INTEGRATED NUTRITION SMART SURVEY REPORT

NAROK COUNTY

24th January to 3rd February 2018

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All individuals in their various capacities whom I cannot mention by name, contributed to the eventual success of the exercise.

List of Abbreviations

CI	Confidence Interval
CLTS	Community Lead Total Sanitation
CMAM	Community Management of Acute Malnutrition
CMR	Crude Mortality Rate
DD	Dietary Diversity
ENA	Emergency Nutrition Assessment
FCS	Food Consumption Score
FSL	Food Security and Livelihood
GAM	Global Acute Malnutrition
GFD	General Food Distribution
HAZ	Height for Age
HH	Household
IDP	Internally Displaced Person
IFAS	Iron Folic Acid Supplements
IYCF	Infant Young Child Feeding
MAM	Moderate Acute Malnutrition
NGO	Non-Governmental Organization
ODF	Open Defecation
OTP	Outpatient Therapeutic Programme
PLW	Pregnant and Lactating Women
PPS	Probability Proportional to Size
SAM	Severe Acute Malnutrition
SC	Stabilization Centre
SFP	Supplementary Feeding Programme
SMART	Standardized Monitoring and Assessment of Relief and Transitions
TSFP	Therapeutic Supplementary Feeding Program
U5	Under Five Years Old
UMR	Under-five Mortality Rate
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation and Hygiene
WAZ	Weight for Age
WFH	Weight for Height
WHO	World Health Organisation

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Executive Summary

Narok County is located in the South Rift Valley to the north of Tanzania. It borders six counties; Nakuru to the North, Bomet, Nyamira and Kisii to the North West, Kajiado to the East and Migori to the West. Narok County is further divided into 6 sub-counties namely Narok East, Narok south, Narok North, Narok West, Transmara East and Transmara west for purposes of administration. According to the National Census (2009), this county's populace is 850,920 with a population density of 47 persons per square kilometre.

Narok County is largely divided into 4 livelihood zones namely mixed farming, agro pastoral, pastoral and formal employment. Farming (wheat) and livestock keeping are the major economic activities in the county. This SMART survey was undertaken from 24th of January to 3rd of March 2018. Its specific goal was to assess and monitor nutritional status in this county. Its findings were to be used to understand the overall nutrition, food security and health status across this region and to give recommendations for continued planning and decision making from county to national level.

To reiterate, Standardized Monitoring Assessment for Relief and Transition Method (SMART) was used to conduct the surveys. The methodology is a cross sectional design. The survey applied two-stage stratified cluster sampling which is part of the SMART methodology with the clusters being selected using the probability proportional to population size (PPS). Emergency Nutrition Assessment (ENA) for Standardized Monitoring of Relief and Transition (SMART) software (July 9, 2015) was utilized to calculate the anthropometry sample size. The total sample size for anthropometry was 630 households and 495 children aged between 6 and 59 months. Data was collected by 7 teams. For anthropometrics, 573 children aged between 6 – 59 months were reached during the survey. In total, 2864 house hold members were incorporated in the survey and the average household size was 4.8.

Table 1: Summary of key findings

Indicator-Nov 2017	**Narok County 2018**	**Classification of public health significance or target (where applicable)**
Wasting (WHO 2006)	n=561	
Global Acute Malnutrition (GAM)	**6.8 % (4.8 - 9.5 95% C.I.)**	**Poor**
Severe Acute Malnutrition (SAM)	**1.1 % (0.4 - 3.2 95% C.I.)**	**Poor**
Design Effect		
Underweight (WHO 2006)	**n=573**	
Prevalence of global underweight	**18.9 % (15.5 - 22.7 95% C.I.)**	**Medium prevalence**
Prevalence of severe underweight	**2.6 % (1.5 - 4.6 95% C.I.)**	
Stunting (WHO 2006)	**n = 562**	

Indicator-Nov 2017	Narok County 2018	Classification of public health significance or target (where applicable)
Prevalence of global stunting	**27.2% (23.1 - 31.8 95% C.I.)**	**Medium prevalence**
Prevalence of severe stunting	**7.7 % (5.5 - 10.6 95% C.I.)**	
Prevalence of acute malnutrition by MUAC	**n=573**	
Severe under nutrition (< 115 mm)	**0.3 % (0.1 - 1.4 95% C.I.)**	**Acceptable**
Global Acute Malnutrition (≤125 mm)	**3.0 % (1.7 - 5.1 95% C.I.)**	**Alert**
Immunization	**N=573**	
BCG Scar		
OPV 1 (Card and Recall)	**98.5%**	**Acceptable**
OPV 3 (Card and Recall)	**95.7%**	**Acceptable**
Measles at 9 months (Card and Recall)	**82.1%**	**Acceptable**
Measles at 18 months (Card and Recall)	**39.6%**	**Poor**
Supplementation and deworming	**N=573**	
6 to 59 months at least once	**44.9%**	**Poor**
6 to 11 months once	**63.6%**	**Poor**
12 to 59 months once	**54.1%**	**Poor**
12 to 59 months twice	**23.0%**	**Poor**
Deworming Once		**Poor**
Deworming twice		**Poor**
Child Morbidity	**N=573**	
Sick in the past 2 weeks	**22.6%**	
Therapeutic Zinc in Diarrhoea management	**68.8%**	**Poor**
Appropriate care seeking	**94.1%**	**Good**
Maternal Nutrition		
MUAC <210mm all women 15-49 years	**2.0%**	**Good**
MUAC <210mm PLW	**0.74%**	**Good**
Women Supplemented with IFAS	**54.3%**	**Poor**
IFAS >180 days days	**0%**	**Poor**
Mean no. of days consumed IFAS	**44**	**Poor**
Water Sanitation and hygiene	**N=597**	
Households getting water <500m	**54.3%**	**Fair**
Hand washing at 4 critical times	**1.7%**	**Poor**
Hand washing with soap and water	**79.2%**	
Water from unsafe sources		
Households water treatment	**28%**	**Poor**
Queuing at water point	**7.2%**	**Good**

In comparison with the SMART survey done in June 2013, the Global Acute malnutrition prevalence remained poor. In 2013 it stood at 7.7(5.3-11.0 95% CI) compared to **6.8 % (4.8 - 9.5 95% C.I.)** at present. The SAM levels reduced however from the critical level of 4.4(95% C.I.) in 2013 to the alert level of **1.1 % (0.4 - 3.2 95% C.I.)** in 2018. Underweight and stunting levels were medium as reported at 18.9% and 27.2% respectively. Despite this classification, 1 in 4 children in the county are stunted.

22.6% of the children in the households sampled were found to have been sick 2 weeks prior to the survey. Majority had had fever with chills (40.9%) followed by respiratory infections at 34.6% and then watery diarrhoea at 12.6%. 94.1% of the children who had been sick had sought care appropriately in either public clinic(50.5%) or private clinic (43.6%).

Where household food security is concerned majority of the households (56.6%) had a poor or borderline Dietary Diversity Score while Women's Dietary Diversity score was also poor with 64.7% of women taking food from less than <5 food groups in the past 24 hours. Majority of the households consumed mainly staples and foods rich in vitamin A with foods rich in protein and foods rich in hem iron being poorly consumed.

Only 9.7% of the households were reported to have been food insecure 7 days prior to the survey creating the need to employ coping strategies. Majority of the households were either relying on less preferred or less expensive foods or borrowing food items to cater for the shortfall they were experiencing.

The underlying causes of malnutrition, measles vaccination, vitamin A supplementation and deworming coverage were very lowly reported at 40% for the 18 months category measles, 63.6% (6-11 months) 49.2% (12-59 months) for vitamin A supplementation, and 40.3% for deworming at least once. All were below the national targets and also below the WHO recommendations.

For WASH, more than 70% of the respondents were using water from unsafe sources while 72% did nothing to their drinking water to make it safe. 47.6% were practicing open defecation and only 1.7% reported washing hands during the recommended four critical times.

Recommendations

Wasting

- Empower CHVs to be able to identify and refer cases of malnutrition to health facilities offering IMAM services

Stunting

- Empower CHVs to offer IFAS and deworming at the community level
- Offer health education on diet diversification by way of kitchen gardening in conjunction with the Ministry of Agriculture
- Scale up uptake of ANC visits to improve on supplementation and health education for mothers

- Enhance linkages with WASH at the community level to reduce incidences of diarrhoea and other infections

Immunization/supplementation

- Strengthen documentation by sensitizing all health workers
- Maximise impact through Malezi bora weeks
- Strengthen level I services by using CHVs to mobilise, organize referrals and give supplementation

Poor WASH indicators

- Continue with the CLTS activities already ongoing in the county to increase toilet coverage
- Provide continous health education about hygiene targeting appropriate handwashing
- Develop key messages about sanitation and hygiene
- Conduct community sensitization on proper hygiene
- Revive school health clubs and use them to pass health messages to school children

Food Fortification

- Develop key messages around food fortification
- Conduct community sensitization using the above messages to create awareness

1. Introduction

Narok County is located in the South Rift Valley to the north of Tanzania. It borders six counties with Nakuru to the North, Bomet, Nyamira and Kisii to the North West, Kajiado to the East and Migori to the West. The county is further divided into 6 sub-counties namely Narok East, Narok south, Narok North, Narok West, Transmara East and Transmara west for purposes of administration. Narok County is largely divided into 4 livelihood zones namely mixed farming, agro pastoral, pastoral and formal employment. According to the National Census (2009), Narok County has a populace of 850,920 with a population density of 47 persons per square kilometre.

More than 90% of its settlement is rural with only 6.9% comprising urban population (Ibis). The major urban centres are Narok, Kilgoris, Nairagie Enkare and Lolgorian. More than one third (33.8%)of the population in Narok County lives under poverty line (KIHBS 2008) even though the county is endowed with natural resources such as those found in the Maasai Mara Reserve, the Mara River and has arable land suitable for agriculture. The main economic activities in Narok County are tourism given the Maasai Mara, commercial farming (wheat), and livestock farming. The health indicators show that 33.6% of households have access to clean water. Almost three quarters (71.4%) of children under the age of one year are fully immunized. Rural development indicators tell of low development with electricity coverage estimated to cover 5.9% of all households. As regards infrastructure, about 4.6 % of roads are paved and 41.2% of roads are described to be in a fair state (KNBS 2009).

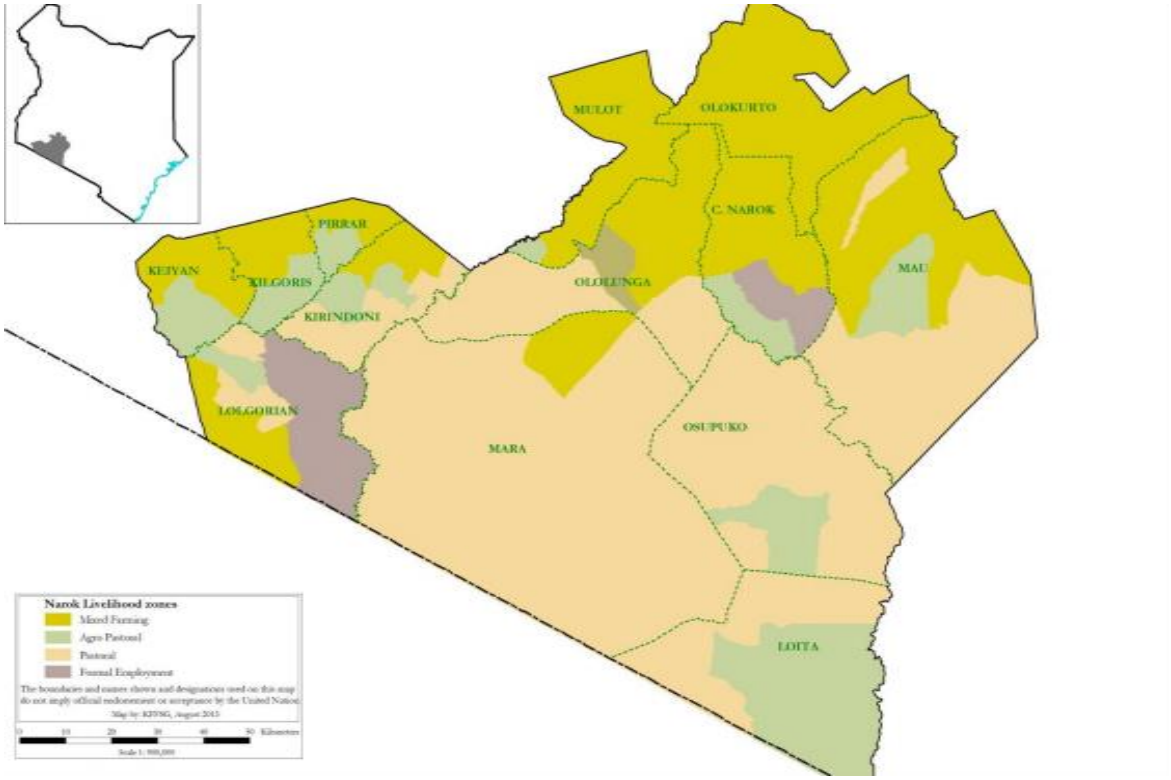


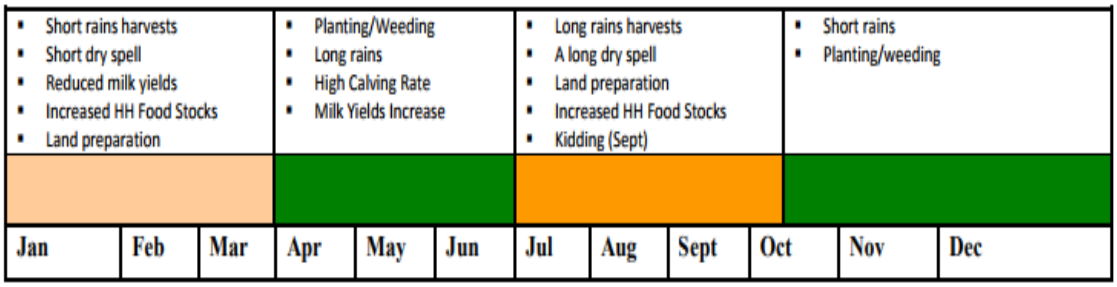
Figure 1: Map of Narok County

1.1 Survey rationale

The NDMA Early Warning bulletin for December 2017 classified the county as normal but the pastoral and leasing pastoral zones were classified as alert. Milk consumption and terms of trade in the county are classified as below normal for the same period. Other anecdotal reports however indicated a worsening food security situation in Narok with a possibility of livestock deaths. Nutrition survey findings will establish the actual nutrition situation and inform response. Additionally, the results will incorporate the short rains assessment report of February/March.

1.2. Survey timing

The survey was done in the first quarter of the year, land preparation (for wheat planting) was on going and though it was dry it rained in some areas for a couple of days during the exercise. More than 80% of the HH are reported to have taken milk the day before the survey and more than 90% of the households gave a negative report about food insecurity in the 7 days preceding the survey.



1.3. Survey Objectives

1.1.1 Overall Objective

To determine the nutrition status of children aged 6- 59 months old and women of reproductive age (15-49 years).

1.1.2 Specific Objectives

- To estimate the current prevalence of acute malnutrition in children aged 6 – 59 months
- To compare the overall nutritional changes with the previous GAM and SAM
- To determine the morbidity rates amongst children aged 6-59 months over a two week recall period
- To estimate the immunization coverage of Measles1, BCG and Oral polio vaccines (OPV1 and 3)
- To determine the coverage for deworming, zinc supplementation for diarrhea, MNP's supplementation and vitamin A supplementation among children 6-59 months
- To estimate the nutritional status of women of reproductive age 15-49 years using MUAC measurements
- To collect information on household food security, water, sanitation, and hygiene practices
- To strengthen the capacity of the county's MOH team to undertake a similar SMART survey in future

2.0 Methodology

Standardized Monitoring Assessment for Relief and Transition Method (SMART) was used to conduct the survey. The methodology is a cross sectional design. A two stage sampling process was used in this survey.

2.1 Sample size anthropometry

The sample sizes were calculated using ENA for SMART software (Version July 9, 2015). The table below shows the anthropometry parameters that were used in sample size calculations and their rationale/source.

Table 2: Number of children and households to be included in nutrition survey

Parameters for Anthropometry	**Value**	**Rationale/ Source**
Estimated prevalence	7.7%	Estimated based on SMART 2013 results
±Desired precision	3	Based on the SMART survey methodology
Design effect	1.5	To cater for heterogeneity across clusters in the three livelihood zones (Mixed, Marginal mixed and Urban)
Children to be included	495	
Average household size	5	Based on previous survey
Percent of <5	18%	Based on previous survey
Percent of non-respondent	3%	To cater for unforeseen circumstances
Households to be included	630	

2.2 Survey Sample Size

Based on the anthropometry sample above, the 7 teams were visiting 15 households per day based on previous experience, and a total of 42 (630/15) clusters were selected. However, given that some families were not at home or there were no adults in some homes even after revisits, and given refusal (3 houses) in some clusters, some teams were not able to get the required number of households thus there were 597 households surveyed in total.

Table 3: Percentage of households and children 6-59 months included in the survey

Number of HH planned	**Number of HH surveyed**	**% surveyed /planned**	**Number of children 6-59 months planned**	**Number of children 6-59 months surveyed**	**% surveyed /planned**
630	597	94.8%	495	573	115.8%

2.3 Number of households per cluster

A household was used as the basic sampling unit. Based on previous experience of similar work and the poor access to some areas due to distance and bad roads, it was decided that

the teams visit 15 households per day per cluster.

2.4 Sampling procedure: selecting clusters

A two stage sampling process was used in this survey.

2.4.1 First stage sampling- Selection of clusters

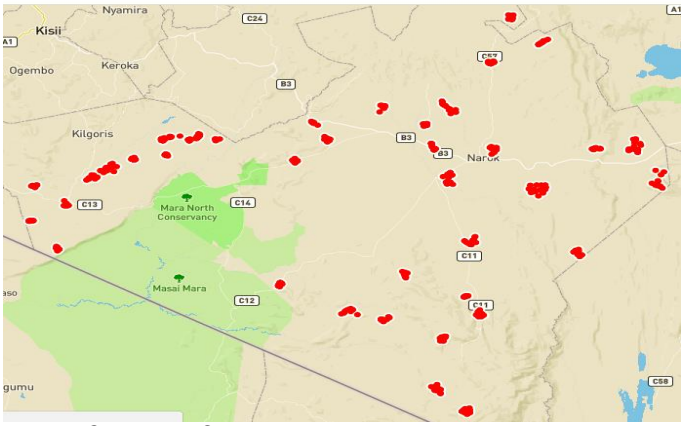


Figure 2: Map of visited clusters

Clusters were selected using probability proportional to size (PPS) where the list of the villages/clusters and their respective populations was established in consultation with the community strategy unit. ENA software was then used to randomly select the clusters once the sampling frame was developed. In total 42 clusters were selected.

A number of the areas that were to be surveyed are in the highlands and so there was the risk of them masking the nutrition situation. The following wards were therefore excluded from the sampling frame: Sogoo, Sagamian, Ololmasani, Kilgoris central and Keyia. In Ololulun'ga, Shakoe, Lelelo, Ilmotiook, Ildamat, Suswa and Melili wards, some sub-locations in the highlands were also excluded from the sampling frame

2.4.2 Second stage sampling- Selection of households

In each cluster a total of 15 households were surveyed. Simple random sampling was used in selection of households using the beneficiary lists provided by the village chiefs and Community Health Volunteers (CHVs)

Household definition: Number of persons who live together and eat from the same pot at the time of assessment.

2.4.3 Sampling procedure: Selecting Children/Respondent

Household selection was done by having an updated list of households in the sampled clusters that were compiled by village chiefs and CHVs following community mobilization. Within the selected households all children aged 6-59 months and all women of reproductive age 15-59 years meeting the inclusion criteria were assessed. In cases where there was no eligible child, a household was still considered part of the sample and only the household questionnaires (general questionnaires) were administered. If a respondent was

absent during the time of a household visit, the teams left a message and re-visited later to collect data from the missing person, with no substitution of a household allowed. The respondent was the primary caregiver of the index child/children

2.4.4 Selection of women for determination of nutritional status

All pregnant and lactating women within the reproductive age (15-49 years) in the identified households were enlisted in the study and their MUAC measurements taken.

2.4.5 Case definitions and inclusion criteria

Household: 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.
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 county that was developed in collaboration with the survey team. Children aged 6-59 months were included in this survey.
Sex: The gender of the child whether male or female was recorded.
Weight: Children were weighed when wearing minimal or light clothing. Weight was taken using bathroom scales (child mother scale, SECA digital model).
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/ supine position (length, < 87cm) and those over two years while standing upright ((≥87cm height).
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.
Bilateral Edema*:* 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 thumb, nutritional edema was indicated
WHO growth standards (2006) were used to analyze and report the nutrition indicators.

2.4.6 Nutritional Indicators for children 6-59 months of age

Table 4: Definitions of acute malnutrition using WFH and/or edema in children aged 6–59 months

Acute malnutrition	WFH Z-Score	Oedema
Severe	<-3 Z Score	Yes/No
	>-3 Z Score	Yes
Moderate	<-2 Z Scores to ≥ -3 Z scores	No
Global	<-2 Z scores	Yes/No

Adapted from SMART Manual, Version 1, April 2006

MUAC

Guidelines for the results expressed as follows:

1. Severe malnutrition is defined by measurements <115mm

2. Moderate malnutrition is defined by measurements >=115mm to <125mm
3. At risk is defined by measurements >=125mm to <135mm
4. Normal >=135mm

MUAC cut off points for pregnant and lactating women: Cut off <21 cm was used for under nutrition

2.5 Questionnaire, Training and Supervision

2.5 1 Questionnaire

The questionnaire was in English and was in some instances questions were asked in Swahili or Maasai/Kipsigis - which are the local languages - depending on cluster. A common way of asking questions was agreed on during training. The data collection was pilot tested before the survey in a cluster not selected for the survey to ensure that the flow of questions in the questionnaire was clear and also to ensure that interviewers and respondents would understand the questions. The pilot was further undertaken to judge whether time taken per household would be right and that interviewers followed correct interview protocols.

2.5.2 Survey Teams and Supervision

There were a total of 7 teams who were trained and took part in the survey. Each survey team comprised of four members, 3 enumerators and a team leader. In most teams at least 2 members were from the MOH or other line ministries with team leaders in six out of the seven teams being sub county MOHs. In each team there was at least one female member (total 9 females out of 28). Teams explained the purpose of the survey and issues of confidentiality and obtained verbal consent before proceeding with an interview. There were 4 survey coordinators in total 3 from the county and 1 from the national team, in addition to the survey consultant who supervised the teams throughout the data collection period. A WhatsApp group was created for the survey and feedback was given every day by all teams.

2.5.3 Training

Teams were trained for four days prior to data collection by the survey consultant. Training included a standardization test where 10 children were assessed to ensure standardization of measurement and recording practice. Topics covered during training were: survey objectives, anthropometric measurements, completion of survey tools, sampling methodology and interviewing skills. A one-day pretest was carried out prior to the survey where every team visited 3 households. A total of 21 households' data was uploaded and analyzed and this was used to give feedback to the team on areas of improvement.

2.6 Data Analysis

Since data collection was done via ODK, the survey consultant downloaded data every evening after all the teams had uploaded their data. Anthropometric processing was conducted using the ENA for SMART software (Version July 9, 2015) where the World Health Organization Growth Standards (WHO 2006) were used. There was exclusion of z-scores from observed mean SMART flags: WHZ -3 to 3; HAZ -3 to 3; WAZ -3 to 3. 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 the other quantitative data were analysed in the EPI Info 7. At the end of each day, the team leader ensured that all their questionnaires were complete and uploaded the data from these online. The SMART plausibility report was generated after each day's data had been uploaded to identify any problems with anthropometric data collection such as flags and digit preference for age, height and weight and to improve the quality of the anthropometric data collected as the survey was on-going. Feedback was given to the teams throughout the data collection process to help improve quality. Table 8 summarises other criteria that was used for exclusion.

Table 5: Definition of other boundaries for exclusion

1. If sex is missing the observation is excluded from analysis.
2. If Weight is missing, no WHZ and WAZ are calculated, and the programme derives only HAZ.
3. If Height is missing, no WHZ and HAZ are calculated, and the programme derives only WAZ.
4. For any child records with missing age (age in months) only WHZ will be calculated.
5. If a child has edema only his/her HAZ is calculated.

3. Results

The mean household size was 4.8 and the mean number of children 6-59 months old per household was 1.1. The sex ratio of male to female was 1.1 which is considered excellent. Table 9 below shows a summary of household demography in the survey zone. 100% of the respondents were residents of Narok County

Table 6: household demography survey

Attribute	Narok
Households Characteristics	n=597
Mean household size	4.8
Total population Covered	2864
Total children 6-59 months at home	573
Total males children under 5	280
Total female children U5	293
Children U5 sex ratio boy: girl	1
Residents	100%

3.1 Anthropometric results (based on WHO standards 2006):

Global acute malnutrition (GAM) is defined as <-2SD Z scores weight-for-height and/or oedema. This is a combination of Moderate Acute Malnutrition and Severe Acute Malnutrition. Moderate Acute Malnutrition is defined as Z Scores of <-2SD - >-3SD while Severe Acute Malnutrition is defined as <-3SD Z scores weight-for-height and/or oedema. The quality of the survey (Overall score (WHZ)) was excellent at 1%.

Generally, there were younger children measured in the sample. As shown in table 12 below, the overall sex ratio (boys: girls) was within the acceptable range of 0.8-1.2.This means that both sexes were equally distributed, and the sample was unbiased.

Table 7: Distribution of age and sex of sample

	Boys		Girls		Total		Ratio
AGE (mo)	no.	%	no.	%	no.	%	Boy: girl
6-17	72	55.0	59	45.0	131	22.9	1.2
18-29	65	43.9	83	56.1	148	25.8	0.8
30-41	64	47.1	72	52.9	136	23.7	0.9
42-53	53	44.2	67	55.8	120	20.9	0.8
54-59	26	68.4	12	31.6	38	6.6	2.2
Total	280	48.9	293	51.1	573	100.0	1.0

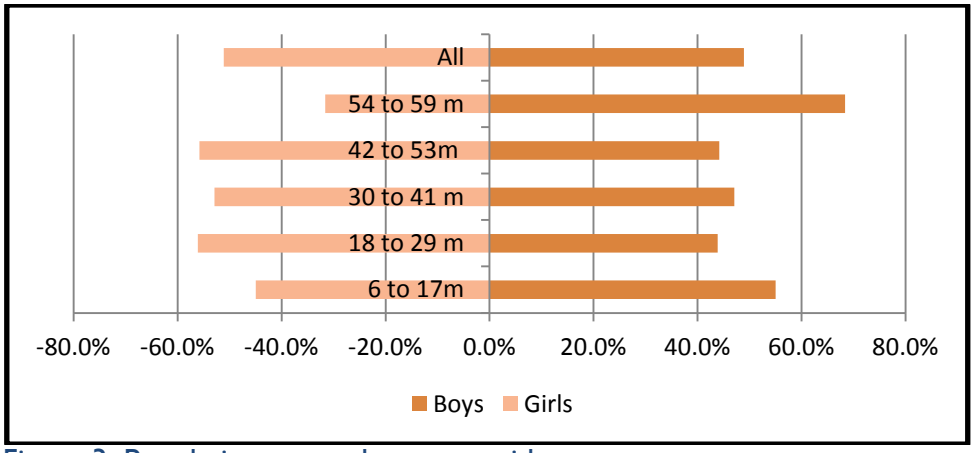


Figure 3: Population age and sex pyramid

3.2.1 Prevalence of Acute Malnutrition

A total of 573 children 6- 59 months were assessed. The survey revealed that Global Acute malnutrition rate has remained more or less the same at a poor level reported at 6.8 % (4.8 - 9.5 95% C.I.) compared to 7.7% (5.3-11.0 95% CI) unveiled in the survey done in 2013. Severe Acute Malnutrition however reduced from critical level at 4.4(95% C.I.) to alert level at **1.1 % (0.4 - 3.2 95% C.I.)** with 0.2% prevalence of oedema. WHO classifies levels of malnutrition between (5-9.9%) as poor. More boys were found to be wasted compared to girls (p=0.0305) and 1 case of oedema was unveiled in the survey as shown in the table below.

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

	All n = 561	**Boys** n = 273	**Girls** n = 288
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(38) 6.8 % (4.8 - 9.5 95% C.I.)	(25) 9.2 % (5.8 - 14.3 95% C.I.)	(13) 4.5 % (2.7 - 7.5 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(32) 5.7 % (4.0 - 8.1 95% C.I.)	(21) 7.7 % (5.1 - 11.5 95% C.I.)	(11) 3.8 % (2.1 - 6.8 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(6) 1.1 % (0.4 - 3.2 95% C.I.)	(4) 1.5 % (0.3 - 6.6 95% C.I.)	(2) 0.7 % (0.2 - 2.8 95% C.I.)

The prevalence of oedema is 0.2 %

As shown in the table below, there were more cases of moderate malnutrition observed among children 6-17 months and 54-59 months as compared to other age categories. For severe malnutrition, the cases observed were more or less distributed equally except for the 42 to 53 group which had none and 54-57 months which had 2 cases (5.6%) as shown in table 9 below

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	128	1	0.8	10	7.8	117	91.4	0	0.0
18-29	146	1	0.7	9	6.2	135	92.5	1	0.7
30-41	135	1	0.7	5	3.7	129	95.6	0	0.0
42-53	116	0	0.0	5	4.3	111	95.7	0	0.0
54-59	36	2	5.6	3	8.3	31	86.1	0	0.0
Total	561	5	0.9	32	5.7	523	93.2	1	0.2

There was 1 case reported for Kwashiorkor and 12 cases for Marasmus. There was no case reported for Marasmic Kwashiorkor as shown in the table below.

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. 12 (2.1 %)	Not severely malnourished No. 559 (97.7 %)

3.2.2 Prevalence of Acute Malnutrition based on MUAC

Mid-upper arm circumference, often shortened to MUAC, is a measurement that allows health workers to quickly determine if a patient is acutely malnourished. MUAC is the best indicator for mortality. After the screening, referral to feeding programs must be organized in line with MUAC cut-off points and the criteria selected for feeding programmes and nutrition intervention programmes. In Kenya the following are the cut offs for children 6-59 months

- Outpatient Therapeutic Program: MUAC <11.5cm
- Targeted Supplementary Feeding Program: MUAC between 11.5 to <12.5CM

Generally, MUAC usually tends to indicate lower GAM levels compared to WFH z-scores. For Narok, the prevalence of acute malnutrition based on MUAC was 3.0% (1.7-5.1 95% C.I.) classified as alert (WHO) as shown in table below. Though marginally girls were more malnourished by MUAC compared to boys, the difference was not statistically significant (p=0.2379)

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

	All n = 573	**Boys** n = 280	**Girls** n = 293
Prevalence of global malnutrition (< 125 mm and/or oedema)	(17) 3.0 % (1.7 - 5.1 95% C.I.)	(6) 2.1 % (0.9 - 5.1 95% C.I.)	(11) 3.8 % (1.8 - 7.7 95% C.I.)
Prevalence of moderate	(15) 2.6 %	(5) 1.8 %	(10) 3.4 %

	All n = 573	Boys n = 280	Girls n = 293
malnutrition (< 125 mm and >= 115 mm, no oedema)	(1.5 - 4.5 95% C.I.)	(0.7 - 4.8 95% C.I.)	(1.7 - 6.7 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(2) 0.3 % (0.1 - 1.4 95% C.I.)	(1) 0.4 % (0.0 - 2.6 95% C.I.)	(1) 0.3 % (0.0 - 2.5 95% C.I.)

As earlier observed in prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema, more cases again were observed in age category 6-17 months and 54-59 months as shown in table 12 below

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	131	1	0.8	8	6.1	122	93.1	0	0.0
18-29	148	0	0.0	2	1.4	146	98.6	1	0.7
30-41	136	0	0.0	1	0.7	135	99.3	0	0.0
42-53	120	0	0.0	2	1.7	118	98.3	0	0.0
54-59	38	0	0.0	2	5.3	36	94.7	0	0.0
Total	573	1	0.2	15	2.6	557	97.2	1	0.2

3.2.3 Prevalence of underweight based on weight-for-age z-scores

Underweight is measured by weight for age and reflects a combination of acute and chronic malnutrition. A low WFA is referred to as underweight. For Narok County, global underweight was 18.9% (15.5 – 22.7 95% C.I.) while severe underweight was 2.6 % (1.5 - 4.6 95% C.I.) as shown in table 13 below. Though marginally there was a difference between rates of underweight in boys and girls, the difference was not significant in all (p=0.0668) though among the severely underweight the difference between the two sexes was statistically significant (p=0.0031). WHO classifies underweight levels < 20% as low.

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

	All n = 567	Boys n = 278	Girls n = 289
Prevalence of underweight (<-2 z-score)	(107) 18.9 % (15.5 - 22.7 95% C.I.)	(61) 21.9 % (16.9 - 28.0 95% C.I.)	(46) 15.9 % (12.7 - 19.8 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(92) 16.2 % (13.6 - 19.2 95% C.I.)	(48) 17.3 % (13.2 - 22.2 95% C.I.)	(44) 15.2 % (11.9 - 19.3 95% C.I.)

	All n = 567	Boys n = 278	Girls n = 289
Prevalence of severe underweight (<-3 z-score)	(15) 2.6 % (1.5 - 4.6 95% C.I.)	(13) 4.7 % (2.5 - 8.4 95% C.I.)	(2) 0.7 % (0.2 - 2.9 95% C.I.)

Prevalence of underweight by age, based on weight-for-age z-scores was higher among children 54-59 months for severe underweight and 42-53 months for moderate underweight compared to other age categories as shown in table 14 below.

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	130	3	2.3	13	10.0	114	87.7	0	0.0
18-29	145	2	1.4	22	15.2	121	83.4	1	0.7
30-41	136	3	2.2	24	17.6	109	80.1	0	0.0
42-53	118	2	1.7	28	23.7	88	74.6	0	0.0
54-59	38	5	13.2	5	13.2	28	73.7	0	0.0
Total	567	15	2.6	92	16.2	460	81.1	1	0.2

3.2.4 Prevalence of stunting based on height-for-age z-scores

A low height-for-age reflects deficits in linear growth and is referred to as stunting. It reflects failure to receive adequate micro and macro nutrients over a long period of time and is also affected by recurrent and chronic illness. Global stunting in Narok County was found to be 27.2% (23.1-31.8 95% C.I.) while severe stunting was 7.7 % (5.5-10.6 95% C.I.). Going by WHO classification stunting levels between 20-29.9% are medium level. Marginally, stunting levels were higher in boys (30.4%) as compared to girls (24.2%) as shown in the table below.

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

	All n = 562	Boys n = 273	Girls n = 289
Prevalence of stunting (<-2 z-score)	(153) 27.2 % (23.1 - 31.8 95% C.I.)	(83) 30.4 % (24.6 - 36.9 95% C.I.)	(70) 24.2 % (19.3 - 30.0 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(110) 19.6 % (16.3 - 23.3 95% C.I.)	(59) 21.6 % (16.7 - 27.6 95% C.I.)	(51) 17.6 % (13.4 - 22.8 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(43) 7.7 % (5.5 - 10.6 95% C.I.)	(24) 8.8 % (5.6 - 13.6 95% C.I.)	(19) 6.6 % (4.1 - 10.3 95% C.I.)

As shown in table 16 below, severe stunting was highest in the 54-59 age group while moderate stunting was highest among the 30-41 and 43-53 months age groups

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	130	6	4.6	23	17.7	101	77.7
18-29	142	13	9.2	28	19.7	101	71.1
30-41	134	13	9.7	33	24.6	88	65.7
42-53	119	6	5.0	24	20.2	89	74.8
54-59	37	5	13.5	2	5.4	30	81.1
Total	562	43	7.7	110	19.6	409	72.8

Table 17: 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	560	-0.60±0.96	1.24	2	11
Weight-for-Age	567	-1.17±0.96	1.18	1	5
Height-for-Age	562	-1.38±1.09	1.33	0	11

* contains for WHZ and WAZ the children with edema.

3.3 Maternal Malnutrition

MUAC was used to determine the level of under nutrition among all women of reproductive age (15 to 49 years). The cut-off used was MUAC <21 cm. Pregnancy imposes a big nutrient-need load on a mother in a bid to meet her needs and those of the growing foetus. Failure to have good nutrition during pregnancy could potentially lead to low birth weight for the infant and may eventually lead to poor child growth and development. For women, it could ultimately result in an adverse birth outcome e.g. maternal death.
Of all the women at home aged between 15 to 49 years in Narok County, 7.1% were pregnant, 48.1% were lactating and 44.8% were neither pregnant nor lactating as shown in the figure below;

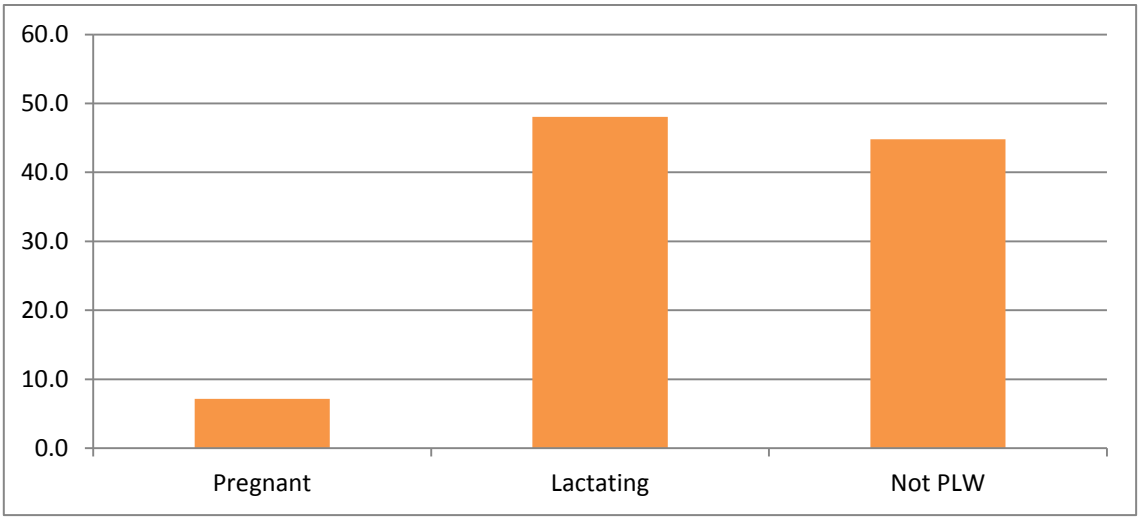


Figure 4: Women of reproductive age physiological status

Overall only 2.04% of the women had a MUAC <21 cm while among the pregnant and lactating women, only 0.74% had a MUAC less than 21cms as shown in the table below;
Table 18: Maternal malnutrition

Indicator	**N**	**%**
MUAC <21.0 cm for all women	491	2.04%
MUAC <21.0 cm for PLW	269	0.74%

3.4 Children's Morbidity, Health Seeking Behaviour and Vaccination

According to UNICEF's conceptual framework on causes of malnutrition, disease is an immediate cause of malnutrition. Disease also affects food intake which is then categorized as another immediate cause. It is therefore important to assess morbidity and whether it has some effect on malnutrition. A total of 573 children 6-59 months were assessed for illness two weeks prior to the survey. From the assessment, 22.6% (127) of these children were reportedly sick during this period.
Most (40.9%) had had fever, followed by 34.6% with Acute Respiratory infection and diarrhoea at 12.6%. 26% reported other illnesses like skin infections, vomiting and eye infections
Figure 5 below summarizes the proportion of children sick and breakdown of illnesses suffered in the last two weeks.

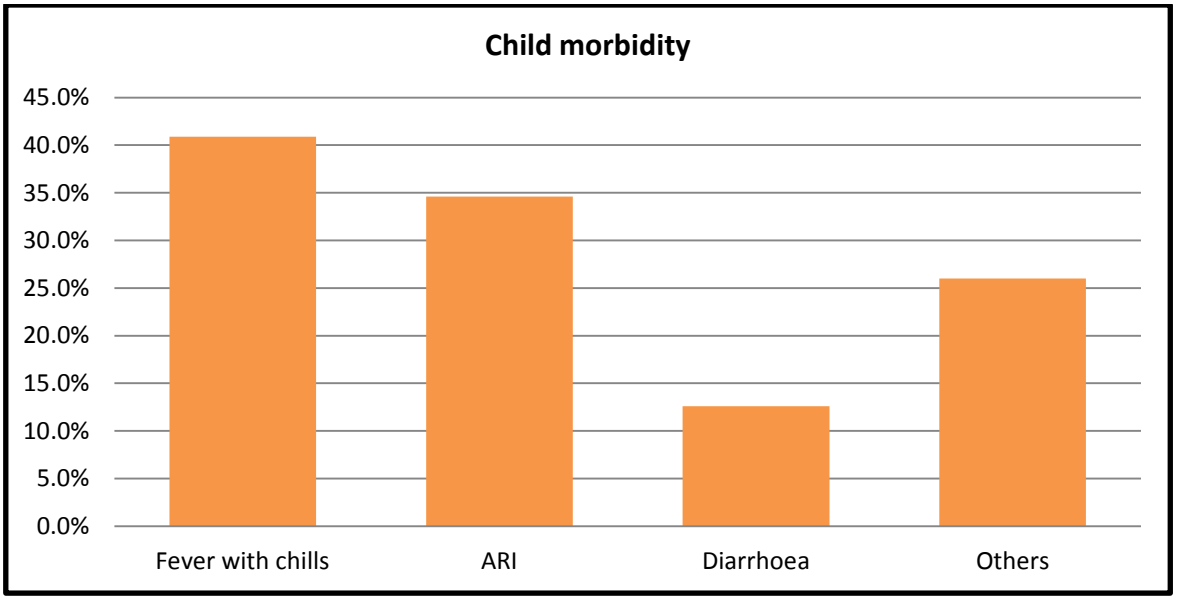


Figure 5: Prevalence of reported illness and symptom breakdown in children in the two weeks prior to interviews

3.4.1 Health Seeking Behaviours

Out of the 127 children under-five years of age reported to be ill in the two weeks before the survey, 94.1% had appropriate health care seeking as shown in figure 6 below. There were 3% of children who sought care from traditional healers however.

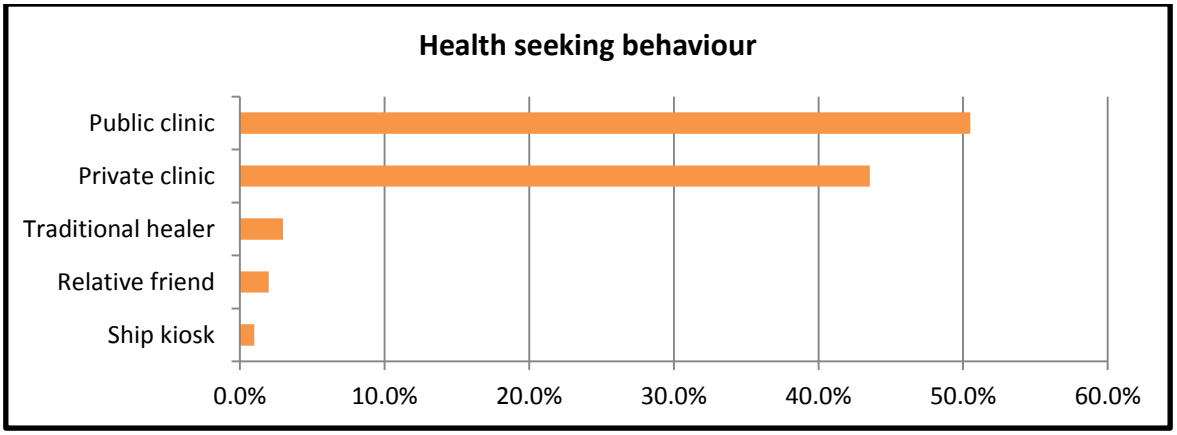


Figure 6: Health Seeking Behaviour

3.5 Mosquito Net Utilization

WHO defines a long-lasting insecticidal net as a factory-treated mosquito net made with netting material that has insecticide incorporated within or bound around the fibres. The net must retain its effective biological activity without re-treatment for at least 20 WHO standard washes under laboratory conditions and it recommends that the net should be used for three years.

78% of the households surveyed own a mosquito net as shown in the figure below

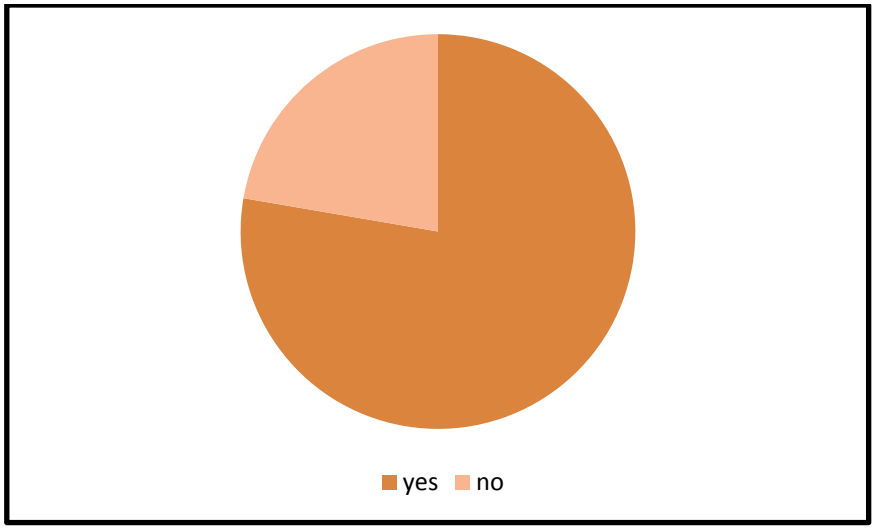


Figure 7: Mosquito Net ownership

3.5.1: Mosquito net utilization

Mosquito net utilization for the children surveyed was reported at 66.7%, 68.1% for the PLW, 78.8% for the children aged 5 to 17 years and 84.4% for adults as shown in the table below.

Table 19: People who slept under a net the night before the survey

	Total Number	Slept under net
< 5 years	660	66.7%
5-17 years	941	78.8%
PLW	270	68.1%
Adults	858	84.4%

3.6 Vaccination Results

3.6.1 OPV 1, OPV 3 and measles Vaccination

The Kenyan government aims to have 90% immunization coverage by the year 2015. Thereafter the aim is to have high coverage of immunization that is sustainable. To gauge how the county was doing in this regard, 3 antigens were checked for; BCG (scar), OPV1 and 3 and measles at 9 and 18 months

94.1 of the children sampled were found to have the BCG scar. More than 60% of the children were found to be vaccinated for OPV1 and OPV 3 confirmed by card, more than 55% of the children aged 9 months and above were also confirmed to have been vaccinated for measles at 9 months. Coverage for the second dose of measles at 18 months was

however found to be quite low as confirmed by card. Only 27.2% of the eligible children were covered for this disease as shown in the figure below.

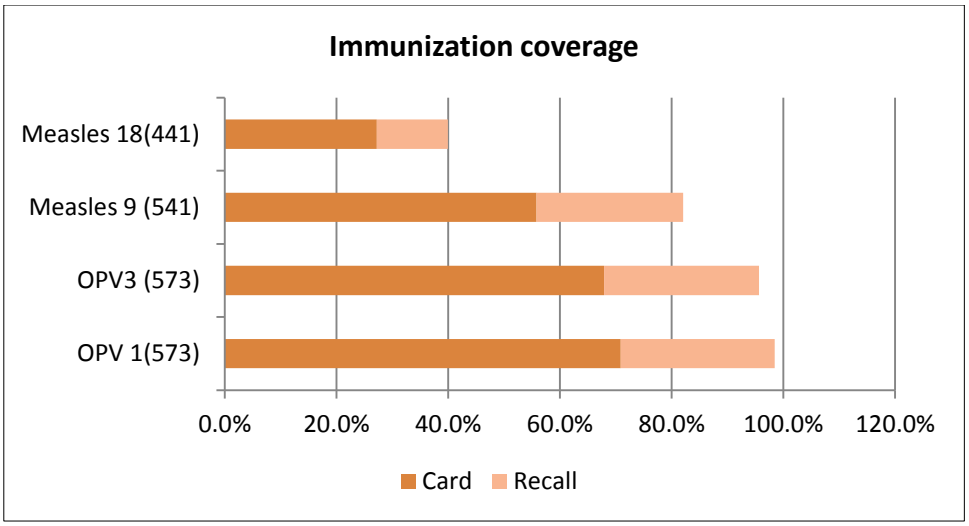


Figure 8: Vaccination coverage: BCG for 6-59 months and measles for 9-59 months

3.6.2 Vitamin A Supplementation

Vitamin A deficiency affects about 190 million preschool-aged children, mostly from Africa and South-East Asia (WHO). In infants and children, vitamin A is essential to support rapid growth and to help combat infections. Inadequate intake of vitamin A may lead to vitamin A deficiency which can cause visual impairment in the form of night blindness and may increase the risk of illness and death from childhood infections, including measles and those causing diarrhoea. Vitamin A supplementation in children 6–59 months of age living in developing countries is associated with a reduced risk of all-cause mortality and reduced incidences of diarrhea. Vitamin A supplementation is therefore critical, not only for eliminating vitamin A deficiency as a public-health problem, but also as a central element for child survival.

To assess the adequacy of vitamin A supplementation, parents and caregivers were asked how many times children had been supplemented in the 12 months preceding the date of the interview. In Narok county vitamin A supplementation was low. It was recorded at 44.9% for all children within the age bracket of 6-59 months. Supplementation for the 6 to 11 months supplemented once category was higher than that ofthe12 to 59 months supplemented twice category as shown in the figure below. Both were however below the >80 national target

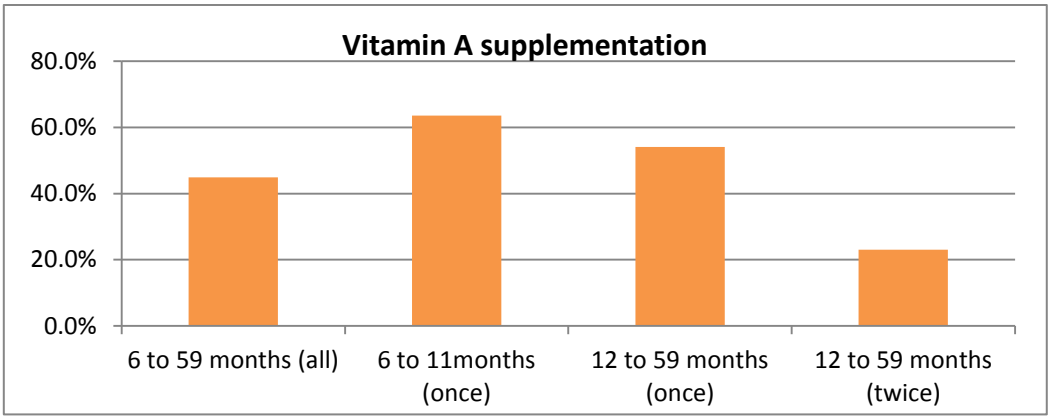


Figure 9: Vitamin A Supplementation 6-59 months

3.6.3 De-worming

De-worming is important in controlling parasites such as helminthes, schistosomiasis (bilharzias) and as well as in the prevention of anaemia. WHO recommends that children in developing countries exposed to poor sanitation and poor availability of clean safe water to be de-wormed once every 6 months.

De-worming was assessed for 509 children aged 12-59 months old. 6 out of 10 (59.7%) in the children assessed were reported to have not been dewormed in the 12 months prior to the survey. Of the 40.3% dewormed, 59.5% (122) had been dewormed once while the remaining 40.5% (83) had been dewormed 2 or more times.

3.6.4 Iron folic supplementationIt is estimated that more than 40% of pregnant women worldwide are anaemic. At least half of those found to have this ailment assume that its cause is iron deficiency. Pregnant women require iron and folic acid that is more than that which is normally ingested to meet both their own nutritional needs and those of the developing fetus. Deficiencies in iron and folic acid during pregnancy can impact the health of the mother, her pregnancy, as well as fetal development negatively. Emphatically, evidence has shown that the use of iron and folic acid supplements is associated with a reduced risk of iron deficiency and anaemia in pregnant women (WHO 2016).

In the survey, 54.3% of caretakers with children aged 24 months and below were supplemented with iron and folic acid during their last pregnancy. The supplements were given in combination or separately depending on available stock. The mean number of days IFAS was consumed by women was 44 days with the majority of women taking the supplements for less than 90 days as shown in the table below:

Table 20: Iron Folic consumption

Categories of IFA Consumption (In Days)	No. of women	Proportion (%)
< 90 Days	122	92.4%
90≥180 Days	10	7.6%
> 180 Days	0	0%

3.7 Education N=1384

3.7.1 School enrolment83.4% of all children eligible to go to school (ages 3 -17 years) were going to school at the time of the survey. For a majority of those not in schools, the reason given was that their caretakers thought they were too young to begin especially for children who were less than 5 years old as shown in the table below:

Table 21: Reasons for children not being in school

Reason for not being in School	n	%
Too young(119- <5yrs, 8-5years, 3->5yrs)	131	60%
Chronic Sickness	4	1.7%
Family Labor responsibilities	6	2.6%
Fees or Cost	3	1.3%
Household doesn't see value of schooling	2	0.9%
No school nearby/distance	64	27.8%
Married	8	3.5%
Others (pregnancy, refused, insecurity etc)	13	5.7%

3.7.2 Highest level of education attained N= 1071

Adults were queried on the highest level of education attained and majority of them were reported to have no education (33.4%) or to have attained only the pre-primary level of education (31.5%) which is quite worrying data for the county as shown in figure 10 below:

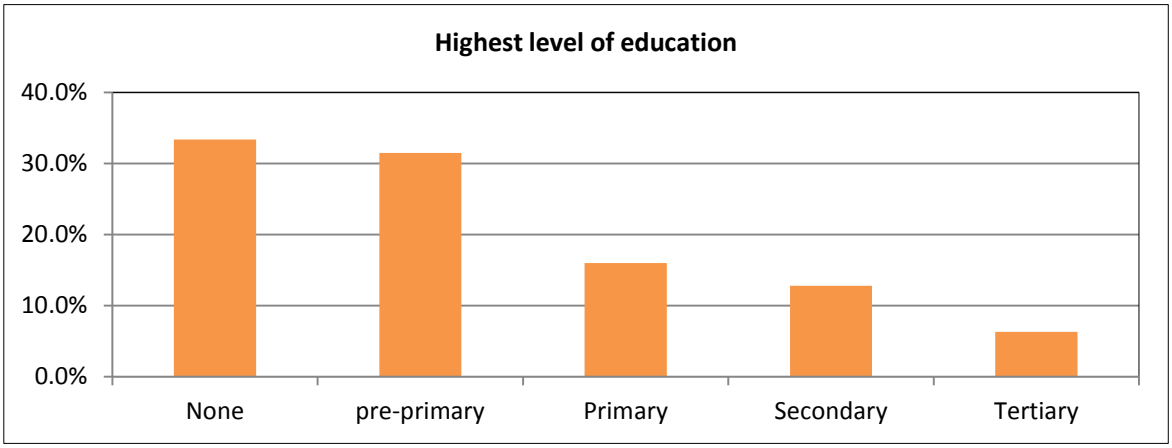


Figure 10: Highest level of education attained for adults

3.8 Water, Sanitation and Hygiene (WASH)

Access to water and sanitation is an international human right. This means that all individuals are entitled to have access to an essential amount of safe drinking water and to basic sanitation facilities. The human right that is access to clean water entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic use. Water and sanitation are deeply interrelated. Sanitation is essential for the

conservation and sustainable use of water resources, while access to water is required for sanitation and hygiene practices. Furthermore, the realization of other human rights, such as the right to the highest attainable standard of health, the right to food, right to education and the right to adequate housing, depends very substantially upon the implementation of the right to water and sanitation.

3.8.1 Main Source of Water

Out of 597 households assessed, only 25.8% of residents obtain their drinking water from safe sources (rain, borehole, spring and piped). The rest (74.8%) obtained their water for drinking from sources whose safety can be compromised hence need for proper treatment before drinking. Such sources included; dug well (3.5%) and surface water (68.2%). Figure 11 below summarizes main sources of water in the area.

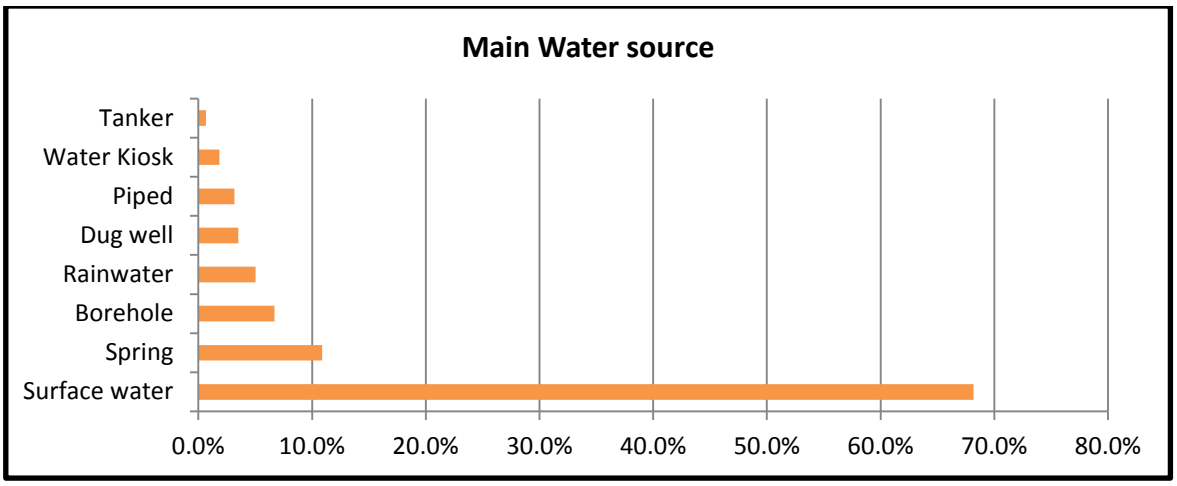


Figure 11: Sources of Drinking Water

3.8.2: Distance to Drinking Water Source

According to SPHERE handbook for minimum standards for WASH, the maximum distance from any household to the nearest water point should be 500 meters or maximum 15 minutes walking distance.

Analysis of distances to water sources indicated that the majority 54.3% of the households obtained their water from sources less than500m (less than 15 minutes walking distance), 37.5% took between 15 min to 1 hour (approximately 500m to 2km) while the rest (7.9%) walked as far as more than 2Km (>1 hour) to their water sources. Table 23 below shows distance to water sources:

Table 22: Distance to Water Sources

Distance travelled	n	2018
Less than 500m	324	54.3%
More than 500M - <2 kms	224	37.5%
More than 2kms	47	7.9%
Others	2	0.34%

3.8.3 Methods of treating drinking water

The survey showed that majority (78.7%) of the residents did not treat their drinking water despite the fact more that 70% of the respondents obtain their water from unsafe sources. Of those who treat drinking water, 71.3% were boiling water while 38.3% used chemicals as shown in the figure below:

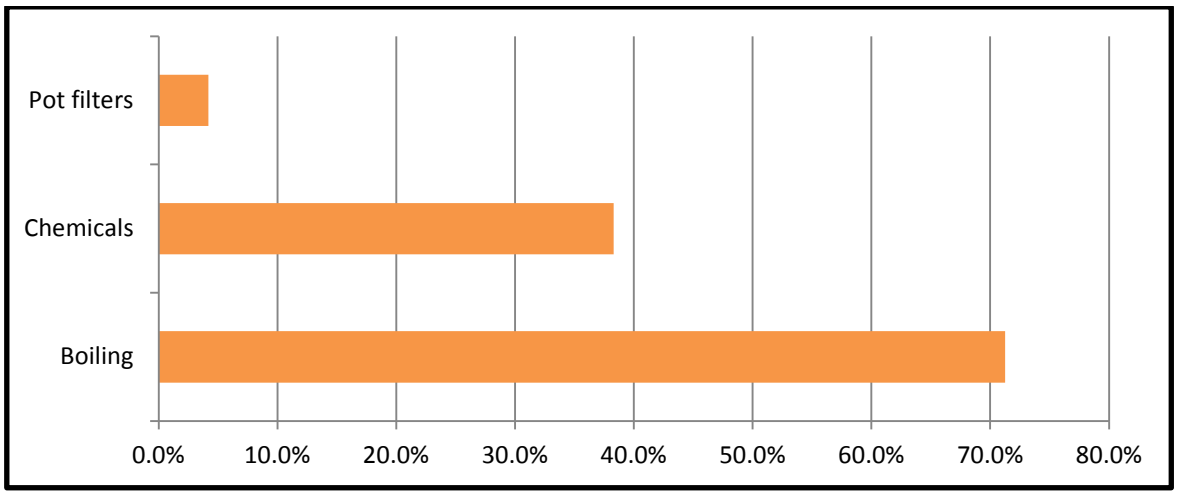


Figure 12: Method of Treating Drinking Water

3.8.4 Hand washing

Hand washing with soap is the single most cost-effective intervention in preventing diarrhoeal diseases. The four critical hand washing moments include; after visiting the toilet/latrine, before cooking, before eating or feeding a baby and after taking children to the toilet/latrine.

More than half of the respondents washed hands before eating (86.9%) and before cooking (50.1%). However only 40.4% of the respondent washed hands after visiting the toilet with those washing hands after changing a child reported to be at only 9.6% as shown in the table below:

Table 23: Hand Washing at Critical Times

HYGIENE	No of H/holds	Percentage
After toilet	241	40.4%
Before cooking	299	50.1%
Before eating	519	86.9%
After taking children to the toilet	57	9.6%
Hand washing in all 4 critical times	10	1.7%

3.8.5 Hand washing agent

Further, majority of the respondents (79.2%) used water and soap for hand washing, while only less than a fifth (18.9 %) used water only for hand washing. Hand washing without soap does not offer effective protection against germs. Figure 14 below shows what is used for hand washing in the survey zone.

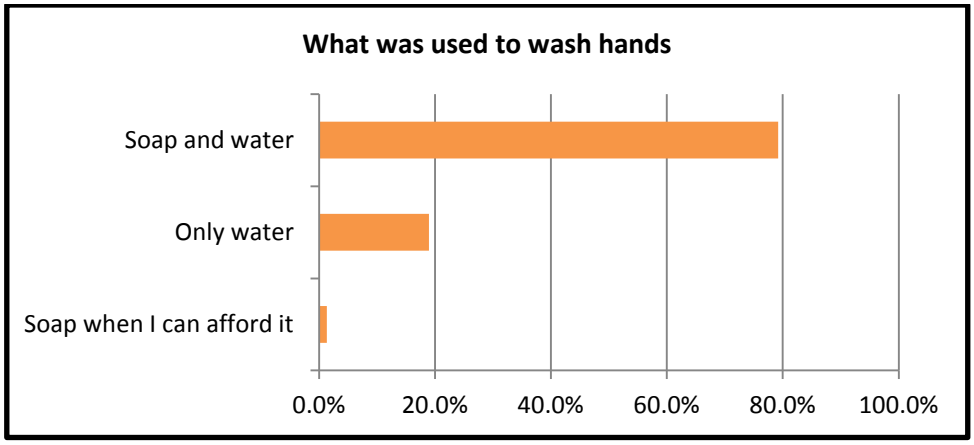


Figure 13: Hand Washing Agents

3.8.6 Latrine Ownership and Utilization

Of the 597 households sampled more than half were using a toilet to relieve themselves while 47.6% of the respondents were relieving themselves in a bush or field, shown in figure 15 below.

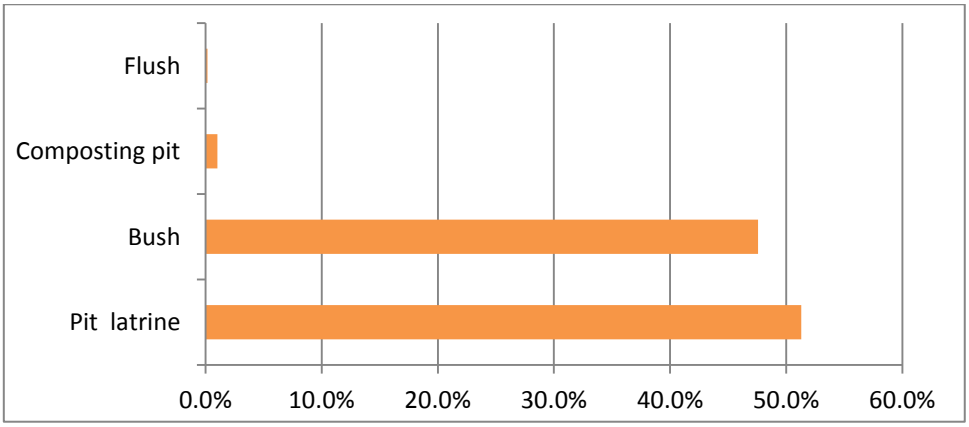


Figure 14: Defecation Sites

3.9 Food, Security and Livelihoods

3.9.1 Household's Source of Income

Household income is critical to food availability. In Narok County majority (31.8%) of the households get their income from the sale of livestock followed by the sale of crops (29.8%)-most especially wheat. Details as regards source of income are shown in the figure 13 below.

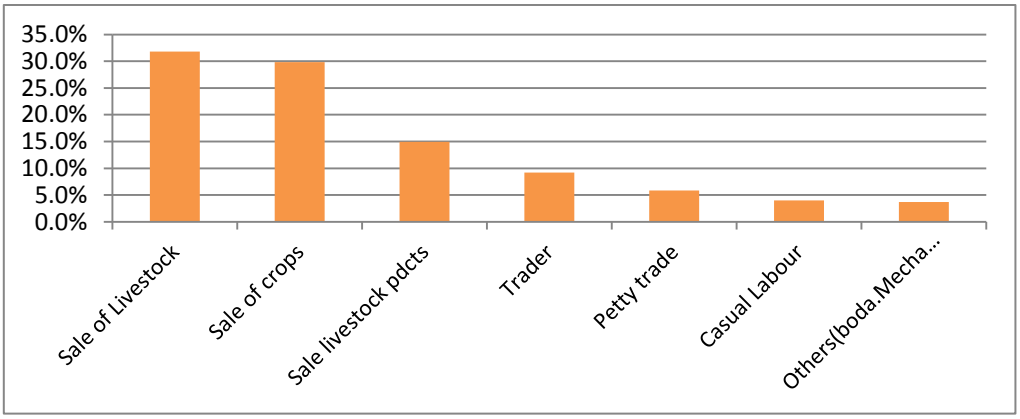


Figure 15: Households Sources of Income

3.9.2 Occupation of the Household Head

Majority of the household heads (39.2%) engage in farm labour at their own farms followed by livestock herding at 36.2% among others as shown in figure 14 below.

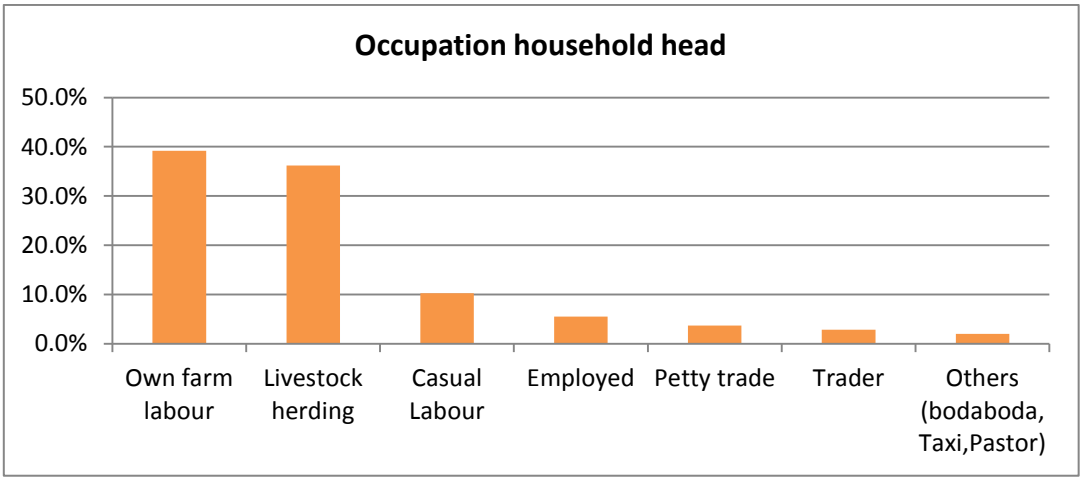


Figure 16: Sources of Income

3.9.3 Foods Groups Consumed by Households

Poor dietary diversity is a proxy indicator of insufficient nutrient intake which in turn exposes a population to deficiencies especially of micronutrients.

In the survey area, sugar, milk, cereal, oils and vegetables were the most consumed foods given a 24 hour recall. Fruits, meat, eggs and fish were the least consumed as shown in the figure below;

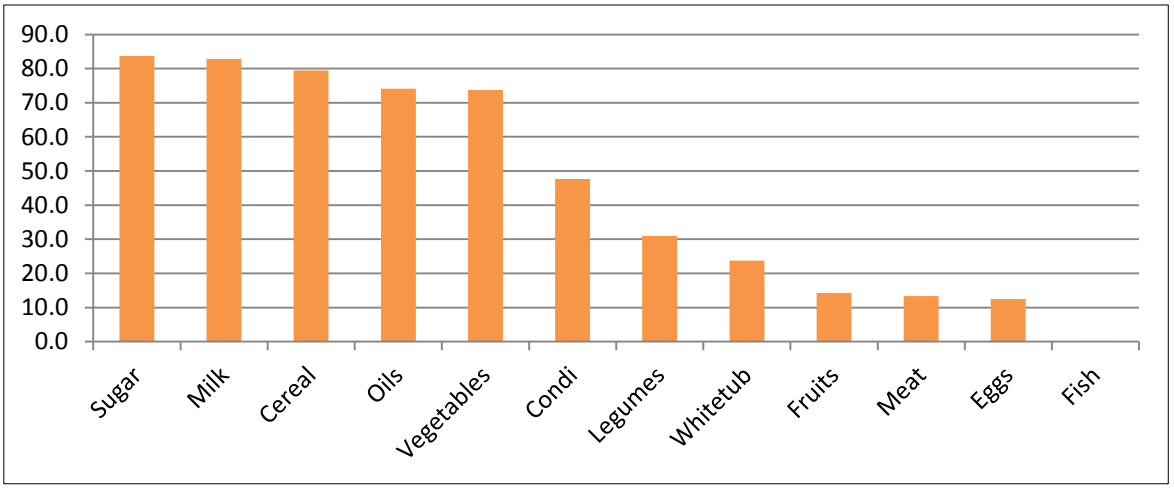


Figure 17: Most consumed foods: 24 hour recall

3.9.4 Household Food Consumption Score (FCS)

The FCS is used to identify the most food insecure households. The prevalence of households with poor and borderline food consumption provides essential information on people's current diets and is helpful in deciding the most appropriate type and scale of food security intervention as well as the right target group for such assistance. In this survey, none of the households sampled had poor food consumption score, 2.2% were borderline while 97.8% had good food consumption score as shown in the table below:

Table 24: Food Consumption Score

Main Threshold	Nomenclature	Proportion of Households 2018
0-21	Poor food consumption…manly cereal and sugar	0%
21.5-35	Borderline food consumption Cereal, legumes, milk, oil, sugar	2.2%
>35.5	Good food consumption Cereal, legumes, milk, condiment, flesh meat, vegetable, oil, sugar	97.8%

3.9.5 Micronutrients consumption in Households with acceptable vs. poor/border line FCS

Comparing the micronutrient intake of households with border line FCS and the one's with a good consumption score gave the result that majority of the houses with border line FCS consumed protein rich food on some days (77%) or not at all (23%) while in households with good FCS, 95.5% of them consumed protein rich foods frequently. Vitamin A rich foods were generally frequently consumed among all houses while foods rich in hem iron were generally poorly consumed in all houses. Notably, 77% of those in households with

poor/border line FCS did not consume these two food items at all in the week preceding the date of the interview as shown in the figure below.

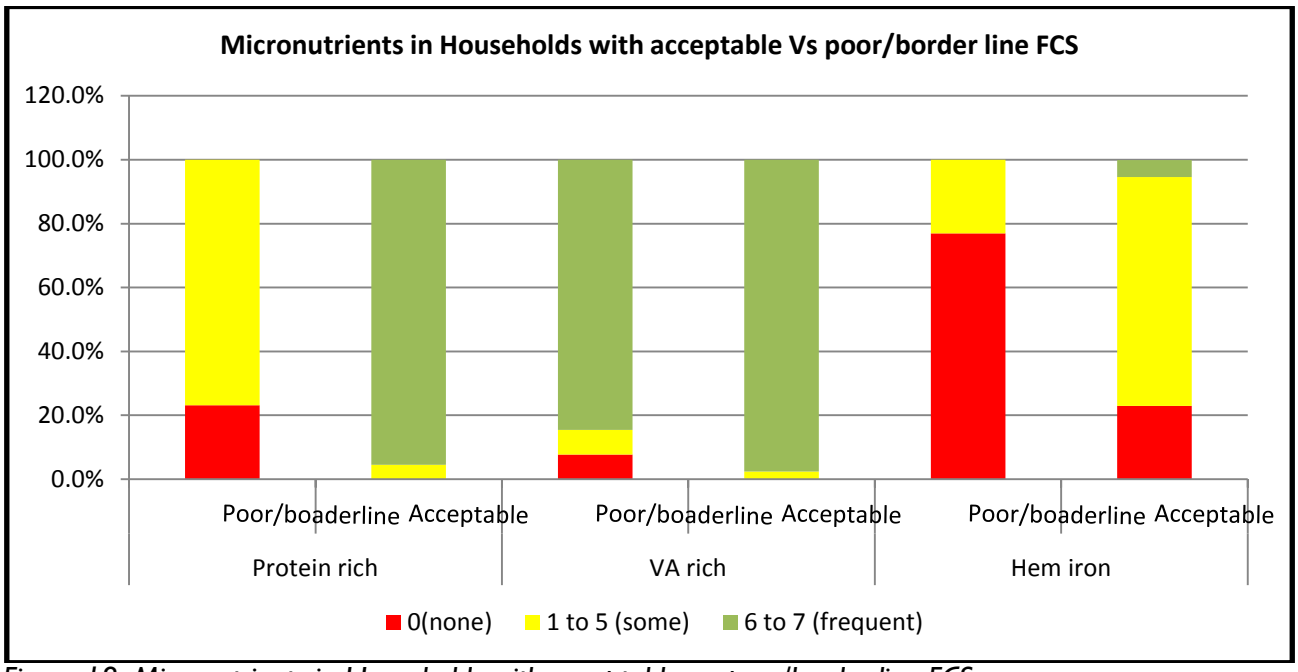


Figure 18: Micronutrients in Households with acceptable vs. poor/border line FCS

3.9.6 Dietary Diversity Score

The analysis for dietary diversity score was based on 24 hour recall. 43.4% of the respondents had a high dietary diversity score taking more than 5 food groups. 46.9% of the respondents took between 4 to 5 food groups while 9.9% of the respondents were taking less than ≤3 food groups as shown in the figure below:

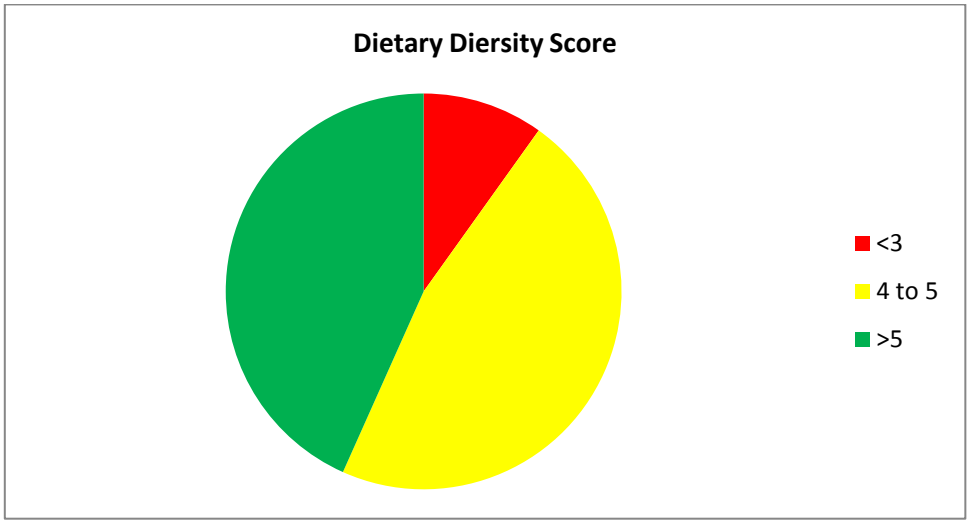


Figure 19: Dietary Diversity Score

3.9.7 Micronutrient Consumption from Household Dietary Diversity

Generally over 80% of the respondents consumed protein rich food, vitamin A rich foods and fruits and vegetables frequently. Foods rich in hem iron were the least consumed with almost a quarter of the respondents reporting to not consuming such foods in the past 7 days preceding the survey as shown in the figure below:

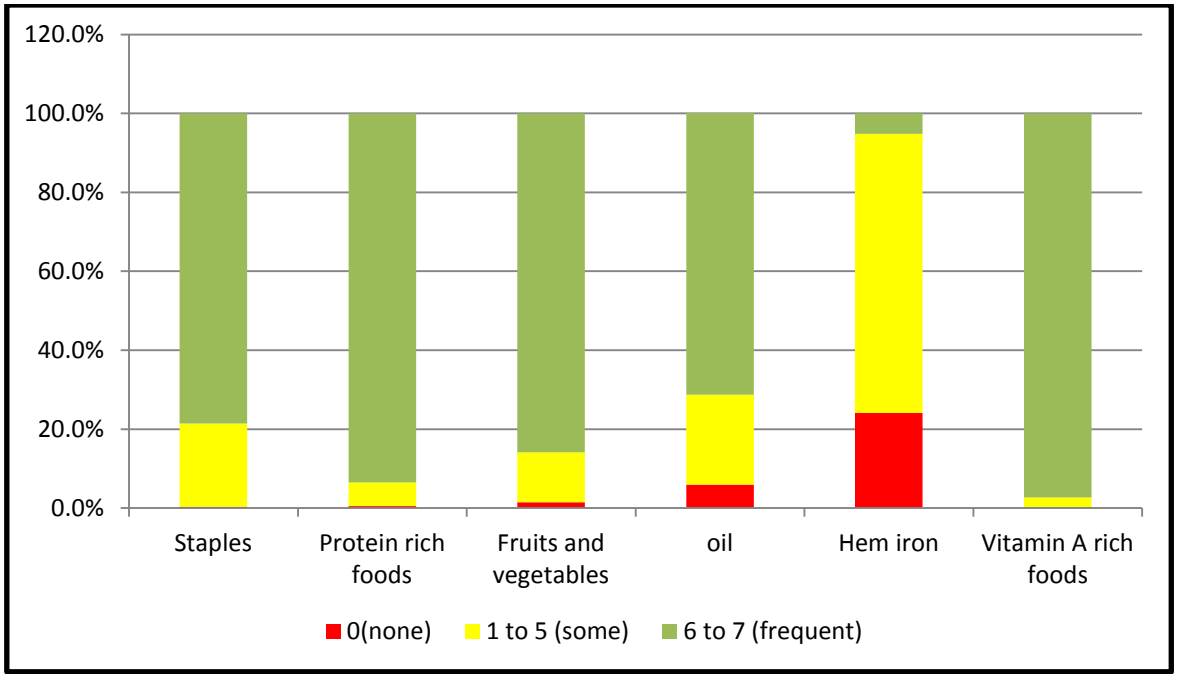


Figure 20: Micronutrient Consumption from Household Dietary Diversity

3.9.8 Average number of days food groups are consumed showing consumption of micronutrients

Foods rich in hem iron were consumed on average for about two days a week while foods with other micronutrients were consumed on average between 5.7 days and 6.9 days. Foods rich in vitamin A (vegetables) were the most highly eaten followed by protein rich foods (milk mostly) as shown in the figure below:

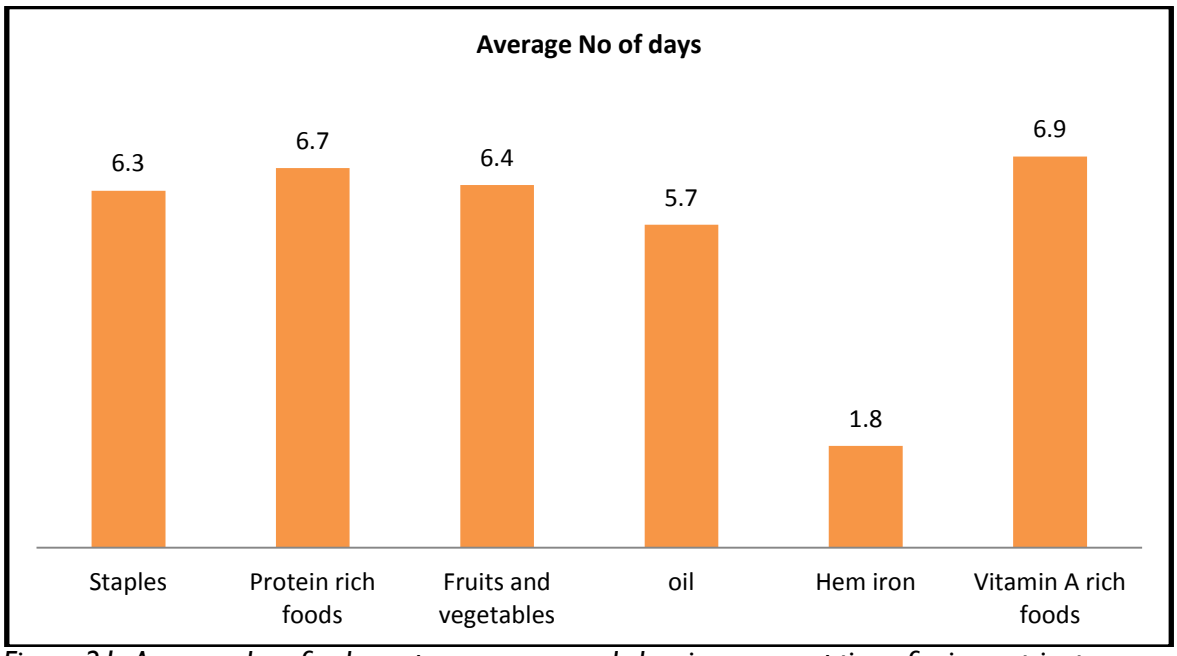


Figure 21: Average days food groups are consumed showing consumption of micronutrients

3.9.9 Minimum Women's Dietary Diversity Score based on 24 hour recall

Majority of women (64.7%) took less than the recommended >5 food groups as shown in the figure below:

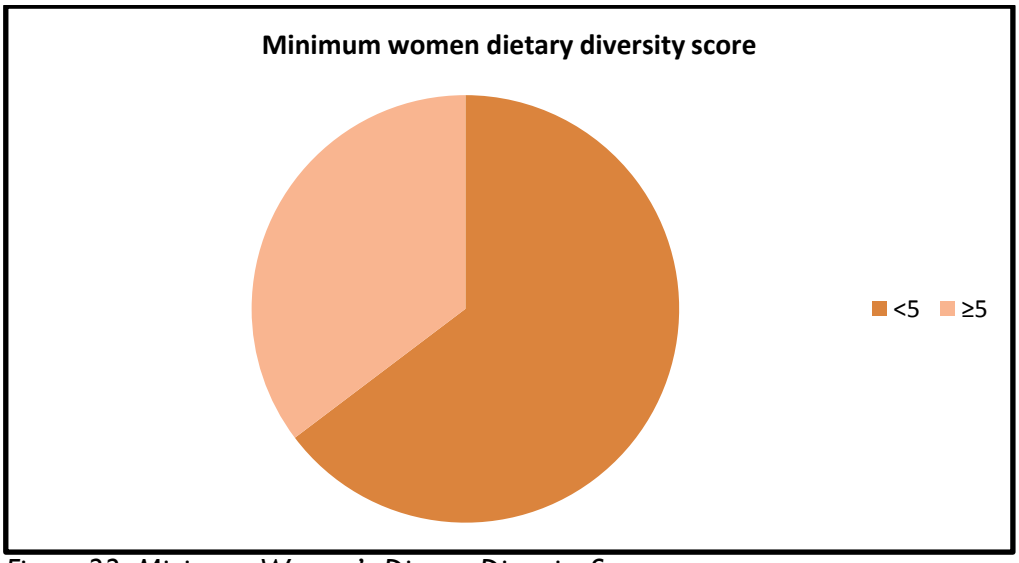
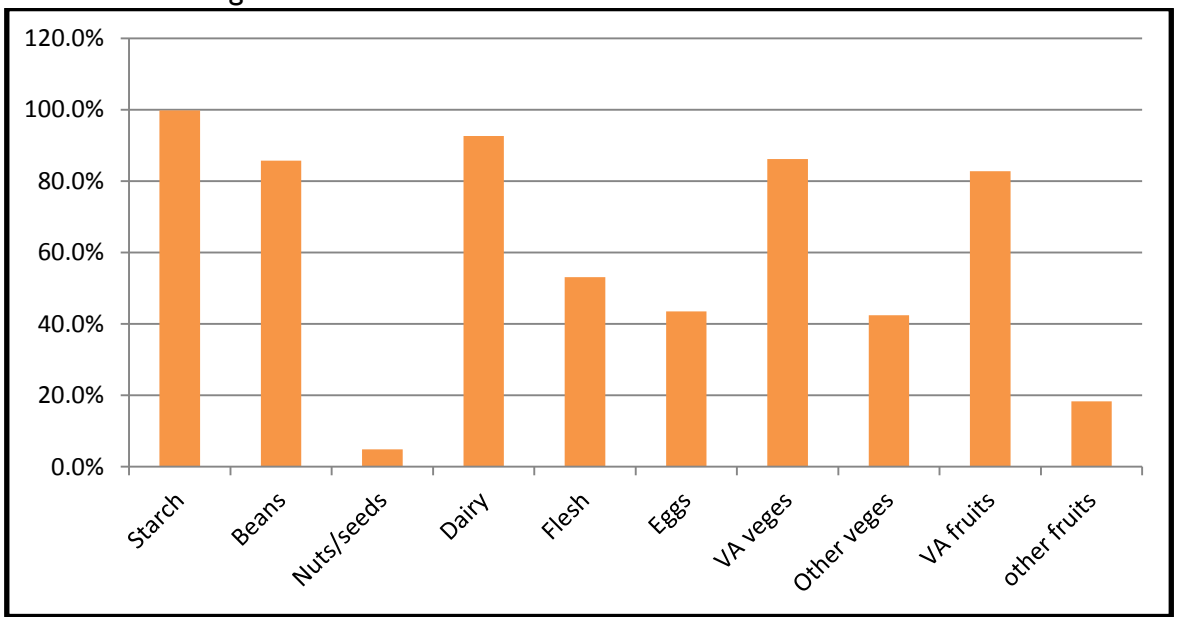


Figure 22: Minimum Women's Dietary Diversity Score

3.9.10 Women Dietary Diversity based on 24 hour recall

In the 24 hours preceding interviewing, majority of women mainly consumed foods rich in starch (99.8%), dairy (92.6%) and Vitamin A - vegetables - (86.2%), beans (85.7%), and Vitamin A - fruits - (82.8%). The least consumed foods were nuts and seeds, meat and eggs as shown in the figure below.



3.10 Household Coping Strategy Index (Reduced CSI)

Only 9.7% (58) of the households in Narok County were reported to have experienced food insecurity 7 days prior to the survey and therefore the overall CSI for the county was quite low at 1.35. The higher the severity weight number the more severe the coping strategy is and in this case the score was very low as shown in the figure below:

Table 25: Table of coping strategies

Coping Strategy	Proportion of HH (N=597)	Frequency score(0-7)	Severity score (1-3)	Weighted score =Freq*weight
Rely on less preferred & less expensive food	7.7%	0.28	1	0.28
Borrow food	7.4%	0.19	2	0.38
Limit portion sizes	6.9%	0.25	2	0.25
Restrict consumption of food by adults for young children to eat	4.2%	0.08	3	0.24
Reduced number of meals	6.4%	0.20	1	0.2
Total weighted Coping Strategy Score				**1.35**

4 Conclusions and recommendations

Comparing the SMART survey done in June 2013 with this one, the Global Acute Malnutrition prevalence remained poor. It was at 7.7(5.3-11.0 95% CI) in 2013 and **6.8 % (4.8 - 9.5 95% C.I.)** this year (2018). The SAM levels however reduced from the critical level of 4.4(95% C.I.) in 2013 to the alert level of **1.1 % (0.4 - 3.2 95% C.I.)** in 2018. Underweight and stunting levels were medium at 18.9% and 27.2% respectively. Noteworthy is that though stunting levels were classified as medium, 1 in 4 children in the county are stunted.

22.6% of the children in the households sampled were found to have been sick 2 weeks prior to the survey. Majority had had fever with chills (40.9%) followed by respiratory infections at 34.6% and then watery diarrhoea at 12.6%. Of the children who had been sick 94.1% had sought care appropriately in either public clinic (50.5%) or private clinic (43.6%).

Where household food security comes into play majority of households (56.6%) had a poor or borderline Dietary Diversity Score. The Women's Dietary Diversity score was also poor with 64.7% of women consuming food from less than <5 food groups in the past 24 hours. Majority of households ate mainly staples and Vitamin A rich foods with protein rich foods and hem iron rich foods being poorly consumed.

Only 9.7% of the households were reported to have been food insecure 7 days prior to the survey leading to these employing coping strategies. Majority of the households were either relying on less preferred or less expensive foods or borrowing foods to cater for shortfalls they were experiencing.

Coverage of underlying causes of malnutrition, measles vaccination, Vitamin A supplementation and de-worming was very low; reported at 40% for the 18 months category measles, 63.6% (6-11 months) 49.2% (12-59 months) for Vitamin A supplementation, and 40.3% for deworming at least once. All were below the national targets and also below WHO recommendations.

Statistics for WASH were: more than 70% of the respondents were using water from unsafe sources while 72% did nothing to their drinking water to make it safe. 47.6% were practicing open defecation and only 1.7% reported that they were washing their hands during the recommended four critical times.

FINDINGS	RECOMMENDATION	ACTOR (BY WHO?)	IMPLEMENTATION TIME LINE
Alert levels of wasting both by Weight for Height (6.8%) and by MUAC (3.0%)	➢ Conduct mass screening in the county so as to ensure all children are in the program ➢ Empower CHVs to be able to identify and refer cases of malnutrition to health facilities offering IMAM services	MOH/Partners	Immediately
Stunting classified as medium reported at 27.2% translating to about one in every four children stunted	➢ Empower CHVs to offer IFAS and de-worming at the community level ➢ Offer health education on diet diversification through kitchen gardening ➢ Scale up uptake of ANC visits to improve on supplementation and health education to mothers	➢ MOH ➢ MOH/MOA ➢ MOH	Immediately By next TWG in March Immediately
Poor Vitamin A supplementation(all at 44.9%) 6-11 once at 63.6%) and 12-59 twice at 49.2%	➢ Strengthen documentation through sensitization of all health workers ➢ Maximise impact through Malezi Bora weeks ➢ Strengthen level 1 services through using CHVs to mobilise and give VA supplementation	➢ MOH	Immediately
Poor immunization especially for measles at 18 months at 27.2% by card	➢ Engage CHVs to refer children for immunization at the community level ➢ Conduct community sensitization on immunization ➢ Engage CHVs to do defaulter tracing	➢ MOH	Immediately Every six months Immediately

FINDINGS	RECOMMENDATION	ACTOR (BY WHO?)	IMPLEMENTATION TIME LINE
Poor water treatment with only 28% treating their water despite high levels of ODF	➢ Sensitization the community on water treatment options using CHVs and other forums ➢ Supply water treatment chemicals ➢ Advocate to the county government to provide safe water across the county	MOH/water department and partners	Immediately
Poor hand washing with hand washing at 4 critical times reported at 1.7%	➢ Develop sanitation and key messages about hygiene ➢ Conduct community sensitization ➢ Revive school health clubs and use them to pass health messages to school children	➢ MOH/water department and partners	Immediately
Lack of awareness on food fortification with only 4.2% reporting hearing about fortification	➢ Develop key messages around food fortification ➢ Conduct community sensitization using the above messages to create awareness	HPO	April 2018
Open Defecation reported at 47.6% of the HHs sampled	➢ Continue with the CLTS activities already ongoing in the county	➢ SCPHO's	April 2018
Poor women dietary diversity with 64.9% not taking the recommended >5 food groups	➢ Strengthen health education during ANC visits ➢ Provide health education in the community through use of CHVs	SCNO/partners/Community strategy	April 2018

FINDINGS	RECOMMENDATION	ACTOR (BY WHO?)	IMPLEMENTATION TIME LINE
0% coverage of MNP	➢ National government to provide supplies for the program or engage cooperate partners to avail the same in the local market	County nutritionist/ National division of nutrition	Immediately

6 References

1. FAO (2010); guidelines for measuring household and individual dietary diversity.
2. WHO guideline: Vitamin A supplementation in infant and children 6 to 59 months of age, Geneva, World Health Organization 2011. http://www.who.int/nutrition/publications/vitamins_minerals/en/index.html
3. WFP (2015), Food Consumption Score, Nutrition Quality Analysis (FCS-N)

7. Appendices

Appendix 1: Plausibility Report

Indicator	Acceptable values/range	Survey Area
Flagged data (% of out of range subjects)	<7.5	**0** (1.7%)
Overall sex ratio (significant CHI square)	>0.001	**0** (p=0.587)
Age ratio (6-29vs 30-59) Significant CHI square	>0.001	**0** (p=0.187)
Dig. prevalence score-weight	<20	**0** (5)
Dig. prevalence score-height	<20	**0** (6)
Dig. prevalence score-MUAC	<20	**0** (6)
Standard Dev. Height WHZ	>0.80	**0** (0.96)
Skewness WHZ	<±0.6	**0** (0.00)
Kurtosis WHZ	<±0.6	**1** (0.34)
Poisson WHZ -2	>0.001	**0** (p=0.102)
Design Effect	<2	**1.24**
OVERALL	**<24**	**1 % (Excellent)**

Appendix 2: Assignment of Clusters

Subcounty	Ward	Sub location	Geographical unit	Population size	Cluster
Narok North	Olloropil	Enengatia	Msondoro	933	1
	Olloropil	Empatipati	society	933	2
	Olokurto	Ilkerimisho	Ilkerimisho	658	3
	Nkareta	olopito	Osinoni	918	4
	Narok town	oleleshwa	Nkuruman	2970	5
	Nkareta	Nkareta	Mpenedapash	918	6
			Olepolos B	603	RC
Narok East	Suswa	Suswa	Nakurtolukuny	1924	7
	Keekonyokie	Keekonyokie	Nairagie Enkare	896	8
	Keekonyokie	olesharo	Karuka	896	9
	Mosiro	Mosiro	Mosiro centre	763	10
	Mosiro	Ongata Naado	Enetarie olkiteng	763	11
Narok South	Ololulunga	Oldonyongiro	Oldonyongiro	8658	12
	Ololulunga	Nkoben	Nkoben	8658	13
	Melelo	Melero	Melero	17535	14,RC
	Naroosura	Narosuura	Narosuura A and B	17825	15,16
	Naroosura		Oleparieta	610	17
	Naroosura		Esopiroto	102	18
	Loita		Oldarpoi	373	19
	Loita		Ololgisoyia	422	20
Narok West	Siana	Sekenani	Oldarpoi	92	21
	Siana	Siana	Onontukom	324	22
	Naikarra	Naikarra	Lower Jua Kali	123	23
	Leshuta	Naikarra	Iloyankalan	215	24
	Mara	Longena	Mismis	606	25
	Mara	Lemek	Kimelok	348	26
	Mara	Nkoronkori	Otumaroi	486	27
Transmara east	Ilkerin	Chamamit	Chebulu	951	28
	Ilkerin	Ilkerin	Cheptuiyet	512	29
	Ilkerin	Ilkerin	Araret	947	30
	Ilkerin	Emurua Dikirr	Chilani	687	31
	Kapsasian	Kabulecho	Kabosweti/Chepngaran	521	32
	Kapsasian	Kiribwet	Chelemei	476	33
	Mogondo	Mugor	Chebungei	580	34
	Mogondo	Mogondo	Cheramgoi	668	35

Subcounty	Ward	Sub location	Geographical unit	Population size	Cluster
Transmara west	Kimintent	Emart	Oronkai	500	RC
	Kimintent	Pusanki	Olmagutian	217	36
	Kimintent	Esoit Nabor	Melelo	350	37
	Kimintent	sitoka	Kuikui	297	38
	Angata Barkoi	Chelchel	Chelchel	549	39
	Angata Barkoi	Mashangwa	Kemaricha	466	40
	Angata Barkoi	oldonyorok	Soimet B	645	RC
	Lolgorian	Masurura	Imbitir	265	41
	Lolgorian	Lolgorian	Ologum	750	42
		Ololmongi	Orkireruki	512	RC

Appendix 3: Enumerators

Teams	Name	Role
1	Dr Maina Kimani	T/leader
	Anthony M Torome	Enumerator
	Marion Mpoke	Enumerator
	Peter Kedoke	Enumerator
2	Chesang Toroitich	T/leader
	Daris Sanoe	Enumerator
	Enock Topisia	Enumerator
	Reenoi Teeka	Enumerator
3	Dr Esther Chula	T/leader
	Pius Langat	Enumerator
	Real Wekesa	Enumerator
	Julius Samperu	Enumerator
4	Dickson	T/leader
	Setia Shurake	Enumerator
	Chweya Alex	Enumerator
	Lydia Chebet	Enumerator
5	Samson Soksok	T/leader
	Morah Mokire	Enumerator
	Kipkirui Cosmas	Enumerator
	Chuchunei Chebet Mary	Enumerator
6	Dr Lumarai Kabola	T/leader
	Wilson Lemayian	Enumerator
	Koini Joseph	Enumerator
	Ezekiel Leparan	Enumerator
7	David Kunono	T/leader
	Ben Ntoitoi	Enumerator
	Mercy Chepkoech	Enumerator
	Wiry Asige	Enumerator

Appendix 4: Result Tables for NCHS growth reference 1977

Table 3.2: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 567	**Boys** n = 277	**Girls** n = 290
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(45) 7.9 % (5.7 - 11.0 95% C.I.)	(27) 9.7 % (6.3 - 14.8 95% C.I.)	(18) 6.2 % (3.7 - 10.1 95% C.I.)
Prevalence of moderate malnutrition	(36) 6.3 % (4.6 - 8.7 95%	(23) 8.3 % (5.2 - 12.9	(13) 4.5 % (2.7 - 7.4 95%

(<-2 z-score and >=-3 z-score, no oedema)	C.I.)	95% C.I.)	C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(9) 1.6 % (0.8 - 3.2 95% C.I.)	(4) 1.4 % (0.6 - 3.7 95% C.I.)	(5) 1.7 % (0.6 - 4.8 95% C.I.)

The prevalence of oedema is 0.2 %

Table 3.3: 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	128	2	1.6	9	7.0	117	91.4	0	0.0
18-29	146	1	0.7	11	7.5	133	91.1	1	0.7
30-41	136	0	0.0	7	5.1	129	94.9	0	0.0
42-53	120	4	3.3	4	3.3	112	93.3	0	0.0
54-59	37	1	2.7	5	13.5	31	83.8	0	0.0
Total	567	8	1.4	36	6.3	522	92.1	1	0.2

Table 3.4: 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. 9 (1.6 %)	Not severely malnourished No. 563 (98.3 %)

Table 3.5: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 573	**Boys** n = 280	**Girls** n = 293
Prevalence of global malnutrition (< 125 mm and/or oedema)	(17) 3.0 % (1.7 - 5.1 95% C.I.)	(6) 2.1 % (0.9 - 5.1 95% C.I.)	(11) 3.8 % (1.8 - 7.7 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(15) 2.6 % (1.5 - 4.5 95% C.I.)	(5) 1.8 % (0.7 - 4.8 95% C.I.)	(10) 3.4 % (1.7 - 6.7 95% C.I.)
Prevalence of severe malnutrition	(2) 0.3 % (0.1 - 1.4 95%	(1) 0.4 % (0.0 - 2.6 95%	(1) 0.3 % (0.0 - 2.5 95%

(< 115 mm and/or oedema)	C.I.)	C.I.)	C.I.)

Table 3.6: 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	131	1	0.8	8	6.1	122	93.1	0	0.0
18-29	148	0	0.0	2	1.4	146	98.6	1	0.7
30-41	136	0	0.0	1	0.7	135	99.3	0	0.0
42-53	120	0	0.0	2	1.7	118	98.3	0	0.0
54-59	38	0	0.0	2	5.3	36	94.7	0	0.0
Total	573	1	0.2	15	2.6	557	97.2	1	0.2

Table 3.5: Prevalence of acute malnutrition based on the percentage of the median and/or oedema

	n = 567
Prevalence of global acute malnutrition (<80% and/or oedema)	(26) 4.6 % (2.7 - 7.6 95% C.I.)
Prevalence of moderate acute malnutrition (<80% and >= 70%, no oedema)	(21) 3.7 % (2.2 - 6.3 95% C.I.)
Prevalence of severe acute malnutrition (<70% and/or oedema)	(5) 0.9 % (0.3 - 2.5 95% C.I.)

Table 3.6: 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	128	0	0.0	7	5.5	121	94.5	0	0.0
18-29	146	0	0.0	6	4.1	139	95.2	1	0.7
30-41	136	0	0.0	1	0.7	135	99.3	0	0.0
42-53	120	3	2.5	3	2.5	114	95.0	0	0.0
54-59	37	1	2.7	4	10.8	32	86.5	0	0.0

Total	567	4	0.7	21	3.7	541	95.4	1	0.2

Table 3.7: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 567	**Boys** n = 277	**Girls** n = 290
Prevalence of underweight (<-2 z-score)	(140) 24.7 % (21.1 - 28.7 95% C.I.)	(75) 27.1 % (21.5 - 33.4 95% C.I.)	(65) 22.4 % (18.6 - 26.8 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(123) 21.7 % (18.8 - 24.9 95% C.I.)	(61) 22.0 % (17.4 - 27.5 95% C.I.)	(62) 21.4 % (17.6 - 25.7 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(17) 3.0 % (1.8 - 4.9 95% C.I.)	(14) 5.1 % (2.8 - 8.8 95% C.I.)	(3) 1.0 % (0.3 - 3.3 95% C.I.)

Table 3.8: 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	130	5	3.8	22	16.9	103	79.2	0	0.0
18-29	146	4	2.7	29	19.9	113	77.4	1	0.7
30-41	136	3	2.2	27	19.9	106	77.9	0	0.0
42-53	117	1	0.9	37	31.6	79	67.5	0	0.0
54-59	38	4	10.5	8	21.1	26	68.4	0	0.0
Total	567	17	3.0	123	21.7	427	75.3	1	0.2

Table 3.9: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 562	**Boys** n = 274	**Girls** n = 288
Prevalence of stunting (<-2 z-score)	(121) 21.5 % (17.9 - 25.6 95% C.I.)	(66) 24.1 % (18.5 - 30.7 95% C.I.)	(55) 19.1 % (14.5 - 24.7 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(94) 16.7 % (13.7 - 20.3 95% C.I.)	(54) 19.7 % (15.2 - 25.1 95% C.I.)	(40) 13.9 % (9.9 - 19.1 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(27) 4.8 % (3.4 - 6.8 95% C.I.)	(12) 4.4 % (2.4 - 8.0 95% C.I.)	(15) 5.2 % (3.2 - 8.5 95% C.I.)

Table 3.10: Prevalence of stunting by age based on height-for-age z-scores

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

				z-score)			
Age (mo)	**Tota l no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	131	2	1.5	24	18.3	105	80.2
18-29	142	8	5.6	22	15.5	112	78.9
30-41	135	9	6.7	24	17.8	102	75.6
42-53	118	5	4.2	21	17.8	92	78.0
54-59	36	3	8.3	3	8.3	30	83.3
Total	562	27	4.8	94	16.7	441	78.5

Table 3.11: Prevalence of overweight based on weight for height cut off's and by sex (no oedema)

	All n = 567	**Boys** n = 277	**Girls** n = 290
Prevalence of overweight (WHZ > 2)	(1) 0.2 % (0.0 - 1.3 95% C.I.)	(1) 0.4 % (0.0 - 2.7 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 3.12: Prevalence of overweight by age, based on weight for height (no oedema)

		Overweight (WHZ > 2)		**Severe Overweight (WHZ > 3)**	
Age (mo)	**Tota l no.**	**No.**	**%**	**No.**	**%**
6-17	128	1	0.8	0	0.0
18-29	146	0	0.0	0	0.0
30-41	136	0	0.0	0	0.0
42-53	120	0	0.0	0	0.0
54-59	37	0	0.0	0	0.0
Total	567	1	0.2	0	0.0

Table 3.13: 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	566	-0.85±0.88	1.28	1	6
Weight-for-Age	567	-1.41±0.90	1.06	1	5
Height-for-Age	562	-1.19±1.05	1.20	0	11

* contains for WHZ and WAZ the children with edema.