MoPHS

NDMA

MBEERE DITRICT

INTEGRATED HEALTH AND NUTRITION SURVEY

MARCH 2013

FINAL REPORT

ACKNOWLEDGEMENT

The survey team would like to express their sincere thanks to all who made it possible given the numerous challenges faced. In particular, the team would like to thank National Drought Management Authority (NDMA) for the funding and the ministry of Public Health and Sanitation for granting staff permission to participate in the survey.

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ACCROYNM AND ABBREVIATIONS

ARI	Acute Respiratory Infection
CI	Confidence Interval
ENA	Emergency Nutrition Assessment
FAO	Food and Agriculture Organization
GAM	Global Acute Malnutrition
GOK	Government of Kenya
GS	Growth Standards
HFA	Height-for-Age
IMAM	Integrated Management of Acute Malnutrition
ITN	Insecticide Treated Nets
EPI	Expanded Programme on Immunization
MOH	Ministry of Health
MUAC	Mid-Upper Arm Circumference
OPV	Oral Polio Vaccine
PPS	Probability Proportional to Population Size
SAM	Severe Acute Malnutrition
NDMA	National Drought Management Authority
SMART	Standardized Monitoring and Assessment of Relief and Transitions
SPSS	Statistical Package for Social Scientists
UNICEF	United Nations Children's Fund
WFA	Weight-for-Age
WFH	Weight-for-Height
WHO	World Health Organization

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EXECUTIVE SUMMARY

Mbeere District is located in Eastern Province and is classified as a Semi-Arid District with 65 per cent of its total land area exhibiting climatic conditions similar to those found in ASAL areas. The district borders Kirinyaga District to the South West, Embu to the West, Meru South to the North, Tharaka to the North West and Kyuso District to the East

The district experience frequent droughts and has witnessed massive drought in the last three years. This has resulted in poor to no harvests, reduced seed stocks to farmers, inadequate natural regeneration of pasture, lack of adequate water and purchasing power of many families has been seriously eroded. The main factors affecting food security in the district is the poor performance of the rains which resulted in below average crop production. Other factors affecting food security are poorly organized markets and long distances to water points.

Survey Objectives

The overall survey objective was to assess the health and nutritional status of children under five years of age. The specific objectives were to determine;

- Prevalence of acute and chronic malnutrition in children aged 6-59 months.
- Immunization, Vitamin A and deworming coverage among under fives.
- Morbidity and health seeking behavior among under fives and pregnant women.
- Nutrition status of care providers.
- Infant and young child feeding practices
- Household food security status, coping strategies and livelihoods.
- Water access, hygiene and sanitation practices.

Methodology

The survey covered all the divisions of Mbeere North and Mbeere South and whose target population involved children 6 – 59 months for anthropometry and 0 -23 months for infant and young child feeding practices. The primary respondent for the survey was the mother/care taker of the child for both household and child questionnaire. In addition, the nutritional status of child mother/care taker aged 15 – 49 years was also determined.

Data was collected on the following variables; anthropometry, morbidity, vaccination and de-worming status, Vitamin A supplementation, hygiene and sanitation practices, other indicators assessed were infant feeding practices, household food security, coping strategies and livelihood.

A total of 650 households were sampled and 462 children aged 6 to 59 months were assessed for anthropometry. Anthropometric data was analyzed using the ENA software version November 2011 while other indicators were analyzed using SPSS version 16.

Key findings

Table 1. Summary of survey findings

Demographic Household Characteristics	N	n	Findings
Mean (sd) household size	628		4.9±2.05
Total population	3100		
Household head (Male)	628	519	82.6%
(Female)		93	14.8%
Proportion of under fives		572	18.4%
Mean (sd) under five size in household			0.9±0.76
Nutritional Status (6 – 59 months) WHO 2006 Standards Weight- for-Height Z – scores (Wasting)			
Global Acute Malnutrition (<-2 Z-score)	451	17	3.8% (2.5 – 5.7, 95%CI)
Severe Acute malnutrition (<-3 Z-score)		0	0.0% (0.0 – 0.0, 95% CI)
Nutritional Status (6 – 59 months) WHO 2006 Standards Weight- for-Age Z – scores (Underweight)			
Prevalence of Global Underweight (<-2 Z-score)	460	73	15.9% (13.2 – 18.9,95%CI)
Prevalence of Severe Underweight (<-3 Z-score)		14	3.0% (1.9 – 5.0, 95CI)
Nutritional Status (6 – 59 months) WHO 2006 Standards Height- for-Age Z – scores (Stunting)			
Prevalence of Global Stunting (<-2 Z-score)	443	181	40.9% (35.8 – 46.1, 95%CI)
Prevalence of Severe Stunting (<-3 Z-score)		62	14.0% (10.8 – 17.9, 95%CI)
Immunization coverage (6-59 months)			
BCG	479		98.9%
OPV1	479		98.7%
OPV3	479		97.8%
Measles (9 – 59 months)	442		97.0%
Vitamin A (6-59 months)	479		78.9%
Deworming (12-59 months)	408		49.0%
Child Morbidity (0 – 59 months)			
Sickness two weeks prior to survey	501	235	46.2%
Acute Respiratory Infection (cough with difficult in breathing)	235	55	36.6%
Fever with chill like malaria		26	13.7%

Watery diarrhea		27	15.7%
Fever		112	47.2%
Others		9	03%
Maternal malnutrition based on MUAC of <210mm			
Pregnant and lactating women	222	11	4.5%
All female care givers	349	11	3.1%
Infant and young child feeding practices			
Ever Breastfed	285	284	99.6%
Initiation of breastfeeding Within 1 hr Within 24hrs After 24hrs	283	 196 67 15	 69.3% 23.7% 5.7%
Exclusive Breastfeeding (0 – 5 months)	80	41	50.6%
Continued breastfeeding (12 – 15 months)	51	47	84.6%
Complementary feeding (Minimum meals)			
Breastfed children (6-23months) who ate ≥3times/day	173	143	82.6%
Non-breastfed children (6-23months) who ate ≥4times/day	30	10	33.3%
Minimum dietary diversity children 6-23 consuming ≥4 food groups	202	173	34.8%
Household Food consumption and dietary diversity			
Households that normally eat the following 3 meals 2 meals 1 meal			 94.1% 4.6% 0.2%
Households that ate the following yesterday 3 meals 2 meals 1 meal			 88.5% 8.3% 2.7%

Household Dietary Diversity Score (HDDS)	626		
< 3 food groups			3.8%
4 – 6 food groups			35.3%
>6 food groups			60.9%

Conclusion

The nutritional status of children as indicated by prevalence of wasting show a normal situation. However, underweight and stunting levels are unacceptably high and above national prevalence rates. The situation could be attributed to high burden of disease, poor infant and young child feeding practices and chronic food insecurity at household level.

Morbidity burden is high with fever, respiratory tract infections, malaria and diarrhoea being the main causes. However, health seeking behaviour can be considered good although access to safe delivery remain poor. Immunization coverage for all antigens are above the national target but Vitamin A among children above one year and deworming coverage is low and below the national target.

Household water access is relatively fair while sanitation is good with very good latrine coverage. Significant number access water from unprotected sources yet Water treatment is hardly done which is an issue of concern across the district.

Infant and young child feeding practices are fair with breastfeeding practices being very poor while complementary feeding and dietary diversity is inadequate. In addition household food security can be considered adequate with majority of households having medium to high household diversity score.

Subsistence agriculture is main form of farming with majority of households cultivating less than 2 acres. Average livestock herd size is low while majority of households do not own livestock and indication of high poverty. The main source of income for the last three months was found to be sale of own farm produce and casual labour.

Recommendations

To address the issues of concern and improve status of the health and nutrition indicators especially chronic malnutrition as found out in the district, the following interventions should be put in place.

- Put concerted efforts to increase vitamin A and deworming coverage through collaboration with ministry of Education through ECD centres.

- Provision of water treatment chemicals to households who access water from unprotected sources.

- Introduce micronutrient supplementation program for children 6 – 23 months to address high levels of chronic malnutrition.

- Retrain all NDMA field monitors on MUAC measurements as part of improving quality of surveillance data.

INTRODUCTION

Background information

The greater Mbeere District is located in Eastern Province and is classified as a Semi-Arid District with 65 per cent of its total land area exhibiting climatic conditions similar to those found in ASAL areas. The district borders Kirinyaga District to the South West, Embu to the West, Meru South to the North, Tharaka to the North West and Kyuso District to the East

Administratively, the district is a constituent of Embu County and is subdivided into two administrative districts, namely Mbeere North and Mbeere South. It occupies an area of 2,092.5 square kilometers with a population of 219,220 persons with under five population of 32,468[1]. The district is categorized in two main livelihood zones namely; mixed farming and marginal mixed farming spread across the two districts. The inhabitants of the two districts who are mainly Mbeeres and Kamba practice both livestock rearing and agriculture. The common livestock species within the district are cattle, goats, donkeys, sheep and chicken. On agriculture the common crops grown are mainly maize, sorghum, beans, tomatoes, French beans and watermelons in some irrigation areas.

Rainfall is bimodal with long rains season expected from mid March to May and the short rains, which is the main season, from mid October to late December. Annual rainfall ranges between 500-800mm and is usually characterized by poor distribution especially the long rains. The district is also characterized by hot and dry weather condition for the greater part of the year with temperature ranging from 18ºC to 26ºC.

An estimated 64.74 percent of the population lives below the poverty line making them vulnerable to shocks affecting food security. The district has experienced poor seasons in the last three years[2]. This has resulted in poor harvests, reduced seed stocks to farmers, poor regeneration of pastures, and water scarcity with ultimate erosion of household purchasing power. Consequently, there has been a gradual increase in cases of malnutrition within the district. Children at-risk of malnutrition as measured by mid upper arm circumference (MUAC<135mm) among children below 5 years of age, indicate a worsening situation.

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[1] Kenya Bureau of Statistics (2009), population and housing census of Kenya

[2] Kenya Food Steering Group (September 2012), Mbeere district Long Rains food security report

Rationale for the survey

Malnutrition is an underlying condition to 55 percent of all under five deaths with risk of death increasing three folds compared to normal child. Lack of current nutrition survey statistics make planning and response to drought difficult. It is for this reason that a baseline survey is necessary to inform in programming of any nutrition interventions in the district

Overall objective of the survey

Determine the household food security and health and nutritional status among children under five years as well as their care givers.

Specific objective

- To estimate the current prevalence of chronic and acute malnutrition in children aged 6 – 59 months (65 – 110 cm height/length)
- To estimate the nutrition status of pregnant women and mothers with children <5 years (15-49 years)
- To estimate the retrospective morbidity among under five children in the survey area and health seeking behaviours
- To estimate Measles, Polio vaccination, deworming and 'Vitamin A' supplementation for children 9-59 months and 6-59 months respectively
- To estimate the proportion of households with access to improved water and sanitation;
- To assess the current food security situation of the surveyed population
- To measure the Infant and Young Child Feeding practices (0-23 months)
- To recommend appropriate interventions based on the survey

METHODOLOGY

Geographic Target Area and Population Group

The survey covered all the divisions of Mbeere North and Mbeere South and whose target population involved children 6 – 59 months for anthropometry and 0 -23 months for infant and young child feeding practices. The primary respondent for the survey was the mother/care taker of the child for both household and child questionnaire. In addition, the nutritional status of child mother/care taker aged 15 – 49 years was also determined.

Survey design

This was a cross sectional study design survey using two stage cluster sampling method. The survey followed all key steps in conducting SMART anthropometric surveys and ENA for SMART software was used to determine sample size using village level population data for each of the three divisions covered.

The first stage involved collection of food security, nutrition situation and demographic data on population and villages in the survey area. The information was obtained from National Drought Management Authority (NDMA) and Ministry of Public Health office in the districts. All the necessary information required for ENA for SMART software was then entered into the software. The information included; estimated population size for under fives, expected prevalence of malnutrition, desired precision and design effect. The sample size was calculated using estimated prevalence of 8.9 percent, under five proportion of 17.9 percent, design effect of 1.5 percent, a precision of 3.5 and non response of 3 percent. The sample size was 625 households and 415 children aged 6 – 59 months. The number of clusters was determined by estimating how many households could be covered in a day based on estimated time of administration of questionnaire in one household. The survey yielded 41 clusters of 16 households each giving a total of 656 households.

The second stage involved identification of households to be visited in each cluster. On arrival at the village which constituted a cluster, a list of all households was prepared after which simple random sampling was used to generate 16 households. With the assistance of village elder, all the households were then identified and visited. All children aged 6-59 and those below 6 months in every household visited were included in the anthropometric and IYCF survey according to SMART Survey Guidelines.

Sampling procedure: Selecting households and children

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.

In cases where there was no eligible child, a household was still considered part of the sample. 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. Once a team entered the household, the first thing was to determine whether the household met the criteria for survey after which the team leader with support of the village guide briefed the household head or the respondent on the objective of the survey and requested for consent.

Selection of Survey Team, Training and pretesting of questionnaire

The survey was coordinated and supervised by a survey coordinator who was an Assistant Chief Nutrition Officer from Ministry of Health headquarters and assisted by a team comprising of; Drought Management Officer, National program officer – food security and nutrition emergencies, Monitoring and Evaluation officer, Data Analyst, Provincial Nutrition Officer and the District Nutrition Officer.

The survey was conducted by 7 teams; each comprising of 4 members inclusive of a team leader/supervisor, interviewer and two enumerators/measurers. All the team leaders were drawn from the Ministry of Health at the district level with minimum qualification of diploma in nursing, public health or nutrition and experience in conducting surveys.

A four day training workshop from 11th to 14th February 2013 was conducted in Ishiara. The training focused on: the purpose and objectives of the survey; familiarization with the questionnaire by reviewing the purpose for each question; interviewing techniques and recording of data; how to take anthropometric measurements; and cluster and household selection. Demonstrations on how to take anthropometric measurements were also conducted. This was followed by practice to standardize anthropometric measurements. A half day of the training was allocated to pre-testing of the questionnaire (in areas that had not been selected for inclusion in the survey) and reviewing of the data collection tools based on the feedback from the field. Data collection took 7 days from 12th to 22nd February 2013 under the supervision of the survey coordinator assisted by other members.

Variables collected

Age: the age of the child was recorded based on a combination 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 Bathroom scale (SECA model with a threshold of 100kgs 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).

Mid Upper Arm Circumference (MUAC): the MUAC of children were taken at the midpoint of the upper left arm using a MUAC tape and recorded to the nearest 0.1cm.

Retrospective morbidity of children:

A 2-week morbidity recall was conducted for all children (6-59 months) to assess the prevalence of common diseases (e.g. malaria, diarhoea).

Vaccination status and coverage:

For all children 6-59 months, information on BCG, Oral polio Vaccine (OPV) 1, 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 card and recall.

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 whether 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 6 months.

Infant and Young Child feeding (IYCF)

Information on timely initiation of breastfeeding, giving of colostrums and pre-lacteal feeds, exclusive breastfeeding rates, maintenance of breastfeeding, frequency of feeding, diversity of

complementary feeds was solicited based on a 24-hour recall, in line with the WHO guidelines to minimize recall bias and thus obtain more valid information. The information was obtained for children 0-23 months of age.

Food security status of the households: Information on the number of meals usually eaten and the number of meals eaten on the day preceding the survey was solicited to establish the food security status of the households. Additionally, information on the family members who had missed a meal the day preceding the survey was also solicited. Information on the primary source of the dominant food was also solicited.

Household food diversity: Dietary diversity is a qualitative measure of food consumption that reflects household access to a wide variety of foods, and is also a proxy of the nutrient intake adequacy of the diet for individuals. Dietary diversity scores were created by summing the number of food groups consumed over a 24- hour period to aid in understanding if and how the diets are diversified. Household dietary diversity score (HDDS) is meant to reflect, in a snap shot the economic ability of a household to consume a variety of foods. A score of 1 was allocated to each food group that was consumed by the household and a score of 0 for each of the food groups not consumed by the household, and thus the highest possible score was 12

Coping Strategies: Information on coping strategies households employ during times of food scarcity was obtained from respondents.

Household water consumption and utilization: The indicators used were main source of drinking and household water, time taken to water source and back, cost of water per 20-litre jerry-can and treatment given to drinking water.

Sanitation: Information on household accessibility to a toilet/latrine, disposal of children's faeces and occasions when the respondents wash their hands was obtained.

Causes data

Secondary data on causes of malnutrition was mainly obtained from bivariate analysis of relevant variables. 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 Mbeere district.

Data Analysis

Anthropometric data entry and processing was done using the ENA for SMART software Beta version, November 2011. Data cleaning was done using World Health Organization Growth

Standards (WHO-GS 2006) and flagging procedures were used to identify outliers which were excluded 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. All other indicators collected during the survey were analyzed using Excel and SPSS version 16.

Nutritional Status Cut-off Points

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

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

The prevalence of wasting (a reflection of the current health/nutritional status of an individual) is presented as Global Acute Malnutrition (GAM) and severe acute malnutrition (SAM) using weight-for-height (WFH) z scores and MUAC indices. The results on wasting were 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 WHO standards (WHO-GS) 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 WHO-GS or had bilateral oedema were classified as severely wasted (to reflect SAM)
- A cut-off point of <12.5cm MUAC was used to denote GAM among the under fives.

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 a very useful tool in growth monitoring.

- Children whose WFA z-scores fell below -2 standard deviations from the median of the WHO-GS or had bilateral oedema were classified as underweight were classified as underweight below -3 standard deviations from the median of the WHO-GS or had bilateral oedema were classified as severely underweight.

Height-for-age (HFA) – Stunting

Height-for-age is a measure of linear growth and therefore an unequivocal reflection of the cumulative effects of past nutritional inadequacy and/or illness episodes.

- Children whose HFA z-scores fell below -2 standard deviations from the median of the WHO-GS were classified as stunted (to reflect Global Stunting)
- Children whose HFA z-scores fell below -3 standard deviations from the median of the WHO-GS were classified as severely stunted.

Malnutrition among care Givers

The measure of nutritional status of care givers reflect likely hood of the child being malnourished. Usually, the interest is in pregnant and lactating women as it influences the outcome of the unborn and care for the breastfeeding infant.

Their nutritional status is measured using Mid Upper Arm circumference and those who have a MUAC of <210mm is considered malnourished

Survey data validation process

Data quality was ensured through:

- Thorough training of team members for four days including a standardization test for all the enumerators and daily supervision of the teams by the survey supervisors
- Review of questionnaires on a daily basis for completeness and consistency
- Plausibility checks from SMART/ENA software specific to each team during daily data entry.
- On-the-spot correction/feedback of any mistakes noted during data collection to avoid mistake carryovers

Survey Limitations

There were few challenges faced by the team mainly logistics and tools for data collection specifically length boards regarding accuracy of readings. This may have led to inaccuracies when analyzing both acute and chronic malnutrition.

SURVEY RESULTS

Socio-demographic Characteristics of Households

A household was defined as a group of people who live together in the same dwelling and shared a common pot. The survey visited a total of 628 households. The total sample population was 3100 persons and 572 children under five years of age. The proportion of children under five years was 18.4 percent and is comparable to the district proportion of 17.9 percent based on 2009 census. The mean household size was 4.9 ± 2.05 with a median of 5 (minimum 1 and maximum 13). Out of 628 households 82.6 percent were headed by men while 18.4 percent were female headed households while 1.6 percent was headed by a grandmother.

The main occupation for majority of household heads was own farm labour at 52.1 percent while casual labor accounted for 20.2 percent. Salaried, petty trade and business was 8.3, 7.6 and 4.3 percent respectively. The results indicate predominance in farming as a source of livelihood for the household heads. Table 2 below shows population characteristics of the study population.

Table 2. Demographic and Household characteristics

	Demographic characteristics	Results
1	Total population of sample	3100
2	Median Household size	5 (Min 1& Max 13)
3	Male headed household	82.6%
4	Female headed household	14.8%
5	Median number of under fives per household	1 (Min 1, Max 3)

Age and sex composition of children under five in survey

Anthropometric data was collected from 467 children between 6 – 59 months. Data from 5 children were excluded from the analysis due to missing information such height and weight. Table 3 below shows age group distribution of children aged between 6 – 59 months and boys and girls' ratio. Among the 462 surveyed children, 229 (49.6%) were boys and 233 (50.4%) were girls. Boys to girls' sex ratio were within the recommended range of 0.8 – 1.2 indicating unbiased selection of study children. The distribution of the sample children age groups did not vary much from expected values. The slight variation among the various age groups as shown in table 3 could be attributed to inability to get older children which was occasioned by the fact that some were in school during the survey. Due to logistical challenges, these children could not be followed to school for measurements.

Table 3. Age distribution of under five children by sex

	Boys		Girls		Total		Ratio
AGE (mo)	no.	%	no.	%	no.	%	Boy: girl
6-17	56	43.4	73	56.6	129	27.9	0.8
18-29	63	51.6	59	48.4	122	26.4	1.1
30-41	43	45.3	52	54.7	95	20.6	0.8
42-53	49	55.7	39	44.3	88	19.0	1.3
54-59	18	64.3	10	35.7	28	6.1	1.8
Total	229	49.6	233	50.4	462	100.0	1.0

Nutritional status of under five children

Prevalence of Acute Malnutrition by Weight-for-Height z-score

The district level prevalence of Global Acute Malnutrition (GAM) was found to be 3.1 percent (with 95% CI 2.5 – 5.7) and Severe Acute Malnutrition (SAM) of 0.0% (with 95% CI 0.0 – 0.0). Based on WHO standards, the survey results show a normal situation. The prevalence of wasting was higher among girls than boys. However, there was no statistical difference between the age groups.

Table 4: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

|	All n = 451	Boys n = 223	Girls n = 228
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(17) 3.8 % (2.5 - 5.7 95% C.I.)	(7) 3.1 % (1.6 - 6.2 95% C.I.)	(10) 4.4 % (2.3 - 8.1 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(17) 3.8 % (2.5 - 5.7 95% C.I.)	(7) 3.1 % (1.6 - 6.2 95% C.I.)	(10) 4.4 % (2.3 - 8.1 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(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.)

The prevalence of oedema is 0.0 %

The results are indicative of stable food security situation and a contrast with NDMA mid upper arm circumference surveillance data which showed a worsening nutrition situation. The stable

nutrition situation could be attributed to a number of factors. Among them are; good performance of the just ended short rains season which resulted into good harvests, improved access to water and sanitation.

Prevalence of wasting by age group

The prevalence of wasting was highest among 18 – 29 months age category using weight for height z-scores as shown in figure 1. Prevalence of wasting using MUAC measurement was highest among 6-17 months and 18-28 months age category. The high prevalence of acute malnutrition among these age groups could be attributed to poor infant feeding practices.

Figure 1. Prevalence of wasting by Age group
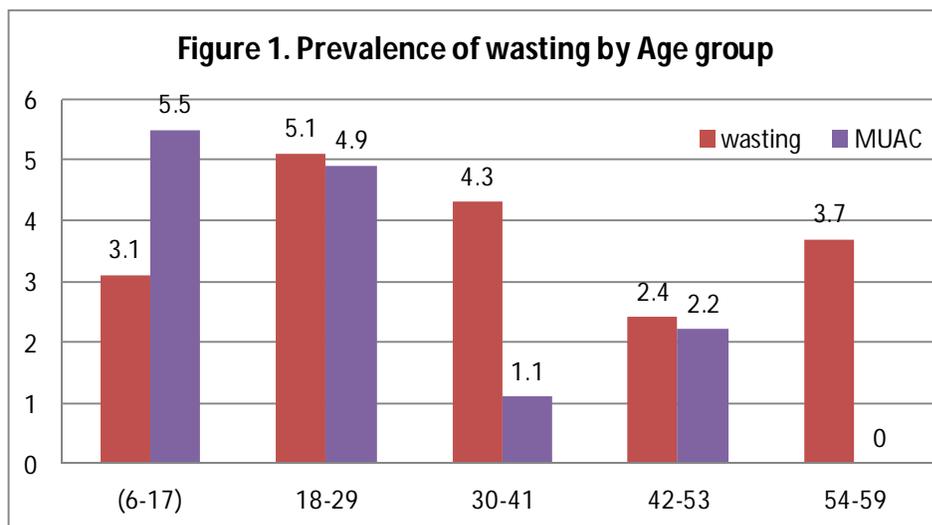
Prevalence of wasting seems to decline as the children grow older ruling out aspects of food insecurity as the immediate cause.

However, there is a notable increase in cases of malnutrition for 54 – 59 months age group though there is no statistical difference between the various age groups (P-value – 0.46)

Prevalence of Wasting Based on MUAC cut off's

The prevalence of acute malnutrition using Mid Upper Arm Circumference cut off's show a similar results compared to weight for height z-scores. The global acute malnutrition based on MUAC was 3.5% (1.7 – 7.1, 95%CI) and severe acute malnutrition of 1.5% (0.6 – 4.0, 95%CI). Girls were slightly malnourished (4.7%) compared to boys (2.2%). However, there was no statistical difference between boys and girls. Table 5 shows prevalence of acute malnutrition using MUAC cut off's. However, the results of children at risk of malnutrition show a prevalence of which is in sharp contrast with district MUAC surveillance data.

Table 5: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 461	Boys n = 229	Girls n = 232
Prevalence of global malnutrition (< 125 mm and/or oedema)	(16) 3.5 % (1.7 - 7.1 95% C.I.)	(5) 2.2 % (0.6 - 7.8 95% C.I.)	(11) 4.7 % (2.3 - 9.5 95% C.I.)

	(9) 2.0 %	(2) 0.9 %	(7) 3.0 %
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(0.9 - 4.1 95% C.I.)	(0.2 - 3.5 95% C.I.)	(1.2 - 7.3 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(7) 1.5 % (0.6 - 4.0 95% C.I.)	(3) 1.3 % (0.3 - 5.6 95% C.I.)	(4) 1.7 % (0.7 - 4.4 95% C.I.)

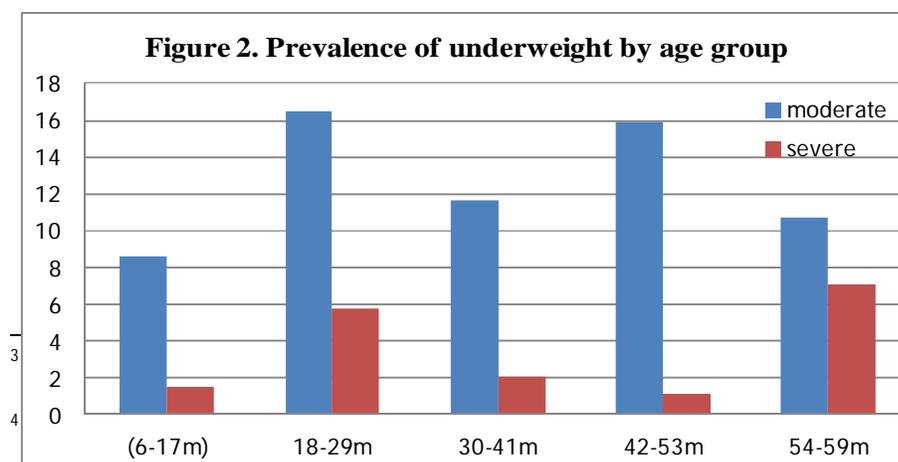## Prevalence of Underweight using Weight-for-age Z-scores

Low weight-for-age which arises from insufficient weight gain relative to age is a function of short stature, thinness or both[3]. Because of its simplicity, it has been used nationally as the indicator to assess nutritional status in under five children on a routine basis through health facilities.

The prevalence of global underweight was 15.9% (13.2 – 18.9, 95% CI) while severe underweight at 3.0% (1.9 – 5.0 95% CI). The prevalence of underweight among boys were higher compared to girls but there was no statistical difference among them as shown in table 6. below. The underweight prevalence is comparable to the national average of 16.1% although it is lower than the region average of 19.8%[4].

Table 6: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 460	Boys n = 228	Girls n = 232
Prevalence of underweight (<-2 z-score)	(73) 15.9 % (13.2 - 18.9 95% C.I.)	(40) 17.5 % (12.9 - 23.4 95% C.I.)	(33) 14.2 % (10.2 - 19.5 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(59) 12.8 % (10.7 - 15.3 95% C.I.)	(33) 14.5 % (10.7 - 19.3 95% C.I.)	(26) 11.2 % (8.0 - 15.6 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(14) 3.0 % (1.9 - 5.0 95% C.I.)	(7) 3.1 % (1.6 - 6.0 95% C.I.)	(7) 3.0 % (1.5 - 6.1 95% C.I.)

Among the various age group categories, there was no general pattern of under nutrition noted. However, the highest prevalence of stunting was found in 18-23 months age category for both moderate and severe underweight. Figure 2. Show prevalence of

Figure 2. Prevalence of underweight by age group

development. Geneva

underweight by age groups. There was however no statistical difference among the age groups

Prevalence of Stunting

Height-for-age is one of the anthropometric indices commonly used as an indicator for malnutrition. Stunting (low height-for-age), results from extended periods of inadequate food intake, poor dietary quality, increased morbidity, or a combination of the above factors[5]. Stunting in childhood leads to reduced adult size and reduced work capacity. This, in turn, has an impact on economic productivity at the national level[6].

The prevalence of stunting in Mbeere district is worrisome at 40.9% with boys being slightly more stunted (42.5%) compared to girls (39.3%). The findings are higher than the national prevalence. However, the rates are comparable to prevalence in the region[4]

Table 7: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 443	Boys n = 219	Girls n = 224
Prevalence of stunting **(<-2 z-score)**	(181) 40.9 % (35.8 - 46.1 95% C.I.)	(93) 42.5 % (34.9 - 50.3 95% C.I.)	(88) 39.3 % (32.6 - 46.4 95% C.I.)
Prevalence of moderate stunting **(<-2 z-score and >=-3 z-score)**	(119) 26.9 % (23.0 - 31.1 95% C.I.)	(54) 24.7 % (18.5 - 32.1 95% C.I.)	(65) 29.0 % (24.0 - 34.7 95% C.I.)
Prevalence of severe stunting **(<-3 z-score)**	(62) 14.0 % (10.8 - 17.9 95% C.I.)	(39) 17.8 % (13.3 - 23.4 95% C.I.)	(23) 10.3 % (7.1 - 14.6 95% C.I.)

The global stunting was highest among 18-29 months category at 50.4%. It is worrisome to note that close to 31% of children below two years are already stunted and peak at 18-29 month group. A similar pattern is noted for severe stunting for the same age group.

Figure 3. Prevalence of stunting by age group
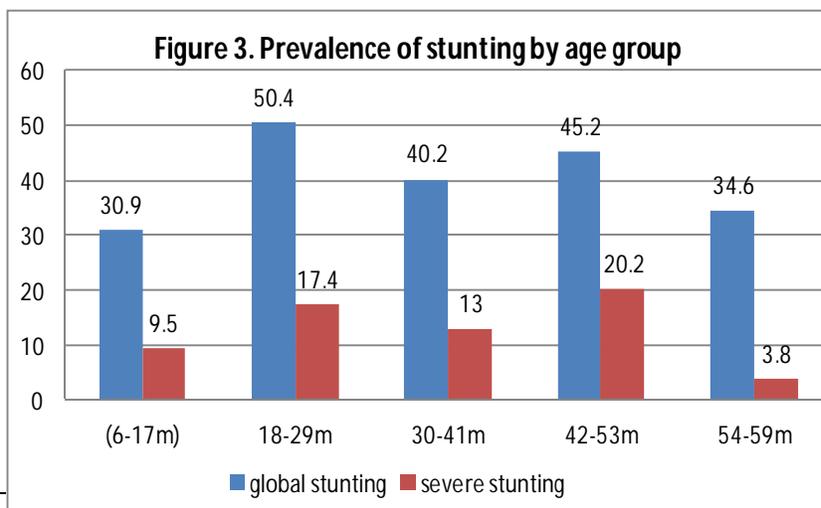
The high levels among these age groups is of concern as there is a small window of opportunity for correction

[5] Gibson RS (2005). Principle of Nutrition Assessment. Oxford university press

[6] ACC/SCN (1997). Third Report on the World Nutrition

since beyond two years, the damage is irreversible.

Figure 3. show prevalence of stunting for various age groups.
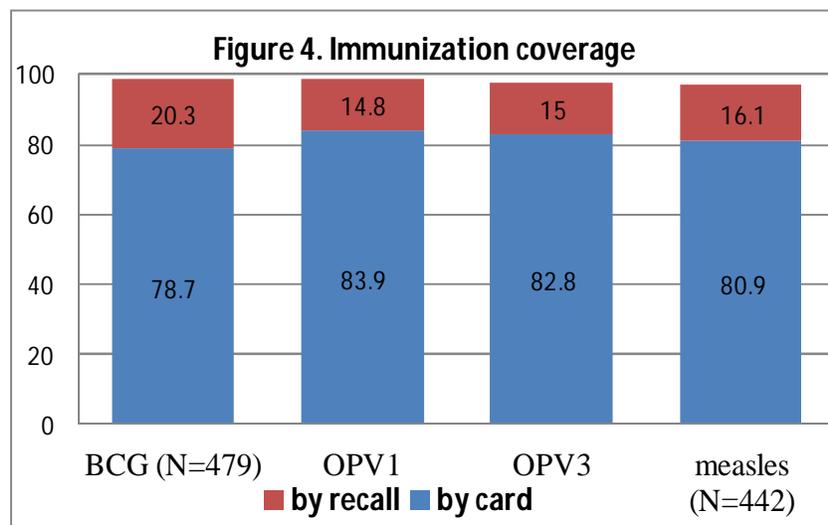
Maternal Malnutrition

Maternal malnutrition has been associated with high risk of low birth weights and it is recommended that before, during and after birth, the maternal nutrition status should be adequate. The nutritional status of care givers as measured by mid upper arm circumference show low prevalence of malnutrition as only 3.1% of the 349 women (MUAC<21cm) sampled were malnourished. However, malnutrition was only found among pregnant and lactating women with a prevalence of 4.5%.

HEALTH, WATER AND SANITATION

Immunization Coverage

Immunization is an important and a powerful, cost-effective preventive health measure to improve on child survival. Through immunization programs many deaths and disability caused by infectious diseases can and have been prevented through Expanded Program on Immunization (EPI).

All of the recommended vaccinations should be given before children reach their first birthday. The survey used three antigens as a proxy for immunization coverage. These were; BCG, Oral Polio vaccination (1 and 3) and measles vaccine. The coverage for all antigens were high and above the national target. Figure 4 show coverage for the three antigens in the district. Notable is confirmation of immunization using health card which is relatively high an indication of good understanding of the importance of such services.

Figure 4. Immunization coverage

	by recall	by card
BCG (N=479)	20.3	78.7
OPV1	14.8	83.9
OPV3	15	82.8
measles (N=442)	16.1	80.9

Vitamin A supplementation and deworming coverage

Vitamin A deficiency (VAD) is a public health problem in Kenya, and the government has set a target of 80% coverage of vitamin A capsules (VAC) among children aged 6-59 months. The national guideline recommends that a child should be supplemented at-least twice a year (every six months). The dosage offer protection against common childhood infections and substantially reduces mortality. Deworming is an important practice that gets rid of worms that compete for nutrients in the body and causing iron deficiency anemia. Vitamin A supplementation over the past six months was determined for 479 children 6 – 59 months. 78.4% of children 6-11months were supplemented while 69.1% of children 12-59 months were supplemented. The coverage is below the national target of 80% for both age groups. Deworming coverage was 50.1% which is low and therefore need for intervention. Figure 5 above show vitamin A and deworming coverage for the various age groups.

Figure 5. Vitamin A and Deworming coverage

(Bar chart showing, by card and by recall:
- Vit A (6-11m): by card 50.1, by recall 28.3
- VitA (12-59m): by card 49.3, by recall 19.8
- deworming>1yr: by card 29.6, by recall 21.5)
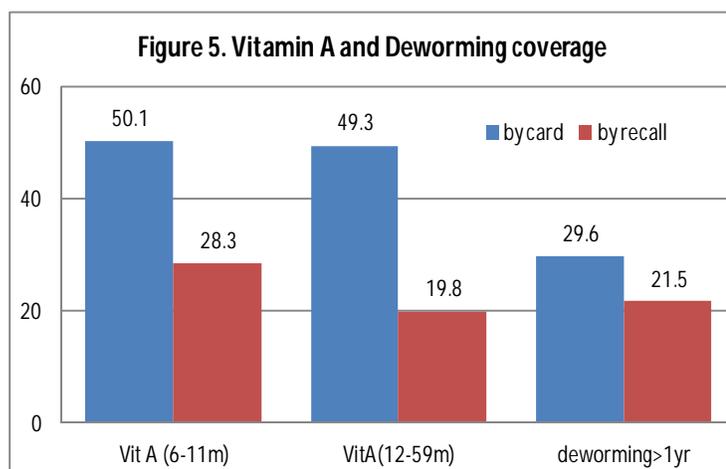
Child Morbidity and Health seeking behavior

There was high burden of diseases reported in the district two weeks prior to the survey. Out of 509 children sampled, 46.2% were sick with fever, acute respiratory tract infections and diarhoea being the leading cause of morbidity. Health seeking behavior is generally good with close to 80% of care givers having sought medical assistance from a health professional. Table x show morbidity trend and health seeking behavior.

Table 8: Morbidity and health seeking behaviour

		Findings
Child morbidity (N=509)	Sick	46.2%
	Not sick	53.8%
Type of illness(N=235)	Fever	47.2%
	ARI	36.6%
	Watery diarhoea	15.7%
	Fever with chills	13.7%
Treatment sought (N=235)	Public clinic	48.1%
	Shop	8.9%
	Private clinic	24.7%
	None	9.8%

Treatment for diarhoea	ORS	44.4%
	Home made solution	33.3%
	zinc	22.2%

Diarhoea is of public importance and is known to lead to malnutrition. Those children who had diarhoea, 44.4% were given oral rehydration salt (ORS) while 33% were given home made solution. Use of zinc supplement in treatment of diarhoea was introduced by the ministry of health as part of reducing severity of episodes of diarhoea. Only 22% of those children who had diarhoea were supplemented.

Household Water Access and Sanitation

The survey was conducted towards the end of the season and therefore reflects the situation during the dry season. Data was collected from 628 households of which the main source of water for domestic use was varied. Close to 32% of the households obtained water from the river, 22% had access to piped water, 12.6% from unprotected wells while 11% had access from boreholes.

Generally, the time taken to water source as a proxy of distance travelled indicate a stable situation with over 52% of households spending less than half an hour. Only 22% of households spent more than an hour to access water.

Water consumption levels in the district indicate a generally a stable situation with close to 48% consuming more than 15 litres per person per day. Only 8.3% had consuming of less than 7.5 litres per person in a day as per SPHERE standards. The cost of water per 20 litre jerican was on average Ksh. 3 for 68% of the households sampled.

Water treatment remains a challenge to majority of households whose source was from unsafe sources. Of the 511 households who obtained water from unsafe sources, more than two thirds did nothing before drinking with only 16% either boiling or used chemicals for treatment. Regarding sanitation, 93.9% of the sampled households had access to latrine facility.

Infant and young child feeding practices

Infant and young child feeding practices information was obtained based on a 24-hr recall method and which is widely used and recommended due to relative low error rate according to World Health Organization. The indicators used were based on the Kenya national guideline for Health and Nutrition surveys using 0-23 months of age group.

Breastfeeding practices

The survey shows that of 285 children (0-23 months), 99.6% were breastfed at some point. Timely initiation of breastfeeding after birth was poor with 69.3% put on breast within one hour after birth while 23.7% were initiated within a day. Provision of pre lacteals is still a practice among a small proportion of the population with 20.8% having given either plain water of sugar

water before initiating breastfeeding. Colostrum, an important milk that confers immunity to an infant was given to 53% of children a trend which is worrisome.

The rate of exclusive breastfeeding for 0-5 months was at 50% which is higher than the national average of 32%. Looking at the various age groups, there is a gradual decline on the rate of exclusive breastfeeding from 75% for 0-1 month to only 31.4% for 4-5 month age group. However, the above findings are only an indication and cannot be used conclusively as the sample size was small. Continued breastfeeding beyond one year (12-15 months) was 84.6%

Complementary feeding and meal frequency

Timely introduction of complementary feeds as measured by frequency of solid and semi solid foods for children 6 – 8 months old show that 97.1% were introduced. The minimum dietary diversity for children aged 6-23 months (≥4 food groups) was low at 34.8%. The minimum meal frequency (≥2 meals) for breastfed infants 6 – 8 months of age was high at 88.5% while the minimum meal frequency (≥4 meals) for breastfed children 6-23 months was at a low of 23.8%.

The findings on individual food groups consumed in the sampled population show low consumption of protein source foods a factor that can explain the high stunting levels in the district. Figure 6 show the proportion of children 6 – 23 months who consumed various food groups a day prior to the survey. Consumption of animal source food is 36% for dairy product while meat and

Figure 6. food groups consumed

Food group	Value
otherfruits	50
grains	60.9
VitAfruits	39.4
dairyproduct	36.3
legumes	45.8
fleshmeat	10.9
eggs	9.5

eggs were consumed by 10.9 and 9.5% respectively. However, consumption of energy foods was at an all time high of 60.9%.
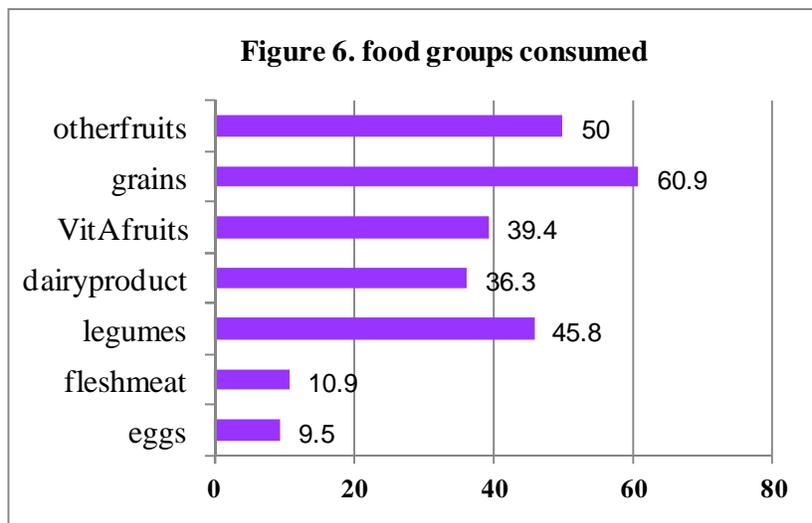
Household food consumption and dietary diversity

Main sources of food and meal frequency
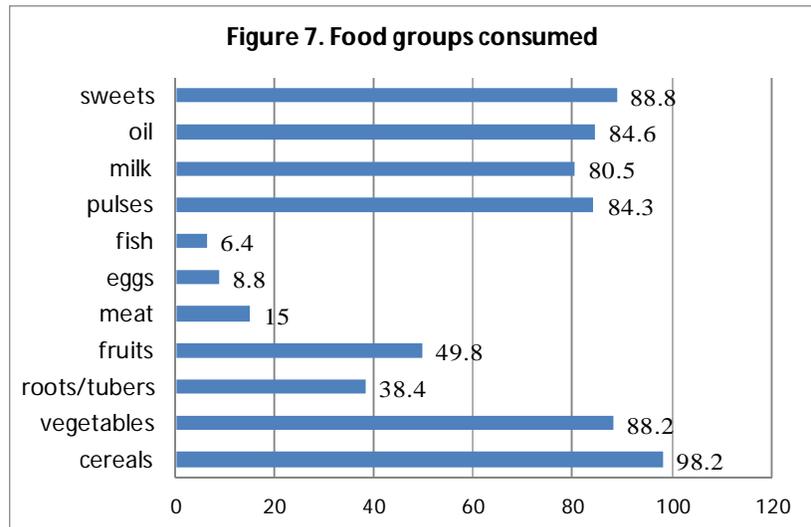
Majority of the respondent (83.5%) indicated own farm produce as their main source of staple food (cereals) with only 13% having obtained through purchase. The findings depict a population that is dependent on own production, a factor that can indicate a stable food security situation. Households were asked on meal frequency compared to usual times and the findings indicate

similarity with usual times. 88.4% of respondent had more than three meals the previous day compared to 94% normally. Those who had consumed only two meals increased to 8.3% compared to 4.6% normally. Overall, this is an indication of a stable food security situation.
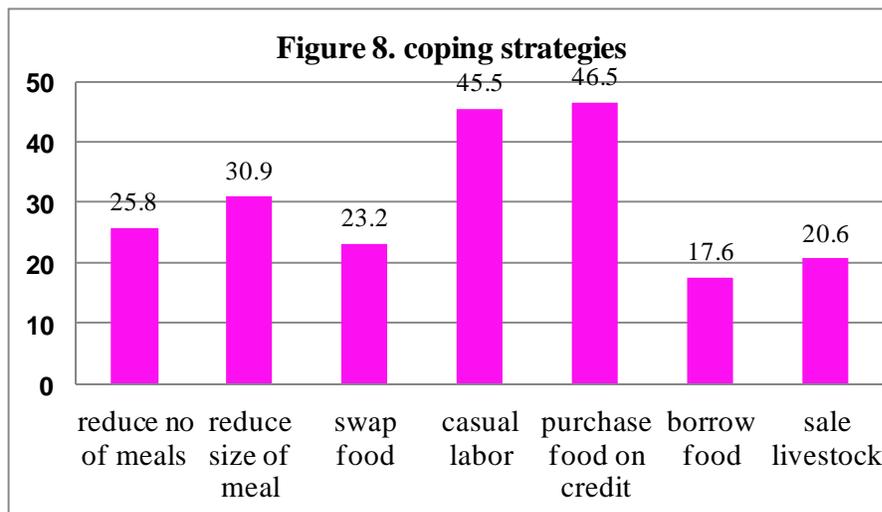
Household dietary diversity

A 24-hour dietary diversity score was calculated to determine the households' economic capacity to consume various foods. The mean household dietary diversity score (HDDS) was 6.4 (sd 1.5). Overall, only 4.2% of households had a low dietary diversity score, 45.8% had medium dietary diversity score while slightly more than half (50.1%) had high dietary diversity score. The results reflect a stable food security situation. Based on individual food items consumed at

Figure 7. Food groups consumed

Food group	Value
sweets	88.8
oil	84.6
milk	80.5
pulses	84.3
fish	6.4
eggs	8.8
meat	15
fruits	49.8
roots/tubers	38.4
vegetables	88.2
cereals	98.2

household level, the major food items of concern are mainly meat and fruits as indicated in figure 7 above. The individual food items consumed by households are comparable to those consumed by children 6 -23 months. Both household dietary diversity score and the individual food items consumed reflect a population that is food secure.

Coping mechanisms

Coping strategy is an indicator of household food security and measures level of acute food

Figure 8. coping strategies

Strategy	Value
reduce no of meals	25.8
reduce size of meal	30.9
swap food	23.2
casual labor	45.5
purchase food on credit	46.5
borrow food	17.6
sale livestock	20.6

insecurity. It simply looks at what household engage in when there is no enough food and no money to buy food. The survey aimed at determining the type of coping mechanisms that households engaged in the last one month as result of food shortage.

The survey findings

show most of the coping strategies employed being food based an indication of a less serious situation, purchase of food on credit was the main form of coping strategy with 46.5% of households while casual labour had 45% of households engaged in. Figure 8 show the type of coping strategies that were employed by households in the past month.

## Food Security and livelihood indicators

Food security and livelihood indicators were collected to ascertain current food security status, coping strategies and livelihood activities to gauge how sustainable are the livelihoods.

Main Livelihood Activities

According National Drought Management Authority in Mbeere district, there are two main livelihood zones. These are mixed farming zones and marginal mixed farming. The survey sought to find out the main livelihood activities engaged by the resident. Agriculture account for 49.0% while crop farming with livestock keeping is at 19.0%. Formal and informal employment constitutes 6.7 and 15.8% respectively. Petty trade account for 8.3% of the sampled population. The above findings show that agriculture is the main economic activity for the residents.

Main source of income

The main source of income for the last three months was determined and results show that waged labour and sale of own farm crop account for the bigger share at 40 and 37% respectively. Sale of livestock and petty trade was at 12 and 11% respectively. Figure 9 show the main sources of income for the last three months.

Figure 9. Source of income

salelivestock 12%

petty trade 11%

sale of own crop 37%

waged labour 40%
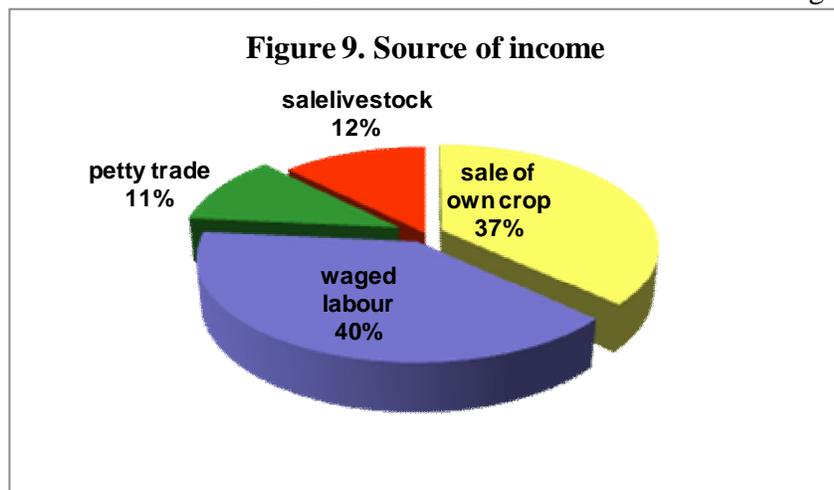
Livestock ownership and land size

Livestock keeping is an important livelihood activity in the marginal mixed farming zones of the district and in particular goat keeping, cattle and donkey. However, a close look at the numbers reveals a state of no economic value for most of the livestock species. The number of goats on average per household is 3 with a maximum of 64 goats while for chicken; the average number per household is 6. The proportion of households owning at least one livestock species also show a worrisome situation with only 56.9% owning a goat, 37% cattle, 22% bull, 12% sheep and 11% donkey. Chicken ownership is at 81.9%

The size of land cultivated, as a factor of production can give an indication of type of farming a community engages in. Out of 628 households sampled, 65% cultivated less than 2 acres the previous season. Only 18% of households put more than 4 acres under cultivation.

DISCUSSION AND CONCLUSION

Nutritional status of children and care givers

The prevalence of GAM in the district depicts a normal nutrition status based on WHO thresholds. However, chronic malnutrition as measured by height-for-age (stunting) show a serious situation and which need to addressed immediately. Similarly, prevalence of underweight was also high although it is comparable to the national average. The high rates of stunting could partly explain the low rates of acute malnutrition as height of most sampled children is shorter for their age leading to gross underestimation of the true prevalence of global acute malnutrition.

It is worth noting that the timing of the survey coincided with a relatively good season and during harvesting a factor that could also explain the low levels of malnutrition as many households had access to food from their farms. The nutritional status the primary care givers showed a similar pattern with very low rates of malnutrition as measured using mid upper arm circumference (MUAC<21cm). This is a clear reflection of current food secure population in the district.

Health and Child care Practices

Exclusive breastfeeding and appropriate and timely introduction to complementary feeding is a pre requisite to better health and nutrition status among children under fives and is a major determinant of child growth and development. The survey found out that majority of the children were ever breastfed at some point in their lives. However, timely initiation is low an issue of concern. Equally, giving of pre lacteals is prevalent among a section of the residents and it is associated with cultural practices. Despite high awareness of importance of exclusive breastfeeding the proportion of those who exclusively breastfed is still low though above the national average. In addition to the above challenges consumption of foods rich in protein is low among children and this could partly explain the high levels of stunting. Part of the solution to addressing chronic malnutrition is through increasing consumption of protein rich foods particularly from animal sources.

Childhood illness is a direct contributor to malnutrition. The high burden of disease among children in the district is of major concern with fever and acute respiratory tract infection being the leading cause of malnutrition. However, bivariate analysis between malnutrition and illness did not reveal any association and this could be explained by the fact health seeking behaviour is generally good in the district hence reduction in severity of illness and ultimate reduction on chances of becoming malnourished.

Immunization coverage for all the antigens were above the national target a factor that could be linked to concerted effort by the ministry of health staff as well as awareness created to the residents on the importance of immunization against preventable diseases. Vitamin A supplementation coverage was however below national target. Similarly, deworming coverage is low at 50%. The low coverage for both could be attributed to documentation as there are partners carrying out programs in the district. There is therefore a need to address the problem of documentation and coordination of partners in order to increase the coverage.

Water access and hygiene

The main sources of water in the district are varied and are dependent on locality. Majority of residents in nearby towns have piped water as source of water while those in rural areas rely mainly from rivers, public water pans, boreholes and unprotected wells. These imply that a significant number of households have access to water from unsafe source. Despite this, majority of households do not treat water a factor that can lead to outbreak of waterborne diseases in the district. Regarding latrine coverage, the district can be considered good and attributable to health education and awareness created over time.

Food Security and livelihood

The food security situation in the district can be considered as food secure. This is based on the number of meals consumed, dietary diversity and coping strategy as proxy indicators for food security. All the indicators showed a stable situation. However, the district is known to suffer from perennial failures of the rain seasons resulting to drought. The fact that overwhelming number of households have own farm production as their main source of food attests to the stability.

Livestock herd size at household level is quite low and of little economic value going by the numbers. The implication of this is households are unable to use livestock as source of livelihood given their low numbers. The low numbers could partly be explained by high poverty levels in the district. In addition, the size of cultivated land shows a population that practice subsistence farming. This implies that households can hardly produce enough for consumption and sale as source of income.

Recommendations

The following recommendations are proposed both short term and medium to long term in order to address issues raised in the survey report.

Short term recommendations

- Given the low coverage of vitamin A supplementation and deworming, there in need to strengthen collaboration with the education sector through ECD centres.

- Strengthen health and nutrition education targeting infant young child feeding practices with emphasize on breastfeeding and complementary feeding.

- Provision of water treatment chemicals to all households with access to water from unprotected sources.

- As part of immediate measure to arrest escalation of chronic malnutrition, there is need to introduce micronutrient supplementation program for children aged 6 – 23 months.

Medium and long term recommendations

Given the magnitude of chronic malnutrition, low livestock numbers and small area put to crop production coupled with high poverty levels, the following recommendations have been proposed;

- Cross sectoral collaboration to initiate livelihood support program specifically to increase livestock herd through restocking especially in the marginal mixed farming zones of the district.

- Provision of extension services to have use of drought resistant crops increased as well as increase acreage.

ANNEX 1. Assignment of clusters

Division	Location	Sub location	House hold s	Total population	cluster
Siakago	Nthawa	Riandu	2,296	9,345	RC,1
		Siakago	2,270	8,216	2,3
	Gitiburi	Gitiburi	1,460	6,213	4
		Thura	729	2,951	RC
Muminji	Mutitu	Mutitu	948	3,718	RC
		Kirie	374	1,600	
	Muminji	Gangara	1,183	5,361	5,6
		Karambari	858	3,671	
Kanyuambora	Kanyuambora	Nguthi	1,530	6,239	7,8
		Ngura	1,434	5,617	9
	Kiangombe	Kariru	627	2,830	
		Kathera	1,237	5,575	10,11
Evurore	Ndurumori	Nthambu	1,102	4,979	RC
		Iria itune	1,199	5,726	12
	Ishiara	Ishiara	1,983	8,775	13,14
		Kamarandi	1,205	5,841	15
Makima	Makima	Makima	4,896	21,291	16,RC,17,18,19
		Mwea grazing	2,112	9,369	20,21
		Mbondoni	7,677	1,740	
Mwea	karaba	Karaba	2,082	8,679	22,23
		Wachora	2,582	9,883	24,25
	Riakanau	Riakanau	1,558	6,673	26
		Gategi	1,112	4,882	27
Gachoka	Mbeti south	Kiamuringa	1,238	4,973	28
		Gachoka	1,754	7,302	29,30
		Gachuriri	1,721	5,762	31
	Mbita	Gikiiro	1,463	6,627	32,33
		Mbita	1,073	4,684	34
	Kianjiru	Kirima	1,522	6,858	35
		Nyangwa	778	3,596	36
Kiritiri	Mavuria	Kombo munyiri	1,021	4,684	37
		Mavuria	902	3,983	38
	Kithunthiri	Kithunthiri	1,252	5,394	39
		Gacegethiuri	668	3,079	40
	Kiambere	Kiambere	1,159	4,983	41
		Mutuabare	374	1,571	

ANNEX 2. PLAUSABILITY CHECK

INDICATOR	SURVEY VALUE	ACCEPTABLE VALUE/RANGE	Interpretations/ COMMENTS
Digit preference - Weight	2 (7)	(0-5 excellent, 5-10 acceptable, 10-20 poor and > 20 unacceptable)	Good
Digit preference - Height	2 (6)		Good
WHZ (Standard Deviation)	0 (1.02)	0.8 – 1.2	Acceptable
WHZ (Skewness)	0 (0.06)	If between minus 1 and plus 1, the distribution can be considered as symmetrical.	Symmetrical
WHZ (Kurtosis)	0 (-0.03)	If less than an absolute value of 1 the distribution can be considered as normal.	Normal Distribution
Percent of flags	0 (2.4)	Less than 10% of the total sample acceptable	Good
Age distribution (%)	4 (p=0.001)		
Group1: 6-17 months	27.9	20 % – 25%	Acceptable
Group 2: 18-29 months	26.4	20 % – 25%	
Group 3: 30-41 months	20.6	20 % – 25%	
Group 4: 42-53 months	19.0	20 % – 25%	
Group 5: 54-59 months	6.1	10%	
Age Ratio: G1+G2/G3+G4+G5	1.0	Should be around 1	
Overall Sex Ratio	1.00	0.8 – 1.2	
OVERAL SURVEY QUALITY	**8**	**Good**	