TURKANA SMART NUTRITION SURVEYS REPORT

JUNE 2014

FINAL REPORT

Coordinated and implemented by Turkana Ministry of Health

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Table 1 : List of acronyms

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	DNO	District 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	IRC	International Rescue Committee
27	KEPI	Kenya Expanded Programme of Immunisation
28	KFSSG	Kenya Food Security Steering Group
29	NDMA	National Drought Management Authority
30	NSO	Nutrition Support Officer (UNICEF)
31	OJT	On The Job Training
32	OPV	Oral polio Vaccine
33	ORS	Oral Rehydration Solution
34	OTP	Outpatient Therapeutic Programme
35	PLW	Pregnant and Lactating Women
36	PPS	Probability proportional to size
37	PRRO	Protracted Relief and Recovery Operations
38	SFP	Supplementary Feeding Programme
39	SMART	Standardized Monitoring and Assessment of Relief and Transitions

40	U5	Under Five Years Old
41	U5MR/U5DR	Under-five Mortality Rate/Under five death rate
42	UNICEF	United Nations Children's Fund
43	WFP	World Food Programme
44	WHO-GS	World Health Organisation Growth Standards
45	WFH	Weight for Height
46	WVK	World Vision Kenya
49	Ksh	Kenya Shillings

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EXECUTIVE SUMMARY

Introduction

SMART nutrition surveys conducted in July 2013 showed the GAM rates were ranging from 9.7% to 17.2% in Turkana Central, South and West survey zones. This indicated the nutrition situation was ranging from poor to critical situation according to WHO classification. In the July 2013 survey, Turkana North survey results were not validated due to poor data quality. As a result, the outcome for July 2014 survey for this cluster has been referenced to the June 2012 survey. Short rain assessment done in February 2014 showed that the food security situation was stressed with likelihood of deterioration if the long rains season (March to May 2014) performance was below average, late or poorly distributed. SMART nutrition survey was implemented in June 2014. The main objective of the survey was to determine the prevalence of malnutrition among the children aged 6- 59 months and factors linked to malnutrition

Specific Objectives

1. To determine the prevalence of acute malnutrition among under five year old children;
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 determine the prevalence of acute malnutrition among pregnant and lactating women;
4. To estimate coverage of iron / folic acid supplementation during pregnancy in women of reproductive age;
5. To estimate crude mortality and under-five mortality rate;
6. To estimate morbidity rates of children below five years;
7. To determine the proportion of households with access to safe water and sanitation and;
8. To investigate household food security and food consumption practice.

Methodology

- Survey design: Cross sectional.
- Target Population: Children 6-59 months of age in order to determine their nutritional status. In addition, women of the reproductive age (15-45 years) to establish their nutritional status.Number of clusters per survey zone was at least 34 clusters.
- Selection of clusters, households, children and women of reproductive age**:** The clusters were selected based on a three stage process - Probability Proportional to Size (PPS) method. Stage 1 involved random selection of clusters using ENA for SMART. The randomly selected clusters were subjected to a second stage process. This involved segmentation of sub-locations/villages within the randomly selected cluster using the estimated number of households per village/sub-locations. In stage 3, households within the randomly selected villages/sub-locations were equally subjected to a random selection using an updated list of households in the randomly selected village/sub-location. The randomly selected households were thereafter included in the survey process. All children between 6-59 months of age staying in the selected household were included in anthropometry sample. MUAC measurements were also taken for all women of reproductive age (15-49 years) in the selected households.

Table 2: Malnutrition and mortality results

Survey Zone	TURKANA CENTRAL	TURKANA SOUTH	TURKANA NORTH	TURKANA WEST
Wasting (WHO 2006)	**N=666**	**N=768**	**N=633**	**N=701**
Global Acute Malnutrition (GAM)(2014)	(191)**28.7%** (24.5-33.2 C.I)	(188) **24.5%** (20.8-28.6 C.I)	(172) **27.2%** (22.7-31.2 C.I)	(122) **17.4%** (14.3-21.0 C.I)
Global Acute Malnutrition (GAM)(2013)[1]	17.2 % (13.2 -21.9 C.I)	16.5 % (13.6-19.9 C.I)	15.3 % (11.7 - 19.6 C.I)	09.7% (7.7 – 12.1 C.I)
Severe Acute Malnutrition (SAM)(2014)	(45) **6.8%** (4.7-9.7 C.I)	(37) **4.8%** (3.6-6.5 C.I)	(33) **5.2%** (3.3-8.1 C.I)	(32) **4.6%** (3.1-6.6 C.I)
Severe Acute Malnutrition (SAM)	3.9% (2.5 -6.1 C.I.)	2.7 % (1.8 – 4.0 C.I)	2.3 % (1.3 - 4.1 C.I)	2.0% (1.1 - 3.6 C.I)
Mean z-scores ± SD (2014)	-1.38±1.03	-1.31±1.00	-1.42±0.99	-1.09±1.02
Mean z-scores ± SD	-1.03±1.09	-1.02±1.08	-1.35±1.07	-0.77±0.98
Design Effect (z-score < -2) (2014)	1.50	1.55	1.74	1.29
Design Effect (z-score < -2)	1.87	1.41	1.71	1.01
Underweight (WHO 2006)	**N=661**	**N= 774**	**N=629**	**N=696**
Prevalence of global underweight (2014)	(221) **33.4%** (28.8-38.4 C.I)	(290) **37.5%** (33.7-41.4 C.I)	(223) **35.5%** (30.4-40.9 C.I)	(158) **22.7%** (18.1-28.1 C.I)
Prevalence of global underweight	**26.8 %** (22.2 - 32.0 C.I.)	**31.0 %** (27.7 - 34.5 C.I.)	**23.4 %** (19.3 - 28.2 C.I)	(107) **13.6 %** (10.9 - 16.8 C.I.)
Prevalence of severe underweight (2014)	(62) **9.4%** (7.1-12.3 C.1)	(87) **11.2%** (9.0-14.0 C.I)	(67) **10.7%** (8.0-14.0 C.I)	(34) **4.9%** (3.2-7.3 C.I)
Prevalence of severe underweight	**7.8 %** (5.9 - 10.1 C.I.)	**7.4 %** (5.5 - 9.8 C.I.)	**5.8 %** (4.3 - 7.8 C.I)	**2.8 %** (1.8 - 4.4 C.I.)
Stunting (WHO 2006)	**N = 625**	**N =750**	**N =589**	**N = 682**
Prevalence of global stunting (<-2 z-score) (2014)	(128) **20.5%** (16.6-25.0 C.1)	(226) **30.1%** (26.4-34.2 C.I)	(156) **26.5%** (22.0-31.6 C.I)	(126) **18.5%** (14.6-23.2 C.I)
Prevalence of global stunting (<-2 z-score)	**22.0** % (17.7 – 27.0 C.I.)	**30.1 %** (26.5 - 34.0 C.I.)	**24.0 %** (19.0 - 29.9 C.I)	**18.3 %** (15.1 - 21.9 9 C.I.)
Prevalence of severe stunting (<-3 z-score) (2014)	(30) **4.8%** (3.1-7.3 C.I)	(70) **9.3%** (7.0-12.3 C.I)	(33) **5.6%** (3.9-8.1 C.I)	(24) **3.5%** (2.3-5.4 C.I)
Prevalence of severe	**5.0 %**	**9.8 %**	**6.8 %**	**4.2 %**

[1] Results for May 2012 in Turkana North have been used since results for June 2013 were not validated due to poor data quality.

stunting (<-3 z-score)	(3.3 - 7.5 C.I.)	(7.6 - 12.7 9 C.I.)	(5.2 - 8.9 C.I)	(2.9 - 5.9 C.I.)
Prevalence of Acute malnutrition MUAC (2014)	**N=678**	**N=782**	**N=648**	**N=717**
Severe under nutrition < 115 mm (2014)	(13) **1.9%** (1.1-3.3 C.I)	(7) **0.9%** (0.4-2.0 C.I)	(6) **0.9%** (0.4-1.9 C.I)	(15) **2.1%** (1.0-4.1 C.I)
Severe under nutrition < 115 mm	**0.8%** (0.4-2.0 CI)	**1.1%** (0.4-3.2 C.I)	**1.0%** (0.4 - 2.6 C.I)	**0.7%** (0.3-1.6 C.I)
Moderate ≥115–<125 mm (2014)	(52) **7.7%** (5.7-10.3 C.I)	(33) **4.2%** (2.9-6.1 C.I)	(80) **12.3%** (9.7-15.6 C.I)	(41) **5.7%** (4.1-7.9 C.I)
Moderate ≥115–<125 mm	**6.2%** (4.3-8.9 C.I)	**6.8%** (5.1-9.2 C.I)	**5.8 %** (4.2 - 8.1C.I)	**3.5%** (2.3-5.1 C.I)
Global Acute Malnutrition ≤125 mm (2014)	(65) **9.6%** (7.3-12.5 C.I)	(40) **5.1%** (3.5-7.4 C.I)	(86) **13.3%** (10.5-16.6 C.I)	(56) **7.8%** (6.0-10.2 C.1)
Global Acute Malnutrition ≤125 mm	**7.0%** (4.9-10.1 C.I)	**7.9%** (5.9 – 10.5 C.I)	**6.9 %** (5.1-9.3 C.I)	**4.2%** (3.0-6.0 C.I)
MORTALITY	**Central**	**South**	**North**	**West**
Crude Death Rate (CDR) (2014)	2.58 (1.73-3.84)	1.67 (1.11-2.52)	0.51 (0.23-1.13)	1.50 (1.05-2.13)
Crude Death Rate (CDR)	0.52 (0.25-1.08)	0.59 (0.36-0.96)	1.51 (1.10-2.08)	0.83 (0.54-1.27)
Under five Death Rate (U5MR) (2014)	1.80 (0.79-4.04)	0.39 (0.10-1.58)	0.96 (0.23-3.93)	0.51 (0.12-2.22)
Under five Death Rate	0.32 (0.07-1.37)	0.74 (0.32-1.69)	1.78 (1.16-2.73)	1.00 (0.50-2.00)
Maternal Malnutrition	**N=379**	**N=406**	**N=344**	**N=443**
Pregnant/Lactating mothers of U6 MUAC: Wasted <21 cm (2014)	(46) **12.1%**	(20) **4.9%**	(49) **14.2%**	(33) **7.4%**
Pregnant/Lactating mothers of U6 MUAC: Wasted <21 cm	7.5%	10.2%	9.5%	6.9%
Care takers Malnutrition	**N= 157**	**N=205**	**N=171**	**N=190**
% Caretakers with MUAC< 21cm (2014)	(25) **15.9%**	(15) **7.3%**	(21) **12.3%**	(13) **6.8%**
% Caretakers with MUAC < 21cm	25.9%	35.7%	27.8%	29.5%

Interpretation of results

1. Compared to July 2013, Global Acute Malnutrition rates increased significantly in Turkana west from **9.7**% to **17.4%.** This was deterioration from **Poor** to **Critical** nutrition situation[2]. A significant increase in acute malnutrition was reported in Turkana Central and Loima from **17.2%** to **28.7%** indicating deterioration from **critical** to **very critical** nutrition situation**.** In Turkana South and East the increase is from **16.5%** to **24.5%** indicating deterioration from **critical** to **very critical** nutrition situation. In Turkana North and Kibish, GAM rates increased from **15.3%** (June 2012) to **27.2%** indicating a **Very *Critical*** nutrition situation, this being deterioration from a **Critical** nutrition situation that was reported in June 2012[3].
2. Overall, wasting is above the national average of 6.7% (KDHS 2008). Analysis of risk of malnutrition by age group 6-29 months and 30-59 months indicated that there was no significant difference in the age groups in all the survey zones (Turkana Central, South, North and West).The proportion of boys malnourished was higher than girls in all the survey zones.
3. Crude Death Rate was at emergency levels (2.58⁄10,000 people/day) in Turkana Central and at alert levels in Turkana South (1.67⁄10,000 people/day), Turkana North (0.51⁄10,000 people/day) and Turkana West (0.50⁄10,000 people/day). The leading causes of mortality among persons over the age of five years were Malaria and accidents/Killings. Under five death rates were mainly caused by malaria and Acute Respiratory Infections.
4. High Impact Nutrition Indicators (HiNi) that showed low performance include Vitamin A supplementation, iron supplementation, de-worming, zinc supplementation for diarrhea cases and hand washing.
5. Morbidity among under five children revealed that half of the children had been sick in the previous two weeks to the survey. The common ailments reported were fever/malaria, acute respiratory infection and diarrhoea. These findings are not significantly different from those that were reported in July 2013.
6. Hand washing with soap and water is low (22-30%) in all the survey zones. Latrine access is low (10-20 %), only 4-11% households own a latrine. Open defecation is high (at least 80%) across all the survey zones.
7. Household mosquito net ownership (11-35%) and mosquito net utilization (8-29%) was low across all the survey zones.
8. Over 90% of the households in the survey zones reported facing food shortage or not having money to buy food and thus resorting to coping strategies. Coping strategy Index was high in all the survey zones. However the highest CSI was reported in Turkana Central (22.7) while the lowest was reported in Turkana West (13.8).In reference to WFP corporate thresholds for coping strategy index, the overall mean food consumption score for all the survey zones was within the acceptable thresholds (> 35%). However, Turkana Central

[2] WHO classification

[3] Survey results for Turkana North/Kibish cluster in July 2013 were invalidated due to poor data quality. The comparison has therefore been made in reference to June 2012 survey.

reported the highest percent with poor food consumption score (27.9%). This was a contributing factor to the high malnutrition rates in all the survey zones.

9. In addition, FEWSNET food security forecast for June-September 2014, indicate that the food security situation in pastoral and agro pastoral areas will remain largely stressed (IPC Phase 2) However; Households in localized areas in Turkana are likely to fall into a Crisis (IPC Phase 3) by September 2014.

RECOMMENDATIONS

Short-term interventions

1. Immediate intensification of the existing nutrition program through (i) increased active case finding at community level (ii) remapping of outreach to increase geographical coverage, (iii) intensification of the monitoring of the nutrition situation and program quality (iv) Linkage of households with children admitted in SFP and OTP to GFD (v) Review through County Nutrition Technical Forum on the need for strengthening existing and creating additional Stabilization Centres in Turkana South (Katilu Health Centre), Turkana West (Lopiding Hospital)and Turkana East (Lokori AIC Health Centre).
2. Strengthen the following High Impact Nutrition Interventions that are currently below the national target of 80% (Iron supplementation, vitamin A supplementation, therapeutic Zinc supplementation, hand washing with soap and de-worming).
3. Strengthen advocacy/public health campaigns on the use of insecticide treated mosquito nets and where possible distribution to households targeting U5 children, pregnant and lactating women.
4. Adopt strategies that will increase access to safe drinking water and latrine use.
5. Food security is a challenge and thus households that are most vulnerable and deprived require social protection mechanisms such as food aid and cash transfers or any other social safety net interventions.
6. Strengthen nutrition early warning systems to be able to establish trends, detect changes and advocate for timely response.

1.0 INTRODUCTION

1.1 Background information

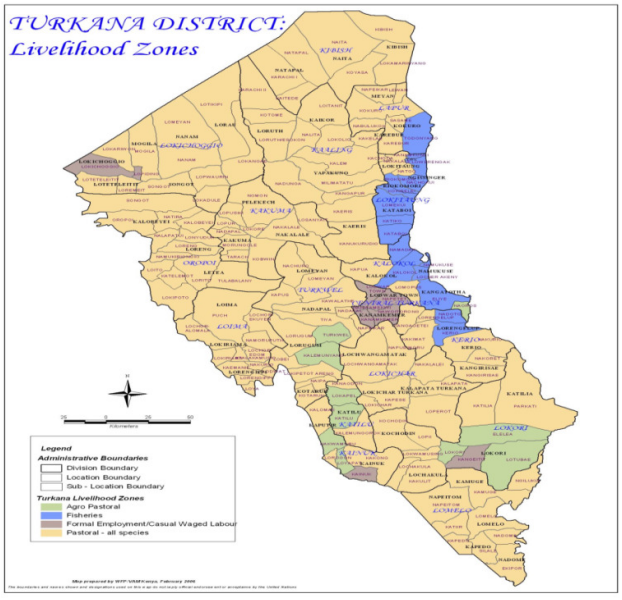
Turkana County is situated in the arid North-western region of Kenya, sharing international borders with Ethiopia, Sudan and Uganda and locally with Baringo, West Pokot and Samburu counties. The County has an estimated total population of 855,399[4] and a coverage area of 77,000 km^2. It is sub-divided into seven sub counties namely; Turkana Central, Loima, Turkana South, Turkana East, Turkana North, Kibish and Turkana West.

The county has poverty index of 94% which contributes a 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).

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. According to National Drought Management Authority, 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. Therefore, the county require continuous surveillance of nutrition situation due to its vulnerability to adverse climatic conditions such as drought and flooding.

1.1.1 Map of Turkana County

Figure 1: Livelihood zones in Turkana

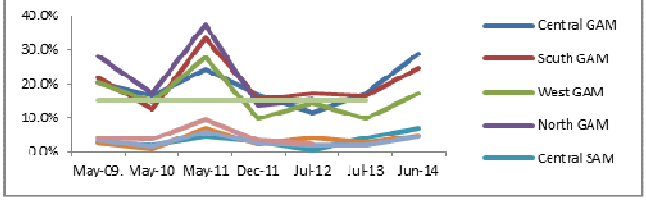


[4] KNBS - Population estimates from 2009 National Census Data

1.2 Nutrition

The overall nutrition situation in Turkana county has been stable from December 2011 following the severe regional drought to July 2013 (*see figure 1*). Nutrition surveys conducted in July 2013 reported a significant reduction of rates of acute malnutrition in Turkana West, a stable nutrition situation in Turkana South, but an increase of acute malnutrition in Turkana Central.

Figure 1: Global Acute Malnutrition and Severe Acute Malnutrition Trends Turkana County (May 2008-June 2014)



In February 2014, analysis of the nutrition situation using secondary data - MUAC sentinel site surveillance data[5], programme admissions trends and mass screening data, indicated deterioration in the nutrition situation in the area, but which was within the normal seasonal trends. The deterioration was linked to the declining food security situation in the area, especially in some parts of Turkana Central and Turkana North. The results of the analysis also indicated that the nutrition situation was likely to deteriorate further should the performance of the long rains season of 2014 be below normal.

In March 2014, based on this analysis, the expected caseload[6] of children with severe malnutrition has been recalculated from 5,274 reported in July 2013 to 9,663. Admission data from the Integrated Management of Acute Malnutrition (IMAM) programme in the county indicate a fluctuating trend in the past 3 months[7]. Due to the concerns of a deteriorating nutrition situation earlier this year, mass screening for cases of acute malnutrition using MUAC was conducted in February by the nutrition sector resulting in an increase in admissions for the same month. The number of admissions decreased in the month of March due to service delivery interruption by national supplementary immunization campaigns for polio.

1.2.1 Current nutrition specific response

1. Implementation of High Impact Nutrition Interventions is on-going in 111 health facilities and 138 outreach clinics. The ministry of health is supported by the following partners to implement the activities, World Vision Kenya in Turkana South and Central, Save the children International in Turkana South (Lokichar), Loima, Kibish and Turkana North and; International Rescue Committee in Turkana West and Kenya Red cross supporting emergency program implementation and scalability as needed.
2. Technical capacity enhancement; the county currently has 20 Nutritionists supporting implementation of activities between the MOH and partners. UNICEF Kenya has a full time Nutrition Support Officer based in Turkana to support the Ministry of Health in coordination

[5] MUAC data collected monthly by National Drought Authority Management
[6] Calculated based on the upper confidence interval of the July 2013 surveys
[7] Kenya District Health Information Systems (DHIS) IMAM Admission Data, December 2013

of activities, emergency response planning and scaling of emergency activities to meet district and country level targets for high impact nutrition interventions.

3. A total of 679 community health workers are being supported in the current nutrition program and advocacy is on-going for integration of nutrition in all community efforts.
4. Coordination: coordination is currently on-going with support from partners (County health technical review meeting-Quarterly, County Nutrition technical forum-monthly). There have been on-going efforts to ensure coordinated support and standardization. Additionally efforts have been made to ensure nutrition is well integrated within the MOH structures.
5. Monitoring-Quarterly joint supervisions are done by partners and Ministry of Health to provide technical support to nutrition programs as well as ensure quality of services offered. Food and nutrition information from routine nutrition programs and NDMA early warning system is analyzed on monthly basis and discussed in monthly nutrition technical forums to inform program decisions for quality service delivery.
6. Essential nutrition supplies are provided by UNICEF and WFP

1.2.2 Nutrition Surveillance:

Nutrition surveillance data in Turkana is routinely collected by National Drought Management Authority (NDMA). On a monthly, field monitors collect data on mid upper arm circumference (MUAC) of children 12-59 months old, from NDMA's sentinel sites as part of its early warning system(EWS). Data is then submitted to NDMA data analyst and outcomes published in the Early Warning Bulletin (EWB). Other organizations working in collaboration with MOH; WVK, IRC, and SCI have received support from UNICEF and DFID to conduct nutrition surveys. SMART nutrition survey data collected from the four survey zones, from 2008, is used for annual/biannual trend analysis.

1.3 Food security situation

The drought situation in the county in all livelihoods is at '*Alert and worsening '*stage, apart from the formal employment/casual labour and agro pastoral livelihood zones that are at '*Alert, and Improving*[8] *stage*. The rainfall was erratic, below average and poorly distributed. For instance Lodwar meteorological station reported a total of 31.6mm from January-June, which is 84% lower than the five averages for the period (189.2mm). Cereal prices and milk consumption have an effect on the household food security and subsequently the nutrition situation of the population. An analysis of the milk availability and cereal prices from the NDMA bulletins for June 2014 indicated a significant increase in cereal prices and reduction of milk availability. There was a decrease of household milk production from 27.5% in May 2014 to 12.0%. Milk consumption at household level in the month of June 2014 was 8.5% which is a decrease from 25.2% in April 2014. Goat prices increased marginally between May and June 2014.

[8]Turkana County- Drought Monitoring And Early Warning Bulletin –June 2014

According to the Short rains assessment conducted in February 2014, the food security situation was classified as 'stressed' (IPC Phase 2) across all the livelihood zones in Turkana County but with a notable deterioration compared to the long rains season of 2013. A total of 142,000 persons were reported to be in need of immediate food assistance.

Currently, WFP/GoK provides food assistance to 58,000 persons in Food for asset and 93,200 in General Food Distribution program. DFID funded- Hunger Safety Net Program (HSNP) targets 39,918 household main providers and they are provided with Ksh 2,300 per month. County Government also provides emergency food assistance to Turkana Population

1.4 Humanitarian and Development partners

1. Many agencies, UN and NGOs are working in collaboration with the ministry of health in child survival interventions. The main responsibility of MoH is quality assurance of the nutrition and health- related activities through the coordination of all activities in Turkana County. The NGOs implementing health and nutrition programmes include: Save the children International (SCI), World Vision Kenya (WVK) and International Rescue Committee (IRC), APHIA PLUS IMARISHA and Elizabeth Glaser pediatric Aids Foundation(EGPAF)
2. UNICEF supports Nutrition, Health, WASH, Communication for Development and Child Protection.
3. World Food Programme (WFP) provides Food for Assets (FFA), General Food Distribution (GFD) in addition to providing SFP food.
4. Child fund, OXFAM and Turkana Relief program implements FFA and GFD
5. Kenya Red Cross supports emergency response including Nutrition, WASH and livelihood projects.
6. Other agencies implementing resilience and livelihood projects are FAO, ADESO, DoL, APHIA PLUS Imarisha and IOM.

1.5 Objectives of the survey

1.5.1 Main Objective

The overall objective of the survey was to determine the prevalence of malnutrition among the children aged 6- 59 months and factors linked to malnutrition.

1.5.2 Specific Objectives

1. To determine the prevalence of acute malnutrition among under five year old children;
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 determine the prevalence of acute malnutrition among pregnant and lactating women;
4. To estimate coverage of iron / folic acid supplementation during pregnancy in women of reproductive age;
5. To estimate crude and under-five mortality rates;

6. To estimate morbidity rates of children below five years;
7. To determine the proportion of households with access to safe water and sanitation and;
8. To investigate household food security and food consumption practice.

2.0 METHODOLOGY

2.1 Survey Zones

Turkana County was divided into four independent survey zones/clusters to cover all the livelihood zones and administrative boundaries. The survey zones and sub counties covered were as follows; Turkana Central (Central and Loima), Turkana South (South and East), Turkana North (North and Kibish) and Turkana West (West).

- Survey design: A Cross sectional survey design was used.
- Target Population: The survey covered Children 6-59 months of age and women of the reproductive age (15-49 years).
- Calculation of sample size: Factors considered included previous prevalence, precision, design effect and household size.

Table 3: Anthropometry sample size

Survey Zone	Turkana Central	Turkana South	Turkana North	Turkana West
Estimated prevalence [9]	17.2%	16.5%	19.6%	12.1%
±Desired precision[10]	5.0%	4.5%	5%	3.6%
Design effect[11]	1.8	1.5%	1.5%	1.2%
Average household size[12]	6	6	6	6
Percentage of under five children[13]	15.2%	12.3%	12.3%	12.3%
Percentage of non-respondent	3	3	3	3
Households to be included	539	662	614	639
Children to be included	429	427	319	412

Table 4: Mortality sample size

Survey Zone	Turkana Central	Turkana South	Turkana North	Turkana West
Estimated CMR[14]	0.52	0.59	0.83	1.51
Precision	0.4	0.4	0.4	0.6
Design effect	1.8	1.5	1.2	1.5
Recall period(days)[15]	97.5	97.5	97.5	97.5
Average household size	6	6	6	6
% non- response	3	3	3	3
Population to be included	2509	2372	2699	2670
Households to be included	431	408	464	459

[9] Based on 2013 smart Nutrition survey(Central, South and West) and 2012 Survey for Turkana North
[10] Based on 2013 SMART nutrition Survey
[11] Based on 203 SMART nutrition survey
[12] Based on Kenya population census, 2009
[13] Based on Kenya population census, 2009
[14] Based on Turkana Mortality survey results June 2013 and 2012(Turkana North)
[15] Beginning of RP: beginning of TT campaign which was 28th February 2014.End of RP was 4.5th June 2014

Number of clusters for anthropometry and mortality were as follows; Turkana Central-34, South-39, North-37 and Turkana West-38.

2.1.1 Selection of clusters:

A three stage process was used to select the clusters. Stage 1 involved random selection of clusters using ENA for SMART. The randomly selected clusters were subjected to a second stage process. This involved segmentation of sub-locations/villages within the randomly selected cluster using the estimated number of households per village/sub-locations. In stage 3, households within the randomly selected villages/sub-locations were equally subjected to a random selection using an updated list of households in the randomly selected village/sub-location. The randomly selected households were thereafter included in the survey process

2.1.2 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.

2.1.3 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.

2.1.4 Selection of women for determination of nutrition status

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

2.2 Selection of the survey team, training and pre-testing of the questionnaires

2.2.1 Survey team

The survey was coordinated by County Health Management Team (CHMT) and supervised by four Sub County Nutrition Officers. The team was supported by officers from implementing partners (County and National) and the MoH-Human Nutrition and Dietetics Unit. The survey was undertaken by 5 teams in each survey zone.

2.2.2 Survey team training

The survey supervisors/team leaders (from HMT and partners) were trained on supervisor's module for SMART for 6 days. The training was supported by trainers from ACF and HNDU office at National level. The team supported facilitation of the enumerators training.

A four-day training workshop was conducted before the commencement of the survey. The training focused on: the purpose and objectives of the survey; familiarization with the questionnaire by reviewing the purpose for each question; interviewing techniques and recording of data; how to take anthropometric measurements; and cluster and household selection. 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 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.

2.3 Data collection

Data collection took place concurrently in all the four survey zones. The data collection took 8 days. Survey coordinators 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 including assurance of confidentiality of information that they would provide. A verbal consent was obtained from the mother/primary caregiver before proceeding with the interview. Through Open Data Kit application, the team used tablets with predesigned e-questionnaires to record the responses. The data was uploaded to Gmail servers at the end of each day. Anthropometry data was downloaded daily from the same servers reviewed/analyzed for plausibility with feedback provided to the teams.

2.4 Variables Measured

Age: The exact age of the child was recorded in months. Calendar of events, health, baptismal 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. Standing height was taken for children with a height greater or equal to 87 cm or who were 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 with a precision of 0.1cm (1mm). MUAC measurements were taken for children 6-59 months of age and equally for women in the reproductive age (18-45 years of age).

Bilateral oedema: This was assessed by the application of normal thumb pressure for at least 3 seconds to both feet at the same time. The presence of a pit or depression on both feet 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 the 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 and recall from caregivers. When estimating measles coverage, only children 9 months of age or older were taken into consideration as it is the age cohort that is eligible for measles 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 and immunization campaign cards and recall from caregivers.

Iron-Folic Acid supplementation: For all female caregivers, information on IFA supplementation and number of days (period) they took IFA supplements in the pregnancy of the last birth taken.

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

Food security status of the households: Food consumption score, source of predominant foods and coping strategies data were collected.

Household water consumption and utilization: The indicators used were mainly source of drinking and household water, time taken to the 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 obtained.

Education: Data on the enrolment in school for children aged 5-18 years and reasons for not attending school were collected.

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

Household food consumption score. 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 that was referenced during analysis of the data.

Table 5: WFP corporate FCS thresholds

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

Coping strategy index: 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

Nutrition Indicators for children 6-59 months of age

The following nutrition indicators were used to determine the nutrition status of the under - fives

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 signifying under nutrition

Mortality indices

The crude mortality rate (CMR) is determined for the entire population surveyed for a given period. The CMR using the current census method is calculated as follows[16]:

$$\text{CMR} = \frac{10{,}000 \text{ people}}{\text{Number of recall days}} \times \frac{\text{number of deaths during recall}}{\text{number of current residents} + 1/2(\text{No. of deaths during recall}) - 1/2(\text{No. of births during recall})} = \text{Deaths/10,000/day}$$

The proportion of deaths among children under-five years of age (U5MR) is also calculated the same way using the under-five population data. The thresholds are defined as follows[17]:

Table 7: ***Proportion of deaths among total population (CRM) and children under 5 years (U5MR)***

	Total population CMR	Under-five population U5MR
Alert level:	1/10,000 people/day	2/10,000 children/day
Emergency level:	2/10,000 people/day	4/10,000 children/day

2.5 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.

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 (1st November 2011 version) by the coordination team. The nutritional indices were cleaned using SMART flags in the ENA for SMART software. Table 8 summarises other criterion that was used for exclusion.

[16] Save the Children (November 2004) "Emergency Nutrition Assessment Guidelines for field workers"
[17] The Sphere Standards, 2004

Table 8: ***Definition of boundaries for exclusion***

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

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

2.6 Survey Limitations

- 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 the child was first seen at the health facility or just the month of birth.
- There was poor recording of vitamin A 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.

3.0 RESULTS AND DISCUSSIONS

3.1 Demographic results

3.1.1 Summary of household demographics

Table 9: Household Demography

Turkana	Turkana Central	Turkana South	Turkana North	Turkana West
Demographic Household	**N=523**	**N=599**	**N=477**	**N=598**
Mean household size	4.0	4.4	4.6	4.3
Total population	2100	2616	2181	2570
Males	1022	1323	1040	1214
Females	1078	1293	1141	1356
Sex ratio	0.94	1.02	0.91	0.90
Total Under five population	666	768	633	701

The mean household size was approximately 5.0. The sex ratio of male to female was around 0.9 which is considered normal.

3.1.2 Residency and marital Status

90-100% of the caretakers interviewed were residents of the respective survey zones. 8.6% of those interviewed in Turkana South were IDPS. At least 80% of the caretakers in all the survey zones reported that they are married. Only 1-3% of the caretakers were single.

Table 10: Summary of caretakers' marital status

Turkana	Turkana Central	Turkana South	Turkana North	Turkana West
	N=523	**N=599**	**N=477**	**N=598**
Married	(484) 92.5%	(559) 93.3%	(405) 84.9%	(52) 88.1%
Single	(3) 0.6%	(16) 2.7%	(13) 2.7%	(18) 3.0%
Widowed	(15) 2.9%	(14) 2.3%	(45) 9.4%	(46) 7.7%
separated	(3) 0.6%	(7) 1.2%	(10) 2.1%	(3) 0.5%

3.1.3 Occupation of the household main provider

The three main occupations in all the survey zones were firewood selling/charcoal burning (14-42%) livestock herding (12-25%) and Petty trade (20-25%).

Table 11: Summary of household's main provider occupation

	Turkana Central	Turkana South	Turkana North	Turkana South	Turkana West
	N=523	**N=599**	**N=477**	**N=599**	**N=598**
Livestock herding	(146) 27.9%	(71) 11.9%	(117) 24.5%	(71) 11.9%	(107) 17.9%
Own farm labour	(4) 0.8%	(70) 11.7%	(2) 0.4%	(70) 11.7%	(2) 0.3%

Employed (salaried	(40) 7.6%	(18) 3.0%	(13) 2.7%	(18) 3.0%	(23) 3.8%
Waged Labour (casual)	(61) 11.7%	(79) 13.2%	(32) 6.7%	(79) 13.2%	(67) 11.2%
Petty trade	(129) 24.7%	(147) 24.5%	(91) 19.1%	(147) 24.5%	(120) 20.1%
Merchant/trader	(7) 1.3%	(0) 0.0%	(27) 5.7%	(0) 0.0%	(9) 1.5%
Firewood/charcoal	(75) 14.3%	(160) 26.7%	(121) 25.4%	(160) 26.7%	(251) 42.0%
Fishing	(9) 1.7%	(0) 0.0%	(34) 7.1%	(0) 0.0%	(0) 0.0%
Others (Basketry, Local alcohol brewing etc.)	(52) 9.9%	(54) 9.0%	(40) 8.4%	(54) 9.0%	(19) 3.2%

3.2 Anthropometry

3.2.1 Age verification

66-86% of the children age was verified from health card, birth certificate/notification or baptism card. Age determination for 14-34% was based on recall, hence prone to bias. This might have affected indices with age as a variable such as stunting and underweight.

Table 12: Summary of Children age verification means

Turkana	**Turkana Central**	**Turkana North**	**Turkana South**	**Turkana West**
	N=656	**N=582**	**N=741**	**N=757**
Health Card	(561) 85.5%	(401) 68.9%	(632) 85.3%	(488) 64.5%
Birth certificate/Notification	(4) 0.6%	(6) 1.0%	(2) 0.3%	(6) 0.8%
Baptism Card	(0) 0.0%	(12) 2.1%	(0) 0.0%	(2) 0.3%
Recall	(91) 13.9%	(163) 28.0%	(107) 14.4%	(261) 34.5%

3.2.2 Age and sex distribution of the sampled children

Generally there were younger children selected in the sample. For example in Central there were 32.2% children instead of 20-25% in the age group 6-17 months. The overall sex ratio (boys: girls) was within the acceptable range of 0.8-1.2 (Table 13). This confirms that both sexes were equally distributed in all the clusters, and the sample was unbiased. However, younger children were selected in all the survey zones.

Table 13: Distribution of age and sex of sample size

	Turkana Central N=666		**Turkana south N=768**		**Turkana North N=633**		**Turkana West N=701**	
AGE (mo)	**Total %**	**Ratio Boy: girl**	**Total %**	**Ratio Boy: girl**	**Total %**	**Ratio Boy: girl**	**Total %**	**Ratio Boy: girl**
6-17	32.2	0.8	27.2	1.1	29.0	1.0	32.1	1.1
18-29	27.1	0.8	27.1	1.4	21.8	1.0	22.7	1.0
30-41	20.2	0.9	24.4	0.9	25.2	1.1	25.1	1.0
42-53	15.6	1.0	15.9	1.2	18.7	1.3	14.1	0.7
54-59	4.9	1.4	5.4	1.2	5.4	1.1	6.0	0.8
Total	100.0	0.9	100.0	1.1	100.0	1.1	100.0	1.0

3.3 Prevalence of Acute Malnutrition

The current malnutrition levels are above emergency threshold of 15% in all the survey zones. There were 0.6% cases of edema in Turkana Central, 0.4% in Turkana South, 0.2% in Turkana North and 0.6% in Turkana west. The Weight for Height standard deviation of 0.99-1.03 was within the acceptable range of 0.8-1.2.The design effect was acceptable (1.3-1.6) in Turkana Central, Turkana South and Turkana West. However in Turkana North the design effect of 1.74 indicated heterogeneity in the sample selected.

Table 14: Prevalence of malnutrition weight-for-height z-scores (WHO Standards 2006)

Turkana	Turkana Central	Turkana South	Turkana North[18]	Turkana West
Wasting (WHO 2006)	**N=666**	**N=768**	**N=633**	**N=701**
Global Acute Malnutrition (GAM)(2014)	**28.70%** (24.5-33.2 C.I)	(188) **24.5%** (20.8-28.6 C.I)	(172) **27.2%** (22.7-31.2 C.I)	(122) **17.4%** (14.3-21.0 C.I)
Global Acute Malnutrition (GAM)(2013)	17.2 % (13.2 -21.9 C.I)	16.5 % (13.6-19.9 C.I)	15.3% (11.7-19.6 C.I)	09.7% (7.7 – 12.1 C.I)
Severe Acute Malnutrition (SAM) 2014	**6.80%** (4.7-9.7 C.I)	(37) **4.8%** (3.6-6.5 C.I)	**(33) 5.2%** (3.3-8.1 C.I)	**(32) 4.6%** (3.1-6.6 C.I)
Severe Acute Malnutrition (SAM) 2013	3.9% (2.5 -6.1 C.I.)	2.7 % (1.8 – 4.0 C.I)	2.3% (51.3-4.1 C.1)	2.0% (1.1 - 3.6 C.I)

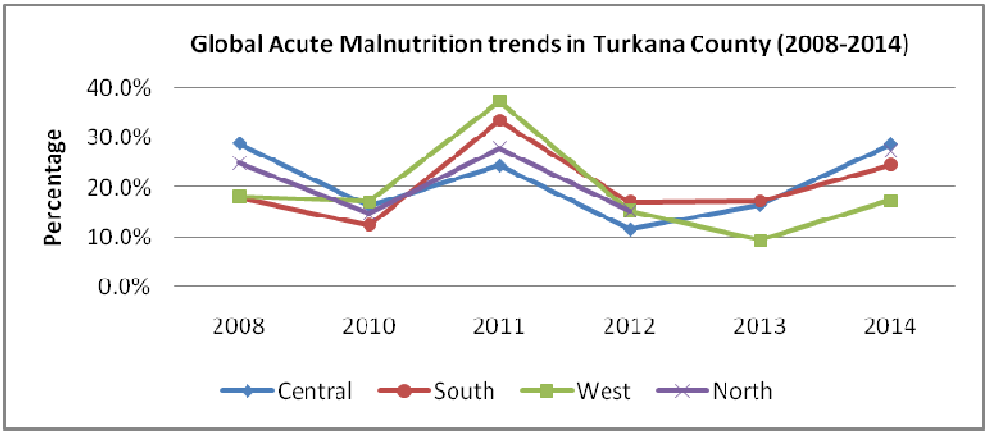
Global Acute malnutrition rates increased significantly in Turkana west from **9.7**% in July 2013 to **17.4%.**This was deterioration from **Poor** to ***Critical*** nutrition situation according to WHO classification. A significant increase in acute malnutrition was reported in Turkana Central/Loima from 17.2% in July 2013 to **28.7%** depicting deterioration from critical to very critical nutrition situation. In Turkana South/East GAM rates increased from 16.5% in July 2013 to **24.5%** indicating deterioration from critical to very critical nutrition situation. In comparison to June 2012[19], the prevalence of malnutrition in Turkana North/Kibish escalated from 15.3% to **27.2%** indicating a ***Very Critical*** situation.

Figure 4 illustrates trends of malnutrition in Turkana County. The results for 2009 which used a different methodology (LQAS) and 2013 Turkana North results that were not validated have not been captured.

[18] 2014 results compared with 2012 SMART survey results because 2013 survey for North were not validated

[19] Results for Turkana North in the July 2013 survey were invalidated due to poor quality data. Reference for this region has therefore been made to results of June 2012 survey.

Figure 2: Trends of Global Acute Malnutrition in Turkana County (2008-2014)



As shown on figure 2, the rates of malnutrition the overall nutrition situation in all the survey zones has been stable from December 2011 following the severe regional drought to July 2013. Overall, wasting is above the national average of 6.7% (KDHS 2008). The proportion of boys malnourished was higher than girls in all the survey zones (Table 15). Analysis of risk of malnutrition by age group 6-29 months and 30-59 months indicated that there was no significant difference in the age groups in all the survey zones.

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

The proportion of boys malnourished was higher than girls in all the survey zones

Table 15: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or edema) and by sex

	Turkana Central N= 666	Turkana South N=768	Turkana North N=633	Turkana West N=701
Sex	Prevalence of global malnutrition (<-2 z-score and/or edema)	Prevalence of global malnutrition	Prevalence of global malnutrition	Prevalence of global malnutrition (<-2
Boys	(97) 31.3 % (26.4 - 36.6%)	(125) 30.6 % (25.4	(100) 30.3 % (23.	(72) 20.8 % (16.9 -
Girls	(94) 26.4 % (20.8 - 32.9%.)	(63) 17.5 % (14.4	(72) 23.8 % (18.2	(50) 14.1 % (10.9 -

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

Analysis of risk of malnutrition by age group 6-29 months and 30-59 months indicated that there was no significant difference in the age groups in all the survey zones (Turkana Central, South, North and West).

Table 16: Distribution of acute malnutrition and edema based on weight for height Z scores WHO Standards 2006

	Turkana Central		Turkana South		Turkana North		Turkana west	
	<-3 z-score	**>=-3 z-score**	**<-3 z-score**	**>=-3 z-score**	**<-3 z-score**	**>=-3 z-score**	**<-3 z-score**	**>=-3 z-score**
Oedema present	Marasmic kwashiorkor No. 2 (0.3 %)	Kwashiorkor No. 2 (0.3 %)	Marasmic kwashiorkor No. 1 (0.1 %)	Kwashiorkor No. 2 (0.3 %)	Marasmic kwashiorkor No. 0 (0.0 %)	Kwashiorkor No. 1 (0.2 %)	Marasmic kwashiorkor No. 0 (0.0 %)	Kwashiorkor No. 4 (0.6 %)
Oedema absent	Marasmic No. 45 (6.6 %)	Not severely malnourished No. 629 (92.8 %)	Marasmic No. 42 (5.4 %)	Not severely malnourished No. 735 (94.2 %)	Marasmic No. 41 (6.3 %)	Not severely malnourished No. 606 (93.5 %)	Marasmic No. 33 (4.6 %)	Not severely malnourished No. 680 (94.8 %)

There were cases of Marasmic- kwashiorkor and kwashiorkor in Turkana Central, South and West. Turkana North had no case of marasmic kwashiorkor but there were 0.2% cases of kwashiorkor.

3.3.3 Prevalence of acute malnutrition based on MUAC

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

Overall, 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 the population in Turkana, similar to the Somali and South Sudanese, with a high cormic index[20].This means, overall significantly lower cases of malnourished children are identified using MUAC when compared to weight for height. This is reflected in the rates of MUAC from the February 2014 mass screening and the NDMA early warning MUAC data. However, there is need for further technical guidance from national and global experts on how programs can deal with this scenario. The table below summarizes MUAC results:

Table 17: Prevalence of Malnutrition based on MUAC in all the survey zones

Turkana	**Turkana Central**	**Turkana South**	**Turkana North**	**Turkana West**
Prevalence of Acute malnutrition MUAC	**N=678**	**N=782**	**N=648**	**N=717**
Severe under nutrition < 115 mm (June 2014)	(13) **1.9%** (1.1-3.3 C.I)	(7) **0.9%** (0.4-2.0 C.I)	(6) **0.9%** (0.4-1.9 C.I)	(15) **2.1%** (1.0-4.1 C.I)
Severe under nutrition < 115 mm (July 2013)	**0.8%** (0.4-2.0 CI)	**1.1%** (0.4-3.2 C.I)	**1.0%** (0.4 - 2.6 C.I)	**0.7%** (0.3-1.6 C.I)

[20] 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, Sth 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

Moderate ≥115–<125 mm (June 2014)	(52) **7.7%** (5.7-10.3 C.I)	(33) **4.2%** (2.9-6.1 C.I)	(80) **12.3%** (9.7-15.6 C.I)	(41) **5.7%** (4.1-7.9 C.I)
Moderate ≥115–<125 mm (July 2013)	**6.2%** (4.3-8.9 C.I)	**6.8%** (5.1-9.2 C.I)	**5.8 %** (4.2 - 8.1 C.I)	**3.5%** (2.3-5.1 C.I)
Global Acute Malnutrition ≤125 mm (June 2014)	(65) **9.6%** (7.3-12.5 C.I)	(40) **5.1%** (3.5-7.4 C.I)	(86) **13.3%** (10.5-16.6 C.I)	(56) **7.8%** (6.0-10.2 C.1)
Global Acute Malnutrition ≤125 mm (July 2013)	**7.0%** (4.9-10.1 C.I)	**7.9%** (5.9 – 10.5 C.I)	**6.9 %** (5.1-9.3 C.I)	**4.2%** (3.0-6.0 C.I)

3.4 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. The prevalence of underweight is shown in table 18. There is significant increase in the prevalence of underweight in June 2014 compared to July 2013 in all the survey zones.

Table 18: Prevalence of underweight

Turkana	**Turkana Central**	**Turkana South**	**Turkana North**	**Turkana West**
Underweight (WHO 2006)	**N=661**	**N= 774**	**N=629**	**N=696**
Prevalence of global underweight (June 2014)	(221) **33.4%** (28.8-38.4 C.I)	(290) **37.5%** (33.7-41.4 C.I)	(223) **35.5%** (30.4-40.9 C.I)	(158) **22.7%** (18.1-28.1 C.I)
Prevalence of global underweight (June 2013)	**26.8 %** (22.2 - 32.0 C.I.)	**31.0 %** (27.7 - 34.5 C.I.)	**23.4 %** (19.3 - 28.2 C.I)	**13.6 %** (10.9 - 16.8 C.I.)
Prevalence of severe underweight (June 2014)	(62) **9.4%** (7.1-12.3 C.1)	(87) **11.2%** (9.0-14.0 C.I)	(67) **10.7%** (8.0-14.0 C.I)	(34) **4.9%** (3.2-7.3 C.I)
Prevalence of severe underweight (June 2013)	**7.8 %** (5.9 - 10.1 C.I.)	**7.4 %** (5.5 - 9.8 C.I.)	**5.8 %** (4.3 - 7.8 C.I)	**2.8 %** (1.8 - 4.4 C.I.)

3.5 Prevalence of stunting

Height for age (stunting) is an indicator of chronic (long-term) malnutrition arising from deprivation related to persistently 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.

There is no significant difference in the prevalence of stunting in July 2014 compared to June 2013 in all the survey zones. This is indicative of minimal/no positive change in addressing stunting context factors (community and societal) and causes.

Table 19: Prevalence of Stunting

Turkana	Turkana Central	Turkana South	Turkana North	Turkana West
Stunting (WHO 2006)	**N = 625**	**N =750**	**N =589**	**N = 682**
Prevalence of global stunting (<-2 z-score) 2014	(128) **20.5%** (16.6-25.0 C.1)	(226) **30.1%** (26.4-34.2 C.I)	(156) **26.5%** (22.0-31.6 C.I)	(126)**18.5%** (14.6-23.2 C.I)
Prevalence of global stunting (<-2 z-score) 2013	**22.0** % (17.7 – 27.0 C.I.)	**30.1 %** (26.5 - 34.0 C.I.)	**24.0 %** (19.0 - 29.9C.I)	**18.3 %** (15.1 - 21.9 C.I.)
Prevalence of severe stunting (<-3 z-score) 2014	(30) **4.8%** (3.1-7.3 C.I)	(70) **9.3%** (7.0-12.3 C.I)	(33) **5.6%** (3.9-8.1 C.I)	(24) **3.5%** (2.3-5.4 C.I)
Prevalence of severe stunting (<-3 z-score) 2013	**5.0 %** (3.3 - 7.5 C.I.)	**9.8 %** (7.6 - 12.7 9 C.I.)	**6.8 %** (5.2 - 8.9 C.I)	**4.2 %** (2.9 - 5.9 C.I.)

3.6 Mortality rates (Retrospective over 97.5 days prior to interview)

The crude death rate (CDR) is defined as the number of people in the total population who die over a specified period of time, as elaborated in the Mortality Indices. In the formula, total population is the population present at the midpoint of the time interval. The time interval is the length of time within which the respondents are asked to state if any deaths have occurred; this is usually referred to as the "recall period." The units for the formula are deaths per 10,000 per day when the "time interval" is expressed in days. In this survey the "recall period" was 97.5 days (28th February 2014-4.5th June 2014) with the recall event being beginning of TT campaign. This is ≈90 days, as recommended for use in developing countries. The same formula was used for calculating Under-five Death Rate (U5DR).

3.6.1 Crude Death Rate

The crude death rate (CDR) was within acceptable level (<2 deaths/10,000 people/day) as per the SPHERE Standards 2004 (Table 7). The CDR was highest in Turkana Central at 1.97 (95%CI: 1.26 – 3.09) while Turkana West reported the lowest of 1.22(95% CI: 0.80-1.86). However, the mortality rates were higher in June 2014 compared to 2013 same period in all the survey zones apart from Turkana West. This may be attributed to the increase in raids across the Turkana borders.

Table 20: Crude Death Rate

	Turkana Central	Turkana South	Turkana North	Turkana West
Crude Death Rate (CDR)	1.97 (1.26-3.09)	1.25 (0.80-1.96)	1.36 (0.75-2.44)	1.22 (0.80-1.86)
Design Effect	1.94	1.5	2.65	1.24

3.6.2 Under five Death Rate

The under-five death rates (U5DR) for all the survey zones was within acceptable level (<4 deaths/10,000 people/day) as per the SPHERE Standards 2011. Turkana Central reported the highest under five death rates of 1.25 (95%CI: 0.61 – 2.54) while Turkana South/East reported the lowest of 0.31(95% CI: 0.07-1.25) (Table 21). However, the mortality rates are higher this time compared to 2013 mortality rates. This may be attributed to the increase in raids across the Turkana borders.

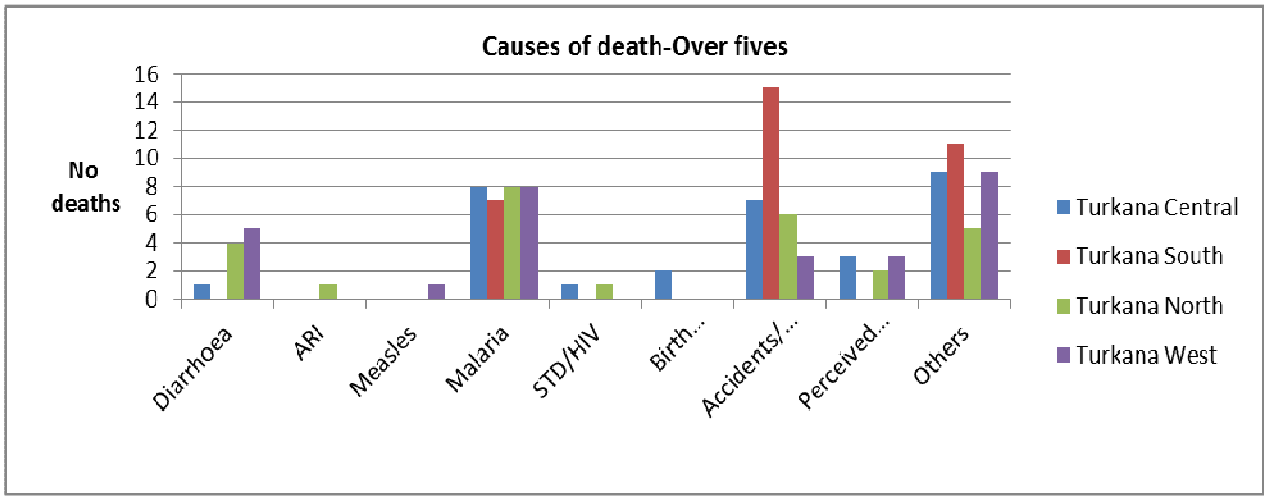
Table 21: Under five death rates

	Turkana Central	Turkana South	Turkana North	Turkana West
Under five Death rate	1.25 (0.61-2.54)	0.31 (0.07-1.25)	0.90 (0.24-3.26)	0.48 (0.11-2.10)
Design Effect	1	1	2.07	1.62

3.6.3 Causes of deaths

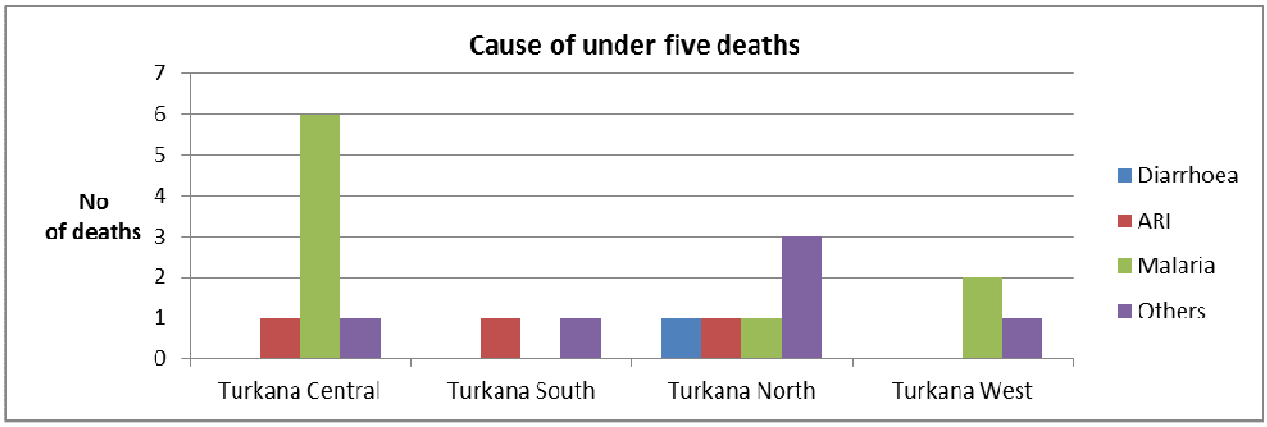
As shown in figure 3, the highest cause of mortality among persons over five years was malaria followed by accidents and raids. Turkana Central recorded most of the deaths due to malaria followed by Turkana West. Turkana South and East reported more deaths due to raids compared to the rest. Turkana North and Central followed. Turkana North had the highest design effect of 2.65 in CDR and 2.07 in U5MR. These means some clusters recorded more deaths than others. Kanamukuny sub location accounts for 21.8% of deaths in Turkana North, out of the 6 deaths reported in the area, 3 of them were due to raids in the area.

Figure 3 Causes of over five deaths



Among the under five deaths, malaria was the main cause of death followed by ARI and diarrhea respectively. Turkana Central survey zone reported the highest cases due to Malaria. However, there were so many deaths among the under-fives that were due to unknown causes. These means that there is poor heath seeking behaviors thus children die before they are taken to the hospitals. These may also be contributed to the vastness of the area and long distances to the health facilities

Figure 4; Causes of under five deaths



3.7 Health

3.7.1 Child morbidity

A 2-week child morbidity recall (inclusive of the day of survey) was assessed to establish the prevalence of common illnesses among the children. In all the four survey zones, approximately 44.6% of children less than five years old had been sick in the two weeks preceding the survey. Fever and Acute Respiratory Infections were the most common illnesses followed by diarrhea. These findings are not significantly different from those in July 2013 SMART survey.

Therapeutic Zinc supplementation for diarrhea cases was ranging from 47.6%-71.7% in all the survey zones. This was an improvement compared to June 2013 in Turkana Central (75.0%) North (57.4%) and West (50.6%) survey zones.

Over 80% of the caretakers in all the survey zones reported to have sought medical assistance when their children were sick. At least 55.6% of the caregivers sought treatment of their sick children from public health facilities. About 5.3% sought treatment from mobile clinics. The rest of the caregivers sought treatment from community health workers, private clinics, shops and traditional healers.

Table 22: Prevalence of child morbidity

Turkana	Turkana Central	Turkana South	Turkana North	Turkana West
Child morbidity (6-59 months)	**N=687**	**N=783**	**N= 680**	**N= 727**
Prevalence of reported illness (2014)	(354) **51.5%**	(246) **31.4%**	(280) **42.4%**	(387) **53.2%**
Prevalence of reported illness (2013)	**45.5%**	**54.8%**	**49.3%**	**42.2%**
Fever /Malaria(alone or with other symptoms) (2014)	(138) **38.9%**	(80) **32.5%**	(108) **38.6%**	(133) **34.4%**
Fever /Malaria(alone or with other symptoms) (2013)	**43.40%**	**44.70%**	**40.9%**	**44.50%**
ARIs (cough and cough with difficult breathing) (2014)	(136) **38.4%**	(108) **43.9%**	(95) **33.9%**	(137) **35.4%**
ARIs (cough and cough with difficult breathing) (2013)	**32.30%**	**32.20%**	40.9%	**26.90%**

Watery Diarrhea (2014)	(58) **16.4%**	(42) **17.1%**	(53) **18.9%**	**(92) 23.8%**
Watery Diarrhea (2013)	**20.80%**	**18.00%**	**22.50%**	**22.40%**
Bloody Diarrhea (2014)	(3) **0.8%**	(2) **0.8%**	(0) **0%**	(7) **1.8%**
Bloody Diarrhea (2013)	**0.70%**	**1.60%**	**0.70%**	**1.20%**
Zinc supplementation (For diarrhea cases) (2014)	(39) **67.2%**	(20) **47.6%**	(38) **71.7%**	(54) **58.7%**
Zinc supplementation(For diarrhea cases) (2013)	75.0%	66.7%	57.4%	50.6%

3.7.2 Immunization coverage

The immunization coverage rates for BCG, OPV1, OPV3 and measles (for children equal to or greater than 9 months) were high (80.0% and above) in all the survey zones. The coverage of measles at 18 months was low (less than 20%) in all the survey zones; this could be attributed to its recent introduction as a public health intervention.

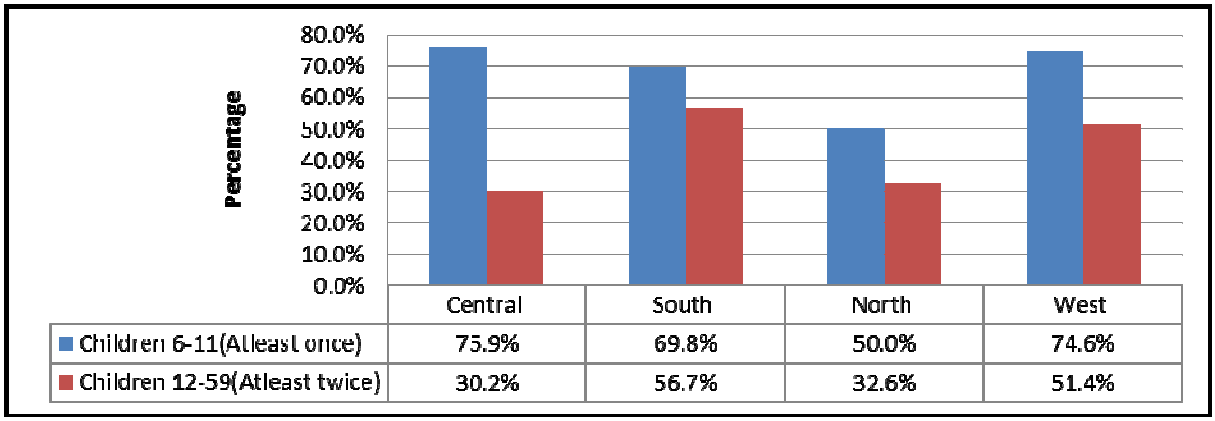
Table 23: Immunization Coverage for Children 6-59 months of age

Turkana	Turkana Central	Turkana South	Turkana North	Turkana West
Immunization of children 6-59m	**N=687**	**N= 783**	**N= 660**	**N= 727**
BCG with scar	98.5%	99.0%	90.3%	93.0%
OPV1 (card and recall)	98.1%	99.2%	90.6%	93.9%
OPV3 (card and recall)	96.1%	96.3%	85.6%	85.9%
Measles (children ≥ 9 -59m	88.9%	92.0%	81.2%	84.2%
Measles (children ≥ 18 -59m	19.0%	9.7%	44.9%	7.9%

3.7.3 Vitamin A Supplementation Coverage for children

Vitamin A coverage for children for both age cohorts (6-11 and 12-59 months) was below 80%.Turkana North reported the lowest (50.0%) vitamin A supplementation (at least once) for children 6-11 months while Turkana Central had the lowest coverage (30.2%) of children 12-59 months who were supplemented at least twice with vitamin A in the last one year

Figure 5: Vitamin A supplementation coverage (Based on card and recall combined)



Based on mother –child booklet/card verification, Vitamin supplementation coverage(at least once) for the children 6-11 age cohort was higher than reported by recall (Turkana central-85.9%, Turkana south-

74.3%, Turkana Nortth-87.8%, Turkana West-49.4%). However, for the children 12-49 age cohort it was lower (Turkana central-35.9%, South-26.3%, North-34.2%, West-25.0%). Generally, Turkana west had the lowest coverage of vitamin A supplementation (both age cohorts) based on card verification. This implies that Vitamin A supplementation (especially for children aged 12-59 months) is poorly documented in mother child booklets (MoH 216).

3.8 De-worming of children 12-59 months of age

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 be de-wormed once in a 6 months period

Table 24: De-worming coverage

Turkana	Turkana Central	Turkana South	Turkana North	Turkana West
	N=571	N=673	N=574	N=603
De-worming once in the last 12-59 months)-June2014	(154) **30.0%**	(409)**60.8%**	(174) **30.3%**	(362) **60.0%**
De-worming once in the last 6 months(12-59 months)-July 2013	**48.8%**	**54.9%**	**39.9%**	**44.4%**
De-worming(at least twice-last one year)-June 2014	**39)6.8%**	**(162)24.1%**	**(47)8.2%**	**(76)12.6%**

Proportion of children 12-59 months who were de-wormed twice or once in the last one year was less than the national benchmark of 80% for HiNi programs in all the survey zones. There is a slight improvement on the percentage of children 12-59 months de-wormed at least once in Turkana South and West. Turkana Central and North had the lowest de-worming coverage (either at least once or twice)

3.9 Mosquito Bed Net Ownership and Utilization

Table 25: Mosquito Bed Net Ownership and Utilization

	Turkana Central	Turkana South	Turkana North	Turkana West
% household mosquito nets ownership	**N=523**	**N=599**	**N=477**	**N=598**
	(187) 35.8%	(69) 11.5%	(126) 26.4%	(68) 11.4%
% household mosquito nets utilization	**N=2100**	**N=2181**	**N=2616**	**N=2570**
	(613) 29.2%	(430) 19.7%	(215) 8.2%	(213) 8.3%

Access or ownership of mosquito nets was highest in Turkana central (35.8%) and least in Turkana West (11.4%).The utilization of the available mosquito nets by household members was highest in Turkana Central (29.2%) and lowest in Turkana North (8.2%).

3.10 Maternal Health

3.10.1 Nutrition status of pregnant Women and Lactating mothers

MUAC was used to determine the level of under nutrition among pregnant women and mothers. The cut-off used was <21 cm. The results compared to July 2012 indicate that there is no significant change in the prevalence of maternal malnutrition in Turkana North and Turkana West and Turkana Central when compared to July 2013. Significant reduction was reported in Turkana South. Turkana North had the highest proportion of pregnant women and lactating mothers wasted (14.2%) while the least was in Turkana South (4.9%).

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. Poor adult nutritional status is a key indicator to household food insecurity. High figures of malnourished PLWs carry a risk of growth retardation of the fetus and consequently low birth weight. If the situation deteriorates, both U5 children and caretakers from the same household are vulnerable to malnutrition, a common scenario during nutrition emergency levels.

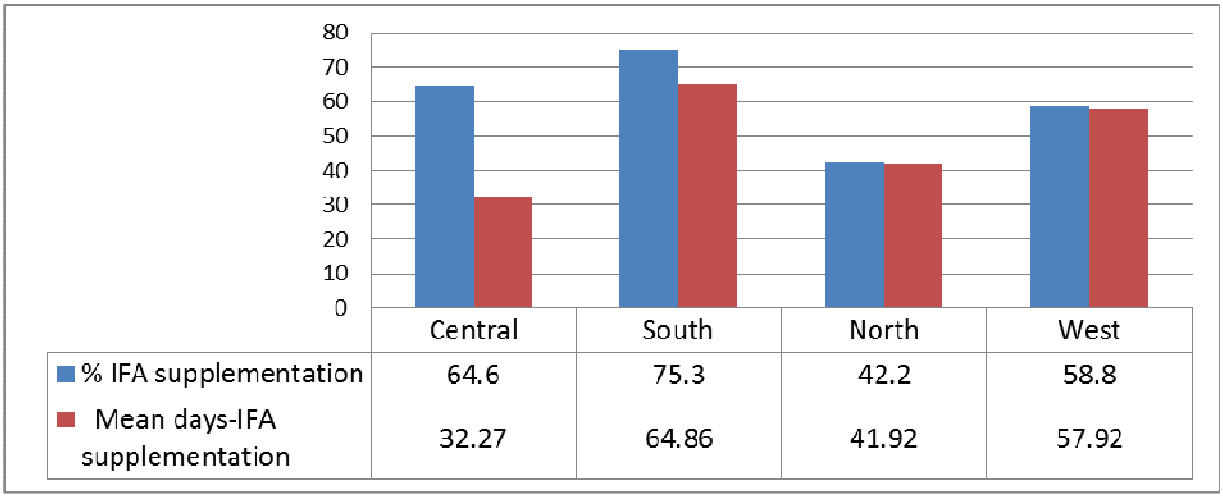
Table 26: Prevalence of maternal malnutrition

Turkana	Turkana Central	Turkana South	Turkana North	Turkana West
Maternal Malnutrition	**N=379**	**N=406**	**N=344**	**N=443**
Pregnant/Lactating mothers of U6 MUAC: Wasted <21 cm –June 2014	**(46) 12.1%**	**(20) 4.9%**	**(49) 14.2%**	**(33) 7.4%**
Pregnant/Lactating mothers of U6 MUAC: Wasted <21 cm –July 2013	**7.50%**	**10.20%**	**9.50%**	**6.90%**

3.10.2 Iron-Folic supplementation for pregnant women

Iron-folic acid (IFA) supplementation for pregnant women help in reducing maternal anemia, risks of low birth weight, neural tube defects in pregnancy and improve the overall pregnancy outcomes. Turkana South had the highest proportion of women who were supplemented with IFA (75.3%) during their last pregnancy. The mean number of days for IFA supplementation was also high in Turkana South. The coverage was lowest in Turkana North (42.2%) and the mean number of days for IFA supplementation was lowest in Turkana Central.

Figure 6: IFA supplementation coverage and mean period of use



The percentage of pregnant women who took IFA tablets for at least 90 days during pregnancy of the last birth was less than the national benchmark (50%) for HiNi programs in all the survey zones. This could be associated to the low Ante natal clinic (ANC) attendance coverage.

Table 27: IFA supplementation for at least 90 days during last pregnancy

Turkana	**Turkana Central**	**Turkana South**	**Turkana North**	**Turkana West**
	N=345	**N=458**	**N=204**	**N=363**
IFA Supplementation at least 90 days last pregnancy	(34) 9.9%	(162) 35.3%	(22) 10.8%	(116) 32.0%

The highest percentage was reported in Turkana South, followed by Turkana West. The least percentage was reported in Turkana Central.

3.11 Water

3.11.1 Sources of drinking water

Table 28: Main sources of drinking water

Turkana	**Turkana Central**	**Turkana North**	**Turkana South**	**Turkana West**
	N=523	**N=477**	**N=599**	**N=598**
Piped System/borehole/ protected spring/protected shallow well	(239)45.7%	(351)73.6%	(358) 59.8%	(305) 51.0%
Unprotected shallow well	(53) 10.1%	(55) 11.5%	(104) 17.4%	(42) 7.0%
River/Spring	(227)43.4%	(33) 6.9%	(99) 16.5%	(135)22.6%
Earth pan/dam	(2) 0.4%	(10) 2.1%	(1)0.2%	(11) 1.8%
Earth pan/dam with infiltration well	-	(22) 4.6%	-	-
Water trucking/Water vendor	(2) 0.4%	(5) 1.0%	(20) 3.3%	0.30%
Others (lake, laga)	-	(1) 0.2%	(17) 2.8%	(103) 17.2%

The piped system/borehole/protected spring/protected shallow well were the main source of drinking water in all the survey zones as shown in the table above. Households that obtained drinking water from safe sources (Piped system/borehole/protected spring/protected spring/protected shallow well and water trucking/water vendor were; Turkana Central (46.1%), Turkana South (63.1%), Turkana North (79.2%) and Turkana West (51.3%). About 20-54% of the households relied on unsafe sources of drinking water such as unprotected well, public pan and *laga*[21].

3.11.2 Time taken to the water source and amount of water used by households

As shown in the table 30, at least 80% of the households in all the survey zones took less than one hour to access[22] water. 19.1% of households in Turkana West spent one to two hours to access water.

Table 29: Time taken to access water

Turkana	Turkana Central	Turkana North	Turkana South	Turkana West
	N= 523	N= 477	N=599	N=598
Less than 500m (less than 15 min)	(272) 52.0%	(325) 68.1%	(345) 57.6%	(373) 62.4%
More than 500 m to less than 2km (15min to 1 hour)	(229) 43.8%	(126) 26.4%	(232) 38.7%	(109) 18.2%
More than 2 km (1hr to 2hrs)	(22) 4.2%	(26) 5.5%	(22) 3.7%	(114) 19.1%

3.11.3 Amount of water used by households

The average household size was 5 persons thus requiring at least 75 liters per day. Tables 31 show that less than 25 % of households were able to meet the standard of 15 liters/person/day[23] in all the survey zones. Only 8.7% of the households in Turkana west met the daily standard water requirement per person.

Table 30: Amount of water used per household per day

Turkana	Turkana Central	Turkana South	Turkana North	Turkana West
	N=523	N=599	N=477	N=598
Greater than 75 liters	(127) 24.3%	(145) 24.2%	(70) 14.8%	(52) 8.7%

3.11.4 Cost of water

At least 29% of the households in Turkana central (31.5%), Turkana South (37.2%) and Turkana West (29.1%) were paying for water with the highest being in Turkana North (61.4%). The average cost of water per month (In Kenya shillings) was as follows; Turkana Central (Ksh 288.9), Turkana South (Ksh 113.4), Turkana North (Ksh 119.9) and Turkana West (Ksh 140.5). The cost of water was highest in Turkana Central (Ksh 288.9) and lowest in Turkana South (113.4).

3.11.5 Treatment of drinking water

4-14% of the households were treating drinking water in all the survey zones as shown in the table 31. Over 60% of the households in all the survey zones were either boiling or using chemicals such as

[21] Seasonal river

[22] Defined by the total duration used to get to the water point and back to the household including the waiting time spent at the water point to draw the water.

[23] SPHERE 2011

pur/water guard to treat drinking water. Boiling of drinking water was highest in Turkana south (55.3%) while use of chemicals is highest in Turkana North (57.8%).

Table 31: Treatment of drinking water at households

	Turkana Central	Turkana South	Turkana North	Turkana West
	N= 523	N= 477	N=599	N=598
HH treating drinking water	(22) 4.2%	(41) 8.6%	(83) 13.9%	(33) 5.5%
Type of treatment	**N=22**	**N=38**	**N=83**	**N=33**
Boiling	(8) 36.4%	(21) 55.3%	(3) 3.6%	(7) 21.2%
Chemicals	(9) 40.9%	(8) 21.1%	(48) 57.8%	(16) 48.5%
Traditional herbs	-	(4) 10.5%	(20) 24.1%	(5) 15.2%
Pot filters	(3)13.6%	(3) 7.9%	(2) 2.4%	-

3.12 Sanitation

3.12.1 Latrine access and utilization

Latrine access is low in all the survey zones Turkana Central (19.7%), Turkana south (15.9%), Turkana North (30.3%) and Turkana West (9.0%)) as indicated in table 33. The highest latrine access was reported in Turkana North (30.3%) and the lowest in Turkana West (9.0%). Only 4.5-11.4% of the households own a latrine/toilet. Open defecation is over 60% in all Turkana region with the hightest in Turkana West (91.0%) and the lowest in Turkana North (69.8%).

Table33: Latrine access and utilization

Table 32 Latrine access and utilization

	Turkana Central	Turkana South	Turkana North	Turkana West
	N=523	N=477	N=599	N=598
In the bushes/Open defecation	(420) 80.3%	(401) 84.1%	(418) 69.8%	(544) 91.0%
Neighbor or shared traditional pit/improved latrine	(51) 9.8%	(56) 11.7%	(113) 18.9%	(27) 4.5%
Own traditional pit/improved latrine	(52) 9.9%	(20) 4.2%	(68) 11.4%	(27) 4.5%

3.12.2 Hand washing occasion

As summarized in table 34, at least 50% of the caretakers in all the survey zones were washing hands before eating. 23-34% of the caretakers were also washing hands after visiting the toilet. Only 22-30% of the caretakers were using soap and water for hand washing.

Table 33: Caretakers' hand washing occasions

Turkana	Turkana Central	Turkana South	Turkana North	Turkana West
Hand washing occasions	435	483	395	402
After toilet	(102)23.4%	(126)26.1%	(145)36.7%	(137)34.1%
Before cooking	(9)2.1%	(6)1.2%	(11)2.8%	(4)1.0%
Before eating	(321) 73.7%	(341)70.6%	(232) 58.7%	(459)64.4%

After taking children to the toilet	(3)0.7%	-	(4)1.0%	-
Hand washing using soap and water	23.3%	22.8%	30.7%	25.9%

3.13 Education

3.13.1 Enrollment in school for children 5-18 years of age

At least 50% of the children 5-18 years are enrolled in school in all the survey zones. The highest enrollment was reported in Turkana South and the lowest in Turkana West.

Table 34: Enrollment of children 5-18 years in School

	Turkana Central	Turkana South	Turkana North	Turkana West
	N=721	N=932	N=940	N=942
Yes	(487) 67.5%	(836) 89.7%	(611) 65.0%	(517) 54.9%
No	(234) 32.5%	(96) 10.3%	(329) 35.0%	(425) 45.1%

3.13.2 Reasons for not attending school

The three major reasons for not attending school in all the survey zones are 1) Family labor responsibilities (11-45%); 2) Household doesn't see the value of education (10-28%), 3) Absence of school nearby (6-23%)

Table 35: Reasons for not attending school

	Turkana Central	Turkana South	Turkana North	Turkana West
	N=234	N=96	N=329	N=425
Chronic Sickness	(2) 0 .9%	-	(4) 1.2%	(3) 0.7%
Family Labor Responsibilities	(39)16.7%	(10) 10.4%	(146) 44.4%	(122) 28.7%
Working Outside Home	(1) 0.4%	-	(4) 1.2%	(1) 0.2%
Teacher Absenteeism	(3) 1.3%	-	(1) 0.3%	-
Too poor to buy school items	(15) 6.4%	(4) 4.2%	(33) 10.0%	(18) 4.2%
Household doesn't see value of schooling	(24)10.3%	(5) 5.2%	(30) 9.1%	(115) 27.1%
No food in schools	-	-	(10) 3.0%	(3) 0.7%
Migrated/moved from school area	(20) 8.5%	(2) 2.1%	(5) 1.5%	(2) 0.5%
Insecurity	(2) 0.9%	(5) 5.2%	(17) 5.2%	(4) 0.9%
No school nearby	(53) 22.6%	(16) 16.7%	(17) 5.2%	(79) 18.6%
Married	(9) 3.8%	(12) 12.5%	(6) 1.8%	(11) 2.6%
Others	(66) 28.2%	(42) 43.8%	(56) 17.0%	(67) 15.8%

3.14 Food Security

3.14.1 Household's source of income

At least 80% of households in all the survey zones had access to some form of income; with the main source income across the survey zone being petty trading (54.7%), casual labor (12.8%) and sale of livestock (8.5%).There is no significant variation in the source of income across the survey zones. A

higher proportion of households in Turkana west have access to some form of income (98.3%) while the lowest is Turkana South (79.8%).

Table 36: Household source of income

	Turkana Central N=523	Turkana South N=599	Turkana North N=477	Turkana West N=598
No income	(75) 14.3%	(121) 20.2%	(65) 13.6%	(10) 1.7%
Sale of Livestock	(43) 8.2%	(29) 4.8%	(41) 8.6%	(73) 12.2%
Sale of livestock product	(32) 6.1%	(23) 3.8%	(21) 4.4%	(11) 1.8%
Sale of Crops	(4) 0.8%	(43) 7.2%	(2) 0.4%	(2) 0.3%
Petty Trading	(260) 49.7%	(270) 45.1%	(269) 56.4%	(402) 67.2%
Casual labor	(68) 3.0%	(95) 15.9%	(45) 9.4%	(73) 12.2%
Permanent Job	(35) 6.7%	(17) 2.8%	(12) 2.5%	(16) 2.7%
Sale of personal assets	(5) 1.0%	-	(16) 3.4%	(3) 0.5%
Remittances	0.2%	(1) 0.2%	6) 1.3%	(8) 1.3%

3.14.2 Household food consumption frequency

Cereals and cereal products are the main staple food consumed by at least 95% of the households in all the survey zones. This is followed by fats and oils (74-87%) and pulses/legumes/nuts (69-83%). Other foods consumed by most of the households are milk and milk products and sweets such as sugar, glucose, sweet juice and sweets. The least consumed foods included fish/sea food (1-28% and eggs (4-18%). This could possibly be explained by the fact that the foods are expensive and not locally available.

Table 37: Food consumption frequency by households based on a 7 day recall

TURKANA	TURKANA CENTRAL N= 523	TURKANA SOUTH N= 599	TURKANA NORTH N= 477	TURKANA WEST N= 598
Cereals and cereal products	(522) 99.8%	(597)99.7%	(453) 95.0%	(593)99.2%
Vitamin A rich vegetables and tubers	(142) 27.2%	(160) 26.7%	(83) 17.4%	(121) 20.2%
Dark green leafy vegetables	(259) 49.5%	(343) 57.3%	(69) 14.5%	(234) 39.1%
Vitamin A rich Fruits	(160) 30.6%	(272) 45.4%	(46) 9.6%	(190) 31.8%
Organ Meat/Poultry and Offal	(367) 70.2%	(369) 61.6%	(322) 67.5%	(481) 80.4%
Eggs	(94) 18.0%	(28) 4.7%	(53) 11.1%	(53) 8.9%
Fish and seafood	(149) 28.5%	(9) 1.5%	(98) 20.5%	(39) 6.5%
Pulses/Legumes/Nuts	(415) 79.3%	(459) 76.6%	(330) 69.2%	(500) 83.6%
Milk and Milk products	(305) 58.3%	(382)63.8%	(250) 52.4%	(497) 83.1%
Oils and Fats	(444) 84.9%	(447) 74.6%	(392) 82.2%	(524) 87.6%
Sweets, sugar and Honey	(360) 68.8%	(307) 51.3%	(265) 55.6%	(479) 80.1%
Condiments, spices and beverages	(157) 30.0%	(27) 4.5%	(38) 8.0%	(153) 25.6%

3.14.3 Source of dominant foods

The main source of source of dominant food in at least 75% of the households in all the survey zones was purchase, followed by food aid and own production. Compared to other survey zones, own production was highest in Turkana South (6.3%). Only 0.2% households were depending on food aid in Turkana Central compared to 16.8% in Turkana North.

Table 38: Source of household dominant foods

	Turkana Central N=523	Turkana South N=599	Turkana North N=477	Turkana West N=598
Own production	(8) 1.5%	(38) 6.3%	(4) 0.8%	(6) 1.0%
Purchase	(502)96.0%	(484) 80.8%	(370)77.6%	(565)94.5%
Gifts from friends/families	(2) 0.4%	(5) 0.8%	(7) 1.5%	(1) 0.2%
Food Aid	(1) 0.2%	(54) 9.0%	(80) 16.8%	(7) 1.2%
Traded or bartered	(0) 0.0%	(0) 0.0%	(6) 1.3%	(15) 2.5%
Borrowed	(4) 0.8%	(4) 0.7%	(4) 0.8%	(1) 0.2%
Gathering/wild fruits	(6) 1.1%	(14) 2.3%	(3) 0.6%	(2) 0.3%
Others	0.0%	(0) 0.0%	(3) 0.6%	(1) 0.2%

3.14.4 Household food consumption score

The Food Consumption Score (FCS) is a proxy indicator of household food security based on the weighted frequency (7 days prior to the survey) of intake of 8 different food groups. It is composite score based on dietary diversity, food frequency, and relative nutritional importance of different food groups.

Table 39: Household Food Consumption Scores

Survey Zone	Turkana Central	Turkana South	Turkana North	Turkana West
	N=523	N=599	N=477	N=598
Poor Food Consumption Score(<21)	(146) 27.9%	(113)18.9%	(71)14.9%	(76)12.7%
Borderline Food Consumption Score(21.5-35)	(110)21%	(143)23.9%	(81)17%	(186)31.1%
Acceptable Food Consumption Score(>35)	(267)51.1%	(343)57.3%	(325)68.1%	(336)56.2%
Mean Food Consumption Scores	39.1	43.8	39.4	39.1

The overall mean food consumption score for all the survey zone was within the acceptable thresholds (> 35%). However, Turkana Central reported the highest percent with poor food consumption score (27.9%). Turkana North had the highest percentage of households with acceptable food consumption scores (68.1%).

3.14.5 Household Coping strategy index (Reduced CSI)

The Coping Strategies Index (CSI) is an indicator of household food security that correlates well with more complex measures of food security. It's an index for a set of five (5) individual coping behaviours that household used in the past 7 days (Less preferred and less expensive food, borrowed or relied on

help from a friend or relative, limited portion size at meal time, restricted consumption by adults in order for small children to eat, Frequency household reduced the number of meals taken in a day).The highest possible CSI is 56.

As shown in table 41, Turkana central (22.72) had the highest CSI while Turkana West (13.77) had the lowest CSI. This indicated Turkana Central households were more food insecure while Turkana West households were less food insecure. This correlates with the trend for percentage of households with poor household food consumption score as shown in table 40.

Table 40: Household coping strategy index

Survey zone	**Turkana Central**	**Turkana South**	**Turkana North**	**Turkana West**
Mean CSI	22.72	17.61	19.52	13.77
Standard Deviation	14.402	12.166	13.141	10.265

Over 90% of HHs in all the survey zones reported facing food shortage and thus adopting coping strategies.The main adopted coping strategies in all the survey zones were; 1) consumption of less preferred and less expensive foods 2) Reduction of the number of meals taken in a day

Food security situation is **precarious** with most households depending on food aid and market purchase (note that 90% of the population live below the poverty line, KNBS 2008). In addition, FEWSNET food security forecast for June-September 2014, show that pastoral and agro pastoral areas foods security situation will remain largely stressed (IPC Phase 2). However, households in localized areas in Turkana are likely to fall into a Crisis (IPC Phase 3) by September 2014.

1.0 RECOMMENDATIONS

3.1 Short-term interventions

1. Immediate intensification of the existing nutrition program through;
    a) Increased active case finding at community level. This can be done through mass screening for malnutrition at the community units, health facilities and outreach clinics.
    b) Remapping of outreach to increase geographical coverage and also address the human resource gaps at the outreach clinics to ensure comprehensive health and nutrition services are offered. There is also need to strengthen community mobilisation to increase demand for health and nutrition services.
    c) Actively engage the 679 community health workers to continuously conduct active case finding for malnutrition and also increase demand for health and nutrition services.
    d) Intensification of the monitoring of the nutrition situation and program quality.
    e) Review through County Nutrition Technical Forum, the need for strengthening existing and creating additional Stabilization Centers in Turkana South (Katilu Health Centre),Turkana West (Lopiding Hospital) and Turkana East (Lokori AIC Health Centre).
2. Strengthen the following High Impact Nutrition Interventions that are currently below 80% target (Iron supplementation, vitamin A supplementation, therapeutic Zinc supplementation, hand washing with soap and de-worming).
3. Strengthen advocacy/public health campaigns on the use of insecticide treated mosquito nets and where possible distribution to households targeting U5 children, pregnant and lactating women.
4. Adopt strategies that will increase access to safe drinking water and latrine use.
5. Food security is a challenge and thus households that are most vulnerable and deprived require social protection mechanisms such as food aid and cash transfers among other safety net interventions.
6. Strengthening nutrition early warning systems to be able to establish trends detect changes and advocate for timely response.

3.2 Medium and long-term Interventions

1. An integrated approach, tackling both the immediate and underlying causes of malnutrition should be put into place and/or scaled up. Such approach is necessary because of the range of factors that interact with each other to contribute to malnutrition. Most of the interventions in Turkana County are humanitarian in nature, dealing with the immediate causes of malnutrition. Whereas these relief services are critical, they need to go hand in hand with developmental activities so as to provide sustainable solutions to the basic of malnutrition. For example, there is need to develop and/or to scale up interventions address household food insecurity.

2. The government's(County and National) efforts in drought mitigation and the provision of health services and alternative means of livelihood in Turkana are acknowledged. There is an urgent need however, to accelerate or re-strategize these efforts. Greater efforts should be made towards the improvement of: the road network; provision of safe water; and availability of health facilities as well as improvement in staffing levels and availability of drugs. The government and the NGOs working in Turkana should also be more actively involved in the diversification of livelihoods and the mitigation of insecurity in the region. Prolonged failure to address underlying and basic causes of malnutrition on a large scale is a setback to the efforts made by humanitarian

agencies in arresting malnutrition, thus rendering malnutrition a chronic problem in the region. It is needless to mention that the activities of the humanitarian agencies are greatly constrained by the lack of infrastructure and insecurity in the area.

3. It is recommended that the interventions by the government and the agencies working in Turkana be based on a coordinated, integrated and holistic approach. Integration of humanitarian services and developmental activities should tackle both the immediate and underlying causes of malnutrition. This approach will increase impact because of the synergy created between the two. Agencies providing different services should strive to do so in the same locality for greater impact. Developmental activities provide a safety-net to household food insecurity by providing alternative means of livelihood. It is however, acknowledged that various agencies are already adopting this approach. Such activities are few and scattered with some being in the pilot or inception stage. The impact of most of these activities in improving the household food security status and consequently improving the nutrition situation is yet to be determined. There is need therefore to evaluate the impact of these activities with the view to up scaling those with the greatest impact on the food security situation in Turkana.

2.0 APPENDICES

Appendix 1: Summary of plausibility report

	Indicator	Acceptable values	Central	South	North	West
1	Missing/Flagged data (% of in-range subjects)	<7.5	1.8%(excellent)	1.5(excellent)	2.3%(excellent)	2.2%(excellent)
2	Overall Sex ratio (Significant chi square) P value	>0.001	0.107(excellent)	0.063(good)	0.239(excellent)	0.737(excellent)
3	Overall Age distribution (Significant chi square)	>0.001	0.00(problematic)	0.00(problematic)	0.00(problematic)	0.00(excellent)
4	Digit preference - weight	<20	4(excellent)	3(excellent)	3(excellent)	5(excellent)
5	Digit preference - height	<20	7(excellent)	8(good)	8(good)	8(good)
6	Dig preference score - MUAC	<20	7(excellent)	6(excellent)	7(excellent)	6(excellent)
7	WHZ (Standard Deviation)	0.8-1.2	1.03(excellent)	1.00(excellent)	0.99(excellent)	1.02(excellent)
8	WHZ (Skewness)	<±0.6	-0.07(excellent)	-0.02(excellent)	0.00(excellent)	-0.06(excellent)
9	WHZ (Kurtosis)	<±0.6	-0.24(good)	0.15(excellent)	0.27(good)	0.09(excellent)
10	Poisson distribution WHZ-2	>0.001	0.062(excellent)	0.006(acceptable)	0.005(acceptable)	0.177(excellent)
	Overall Score WHZ		**11%(good)**	**17(acceptable)**	**16%(acceptable)**	**12%(good)**

Appendix 2: Turkana Malnutrition conceptual framework -June 2014

The following table summarises the main indicators used for malnutrition and causes of malnutrition in this study. The indicators and the interpretations are explained in relevant sections of the results and discussion

		Indicators used	Interpretation	Turkana Central	Turkana South	Turkana North	Turkana West
Malnutrition		**Children WHZ <-2SD (GAM)**	**Critical/Very Critical**	**28.7%**	**24.5%**	**27.2%**	**17.4%**
		Children 11.5-<12.5cm MUAC (GAM)		**9.6%**	**5.1%**	**13.3%**	**7.8%**
		Children WHZ <-3SD (SAM)	**Moderate-Emergency**	**6.8%**	**4.8%**	**5.2%**	**4.6%**
		Children <11.5 cm MUAC (SAM)		**1.9%**	**0.9%**	**0.9%**	**2.1%**
		Crude mortality rate	<2deaths/10,000pple/day	**2.58**	**1.67**	**0.51**	**1.50**
		Under five mortality rate	<4deaths/10,000pple/day	**1.80**	**0.39**	**0.96**	**0.51**
		Global Underweight	**High**	**33.4%**	**37.5%**	**35.5%**	**22.7%**
		Severe Underweight		**9.4%**	**11.2%**	**10.7%**	**4.9%**
		Global Stunting	**High**	**20.5%**	**30.1%**	**26.5%**	**18.5%**
		Severe Stunting		**4.8%**	**9.3%**	**5.6%**	**3.5%**
		Pregnant/lactating mothers : MUAC <21.0 cm		**12.1%**	**4.9%**	**14.2%**	**7.4%**
Immediate causes							
		Vaccination Coverage	**>80% OPV1;OPV3 & Measles**				
		Vitamin A Supplementation					
		Children 6-11 months(at least once)	**<80%**	**75.9%**	**69.8%**	**50.0%**	**74.6%**
		Children 12-59 months(at least twice)	**<80%**	**30.2%**	**56.7%**	**32.6%**	**51.4%**

		Deworming for 12-59 months	<80%	30.0%	60.8%	30.3%	60.0%
		Zinc Supplementation	>50%	67.2%	47.6%	71.7%	58.7%
		Iron Supplementation for women at least 90 days during last pregnancy	<80%	9.9%	35.3%	10.8%	32.0%
		Morbidity-High prevalence of Malaria, ARIs and Diarrhoea	High	51.4%	31.4%	42.4%	53.2%
Underlying causes							
	Current Household Food Security	Inadequate food access	Lack of food/money to buy food last 7 days	93.7%	93.7%	97.9%	92%
		Mean HH Food Consumption Scores	>35	39.1	43.8	39.4	39.1
		% HH with poor food consumption scores(<21)	>10%	27.9%	18.9%	14.9%	12.7%
		% HH with no source of Income	>10%	14.3%	20.2%	13.6%	1.7%
		Main source of dominant foods consumed-Purchase	>80%	96.0%	80.8%	77.6%	94.5%
		Coping strategy Index	High	22.72	17.61	19.52	13.77
	Health/Water/ Sanitation	Access to safe water sources		46.1%	63.1%	79.2%	51.3%
		% HH treating drinking water		4.2%	8.6%	13.9%	5.5%
		% HH using>75 litres per day		24.3%	24.2%	14.8%	8.7%
		Caretakers hand-washing appropriately		23.3%	22.8%	30.7%	25.9%
		Access to toilet/latrine(own or neighbour)	Poor	19.7%	15.9%	30.3%	9.0%
		Open defecation	High	80.3%	84.1%	69.8%	91.0%
		Household Mosquito nets Utilisation		29.2%	19.7%	8.2%	8.3%
		Health services/personnel/drugs	Inadequate				
	Social Care						

	Practices						
Basic causes							
	Economic social systems	Restricted mobility impacting on seasonal access to water and pasture and access to labour and trade					
		Lack (quantity and quality)of basic infrastructure and services: poor market linkages, increased cost of trade and limited access to functional public health, education and water systems					
	Potential Resources: Technology	Inadequate marketing support for livestock, fisheries and agro-produce. Inadequate business training and micro-finance					
	Organizational Resources	Delayed regional support for appropriate policy and practice Funds are usually not available before a crisis, when mitigation interventions Are required.					
		Lack of Livelihoods-based early warning to improve the sensitivity of monitoring systems to hunger and impoverishment (shocks/coping strategies).					
	Potential Resources: People	Increasing constraints to traditional coping, leading to new vulnerable groups emerging and slow implementation of pastoral policy					
		Rural to urban population shifts, concentration and growth: increase of ex-pastoralists engaging in unsustainable livelihoods (charcoal/firewood selling and brewing). Environmental degradation ensues, threatening the viability of natural resource-based livelihoods. Brewing reduces manpower productivity					
		Shifting wealth status impacting on kin support and traditional social support (insurance)					

	Cultural social systems (inadequate/inappropriate knowledge and discriminatory attitudes limit HH access to actual resources)	Restrictive elements of development: illiteracy; negative cultural barriers; low status of women in controlling HH resources: speed of change: low capacity of community to adapt, utilization of new species to enhance dietary diversity				
	Potential Resources: Environment	Declining access to rangelands and Rangeland degradation				
		Human, livestock and crop health risks				
		More extreme climatic variations -Increased frequency of drought reducing resilience of community to shocks: pastoral livelihoods are becoming less sustainable.				
	Political	Insecurity				

Appendix 3: Summary of causes of deaths

Turkana Central						
S/NO	**CAUSE CODE**	**CODE ELUCIDATION**	**U5**	**%**	**OVER 5**	**%**
1	1	Diarrhoea	0	0.0%	1	3.0%
2	2	ARI	1	2.4%	0	0.0%
3	3	Measles	0	0.0%	0	0.0%
4	4	Malaria	4	9.8%	10	30.3%
5	5	STD/HIV	0	0.0%	1	3.0%
6	6	Anaemia	0	0.0%	0	0.0%
7	7	Birth complications	0	0.0%	2	6.1%
8	8	Accidents/ killed/physical	0	0.0%	7	21.2%
9	9	Hunger starvation	0	0.0%	3	9.1%
10	88	Others specify –Witchcraft, Cancer	3	7.3%	9	27.3%
	Total	**41**	**8**		**33**	
Turkana South						
1	1	diarrhoea	0	0.0%	0	0.0%
2	2	ARI	1	50.0%	0	0.0%
3	3	Measles	0	0.0%	0	0.0%
4	4	Malaria	0	0.0%	8	24.2%
5	5	STD/HIV	0	0.0%	0	0.0%
6	6	Anaemia	0	0.0%	0	0.0%
7	7	Birth complications	0	0.0%	0	0.0%
8	8	Accidents/ killed/physical	0	0.0%	17	51.5%
9	9	Hunger starvation	0	0.0%	0	0.0%
10	88	Others specify –Unknown, Kidney problem	1	50.0%	8	24.2%
	Total	**35**			**33**	
Turkana North						

1	1	Diarrhoea	1	16.7%	4	14.8%
2	2	ARI	1	16.7%	2	7.4%
3	3	Measles	0	0.0%	0	0.0%
4	4	Malaria	1	16.7%	8	29.6%
5	5	STD/HIV	0	0.0%	1	3.7%
6	6	Anaemia	0	0.0%	0	0.0%
7	7	Birth complications	0	0.0%	0	0.0%
8	8	Accidents/ killed/physical	0	0.0%	6	22.2%
9	9	Hunger starvation	0	0.0%	2	7.4%
10	88	Others specify-TB, Witchcraft, Unknown	3	50.0%	4	14.8%
	Total	**33**	**6**		**27**	
Turkana West						
1	1	Diarrhoea	0	0.0%	5	17.2%
2	2	ARI	0	0.0%	0	0.0%
3	3	Measles	0	0.0%	1	3.4%
4	4	Malaria	2	66.7%	8	27.6%
5	5	STD/HIV	0	0.0%	0	0.0%
6	6	Anaemia	0	0.0%	0	0.0%
7	7	Birth complications	0	0.0%	0	0.0%
8	8	Accidents/ killed/physical	0	0.0%	3	10.3%
9	9	Hunger starvation	0	0.0%	3	10.3%
10	88	Others specify – Unknown, Old age	1	33.3%	9	31.0%
	Total	**32**	**3**		**29**	

Appendix 4: Summary of Turkana Surveys Clusters

Geographical unit	Population size	Cluster	Geographical unit	Population size	Cluster
Loritit	8527	1,2	Nakalale	3886	
Tulubalany	4202	3	Losajait	2152	24
Katelemot	4007		Kobwin	3487	
Lokipoto	15437	4,5,6	Lokichoggio	10980	25,26
Loito	5388	RC	Lokariwom	10980	27,28
Nalapatui	4016	RC	Songot	3620	29
Natira	2004		Lokundule	2619	
Oropoi	4827	7	Lopwarin	1939	
Lonyuduk	2521		Lokangae	9446	RC,30
Kalobeyyei	3010	8	Lotikipi	7406	31
Songot	1894		Mogila	14547	32,33,34
Loreng	3210	9	Lopiding	5208	35
Namor-Kirionok	2491		Nanam	5603	36
Lopur	38211	10,11,12,13,14,15,RC	Lomeyan	9447	37
Tarach	5936	16	Loteteleit	4607	38
Nadapal	15870	17,18	Loremiet	2700	
Namorungole	11733	19,20			
Lokore	5963	21			
Lopusiki	4870	22			

Turkana North						
Geographical unit	**Population size**	**Cluster**		**Geographical unit**	**Population size**	**Cluster**
Nakalale	3527	1		Naita	2734	19
Kachoda	2387	2		Koyasa	298	
Natoo	1325	3		Natapar	4445	RC

Kataboi	4203	4		Karach(1)	4481	20,RC
Katiko	2031	5		Kaitede	5157	21,22
Lomekwi	2527			Loitanit	4237	RC
Riakomor	5710	6,7		Nalita	3675	23
Kokiselei	3232	8		Lokolio	6859	24,25
Lowarengak	5481	RC,9		Milima tatu	4622	26,27
Kanamukuny	2231	10		Kaalem	6139	28,29
Nachukui	6088	11,12		Kakelae	2508	30
Karebur	1982			Loruth esekon	2675	31
Nabulukok	1171	13		Katome	2297	
Lewan	2798	14		Karach	1465	32
Napeikar	2788	15		Kanakurudio	4491	33
Kokuro	3843	16		Kaeris	5544	34,35
Sesame	2111	17		Nadunga	4274	36
Kibish	1144			Kangakipur	2407	37
Lokomarinyang	3414	18				

TURKANA SOUTH CLUSTERS						
Geographical unit	**Population size**	**Cluster**		**Geographical unit**	**Population size**	**Cluster**
Lokori	8261	1,2		Kapese	12632	17,18
Kangitit	6400	3		Kalapata	8941	19,20
Lotubae	18021	4,5,6,7		Loperot	7384	21,22
Lochodin	2039			Nakalale	7184	23
Lopii	2810	RC		Lochwaa ngikamatak	14561	24,25,RC
Katilia	7747	8,RC		Naposumuru	6220	26,27
Elelea	3907			Kainuk	7151	28

Lochakula	1566	9		Kakongu	1883	29
Kakulit	2029			Loyapat	2094	
Lokwamosing	2919	RC		Kalomwae	3634	30
Lomelo	1144			Lorogon	2405	
Katir	1756			Katilu	17686	31,32,33,34
Napeitom	6305	10,11		Lokapel	7475	35,36
Ekipor	1597			Kalemngerok	8531	37
Kamuga	5104	12		Kanaodon	8232	38,39
Ngilukia	3547	13				
Kapedo	1415					
Silale	1595	14				
Lokichar	10820	15,16				

TURKANA CENTRAL						
Geographical unit	**Population size**	**Cluster**		**Geographical unit**	**Population size**	**Cluster**
Nakwamekwi	10285	1		Puch	9774	19
Napetet	11155	2,3		Namoruputh	4478	20
Kanamkemer	14403	4,5		Lorengippi	2459	
Nawaitorong	8381	6,7		Kaemanik	1207	21
Kerio	4254			Nakurio	1070	
Nakurio	7754	8,9		Lodwat	1384	
Nadoto	8425	RC		Lokiriama	3615	22
Kangirisae	3643			Lochor Lomala	5839	
Nakoret	4198	RC		Atala Kamusio	3981	23
Lorengelup	2173			Lorugum	4737	24
Kangagetei	1886	10		Turkwel	8139	25
Kakimat	1879			Kalemnyang	8666	26

Kalokol	11480	11,12		Lobei	5129	27
Kapua	3972	13		Nadapal	3286	28
Namadak	4025			Tiya	2923	
Namukuse	6282	14		Napeikar	4526	29
Lochere Ekeny	4580	15		Kawalathe	1473	
Eliye	4792	16		Lomeyan	10093	30,31
Naworos	4562			Nachuro	5164	32
Lomopus	2479	17		Kaapus	7058	RC
Lochor Ekunyen	3354			Kotaruk	9878	33
Lochor Edome	2242	18		Naipa	3606	34
				Lokipetot Arengani	4350	RC
				Nachuro	5164	32
				Kaapus	7058	RC
				Kotaruk	9878	33
				Naipa	3606	34
				Lokipetot Arengani	4350	RC

3.3 Calendar of Events -June 2014

	Annual	2009	2010	2011	2012	2013
January	-School opening		52 Sun eclipse Marich bridge collpases	40	28 Happy New Year	16 IEBC vetting Verification of voters
February	(Hot season)		51 Floods in Lokori Redcross rescueCholera outbreak	39 Ekaru a voucher WVK Kaputir food security	27	15 Campaigns School buses by Nanok
March	(Hot season)		50 Start of voters registration	38 Ordination of bishop Kimengich	26	14 Elections
April	(long rains)		49 Voters registration	37 Tondonyang Massacre Raila visits Todonyang	25 Ngamia One Oil Exploration	13 Easter holiday
May			48 End of voters registration	36 End of the world prophesy by Haron Death of Osama bin Laden	24 Safcom in Kaikor Kakuma Voluntary Circumcision	12 Governors swearing in Death of Fr. Manzi
June		59 Nginokakim Ngatuk angidongiro(fire burns)	47 End of Nutrition Survey 2010	35 RDU settlement in Todonyang,,MSF food distribution,Ekaru atinga,Death of police	23 Ekaru Asuru Angikeng Shooting of vehicle in	11 Home coming for Ekwee

				inspectors(baiba)	Loitanit	
July	(Cool cloudy season)	58	46 Killing of Napeitom Chief	34 Emahindi a RCEA	22 Saitoti/Ojode Helicopter crash Nutrition Survey Dayah Bus Accident in Kamatina	10 SMART survey
August		57 Census	45 Referendum	33 Kenya 4 Kenyans BSFP Naburo Raila Visits Morulem Oxfam starts cash transfer	21 Ocampo 6 Polio Campaign	9 HSNP by Oxfam and Helpage -start
September		56 Cholera outbreak in Kerio	44 Release of councillor Ebenyo	32 Teachers strike Kenya Army car swept at Nakiria,Eld expressaccident	20 MP Turkana South Suicide St. Leo School Bus Accident	8 Trachoma/TT campaigns Teachers' strike
October		55 Ndapal lokichogio border conflict	43 Alleged dog eating	31 Op. Linda Nchi Fundrasing at lokitaung and Kataboi	19 Trachoma Campaign Teacher's Strike	7 HSNP ended
November	(short rains)	54 Councillors die in Nakuru road	42	30 DC car swept Kinyanjui canter	18 Baragoi Massacre Oxfam HH	6 Solar eclipse Doctors' strike

		accident		**swept**	**Registration**	
December (Christmas)		**53** **Pokot massacre at Lorengippi**	**41**	**29** **Nutrition survey** **Man stoned to death**	**17** **VoterRegistration** **Obama Wins** **KakumaAtanaeche** **Measles Campaign**	

Any child who was born between **November 2013** and **June 2009 is** eligible for anthropometric measurements