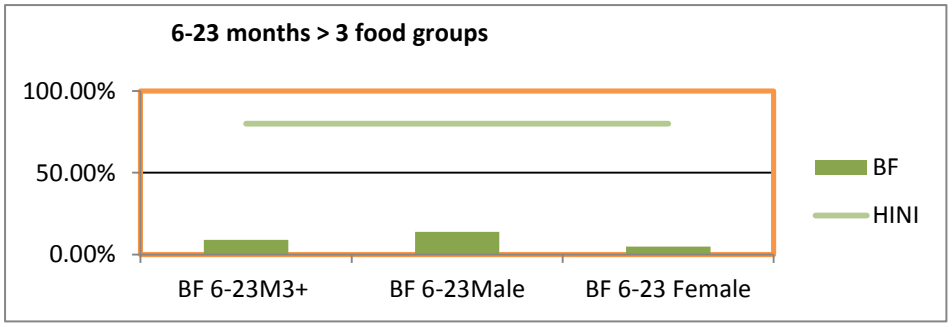

Figure 8: Minimum dietary diversity (n=13)

4.2.2.4. Meal Frequency

Meal frequency was also below the HINI thresholds of 70%. The meal frequency of 6-8 months breast fed and fed 2 times a day being 34.1% while the proportion of 9-23 months breastfed and fed more than 3 times a day was 52.8% as shown in figure 11 and 12 below.

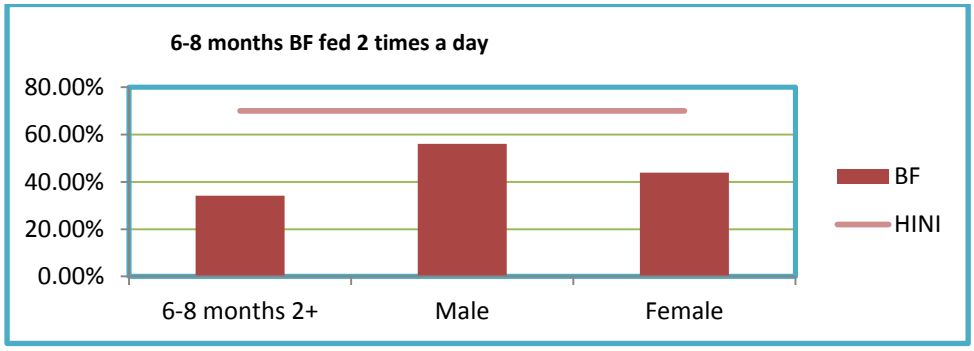

Figure 9: Minimum meal times for breastfed children 6-8 months (n=41)

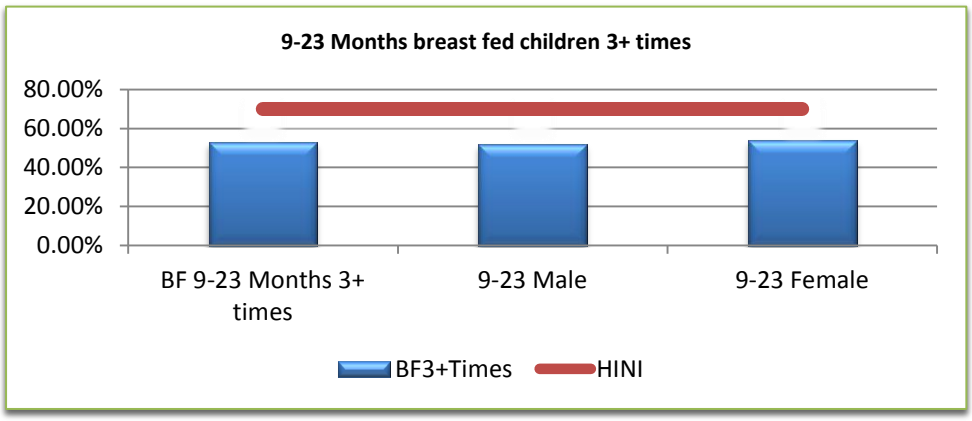

Figure 10: Minimum meal times for breastfed children 9-23 months (n=56)

The proportion of non-breastfed 6-23 months fed more than four times as recommended was 18.5% as shown in figure 13 below.

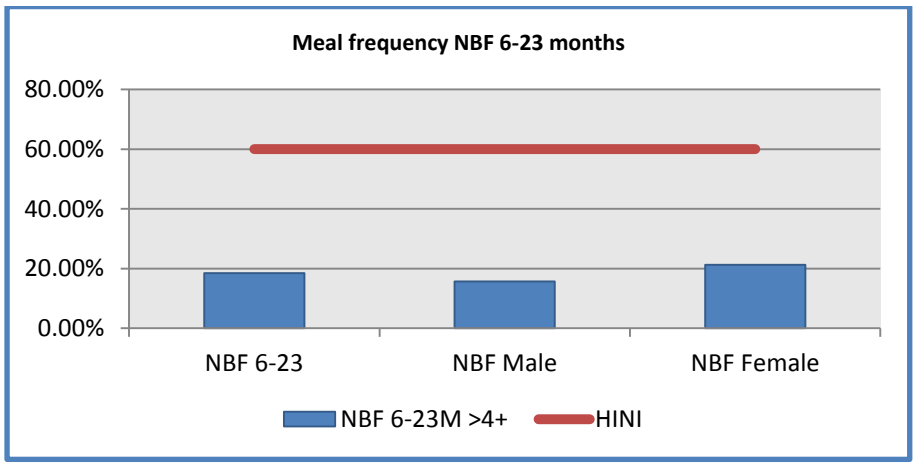

Figure 11: Minimum meal times for Non breastfed children 6-23 months (n=12)

4.3. Water and Sanitation

4.3.1. Main water source

The main sources of water for a majority of the population were borehole (30.8%), unprotected wells (25.1%), and protected wells at (15.1%). Most of the respondents reported to getting their water from safe sources (58%). More than 80% took less than 1 hour to and from water sources.this is as shown in the figure below few of the households got water from protected

wells and water taps as shown below;

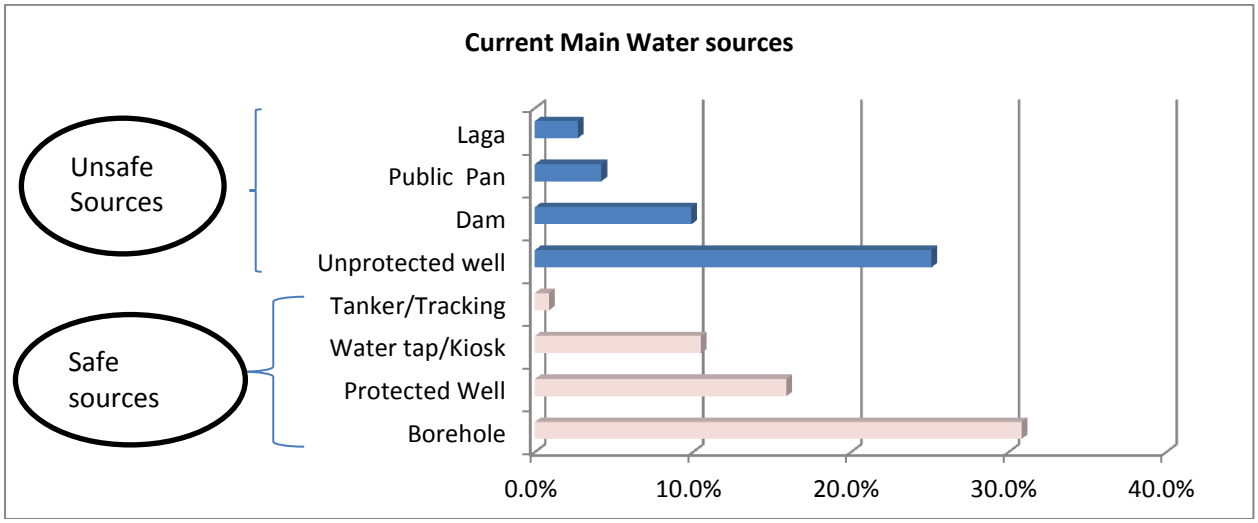

Figure 12: Main current water sources

4.3.2. Water treatment

Though quite a number of the respondents reported to having used water from unsafe sources (around 47%), most respondent did not do anything to their drinking water (94.3%). Chemical use in water treatment was reported by around 7% of the respondents as shown in the figure below;

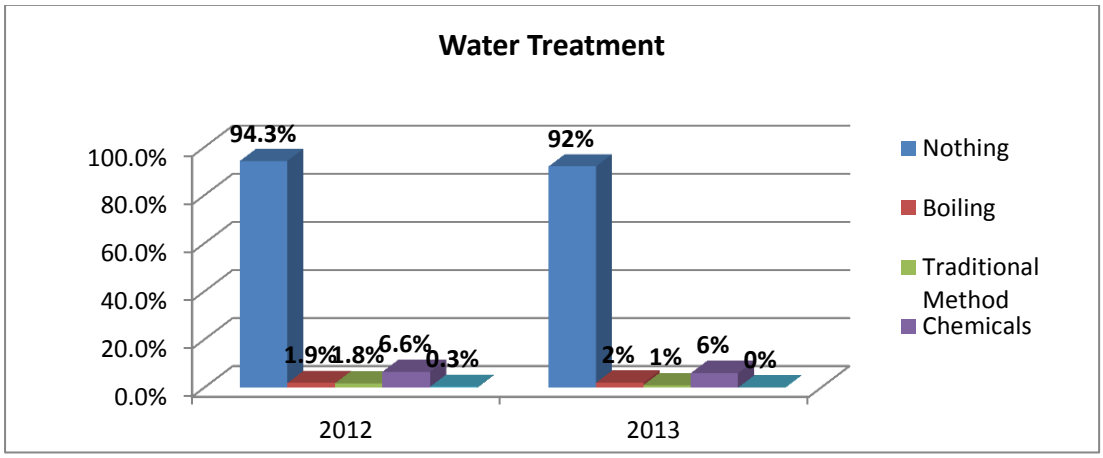

Figure 13: Treatment given to drinking water

4.3.3. Hand washing practices

Around two thirds of the respondents reported to washing hands at the most critical times. However it is worth noting that most of them used water only (85%) as shown in figure 16 and 17 below;

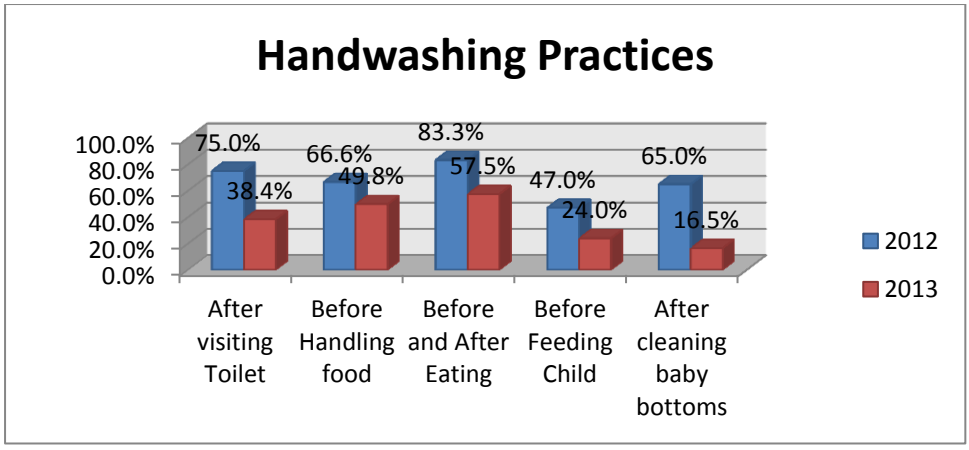

Figure 14: When hands were washed

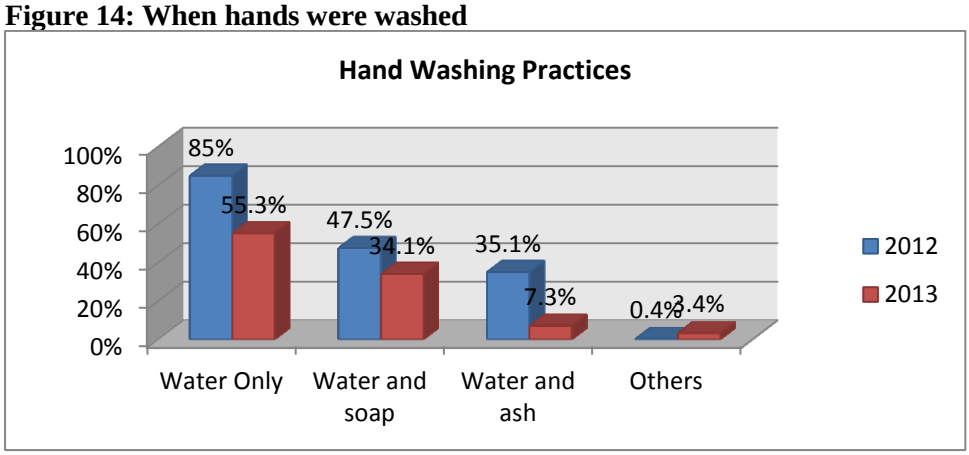

Figure 15: what was used to clean hands

4.3.4. Access to toilet facilities

Only 48% of the respondents reported to having access to a toilet facility (either own or neighbours). This was mainly reported in the urban areas with the rural areas reported to using bush. This indicates poor human waste disposal methods that have the potential to contaminate the open water sources leading to diarrhoea and other water borne diseases.

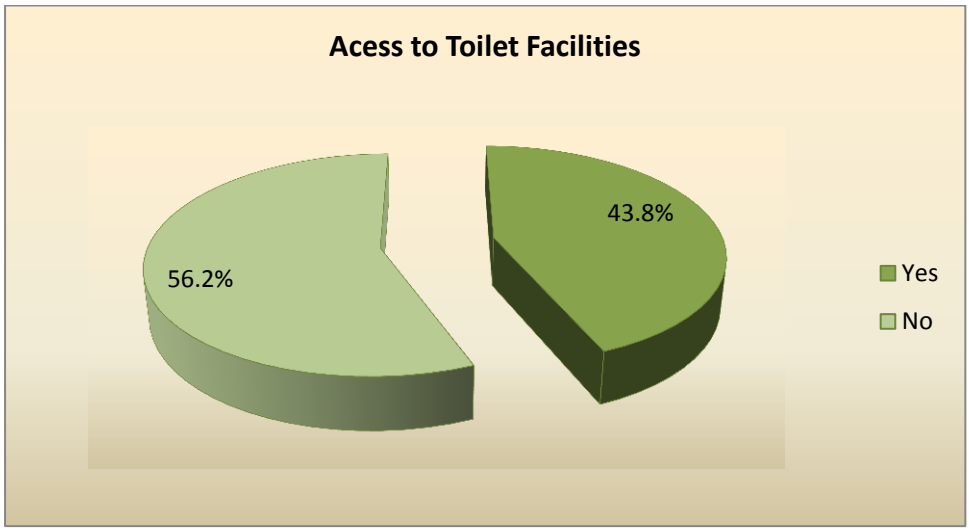

Figure 16: Access to toilet facilities

5.0. Conclusions

The prevalence of malnutrition in Mandera Central is still above the emergency threshold with Global Acute Malnutrition (GAM) of 20.6% (16.2-25.8 95% C.I.) and Severe Acute Malnutrition (SAM) of 3.9 % (2.0-7.6 95% C.I.). The malnutrition prevalence rates are higher than they were in 2012 which indicated GAM prevalence of 17.9% (14.9-21.4 95% C.I.) and SAM rate of 3.5% (2.1- 5.3 95% C.I.) This increase was however insignificant in the GAM rates since the p value is (p=0.457) while that of SAM was (p=0.74) indicating a insignificant increase.

The levels of Immunization (OPV1&3, Measles, BCG) were within the recommended national levels of above 80% both by card and recall.

Other HINI indicators like use of zinc in the management of diarrhoe, deworming and vitamin A supplementation for the 12-59 months were however below the recommended HINI thresholds while IYCF practices are poor with high proportions of children not recieving optimal feeding practices apart from initiation of breastfeeding and exclusive breastfeeding practices which met the HINI recommendations of 80% and 50% respectively.

Hygiene and sanitation practices were also not up to scale.

6.0. Recommendations

Table 25:Action point Matrix

Issue	Possible causes	Recommendation	By who
GAM levels above emergency threshold of 15%	Poor WASH indicators Poor IYCN indicators (Meal frequency and dietary diversity) Poor dietary diversity at HH level High morbidity especially ARIs and diarrhoea which have a bearing on nutrition status. Lack of staffing in hospitals and health centres (only three nurses currently in the district Poor infrastructure	Community WASH interventions HR issues in the district to be addressed Improvement on the infrastructure to address the issues of access to food in the markets. Explore use of kitchen gardens	GOK SCI MOA
Poor IYCF practices especially meal frequency and dietary diversity	Access and cost of food in the market. Cultural beliefs and practices	Strengthening mother support group linkages for referrals within the communities in order to improve IYCF practices.	MOH SCI
Marginal decline in appropriate hand-washing practices(from 47% to 35%)	Reduced coverage of hygiene promotional messages due to less outreaches and reduced staffing	The promotion of home improvised hand washing stations to sustain hand washing practices (through CHWs)	MOH SCI

Poor water treatment practices about 90% of the respondents did nothing to their drinking water	Dislike of after taste of chemical treatment Impatience during water treatment	Strengthening hygiene promotion awareness on the importance of environmental and personal hygiene. Strengthen Water quality surveillance to identify safety of water in use in the district	SCI MOH
Low toilet coverage (about 44%)	Poverty Ignorance and high dependency on donor funded activities Poor infrastructure	Training and advocacy on CLTS, Sensitization of community leaders on use latrines. This will also include promotion of positive behaviour change	SCI MOH

7.0. Appendices

7.1. Appendix 1: Plausibility Report

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (0.2 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.216)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**10** (p=0.000)
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**0** (3)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**0** (5)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (1.04)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.28)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (-0.04)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=0.305)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =				0-5	5-10	10-15	>15 **10** %

At the moment the overall score of this survey is 10 %, this is good.

7.2. Appendix 2: Assignment of clusters

Table 27: List of clusters

Geographical unit	Population size	Cluster
Bulla Afya	1055	
Udole	2642	1,2
Dawder	930	3
Bulla Ayo	1550	4
Wante	1303	5
Elwak Town	1157	
LMD	1157	6
Bulla Dana	1157	7
Guyo Madow	1157	8
Bulla Power / Tawakal	1157	
Lafey IDP	1157	9
Qoroboshana	1662	10
El Hache	1662	11
El Hagarsu	1662	12,RC
El Safara	1662	13

El Taib	1662	14
Bulla Watta	1662	15
Dabacity	1923	16
Garsesala	3638	17,18
Kotulo	3338	RC,19,20
Borehole 11 Centre	3142	21,22
Gothe IDP	1346	RC
Kutayo	1460	23
Adakalo	162	
Qarsadamu	382	
Kob Adadi	744	
Qalanqelsa	2424	RC,24
Fincharo	1704	25
Shimbir Fatuma Town	2681	26,27
Warido	323	
Chachabole	540	
Quramadow	2132	28,29
Sukela Tinfa	168	
Elele	2233	30
Wargadud Town	696	31
Wargadud East Kalacha	2741	32,33
Chirole	899	
Sotohoro	1351	34
Bulla AP	912	35

7.3. Appendix 3: Result Tables for NCHS growth reference 1977

Table 26: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 408	**Boys** n = 217	**Girls** n = 191
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(82) 20.1 % (16.1 - 24.7 95% C.I.)	(49) 22.6 % (16.7 - 29.8 95% C.I.)	(33) 17.3 % (12.9 - 22.8 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(72) 17.6 % (14.4 - 21.5 95% C.I.)	(42) 19.4 % (14.7 - 25.0 95% C.I.)	(30) 15.7 % (11.6 - 21.0 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(10) 2.5 % (1.2 - 5.1 95% C.I.)	(7) 3.2 % (1.2 - 8.1 95% C.I.)	(3) 1.6 % (0.5 - 4.8 95% C.I.)

The prevalence of oedema is 0.0 %

Table 27: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

	Severe wasting (<-3 z-score)	**Moderate wasting (>= -3 and <-2**	**Normal (> = -2 z score)**	**Oedema**

				z-score)					
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	127	3	2.4	14	11.0	110	86.6	0	0.0
18-29	106	7	6.6	17	16.0	82	77.4	0	0.0
30-41	76	0	0.0	15	19.7	61	80.3	0	0.0
42-53	72	0	0.0	18	25.0	54	75.0	0	0.0
54-59	27	0	0.0	8	29.6	19	70.4	0	0.0
Total	408	10	2.5	72	17.6	326	79.9	0	0.0

Table 28: Distribution of acute malnutrition and oedema based on weight-for-height z-scores

	<-3 z-score	**>=-3 z-score**
Oedema present	Marasmic kwashiorkor No. 0 (0.0 %)	Kwashiorkor No. 0 (0.0 %)
Oedema absent	Marasmic No. 10 (2.4 %)	Not severely malnourished No. 399 (97.6 %)

Table 29: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 409	**Boys** n = 217	**Girls** n = 192
Prevalence of global malnutrition (< 125 mm and/or oedema)	(35) 8.6 % (6.0 - 12.1 95% C.I.)	(16) 7.4 % (4.6 - 11.6 95% C.I.)	(19) 9.9 % (6.4 - 15.0 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(33) 8.1 % (5.6 - 11.5 95% C.I.)	(15) 6.9 % (4.4 - 10.7 95% C.I.)	(18) 9.4 % (5.9 - 14.7 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(2) 0.5 % (0.1 - 1.9 95% C.I.)	(1) 0.5 % (0.1 - 3.2 95% C.I.)	(1) 0.5 % (0.1 - 3.8 95% C.I.)

Table 30: Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema

		Severe wasting (< 115 mm)		**Moderate wasting (>= 115 mm and < 125 mm)**		**Normal (> = 125 mm)**		**Oedema**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	127	1	0.8	23	18.1	103	81.1	0	0.0
18-29	106	0	0.0	10	9.4	96	90.6	0	0.0
30-41	77	1	1.3	0	0.0	76	98.7	0	0.0
42-53	72	0	0.0	0	0.0	72	100.0	0	0.0
54-59	27	0	0.0	0	0.0	27	100.0	0	0.0
Total	409	2	0.5	33	8.1	374	91.4	0	0.0

Table 31: Prevalence of acute malnutrition based on the percentage of the median and/or oedema

	n = 408
Prevalence of global acute malnutrition (<80% and/or oedema)	(45) 11.0 % (7.7 - 15.6 95% C.I.)

Prevalence of moderate acute malnutrition (<80% and >= 70%, no oedema)	(45) 11.0 % (7.7 - 15.6 95% C.I.)
Prevalence of severe acute malnutrition (<70% and/or oedema)	(0) 0.0 % (0.0 - 0.0 95% C.I.)

Table 32: Prevalence of malnutrition by age, based on weight-for-height percentage of the median and oedema

		Severe wasting (<70% median)		**Moderate wasting (>=70% and <80% median)**		**Normal (> =80% median)**		**Oedema**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	127	0	0.0	12	9.4	115	90.6	0	0.0
18-29	106	0	0.0	15	14.2	91	85.8	0	0.0
30-41	76	0	0.0	6	7.9	70	92.1	0	0.0
42-53	72	0	0.0	4	5.6	68	94.4	0	0.0
54-59	27	0	0.0	8	29.6	19	70.4	0	0.0
Total	408	0	0.0	45	11.0	363	89.0	0	0.0

Table 33: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 406	**Boys** n = 217	**Girls** n = 189
Prevalence of underweight (<-2 z-score)	(145) 35.7 % (29.7 - 42.2 95% C.I.)	(84) 38.7 % (31.1 - 46.9 95% C.I.)	(61) 32.3 % (25.6 - 39.8 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(120) 29.6 % (24.6 - 35.1 95% C.I.)	(73) 33.6 % (27.4 - 40.5 95% C.I.)	(47) 24.9 % (19.0 - 31.9 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(25) 6.2 % (3.9 - 9.5 95% C.I.)	(11) 5.1 % (2.6 - 9.7 95% C.I.)	(14) 7.4 % (4.4 - 12.2 95% C.I.)

Table 34: Prevalence of underweight by age, based on weight-for-age z-scores

		Severe underweight (<-3 z-score)		**Moderate underweight (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**		**Oedema**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	125	10	8.0	26	20.8	89	71.2	0	0.0
18-29	105	10	9.5	35	33.3	60	57.1	0	0.0
30-41	77	5	6.5	23	29.9	49	63.6	0	0.0
42-53	72	0	0.0	24	33.3	48	66.7	0	0.0
54-59	27	0	0.0	12	44.4	15	55.6	0	0.0
Total	406	25	6.2	120	29.6	261	64.3	0	0.0

Table 35: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 401	**Boys** n = 212	**Girls** n = 189
Prevalence of stunting (<-2 z-score)	(75) 18.7 % (14.9 - 23.3 95% C.I.)	(40) 18.9 % (14.0 - 25.0 95% C.I.)	(35) 18.5 % (13.9 - 24.2 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(55) 13.7 % (10.5 - 17.8 95% C.I.)	(30) 14.2 % (10.1 - 19.5 95% C.I.)	(25) 13.2 % (9.3 - 18.5 95% C.I.)

Prevalence of severe stunting (<-3 z-score)	(20) 5.0 % (3.3 - 7.5 95% C.I.)	(10) 4.7 % (2.6 - 8.5 95% C.I.)	(10) 5.3 % (3.0 - 9.1 95% C.I.)

Table 36: Prevalence of stunting by age based on height-for-age z-scores

		Severe stunting (<-3 z-score)		**Moderate stunting (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	126	6	4.8	15	11.9	105	83.3
18-29	104	8	7.7	18	17.3	78	75.0
30-41	72	4	5.6	8	11.1	60	83.3
42-53	72	2	2.8	10	13.9	60	83.3
54-59	27	0	0.0	4	14.8	23	85.2
Total	401	20	5.0	55	13.7	326	81.3

Table 37: Mean z-scores, Design Effects and excluded subjects

Indicator	n	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	408	-1.29±0.89	1.14	0	1
Weight-for-Age	406	-1.61±0.99	1.70	0	3
Height-for-Age	401	-0.91±1.26	1.12	0	8