TURKANA SMART NUTRITION SURVEYS

FINAL REPORT

January 2017

ACKNOWLEDGEMENT

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LIST OF ABBREVIATION

1	ARI	Acute Respiratory Infections
2	ASAL	Arid and Semi-Arid Lands
3	CHWs	Community Health Workers
4	CI	Confidence interval
5	CMAM	Community Management of acute Malnutrition
6	CMR	Crude Mortality Rate
7	CSB	Corn Soy Blend
8	DD	Dietary Diversity
9	DHMT	District Health Management Team
10	DMB	Drought Management Bulletin
11	SCNO	Sub County Nutrition Officer
12	DoL	Diocese of Lodwar
13	ENA	Emergency Nutrition Assessment
14	EPI	Expanded Program on Immunizations
15	EWS	Early Warning System
16	FEWSNET	Famine Early Warning Systems Network
17	FCS	Food Consumption Score
18	FFA	Food For Asset
19	GFD	General Food Distribution
20	GoK	Government of Kenya
21	HH	Household
22	HiNi	High Impact Nutrition Interventions
23	HNDU	Human Nutrition and Dietetics Unit
24	IMAM	Integrated Management of Acute Malnutrition
25	IPC	Integrated Food Security Phase Classification
26	KEPI	Kenya Expanded Programme of Immunisation
27	KFSSG	Kenya Food Security Steering Group
28	NDMA	National Drought Management Authority
29	OJT	On The Job Training
30	OPV	Oral polio Vaccine
31	ORS	Oral Rehydration Solution
32	OTP	Outpatient Therapeutic Programme
33	PLW	Pregnant and Lactating Women
34	PPS	Probability proportional to size
35	SFP	Supplementary Feeding Programme
36	SMART	Standardized Monitoring and Assessment of Relief and Transitions
37	U5	Under Five Years Old
38	UMR	Under-five Mortality Rate
39	UNICEF	United Nations Children's Fund
40	WFP	World Food Programme
41	WHO-GS	World Health Organisation Growth Standards
42	WFH	Weight for Height

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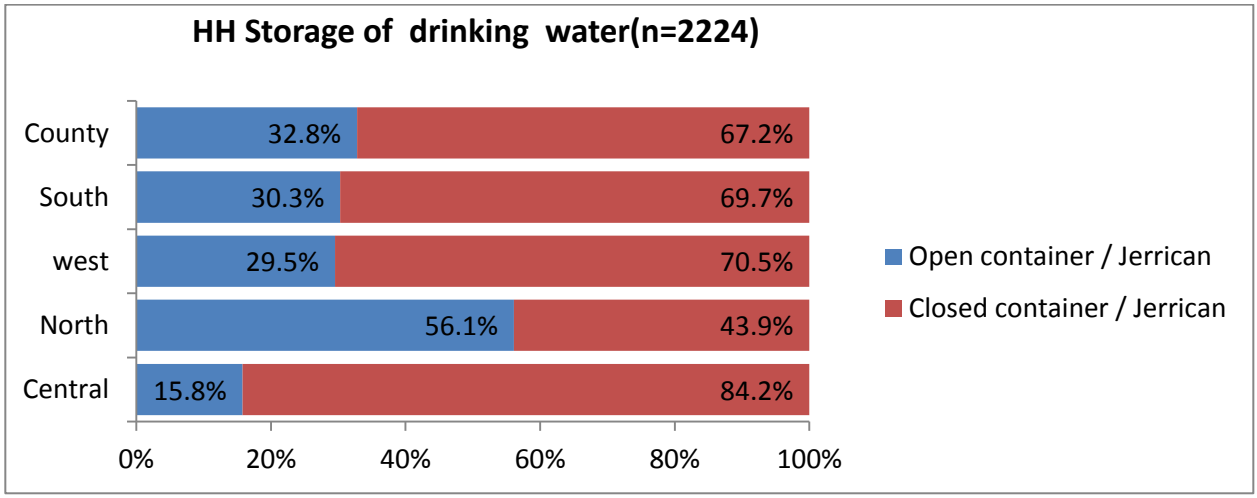

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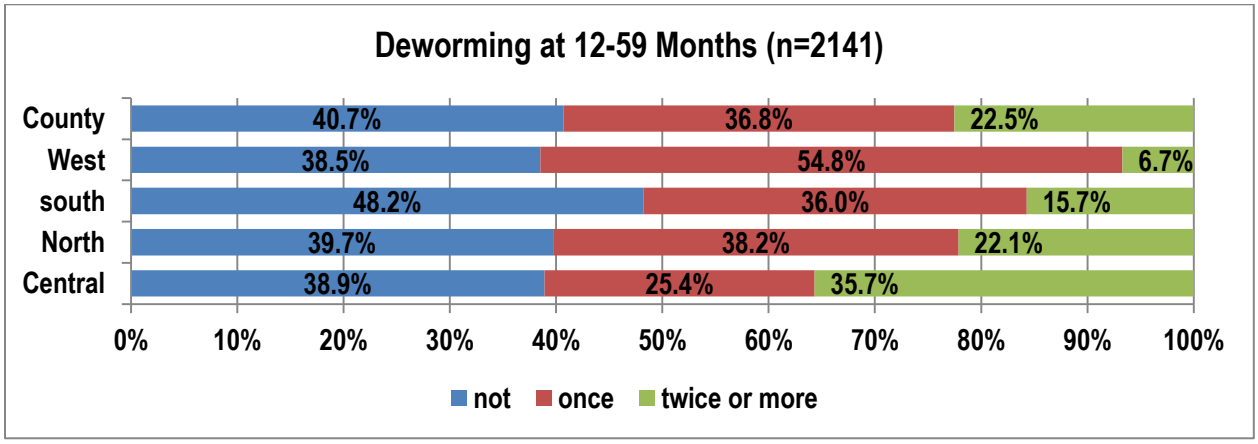

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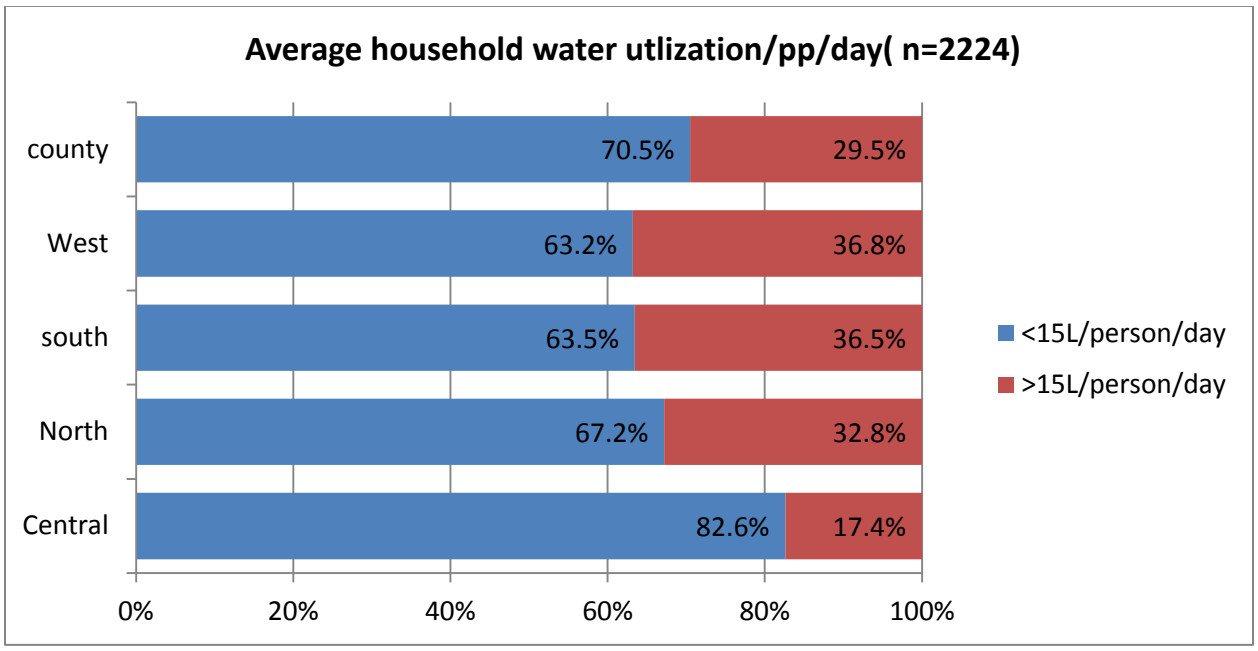

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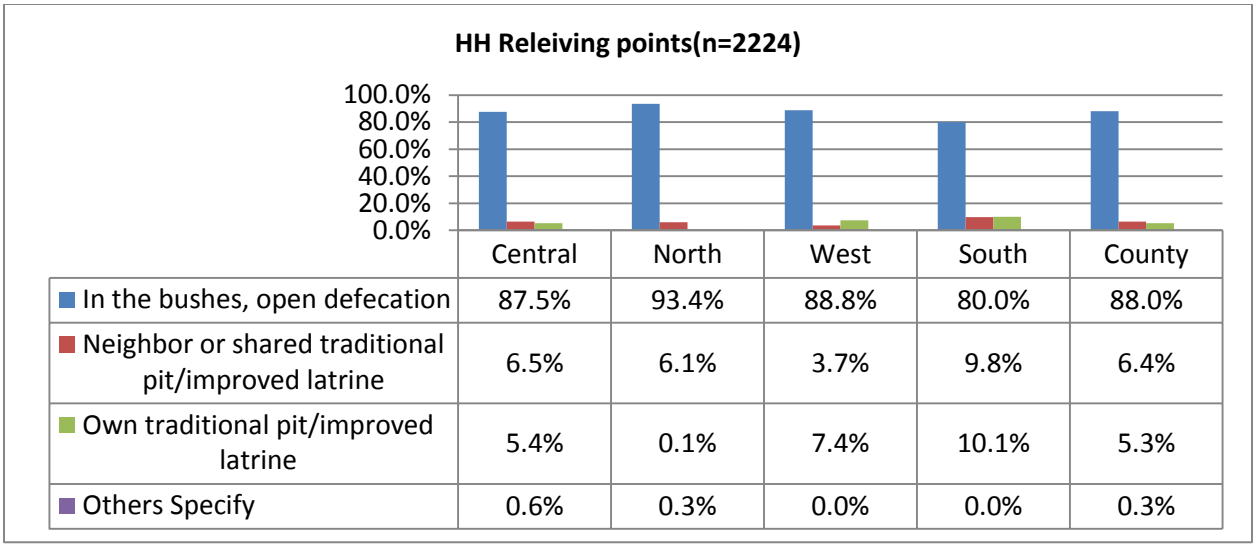

	Central	North	West	South	County
In the bushes, open defecation	87.5%	93.4%	88.8%	80.0%	88.0%
Neighbor or shared traditional pit/improved latrine	6.5%	6.1%	3.7%	9.8%	6.4%
Own traditional pit/improved latrine	5.4%	0.1%	7.4%	10.1%	5.3%
Others Specify	0.6%	0.3%	0.0%	0.0%	0.3%

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EXECUTIVE SUMMARY

Turkana County department of health in collaboration with nutrition partners (NDMA, KRCS,WFP,UNICEF, Save the Children International,) successfully conducted Four independent SMART surveys concurrently in January 2017 covering the entire county. This ensured all the livelihood zones in the county (pastoral, agro-pastoral and formal employment/business/petty trade) were covered. The survey zones included Turkana Central (Central and Loima sub counties), Turkana North (North and Kibish sub counties), Turkana South (South and East sub counties) and Turkana West (West Sub County).

The main goal of the survey was to determine the prevalence of malnutrition among children aged 6-59 months old and women of reproductive age (WRA) in Turkana County.

The specific objectives of the survey were;

1. To determine the prevalence of acute malnutrition among under five year old children and women of reproductive age
2. To determine the immunization coverage for measles, Oral Polio Vaccines (OPV 1 and 3), and vitamin A supplementation in children aged 6-59 months;
3. To estimate coverage of iron / folic acid supplementation during pregnancy in women of reproductive age
4. To determine de-worming coverage for children aged 12 to 59 months;
5. To determine the prevalence of common illnesses;
6. To collect information on possible underlying causes of malnutrition such as household food security, water, sanitation, and hygiene practices.

Standardized Monitoring Assessment for Relief and Transition (SMART) Method was used to conduct the surveys. The methodology is a cross sectional design. A three stage sampling process was used in this survey. The first stage involved sampling of sub locations (clusters) from a sampling frame using ENA for SMART software (July 9 , 2015 version).The second stage sampling involved segmentation of the sampled sub locations to identify villages to be sampled. In the third stage, households were selected randomly upon getting the updated list of households in the village. Household was used as the basic sampling unit. Standard SMART questionnaire in Open Data Kit (ODK) collect installed in android tablets was used to collect data. The data was uploaded in ODK aggregate servers (courtesy of Save the Children) from the tablets and downloaded daily for plausibility checks and at the end of the survey for data analysis. The data collection teams were provided with daily feedback on the quality of data collected the previous day.

A snapshot of results of this survey show that Turkana North and Kibish at a GAM rate of 30.7% are in **a Very Critical Nutrition situation** (phase 5; Global Acute Malnutrition ≥ 30 percent). A **Critical Nutrition Situation** (Phase 4; GAM WHZ 15.0 -29.9 percent) is represented in Turkana South, West and Central, all with a GAM ranging from 15.3% IN West and 25.9% in Central despite the slight but insignificant improvement in the nutrition situation in Turkana south. Household food security status has also deteriorated significantly across the county. More than 75% of the women consumed food from less than five food groups out of 10 and the mean coping strategy index has significantly increased across the four survey zones with Turkana Central and North leading. In general the Coping strategy index increased from 21.9 in June 2016 to 27.2 in February 2017. Additionally, sanitation is very poor as 9 in 10 households reported to practicing open defecation and just 1 in 10 wash their hands at four critical times. Below are a summary of the recommendations from this survey

Table 1: Recommendations

No	Recommendation	Activity	By who	Timeline
1	Update and activate County nutrition contingency and response plans.	•Hold joint meeting to revise the contingency plans. •Ongoing quarterly review of the contingency plans.	MoH, NDMA and nutrition partners	Immediately
2	Support Nutrition mass screening in all malnutrition hot spots	•Map out hot spots areas. •Conduct mass screening	MOH,NDMA & Nutrition partners (UNICEF,WFP,IRC,SCI	Immediately

			,APHIA Timiza, World Relief	
3	Conduct integrated health and nutrition outreaches	•Map out sites for outreach support. •Conduct integrated health and nutrition outreaches	MOH,NDMA & Nutrition partners (UNICEF,WFP,IRC,SCI ,APHIA Timiza, World Relief	Immediately
4	Plan for BSFP to protect nutrition status of U5 &PLW	•Draft a costed BSFP strategy. •Mobilize resources for BSFP. •Implementation & monitoring of BSFP.	MOH and Partners	Immediately
5	Mobilize nutrition sensitive actors to provide food security and livelihood protection to vulnerable households	•Disseminate findings of the survey to the CSG. •Participate in the county response and planning meeting	MOH and H&N IPS	Immediately.

CHAPTER ONE

1.0 BACKGROUND INFORMATION

Turkana County is situated in the arid North-western region of the country. It shares international borders with Ethiopia, Sudan and Uganda and locally with Baringo, West Pokot and Samburu counties. The County has an estimated total population of 855,399[1] and cover an area of 77,000km^2. The County is divided into seven sub counties namely; Turkana Central, Loima, South, East, North, Kibish and West

According to National Drought Management Authority (NDMA), the County has four main livelihood zones. Nearly 60% of the population is considered pastoral, 20% agro pastoral, 12% fisher folks and 8% are in the urban/peri-urban formal and informal employments. The county has poverty index of 94% which contributes 3.13% on national poverty index. Turkana is constrained by the harsh environment, remoteness coupled with the poor infrastructure and low access to essential services in addition to other underlying causes of poverty that are experienced elsewhere in Kenya. It is classified among the Arid and semi-arid lands (ASAL).

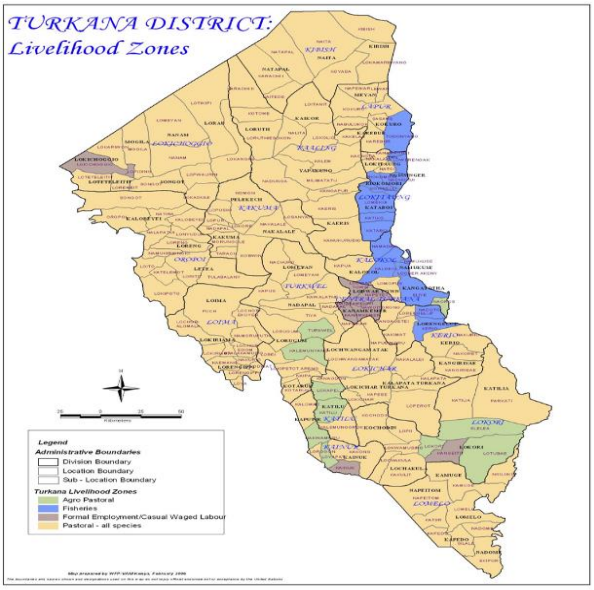


Figure 1: Map of Turkana County

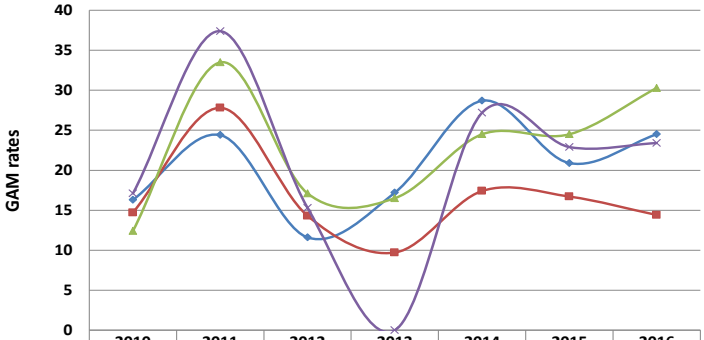
Being an ASAL county, Turkana is a drought prone area that experiences frequent, successive and prolonged drought and cattle rustling which leads to heavy losses of lives and livestock.

1.1 Food security situation

According to the December Drought Early Warning Bulletin by NDMA, Turkana County is currently in 'Alarm' early warning phase compared to the 'Alert' reported in November 2016. The vegetation Cover Index has declined from 26 in November 2016 to 18 in December 2016, this is below normal and Long term average. All the other indicators such as livestock migration pattern, water availability, animal body condition, terms of trade, Milk availability, and nutrition status are all off the mark from the normal averages. For instance, the average amount of rain received in the last 3 months is even below the minimum. If off season rains do not come, the county might move from the current Alarm to emergency at a fast pace. The food situation in the county in all livelihoods is: *Stressed (IPC Phase 2)*[2] indicating no change for the last three seasons (Including SRA February 2016 and LRA August 2015). Food security was affected by poor temporal distribution of the long rains, recurrent insecurity and conflicts over rangeland resources, locust infestation on forage in the pastoral livelihood zones in the north, low fish catch due to the fishing ban, pests in the agro-pastoral livelihood zones and flash floods that claimed some livestock. In 2016 the acreage under maize decreased by 34 percent compared to the long-term average (LTA) coupled with delayed provision of farm inputs (seeds) by the county government, delayed planting and pest infestation (the maize stalk-borer). Consequently, maize production is projected to decrease by 41 percent. In addition, the area under irrigated maize, sorghum and cowpeas (green leaf) decreased by 41, 22 and 13 percent respectively compared to the LTA. This is largely attributed to delayed support on farm inputs/seeds and destroyed/silted irrigation schemes. The projected production of the three crops is expected to decline by 41, 46 and 26 percent respectively compared to the LTA[3]

[1] Kenya National Bureau of Statistics (KNBS) 2009 Census Report
[2] LRA 2016 Turkana County
[3] LRA 2016 Turkana County

A series of nutrition SMART Surveys were conducted in **June 2016 in the four sub counties of Turkana as part of the routine surveillance system and reported a *Very Critical* Nutrition Situation (>20% Global Acute Malnutrition (GAM)) with Turkana South, Central and North being the most affected.** While this is not a statistically significant deterioration from 2015, both the 2015 and 2016 point estimates of Acute Malnutrition have been on the rise over the last 3 seasons. This is more so in the **Turkana South and Central** sub counties inspite of significantly improving food security conditions.

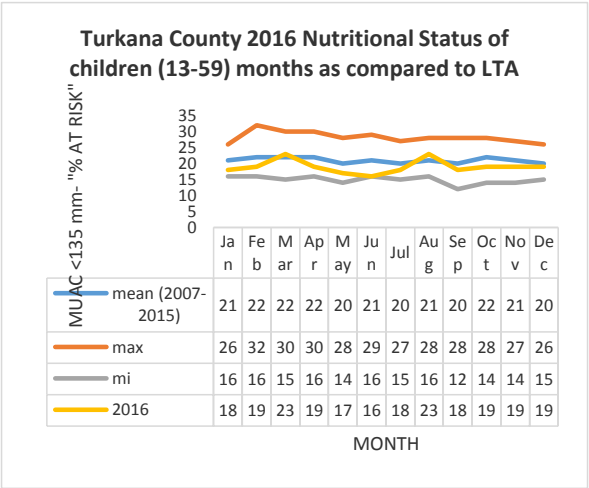


	2010	2011	2012	2013	2014	2015	2016
Central	16.3	24.4	11.6	17.2	28.7	20.9	24.5
west	14.7	27.8	14.3	9.7	17.4	16.7	14.4
South	12.4	33.5	17.1	16.5	24.5	24.5	30.3
North	17.1	37.4	15.3	0	27.2	22.9	23.4

The levels of acute malnutrition have varied in severity across the four sub counties of Turkana since the severe drought in 2011 based on the most recent nutrition SMART surveys conducted as illustrated above in **Figure 3: Trends of Acute Malnutrition in Turkana County** have all exceeded the emergency thresholds of 15% GAM over the last 5 years. This again highlights **no obvious recovery from the persistent shocks including drought, floods, and conflict that the communities are faced regularly with, thus illustrating very high levels of chronic vulnerability**.

The major drivers of the high levels of acute malnutrition in the county remain chronic food insecurity, poor dietary diversity, suboptimal child care and feeding practices including poor hygiene and sanitation, low access to essential health and nutrition services, as well as insecurity which directly influence access to basic quality services. The June 2016 survey again highlighted the specific vulnerabilities related to hygiene and sanitation with less than 15% of the respondents practising hand washing at four critical times and over 75% practicing open defecation.

NDMA surveillance bulleting December 2016 indicates the proportion of children at risk of malnourished whose Mid Upper Circumference (MUAC) measurement below 135 mm remained constant for the last 3 months at 19%.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
mean (2007-2015)	21	22	22	22	20	21	20	21	20	22	21	20
max	26	32	30	30	28	29	27	28	28	28	27	26
mi	16	16	15	16	14	16	15	16	12	14	14	15
2016	18	19	23	19	17	16	18	23	18	19	19	19

1.2 Humanitarian and Development partners

Many agencies, UN and NGOs are working in collaboration with the Ministry of Health (MoH) in offering child survival interventions. The main responsibility of MoH is to provide quality services and conduct quality assurance of the nutrition and health- related activities through effective coordination, supportive supervision and enforcement of set standards and regulations. The NGOs implementing health and nutrition programs include:

1. Save the Children International (SCI),
2. APHIA PLUS IMARISHA/Timiza,
3. International Livestock Research Institute (ILRI),
4. Global Alliance in Nutrition (GAIN) and,
5. Elizabeth Glaser Pediatric Aids Foundation (EGPAF).

Operational partners (Providing, supplies, financial and technical support etc.) include:

i. UNICEF supports Nutrition, Health, Education, WASH, Communication for Development and Child Protection programs
ii. World Food Programme (WFP) provides Food for Assets (FFA) and SFP food commodities.
iii. Child fund, OXFAM and Turkana Relief program implement FFA and Cash transfer.
iv. Kenya Red Cross support emergency response including Nutrition, WASH and livelihood project
v. Other agencies implementing resilience and livelihood projects are FAO, ADESO, DoL, APHIA PLUS Imarisha and IOM

1.3 Main Objective

The overall goal of the survey was to determine the prevalence of malnutrition among the children aged 6- 59 months old and women of reproductive age in Turkana County.

1.4 Specific Objectives

1. To determine the prevalence of acute malnutrition among under five year old children and women of reproductive age (WRA);
2. To determine the immunization coverage for measles, Oral Polio Vaccines (OPV 1 and 3), and vitamin A supplementation in children aged 6-59 months;
3. To estimate coverage of Iron / Folic acid supplementation during pregnancy in women of reproductive age
4. To determine de-worming coverage for children aged 12 to 59 months;
5. To determine the prevalence of common illnesses;
6. To collect information on possible underlying causes of malnutrition such as household food security, water, sanitation, and hygiene practices.

1.5 Timing of Turkana SMART surveys

The surveys were conducted in January 2017 towards the end of short rains season following an alarming prognosis progression of key food and nutrition indicators towards a drought triggered emergency. It was purposively conducted just before Short Rains assessment (SRA) to inform the SRA and analysis.

Table 1: Turkana Seasonal Calendar

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry Season			Long Rain			Dry Cool Season			Short Rains		

1.6 Survey Area

Four independent surveys were conducted to cover all the livelihood zones (pastoral, agro-pastoral and formal employment/business/petty trade) and administrative boundaries of Turkana County. The survey zones are summarised in table 4 below;

Table 2:Turkana County survey zones

No	Survey Zone	Administrative Sub counties
1	Turkana Central	Central and Loima
2	Turkana North	North and Kibish

3	Turkana West	West
4	Turkana South	South and East

CHAPTER TWO

2.0 METHODOLOGY

The SMART Method was used to conduct the survey in planning, training, data entry and analysis. Other data sets collected concurrently included data on Water Sanitation and Hygiene (WASH) and Food security and livelihood (FSL).The entire exercise was done in consideration with all guidelines as stipulated by the MoH at county and national level. The survey methodology was presented to the County Steering Group (CSG) and National Nutrition Information Working Group (NIWG) for validation before commencement of data collection.

2.1 Sample size calculation

The Sample size was determined using ENA for SMART software (9th July 2015). The table below outlines factors considered when determining the sample size calculation

Table 3:Sample size calculation

	Central	North	South	West	Rationale
Estimated prevalence of GAM	[4]29.4	[5]28.1%	[6]34.1%	[7]18.1%	NDMA December 2016 bulletin indicated an alarm situation in all livelihood zones with a worsening trend across the county.
±Desired precision	5%	5%	5%	4%	Limits of CI doesn't influence decision making/control quality hence reduce bias and previous survey values
Design effect	[8]1.6	[9]1.5	[10]1.6	[11]1.5	Rule of thumb/slight variations among clusters and previous survey results
Average household size	6	6	6	6	KNBS Census report 2010 and previous survey results
Percent of under five children	15.2%	15.2%	15.2%	15.2%	KNBS Census report 2010
Percent of non-respondent	2%	2%	2%	2%	This is the anticipated non response based on the previous surveys experience
Households to be included	614	609	674	501	
Children to be included	494	490	542	403	

[4] SMART survey June 2016 - **24.5 %** (20.2 – 29.4 CI)
[5] SMART survey June 2016 - 23.4 **%** (19.4 – 28.1 CI)
[6] SMART survey June 2016 - 30.3**% (**26.7 – 34.1 CI)
[7] SMART survey June 2016 - 14.4 % (11.1– 18.5 CI)

[8] Previous surveys values
[9] Rule of thumb/Slight cluster variations and previous survey values
[10] Due to the slight differences in the means of livelihood
[11] Based on the heterogeneity of the villages(clusters) and previous survey values

Number of clusters	41	41	45	34	

2.2 Sampling method

A three stage sampling process was used in this survey. The first stage involved sampling of sub locations (clusters) from a sampling frame using ENA for SMART software (9th July 2015 version).The second stage sampling involved segmentation of the sampled sub locations using the estimated populations provided by the chief/sub chief to identify the villages to be sampled. In the third stage, households were selected randomly upon getting the updated list of households in the village provided by the village elder. Taking into account the time spent on travelling to each household, introductions and breaks, 16 households were sampled per cluster. Table 6 shows a summary of the actual number of sampled clusters, households and children per survey zone

Table 4:Sampled number of Clusters, Households and Children

Survey Zone	Number of Clusters	No of Households	No. of children sampled
Turkana Central	39	691	556
Turkana North	35	630	507
Turkana South	33	399	321
Turkana West	32	470	378

Selection of the households

The definition of a household was a shelter or more whose residents ate from the same "cooking pot". Households to be surveyed were selected randomly using the updated list of households in the selected village/segment.

Selection of children for anthropometry

All children between 6-59 months of age staying in the selected household were included in the sample. The respondent was the primary care giver of the index child/children. If a child and/or the caregiver were temporarily absent, then the survey team re-visited the household to collect the data at an appropriate time.

Selection of women for determination of nutritional status

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

2.3 Survey team

The survey was coordinated by the County Nutrition Coordinator and supervised by four Sub County Nutrition Officers. The team was supported by officers from Save the Children, the Human Nutrition and Dietetics Unit-National MoH), WFP and UNICEF. The survey was undertaken by 5 teams in each survey zone. Each team comprised of 2 enumerators and 1 team leader.

2.4 Survey team training

Supervisors training

The survey core team [from Health Management Team (HMT) and nutrition partners] was sensitized on supervisor's module for SMART for a day. The training was supported by 1 UNICEF technical advisor and representatives from nutrition implementing partners.

Enumerators training

A four-days training was conducted before the commencement of the survey. The training focused on the objectives of the survey, survey questionnaire, interviewing techniques, anthropometric measurements, cluster and household selection. Role-plays on how to administer the questionnaire and record responses were conducted. 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 tablet 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. The anthropometric measurements from pre-testing were entered into the ENA for SMART software and a plausibility report developed for each team and this information was used to correct the teams' mistakes.

2.5 Data collection

Data collection took place concurrently in all the four survey zones. The data collection took 5-6 days; survey zones coordinators with support from implementing partners' officers supervised the teams throughout the data collection period. Teams administered the standardized questionnaire to the mother or primary caregiver. Each survey team explained the purpose of the survey and issues of confidentiality and obtained verbal consent before proceeding with the interview. The teams used ODK questionnaire in tablets to record the responses. The data was uploaded to Save the Children servers at the end of each day. Anthropometry data was downloaded daily, reviewed/analyzed for plausibility and feedback provided to the teams. Feedback was provided through use of daily customized scorecards.

2.6 Variables Measured

Age: The exact age of the child was recorded in months. Calendar of events, health or baptismal cards and birth certificates were used to determine age.

Weight: Children were measured using a digital weighing scale

Height: Recumbent length was taken for children less than 87 cm or less than 2 years of age while height measured for those greater or equal to 87 cm or more than 2 years of age.

MUAC: Mid Upper Arm Circumference (MUAC) was measured on the left arm, at the middle point between the elbow and the shoulder, while the arm was relaxed and hanging by the body's side. MUAC was measured to the nearest cm. MUAC measurements were taken for children 6-59 months of age and for women in the reproductive age (15-45 years of age).

Bilateral oedema: Assessed by the application of normal thumb pressure for at least 3 seconds to both feet/arms at the same time. The presence of a pit or depression on both feet/arms was recorded as oedema present and no pit or depression as oedema absent.

Morbidity: Information on two-week morbidity prevalence was collected by asking the mothers or caregivers if the index child had been ill in the two weeks preceding the survey and including the day of the survey. Illness was determined based on respondent's recall and was not verified by a clinician.

Immunization status: For all children 6-59 months, information on BCG, OPV1, OPV3 and measles vaccinations status was collected using health cards/mother-child booklets and recall from caregivers. When estimating measles coverage, only children 9 months of age or older were taken into consideration as they are the ones who were eligible for the vaccination.

Vitamin A supplementation status: For all children 6-59 months of age, information on Vitamin A supplementation in the 6 months prior to the survey date was collected using child health/Mother-Child booklets and immunization campaign cards and recall from caregivers.

Iron-Folic Acid supplementation: For all female caregivers, information was collected on IFA supplementation and number of days (period) they took IFA supplements in the pregnancy of the last birth that was within 24 months of this survey.

De-worming status: Information was solicited from the caregivers as to whether children 12-59 months of age had received de-worming tablets or not in the previous one year. This information was verified by health card where available.

Food security status of the households: Food consumption score, Minimum dietary diversity score women source of predominant foods and coping strategies data was collected.

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: Data on household access and ownership to a toilet/latrine, occasions when the respondents wash their hands were also obtained.

Mosquito nets ownership and utilization: Data on the household ownership of mosquito nets and their utilisation was collected

Minimum dietary diversity score women (MDD-W): A 24 hour food consumption recall was administered to all women of reproductive Age (15-49 years).All foods consumed in the last 24 hours were enumerated for analysis. All food items were combined to form 10 defined food groups and all women consuming more at least five of the ten food groups were considered to meet the MDD-W.

Household food consumption score (FCS). Data on the frequency of consumption of different food groups consumed by a household during 7 days before the survey was collected. The Table below shows WFP corporate thresholds for FCS used to analyse the data.

Table 5: WFP corporate FCS thresholds

Food Consumption Score	Profile
<21	Poor
21.5-35	Borderline
>35	Acceptable

Coping strategy index (CSI): Data on the frequency of the five reduced CSI individual coping behaviours was collected. The five standard coping strategies and their severity weightings used in the calculation of Coping Strategy Index are:

1. eating less-preferred foods (1.0),
2. borrowing food/money from friends and relatives (2.0),
3. limiting portions at mealtime (1.0),
4. limiting adult intake (3.0), and
5. reducing the number of meals per day (1.0)

CSI index per household was calculated by summing the product of each coping strategy weight and the frequency of its use in a week (no of days).

Nutrition Indicators

Nutritional Indicators for children 6-59 months of age

The following nutrition indicators were used to determine the nutritional status children under five years

Table 6: 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 the women for pregnant and lactating women: Cut off <21 cm was used for under nutrition

2.7 Data analysis

During supervision in the field, and at the end of each day, supervisors manually checked the tablet questionnaires for completeness, consistency and accuracy. This check was also used to provide feedback to the teams to improve data collection as the survey progressed. At the end of each day, and once supervisors had completed their checks, the tablets were each synchronized to the server and the data collected was uploaded, therefore there was no need for any further data entry. The SMART plausibility report was generated daily in order to identify any problems with anthropometric data collection such as flags and digit preference for age, height and weight, to improve the quality of the anthropometric data collected as the survey was on-going. Feedback was given to the teams every morning before the teams left for the field.

All data files were cleaned before analysis, although use of tablet reduced the amount of cleaning needed, as a number of restrictions were programmed in order to reduce data entry errors. Anthropometric data for children 6-59 months was cleaned and analysed using ENA for SMART software (9th July 2015) by the coordination team. The nutritional indices were cleaned using SMART flags in the ENA for SMART software. Weighting of the sub county results was done in order to obtain county estimate. Table 9 summarises other criterion that was used for exclusion.

Table 7:Definition of boundaries for exclusion

1. If sex is missing the observation was excluded from analysis.
2. If Weight is missing, no WHZ and WAZ were calculated, and the programme derived only HAZ.
3. If Height is missing, no WHZ and HAZ were calculated, and the programme derived only WAZ.
5. For any child records with missing age (age in months) only WHZ was calculated.

6. If a child has oedema only his/her HAZ was calculated.

Additional data for children aged 6-59 months, women aged 15-49 years, WASH, and food security indicators were cleaned and analysed using SPSS and Microsoft excel.

2.8 Survey Limitations

1. There were inherent difficulties in determining the exact age of some children (even with use of the local calendar of events), as some health cards had erroneous information. This may have led to inaccuracies when analysing chronic malnutrition. Although verification of age was done by use of health cards, in some cases no exact date of birth was recorded on the card other than the date a child was first seen at the health facility or just the month of birth. Recall bias may have led to wrong age estimation which then could have ended up with wrong weight for age and height for age indices.
2. There was poor recording of vitamin A supplementation and de-worming in the health cards. Some of the mothers indicated that their children had received Vitamin A and de-worming while it was not recorded in the health cards.

2.9 Ethical considerations

Sufficient information was provided to the local authorities about the survey including the purpose and objectives of the survey, the nature of the data collection procedures, the target group, and survey procedures. Verbal consent was obtained from all adult participants and parents/caregivers of all eligible children in the survey. The decision of caregiver to participate or withdrawal was respected. Privacy and confidentiality of survey respondent and data was protected.

CHAPTER THREE: RESULTS & DICSUSSIONS

3.0 MATERNAL AND CHILD HEALTH & NUTRITION

3.1 . Child Health and Nutrition

Demographic results

Turkana county mean household size was 4.4 and the mean number of children 6-59 months old per household was 1.46. The sex ratio of male to female was 1.2 which is considered normal. Table 10 below shows a summary of household demography per survey zone.

Table 8: household demography per survey

Attribute	Central	North	South	West	County
Household Characteristics	n=703	n=622	n=416	n=484	n=2225
Mean household size	4.43	3.89	4.87	4.72	4.4
Total population	3118	2422	2029	2287	9856
Total children 6-59 months	814	726	430	492	2462
Total males children under 5	435	407	217	276	1335
Total female children U5	379	319	213	216	1127
Children U5 sex ratio boy: girl	1.1	1.3	1.0	1.3	1.2
Mean Children 6-59 month	1.47	1.43	1.5	1.44	1.46

Residency and marital Status

Out of the sampled household`s 99.0 % of them were residents of Turkana County. Turkana North had the highest number of IDPs at 2.9%. In addition 83.6% of the respondents were married and the Turkana central had the highest number of widowed caretakers at 10.2% of the respondent. Table 11 and 12 below shows a summary of caretakers' marital status per survey zone.

Table 9: Residency

		Residency			
		Resident	Refugee	IDP	Total
Central	Count	703	0	0	703
	% within Zone	100.0%	0.0%	0.0%	100.0%
North	Count	604	0	18	622
	% within Zone	97.1%	0.0%	2.9%	100.0%
south	Count	411	1	4	416
	% within Zone	98.8%	.2%	1.0%	100.0%
West	Count	484	0	0	484
	% within Zone	100.0%	0.0%	0.0%	100.0%
County	Count	2202	1	22	2225
	% within Zone	99.0%	.0%	1.0%	100.0%

Table 10: Summary of caretakers' marital status

		Marital Status of caregiver					
		Married	single	widowed	Divorced	Separated	Total
Central	Count	572	38	72	7	14	703
	% within Zone	81.4%	5.4%	10.2%	1.0%	2.0%	100.0%
North	Count	557	29	27	6	3	622
	% within Zone	89.5%	4.7%	4.3%	1.0%	.5%	100.0%
south	Count	331	33	34	8	10	416
	% within Zone	79.6%	7.9%	8.2%	1.9%	2.4%	100.0%
West	Count	399	33	46	4	2	484
	% within Zone	82.4%	6.8%	9.5%	.8%	.4%	100.0%
County	Count	1859	133	179	25	29	2225
	% within Zone	83.6%	6.0%	8.0%	1.1%	1.3%	100.0%

Anthropometry

Out of all sampled children in the County 75.3% of them had a health card, birth certificate/notification or baptism card and these were used to verify their age. Age determination for 24.7% of the children was based on recall, hence prone to bias. Table 14 below show the age verification means per survey zone.

Table 11:Summary of Children age verification means

		Age verification		
		Card	Recall	Total
Central	Count	617	197	814
	% within Zone	75.8%	24.2%	100.0%
North	Count	507	219	726
	% within Zone	69.8%	30.2%	100.0%
south	Count	348	82	430
	% within Zone	80.9%	19.1%	100.0%
West	Count	383	109	492
	% within Zone	77.8%	22.2%	100.0%
County	Count	1855	607	2462
	% within Zone	75.3%	24.7%	100.0%

Age and sex distribution of the sampled children

Generally there were younger children selected in the sample across all survey zones. As shown in table 15 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 12: Distribution of age and sex of sample

	Turkana Central		Turkana North		Turkana south		Turkana West		County	
AGE (months)	Total%	Ratio	Total %	Ratio	Total %	Ratio	Total %	Ratio	Total %	Ratio
6-17	24.8	1.1	25.5	1.0	32.6	0.7	30.9	1.3	27.6	1.0
18-29	25.7	1.2	26.0	1.3	24.4	1.4	28.7	1.4	26.2	1.3
30-41	23.8	1.1	22.6	1.3	20.2	1.1	18.7	1.1	21.8	1.2
42-53	21.1	1.2	19.7	1.5	16.3	1.3	16.5	1.3	18.9	1.3
54-59	4.5	1.2	6.2	1.5	6.5	0.8	5.3	1.4	5.5	1.2
Total	100.0	1.1	100.0	1.3	100.0	1.0	100.0	1.3	100.0	1.2

Prevalence of Acute Malnutrition

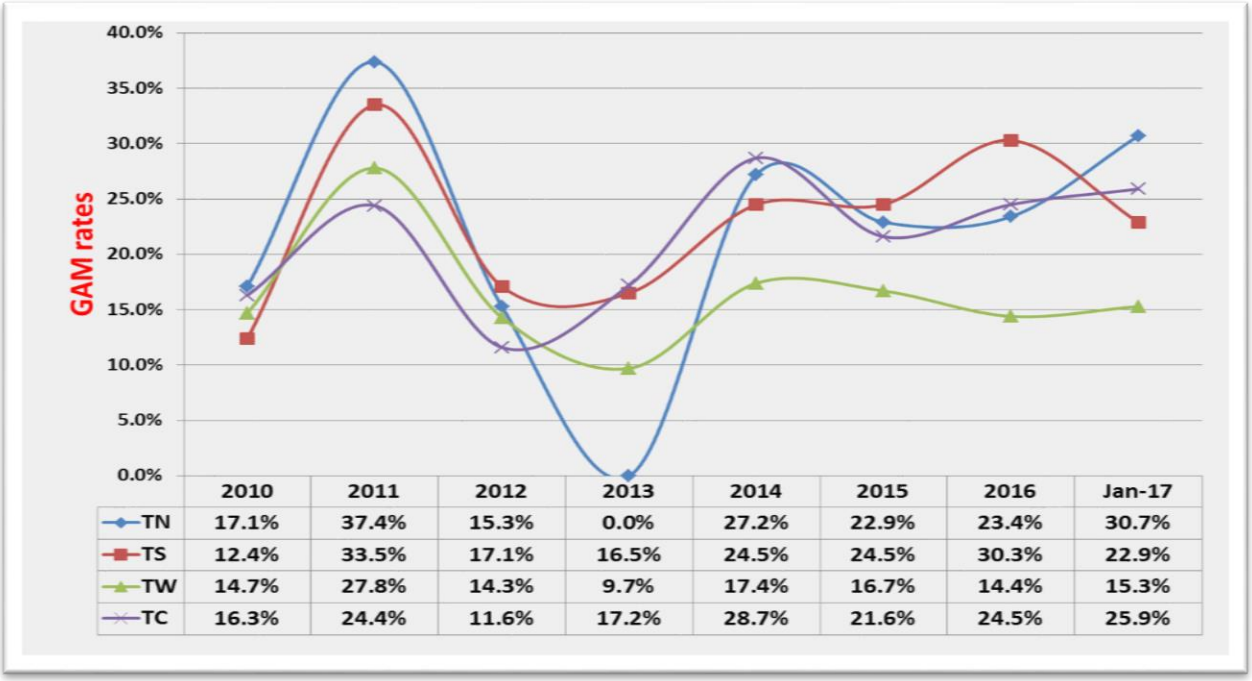
Acute malnutrition levels remain above emergency level with **very critical** levels in Turkana North at 30.7% while the nutrition situation in Turkana central, South and West is classified as **critical** with a GAM of 25.9%, 22.9% and 15.3% respectively**.** As shown in Table 16, there was no significant change of the nutrition situation in Turkana County from the same time last year. The weighted Global Acute Malnutrition (GAM) for Turkana County is 24.7% (22.7 - 26.8) which is an increase from the same time last year, albeit insignificant. These results estimate that about ***1 in 4 children is acutely malnourished***.

Table 13: **Prevalence of malnutrition weight-for-height z-scores (WHO Standards 2006)**

Indices	Central	North	South	West	County
Wasting (WHO 2006) Jan 2017	n=795	n=707	n=420	n=483	N=2408
Global Acute Malnutrition (GAM) –Jan 2017	25.9 % (21.7 - 30.6 95% C.I.)	(217) 30.7 % (26.6 - 35.1 95% C.I.)	(96) 22.9 % (18.4 - 28.0 95% C.I.)	(74) 15.3 % (11.5 - 20.2 95% C.I.)	(594) 24.7 % (22.7 - 26.8 95% C.I.)
Global Acute Malnutrition (GAM) -June 2016	(174)24.5% (20.2- 29.4)	(154)23.4% (19.4-28.1)	(249)30.3% (26.7-34.1)	(81)14.4% (11.1-18.5)	23.3% (21.1 – 25.5)
Severe Acute Malnutrition (SAM)-Jan 2017	(51) 6.4 % (4.4 - 9.2 95% C.I.)	(57) 8.1 % (6.0 - 10.7 95% C.I.)	(24) 5.7 % (3.7 - 8.7 95% C.I.)	(15) 3.1 % (1.6 - 5.9 95% C.I.)	(148) 6.1 % (5.1 - 7.4 95% C.I.)
Severe Acute Malnutrition (SAM)-June 2016	(40) 5.6% (4.2-7.5)	(27)4.1% (2.5-6.7)	(73)8.9% (7.1-11.0)	(10)1.8 (1.0-3.3)	5.3% (4.5-6.3)

The levels of acute malnutrition have varied in severity across the four survey zones of Turkana since the severe drought in 2011. Figure 2 below illustrates the changes in acute malnutrition over time per survey cluster, this further reveals persistently high GAM rates (exceeding WHO emergency thresholds of 15%) for over the last five years. This again highlights no obvious recovery from the persistent shocks from drought, floods, and conflict that the communities are faced with.

Figure 2: Trends of Global Acute Malnutrition in Turkana County (2010- January 2017)



	2010	2011	2012	2013	2014	2015	2016	Jan-17
TN	17.1%	37.4%	15.3%	0.0%	27.2%	22.9%	23.4%	30.7%
TS	12.4%	33.5%	17.1%	16.5%	24.5%	24.5%	30.3%	22.9%
TW	14.7%	27.8%	14.3%	9.7%	17.4%	16.7%	14.4%	15.3%
TC	16.3%	24.4%	11.6%	17.2%	28.7%	21.6%	24.5%	25.9%

NB: The results for 2009 which used a different methodology (LQAS) and 2013 Turkana North results that were not validated due data quality issues have not been captured.

3.1.2.1 Prevalence of acute malnutrition based on weight-for-height z-scores (and/or edema) and by sex

The proportion of boys malnourished was slightly higher than girls in all the 4 surveys zones. Table 17 below shows the prevalence of global acute malnutrition by sex per survey.

Table 14: **Prevalence of acute malnutrition based on weight-for-height z-scores (and/or edema) and by sex (95% Confidence interval)**

	Sex	Central N=795 M =425 ,F=370	North N=707 M =394,F=313	South N= 420 M =214, F=206	West n=483 M =271,F =212	County n= 2408 M= 1305 F=1103
Prevalence of global malnutrition (<-2 z- score and/or edema)	Boys	(124) 29.2 % (23.0 - 36.2 95% C.I.)	(134) 34.0 % (29.2 - 39.1 95% C.I.)	(61) 28.5 % (21.4 - 36.8 95% C.I.)	(47) 17.3 % (11.9 - 24.6 95% C.I.)	(365) 28.0 % (25.0 - 31.1 95% C.I.)
	Girls	(82) 22.2 % (17.8 - 27.2 95% C.I.)	(83) 26.5 % (20.7 - 33.2 95% C.I.)	(35) 17.0 % (13.0 - 21.9 95% C.I.)	(27) 12.7 % (8.9 - 18.0 95% C.I.)	(229) 20.8 % (17.9 - 23.9 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	Boys	(89) 20.9 % (16.5 - 26.2 95% C.I.)	(100) 25.4 % (20.9 - 30.4 95% C.I.)	(43) 20.1 % (14.9 - 26.6 95% C.I.)	(35) 12.9 % (9.0 - 18.1 95% C.I.)	(267) 20.5 % (18.2 - 22.9 95% C.I.)
	Girls	(66) 17.8 % (14.5 - 21.8 95% C.I.)	(60) 19.2 % (14.6 - 24.8 95% C.I.)	(29) 14.1 % (10.3 - 18.9 95% C.I.)	(24) 11.3 % (7.7 - 16.4 95% C.I.)	(179) 16.2 % (13.8 - 18.9 95% C.I.)

Prevalence of severe malnutrition (<-3 z-score and/or oedema)	Boys	(35) 8.2 % (5.6 - 12.0 95% C.I.)	(34) 8.6 % (6.2 - 11.8 95% C.I.)	18) 8.4 % (5.1 - 13.5 95% C.I.)	(12) 4.4 % (2.3 - 8.3 95% C.I.)	(98) 7.5 % (6.1 - 9.3 95% C.I.)
	Girls	(16) 4.3 % (2.6 - 7.2 95% C.I.)	(23) 7.3 % (4.4 - 12.0 95% C.I.)	(6) 2.9 % (1.4 - 6.1 95% C.I.)	(3) 1.4 % (0.3 - 5.8 95% C.I.)	(50) 4.5 % (3.4 - 6.0 95% C.I.)

3.1.2.2 Prevalence of acute malnutrition (wasting) by age based on weight-for-height Z-scores and or edema (WHO Standards 2006)

Table 15: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

Zone	Age (mths)	Total no.	Severe wasting (<-3 z-score)%	Moderate wasting (>= -3 and <-2 z-score)%	Normal (> = -2 z score)%	Oedema %
Central	**6-17**	194	4.1	18.0	77.8	0.0
	18-29	205	11.2	19.0	69.8	0.0
	30-41	190	5.8	19.5	74.7	0.0
	42-53	169	3.0	22.5	74.6	0.0
	54-59	37	10.8	16.2	73.0	0.0
	Total	795	6.4	19.5	74.1	0.0
North	**6-17**	178	5.6	15.2	79.2	0.0
	18-29	185	8.6	22.2	69.2	0.0
	30-41	159	6.9	22.0	71.1	0.0
	42-53	141	11.3	28.4	60.3	0.0
	54-59	44	9.1	38.6	52.3	0.0
	Total	707	8.1	22.6	69.3	0.0
South	**6-17**	135	4.4	20.0	75.6	0.0
	18-29	101	7.9	11.9	80.2	0.0
	30-41	87	3.4	20.7	75.9	0.0
	42-53	69	10.1	14.5	75.4	0.0
	54-59	28	0.0	17.9	82.1	0.0
	Total	420	5.7	17.1	77.1	0.0
West	**6-17**	149	3.4	9.4	87.2	0.0
	18-29	140	0.7	12.9	86.4	0.0
	30-41	90	3.3	10.0	86.7	0.0
	42-53	78	6.4	14.1	79.5	0.0
	54-59	26	3.8	26.9	69.2	0.0
	Total	483	3.1	12.2	84.7	0.0

Table 16: **Distribution of acute malnutrition and oedema based on weight-for-height z-score**

	Turkana Central		**Turkana North**		**Turkana South**		**Turkana west**		**County**	
Z-score	<-3	>=-3	<-3	>=-3	<-3	>=-3	<-3	>=-3	<-3	>=-3
	Maras kwash	Kwash	Maras kwash	Kwash	Maras kwash	Kwash	Maras kwash	Kwash	Maras kwash	Kwash

Oedema present	0 (0.0 %)	0 (0.0 %)	0 (0.0 %)	0 (0.0 %)	0 (0.0 %)	0 (0.0%)	0 (0.0 %)	0 (0.0 %)	1 (0.0 %)	0 (0.0 %)
Oedema absent	Maras	Not SAM	Maras	Not SAM	Maras	Not SAM	Maras	Not SAM	Maras	Not SAM
	62 (7.6 %)	752 (92.4 %)	65 (9.0 %)	661 (91.0 %)	30 (7.0 %)	400 (93.0 %)	22 (4.5 %)	470 (95.5 %)	179 (7.3 %)	2283 (92.7 %)

3.1.2.3 Prevalence of acute malnutrition based on MUAC

Compared to weight for height Z-scores, the mid-upper arm circumference (MUAC) is not a very sensitive indicator of acute malnutrition and tends to underestimate acute malnutrition for children below one year of age. It is, however, used as a rapid screening tool for admission into nutrition intervention programmes.

Generally, MUAC usually tends to indicate lower GAM levels compared to WFH z-scores. The prevalence of malnutrition using MUAC is significantly lower compared to using Weight for Height Z-scores. This could be associated with the physiology of this population in Turkana, similar to the Somali and South Sudanese, with a high cormic index[12].This means, overall significantly lower cases of malnourished children are identified using MUAC when compared to weight for height. Clearly, the results by MUAC only identified a third of children malnourished with Turkana North (10.3%) recording the highest GAM rate followed by Turkana south (8.8%) while SAM was highest in Turkana south (1.9%) followed by Turkana North (1.1%).The table 20 below summarizes prevalence of malnutrition by MUAC.

Table 17:Prevalence of Malnutrition based on MUAC per survey

Prevalence of Acute malnutrition MUAC	Central	North	South	West	County
2017 n	n=814	n=726	n=430	n=492	n=2462
2016 n	n=720	n=661	n=831	n=567	n=2462
Severe under nutrition (< 115 mm) –Jan 2017)	(7) 0.9 % (0.3 - 2.1 95% C.I.)	(8) 1.1 % (0.5 - 2.5 95% C.I.)	(8) 1.9 % (0.9 - 3.8 95% C.I.)	(3) 0.6 % (0.2 - 1.9 95% C.I.)	(26) 1.1 % (0.7 - 1.6 95% C.I.)
Severe under nutrition (< 115 mm) -June 2016)	(17) 2.4 % (1.3 - 4.2)	(10) 1.5 % (0.8 - 2.8)	(19) 2.3 % (1.2 - 4.4)	(7) 1.2 % (0.5 - 3.3)	(53) 1.9 % (1.3 - 2.7)
Moderate undernutrition (≥115–<125 mm)-Jan 2017)	(51) 6.3 % (3.9 - 10.0 95% C.I.)	(67) 9.2 % (6.4 - 13.2 95% C.I.)	(30) 7.0 % (4.5 - 10.7 95% C.I.)	(27) 5.5 % (3.4 - 8.7 95% C.I.)	(175) 7.1 % (5.8 - 8.7 95% C.I.)
Moderate undernutrition (≥115–<125 mm)-June 2016)	(45) 6.3 % (4.5 - 8.6)	(60) 9.1 % (6.5 - 12.6)	(68) 8.2 % (6.3 - 10.6	(41) 7.2 % (4.9 - 10.5)	(214) 7.7 % (6.5 - 9.1)
Global Acute Malnutrition (≤125 mm)-Jan 2017)	(58) 7.1 % (4.6 - 10.8 95% C.I.)	(75) 10.3 % (7.2 - 14.6 95% C.I.)	(38) 8.8 % (5.9 - 13.1 95% C.I.)	(30) 6.1 % (3.8 - 9.6 95% C.I.)	201) 8.2 % (6.7 - 9.9 95% C.I.)
Global Acute Malnutrition (≤125 mm)-June 2016)	62) 8.6 % (6.4 - 11.5)	(70) 10.6 % (7.6 - 14.6)	(87) 10.5 % (8.1 - 13.4	(48) 8.5 % (5.8 - 12.2)	(267) 9.6 % (8.2 - 11.3)

[12] The most common bivariate index of shape is the Cormic index, sitting height/ total height (SH/S). It is a measure of the relative length of the trunks or legs and varies between individuals and groups. If sitting height is held constant and leg length varied it produce a range of ratios from 0.48 to 0.55 within and between populations. This demonstrates that variations in SH/S found in or between different population groups may be associated with variations in BMI of some 5kg/m^2, with weight and composition being kept constant. The mean SH/S for European and Indo-Mediterranean populations is about 0.52. Africans have proportionally longer legs, in general, with ratios around 0.51 most notable Somali, Sudanese and Turkana populations with even higher ratios. Asian and Far Eastern populations have proportionally shorter legs and means of 0.53-0.54. However, there is considerable variation within populations and within these major groupings

Prevalence of underweight

The weight-for-age (WFA) index provides a composite measure of wasting and stunting and is commonly used to monitor the growth of individual children in Mother-child booklet since it enables mothers to easily visualise the trend of their children's increase in weight against age. A low WFA is referred to as underweight. Turkana North had the highest prevalence of underweight (35.0%) followed by Turkana south (34.8%) and Turkana central (33.1%) respectively, as illustrated in the table 21 below.

Table 18: Prevalence of underweight

Underweight (WHO 2006)	Central	North	South	West	County
2017	n=801	n=719	n=425	n=489	n=2430
2016	n=771	n=653	n=821	n=563	n=2718
Prevalence of global underweight –Jan 2017)	(265) 33.1 % (28.7 - 37.8 95% C.I.)	(252) 35.0 % (29.4 - 41.2 95% C.I.)	(148) 34.8 % (30.1 - 39.9 95% C.I.)	(114) 23.3 % (19.1 - 28.2 95% C.I.)	(778) 32.0 % (29.6 - 34.5 95% C.I.)
Prevalence of global underweight -June 2016)	(241) 33.9 % (29.6 - 38.4)	(201) 30.8 % (25.6 - 36.5)	366) 44.6 % (40.4 - 48.8)	(157) 27.9 % (23.1 - 33.2)	(943) 34.7% (32.1 - 37.4)
Prevalence of severe underweight –Jan 2017)	(78) 9.7 % (7.5 - 12.6 95% C.I.)	(71) 9.9 % (7.4 - 13.1 95% C.I.)	(44) 10.4 % (7.8 - 13.6 95% C.I.)	(33) 6.7 % (4.4 - 10.3 95% C.I.)	(225) 9.3 % (7.9 - 10.8 95% C.I.)
Prevalence of severe underweight -June 2016)	(71) 10.0 % (7.3 - 13.5)	(59) 9.0 % (6.7 - 12.1)	(146) 17.8 % (14.6 - 21.4)	(34) 6.0 % (3.8 - 9.5)	(297)10.9% (9.5 - 12.4)

Prevalence of stunting

Height for age (stunting) is an indicator of chronic (long-term) malnutrition arising from deprivation related to persistent /chronic poor food security situation, micronutrient deficiencies, recurrent illnesses and other factors which interrupt normal growth. Unlike wasting, it is not affected by seasonality but is rather related to the long-term effects of socio-economic development and long-standing food insecurity situation. A low height-for-age reflects deficits in linear growth and is referred to as stunting. Results below show no major change in the level of stunting across the county which remain above 20%.

Table 19:Prevalence of Stunting

Stunting (WHO 2006)	Central	North	South	West	County
2017	n=772	n=677	n=409	n=477	n=2332
2016	n=688	n=633	n=813	n=557	n=2691
Prevalence of global stunting (<-2 z-score) Jan 2017	(176) 22.8 % (19.7 - 26.3 95% C.I.)	(158) 23.3 % (18.9 - 28.4 95% C.I.)	(112) 27.4 % (22.2 - 33.3 95% C.I.)	(96) 20.1 % (16.4 - 24.5 95% C.I.)	(541) 23.2 % (21.5 - 25.0 95% C.I.)
Prevalence of global stunting (<-2 z-score) June 2016	(187) 27.2 % (22.4 - 32.5)	(159) 25.1 % (20.9 - 29.9)	(273)33.6% (29.3 -38.1)	(144) 25.9 % (21.3 - 31.0)	(763)28.2% (25.7 - 30.9)
Prevalence of severe stunting (<-3 z-score)-Jan 2017	(41) 5.3 % (3.9 - 7.2 95% C.I.)	(49) 7.2 % (5.0 - 10.3 95% C.I.)	(30) 7.3 % (5.5 - 9.8 95% C.I.)	(23) 4.8 % (3.4 - 6.8 95% C.I.)	(142) 6.1 % (5.1 - 7.3 95% C.I.)
Prevalence of severe stunting (<-3 z-score)-June 2016	(56) 8.1 % (5.4 - 12.1)	(41) 6.5 % (4.7 - 8.9)	(85) 10.5 % (7.8 - 13.9)	(36) 6.5 % (4.5 - 9.1)	(218)8.0% (6.7 - 9.4)

Children's Morbidity and Health Seeking Behavior

According to UNICEF conceptual framework on causes of malnutrition, disease is an immediate cause of malnutrition. It also affects food intake which is also categorized as an immediate cause. It is important therefore to assess morbidity and whether it had some effect on malnutrition.

3.1.2.4 Child Morbidity

To assess child morbidity mothers/caregivers of children aged 6 to 59 months were asked to recall whether their children had been sick in the past 2 weeks. Those who gave an affirmative answer to this question were further probed on what illness affected their children and whether and where they sought any assistance when their child/children were ill. Those who indicated that their child/children suffered from watery diarrhea were probed on the kind of treatment that was given to them.

From the assessment, a third of the assessed children were reportedly sick in the past two weeks prior to the survey .Figure 23 below summarizes the proportion of children sick and those who sought assistance per survey zone.

Table 20: Children ill

	Central	North	South	West	County
n	**814**	**726**	**430**	**492**	**2462**
No	69.16%(563)	78.93% (573)	67.44%(290)	57.11%(281)	69.33% (1707)
Yes	30.84%(251)	21.07%(153)	32.56% (140)	42.89%(211)	30.66%(755)

Among those who were sick in the county, majority (61.59%) were affected by acute respiratory infection (ARI)/Cough especially in the North, a common ailment during the dry spell. Fever chills like malaria affected 50.99%, while 16.42% suffered from watery diarrhea. Other morbidities reported included skin infections, eye and ear infections. Table 24 below summarizes prevalence of child morbidity.

Table 21:Prevalence of child morbidity 2 weeks prior to the survey

	Central	North	South	West	County
n	**251**	**153**	**140**	**211**	**755**
Fever with chill like malaria	56.67% (142)	36.6%(56)	42.86 %(60)	60.19%(127)	50.99%(355)
ARI/Cough	72.91% (183)	60.13%(92)	74.29%(104)	40.76%(86)	61.59%(465)
watery diarrhoea	13.94% (35)	11.76%(18)	25.71%(36)	16.59%(35)	16.42%(124)
bloody diarrhoea	1.20% (3)	0.65%(1)	0%(0)	0%(0)	0.53%(4)
Others	6.77 %(17)	1.96%(3)	4.29%(6)	4.74%(10)	4.77%(36)

3.1.2.5 Therapeutic Zinc Supplementation during Watery Diarrhea Episodes

Based on compelling evidence from efficacy studies that zinc supplementation reduces the duration and severity of diarrhea, in 2004 WHO and UNICEF recommended incorporating zinc supplementation (20 mg/day for 10-14 days for children 6 months and older, 10 mg/day for children under 6 months of age) as an adjunct treatment to low osmolality oral rehydration

salts (ORS), and continuing child feeding for managing acute diarrhea[13]. Kenya has adopted these recommendations. According to Kenyan policy guideline on control and management of diarrheal diseases in children below five years in Kenya, all under-fives with diarrhea should be given zinc supplements as soon as possible.

The survey sought to establish the number of children who suffered from watery diarrhea and supplemented with zinc. 72.6% of those who suffered from watery diarrhea were supplemented with zinc as indicated in the table below. Results show a significant uptake of Zinc which is close to ¾ of children treated of diarrhea.

Table 22: **Therapeutic Zinc supplementation**

Therapeutic Zinc Supplementation	Central	North	South	West	County
n	**35**	**18**	**36**	**35**	**124**
Yes	62.86%(22)	72.22%(13)	83.3%(30)	71.4%(25)	72.6%(90)
No	37.14%(13)	27.78%(5)	16.7%(6)	28.6%(10)	27.4%(34)
Do not Know	0%(0)	0%(0)	0%(0)	0%(0)	0%(0)

3.1.2.6 Health Seeking Behavior

Health care seeking

Out of those who reported to have been ill in the past two weeks 82.25% reported to have sought assistance, the table below illustrates care seeking behavior

	Central	North	South	West	County
n	**251**	**153**	**140**	**211**	**755**
Yes	76.10%(191)	80.39%(123)	88.57%(124)	86.73%(183)	82.25%(621)
No	23.90%(60)	19.61%(30)	11.43%(16)	13.27(28)	17.75%(134)

Point of seeking health care

Mothers and caregivers whose children were sick in the past 2 weeks were further asked where they sought assistance. Majority (91.4%) sought assistance from appropriate service delivery points namely, public hospital (82.8%), mobile clinics (4.4%), private clinic/pharmacy (4.0%), and NGO/FBO clinics (2.7%). From such places they are likely to get assistance from trained health personnel with proper diagnosis and treatment being done. Apparently a number of them (2.3 %) sought assistance either from a shop/kiosk, relatives and friends, traditional healers or local herbs. In such places, they were likely to be misdiagnosed and receive inappropriate treatment as the service providers lacked expertise and knowledge of offering treatment services. Figure 26 below summarizes the health seeking behavior per survey zone in Turkana County.

Table 23:Point of seeking health assistance

First Point of seeking health care	Central	North	South	West	County

[13] Klemm RDW, Harvey PWJ, Wainwright E, Faillace S, Wasantwisut, E. Micronutrient Programs: What Works and What Needs More Work? A Report of the 2008 Innocenti Process. August 2009, Micronutrient Forum, Washington, DC.

n	191	123	124	183	621
Traditional healer	1.05%(2)	3.25%(4)	0.00%(0)	0.00%(0)	0.97%(6)
Community health worker	2.1%(4)	1.6%(2)	0.8%(1)	2.2%(5)	1.8%(11)
Private clinic/Pharmacy	1.055(2)	0.00%(0)	4.84%(6)	9.29%(17)	4.03%(25)
Shops/Kiosks	2.62 (5)%	0.00%(0)	4.84%(6)	1.64%(3)	2.25% (14)
Public clinic	89.53%(171)	73.98%(91)	81.45%(101)	82.51%(151)	82.77%(514)
Mobile clinic	0.52%(1)	12.20%(15)	6.45%(8)	1.64%(3)	4.35%(27)
Relative /friend	0.0%(0)	0.81%(1)	0.0%(0)	1.09%(2)	0.48%(3)
NGO/FBO clinics	2.62%(5)	8.13%(10)	1.61%(2)	0.0%(0)	2.74%(17)
Other(specify)	0.52%(1)	0.00%(0)	0.00%(0)	1.64%(3)	0.64%(4)

Childhood Immunization, Vitamin A Supplementation and Deworming

Childhood Immunization

Kenya aims to achieve 90% under one immunization coverage by the end of second medium term plan (2013- 2017). The Kenya guideline on immunization defines a fully immunized child as one who has received all the prescribed antigens ***and at least one Vitamin A dose*** under the national immunization schedule before the first birthday. This survey assessed the coverage of 4 vaccines namely, BCG, OPV1, OPV3, and measles at 9 and 18 months. From the assessment, 98.9% of children were confirmed by scar to have been immunized by BCG[14]. Those who were immunized (based on card and recall) by OPV1[15] and OPV3 were 94.31% and 88.74% respectively while 87.13 % (cards& recall) had been immunized for measles at 9 months. However, only 49.25% had been immunized (card and recall) with the second dose of measles antigen at 18 months. Table 27 -29: below summarizes the coverage of the assessed 4 vaccines per survey zone in Turkana County

Table 24: Child BCG immunization Coverage

	Has child received BCG vaccination	Confirmation of BCG vaccination

[14] The BCG vaccine has variable efficacy or protection against tuberculosis (TB) ranging from 60-80% for a period ranging from 10-15 years. It is known to be effective in reducing the likelihood and severity of military TB and TB meningitis especially in infants and young children. This is especially important in Kenya where TB is highly prevalent, and the chances of an infant or young child being exposed to an infectious case are high.

[15] In Kenya infants receive 4 doses of trivalent OPV before one year of age 1st dose is given immediately at birth or within two weeks of birth. This is known as the ***"birth dose"*** or ***"Zero dose"*** The other 3 doses should be given at 6 (OPV1) 10(OPV2) and 14 weeks (OPV3 of age

Survey zone	n	No	Yes	n	Scar	No scar
Central	812	5.91% (48)	94.09%(764)	764	98.04%(749)	1.96%(15)
North	725	4.55%(33)	95.45%(692)	692	99.42% (688)	0.58%(4)
South	430	2.56%(11)	97.44%(419)	419	99.28% (416)	0.72%(3)
west	492	6.91%(34)	93.09%(458)	458	99.13% (454)	0.87%(4)
County	2459	5.12%(126)	94.88%(2333)	2333	98.89%(2307)	1.11%(26)

Table 25: Child OPV 1 and 2 coverage

	OPV1 vaccination					OPV3 vaccination				
Survey zone	n	Yes by card	Yes by recall	No	Do not know	n	Yes by card	Yes by recall	No	Do not know
Central	814	75.18% (612)	18.67% (152)	5.90% (48)	0.25% (2)	814	70.39 % (573)	17.57% (143)	11.55% (94)	0.49%(4)
North	726	71.49% (519)	23.83% (173)	4.27% (31)	0.41% (3)	726	68.46% (497)	22.04% (160)	7.71% (56)	1.79%(13)
South	430	81.40% (350)	15.35% (66)	1.86% (8)	1.4% (6)	430	76.05% (327)	14.65% (63)	7.67% (33)	1.63% (7)
west	492	74.39% (366)	17.07% (84)	7.93% (39)	0.61% (3)	492	69.72% (343)	16.06% (79)	13.21% (65)	1.02% (5)
County	2462	75.02% (1847)	19.29% (475)	19.2% (126)	0.57% (14)	2462	70.67% (1740)	18.07% (445)	10.07% (248)	1.18% (29)

Table 26: Child measles 9 and 18 months coverage

	Measles vaccination at 9 months					Measles vaccination at 18 months				
Survey zone	n	Yes by card	Yes by recall	No	Do not know	n	Yes by card	Yes by recall	No	Do not know
Central	768	67.19% (516)	19.01% (146)	13.54% (104)	0.26% (2)	612	37.42% (229)	7.19% (44)	55.07% (337)	0.33% (2)
North	681	67.11% (457)	24.38% (166)	8.22% (56)	0.29% (2)	541	51.39% (278)	14.60% (79)	29.57% (160)	4.44% (24)
South	404	70.30% (284)	14.60% (59)	13.61% (55)	1.49% (6)	290	22.07% (64)	8.62% (25)	65.17% (189)	4.14% (12)
West	461	67.03% (309)	17.14% (79)	15.18% (70)	0.65% (3)	340	35.88% (122)	10.88% (37)	50.885 (173)	2.35% (8)
County	2314	67.68% (1566)	19.45% (450)	12.32% (285)	0.56% (13)	1783	38.87% (693)	10.38% (185)	48.18% (859)	2.58% (46)

Vitamin A supplementation

Improving the vitamin A status of deficient children through supplementation enhances their resistance to disease and can reduce mortality from all causes by approximately 23 per cent[16]. Therefore, vitamin A supplementation is critical, not only for eliminating vitamin A deficiency as a public-health problem, but also as a central element for child survival.

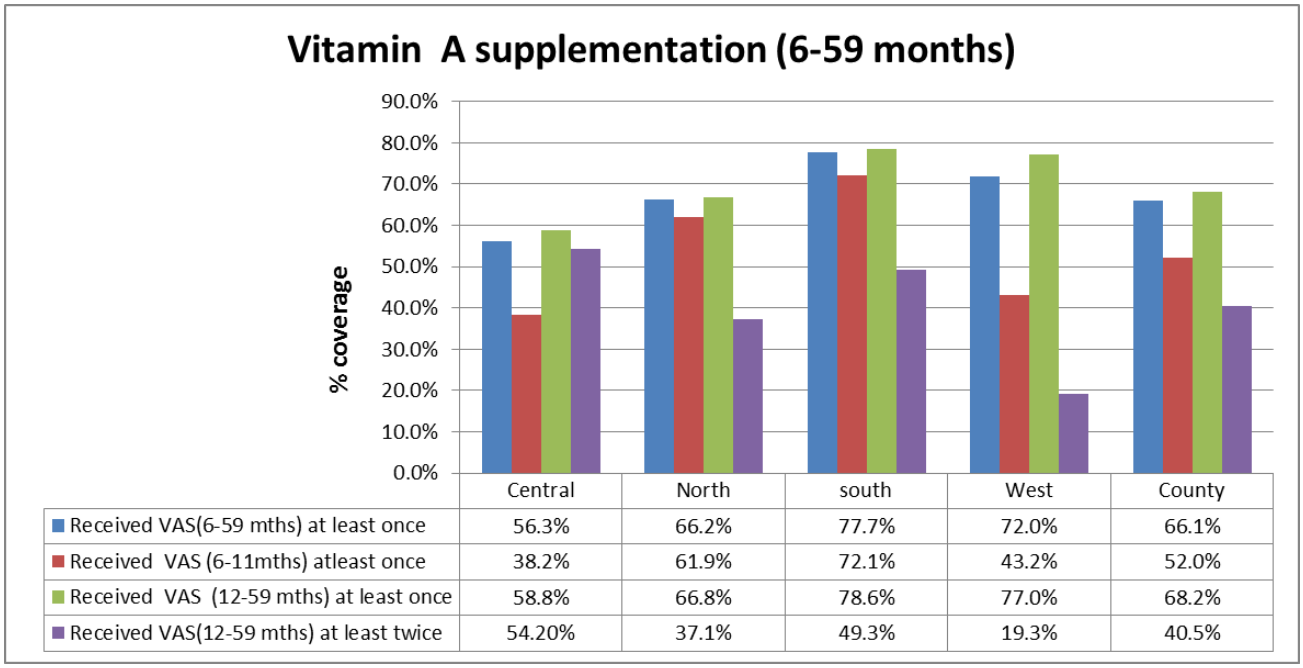
Poor data management on vitamin A logistics, inadequate social mobilization to improve vitamin uptake and placement of vitamin A at lower level of priority among other interventions have been cited as major challenges in achieving the supplementation targets (MOH Vitamin A supplementation Operational Guidelines for Health Workers 2012).

To assess vitamin A supplementation, parents and caregivers were probed on whether children had been supplemented, for how many times and the place of supplementation (whether it was done in a health facility, outreach site or during mass campaigns) in the past one year. Reference was made to the child health card and in case the card was not available recall method was applied.

According to the survey, 52.0% of the children aged 6- 11 months were supplemented with vitamin A at least once, and only 68.2% children aged 12 to 59 months who had been at least supplemented once while only 40.5% received twice as recommended by MOH policy. The performance of vitamin A supplementation especially among children 12-59 months is poor compared to the ministry of health target of 80%.Figure 4 below shows vitamin A supplementation coverage per survey zone in Turkana County.

Majority (76.9%) of vitamin A supplementation was done at the health facilities, 18.3% from outreaches, and 7.6% from campaigns. This indicates the need to integrate Vitamin A supplementation into other existing points of care including ECDs and Outreaches. Figure 4 below shows of the vitamin A supplementation sites per survey zone in Turkana County.

Figure 3: Vitamin A supplementation coverage



	Central	North	south	West	County
Received VAS(6-59 mths) at least once	56.3%	66.2%	77.7%	72.0%	66.1%
Received VAS (6-11mths) atleast once	38.2%	61.9%	72.1%	43.2%	52.0%
Received VAS (12-59 mths) at least once	58.8%	66.8%	78.6%	77.0%	68.2%
Received VAS(12-59 mths) at least twice	54.20%	37.1%	49.3%	19.3%	40.5%

[16] Vitamin A Supplementation: A Decade of Progress, UNICEF 2007

Figure 4: Places of vitamin A supplementation

De-worming

De-worming is important in controlling parasites such as helminthes, schistosomiasis (bilharzias) and prevention of anemia. 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 children aged 12-59 months old. Based on the findings, only 22.5% of this category of children was de-wormed at least twice as per the WHO recommendation. 36.8% of the children were de-wormed at least once. This coverage is extremely low compared to the Country's target of 80%. This could be attributed to low community awareness on the importance of deworming or low access to the service, thus the need to integrate and accelerate services through existing opportunities like annual Malezi bora campaigns. Figure 5 shows coverage of de-worming per survey zone in Turkana County.

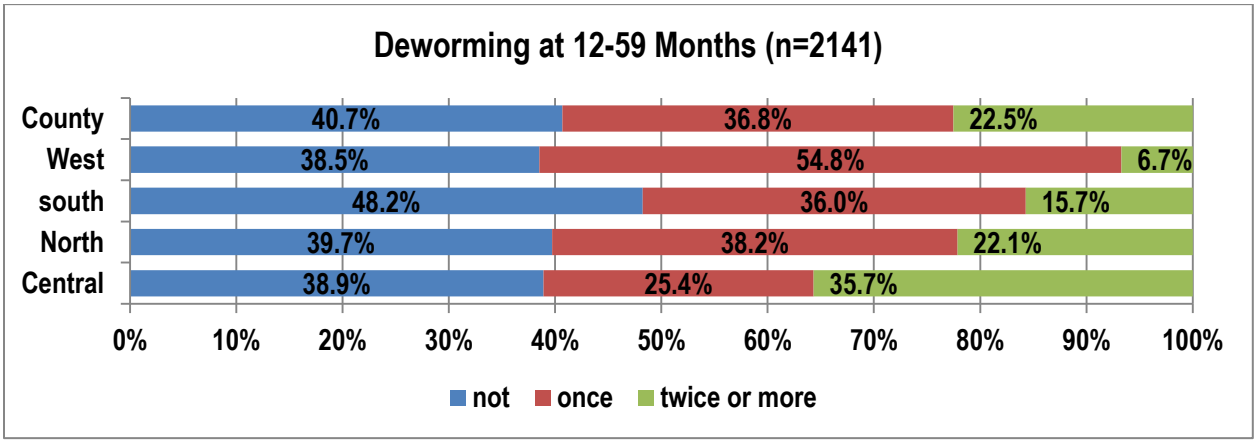


Figure 5:De-worming coverage among children 12-59 months old

3.2 MATERNAL NUTRITION

Pregnancy imposes a big nutrient-need load on mothers, which in the absence of adequate extra nutrients leads to utilization of body nutrient reserves leading to malnutrition.Gestational malnutrition leads to low birth weights and may ultimately culminate in poor child growth and development, thus there is an urgent need to address high rates of malnutrition among pregnant women. Household food insecurity is a key indicator/determinant for poor adult nutritional status. A high number of malnourished PLWs increase the risk of growth retardation of the fetus and consequently an increase in low birth weight and malnutrition burden spreads to both U5 children and caretakers from the same household faced with food insecurity and related vulnerabilities, a common scenario during nutrition emergency levels .

Women physiological status

The figure 6 below indicates that majority of the surveyed women of Reproductive age (15-49 years) in the county were lactating (51.5%) and 38.1% were not pregnant or lactating.

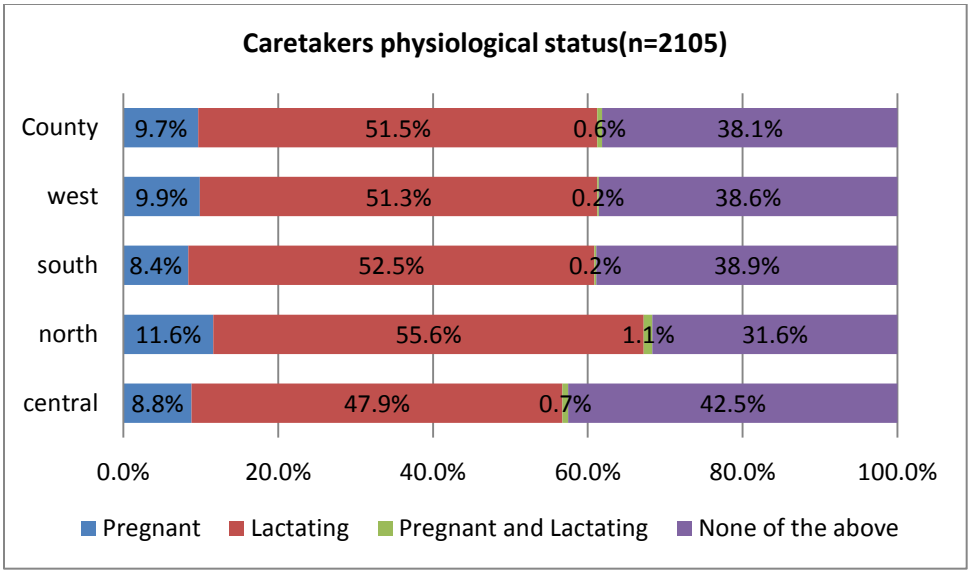


Figure 6: Women physiological status

Acute Malnutrition

Maternal nutrition was assessed by measuring MUAC of all women of reproductive age (15 to 49) in all sampled households. Analysis was further focused on pregnant and lactating women. Based on the survey findings, 8.0% of all assessed women of reproductive age in the county were malnourished with a MUAC≤ 21.0 cm. In particular, 7.5% of pregnant and lactating women were malnourished using the same criteria. *Figure 7 below* show the prevalence of acute malnutrition among pregnant and lactating women and women of reproductive age (WRA) respectively.

Table 30: **Nutrition status of Women of Reproductive age and Nutrition status of pregnant and lactating women**

WRA Nutrition status		MUAC _category		Total
		MUAC less than 21.0	MUAC 21 and above	
Central	Count	65	605	670
	% within survey zone	9.7%	90.3%	100.0%
North	Count	57	477	534
	% within survey zone	10.7%	89.3%	100.0%
South	Count	33	373	406
	% within survey zone	8.1%	91.9%	100.0%
West	Count	30	465	495
	% within survey zone	6.1%	93.9%	100.0%
County	Count	185	1920	2105
	% within survey zone	8.8%	91.2%	100.0%

Table 31: Nutrition status of pregnant and lactating women

PLWs Nutrition status				physiological_status_cat Pregnant and lactating
Central	muac_category	Muac less than 21.0	Count	41
			% within physiological_status_cat	10.6%
		MUAC 21 and above	Count	344
			% within physiological_status_cat	89.4%
North	muac_category	Muac less than 21.0	Count	42
			% within physiological_status_cat	11.5%
		MUAC 21 and above	Count	323
			% within physiological_status_cat	88.5%
South	muac_category	Muac less than 21.0	Count	18
			% within physiological_status_cat	7.3%
		MUAC 21 and above	Count	230
			% within physiological_status_cat	92.7%
West	muac_category	Muac less than 21.0	Count	17
			% within physiological_status_cat	5.6%
		MUAC 21 and above	Count	287
			% within physiological_status_cat	94.4%
Total	muac_category	Muac less than 21.0	Count	118
			% within physiological_status_cat	9.1%
		MUAC 21 and above	Count	1184
			% within physiological_status_cat	90.9%

Iron and Folic Acid Supplementation (IFAS)

During pregnancy, women have increased need for additional iron to ensure they have sufficient iron stores to prevent iron deficiency. Iron supplementation is recommended in resource limited settings as strategy to prevent and correct iron deficiency and anemia among pregnant women

WHO recommends daily consumption of 60mg elemental iron and 0.4mg folic acid throughout the pregnancy[17].These recommendations have since been adopted by Kenya government in its 2013 policy guidelines on supplementation of iron folic acid supplementation (IFAS) during pregnancy. During the survey, iron folic supplementation was assessed by asking mothers of children below 2 years if they consumed iron folate in their most recent pregnancy. Results show that Turkana county is yet to achieve the target for IFAS, Possibly due to operational shortfalls in the delivery of the product or health seeking behaviour where mother seek ANC services late in their last trimester.

[17] WHO. Guideline: Daily iron and folic acid supplementation in pregnant women. Geneva, World Health Organization, 2012.

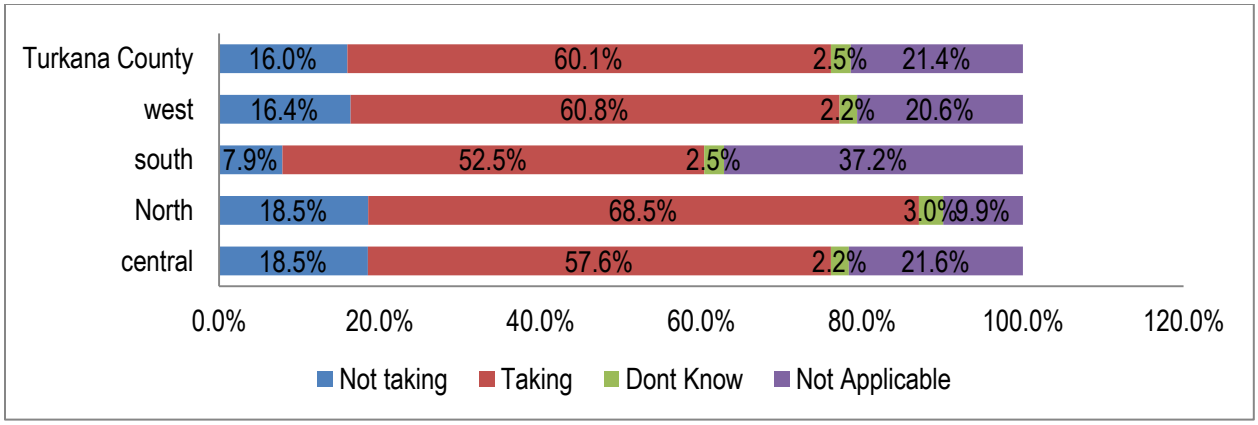


Figure 7: Proportion of women of reproductive age (WRA) taking IFAS

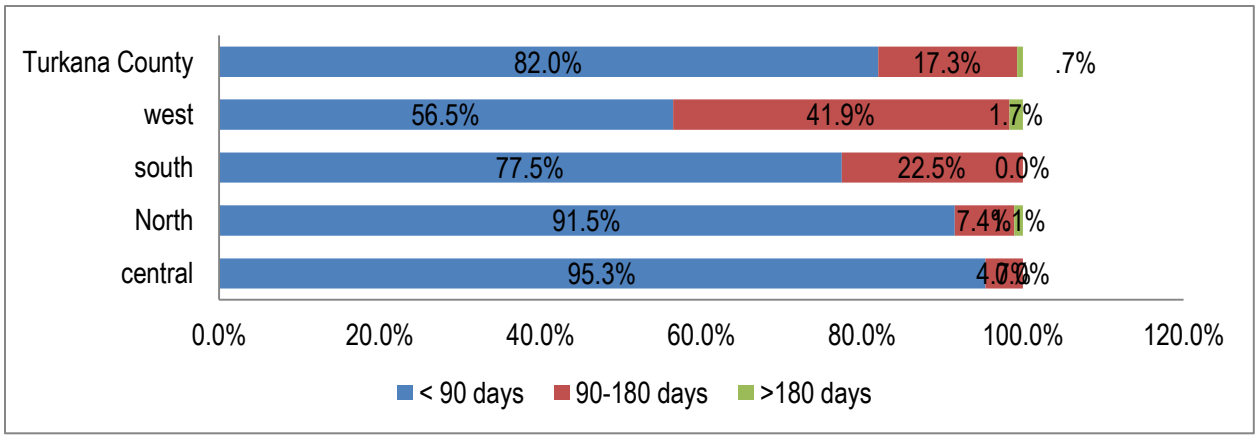


Figure 8: Number of days caretakers with children aged 24 months and below consumed IFAS in their last pregnancy

3.3 Mosquito Nets Ownership and Utilization

Overall, 25.3% of sampled households owned mosquito net, and 19.8 % and 10.1% of the household's children under five and WRA respectively had slept under the net the previous night. Turkana is largely not a malaria endemic county except for Loima and parts Turkana West Sub Counties.

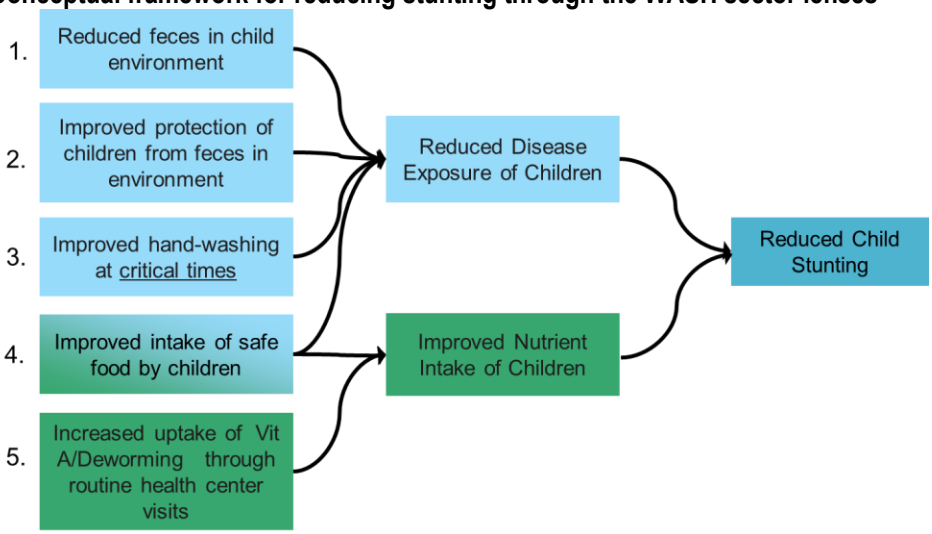
Table 32: Mosquito nets ownership and utilization

		Net ownership		Persons that slept under the net	
		n	yes	Child under five	Mother
Central	Count	703	276	218	109
	% within Zone		39.3%	31.0%	15.5%
North	Count	622	90	74	36
	% within Zone		14.5%	11.9%	5.8%
south	Count	416	98	75	40
	% within Zone		23.6%	18.0%	9.6%
West	Count	484	98	73	39
	% within Zone		20.2%	15.1%	8.1%
County	Count	2225	562	440	224
	% within Zone		25.3%	19.8%	10.1%

3.4 WATER SANITATION & HYGIENE

International human rights consider access to water and sanitation as a human right.[18] 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 to 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. Increasingly current evidence on poor WASH indicators is being linked to under nutrition and more so on High Stunting levels. Diarrhea, the leading killer of young children is closely linked to poor/inadequate WASH (Pruss-Ustun et al, 2014), which often causes undernutrition, which in turn reduces a child's resistance to subsequent infections, thus creating a vicious circle. An estimated 25% of stunting is attributable to five or more episodes of diarrhea before 24 months of age (Checkley et al, 2008). Below is a pathway to reduce stunting among children 0-2years of age showing the prominence of WASH interventions.

Figure 7: Conceptual framework for reducing stunting through the WASH sector lenses



**Conceptual framework is non-exhaustive and focused for this particular intervention.*

.Main Source of Water

Only 60.3% of Turkana County residents obtain their drinking water from safe sources namely; piped water, borehole, protected spring or protected shallow wells. The rest (39.7%) obtained their water for drinking from sources whose safety can be compromised hence need proper treatment before drinking. Such sources included; unprotected dug well/ laga (17.3%) unprotected shallow well (10.6%), river/spring (6.3%), and earth pan/dam (0.09%). Table 33 below, summarizes main sources of water per survey zone. The use of unprotected dug shallow well had increased from the last survey which is hugely associated with community coping mechanisms as result of traditional water sources drying up.

Table 27: **Current main sources of water**

[18] The UN committee on economic, Cultural and Social rights states in its General Comment of November 2002

Current main source of drinking water	Central	North	West	South	County
n	702	622	484	416	2224
Piped water system/ borehole/ protected spring/protected shallow wells	38.5%(270)	74.5% (464)	63.8%(309)	71.4%(297)	60.3%(1340)
Unprotected shallow well	11.1% (78)	9% (56)	17.1%(83)	4.6%(19)	10.6%(236)
Unprotected dug well/ laga	28.7% (202)	7.7%(48)	13.8%(67)	16.3%(68)	17.3%(236)
River/spring	13.1%(92)	2.5%(16)	0.2%(1)	7.7%(32)	6.3%(141)
Earth pan/dam	0.2%(2)	0%(0)	0%(0)	0%(0)	0.09%(2)
Lake	7.8%(55)	6.1%(38)	0%(0)	0%(0)	4.18%(93)
Water trucking /Water vendor	0.4%(3)	0%(0)	4.7%(23)	0%(0)	1.2%(26)
others	0%(0)	0%(0)	0.2%(1)	0%(0)	0% (1)

Distance to Water Source and Queuing Time

According to SPHERE handbook for minimum standards for WASH, the maximum distance from any household to the nearest water point should be 500 meters. It also gives the maximum queuing time at a water source which should be not more than 15 minutes and it should not take more than three minutes to fill a 20-litre container.

Analysis of distances to water sources indicated 57.1% of the households obtained their water from sources less than 500m (less than 15 minutes walking distance),29.5% took between 15 min to 1 hour (approximately 500m to 2km) while the rest (12.8%) walked as far as more than 2Km (1- 2hrs) to their water sources. Figure 10 below shows distance to water sources per survey zone in Turkana County

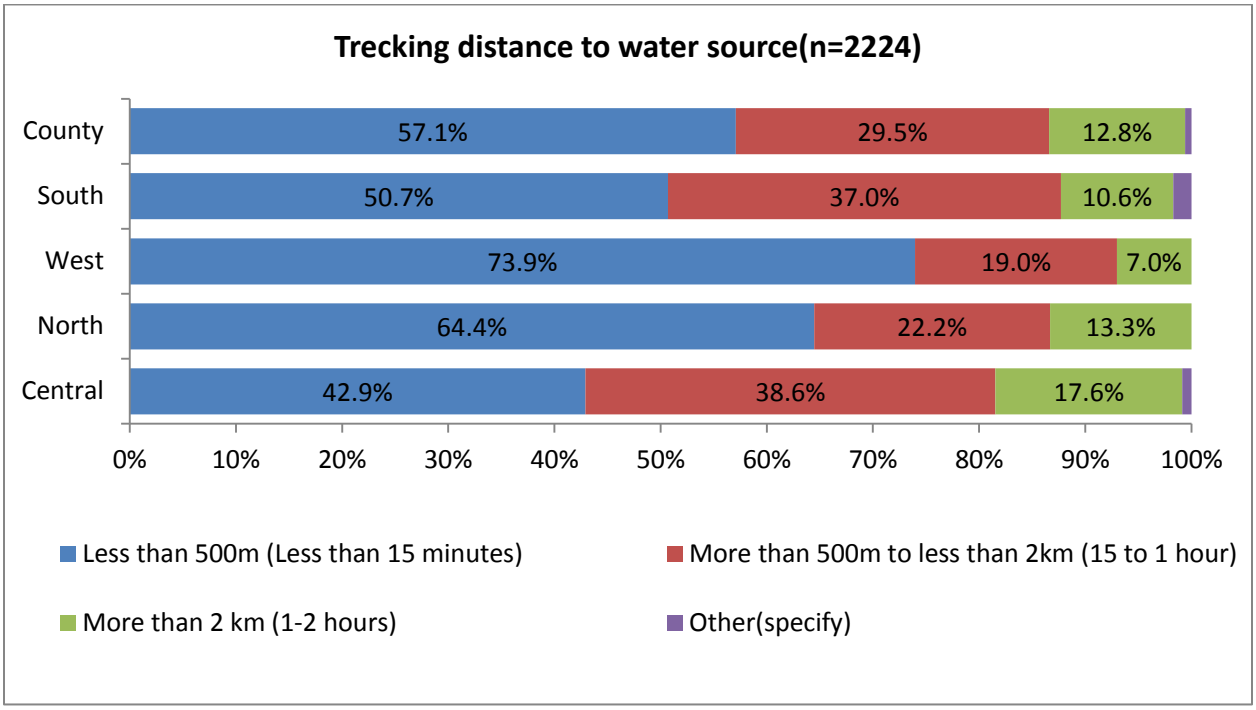


Figure 8: Distance to water sources

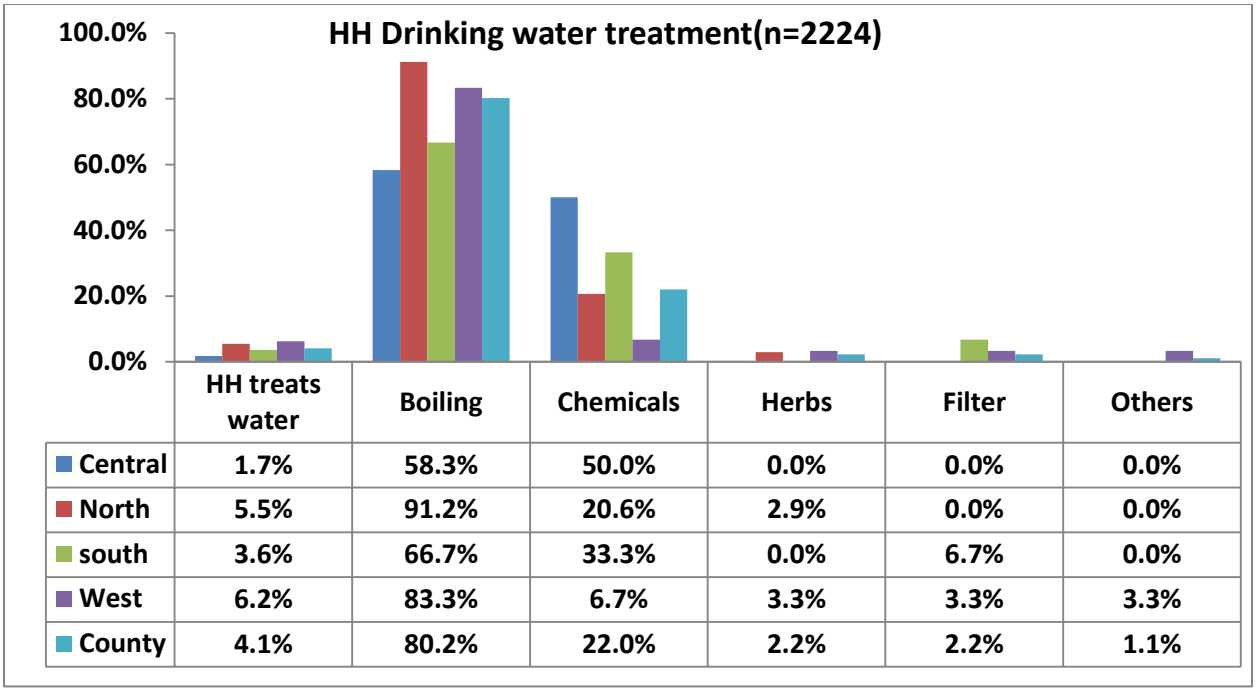
In the county only 45.1% of the sampled households queued for water for less than 30 minutes, a third of them queued for between 30 and 60 minutes and only 21% queued for more than one hour (an increase from last survey). Table 34 shows the percentage that queue and queuing time per survey zone.

Table 34: Queuing time at water source

	Central	North	West	South	County
n	**702**	**622**	**484**	**416**	**2224**
HH Queuing for water	24.7% (174)	35.4%(220)	55.8%(270)	56.5%(235)	40.4%(899)
Water Queuing time (n)	**174**	**220**	**270**	**235**	**899**
Less than 30 minutes	52.3%(91)	50.5%(111)	49.6%(134)	29.8% (70)	45.1%(406)
30-60 minutes	36.2%(63)	25.9%(57)	32.2%(87)	41.3% (97)	33.8%(304)
More than 1 hour	11.5%(20)	23.6%(52)	18.1%(49)	28.9%(68)	21%(189)

Methods of drinking water treatment and storage

The survey showed that only 4.1% of the sampled households treated water. The common water treatment method was boiling (80.2%). This was expected since for a long time there has been limited distribution of water purifiers.



	HH treats water	Boiling	Chemicals	Herbs	Filter	Others
Central	1.7%	58.3%	50.0%	0.0%	0.0%	0.0%
North	5.5%	91.2%	20.6%	2.9%	0.0%	0.0%
south	3.6%	66.7%	33.3%	0.0%	6.7%	0.0%
West	6.2%	83.3%	6.7%	3.3%	3.3%	3.3%
County	4.1%	80.2%	22.0%	2.2%	2.2%	1.1%

Figure 11: Methods used for treating drinking water by households

Out of the sampled households only 67.2% stored drinking water in closed container/Jerri can, thus preventing it from physical contamination. This extremely low proportion of households that treat drinking water, coupled with the low latrine coverage and high rates of open defecation (as covered in section 3.4..6 below…) could be one of the main contributors of malnutrition in the County as already explained above (relationship between undernutrition and poor WASH.

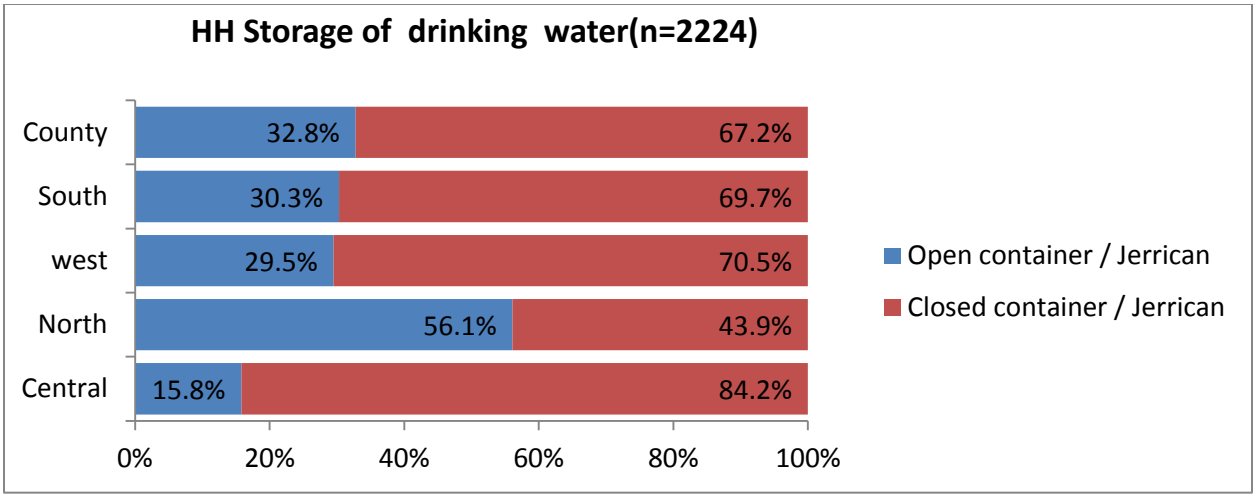


Fig.12: Household storage of drinking water storage

Water Utilization and Payment

According to SPHERE handbook for minimum standards for WASH, the average water use for drinking, cooking and personal hygiene in any household should be at least 15 liters per person per day. Out of the sampled households only 29.5 % of the households used at least 15 liters of water per person per day which is the minimum per capita recommendation for drinking cooking and personal hygiene (SPHERE Hand book 2004). Figure 13 below shows the water utilization in Liters per person per day in all the survey zones in Turkana County.

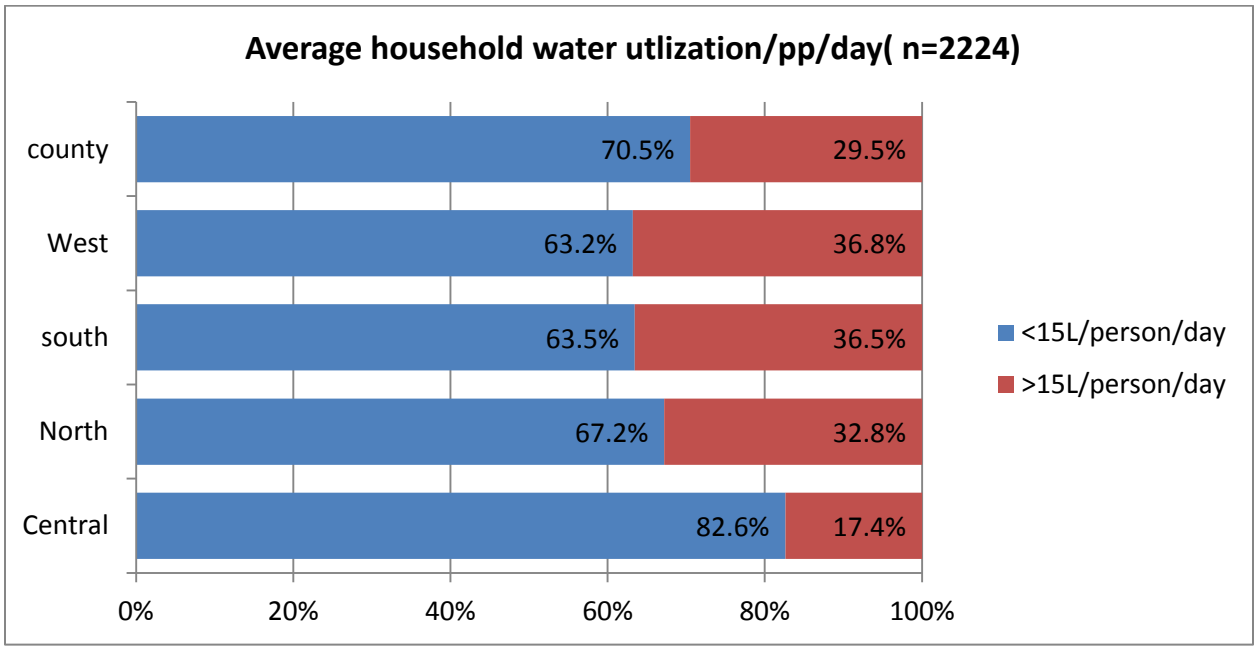


Figure 9*:* Water utilization (Liters/person/day)

In the county 37.5 % of the surveyed households buy water for domestic use, out of these two thirds of households (76.7%) make a monthly payment, 93.8% of those that bought water using a 20 L jerican paid less than 10 Ksh. Table 36 shows the percentage of households paying for water and cost of water per 20 litter jerican per survey zone. While 64.1% of those that paid for water on a monthly paid 100 Ksh or less .Turkana central had the highest proportion (29.1%) of households

paying more than 400 Ksh per month for water, this could partially explain the fact that most of the households are not meeting the SPHERE standards on the average number of litres per person per day.

Table 28: **Payment for water**

Water payment		Central	North	south	West	County
	n	**702**	**622**	**416**	**484**	**2224**
	Yes	20.9%	43.4%	63.9%	31.2%	37.5%
HH paying for water	No	79.1%	56.6%	36.1%	68.8%	62.5%
	n	**147**	**270**	**266**	**151**	**834**
	Pay monthly	95.9%	98.9%	54.5%	57.6%	76.7%
water payment mode	pay per 20 L Jerrican	4.1%	1.1%	45.5%	42.4%	23.3%
	n	**141**	**267**	**145**	**87**	**640**
	≤100 Kes	38.3%	70.4%	72.4%	72.4%	64.1%
	>100 to ≤200 kes	17.0%	13.1%	11.0%	5.7%	12.5%
Amount paid per month	>200 to ≤300 kes	11.3%	11.2%	6.9%	13.8%	10.6%
	>300 to ≤400 kes	4.3%	0.0%	1.4%	1.1%	1.4%
	>400 kes	29.1%	5.2%	8.3%	6.9%	11.4%
	n	**6**	**3**	**121**	**64**	**194**
	≤10 kes	100.0%	0.0%	97.5%	90.6%	93.8%
per 20 L jerrican	>10 to ≤ 20 kes	0.0%	66.7%	1.7%	7.8%	4.6%
	>20 to ≤ 30 kes	0.0%	33.3%	0.0%	1.6%	1.0%
	>30 kes	0.0%	0.0%	.8%	0.0%	.5%

Hand washing

Hand washing with soap is the single most cost-effective intervention in preventing diarrhea diseases[19]. The four critical hand washing moments include; after visiting the toilet/latrine, before cooking, before eating and after taking children to the toilet/latrine. Assessment of hand washing in the 4 critical times in Turkana County indicated that while, 77.4% of the respondents were practicing hand washing, only a mere 10.2% of respondents adhered to the recommendation for 4 critical times. Hand washing moments include before eating (88.7%), before cooking (55.3%), after toilet (50.1%) and after changing the baby (25.4%).Table 38 below shows hand washing at critical times per survey zone in Turkana County

Table 36: Handwashing at critical times

	Central	North	south	West	County
n	**702**	**622**	**416**	**484**	**2224**
% Washing hands	80.6%	69.8%	88.0%	73.3%	77.4%
Hand washing times(n)	**566**	**434**	**366**	**355**	**1721**
After toilet	47.0%	44.7%	55.7%	56.1%	50.1%
Before cooking	51.1%	47.5%	68.3%	58.0%	55.3%
Before eating	82.0%	92.2%	92.6%	91.3%	88.7%
After changing the baby	15.5%	27.2%	31.1%	33.0%	25.4%
others	7.8%	5.8%	3.6%	1.1%	5.0%

[19] Borghi, J., Guinness, L., Ouedraogo, and J., Curtis, V. (2002): Is hygiene promotion cost-effective? A case study in Burkina Faso. *Tropical Medicine and International Health*, **7(11)**, 960-969.

All four critical times	4.4%	9.0%	14.4%	16.3%	10.2%
less than 4 critical times	95.6%	91.0%	85.6%	83.7%	89.8%

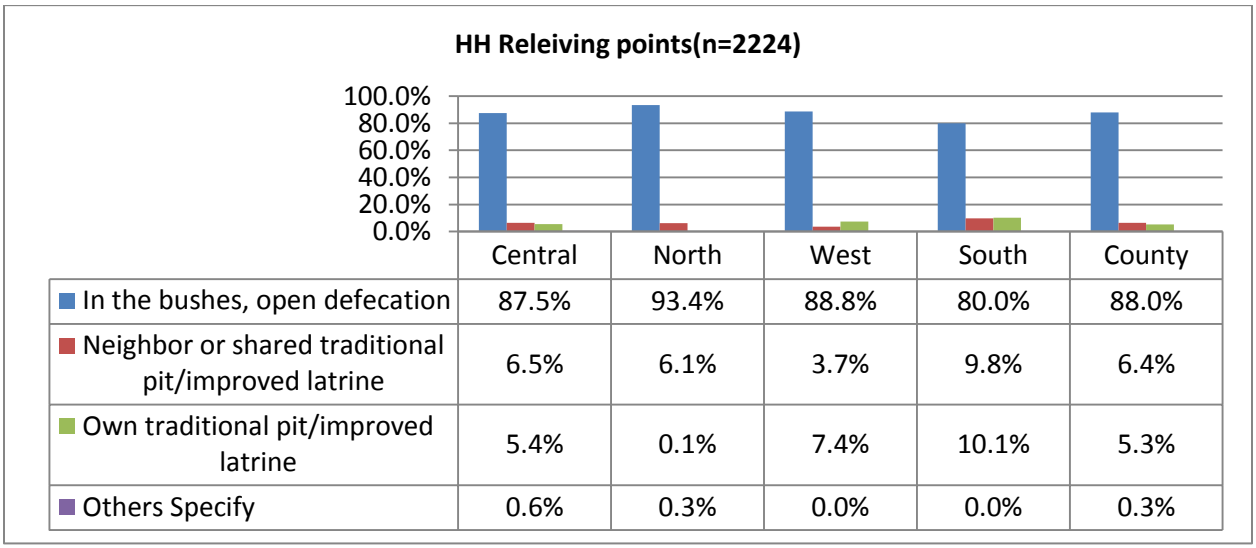
Only 26.5 % of the sampled households used soap and water for handwashing. Handwashing without soap does not offer effective protection against germs. Figure 12 below shows what is used for handwashing

Table 10: items used for handwashing

Handwashing Items	Central	North	South	West	County
n	566	434	366	355	1721
Only water	57.8%	87.3%	40.7%	53.8%	60.8%
Soap and water	23.3%	10.4%	39.9%	37.5%	26.5%
Soap when I can afford it	17.0%	2.3%	18.9%	7.9%	11.8%
water and ash	1.8%	0.0%	0.0%	0.3%	0.6%
Any other specify	0.2%	0.0%	0.5%	0.6%	0.3%

Latrine Ownership and Utilization

Overall, 88.0% of the respondents continue to relieve themselves in the bushes (open defecation) while the rest use own latrine, neighbor's or shared traditional pit/improved latrines). Figure 13 below show latrine ownership and utilization per survey zone.



	Central	North	West	South	County
In the bushes, open defecation	87.5%	93.4%	88.8%	80.0%	88.0%
Neighbor or shared traditional pit/improved latrine	6.5%	6.1%	3.7%	9.8%	6.4%
Own traditional pit/improved latrine	5.4%	0.1%	7.4%	10.1%	5.3%
Others Specify	0.6%	0.3%	0.0%	0.0%	0.3%

Figure 11: Latrine ownership and utilization

3.5 Food Security

Household's Source of Income

Household income is critical to food availability at household level. Most of the households source of income was main source income across the county was petty trading (55.7%), sale of livestock (19.8%) and casual labour (10.4%) .Turkana North had the highest proportion of households dependent on sale of livestock in comparison to the other 3 survey zones .The table below shows the household's source of income.

Table 38: Household's source of income

Zone		Main source of income									Total
		Sale of livestock	livestock products	Sale of crops	Petty trading	Casual labour	Permanent job	Sale of personal assets	Remittance	Others (specify)	
Central	Count	129	12	0	340	122	22	0	38	40	703
	% within Zone	18.3%	1.7%	0.0%	48.4%	17.4%	3.1%	0.0%	5.4%	5.7%	100.0%
North	Count	194	23	6	350	25	5	2	7	10	622
	% within Zone	31.2%	3.7%	1.0%	56.3%	4.0%	.8%	.3%	1.1%	1.6%	100.0%
south	Count	22	26	21	264	48	16	3	2	14	416
	% within Zone	5.3%	6.3%	5.0%	63.5%	11.5%	3.8%	.7%	.5%	3.4%	100.0%
West	Count	96	15	3	285	36	15	1	7	26	484
	% within Zone	19.8%	3.1%	.6%	58.9%	7.4%	3.1%	.2%	1.4%	5.4%	100.0%
County	Count	441	76	30	1239	231	58	6	54	90	2225
	% within Zone	19.8%	3.4%	1.3%	55.7%	10.4%	2.6%	.3%	2.4%	4.0%	100.0%

Main occupations of the household's heads

The main occupations of the households heads was livestock herding followed firewood and charcoal selling and waged labor as illustrated in the table below

Table 39: Main occupations of the household's heads

		Main occupation of Household head									Total
		Livestock herding	Own farm labour	Employed (salaried)	Waged labour (Casual)	Petty trade	Merchant/trader	Firewood/ charcoal	Fishing	Others	
Central	Count	272	1	24	105	201	2	39	40	19	703
	% within Zone	38.7%	.1%	3.4%	14.9%	28.6%	.3%	5.5%	5.7%	2.7%	100.0%
North	Count	336	1	7	17	93	14	101	45	8	622
	% within Zone	54.0%	.2%	1.1%	2.7%	15.0%	2.3%	16.2%	7.2%	1.3%	100.0%
south	Count	77	45	18	38	104	20	99	0	15	416
	% within Zone	18.5%	10.8%	4.3%	9.1%	25.0%	4.8%	23.8%	0.0%	3.6%	100.0%
West	Count	179	7	15	48	79	5	124	0	27	484
	% within Zone	37.0%	1.4%	3.1%	9.9%	16.3%	1.0%	25.6%	0.0%	5.6%	100.0%
County	Count	864	54	64	208	477	41	363	85	69	2225
	% within Zone	38.8%	2.4%	2.9%	9.3%	21.4%	1.8%	16.3%	3.8%	3.1%	100.0%

Source of Dominant Foods

In the entire county the main source of starches (77.4%), legume (83.2%), vegetables and fruits (67.3%) and milk (61.3%) was purchase. It is important to note that majority of the household in Turkana North (40%) were consuming milk from own production. Turkana south had the least proportion of households consuming milk from own production with the majority of the residents (76.9%) accessing milk through purchase. This, coupled with fact that the South region has the highest proportion of households with no source of income as already highlighted implies that the Turkana South residents could be more vulnerable to shocks compared to the other geographic locations which could partially explain the high levels of GAM in the region.Table 39- below summarizes the sources of dominant foods.

Main sources of starchy foods

As illustrated in the table below the main source of starchy foods for the households in the county was purchase (88.8%) followed by food aid at 3.2%

Table 29: Source of starchy foods

		Sources of starchy Foods									Total
		Own production	Purchase	Gifts from friends/families	Food aid	Traded or Bartered	Borrowed	Gathering/ wild fruits	Not applicable	Other (specify)	
Central	Count	1	659	2	7	0	21	3	6	3	702
	% within Zone	.1%	93.9%	.3%	1.0%	0.0%	3.0%	.4%	.9%	.4%	100.0%
North	Count	3	541	32	30	5	5	1	5	0	622
	% within Zone	.5%	87.0%	5.1%	4.8%	.8%	.8%	.2%	.8%	0.0%	100.0%
south	Count	29	341	4	22	2	16	0	2	0	416
	% within Zone	7.0%	82.0%	1.0%	5.3%	.5%	3.8%	0.0%	.5%	0.0%	100.0%
West	Count	14	433	3	13	2	8	3	4	4	484
	% within Zone	2.9%	89.5%	.6%	2.7%	.4%	1.7%	.6%	.8%	.8%	100.0%
County	Count	47	1974	41	72	9	50	7	17	7	2224
	% within Zone	2.1%	88.8%	1.8%	3.2%	.4%	2.2%	.3%	.8%	.3%	100.0%

Main sources of Pulses

Similarly to the starchy foods the main sources of pulses was purchase at 81.6% followed by food aid 4.4%

Table 40: Source of pulses for households

		Pulses Source									Total
		Own production	Purchase	Gifts from friends/families	Food aid	Traded or Bartered	Borrowed	Gathering/ wild fruits	Not applicable	Other (specify)	
Central	Count	1	615	1	5	1	15	33	28	3	702
	% within Zone	.1%	87.6%	.1%	.7%	.1%	2.1%	4.7%	4.0%	.4%	100.0%
North	Count	3	446	41	50	3	3	2	71	3	622
	% within Zone	.5%	71.7%	6.6%	8.0%	.5%	.5%	.3%	11.4%	.5%	100.0%
south	Count	5	356	11	22	1	7	0	13	1	416
	% within Zone	1.2%	85.6%	2.6%	5.3%	.2%	1.7%	0.0%	3.1%	.2%	100.0%
West	Count	12	397	3	21	2	6	4	35	4	484
	% within Zone	2.5%	82.0%	.6%	4.3%	.4%	1.2%	.8%	7.2%	.8%	100.0%
County	Count	21	1814	56	98	7	31	39	147	11	2224
	% within Zone	.9%	81.6%	2.5%	4.4%	.3%	1.4%	1.8%	6.6%	.5%	100.0%

Main sources of fruits and vegetables

Main sources fruits and vegetables was purchases as illustrated in the table below

Table 41: Source fruits and vegetables for households

		Fruits and vegetable Food source									
		Own production	Purchase	Gifts from friends/families	Food aid	Traded or Bartered	Borrowed	Gathering/ wild fruits	Not applicable	Other (specify)	Total
Central	Count	7	430	2	2	0	15	40	201	5	702
	% within Zone	1.0%	61.3%	.3%	.3%	0.0%	2.1%	5.7%	28.6%	.7%	100.0%
North	Count	6	184	37	4	5	1	48	335	2	622
	% within Zone	1.0%	29.6%	5.9%	.6%	.8%	.2%	7.7%	53.9%	.3%	100.0%
south	Count	23	291	6	5	2	2	2	84	1	416
	% within Zone	5.5%	70.0%	1.4%	1.2%	.5%	.5%	.5%	20.2%	.2%	100.0%
West	Count	7	272	4	6	0	0	11	184	0	484
	% within Zone	1.4%	56.2%	.8%	1.2%	0.0%	0.0%	2.3%	38.0%	0.0%	100.0%
County	Count	43	1177	49	17	7	18	101	804	8	2224
	% within Zone	1.9%	52.9%	2.2%	.8%	.3%	.8%	4.5%	36.2%	.4%	100.0%

Main sources of dairy products

The mains sources of dairy products was purchases (50.1%) followed by own production (7.5%)

Table 42: Source of dairy products for households

		Dairy products Food source									
		Own production	Purchase	Gifts from friends/families	Food aid	Traded or Bartered	Borrowed	Gathering/ wild fruits	Not applicable	Other (specify)	Total
Central	Count	72	396	4	0	0	8	1	221	0	702
	% within Zone	10.3%	56.4%	.6%	0.0%	0.0%	1.1%	.1%	31.5%	0.0%	100.0%
North	Count	44	199	34	0	5	1	3	334	2	622
	% within Zone	7.1%	32.0%	5.5%	0.0%	.8%	.2%	.5%	53.7%	.3%	100.0%
south	Count	17	272	3	3	1	3	1	113	3	416
	% within Zone	4.1%	65.4%	.7%	.7%	.2%	.7%	.2%	27.2%	.7%	100.0%
West	Count	33	248	3	2	1	1	1	195	0	484
	% within Zone	6.8%	51.2%	.6%	.4%	.2%	.2%	.2%	40.3%	0.0%	100.0%
County	Count	166	1115	44	5	7	13	6	863	5	2224
	% within Zone	7.5%	50.1%	2.0%	.2%	.3%	.6%	.3%	38.8%	.2%	100.0%

Main sources of milk

Main source of milk for household's within the county was purchases (52.5%) followed by own production (6.4%)

Table 43: Source of milk for households

		Milk food source									
		Own production	Purchase	Gifts from friends/families	Food aid	Traded or Bartered	Borrowed	Gathering/ wild fruits	Not applicable	Other (specify)	Total
Central	Count	77	405	3	0	0	7	1	205	4	702
	% within Zone	11.0%	57.7%	.4%	0.0%	0.0%	1.0%	.1%	29.2%	.6%	100.0%
North	Count	18	219	33	1	6	1	1	341	2	622
	% within Zone	2.9%	35.2%	5.3%	.2%	1.0%	.2%	.2%	54.8%	.3%	100.0%
south	Count	24	273	2	1	1	0	1	109	5	416
	% within Zone	5.8%	65.6%	.5%	.2%	.2%	0.0%	.2%	26.2%	1.2%	100.0%
West	Count	24	271	1	0	0	0	2	186	0	484
	% within Zone	5.0%	56.0%	.2%	0.0%	0.0%	0.0%	.4%	38.4%	0.0%	100.0%
County	Count	143	1168	39	2	7	8	5	841	11	2224
	% within Zone	6.4%	52.5%	1.8%	.1%	.3%	.4%	.2%	37.8%	.5%	100.0%

Foods Groups Consumed by Households

As illustrated in table 15 below, consumption of vegetables, fruits, eggs, fish and organ meat were very low, with less than 20% of the households consumed food items from these food groups. Foods mostly consumed are cereals, oils/fats milk

and pulses &legumes. Most of the households consumed a cereal based diet in the county (81.9%). Fish consumption was higher in Turkana North and Central compared to other survey zones which might be associated with access to the lake. It basically indicates that households are not consuming diversified diets .This is a proxy indicator of insufficient nutrient intake further exposing the populations to deficiencies especially micronutrients.

Table 44: Food groups consumed by households from 24 hour recall

Zone	n	cereals	vegetables	Fruits	organ meats	Eggs	fish	legumes	milk &products	Fats & oils	sweets	spices & condiments	Flesh meat & offals
Central	**665**	81.4%	14.9%	10.1%	8.7%	2.0%	11.4%	67.1%	16.5%	66.2%	44.2%	10.5%	14.3%
North	**550**	79.8%	2.4%	.4%	4.9%	.4%	8.4%	38.2%	4.5%	54.5%	33.5%	24.5%	24.0%
South	**404**	81.2%	29.2%	11.6%	14.6%	3.0%	2.5%	60.6%	40.6%	77.7%	51.7%	47.0%	27.5%
West	**456**	85.7%	11.0%	2.6%	29.6%	2.0%	.2%	50.0%	7.2%	56.8%	30.7%	14.5%	40.4%
County	**2075**	81.9%	13.5%	6.2%	13.4%	1.7%	6.4%	54.4%	16.0%	63.3%	39.9%	22.2%	25.2%

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 the assistance. In this survey, only 46.5% of the population had an acceptable food consumption score (>35), the household food consumption score, while 31.5% were at boarder line (>21.5) and while 22.0% had a poor foo d consumption score. This indicates the around 50% of the population were in need of immediate interventions with the aim of ensuring access and adequacy of foods for consumption.

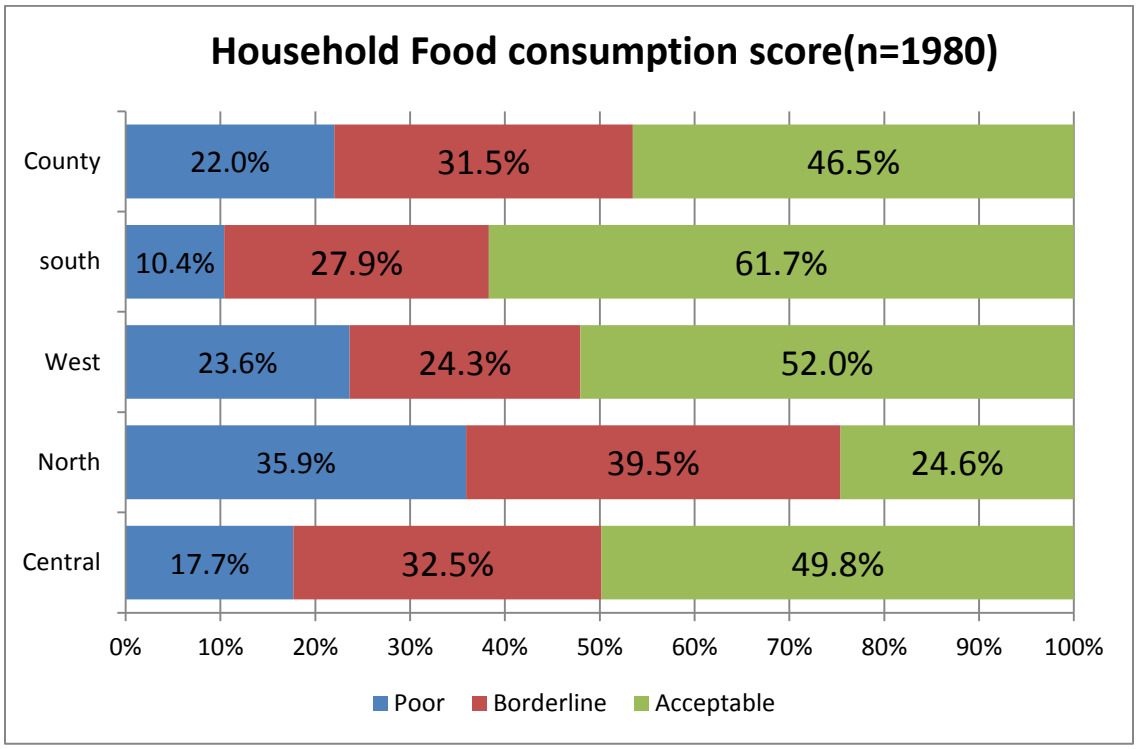


Figure 12: Household food consumption score

Micronutrient Rich Foods

As illustrated in the table below consumption frequency of nutrient rich food groups in the four survey zones showed that a higher proportion of households are not eating enough Iron-rich, fruits & vegetables ,vitamin A rich foods . Most consumed predominant foods in the diets were staples, oils and fats. However, consumption of micronutrient rich foods was poorest in Turkana North which confirms the high proportion of households with poor FCS. As already captured above, these results presage a higher risk of undernutrition and micronutrient deficiencies in Turkana further explaining the relatively high rates of chronic and acute undernutrition prevailing in the county. At the same time, the widespread low consumption frequency of iron rich foods across all survey zones could indicate a higher risk of iron deficiency anemia across the country.

Table 45: Household consumption of micronutrient rich foods

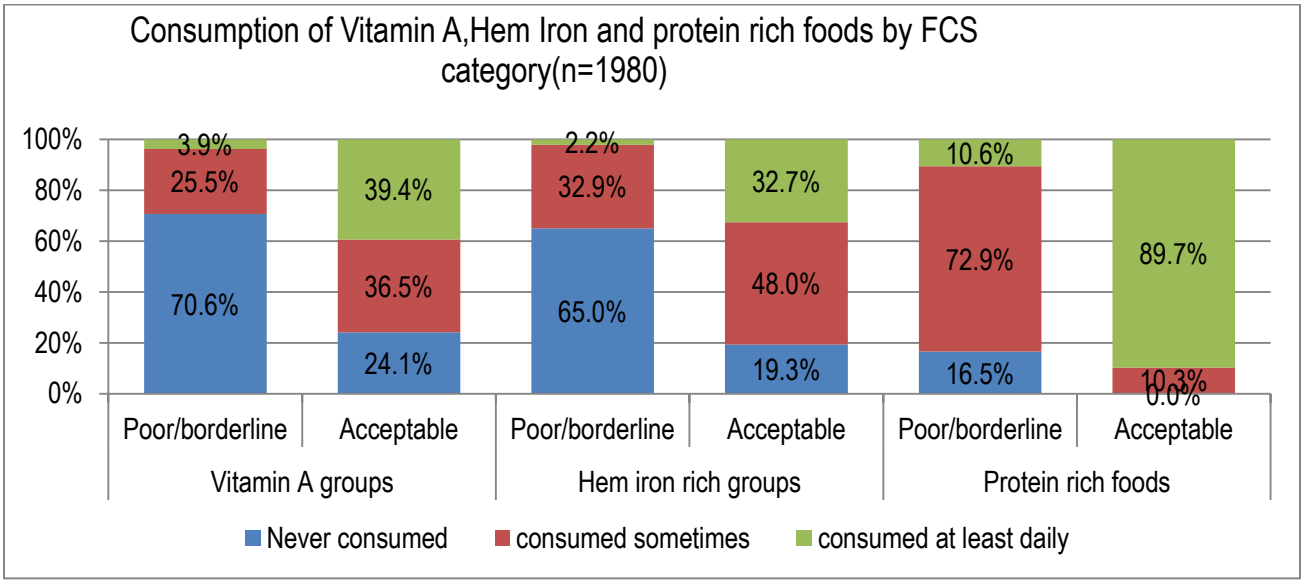
	n	Food group	Never consumed(0 days)	Consumed sometimes (1-6 days)	Consumed at least daily (7 days)
Central	703	Vitamin A rich foods	51.1%	27.2%	21.8%
		Proteins rich foods	13.2%	41.4%	45.4%
		Hem iron rich foods	55.2%	32.3%	12.5%
		Oils & fats	27.9%	28.7%	43.4%
		Staples	5.7%	50.5%	43.8%
		Fruits &vegetables	57.5%	18.2%	24.3%
North	622	Vitamin A rich foods	83.6%	14.5%	1.9%
		Proteins rich foods	30.9%	47.7%	21.4%
		Hem iron rich foods	55.5%	36.3%	8.2%
		Oils & fats	34.7%	52.4%	12.9%
		Staples	5.6%	83.3%	11.1%
		Fruits &vegetables	96.3%	3.1%	.6%
South	416	Vitamin A rich foods	20.9%	38.9%	40.1%
		Proteins rich foods	6.0%	33.4%	60.6%
		Hem iron rich foods	43.5%	45.2%	11.3%
		Oils & fats	13.5%	43.3%	43.3%
		Staples	3.1%	54.3%	42.5%
		Fruits &vegetables	37.5%	26.0%	36.5%
West	484	Vitamin A rich foods	50.4%	34.5%	15.1%
		Proteins rich foods	20.0%	31.6%	48.3%
		Hem iron rich foods	40.1%	31.4%	28.5%
		Oils & fats	38.0%	33.9%	28.1%
		Staples	6.6%	52.7%	40.7%
		Fruits &vegetables	79.1%	9.9%	11.0%
County	2225	Vitamin A rich foods	54.4%	27.4%	18.2%
		Proteins rich foods	18.3%	39.6%	42.2%
		Hem iron rich foods	49.8%	35.6%	14.6%
		Oils & fats	29.3%	39.2%	31.5%
		Staples	5.4%	60.9%	33.8%

		Fruits &vegetables	69.3%	13.6%	17.1%

Household Consumption of Protein, Vitamin A and Heme Iron Rich Food Groups by Poor/Borderline and Acceptable Food Consumption Score Groups in Turkana County

Table below shows that most of the households with poor/borderline food consumption score have a low frequency of consumption of vitamin A, hem iron and protein rich foods and as such they are likely not to be consuming enough to meet their nutrient needs. Consumption of vitamin A rich food groups is even much worse among households in the poor/borderline FCS category.

Figure 16: consumption of protein, vitamin A and hem iron rich food groups by poor/borderline and acceptable food consumption score groups in Turkana County

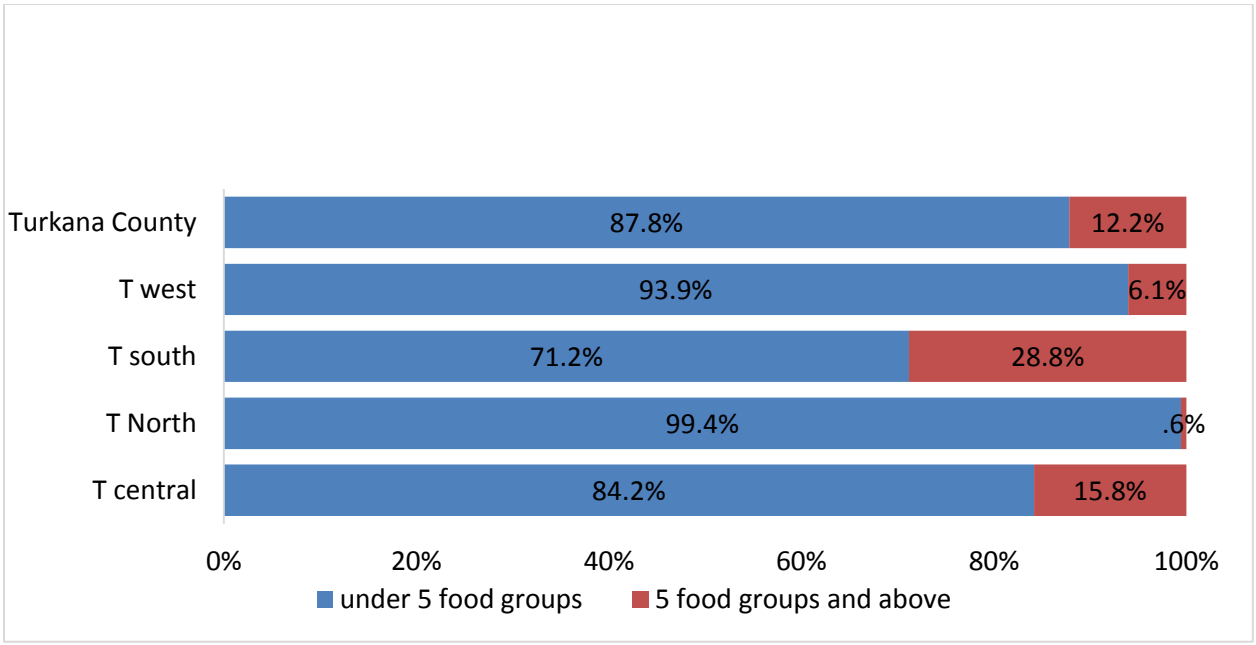


Minimum Dietary Diversity -Women Score (MDD-W)

Women of reproductive age (WRA) are often nutritionally vulnerable because of the physiological demands of pregnancy and lactation. Requirements for most nutrients are higher for pregnant and lactating women than for adult men (National Research Council, 2006; World Health Organization [WHO]/Food and Agriculture Organization of the United Nations [FAO], 2004). Outside of pregnancy and lactation, other than for iron, requirements for WRA may be similar to or lower than those of adult men, but because women may be smaller and eat less (fewer calories), they require a more nutrient-dense diet (Torheim and Arimond, 2013). Insufficient nutrient intakes before and during pregnancy and lactation can affect both women and their infants. Yet in many resource-poor environments, diet quality for WRA is very poor, and there are gaps between intakes and requirements for a range of micronutrients (Arimond et al., 2010; Lee et al. 2013).

MDD-W is a dichotomous indicator of whether or not women 15–49 years of age have consumed at least five out of ten defined food groups the previous day or night. The ten defined food groups include ;1) Grains, white roots and tubers and plantains; 2) pulses (beans ,peas and lentils); 3) Nuts and seeds,4) Dairy; 5) Meat ,poultry and fish; 6) Eggs; 7) Dark green Leafy vegetables; 8) Other vitamin A rich fruits and vegetables; 9) Other vegetables; 10) Other fruits. The proportion of women 15–49 years of age who reach this minimum in a population can be used as a proxy indicator for higher micronutrient adequacy, one important dimension of diet quality.

Figure17: MDD-W score Turkana County

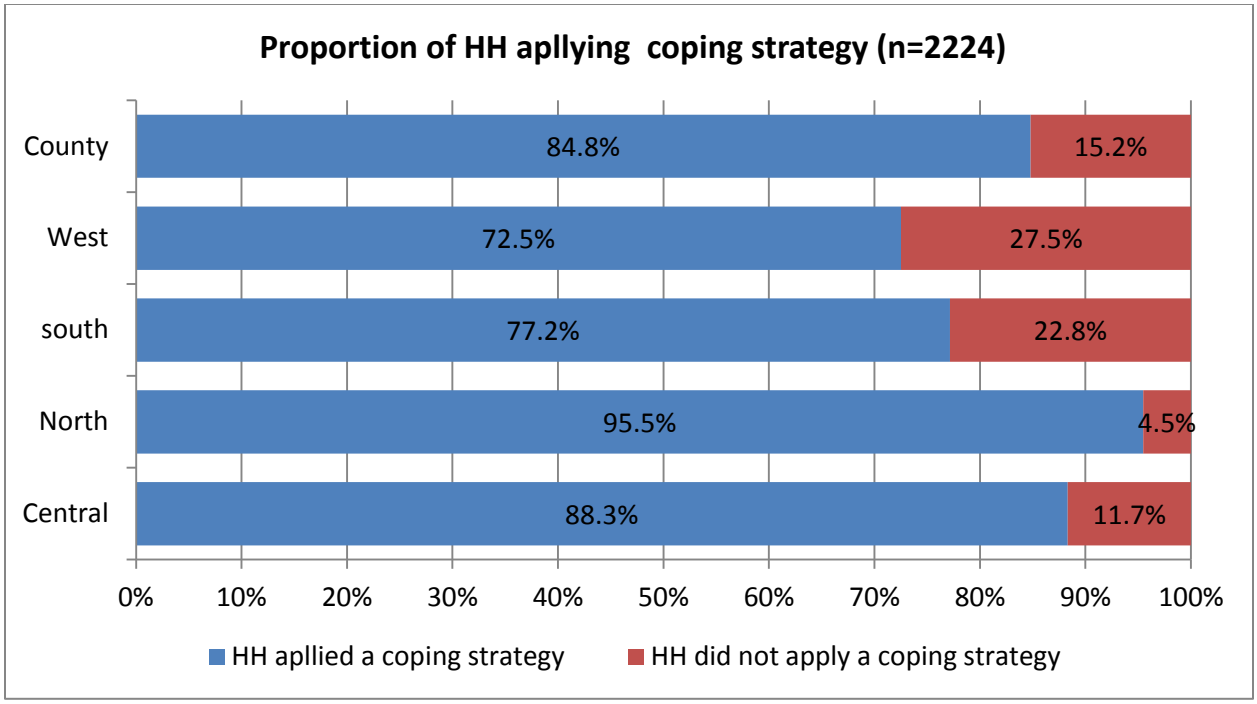


As illustrated in figure 17 above, only a 12.2 % of the WRA in Turkana County were consuming at least five food items from the 10 food groups in the MDD-W. Turkana west and North had the least proportion of WRA (6.1% and 0.6% respectively) consuming at least five food items from the 10 food groups in the MDD-W .The lower proportions of WRA consuming food items from at least five of the ten food groups indicates lower proxy micronutrient adequacy among the WRA in the county. In summary this is a proxy indicator of high micronutrient deficiency among WRA in Turkana County that is likely to affect birth outcomes.

Household Coping Strategy Index (Reduced CSI)

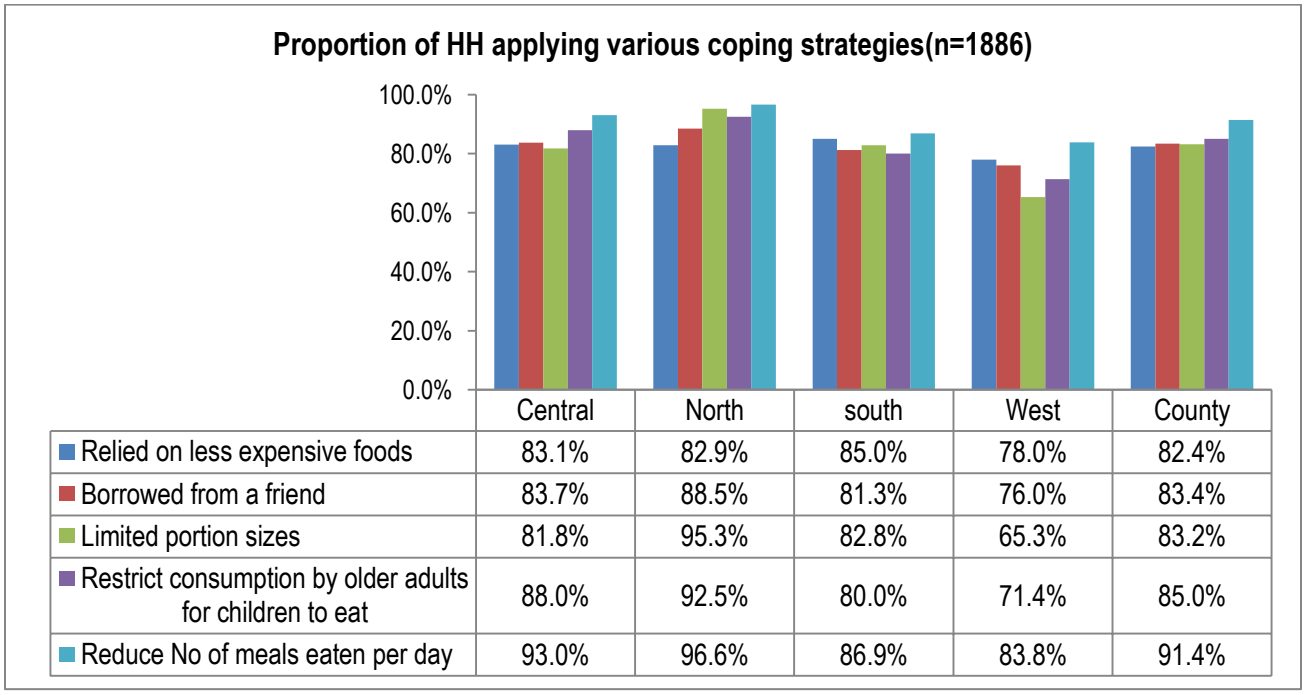
As indicated in the figure 18 below, 84.8% of the households in the county reported facing food shortage and thus adopting coping strategies. Again, in tract with poor food consumption score and intake of micro-nutrient rich foods, Turkana North and central had a slightly higher number of households applying a coping strategy

Figure 18: Proportion of household applying a coping strategy



The main adopted coping strategies in all the survey zones were; 1) Reduction of number of meals eaten per day 2) restricted consumption by adults in order for small children to eat as illustrated in the diagram below.

Figure 19: Coping strateies applied in households



	Central	North	south	West	County
Relied on less expensive foods	83.1%	82.9%	85.0%	78.0%	82.4%
Borrowed from a friend	83.7%	88.5%	81.3%	76.0%	83.4%
Limited portion sizes	81.8%	95.3%	82.8%	65.3%	83.2%
Restrict consumption by older adults for children to eat	88.0%	92.5%	80.0%	71.4%	85.0%
Reduce No of meals eaten per day	93.0%	96.6%	86.9%	83.8%	91.4%

As shown in table 46 below, there was an increase (from 21.88 to 27.2) in the reduced CSI (mean) indicating an increase in proportion of food insecure households. Turkana central and North had the highest CSI followed by Turkana south and west indicating more food insecure households as illustrated in the table below.

Table 30: Mean Household Coping Strategy Index(CSI)

Mean Household Coping Strategy Index(CSI)					
	Central	**North**	**South**	**West**	**County**
Jan 2017	32.35	28.09	24.85	18.75	27.2
2016	19.33	23.26	22.39	23.19	21.88
2015	18.28	17.31	26.01	22.6	21.06
2014	22.72	19.52	17.61	13.77	

CHAPTER FOUR:

4.0 CONCLUSION

- Acute malnutrition levels remain above emergency level with *Critical* and *extremely critical* levels in Turkana central and Turkana North at 25.9% and 30.7% respectively.
- An estimated 10% of the pregnant and lactating women were acutely malnourished (MUAC <21cm) compared to 8% in June 2016.
- At least three quarters of caregivers have no formal education in Turkana West, North and Central
- Half of the households' source of income was petty trade – (*sale of charcoal, cloths, groceries)* an increase from 37% in June 2016.
- Sale of livestock has doubled in Turkana North to 31.2 % an indication of the rush by the pastoralists to sell animals at risk of death.
- Thirty per cent of the children 6-59 months assessed were ill two weeks preceding the survey. Leading illnesses were, ARI, Malaria and diarrhea.
- On overall, households' trekking distance to the nearest water source (2km) has increased from 9.2% *(June 2016)* to 12.8% compared to *(January 2017).*
- The proportion of households queuing time for water (over 1hour) was highest in Turkana South and Turkana North (26.8% and 23.6% respectively)
- Household food security status has deteriorated significantly (acceptable FCS declined from 70% (June 2016) to 46.5% (January 2017).
- More than 75% of the women consumed food less than five food groups out of 10, indicating high food insecurity
- At least 55% of the women with children below 2 years took IFAS for 90 days during the last pregnancy.
- Sixty per cent of the Households access drinking from improved water sources.
- The mean coping strategy index has increased across the four survey zones. Turkana Central and North recorded the highest indices.

CHAPTER FIVE:

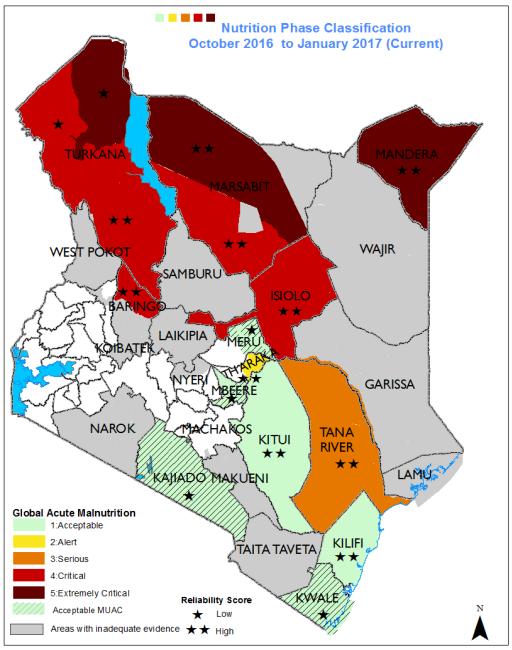
5.0 RECOMMENDATIONS

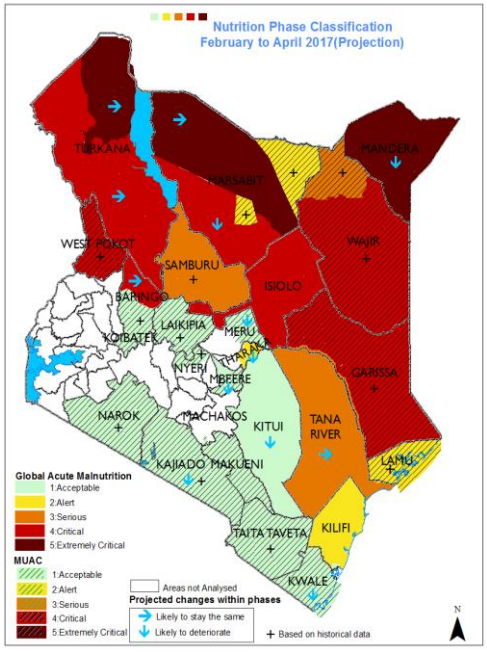
Table47:Reccomendations

No	Recommendation	Activity	By who	Timeline
1	Update and activate County nutrition contingency and response plans.	•Hold joint meeting to revise the contingency plans. •Ongoing quarterly review of the contingency plans.	MoH, NDMA and nutrition partners	Immediately
2	Support Nutrition mass screening in all malnutrition hot spots	•Map out hot spots areas. •Conduct mass screening	MOH,NDMA & Nutrition partners (UNICEF,WFP,IRC,SCI ,APHIA Timiza, World Relief	Immediately
3	Conduct integrated health and nutrition outreaches	•Map out sites for outreach support. •Conduct integrated health and nutrition outreaches	MOH,NDMA & Nutrition partners (UNICEF,WFP,IRC,SCI ,APHIA Timiza, World Relief	Immediately
4	Plan for BSFP to protect nutrition status of U5 &PLW	•Draft a costed BSFP strategy. •Mobilize resources for BSFP. •Implementation & monitoring of BSFP.	MOH and Partners	Immediately
5	Mobilize nutrition sensitive actors to provide food security and livelihood protection to vulnerable households	•Disseminate findings of the survey to the CSG. •Participate in the county response and planning meeting	MOH and H&N IPS	Immediately.

6.0 APPENDICES

Appendix 1: IPC for Acute malnutrition Maps





Appendix 2:Summary of plausibility report

	Indicator	Acceptable values/range	CENTRAL	SOUTH	NORTH	WEST
1	Flagged data (% of out of range subjects)	<7.5	0 (2.3 Exc)	0 (2.3% excel)	5 (2.6% Good)	0 (1.8% Excel)
2	Overall sex ratio (significant CHI square)	>0.001	2 (p=0.050 Good)	0 (p=0.847 Excel)	4 (p=0.001 Accep)	4 (p=0.007 Accept)
3	Age ratio (6-29vs 30-59) Significant CHI square	>0.001	4(p=0.009 Accep)	10 (p=0.000 Prob)	4 (p=0.003 Accep)	10 (p=0.000 Prob)
4	Dig. prevalence score-weight	<20	0(1 Exc)	0 (6 Excel)	0 (4 Excel)	0 (4 Excel)
5	Dig. prevalence score-height	<20	0 (6 Excl)	2 (8 Good)	2 (12 Good)	2 (8 Good)
6	Dig. prevalence score-MUAC	<20	0 (5 Excel)	0 (4 Excel)	0 (3 Excel)	0 (4 Accep)
7	Standard Dev..height WHZ	>0.80	0 (1.06 Excel)	0 (1.07 Excel)	0 (1.07 Excel)	0 (0.99 Excel)
8	Skewness WHZ	<±0.6	0 (-0.11 Excel)	0 (-0.09 Excel)	0 (0.07 Excel)	0 (-0.05 Excel)
9	Kurtosis WHZ	<±0.6	1 (-0.28 Good)	0 (-0.11 Excel)	0 (-0.08 Excel)	0 ()0.06 Excel
10	Poisson WHZ -2	>0.001	3 (p=0.009 Accep)	0 (p=0.153 Excel)	3 (p=0.07 Accept)	3 (p=0.007 Accep)

11	OVERALL	<24	10% Good	12% Good	18% Accept	19%Accept

Appendix 3:Turkana Central Survey Zone Sampled clusters

Dates	T 1	T 2	T 3	T 4	T 5	T 6	T 7	T 8
25/01/17	lodwar town(1)	Eluktoliasi(2)	Ngasaja(3)	Natambusio(4)	Natotol(5)	Hewani(6)	Hewani(7)	Atiirlulung(8)
26/01/17	Narewa(9)	kalomegur(29)	turkwel(30)	kangalita(31)	Naurienpuu(33)	Naoyawoi(34)	Ngakoriyek(35)	Nachuro(36)
27/01/17	Namwa(39)	Kotaruk(38)	Komera(32)	Lobole(24)	Kaemanik(25)	Lokiriama(26)	Lochoralomala(27)	Nakwamunyen(37)
28/01/17	Kichada(21)	Katula(20)	Nauriendudung(23)	Nakurio(19)	Akwamekwi(18)	Narukopo)17)	Lomukusei(22)	Ngikorkippi(28)
29/01/17	Nawoiangikeny(16)	Kosikiria(15)	Nariamawoi(14)	Kangirisae(13)	Nangitony(12)	Mugur(11)	Kairiama(10)	to join other teams.

Appendix 4:Turkana SouthSurvey zone sampled clusters

TURKANA SOUTH ZONE MOVEMENT PLAN						
TEAM NO.		**DAY 1**	**DAY 2**	**DAY 3**	**DAY 4**	**DAY 5**
	24/1/17	**25/1/17**	**26/1/17**	**27/1/17**	**28/1/17**	**29/1/17**
TEAM 1	**TRAVELLING**	A.P LINE **(1)**	KATIIR **(8)**	KAKONG **(25)**	KATILU CENTRE **(29)**	LOCHEREMOIT **(22)**
TEAM 2	**TRAVELLING**	KAMBI MOI **(2)**	NARUMA **(9)**	ACHUKULE **(33)**	LOPUR-SHANTY **(30)**	LOMOKAMA **(15)**
TEAM 3	**TRAVELLING**	LODOPUA B**(3)**	PARKATI **(10)**	NAOYARAGAE **(28)**	LOKAPEL **(31)**	KAPESE CENTRE**(14)**
TEAM 4	**TRAVELLING**	APETET **(4)**	NAPEITOM **(11)**	NAKWAMORU **(27)**	KANAODON **(34)**	LOKICHAR CENTRE**(12)**
TEAM 5	**TRAVELLING**	EPETAMUGE **(5)**	KANGAKI**(17)**	JULUK**(26)**	NAKABOSAN**(20)**	NALEMSEK**(16)**
TEAM 6	**TRAVELLING**	NAKWASINYEN **(6)**	KATIIR **(18)**	ARUMRUM-ALOCHA**(32)**	KIMAB5UR **(21)**	IDP **(13)**
TEAM 7	**TRAVELLING**	WINDMILL **(7)**	NALEMKAL **(19)**	NADAPAL **(24)**	LOCHWAA (**23)**	

Appendix 5:Turkana West Survey zone sampled clusters

	DAY 1 25/1/2017.	DAY 2 26/1/2017.	DAY 3 27/1/2017.	DAY 4 28/1/2017.	DAY 5 29/1/2017.
TEAM I	SL-lokichoggio VL-Jerusalem Cluster-21	SL-Nanam VL-Nalamacha. Cluster-30	SL-Loritit VL-Lorengesinyen Cluster-2	SL-Lopur VL-Lopur Cluster-10	SL-Losajait VL-lowoi. Cluster-17
TEAM 2	SL-Lokichoggio VL- nachuchukait. Cluster-22	SL-Nanam VL-Lomeyen Cluster-31	SL-Katelemoit VL-Katelemoit Cluster-3	SL-Lopur VL-lopur Cluster-11	SL-Lokore VL-Naivasha Cluster-18
TEAM 3	SL- Lokariwon VL-locherekaal Cluster-23	SL-Loteteleit VL-Nasoo. Cluster-32	SL-lokipoto VL-Lokipoto Cluster-4,RC	SL-lopur VL- Nalemsekon. Cluster-12	SL-Lopusiki VL- Ngimunyenakirionok Cluster-13
TEAM 4	SL-Lokariwon VL-ngigoloki Cluster-24	SL-Natira. VL-Abaat Cluster-6	SL-Loito VL-Loito Cluster-5	SL-Lopur VL- Nalemsekon Cluster-13	
TEAM 5	SL-mogila VL- Kanyangagiro. Cluster-27	SL-Lonyuduk VL-Lonyuduk Cluster-7	SL-Lokangae. VL-Lokangae B Cluster-25	SL-Tarach VL- Lochereng Cluster-14	
TEAM 6	SL- mogila VL-lorus Cluster-28	SL-Songot VL- Ngimunyenakirionok.Cluster-8	SL-Lotikipi VL-Nasinyono. Cluster-26	SL-Nadapal VL-Natir 2 Cluster-15	
TEAM 7	SL-lopiding VL-Kaachuro Cluster-29	SL-Loritit. VL-Loreng. Cluster-1	VL-Lopur VL-Lopur Cluster-9,RC	SL-Morungole VL-Ekipetot Cluster-16	

Turkana North Clusters					
TEAMS	25/1/17	26/1/17	27/1/17	28/1/17	29/1/17
1	KATABOI	RIOKOMOR	NALITA	NATAPAR	MLIMATATU
	EPUR	TURAMOE	EKOOPUS	KAEMOSIA	KASUGURU
	3	5	22	16	25
2	KATIKO	NAKALALE	LOITANIT	KAITEDE	KANGAKIPUR
	KAITENGIRO	LOMEGURA	NAPAK EDUNG	NGIKATURIAKAE 19	IKINGOL
	4	1	21		35
3	NACHUKUI	KACHODA	LOITANIT	KAALEM	KANAKURUDIO
	KOKISELEI	LOPURKOU	KANGITULAE	LOKUMWAE2 27	KANGAMOJOJ
	9	2	20		31
4	NACHUKUI	SASAME	LORUTH	NATAPAR	NADUNGA
	RUKRUK	AKALALE	LORUTH ESEKON	NAPAK	KANGIBENYOI
	10	13	29	17	34
5	LOWARENGAK	KOKURO	LORUTH	KAKELAE	KAERIS
	NAMOROTOT	KOKURO	KARACH	ETELITE	EJEM
	7	12	30	28	32
6	LOWARENGAK	TODONYANG PLAIN	LOKOLIO	KARACH	KAERIS
	ELELEA	14	NAKILINGA	KARACH 1	NAWOITORONG
	6		24	18	33
7	KANAMKUNY	MEYAN	LOKOLIO	NAITA	KAALEM
	KARE EDOME	ACHUKULMURA 11	LONGOLEMUR	KOYASA	AKAI AMANA
	8		23	15	26

Appendix 6:Weight for Height Z scores ± SD-Malnutrition pockets in red font colour
Turkana Central Weight for Height Z scores ± SD

Turkana central

Weight-for-Height z-scores ± SD	**Cluster Name**
Cluster 1 : -0.71 ± 0.62 (n=16)	KambiMoto
Cluster 2 : -0.85 ± 1.21 (n=19)	Elukotoliasi
Cluster 3 : -1.01 ± 1.18 (n=19)	Ngasaja
Cluster 4 : -1.19 ± 0.91 (n=16)	Natambusio
Cluster 5 : -1.32 ± 0.98 (n=22)	Natoltol

Cluster 6 : -1.22 ± 1.28 (n=17)	Hewani A
Cluster 7 : -0.91 ± 1.01 (n=22)	Hewani B
Cluster 8 : -1.37 ± 1.28 (n=12)	Atirlulung
Cluster 9 : -1.53 ± 1.18 (n=16)	Narewa A
Cluster 10 : -2.06 ± 1.23 (n=16)	Kairima
Cluster 11 : -2.03 ± 0.90 (n=24)	Mugul
Cluster 12 : -1.56 ± 0.86 (n=19)	Nangitony
Cluster 13 : -1.36 ± 1.20 (n=21)	Kangrisae
Cluster 14 : -1.27 ± 0.76 (n=23)	Nariamawoi
Cluster 15 : -1.26 ± 1.06 (n=18)	Kosikiria
Cluster 16 : -1.72 ± 1.35 (n=24)	Nawoiyankeny
Cluster 17 : -1.89 ± 1.10 (n=27)	Narukopo
Cluster 18 : -1.41 ± 0.93 (n=21)	Akwamekwi
Cluster 19 : -1.19 ± 1.02 (n=18)	Nakurio
Cluster 20 : -1.39 ± 1.14 (n=21)	katuala
Cluster 21 : -1.44 ± 1.15 (n=20)	Kichada
Cluster 22 : -1.71 ± 0.95 (n=22)	Lomukuse
Cluster 23 : -0.88 ± 0.75 (n=21)	Nuredudung
Cluster 24 : -1.45 ± 0.88 (n=20)	Lobole
Cluster 25 : -1.14 ± 1.09 (n=16)	Kaemanik
Cluster 26 : -1.04 ± 0.75 (n=22)	Lokiriama
Cluster 27 : -1.19 ± 1.05 (n=21)	lochoralomala
Cluster 28 : -1.71 ± 1.00 (n=18)	Ngikorkipi
Cluster 29 : -1.03 ± 1.29 (n=25)	Kalomegul
Cluster 30 : -1.05 ± 0.89 (n=30)	Turkwel
Cluster 31 : -1.04 ± 1.05 (n=27)	Kangalita
Cluster 32 : -1.19 ± 0.90 (n=29)	Komera
Cluster 33 : -1.30 ± 0.95 (n=22)	Naurenpuu
Cluster 34 : -1.71 ± 1.02 (n=24)	Naowiyawoi
Cluster 35 : -1.08 ± 0.70 (n=21)	Ngakoriyek
Cluster 36 : -1.23 ± 0.94 (n=17)	Nachuro
Cluster 37 : -1.68 ± 0.99 (n=21)	Nakwamunyen
Cluster 38 : -1.40 ± 1.44 (n=21)	Kotaruk
Cluster 39 : -1.63 ± 0.67 (n=7)	Namwa
	Emergency
	Very high
	High
	Moderate
	Normal

Turkana North Weight for Height Z scores ± SD

Turkana North

Weight-for-Height z-scores ± SD	**Village**	**Sublocation**
Cluster 1 : -2.02 ± 1.14 (n=22)	Lomgura	Nakalale
Cluster 2 : -1.68 ± 0.89 (n=17)	Lopkur	Kachoda
Cluster 3 : -1.14 ± 1.03 (n=28)	Epur	kataboi
Cluster 4 : -1.36 ± 0.99 (n=16)	Kaitegiro	Katiko
Cluster 5 : -1.10 ± 0.83 (n=16)	Riokomor	Riokomor
Cluster 6 : -1.75 ± 1.13 (n=11)	Elea	Louwarengak
Cluster 7 : -1.61 ± 1.34 (n=27)	Namorotot	Louwarengak
Cluster 8 : -1.42 ± 0.92 (n=15)	Kareedome	Kananmukuny
Cluster 9 : -1.11 ± 1.14 (n=18)	kokslei	Kokslesi
Cluster 10 : -1.33 ± 0.95 (n=20)	Rukurkur	Nachukui
Cluster 11 : -1.39 ± 1.08 (n=24)	Achukurmuria	Napeikar
Cluster 12 : -1.64 ± 1.38 (n=23)	Kokuro	Kokuro
Cluster 13 : -1.92 ± 0.91 (n=19)	Akalale	Sesame
Cluster 14 : -1.65 ± 0.66 (n=14)	Todongany	Louwarengak
Cluster 15 : -1.55 ± 0.85 (n=18)	koyosa	koyosa
Cluster 16 : -1.47 ± 1.14 (n=25)	Kaemosia	Natapar
Cluster 17 : -1.12 ± 1.17 (n=17)	Natapar	Natapar
Cluster 18 : -1.19 ± 1.17 (n=15)	Karach 1	Karach1
Cluster 19 : -1.45 ± 0.88 (n=22)	Ngikaturikae	Kaitende
Cluster 20 : -1.34 ± 1.05 (n=19)	Kangiturae	Loitanit
Cluster 21 : -1.50 ± 1.12 (n=26)	Napakedung	Loitanit
Cluster 22 : -1.89 ± 1.09 (n=31)	Ekopus	Naliita
Cluster 23 : -1.63 ± 0.94 (n=19)	Longeremwour	Lokolio
Cluster 24 : -1.27 ± 1.28 (n=15)	Lokolio	Lokolio
Cluster 25 : -1.04 ± 0.92 (n=34)	Kasunguru	Kangakipur
Cluster 26 : -1.63 ± 1.64 (n=17)	Akaimana	Kaalem
Cluster 27 : -1.10 ± 0.92 (n=20)	Emoja	KAALEM
Cluster 28 : -1.51 ± 1.24 (n=19)	Etelite	Kaakelae
Cluster 29 : -1.62 ± 0.93 (n=15)	Loruth Esekon	Loruth Esekon
Cluster 30 : -1.29 ± 1.08 (n=24)	Loruth Karach	Natapar
Cluster 31 : -1.78 ± 0.84 (n=18)	Kangamojoj	Kanakurudio
Cluster 32 : -1.81 ± 0.85 (n=27)	Ejem	Kaeris
Cluster 33 : -1.59 ± 0.63 (n=14)	nawaitorong`o	Kaeris
Cluster 34 : -0.71 ± 1.23 (n=15)	kangibenyoi	Nadunga
Cluster 35 : -1.54 ± 1.04 (n=27)	Kangakipur	Iking`or

Turkana West Weight for Height Z scores ± SD

Turkana West

Weight-for-Height z-scores ± SD	Village	sublocation
Cluster 1 : -0.53 ± 1.05 (n=14)	Loreng	Loritit
Cluster 2 : -0.99 ± 1.09 (n=21)	Lorengisinyen	Loritit
Cluster 3 : -0.69 ± 0.85 (n=13)	katelemoit	katelemoit
Cluster 4 : -1.14 ± 0.77 (n=17)	Lokipoto	Lokipoto
Cluster 5 : -0.77 ± 1.09 (n=23)	Loito	Loito
Cluster 6 : -0.46 ± 0.91 (n=10)	Abat	Natira
Cluster 7 : -0.79 ± 0.85 (n=17)	Lonyuduk	Lonyuduk
Cluster 8 : -0.83 ± 0.79 (n=17)	Ngimunyenakirionok	Songot
Cluster 9 : -0.75 ± 1.03 (n=14)	Nadome	lopursiki
Cluster 10 : -0.73 ± 0.79 (n=18)	Lobanga	lopursiki
Cluster 11 : -0.70 ± 0.95 (n=15)	Lopur centre	Lopur
Cluster 12 : -1.20 ± 0.97 (n=14)	Nalemsekon	Lopur
Cluster 13 : -1.22 ± 0.82 (n=7)	Nalemsekon	Lopur
Cluster 14 : -1.21 ± 0.66 (n=15)	Locherengierengo	Tarach
Cluster 15 : -1.42 ± 1.20 (n=15)	Natir 2	Nadapal
Cluster 16 : -1.92 ± 1.12 (n=17)	Ekipetot	Namorungole
Cluster 17 : -1.29 ± 1.15 (n=20)	Lowoi	Losajait
Cluster 18 : -1.33 ± 1.18 (n=17)	Naivasha	Lokore
Cluster 19 : -0.96 ± 0.91 (n=14)	Ngimunyenakirionok	lopursiki
Cluster 21 : -0.99 ± 0.79 (n=19)	Jelusalem	Lokichogio
Cluster 22 : -1.39 ± 0.97 (n=20)	Nachuchukait	Lokichogio
Cluster 23 : -1.36 ± 0.74 (n=15)	Locherekaal	Lokariwom
Cluster 24 : -0.99 ± 0.75 (n=6)	Ngiloki	Lokariwom
Cluster 25 : -1.47 ± 1.14 (n=18)	Lokangae B	Lokangae
Cluster 26 : -1.07 ± 0.71 (n=17)	Nasinyono	Lokitipi
Cluster 27 : -1.34 ± 1.04 (n=17)	Kanyangangiro	Mogila
Cluster 28 : -0.86 ± 1.00 (n=13)	Lorus	Mogila
Cluster 29 : -0.93 ± 0.91 (n=19)	Kachuro	Lopiding
Cluster 30 : -1.01 ± 1.03 (n=18)	Nalamacha	Lomeyan
Cluster 31 : -0.95 ± 1.01 (n=11)	Nanam	Lomeyan
Cluster 32 : -1.26 ± 1.21 (n=12)	Nasoo	Lotelit

Turkana West Weight for Height Z scores ± SD

Turkana South

Weight-for-Height z-scores ± SD		Village	Sublocation
Cluster 1 :	-1.78 ± 1.24 (n=13)	Apline	Lokori
Cluster 2 :	-1.43 ± 0.97 (n=13)	Kambimoi	Lokori
Cluster 3 :	-1.56 ± 1.08 (n=15)	LodopuaB	Kangitit
Cluster 4 :	-1.46 ± 0.75 (n=13)	Apetet	Lotubae
Cluster 5 :	-1.46 ± 1.15 (n=20)	Epeta Muge	Lotubae
Cluster 6 :	-0.87 ± 1.07 (n=7)	Nakwasinyen	Lotubae
Cluster 7 :	-0.70 ± 0.70 (n=20)	Windmill	Lotubae
Cluster 8 :	-1.13 ± 0.82 (n=13)	Katiir	Katilia
Cluster 9 :	-1.80 ± 0.94 (n=11)	Naruma	Elelea
Cluster 10 :	-1.58 ± 0.76 (n=15)	Parakati	Parakati
Cluster 12 :	-1.50 ± 1.28 (n=10)	Lokichar center	Lokichar
Cluster 13 :	-1.19 ± 0.87 (n=9)	Lokichar IDP	Lokichar
Cluster 14 :	-1.75 ± 1.35 (n=11)	Kapese	Kapese
Cluster 15 :	-0.80 ± 0.81 (n=5)	Lomokamar	Kapese
Cluster 16 :	-0.97 ± 1.25 (n=14)	Nalemsek	Lokichar
Cluster 17 :	-1.38 ± 1.22 (n=13)	Kangaki	Kalapata
Cluster 18 :	-1.12 ± 1.16 (n=13)	Katiir	Kalapata
Cluster 19 :	-1.33 ± 1.22 (n=17)	Nalemkai	Loperot
Cluster 20 :	-1.40 ± 1.12 (n=16)	Nakabsoan	Kalemongorok
Cluster 21 :	-1.01 ± 0.75 (n=11)	Kimabur	lochwaa_ngikamatak
Cluster 22 :	-0.98 ± 1.28 (n=12)	locheremoit	lochwaa_ngikamatak
Cluster 23 :	-0.86 ± 1.15 (n=12)	Lochwaa	Lokichar
Cluster 24 :	-0.77 ± 1.19 (n=16)	Nadapal	Kainuk
Cluster 25 :	-0.72 ± 1.15 (n=14)	Kakong	Kakong
Cluster 26 :	-1.45 ± 1.21 (n=12)	Jolouk	kalomwae
Cluster 27 :	-1.36 ± 0.99 (n=13)	Nakwamoru	Katilu
Cluster 28 :	-1.54 ± 0.81 (n=14)	Nawoyatira	Nakwamoru
Cluster 29 :	-1.41 ± 1.40 (n=12)	Katilu Centre	Katilu
Cluster 30 :	-0.83 ± 0.47 (n=10)	Shanty_lopur	Katilu
Cluster 31 :	-1.40 ± 0.92 (n=15)	Lokapel	Lokapel
Cluster 32 :	-0.89 ± 1.18 (n=11)	Arumrum alocha	Kalemongorok
Cluster 33 :	-1.15 ± 0.85 (n=10)	Achukule	Kalemongorok
Cluster 34 :	-0.94 ± 1.25 (n=10)	Kanaodon	Kanaodon

Appendix 7: **SMART survey questionnaire**

Turkana Nutrition SMART Survey Questionnaire © Jan 2017

1.IDENTIFICATION **1.1 Data Collector**_____ **1.2 Team Leader**_____ **1.3 Survey date (dd/mm/yy)----------**

1.4 County	1.5 Sub County	1.6 Division	1.7 Location	1.8 Sub-Location	1.9 Village	1.10 Cluster No	1.11 HH No	1.12 Team No.

2. Household Demographics

2.1	2.2	2.3		2.4	2.5	2.6	2.7	2.8	2.9
Age Group	**Please give me the names of the persons who usually live in your household.**	**Age (months for children <5yrs and years for over 5's)**		**Childs age verified by** 1=Health card/Birth certificate/ notification /Baptism card 2=Recall 3= no verification	**Sex** 1= Male 2= Female	**If 3 yrs and under 18 Is child enrolled in school?** 1 = Yes 2 = No (If yes go to 2.8; If no go t o 2.7)	**Main Reason for not attending School (Enter one code from list)** 1=chronic Sickness 2=Weather (rain, floods, storms) 3=Family labour responsibilities 4=Working outside home 5=Teacher absenteeism 6=Too poor to buy school items e.t.c 7=Household doesn't see value of schooling 8 =No food in the schools 9 = Migrated/ moved from school area 10=Insecurity 11-No school Near by 12=Married 13=others (specify)……..	**What is the highest level of education attained?(level completed) From 5 yrs and above** 1 = pre primary 2= Primary 3=Secondary 4=Tertiary 5= None 6=others(specify)	**If the household owns mosquito net/s, who slept under the mosquito net last night?** 1= children under 5 2=Pregnant /lactating mothers 3= other(_____)
		YRS	MTH						
< 5 YRS									
>5 TO 18 YRS									

ADULT									

2.10	**How many mosquito nets does this household have? _____ (Indicate no.)**	
2.11	**Main Occupation of the Household Head – HH.** **(enter code from list)** 1=Livestock herding 2=Own farm labour 3=Employed (salaried) 4=Waged labour (Casual) 5=Petty trade 6=Merchant/trader 7=Firewood/charcoal 8=Fishing **9=Others (Specify)** |____|	**2.12.** What is your **main** current source of income 1. =No income 2. = Sale of livestock 3. = Sale of livestock products 4. = Sale of crops 5. = Petty trading e.g. sale of firewood 6. = waged labor 7. =Permanent job 8. = Sale of personal assets 9. = Remittance 10. Other-Specify |____|
2.13	Marital status of the respondent 1. = Married 2. = Single 3. = Widowed 4. = separated 5. = Divorced. |____|	**2.14 What is the residency status of the household**? 1. IDP 2. Refugee |___| 3. Resident

Fever with Malaria: High temperature with shivering	**Cough/ARI:** Any episode with severe, persistent cough or difficulty breathing	**Watery diarrhoea:** Any episode of three or more watery stools per day	**Bloody diarrhoea:** Any episode of three or more stools with blood per day

3. CHILD HEALTH AND NUTRITION (ONLY FOR CHILDREN 6-59 MONTHS OF AGE; IF N/A SKIP TO SECTION 3.6)

Instructions: *The caregiver of the child should be the main respondent for this section*

3.1 CHILD ANTHROPOMETRY

*(**Please** fill in **ALL REQUIRED** details below. Kindly maintain the same child number as part 2)*

A **Child No.**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**3.2**	**3.3**
	what is the relationship of the respondent with the child/children 1=Mother 2=Father 3=Sibling 4= grandparent 5=Other (specify)	SEX F/m	Exact Birth Date	Age in months	Weigh t (KG) XX.X	Height (CM) XX.X	Oedem a Y= Yes N= No	MUAC (cm) XX.X	Has your child (NAME) been ill in the past two weeks? If No, please skip part K and proceed to 3.4) 1.Yes 2. No	If YES, what type of illness (multiple responses possible) 1 = Fever with chills like malaria 2 = ARI /Cough 3 = Watery diarrhoea 4 = Bloody diarrhoea 5 = Other (specify) *See case definitions below*	If the child **had watery diarrhoea** in the last TWO (2) WEEKS, did the child get THERAPEUTIC zinc supplementation ? *Show sample and probe further for this component* *check the remaining drugs(confirm from mother child booklet)* 1 = Yes 2 = No 3 = Do not know	**When the child was sick did you seek assistance ?** 1.Yes 2. No	**If the response is yes to question # 3.2 where did you first seek assistance?** 1. Traditional healer 2.Community health worker 3. Private clinic/ pharmacy 4. Shop/kiosk 5.Public clinic 6. Mobile clinic 7. Relative or friend 8. Local herbs 9.NGO/FBO 10. other specify

01													
02													
03													
04													

3.4 Kindly maintain the same child number as part 2 and 3.1 above

	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
Child No.	How many times has child received Vitamin A in the past year? (show sample)	How many times did you receive vitamin A capsules from the facility or out reach 1= health facility 2= outreach site 3= ECDE centres 4= campaigns	If Vitamin A received how many times verified by **Card?**	How many times has child received drugs for worms in the past year? **(12-59 Months)** *(show Sample)*	Has the child received BCG vaccination? **1 = scar** **2=No scar**	Has child received OPV1 vaccination **1=Yes, Card** **2=Yes, Recall** **3 = No** **4 = Do not know**	Has child received OPV3 vaccination? **1=Yes, Card** **2=Yes, Recall** **3 = No** **4 = Do not know**	Has child received measles vaccination at 9 months *(On the upper right shoulder)?* **1=Yes, Card** **2=Yes, Recall** **3 = No** **4 = Do not know**	Has child received the second measles vaccination (18 to 59 months) *(On the upper right shoulder)?* **1=Yes, Card** **2=Yes, Recall** **3 = No** **4 = Do not know**
01									
02									
03									

MATERNAL NUTRITION FOR WOMEN OF REPRODUCTIVE AGE (15-49 YEARS)*(Please insert appropriate number in the box)*				
3.7	**3.8**	**3.9**	**3.10**	**3.11**
Woman NUmber. **(all ladies in the HH aged 15-49 years from the demographics page)**	What is the Woman's physiological status **1. Pregnant** **2. Lactating** **3. Pregnant and lactating** **4. None of the above**	Woman's MUAC reading: ____.__**cm**	During the pregnancy of the (name of child below 24 months) did you take IFASS (iron pills, sprinkles with iron, iron syrup or iron-folate tablets? (name that appears in HH register) **1. Yes** **2. No** **3. Don't know** **4. N/A**	If Yes, for how many days? (approximate the number of days)

4.0 WATER, SANITATION AND HYGIENE (WASH)/- *Please ask the respondent and indicate the appropriate number in the space provided*			
4.1	**What is the MAIN source of drinking water for the household <u>NOW</u>?** 1. Piped water system/ borehole/ protected spring/protected shallow wells 2. Unprotected shallow well 3. River/spring 4. Earth pan/dam 5. Earth pan/dam with infiltration well |____| 6. Water trucking /Water vendor 7. Other *(Please specify)*	**4.2 What is the trekking distance to the current main water source?** 1=less than 500m (Less than 15 minutes) 2=more than 500m to less than 2km (15 to 1 hour) 3=more than 2 km (1 – 2 hrs) 4=Other(specify) |____|	
4.2.2a	**Do you queue for water?** 1. Yes 2. No **(If No skip to question 4.3)** |____|	**4.2.2b. If yes how long?** 1. Less than 30 minutes |____| 2. 30-60 minutes 3. More than 1 hour	
4.3a	**Is anything done to your water before drinking *(Use 1 if YES and 2 if NO)*. if No skip to 4.4** |____|	**4.3b If yes what do you do? (*MULTIPLE RESPONSES POSSIBLE) (Use 1 if YES and 2 if NO)*.** 1. Boiling…… …… |____| 2. Chemicals (*Chlorine,Pur,Waterguard*)…… |____| 3. Traditional herb…….. |____| 4. Pot filters…….. |____| **5.** Other (specify_____)…… |____|	
4.4	**Where do you store water for drinking?** 1. Open container / Jerrican 2. Closed container / Jerrican |____|	**4.5 How much water did your household use YESTERDAY (excluding for animals)?** *(Ask the question in the number of 20 liter Jerrican and convert to liters & write down the total quantity used in liters)* **|____|**	
4.6	**Do you pay for water?** 1. Yes 2. No **(If No skip to Question 4.7.1**) |____|	**4.6.1 If yes, how much per 20 liters jerrican _____ KSh/20ltrs**	**4.6.2 If paid per month how much** |____|

4.7.1	**Yesterday (within last 24 hours) at what instances did you wash your hands? (MULTIPLE RESPONSE-** (Use 1 if "Yes" and 2 if "No") 1. After toilet…… 2. Before cooking…….. |____| 3. Before eating…… 4. After taking children to the toilet…… |____| 5. Others…… |____| |____| |____|	
4.7.2	**If the caregiver washes her hands, then probe further; what do you use to wash your hands?** 1. Only water 2. Soap and water 3. Soap when I can afford it 4. traditional herb 5. water and ash 6. Any other specify |____|	**4.8 Where do members of your household Mainly relieve themselves?** 1. In the bushes, open defecation 2. Neighbor or shared traditional pit/improved latrine 3. Own traditional pit/improved latrine 4. Others Specify |____|

5.0: Food frequency and Household Dietary Diversity

	Did members of your household consume any food from these food groups in the last *7 days?(food must have been cooked/served at the household)* ***1=Yes*** ***0=No***	**If** *yes*, **mark days the food was consumed in the last 7 days?** **yes=1; no=2**								What was the **main** source of the dominant food item consumed in the HHD? **1.Own production** **2.Purchase** **3.Gifts from friends/families** **4.Food aid** **5.Traded or Bartered** **6.Borrowed** **7.Gathering/wild fruits** **8.Other (specify)**

Type of food*		**D1**	***D2***	**D 3**	**D 4**	**D5**	**D 6**	**D7**	**TOTAL**	
5.1. Cereals and cereal products *(e.g. sorghum, maize, spaghetti, pasta, anjera, bread*)?										
5.2. Vitamin A rich vegetables and tubers: Pumpkins, carrots, orange sweet potatoes										
5.3. White tubers and roots: White potatoes, white yams, cassava, or foods made from roots										
5.4 Dark green leafy vegetables: Dark green leafy vegetables, including wild ones + locally available vitamin A rich leaves such as cassava leaves etc.										
5.5 Other vegetables *(e,g, tomatoes, egg plant, onions)?*										
5.6. Vitamin A rich fruits: + other locally available vitamin A rich fruits										
5.7 Other fruits										
5.8 Organ meat (iron rich): Liver, kidney, heart or other organ meats or blood based foods										
5.9. Flesh meats and offals: Meat, poultry, offal *(e.g. goat/camel meat, beef; chicken/poultry)?*										
5.10 Eggs?										
5.11 Fish: Fresh or dries fish or shellfish										
5.12 Pulses/legumes, nuts *(e.g. beans, lentils, green grams, cowpeas)*?										
5.13 Milk and milk products *(e.g. goat/camel/ fermented milk, milk powder)?*										
5.14 Oils/fats *(e.g. cooking fat or oil, butter, ghee, margarine)?*										
5.15 Sweets: Sugar, honey, sweetened soda or sugary foods such as chocolates, sweets or candies										
5.16 Condiments, spices and beverages:										

6. COPING STRATEGIES INDEX		
		Frequency score: Number of days out of the past seven (0 -7).
	In the past 7 DAYS, have there been times when you did not have enough food or money to buy food? If No; END THE INTERVIEW AND THANK THE RESPONDENT **If YES, how often has your household had to:** *(INDICATE THE SCORE IN THE SPACE PROVIDED*)	
1	Rely on less preferred and less expensive foods?	
2	Borrow food, or rely on help from a friend or relative?	
3	Limit portion size at mealtimes?	
4	Restrict consumption by adults in order for small children to eat?	
5	Reduce number of meals eaten in a day?	
	TOTAL HOUSEHOLD SCORE: **END THE INTERVIEW AND THANK THE RESPONDENT**	

REFERENCES:

Bhutta, Z. A., Das, J. K., Walker, N., Rizvi, A., Campbell, H., Rudan, I. & Black, R. E. 2013. Interventions to address deaths from childhood pneumonia and diarrhoea equitably: what works and at what cost? *The Lancet,* 381, 1417-1429.

Checkley, W., Buckley, G., Gilman, R. H., Assis, A. M., Guerrant, R. L., Morris, S. S., MØlbak, K., Valentiner-Branth, P.,Lanata, C. F., Black, R. E., Malnutrition, A. T. C. & Network, I. (2008). Multi-country analysis of the effects of diarrhoea on childhood stunting. *International journal of epidemiology*, *37*(4), 816-830.

FAO and FHI 360. 2016. *Minimum Dietary Diversity for Women: A Guide for Measurement.* Rome: FAO.

Prüss-Ustün, A., Bartram, J., Clasen, T., Colford, J. M., Cumming, O., Curtis, V., ... & Cairncross, S. (2014). Burden of disease from inadequate water, sanitation and hygiene in low-and middle-income settings: a retrospective analysis of data from 145 countries. *Tropical Medicine & International Health*,*19*(8), 894-905.

United Nations World Food Programme, Food security analysis (VAM). Food Consumption Score Nutritional Quality analysis (FCS-N): Technical Guidance Notes .Via Cesare Giulio Viola 68, Parco dei Medici, 00148 - Rome - Italy