NUTRITIONAL ANTHROPOMETRIC AND MORTALITY SURVEY

FINAL REPORT

MANDERA CENTRAL DISTRICT

MANDERA COUNTY, KENYA

June 2014

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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 Elwak district hospital. Save the Children is currently supporting the MOH to 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. Other nutrition surveys have been conducted in the District in 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 4th and 14th June 2014.

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;
- To recommend appropriate interventions based on the survey findings;

Methodology

Emergency Nutrition Assessment (ENA) for Standardized monitoring of Relief in Transitions (SMART) was used to calculate anthropometry and mortality samples. 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. While simple random sampling was used to select households in selected clusters.

Main survey results

Table 1: Results Summary

Characteristic	N	n	% (95% CI) 2014	% (95% CI) 2013
GAM (WFH <-2 Z score or presence of oedema) - WHO 2006	535	117	22.3(17.6-27.5)	20.6%(16.2-25.8)
SAM (WFH <-3 Z score or presence of oedema) - WHO 2006	535	22	4.2(2.7-6.5)	3.9 % (2.0-7.6)
Prevalence of GAM by MUAC (<12.5cm)	535	31	5.8(4.0-8.2)	8.6%(6.0-12.1)
Proportion of children sick two weeks prior to survey	592	181	30.6%	33.3%
Proportion of caretakers seeking medical care when child is ill	179 *	138	77.1%	75.0%
BCG Scar	588	572	97.3%	99.3%
Measles immunization (card and confirmation)	557	458	82.2%	87.8%
OPV1 immunization (card and confirmation)	587	532	90.6%	99.8%
OPV3 immunization (card and confirmation)	588	510	86.7%	99.0%
Vitamin A supplementation coverage (>12 month) -1 time	523	90	35.2%	57.6%
Vitamin A supplementation coverage (>12 month) -2 times	523	155	60.6%	49.5%
Vitamin A supplementation coverage (6-11 months)- 1 time	54	15	27.7%	74.6%
Proportion of children >1 year de-wormed 1 time	516	69	13.7%	25.1%
Proportion of children >1 year de-wormed 2 time2	516	36	9.9%	16.8%
Iron-folate Supplementation for pregnant mothers	205	66	32.2%	38.3%
Appropriate hand-washing with soap/ash	458	126	27.2%	26%
Proportion of children 6-59 months supplemented with Zinc the last time they had diarrhoea	32	14	43.6%	4.5%

Summary of findings

The malnutrition levels were reported at 22.3(17.8-27.6 compared to last year rates of 20.6% (16.2-25.8 95% C.I.) Using the CDC calculator for significance the p-value was found to be 0.616 meaning there was no difference between the two seasons. This was also true for SAM which was reported at 4.2(2.7-6.5) compared to last season reported at 3.5% (2.1- 5.3 95% C.I.) with the p-value being P=0.848. Stunting was however shown to have decreased significantly from 24.4(19.5-30.1) to 15.3 (11.9-19.3) with the test of significance giving a p-value of p=0.006 and as well underweight dropping from 30.6 (24.7-37.3) to 22.0(18.6-25.9) with a p value of p=0.019.

The malnutrition rates by MUAC both for GAM and SAM did not change significantly reported at 5.8% compared 8.6% last year for GAM and 0.7% compared to 0.5% with p-values of p=0.131 and p=0.733 respectively

There were low rates of Iron folate supplementation reported at 32.2% and the trends have been declining since 2012. Utilization of the same was low reported at consumed for 30 days (34.6%) followed by consumed for only 2 days (21%)

There were poor WASH indicators with access to sanitation reported at 57% though this is an improvement from last year it is still not ideal. Hand washing was also poor especially after cleaning children bottoms reported at 18.3%. Hand washing is also done mostly with water only.

The levels of Immunization (OPV1&3, Measles, BCG) were within the recommended national levels of above 80% both by card and recall. There has been an increase of reported immunization by recall which is not as reliable as by card which should be looked into.

Vitamin A supplementtation and Deworming were also poor reported at 60.6 12-59 months 2 times and 9.9 2 times 12-59 respectively. For routine vitaminn A supplementation, documentation seemes to be a problem reported at 26% for the 6-11 months and 18.7% for the 12-59 months.. There was however a remarkable increase in Zinc supplementation that can be attributed to the continous health education on Zinc supplementation and the employment and deployment of health workers by the County to the health facilities. In addition the supply chain management of drugs have been improved and the staffs trained on integrated management of child hood illneses.

Most of the respondents reported to have attained no level of education(56.2%) or preprimary (34.5)

Recommendations

Table 2: Action points

	Recommendation	Activities	Time Frame	Responsible Person	Resources Needed

1	Holistic approach to improve the health seeking behavior of the community	Sensitization of the community by use of CHWS, MTMSG and social leaders on importance of adopting good health seeking practices. Increase awareness during Males bora and other National campaigns Strengthening the linkage of community to health facilities through CHWs	October and continuous Ongoing October and continuous November 2014 and Continuous May 2015 and continuous	SCPHO/Save the Children SCHO/SCPHO/SC SCPHO SCPHO/Save the Children SCHO/SCPHO/Save the Children	IEC materials, Vehicle Vehicle, IEC Materials Checklist, referral slips, vehicle Vehicle
2	Integrated approach to increase immunization coverage	Operationalize immunization in the six new Health Facilities Provision/Strengthening of adequate MCH/FP booklets to health facilities and outreach sites Sensitization of health workers on the importance of the MCH/FP booklets as means of immunization verification Strengthening tracing of immunization defaulter through use of CHWs	April 2015 September and continuous September 2014 December 2014 and Continuous	SCHO/SCPHN SCPHN/SCHRIO SCPHN/SC SCPHO/SC SCPHO/SC	Fridges, Vaccines Vehicle Booklets Vehicle, Fuel, SMART survey result Stationaries, vehicle and fuel

3	Improving coverage of vitamin A and De-wormers	Up scaling of Vit A supplementation and Deworming through outreach and Health Facilities Strengthening documentation of Vit A and deworming data. Strengthening Nutrition education and counselling at community level Sensitization of health workers on the need to explain to the client when given Vit A and Dewormers Training of school patrons and ECD teachers on Vitamin A and de-wormers and implementation at ECD Centres Supportive supervision	October 2014(Males bora time) and continuous December 2014 and continuous March 2015 October 2014 October 2014 October 2014 a nd continuous December 2014 and continuous	SCNO/SCPHN/SC SCNO/SCPHN/SC SCNO/SCPHN/SC SCPHO/SC SCNO/SCPHN/Save the Children SCNO/SCHO/SCPHO/Save the Children	Vehicle, Fuel, Vit A, Dewormers, stationaries and budget. Vitamin tally sheets and registers Vehicle and fuel Budget, Vit A, Dewormers, stationaries. Vehicle, fuel and checklist Vehicle, IEC materials, Checklist
4	Promotion of the use of safe drinking water since the majority of the population drinks water without treating	Intensify hygiene promotion through the CHW targeting importance of treating water before drinking Conduct Water quality surveillance and promotion of water safety as most of the population are using earth pan as their main source.	Ongoing March 2014	SCPHO/Save the Children SCPHO/Save the Children SCPHO/SCWO/Save the Children	IEC Materials Training material, Hall and budget. Vehicle, Potalab, Chemical treatment

5	Improvement latrine accessibility from 57.2% to 70% through the use of CHWs and Social leaders to advocate for construction and utilization of latrines at house hold level	Sensitization of the community on CLTS model. Sensitization of community leaders on use latrines. Close supervision of CHWs work towards promotion of latrine	November 2014 and continuous	SCPHO/SCPHN/ Save the Children	Vehicle and IEC materials
6	Promotion of hand washing practices by use of soaps during the four critical hand washing times	Sensitization of social leaders on importance of using soap during hand washing. On job training of CHWS on hygiene promotion. Hygiene promotion and education in school clubs and villages on hand washing with soap Sensitization campaigns on world hand washing day Awareness creation on use of tippy tap and soaps via CHWs at house hold levels which is	October 2014 and continuous March 2015 October 2014 and Continuous 15th October 2014 Ongoing December 2014	SCPHO/Save the Children SCPHO/Save the Children SCPHO/Save the Children SCPHO/SCPHN/Save the Children SCPHO/Save the Children SCPHO/Save the Children	Vehicle, Fuel, IEC Materials Budget, Training Materials Hand washing station, soaps IEC Materials, Soaps, Public Address System, Vehicle
7	Improving the coverage of iron supplementation	Sensitization of mothers on importance of iron supplementation in pregnancy Sensitization of social leaders and MTMSG on importance of iron supplementation Strengthening health education to pregnant mothers on importance of iron supplementation by health workers and	December 2014 and continuous December 2014 and continuous June 2015	SCNO/SCPHN/Save the Children SCNO/SCPHN/Save the Children SCPHO/save the Children SCPHO/Save the Children	Vehicle, fuel, IEC Material Vehicle, fuel, IEC Material Vehicle, fuel, IEC materials

8	Strengthening active case finding of malnourished children and PLWs as a result of increased GAM and SAM rates	Conduct bimonthly mass screening. Involvement of local leaders on defaulter tracing	December 2014 and Continuous September 2014 and continuous	SCNO/Save the Children SCNO/SCOH	Vehicle, Fuel
9	Conduct qualitative assessment to ascertain why low utilization of Vit A, Iron Supplementation and Deworming despite the support from government and partners	Incorporating into KAP Survey	October 2014	SCNO/SC/DPHN	Vehicles, Survey materials

1.0 INTRODUCTION

1.1. Geography

Mandera Central is one of the sub counties 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 destitute (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.

1.2. 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.

[1] Projected 1999 data

Table 3: 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	

1.3. 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.

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:

Emergency Nutrition Assessment (ENA) for Standardized Monitoring of Relief and Transition (SMART) was used to calculate both anthropometry and mortality samples. 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 2014 for the district was used as the sampling frame. The population was obtained from the District development officer.

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 20.6%[2]
2) The design effect is 1.6[3]
3) Precision of 5%[4]
4) Average household size 7[5]
5) Proportion of under-fives 13%[6]

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

Table 4: Final sample size

Estimated prevalence	Precision	Design effect	% of none response	Sample size anthropometry	HH anthropometry.	No of HH per day	No. of clusters
20.6%	5%	1.6	1%	438	540	17	34

[2] Based on SMART survey findings 2013
[3] Based on SMART survey findings 2013
[4] Following Kenya National Survey Guidelines
[5] Based on SMART survey findings 2013
[6] Based on SMART survey findings 2013

2.2.3. Mortality sample Calculation

Table 5: Mortality Sample Calculation

Estimated death rate	Precision	Design effect	% of none response	No of Recall days	Sample size mortality	HH mortality.	No of HH per day	No. of clusters
0.41%	0.3%	1.6	1%	114	2674	386	17	34

From the figures above, 2,674 people were to be included in the mortality sample. In total to get this number of people, 386 households were to be visited. However comparing the number of HH from the mortality sample and from the anthropometry sample, the anthropometry sample size was higher and therefore this number of HH (540) was considered and mortality was collected in these HHs as well as anthropometry.

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 where not available from the village elders. Thereafter 17 households were selected randomly through a random number generator application on the tablets used to collect data

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 while all household members were part of the mortality survey. In cases where there was no eligible child, a household was still considered part of the sample and its household data and mortality 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.

2.5. 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 540 households.

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[7]

Table 6: 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 developed through the Nutrition Information Working group (NIWG) was used for data collection during the survey.
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 pre-test 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 and a data entry clerk since they were using phones to collect data. Three of the

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

team leaders were from Ministry of Health (MOH), one from the National Drought management agency (NDMA) 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 M&E specialist). The training was undertaken for 4 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 pretest was also conducted to assist the enumerators to familiarize themselves more with the data collection process and to conduct the anthropometric measurements.

2.10. Data analysis

Anthropometric and mortality data entry and processing was done using the ENA for SMART software 2011 16th November 2013 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 collected using tablets and the output was in excel but analysis was in the EPIINFO 3.5.4 version.

3.0. RESULTS

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 7: Distribution of age and sex of sample

	Boys		Girls		Total		Ratio
AGE (mo)	**no.**	**%**	**no.**	**%**	**no.**	**%**	**Boy:girl**
6-17	67	60.4	44	39.6	111	20.7	1.5
18-29	71	50.0	71	50.0	142	26.5	1.0
30-41	76	52.8	68	47.2	144	26.9	1.1
42-53	53	47.7	58	52.3	111	20.7	0.9
54-59	8	29.6	19	70.4	27	5.0	0.4
Total	275	51.4	260	48.6	535	100.0	1.1

The overall sex ratio was 1.06 (p-value = 0.517) indicating that both boys and girls were equally represented. The overall age distribution (p-value = 0.000), meaning there was significant diffrence between the no of children 6-29 months compared to the 30 to 59 months. There was also significance diffrence in the overall sex/age distribution again with a p-value = 0.000. There was an under representation of children between the ages of 54-59 months which may be attributed to the older children movement with animals in the search for pastures and as well some of them being in school since the survey was done when schools were in session.

Figure 1: Population age and sex pyramid

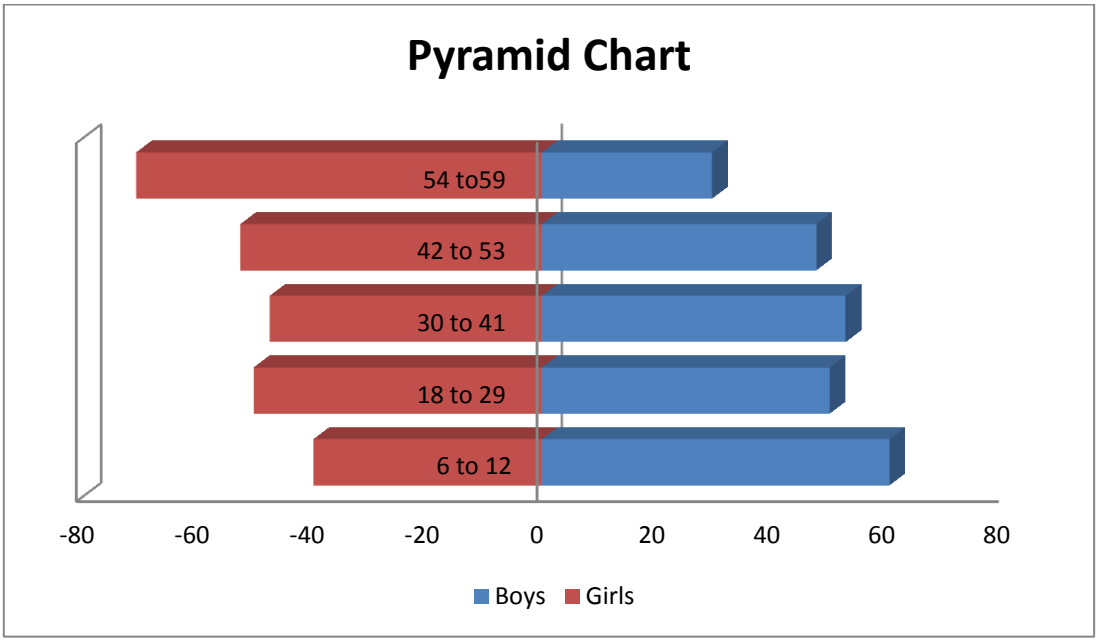


Table 8: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	Boys	Girls	2013	2014

	n = 272	n = 257	n = 408	n = 529
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(66) 24.3 % (19.5 - 29.8 95% C.I.)	(52) 20.2 % (15.3 - 26.3 95% C.I.)	(84) 20.6 % (16.2 - 25.8 95% C.I.)	(118) 22.3 % (17.8 - 27.6 95% C.I.) P=0.616
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(54) 19.9 % (15.3 - 25.3 95% C.I.)	(42) 16.3 % (11.7 - 22.4 95% C.I.)	(68) 16.7 % (13.0 - 21.1 95% C.I.)	(96) 18.1 % (14.1 - 23.1 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(12) 4.4 % (2.6 - 7.3 95% C.I.)	(10) 3.9 % (2.0 - 7.4 95% C.I.)	(16) 3.9 % (2.0 - 7.6 95% C.I.)	(22) 4.2 % (2.7 - 6.5 95% C.I.) P=0.848

The prevalence of oedema is 0.2 %

The result depicted worsening GAM rates in the sub-county compared to last year survey, with a slight increase in GAM rate from 20.6%(16.2-25.8 95% C.I) to 22.3% (17.8-27.6 95% C.I) in 2014 (this was however not statistically significant P=0.616 probability 38.4%) using the CDC calculator this was also true for SAM at a p value of 0.848 and 15.5% probability of change compared to last year.

Table 9: 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	111	4	3.6	15	13.5	91	82.0	1	0.9
18-29	140	6	4.3	24	17.1	110	78.6	0	0.0
30-41	141	4	2.8	25	17.7	112	79.4	0	0.0
42-53	110	7	6.4	29	26.4	74	67.3	0	0.0
54-59	27	0	0.0	3	11.1	24	88.9	0	0.0
Total	529	21	4.0	96	18.1	411	77.7	1	0.2

Compared to last year more or less malnutrition was distributed among the age similarly but there was one case of oedema that was identified this year.

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

	<-3 z-score	**>=-3 z-score**
Oedema present	Marasmic kwashiorkor No. 0 (0.0 %)	Kwashiorkor No. 1 (0.2 %)
Oedema absent	Marasmic No. 23 (4.3 %)	Not severely malnourished No. 511 (95.5 %)

There were no marasmic-kwashiorkor cases. There was one case of kwashiorkor cases and 23 children with marasmus encountered during the survey however.

The figure below show the weight for height distribution curves of the surveys sample in Z-scores for comparison with both the WHO reference populations. The weight for height

distribution curves of the sample are shifted to the left, with a mean Z-score of -1.21±1.03, which indicates a suboptimal nutrition status compared to the reference population (WHO reference table).

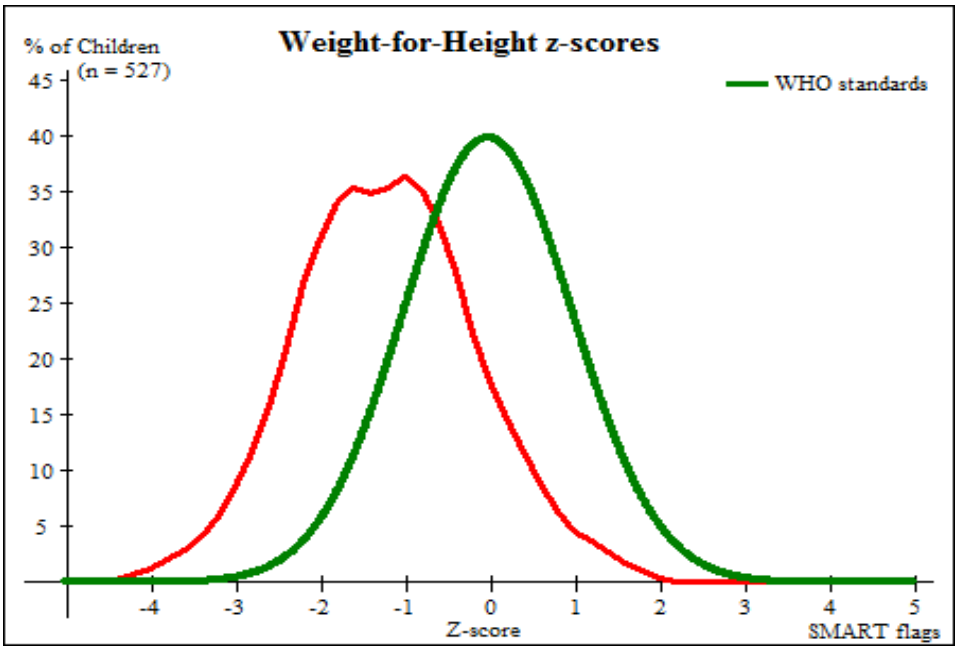


Figure 2: GAM by Weight for Height

3.2. Malnutrition by MUAC

Table 11: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	Boys n = 275	**Girls** n = 260	**2013** n = 409	**2014** n = 535
Prevalence of global malnutrition (< 125 mm and/or oedema)	(12) 4.4 % (2.7 - 7.1 95% C.I.)	(19) 7.3 % (4.8 - 11.1 95% C.I.)	(35) 8.6 % (6.0 - 12.1 95% C.I.)	(31) 5.8 % (4.0 - 8.2 95% C.I.) P=0.131
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(10) 3.6 % (2.1 - 6.3 95% C.I.)	(17) 6.5 % (4.2 - 10.0 95% C.I.)	(33) 8.1 % (5.6 - 11.5 95% C.I.)	(27) 5.0 % (3.4 - 7.4 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(2) 0.7 % (0.2 - 2.9 95% C.I.)	(2) 0.8 % (0.2 - 3.2 95% C.I.)	(2) 0.5 % (0.1 - 1.9 95% C.I.)	(4) 0.7 % (0.2 - 2.5 95% C.I.) P=0.733

Table 12: 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	111	3	2.7	9	8.1	99	89.2	1	0.9
18-29	142	0	0.0	10	7.0	132	93.0	0	0.0

30-41	144	0	0.0	3	2.1	141	97.9	0	0.0
42-53	111	0	0.0	4	3.6	107	96.4	0	0.0
54-59	27	0	0.0	1	3.7	26	96.3	0	0.0
Total	535	3	0.6	27	5.0	505	94.4	1	0.2

3.3. Prevalence of Chronic malnutrition

3.3.1 Underweight

Table 13: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 472	**Boys** n = 251	**Girls** n = 221
Prevalence of underweight (<-2 z-score)	(104) 22.0 % (18.6 - 25.9 95% C.I.)	(56) 22.3 % (17.7 - 27.7 95% C.I.)	(48) 21.7 % (16.8 - 27.5 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(78) 16.5 % (13.9 - 19.5 95% C.I.)	(44) 17.5 % (13.2 - 22.9 95% C.I.)	(34) 15.4 % (11.6 - 20.2 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(26) 5.5 % (3.5 - 8.7 95% C.I.)	(12) 4.8 % (2.6 - 8.8 95% C.I.)	(14) 6.3 % (3.4 - 11.5 95% C.I.)

Table 14: 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	98	0	0.0	10	10.2	88	89.8	1	1.0
18-29	122	8	6.6	23	18.9	91	74.6	0	0.0
30-41	132	9	6.8	18	13.6	105	79.5	0	0.0
42-53	96	7	7.3	22	22.9	67	69.8	0	0.0
54-59	24	2	8.3	5	20.8	17	70.8	0	0.0
Total	472	26	5.5	78	16.5	368	78.0	1	0.2

3.3.2. Stunting

Table 15: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 439	**Boys** n = 226	**Girls** n = 213
Prevalence of stunting (<-2 z-score)	(67) 15.3 % (11.9 - 19.3 95% C.I.)	(32) 14.2 % (10.4 - 18.9 95% C.I.)	(35) 16.4 % (11.7 - 22.6 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(54) 12.3 % (9.9 - 15.2 95% C.I.)	(24) 10.6 % (7.6 - 14.6 95% C.I.)	(30) 14.1 % (10.2 - 19.1 95% C.I.)
Prevalence of severe stunting	(13) 3.0 %	(8) 3.5 %	(5) 2.3 %

(<-3 z-score)	(1.6 - 5.4 95% C.I.)	(1.7 - 7.1 95% C.I.)	(0.9 - 6.1 95% C.I.)

Table 16: 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	88	3	3.4	6	6.8	79	89.8
18-29	110	4	3.6	13	11.8	93	84.5
30-41	122	3	2.5	16	13.1	103	84.4
42-53	95	3	3.2	14	14.7	78	82.1
54-59	24	0	0.0	5	20.8	19	79.2
Total	439	13	3.0	54	12.3	372	84.7

Table 17: Prevalence of overweight based on weight for height cut off's and by sex (no oedema)

	All n = 529	**Boys** n = 272	**Girls** n = 257
Prevalence of overweight (WHZ > 2)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)
Prevalence of severe overweight (WHZ > 3)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)

Table 18: Prevalence of overweight by age, based on weight for height (no oedema)

		Overweight (WHZ > 2)		**Severe Overweight (WHZ > 3)**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**
6-17	111	0	0.0	0	0.0
18-29	140	0	0.0	0	0.0
30-41	141	0	0.0	0	0.0
42-53	110	0	0.0	0	0.0
54-59	27	0	0.0	0	0.0
Total	529	0	0.0	0	0.0

Table 19: 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	528	-1.21±1.04	1.78	1	6
Weight-for-Age	472	-1.14±1.10	1.00	57	6
Height-for-Age	439	-0.60±1.34	1.12	56	40

* contains for WHZ and WAZ the children with oedema.

3.4 Mortality results (retrospective over 3 months prior to interview)

In total there were 6 reported cases of death in mandera during the survey
The reported causes of death for under-fives (4 cases) were:

a) 1- Vomiting
b) 1- Chest Infection
c) 1- diarrhoea
d) 1-Sickness

The reported causes of death for adults (2 cases) were;

a) 1-Unknown
b) 1-Excess Vomiting

Table 20: Mortality rates

Indicator	2012	2014
CMR (total deaths/10,000 people / day): (95% CI)	0.36 (0.03-3.63)	0.18 (0.08-0.44) D. effect 1.01
U5MR (deaths in children under five/10,000 children under five / day): (95% CI)	0.22 (0.05-0.87	0.53 (0.21-1.35) D. Effect 1.00

3.5. Children's morbidity

Out of 592 children who participated in the survey, 181 of them reported to having been sick two weeks prior to the survey. Below are the morbidity trends in the sub-county since 2012 to date

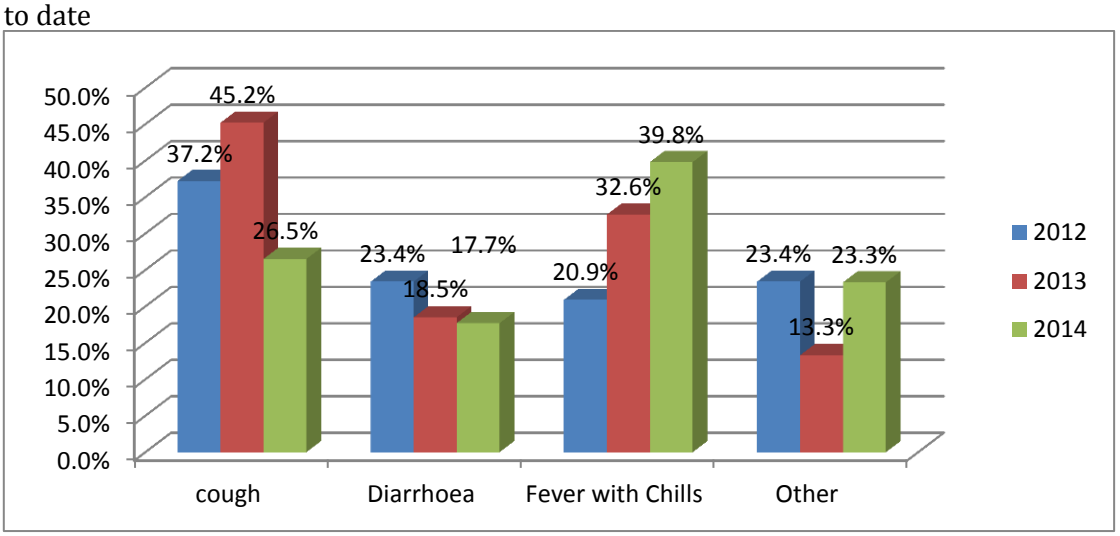


Figure 3: Prevalence of reported illness in children in the two weeks prior to interview (n=135)

Fever with chills was the most common disease reported at 39.8%, this was followed by Acute Respiratory tract infection and diarrhoea reported at 26.5% and 17.7% respectively. This was different from the previous two years where most of the children were reported to have suffered mostly from cough. Of those who reported to have been sick 50.8% reported to have sought assistance form public clinic which was a drop from 2013 62.5%. There was an increase of those who had sought help from kiosk (from 0 to 4.4%) and as well those who went to the community Health workers (from 1.7 to 7.5%). Of concern as well were the more than a fifth of the parents who reported to have sought no help when their children were sick as shown in figure 4 below

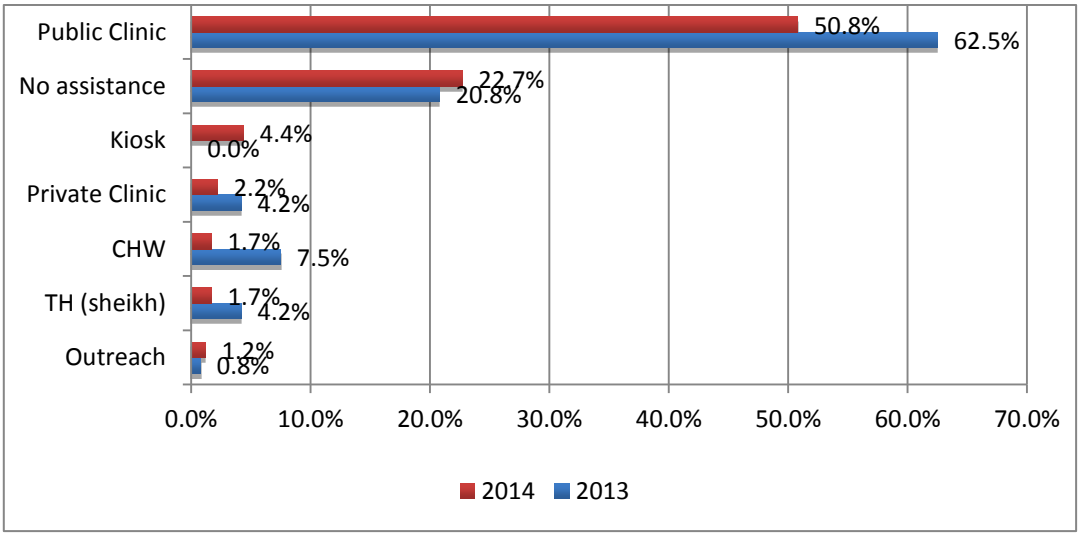


Figure 4: Health seeking Behaviour

3.6. Vaccination Results

3.6.1. 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 97.3%. There was a noted increase in the number of respondents who reported through recall which has been on the increase since 2012 which could be attributed to shortage of Mother Child booklets in the Sub County due to transition hiccups of devolving health from National to County government

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.

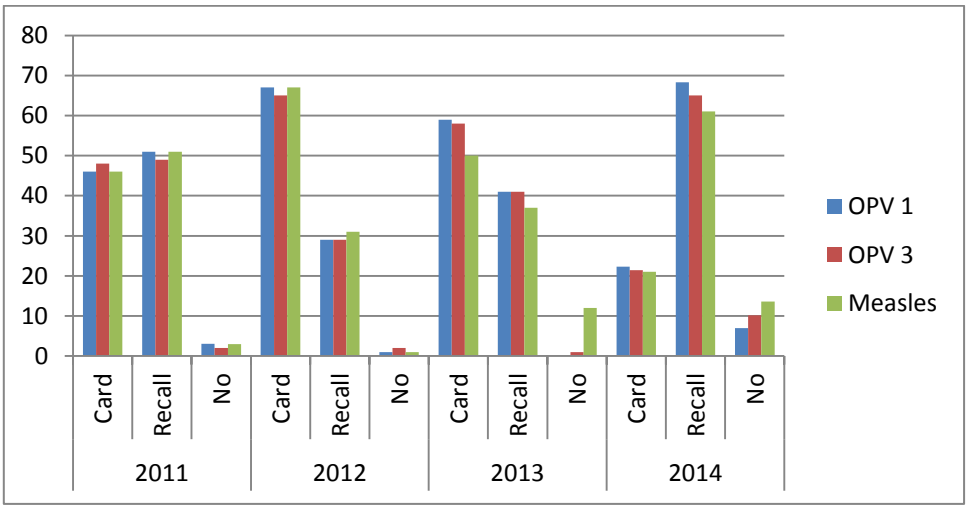


Figure 5: Vaccination coverage: BCG for 6-59 months and measles for 9-59 months

3.7. Micronutrient supplementation and Deworming

Table 21: Micronutrient and deworming coverage

	Factor	2012	2013	2014
Vitamin A supplementation (6-11 months)	1 time	82% (68)	74.6%(56)	65.2%(15)
	>1 time	-	12%(9)	30.4%(7)
Vitamin A supplementation (≥12months)	1 time	47% (464)	57.6%(125)	35.2%(90)
	2 times	38% (374)	49.5%(157)	43.4%(111)
	>2 times	-	0.9%(3)	17.2%(44)
De-worming Children aged > 12 months	1 time	38% (289)	25.1%(100)	13.7%
	2 times	37%(284)	16.8%(67)	9.9%

87% of the caretakers with children 6-11 months reported to have received the VAS at health facility however only 26% could be verified by card. For the 12-59months 87.1% reported to have received from HF with 18.7% only verified by card. This means that though supplementation with Vitamin A was being done documentation was very poor which should form part of ongoing OJT with the health workers

Compared to the previous years there was a great improvement in usage of zinc in the management of diarrhoea which was only reported by 43.8% compared to last year 4.5% of all the respondents who reported to have had diarrhoea two weeks prior to the survey. This could be attributed to the continuous health education on Zinc supplementation and the employment and deployment of health workers by the County to the health facilities. In addition the supply chain management of drugs have been improved and the staffs trained on integrated management of child hood illnesses.

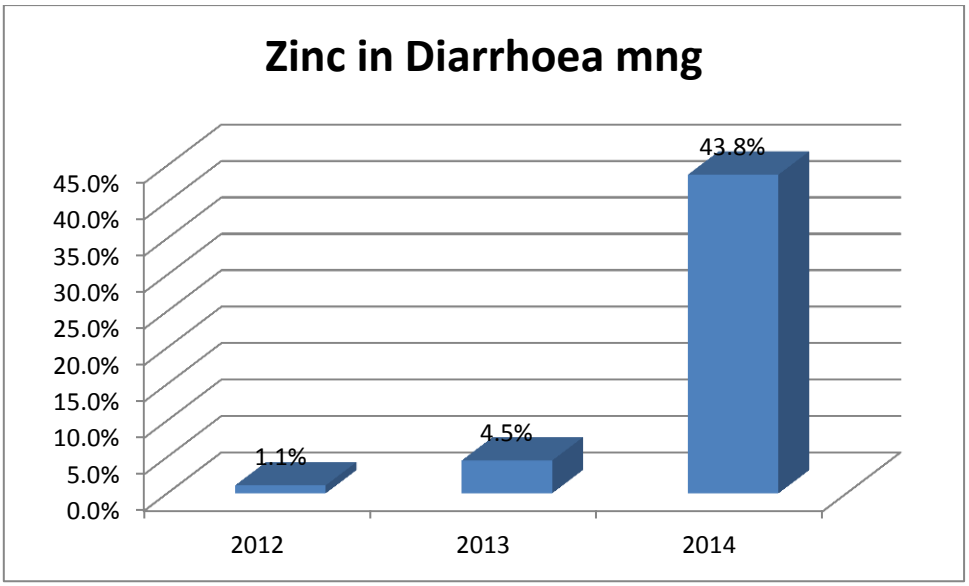


Figure 6: Zinc in diarrhoea management

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).

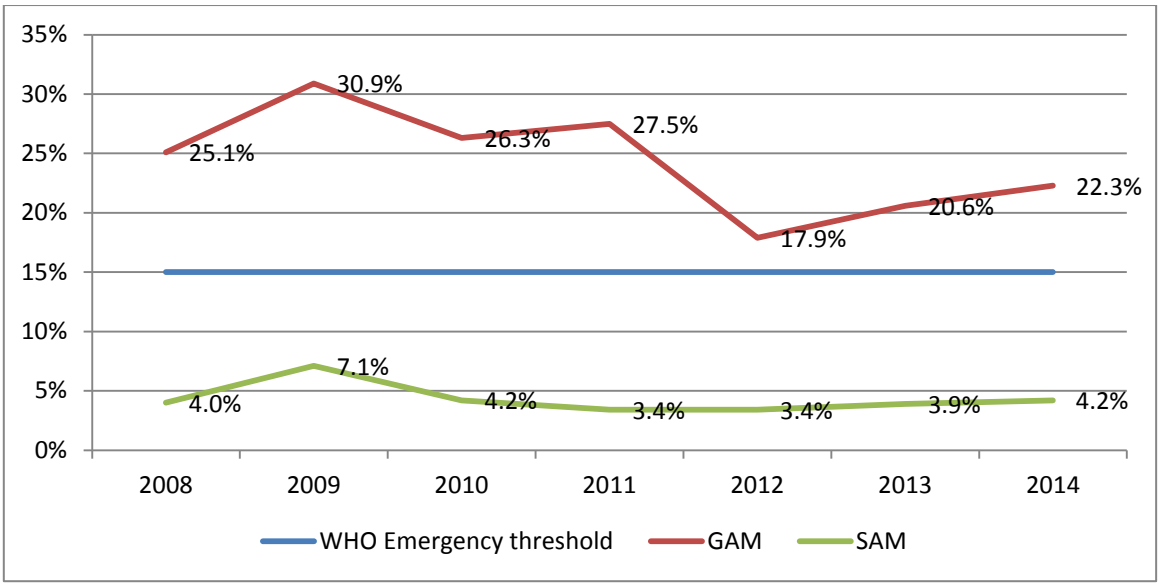


Figure 7: GAM/SAM Trends since 2008 to date

4.2. Causes of malnutrition

The nutrition survey was undertaken at the long rains within the month of June 2014. 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 30.6% similar to last year's 33.3%. The main causes of morbidity reported were; fever with chills like malaria (39.8%), acute respiratory tract infections (26.5%), and diarrhoea (17.7%). The disease patterns in the community were said to be typical for the season.

4.2.2. Water, Hygiene and Sanitation

4.2.2.1. Main water source

Most of the respondents reported to getting their water from safe sources (59.7%). The most reported sources were borehole followed by unprotected well protected well and Dam. More than 85% took less than 1 hour to and from water sources. 54.6% paid for their water amount ranging from 1-50 shillings with the majority (43.5%) paying 5 shillings for a 20 litre jerrican. In addition 70.4% of the respondents reported to storing their water in closed containers. One average the respondents reported to use 13.8 litres of water per person almost the recommended 15 Litres per day but not quite there. 51.8% of the respondents did

not queue for water. The figure below shows the main water sources in the sub county;

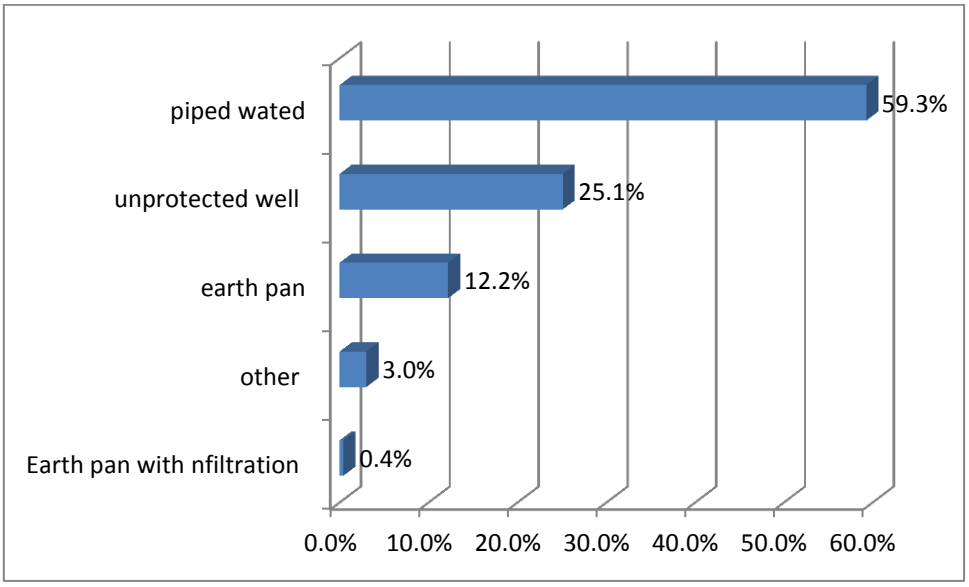


Figure 8: Main current water sources

4.2.2.2. Water treatment

Though more than a third of the respondents reported to having used water from unsafe sources , most respondents reported to not doing anything to their drinking water (97.7%) this trends are similar from the last thee years. Chemical use in water treatment was reported by around 2% of the respondents while a few also were boiling their drinking water as shown in the figure below;

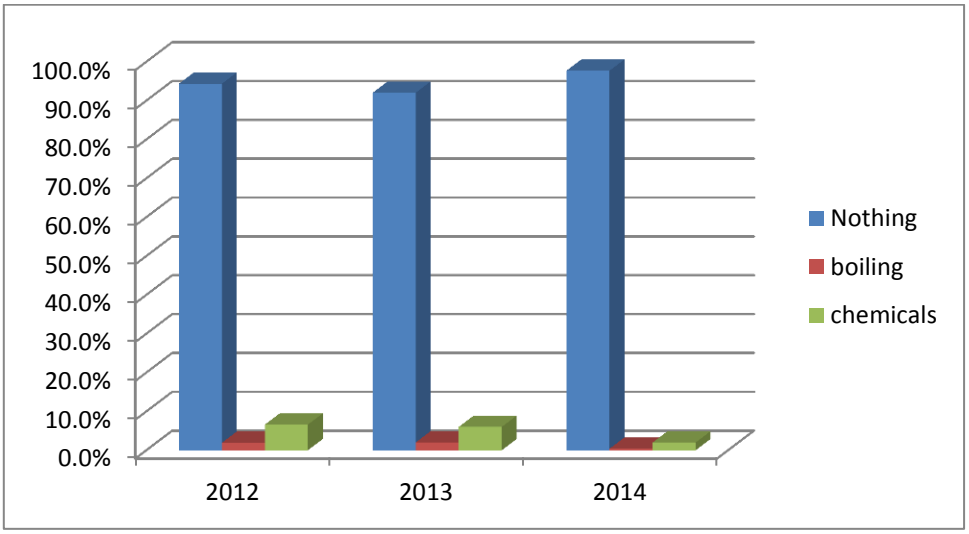


Figure 9: Treatment given to drinking water

4.2.2.3. Hand washing practices

4.2.2.3.1. Hand washing at critical times

More than a third of the population reported to have washed their hands at the most critical times most people however washed hands after visiting the toilet and before and after eating and least after cleaning baby bottoms. Compared to same time last year, there was a marginal increase in hand washing after visiting the toilet, before and after eating and slightly after cleaning children bottoms but there was a drop in hand washing before handling food as shown in figure 14 below;

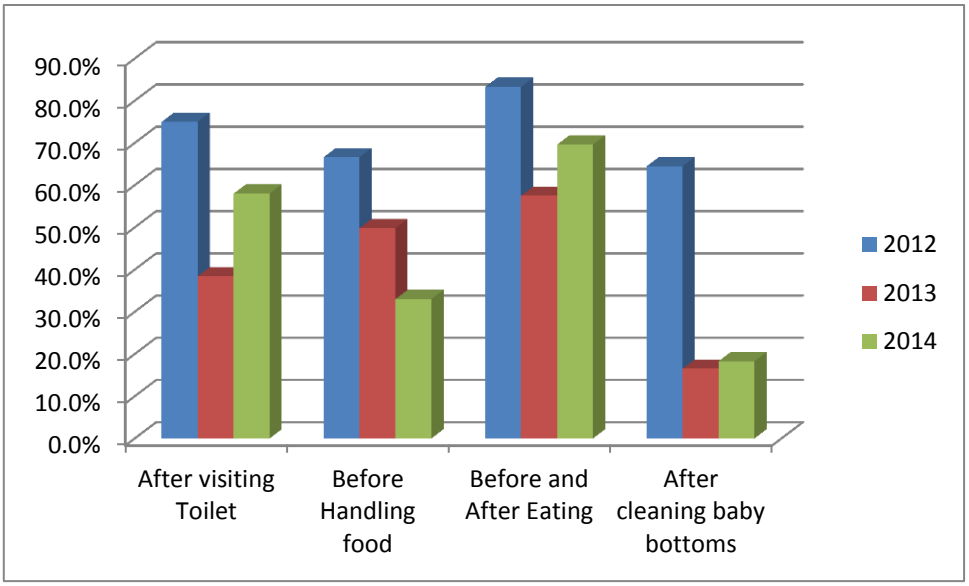


Figure 10: When hands were washed

4.2.2.3.2. Appropriate hand washing

Though a substantial number of people washed hands it is worth noting that most of them used water only (63%). This was a drop however from last 85% with a number of people washing hands occasionally with soap when it was available. This could be attributed to health promotion exercises being undertaken in the community.

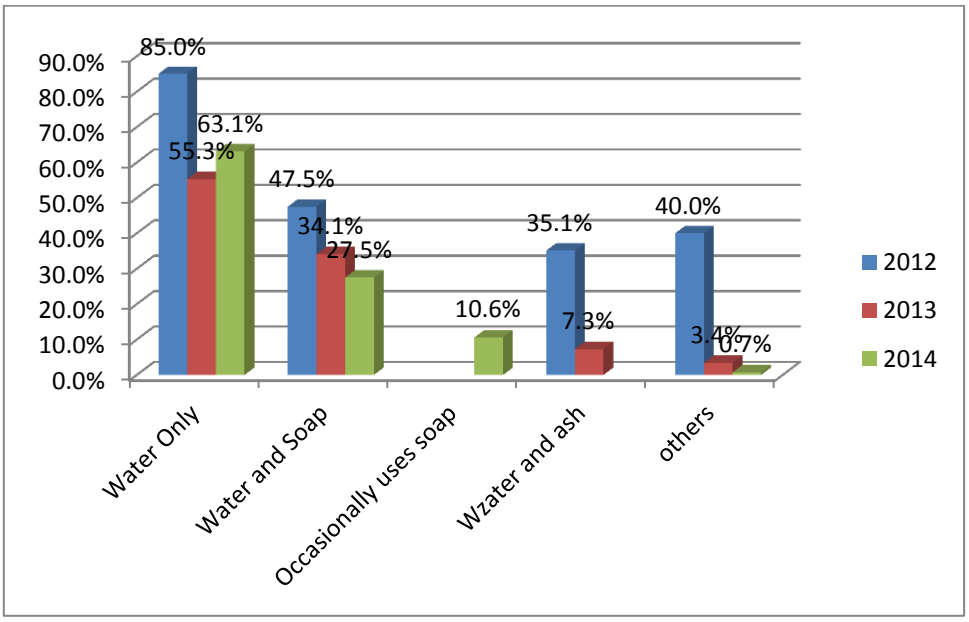


Figure 11: what was used to clean hands

4.2.2.4. Access to toilet facilities

57.2% of the respondents reported to have access to a toilet facility (either their own or a neighbours) this was a slight improvement from last year reported at 48%. This increase could be attributed to the pilot of Community Led total Sanitation (CLTS) in some sites and continuous sensitization of the community using CHWs and social leaders on importance of constructing and utilizing toilets to achieve open defecation free community. The families that did not have access to a toilet facility reported to relieving themselves in the bush as shown in the figure below. This indicates poor human waste disposal methods that have the potential to contaminate the open water sources like earth pans and unprotected wells

(which are common water sources in the sub county) leading to diarrhoea and other water borne diseases.

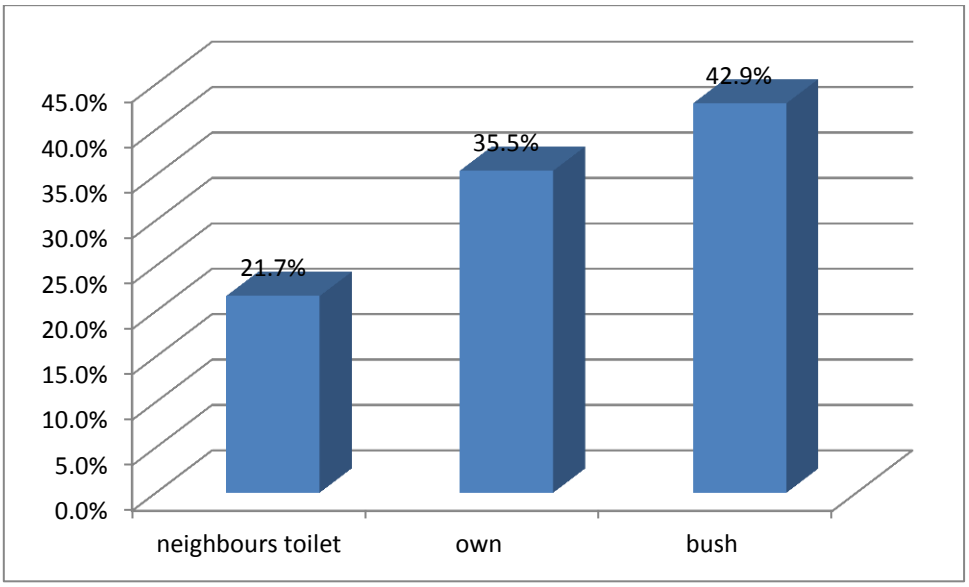


Figure 12: Access to toilet facilities

4.2.3. House Hold Food security

4.2.3.1. Main livelihood and sources of income

The main livelihood activity for most of the HHs interviewed was Livestock herding (34.3%). This was followed waged labour (16.5%) and petty trade (15.8) with some cases of firewood and charcoal sale and some salaried people. The main sources of income for the HH was however petty trade (22.7%), sale of personal products, casual labour and sale of livestock products since in the community it is not common to sale livestock as shown in figure 13 and 14 below;

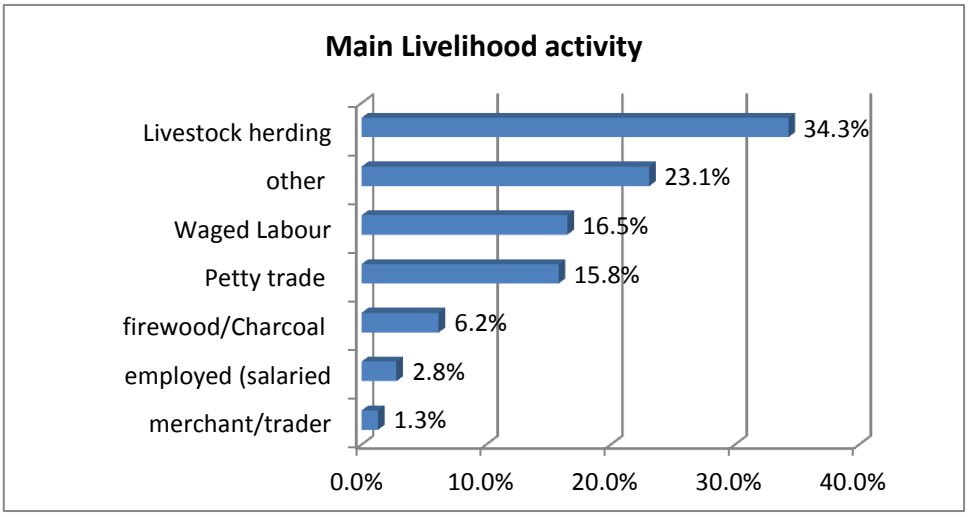


Figure 13: Main HH livelihood activity

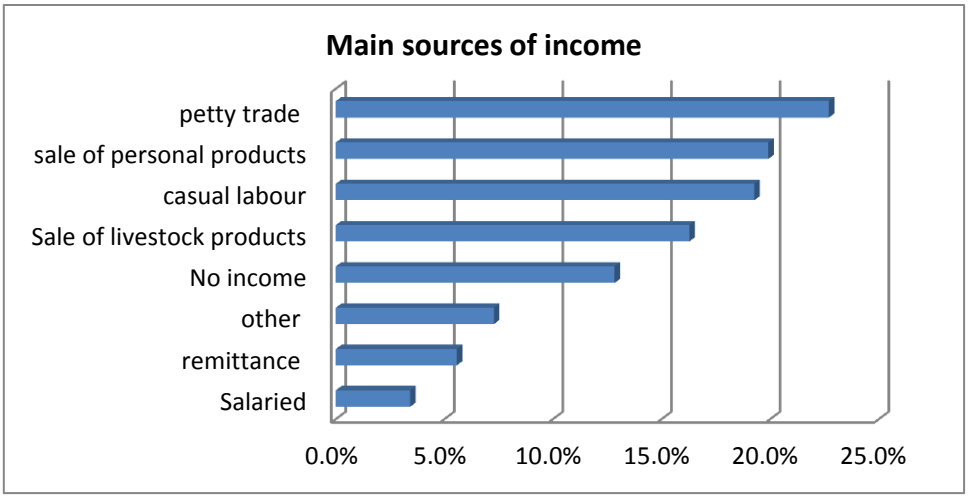


Figure 14: Main Sources of income

4.2.3.2. Coping strategies

51.7% of the respondents reported to have experienced something that affected to eat the type of foods they preferred in the previous 7 days. The table below shows an analysis of the coping strategies using the WFP coping Score Index. This showed that for all the households that had employed coping strategies in mandera Central on average they had a reduced CSI score of 18.

Table 22: Coping Strategy Index

Indicator	Raw Score	Severity weight	Weighted Score (frequency*weight)
a) Rely on less preferred and less expensive foods?	3	1	3
b) Borrow food, or rely on help from a friend or relative?	2	2	4
c) Limit portion size at mealtimes?	3	1	3
d) Restrict consumption by adults in order for small children to eat?	2	3	5
e) Reduce number of meals eaten in a day?	3	1	3
Total Reduced CSI for Mandera Central (Mean)			18

4.2.3.3. Dietary Diversity

Majority of the households (52.3%) reported to having medium dietary diversity this was followed by 44.1% of the households reported to having high dietary of more than 6 food groups out of the 16 food groups provided by FAO (I however did not include condiments in my analysis). There were 3.6% of households however who had a low dietary diversity as shown in figure 15 below.

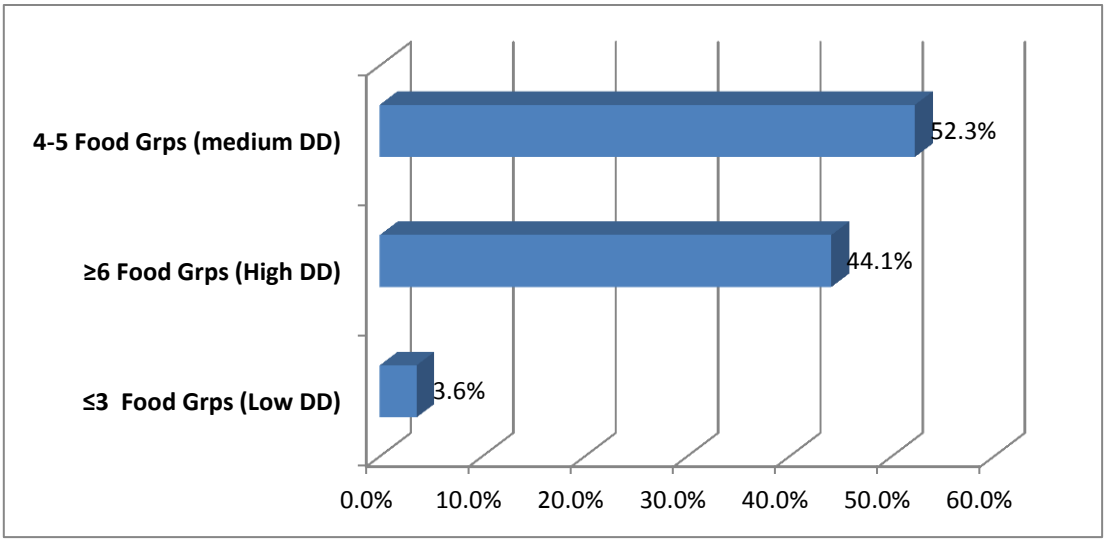


Figure 15: Food groups consumed

4.2.3.4. Food consumption score

Also a majority of the households (84.5%) reported above 35 on the food consumption score with borderline and poor food consumption being reported at 5.9% and 9.6% respectively as shown in the figure below.

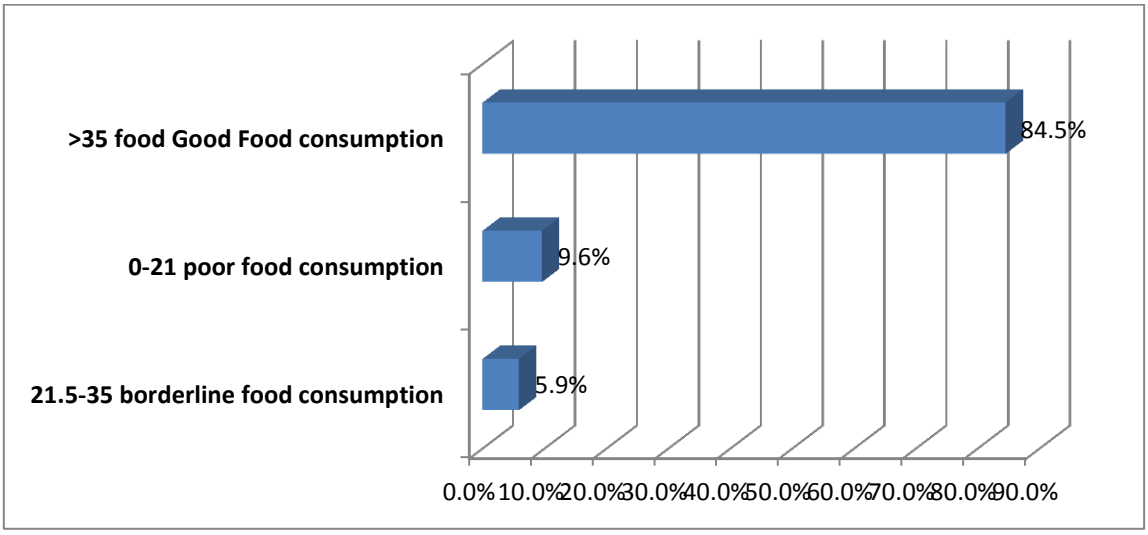


Figure 16: Food consumption score

4.2.4. MATERNAL INDICATORS

Most of the women between 15-49 years were neither pregnant nor breastfeeding caretakers were neither pregnant or lactating (48.4%) as shown in the figure 6 below;

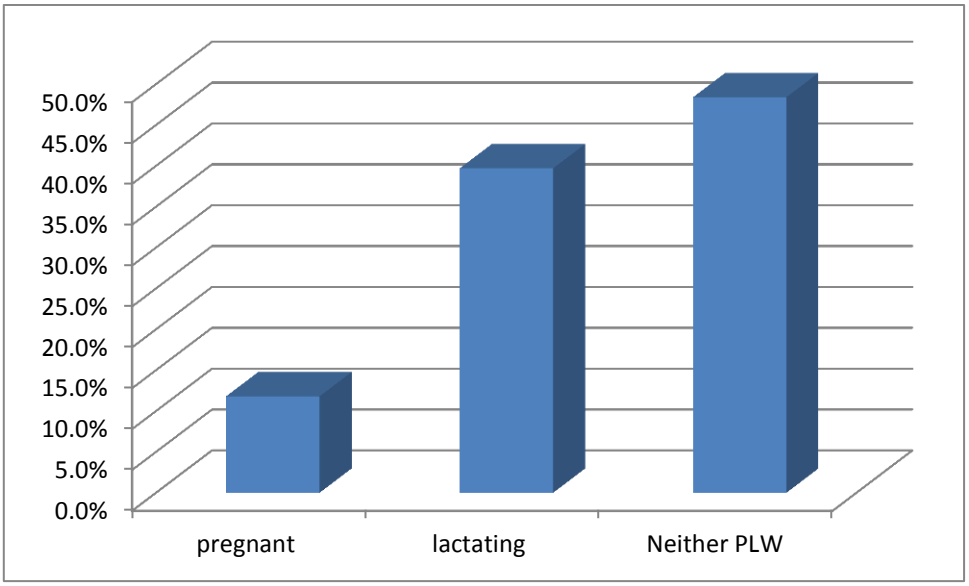


Figure 17: Women current physiological status

4.2.4.1. MUAC

There was a slight increase in malnutrition by MUAC for the pregnant and lactating women from 8.3% in 2013 to 10.2% in 2014 for all the women combined however the rates for MUAC less that 21cms remained more or less the same as shown below;

Table 23: Care Takers MUAC measurements

Category	2012 MUAC <21 CM	2013 MUAC <21 CM	2014 MUAC <21 CM (n=504)
All women(15-49 years)	95(14.3%)	7.5% (17)	7.9% (40)
PLW	28(6.4%)	8.3%(5)	10.2% (27)

4.2.4.2. Iron supplementation

Iron supplementation in Mandera central has been on a downward trend from 2012 to date. This could be attributed to poor sensitization of pregnant mothers on use of iron supplements by health workers and the side effects of the drug which result in nausea and vomiting and black hard stool as per the pregnant mothers complain. Of those who reported to have been supplemented with iron the majority only took the supplements for an average of 30 days (36.4%) followed by a 21% who reported to taking the supplements for 2 days only. This against a recommendation of 270 days (the entire gestation period) as shown in table 12 and figure 10 below;

Table 24: iron folate supplementation

Iron Supplementation	Factor	2012	2013	2014
Supplemented with Iron	Yes	46.5%	38.3%	32.2%

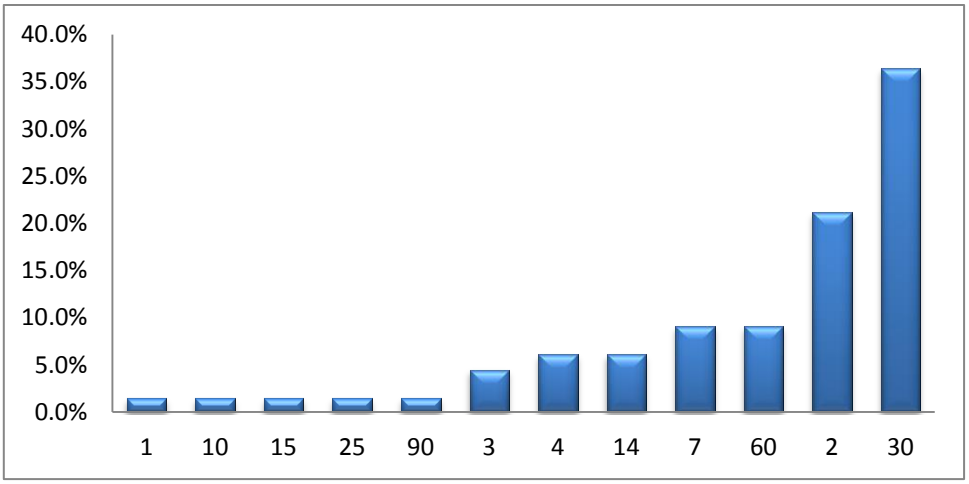


Figure 18: No of days that iron was consumed

4.2.5. Other HH Indicators

4.2.5.1. Status of the HH

Most of the households (91%) reported to being residents of clusters visited with 9% reporting to being internally displaced. This was following the interclan conflicts in both 2013 and 2014 with some people now currently living in Elwak town (bulla IDP) after migrating from Wajir last year. Most of the respondents (85.9%) were married at the time of the survey followed by 10% who were wowed among others as shown below;

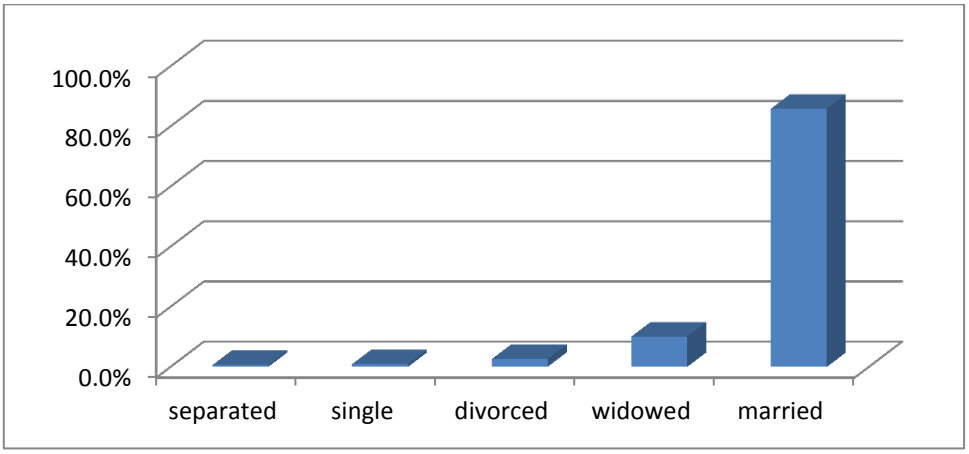


Figure 19: Marital status of respondents

4.2.5.2. Nets availability and usage

Most of the households (75.8%) reported to not having any mosquito nets. This was followed by a 10.5% who had one mosquito net but there were some 2.4% of the HH who reported to having more than 4mosquito nets.

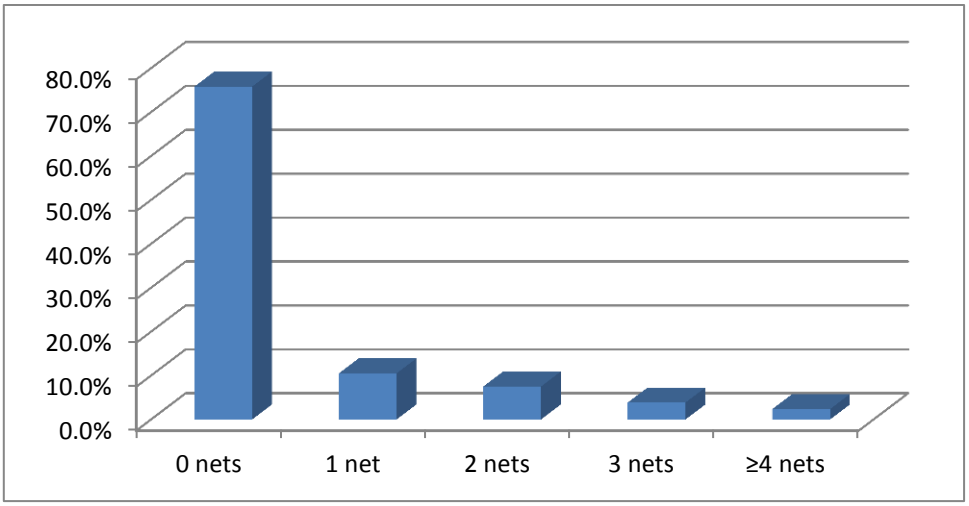


Figure 20: No of nets per household

4.2.5.3. Highest level of education attained

Most people reported to not have attained any level of education with also a considerable number only reporting to have only completed pre-primary level of education

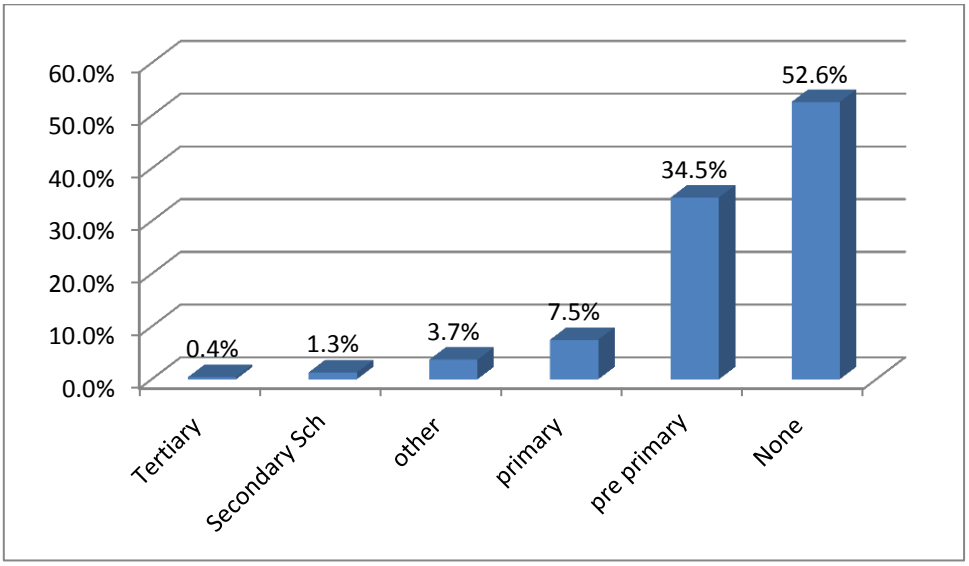


Figure 21: Highest level of education completed

5.0. CONCLUSSION AND LIMITATIONS

The malnutrition levels were reported at 22.3(17.8-27.6 compared to last year rates of 20.6% (16.2-25.8 95% C.I.) Using the CDC calculator for significance the p-value was found to be 0.616 meaning there was no difference between the two seasons. This was also true for SAM which was reported at 4.2(2.7-6.5) compared to last season reported at 3.5% (2.1- 5.3 95% C.I.) with the p-value being P=0.848. Stunting was however shown to have decreased significantly from 24.4(19.5-30.1) to 15.3 (11.9-19.3) with the test of significance giving a p-value of p=0.006 and as well underweight dropping from 30.6 (24.7-37.3) to 22.0(18.6-25.9) with a p value of p=0.019.

The malnutrition rates by MUAC both for GAM and SAM did not change significantly reported at 5.8% compared 8.6% last year for GAM and 0.7% compared to 0.5% with p-values of p=0.131 and p=0.733 respectively

There were low rates of Iron folate supplementation reported at 32.2% and the trends have been declining since 2012. Utilization of the same was low reported at consumed for 30 days (34.6%) followed by consumed for only 2 days (21%)

There were poor WASH indicators with access to sanitation reported at 57% though this is an improvement from last year it is still not ideal. Hand washing was also poor especially after cleaning children bottoms reported at 18.3%. Hand washing is also done mostly with water only.

The levels of Immunization (OPV1&3, Measles, BCG) were within the recommended national levels of above 80% both by card and recall. There has been an increase of reported immunization by recall which is not as reliable as by card which should be looked into.

Vitamin A supplementtation and Deworming were also poor reported at 60.6 12-59 months 2 times and 9.9 2 times 12-59 respectively. For routine vitaminn A supplementation, documentation seemes to be a problem reported at 26% for the 6-11 months and 18.7% for the 12-59 months.. There was however a remarkable increase in Zinc supplementation that can be attributed to the continous health education on Zinc supplementation and the employment and deployment of health workers by the County to the health facilities. In addition the supply chain management of drugs have been improved and the staffs trained on integrated management of child hood illneses.

Most of the respondents reported to have attained no level of education(56.2%) or preprimary (34.5%)

LIMITATIONS

- Some sites were excluded from the sampling frame due to insecurity concerns
- Due to the use of tablets in the data collection a follow up question in the food consumtion score was missed for 43 house holds meaning they were not included in the calculation of FCS even though their data was used in the calculation of the dietary diversity.
- For the MUAC data for the women of child bearing age the sampling frame was slightly differnt from last year (in last year only the respondents MUAC was taken while this year all women in HH between 15-49 years MUAC was taken)

6.0. RECOMMENDATIONS AND PRIORITIES

	Recommendation	Activities	Time Frame	Responsible Person	Resources Needed
1	Holistic approach to improve the health seeking behavior of the community	Sensitization of the community by use of CHWS, MTMSG and social leaders on importance of adopting good health seeking practices. Increase awareness during Males bora and other National campaigns Strengthening the linkage of community to health facilities through CHWs	October and continuous Ongoing October and continuous November 2014 and Continuous May 2015 and continuous	SCPHO/Save the Children SCHO/SCPHO/SC SCPHO SCPHO/Save the Children SCHO/SCPHO/Save the Children	IEC materials, Vehicle Vehicle, IEC Materials Checklist, referral slips, vehicle Vehicle
2	Integrated approach to increase immunization coverage	Operationalize immunization in the six new Health Facilities Provision/Strengthening of adequate MCH/FP booklets to health facilities and outreach sites Sensitization of health workers on the importance of the MCH/FP booklets as means of immunization verification Strengthening tracing of immunization defaulter through use of CHWs	April 2015 September and continuous September 2014 December 2014 and Continuous	SCHO/SCPHN SCPHN/SCHRIO SCPHN/SC SCPHO/SC SCPHO/SC	Fridges, Vaccines Vehicle Booklets Vehicle, Fuel, SMART survey result Stationaries, vehicle and fuel

3	Improving coverage of vitamin A and De-wormers	Up scaling of Vit A supplementation and Deworming through outreach and Health Facilities Strengthening documentation of Vit A and deworming data. Strengthening Nutrition education and counselling at community level Sensitization of health workers on the need to explain to the client when given Vit A and Dewormers Training of school patrons and ECD teachers on Vitamin A and de-wormers and implementation at ECD Centres Supportive supervision	October 2014(Malesbora time) and continuous December 2014 and continuous March 2015 October 2014 October 2014 October 2014 and continuous December 2014 and continuous	SCNO/SCPHN/SC SCNO/SCPHN/SC SCNO/SCPHN/SC SCPHO/SC SCNO/SCPHN/Save the Children SCNO/SCHO/SCPHO/Save the Children	Vehicle, Fuel, Vit A, Dewormers, stationaries and budget. Vitamin tally sheets and registers Vehicle and fuel Budget, Vit A, Dewormers, stationaries. Vehicle, fuel and checklist Vehicle, IEC materials, Checklist
4	Promotion of the use of safe drinking water since the majority of the population drinks water without treating	Intensify hygiene promotion through the CHW targeting importance of treating water before drinking Conduct Water quality surveillance and promotion of water safety as most of the population are using earth pan as their main source.	Ongoing March 2014	SCPHO/Save the Children SCPHO/Save the Children SCPHO/SCWO/Save the Children	IEC Materials Training material, Hall and budget. Vehicle, Potalab, Chemical treatment

5	Improvement latrine accessibility from 57.2% to 70% through the use of CHWs and Social leaders to advocate for construction and utilization of latrines at house hold level	Sensitization of the community on CLTS model. Sensitization of community leaders on use latrines. Close supervision of CHWs work towards promotion of latrine	November 2014 and continuous	SCPHO/SCPHN/ Save the Children	Vehicle and IEC materials
6	Promotion of hand washing practices by use of soaps during the four critical hand washing times	Sensitization of social leaders on importance of using soap during hand washing. On job training of CHWS on hygiene promotion. Hygiene promotion and education in school clubs and villages on hand washing with soap Sensitization campaigns on world hand washing day Awareness creation on use of tippy tap and soaps via CHWs at house hold levels which is	October 2014 and continuous March 2015 October 2014 and Continuous 15th October 2014 Ongoing December 2014	SCPHO/Save the Children SCPHO/Save the Children SCPHO/Save the Children SCPHO/SCPHN/Save the Children SCPHO/Save the Children SCPHO/Save the Children	Vehicle, Fuel, IEC Materials Budget, Training Materials Hand washing station, soaps IEC Materials, Soaps, Public Address System, Vehicle
7	Improving the coverage of iron supplementation	Sensitization of mothers on importance of iron supplementation in pregnancy Sensitization of social leaders and MTMSG on importance of iron supplementation Strengthening health education to pregnant mothers on importance of iron supplementation by health workers and	December 2014 and continuous December 2014 and continuous June 2015	SCNO/SCPHN/Save the Children SCNO/SCPHN/Save the Children SCPHO/save the Children SCPHO/Save the Children	Vehicle, fuel, IEC Material Vehicle, fuel, IEC Material Vehicle, fuel, IEC materials

8	Strengthening active case finding of malnourished children and PLWs as a result of increased GAM and SAM rates	Conduct bimonthly mass screening. Involvement of local leaders on defaulter tracing	December 2014 and Continuous September 2014 and continuous	SCNO/Save the Children SCNO/SCOH	Vehicle, Fuel
9	Conduct qualitative assessment to ascertain why low utilization of Vit A, Iron Supplementation and Deworming despite the support from government and partners	Incorporating into KAP Survey	October 2014	SCNO/SC/DPHN	Vehicles, Survey materials

7.0. REFERENCES

List all secondary sources to which you have referred in the text.

- 2008-09 Kenya demographic health survey
- The sphere project 2011, Humanitarian charter and Minimum standards
- National Centre for Health Statistics (1977) growth curves for children 0-18 yrs.
- Kenya nutrition survey guidelines 2012
- Coping Strategies Index: Field Methods Manual. Copyright © 2008 Cooperative for Assistance and Relief Everywhere, Inc. (CARE).

8.0. Appendices

Appendix 1: Plausibility Report

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	Score
Missing/Flagged data (% of in-range subjects)	Incl	%	0-2.5 0	>2.5-5.0 5	>5.0-7.5 10	>7.5 20	**0** (1.5 %)
Overall Sex ratio (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	**0** (p=0.561)
Overall Age distrib (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	**10** (p=0.000)
Dig pref score - weight	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	**0** (7)
Dig pref score - height	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	**2** (9)
Dig pref score - MUAC	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	**2** (9)
Standard Dev WHZ .	Excl	SD	<1.1 and	<1.15 and	<1.20 and	>=1.20 or	
.	Excl	SD	>0.9 0	>0.85 2	>0.80 6	<=0.80 20	**0** (1.03)
Skewness WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	**0** (0.13)
Kurtosis WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	**0** (-0.13)
Poisson dist WHZ-2	Excl	p	>0.05 0	>0.01 1	>0.001 3	<=0.001 5	**1** (p=0.013)
Timing	Excl	Not determined yet 0		1	3	5	
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**15** %

The overall score of this survey is 15 %, this is acceptable.

Appendix 2: *Assignment of Clusters*

Geographical unit	Population size	Cluster	Geographical unit	Population size	Cluster
Bulla Afya	1055	1	Borehole 11 Centre	3142	"19,20"
Udole	2642	"2,3"	Gothe IDP	1346	21
Dawder	930		Kutayo	1460	22
Bulla Ayo	1550	RC	Qarsadamu	382	
Wante	1303	4	Kob Adadi	744	
Elwak Town	1157	5	Qalanqelsa	2424	"RC,23"
LMD	1157		Fincharo	1704	24
Bulla Dana	1157	6	Shimbir Fatuma Town	2681	25
Guyo Madow	1157	7	Chachabole	540	26
Bulla Power / Tawakal	1157		Bulla Wajir	2000	27
Lafey IDP	1157	8	Iresuki	700	

Qoroboshana	1662	RC	Tulli	300	28
El Hache	1662	9	Haradi	300	
El Hagarsu	1662	10	Falama	700	
El Safara	1662	11	Dimu	500	
El Taib	1662	12	Elkalla	500	29
Bulla Watta	1662	13	Alango desheg	500	
Dabacity	1923	14	Harbati	226	
Garsesala	3638	"15,RC"	Elele	2233	"30,31"
Kotulo	3338	"16,17"	Wargadud Town	696	
Lehele	838	18	Wargadud East Kalacha	2741	"32,33"
Harwale	527		Chirole	899	
Bulla AP	912		Sotohoro	1351	34

Appendix 3: Result Tables for NCHS growth reference 1977

Table 25: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 531	**Boys** n = 274	**Girls** n = 257
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(121) 22.8 % (18.4 - 27.9 95% C.I.)	(71) 25.9 % (21.0 - 31.6 95% C.I.)	(50) 19.5 % (14.7 - 25.3 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(105) 19.8 % (15.8 - 24.4 95% C.I.)	(63) 23.0 % (17.9 - 29.0 95% C.I.)	(42) 16.3 % (12.5 - 21.0 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(16) 3.0 % (1.7 - 5.4 95% C.I.)	(8) 2.9 % (1.4 - 6.1 95% C.I.)	(8) 3.1 % (1.5 - 6.3 95% C.I.)

The prevalence of oedema is 0.2 %

Table 26: 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	111	3	2.7	18	16.2	89	80.2	1	0.9
18-29	139	5	3.6	32	23.0	102	73.4	0	0.0
30-41	143	2	1.4	25	17.5	116	81.1	0	0.0
42-53	111	5	4.5	27	24.3	79	71.2	0	0.0
54-59	27	0	0.0	3	11.1	24	88.9	0	0.0
Total	531	15	2.8	105	19.8	410	77.2	1	0.2

Table 27: 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. 1 (0.2 %)
Oedema absent	Marasmic No. 15 (2.8 %)	Not severely malnourished No. 519 (97.0 %)

Table 28: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 535	**Boys** n = 275	**Girls** n = 260
Prevalence of global malnutrition (< 125 mm and/or oedema)	(31) 5.8 % (4.0 - 8.2 95% C.I.)	(12) 4.4 % (2.7 - 7.1 95% C.I.)	(19) 7.3 % (4.8 - 11.1 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(27) 5.0 % (3.4 - 7.4 95% C.I.)	(10) 3.6 % (2.1 - 6.3 95% C.I.)	(17) 6.5 % (4.2 - 10.0 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(4) 0.7 % (0.2 - 2.5 95% C.I.)	(2) 0.7 % (0.2 - 2.9 95% C.I.)	(2) 0.8 % (0.2 - 3.2 95% C.I.)

Table 29: 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	111	3	2.7	9	8.1	99	89.2	1	0.9
18-29	142	0	0.0	10	7.0	132	93.0	0	0.0
30-41	144	0	0.0	3	2.1	141	97.9	0	0.0
42-53	111	0	0.0	4	3.6	107	96.4	0	0.0
54-59	27	0	0.0	1	3.7	26	96.3	0	0.0
Total	535	3	0.6	27	5.0	505	94.4	1	0.2

Table 30: Prevalence of acute malnutrition based on the percentage of the median and/or oedema

	n = 531
Prevalence of global acute malnutrition (<80% and/or oedema)	(68) 12.8 % (9.3 - 17.4 95% C.I.)
Prevalence of moderate acute malnutrition (<80% and >= 70%, no oedema)	(64) 12.1 % (8.6 - 16.7 95% C.I.)
Prevalence of severe acute malnutrition (<70% and/or oedema)	(4) 0.8 % (0.3 - 2.0 95% C.I.)

Table 31: 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	111	0	0.0	11	9.9	99	89.2	1	0.9
18-29	139	1	0.7	20	14.4	118	84.9	0	0.0
30-41	143	1	0.7	11	7.7	131	91.6	0	0.0
42-53	111	1	0.9	20	18.0	90	81.1	0	0.0
54-59	27	0	0.0	2	7.4	25	92.6	0	0.0
Total	531	3	0.6	64	12.1	463	87.2	1	0.2

Table 32: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 474	**Boys** n = 251	**Girls** n = 223
Prevalence of underweight (<-2 z-score)	(139) 29.3 % (25.3 - 33.7 95% C.I.)	(74) 29.5 % (24.1 - 35.5 95% C.I.)	(65) 29.1 % (23.7 - 35.3 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(109) 23.0 % (19.5 - 26.9 95% C.I.)	(61) 24.3 % (19.2 - 30.3 95% C.I.)	(48) 21.5 % (16.7 - 27.3 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(30) 6.3 % (4.4 - 9.0 95% C.I.)	(13) 5.2 % (3.0 - 8.9 95% C.I.)	(17) 7.6 % (4.6 - 12.3 95% C.I.)

Table 33: 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	98	1	1.0	19	19.4	78	79.6	1	1.0
18-29	123	11	8.9	30	24.4	82	66.7	0	0.0
30-41	133	11	8.3	23	17.3	99	74.4	0	0.0
42-53	96	5	5.2	32	33.3	59	61.5	0	0.0
54-59	24	2	8.3	5	20.8	17	70.8	0	0.0
Total	474	30	6.3	109	23.0	335	70.7	1	0.2

Table 34: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 448	**Boys** n = 235	**Girls** n = 213
Prevalence of stunting (<-2 z-score)	(60) 13.4 % (10.3 - 17.2 95% C.I.)	(31) 13.2 % (9.7 - 17.8 95% C.I.)	(29) 13.6 % (9.3 - 19.6 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(50) 11.2 % (8.6 - 14.4	(25) 10.6 % (7.6 - 14.7	(25) 11.7 % (8.1 - 16.7

	95% C.I.)	95% C.I.)	95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(10) 2.2 % (1.3 - 3.9 95% C.I.)	(6) 2.6 % (1.2 - 5.4 95% C.I.)	(4) 1.9 % (0.8 - 4.6 95% C.I.)

Table 35: 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	91	0	0.0	8	8.8	83	91.2
18-29	116	3	2.6	13	11.2	100	86.2
30-41	122	4	3.3	10	8.2	108	88.5
42-53	95	3	3.2	14	14.7	78	82.1
54-59	24	0	0.0	5	20.8	19	79.2
Total	448	10	2.2	50	11.2	388	86.6

Table 36: Prevalence of overweight based on weight for height cut off's and by sex (no oedema)

	All n = 531	**Boys** n = 274	**Girls** n = 257
Prevalence of overweight (WHZ > 2)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)
Prevalence of severe overweight (WHZ > 3)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)

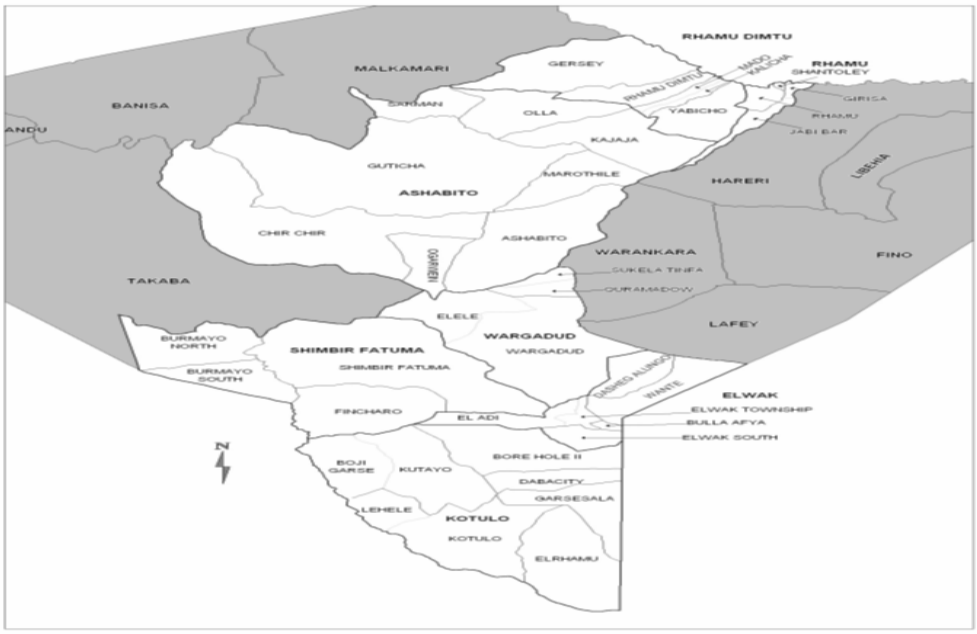
Table 37: Prevalence of overweight by age, based on weight for height (no oedema)

		Overweight (WHZ > 2)		**Severe Overweight (WHZ > 3)**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**
6-17	111	0	0.0	0	0.0
18-29	139	0	0.0	0	0.0
30-41	143	0	0.0	0	0.0
42-53	111	0	0.0	0	0.0
54-59	27	0	0.0	0	0.0
Total	531	0	0.0	0	0.0

Table 38: 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	530	-1.35±0.90	1.66	1	4
Weight-for-Age	474	-1.38±1.07	1.00	57	4
Height-for-Age	448	-0.45±1.34	1.09	56	31

* contains for WHZ and WAZ the children with edema.

Appendix 5: Maps of area