LAIKIPIA COUNTY
INTEGRATED NUTRITION SMART SURVEY

JULY 2017

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ACKNOWLEDGEMENT

EXECUTIVE SUMMARY

Laikipia County is situated within the Great Rift Valley northwest of Mount Kenya and borders Samburu County to the north, Isiolo County to the northeast, Meru County to the south, Nyandarua, Nyeri and Nakuru Counties to the southwest and Baringo County to the west. The county covers an area of 9,462 square kilometers with a population of 399,227[1]. It is divided into three sub-counties namely Laikipia West, Laikipia North and Laikipia East. The County is physically diverse, covered by open grasslands, basalt hills, and dense cedar forests, fed by the Ewaso Nyiro and Ewaso Narok rivers. The county has four main livelihood zones: mixed farming (MF), marginal mixed farming (MMF), pastoral, and formal employment. It is home to ethnically diverse communities including the Maasai, Kikuyu, Meru, Turkana, Samburu and Pokot. Crop farming, cattle rearing on large commercial ranches, and community-owned rangelands are the main livelihoods, with 65 percent of the pastoral livelihood zone under ranching.

An integrated nutrition SMART survey was conducted in July 2017 following deterioration of food security and nutrition situation as a result of a below normal performance of long rains season which is critical for livelihoods in the County. The objective of the survey was as follows;

1. To estimate prevalence of acute and chronic malnutrition in children aged 6 – 59 months in the county.
2. To estimate immunization coverage for the following antigens; Measles, BCG and OPV, vitamin A supplementation and deworming among children.
3. To determine the coverage for zinc supplementation and vitamin A supplementation among the children 6-59 months
4. To estimate the nutritional status of the mother/ caregivers aged 15 – 49 years using MUAC measurements.
5. To collect contextual information on possible causes of malnutrition such as household food security, water, hygiene and sanitation (WASH) practices and morbidity among children.
6. Develop recommendations based on survey findings.

The survey was conducted in the three sub counties of Laikipia namely Laikipia East, Laikipia West and Laikipia North. Data was collected on the following variables; anthropometry, morbidity, vaccination and de-worming status, Vitamin A supplementation, hygiene and sanitation practices, other indicators assessed were water and sanitation, iron and folic acid supplementation, household food security and livelihood.

A total of 632 households were sampled from 42 clusters and 500 children aged 6 to 59 months were assessed for anthropometry. Anthropometric data was analyzed using the ENA software version (July, 2015) while other indicators were analyzed using SPSS version 22.

Summary of Key findings

Table 1. Summary of survey findings

Indicators	Laikipia East	Laikipia West	Laikipia North	County
Clusters				**42**
HHs covered				**632**
Total population				**3048**

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[1] County government of Laikipia, July 2017

Median HH size				**4.8**
Male headed HH	72.3	80.2	84.1	**79.9**
Nutritional Status (6 – 59 months) Weight- for-Height Z – scores (Wasting) WHO 2006 Standards				
Global Acute Malnutrition (<-2 Z-score)				**11.4 (8.8-14.7)**
Severe Acute malnutrition (<-3 Z-score)				**2.2 (1.1 – 4.6)**
Nutritional Status (6 – 59 months) Weight- for-Age Z – scores (Underweight) WHO 2006 Standards				
Prevalence of Global Underweight (<-2 Z-score)				**20.1 (16.4 – 24.3)**
Nutritional Status (6 – 59 months) Height- for-Age Z – scores (Stunting) WHO 2006 Standards				
Prevalence of Global Stunting (<-2 Z-score)				**25.1 (21.3 – 29.3)**
Immunization and vitamin A coverage				
BCG				**87.5**
OPV1				**91.9**
OPV3				**89.4**
Measles (9 – 59 months)				**90.1**
Vitamin A (6 – 59 months) at-least once				**50.9**
Vitamin A (12 – 59 months) – twice				**48.9**
Deworming (12-59 months)				**36.8**
Child morbidity two weeks prior to survey				
Sickness two weeks prior to survey				34.2
Acute Respiratory Infection				68.6
Fever with chill like malaria				10.5
Watery diarrhoea				14.5
Women nutrition status				
MUAC <21cm				3.5%
IFA supplement (≥3 months)				32.6%
Food consumption and dietary diversity				
Low DDS	3.1	6.0	12.6	7.7
Medium DDS	33.1	49.5	57	48.6
High DDS	63.8	44.5	30.4	43.7
Poor FCS	1.5	2.8	10.7	5.3
Borderline FCS	3.8	16.3	13.1	12.6
Acceptable FCS	94.6	80.9	76.2	82.1
Water and Sanitation				
Average water consumption (L/p/day)	15.8	13.0	9.5	12.2
Access to toilet facility	97%	84.9	41.9	72.8
Water treatment				25.9
Hand washing (≥4 critical times)				1.9

Conclusion and Recommendations

The poor health and nutrition indicators among children under the age of five years in the county among other indicators require immediate intervention in order to prevent further deterioration of nutritional status, improve infant and young child nutrition as well as household indicators.

- The serious levels of GAM calls for increased active case findings for malnourished children and enrolment into selective feeding program. Further, intensification of outreach programs in the hard to reach areas particularly in Laikipia North and West is needed.

- Short term intervention for food insecure households and households with malnourished children included in food relief program such as "*chakula kwa jamii*".

- Strengthen community health strategy and train community health workers on nutrition screening for malnutrition.

- Scale up IMAM services in the three sub counties and increase health and nutrition education.

- Strengthen health education on the importance vitamin A, deworming and zinc supplementation.

- Improve Behaviour Change and Communication (BCC) through community sensitization on the importance of proper human waste disposal

1. Introduction

1.1 County background

Laikipia County is situated within the Great Rift Valley northwest of Mount Kenya and borders Samburu County to the north, Isiolo County to the northeast, Meru County to the south, Nyandarua, Nyeri and Nakuru Counties to the southwest and Baringo County to the west. The county covers an area of 9,462 square kilometers with a population of 399,227[2]. It is divided into three sub-counties namely Laikipia West, Laikipia North and Laikipia East. The County is physically diverse, covered by open grasslands, basalt hills, and dense cedar forests, fed by the Ewaso Nyiro and Ewaso Narok rivers. The county has four main livelihood zones: mixed farming (MF), marginal mixed farming (MMF), pastoral, and formal employment. It is home to ethnically diverse communities including the Maasai, Kikuyu, Meru, Turkana, Samburu and Pokot. Crop farming, cattle rearing on large commercial ranches, and community-owned rangelands are the main livelihoods, with 65 percent of the pastoral livelihood zone under ranching (Figure 1).
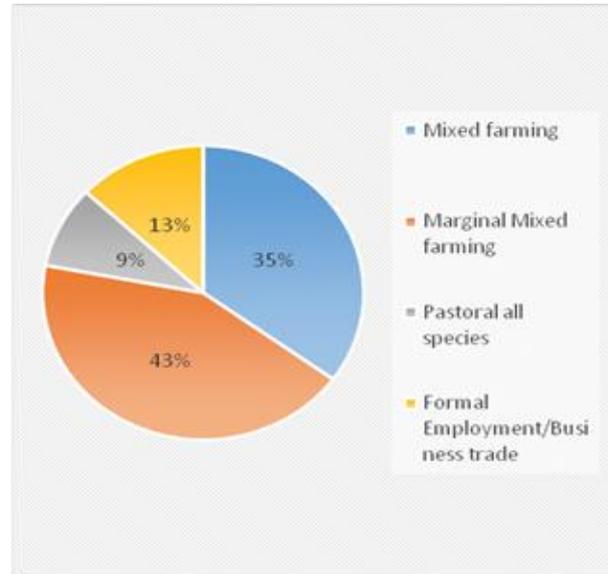
Figure 1: Population distribution by livelihood zone

1.2 Physical and Topographic Features

The altitude varies between 1,500 m above sea level at Ewaso Nyiro basin in the North to a maximum of 2,611 m above sea level around Marmanet forest. The other areas of high altitude include Mukogodo and Ol Daiga Forests in the eastern part of the county at 2,200 m above sea level. There are two major swamps in the county namely: Marura Swamp which runs along the Moyot valley in Ol Pajeta Ranch and the Ewaso Narok Swamp around Rumuruti Township. The swamps have some agricultural potential if properly protected and managed. However, they are currently under pressure due to encroachment for human settlement and agricultural production.

1.3 Climatic Conditions

The county experiences a relief type of rainfall due to its altitude and location. The annual average rainfall varies between 400mm and 750mm though higher annual rainfall totals are observed on the areas bordering the slopes of Mt. Kenya and the Aberdare Ranges. North Marmanet receives over 900mm of rainfall annually; while the drier parts of Mukogodo and Rumuruti receive slightly over 400mm annually. The plateau receives about 500mm of rain annually, while Mukogodo Forest receives an average rainfall of about 706mm annually. The seasonal distribution of rainfall in the county is as a result of the influences of Northeast and South trade winds, the Inter- Tropical Convergence Zone and the Western winds. The long rains occur from March to May while the short rains are in October and November. The parts neighbouring Aberdare Ranges and Mt. Kenya form an exception to this pattern

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[2] County government of Laikipia, July 2017

as they receive conventional rainfall between June and August because of the influence of the trade winds. The annual mean temperature of the county ranges between 16°C and 26° C. This is as a result of relief and trade winds resulting to cooler conditions in eastern side which is near Mt. Kenya and hotter in the low-lying areas in the North. The western and southern parts of the county have cooler temperatures with the coolest month being April and the hottest month being February. The average duration of sunshine is between ten and twelve hours daily.

1.4 Frequent Drought and other hazards

Laikipia is prone to frequent weather changes, with major droughts recurring after every 4-5 years. Insecurity (cattle rustling) and occasional floods that adversely affect the health sector. . This leads to famine where communities are forced to depend entirely on relief food. Other effects include low livestock off-take prices, encroachment into wetlands, closure of schools, tension between upstream and downstream users, massive livestock losses and migration to southern parts of the county and Mt. Kenya slopes in search for pastures. The areas which are mainly affected by the ravages of the drought are Olmoran, Mukogodo, Sosian and Lamuria.

Due to inadequate drought management policies and resources, these hazards often result in disasters, causing widespread food crises. Drought negatively impacts the various livelihoods differently but ultimately compromises the household food security. Food insecurity has a direct bearing on the health and nutritional status of the communities especially vulnerable groups such children (6-59 months of age) pregnant, and Lactating mothers and the elderly. Commercial ranching practiced in Mukogondo, Central and Rumuruti divisions take up 64 percent of the County's land Mass.

1.5 Health Access and Nutrition

The health infrastructure consists of two county referral hospitals at Nanyuki and Nyahururu and 2 sub county hospitals at Dol dol and Rumuruti. The county has eight public health centres and 55 public dispensaries. In addition, there are three private hospitals, one nursing home; one private health centre, six private dispensaries and 33 private clinics. Most of the public facilities have been established with the support of the devolved funds particularly County Development Fund (CDF).   The average distance to health facilities is six kilometers. There are about 10 percent of the households lying in the range of zero to one kilometer from the nearest health facility while 40 percent lie within the range of 1.1 to 4.9 Km. The remaining 50 per cent of households are found over five kilometers to the nearest health facility. The doctor-population ratio stands at 1:12,500 while the nurse-population ratio is 1:1,000

1.6 Survey Objectives

Overall goal of the survey
The overall goal of the survey was to determine the health and nutrition status of children between 6 – 59 months of age in the county and possible causes with the aim of providing concrete recommendation.

Specific Objectives:
7. To estimate prevalence of acute and chronic malnutrition in children aged 6 – 59 months

8. To estimate immunization coverage for the following antigens; Measles, BCG and OPV, vitamin A supplementation and deworming among children.
9. To determine the coverage for zinc supplementation and vitamin A supplementation among the children 6-59 months
10. To estimate the nutritional status of the mother/ caregivers aged 15 – 49 years using MUAC measurements.
11. To collect contextual information on possible causes of malnutrition such as household food security, water, hygiene and sanitation (WASH) practices and morbidity among children.
12. Develop recommendations based on survey findings.

2. METHODOLOGY

2.1 Geographic Target Area and Population Group

The survey was conducted in Laikipia County and covered all livelihood zones of Laikipia North Sub county, Laikipia West and East sub counties with an exception of the high potential areas. The primary respondent for the survey was the mother/care taker of the child for both household and child questionnaire. Data was collected on the following variables; anthropometry, morbidity, vaccination and de-worming status, Vitamin A supplementation, household hygiene and sanitation practices, household food security and women dietary diversity. In addition, the nutritional status of mothers/care takers aged 15 – 49 years was also determined.

2.2 Survey design

The survey applied a two stage cluster sampling using the SMART methodology with the clusters being selected using the probability proportional to population size (PPS). Stage one sampling involved the sampling of the clusters to be included in the survey while the second stage sampling involved the selection of the households from the sampled clusters.

2.3 Study Population

The target population for the survey was children aged 6 – 59 months for the anthropometric component and mother/caretaker for household information and nutrition status.

2.4 Anthropometric Sample Size

The anthropometric survey sample size was calculated using the SMART survey calculator. The parameters of interest were captured in the ENA Nov 2011 software and the respective number of children and households required for the survey computed as indicated in Table 2. The sampling frame for this survey was the updated list of villages (with current projected population) from the survey area.

Table 2. Anthropometric Sample Size for the survey

Variable	Value	Rationale
Estimated prevalence (GAM)	12.8	Situation similar to 2012
Desired Precision	3.5	
Design Effect	1.2	There exist some element of heterogeneity
Average household size	6	Based on county estimates
Proportion of Children Under 5	14.7	Based on county estimates
Non response rate	3.0	To cater for absent households
Estimated Number of Households	**594**	
Children	**457**	
Number of Cluster	**42**	
HH per Day	12	Based on logistical movement
Number of Teams	7	
Number of Days	6	

2.5   Cluster and Household Selection

All accessible villages were included in the initial sample selection with each village considered a cluster which was sampled with probability proportional to size.   At stage two each team used the simple random sampling method in household selection. Within the selected households all children 6-59 months fitting the inclusion criteria were measured.

A household was defined as a group of people who lived together and shared a common cooking pot. In polygamous families with several structures within the same compound but with different wives having their own cooking pots, the structures were considered as separate households and assessed separately.

In cases where there was no eligible child, a household was still considered part of the sample. If a respondent was absent during the time of household visit, the teams left a message and re-visited later to collect data for the missing person, with no substitution of households allowed.

2.6   Variables collected

Age: the age of the child was recorded based on a combination of child health cards, the mothers'/caretakers' knowledge of the birth date and use of a calendar of events for the district developed in collaboration with the survey team.

Sex: it was recorded whether a child was male or female.

Bilateral oedema: normal thumb pressure was applied on the top part of both feet for 3 seconds. If pitting occurred on both feet upon release of the fingers, nutritional oedema was indicated.

Weight: the weights of children were taken with minimal or light clothing on, using Bathroom scale (SECA model with a threshold of 100kgs and recorded to the nearest 0.1kg.

Length/height: children were measured bareheaded and barefooted using wooden UNICEF height boards with a precision of 0.1cm. Children under the age of two years were measured while lying down (length) and those over two years while standing upright (height). If child age could not be accurately determined, proxy heights were used to determine cases where height would be taken in a supine position (<87cm) or in an upright position (≥87cm).

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

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

Vaccination status and coverage:
For all children 6-59 months, information on BCG, Oral polio Vaccine (OPV) 1, OPV 3 and measles vaccination was collected using health cards and recall from caregivers. The vaccination coverage was calculated as the proportion of children immunized based on card and recall.

Vitamin A supplementation status: For all children 6-59 months of age, information on Vitamin A supplementation was collected using the child welfare cards and recall from caregivers. Information on whether the child had received supplementation in the last 6 months was collected. Vitamin A capsules were also shown to the mothers to aid in recall.

De-worming status: Information was solicited from the care takers as to whether their child/children 6-59 months had been de-wormed in the last 6 months.

Household food diversity: Dietary diversity is a qualitative measure of food consumption that reflects household access to a wide variety of foods, and is also a proxy of the nutrient intake adequacy of the diet for individuals. Dietary diversity scores were created by summing the number of food groups consumed over a 24- hour period to aid in understanding if and how the diets are diversified. Household dietary diversity score (HDDS) is meant to reflect, in a snap shot the economic ability of a household to consume a variety of foods. A score of 1 was allocated to each food group that was consumed by the household and a score of 0 for each of the food groups not consumed by the household, and thus the highest possible score was 12. In addition, food consumption score as a proxy of household food security status was computed based on a 7-day recall period where a household respondent was asked to recall what the household consumed for the past seven days. The food consumption score was then calculated based on frequency of consumption for each major food items. A categorization was then made whether a household had poor, borderline or adequate food consumption score.

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

Sanitation: Information on household accessibility to a toilet/latrine, disposal of children's faeces and occasions when the respondents wash their hands was obtained. The information was then analysed to determine household hand washing practises.

2.7   Data Analysis

Anthropometric data entry and processing was done using the ENA for SMART software Beta version, July 2013 at the district level every day. Data cleaning was done using World Health Organization Growth Standards (WHO-GS 2006) and flagging procedures were used to identify outliers which were excluded from anthropometric analysis. The SMART/ENA software generated weight-for-height, height-for-age and weight-for-age Z scores to classify them into various nutritional status categories using WHO standards and cut-off points. All other indicators collected during the survey were analyzed using Excel and SPSS version 22.

2.8   Nutritional Status Cut-off Points

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

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

The prevalence of wasting (a reflection of the current health/nutritional status of an individual) is presented as Global Acute Malnutrition (GAM) and severe acute malnutrition (SAM) using weight-for-height (WFH) z scores and MUAC indices. The results on wasting were presented as global acute malnutrition (GAM) and severe acute malnutrition (SAM):

- Children whose WFH z-scores fell below -2 standard deviations from the median of the WHO standards (WHO-GS) or had bilateral oedema were classified as wasted (to reflect GAM)
- Children whose WFH z-scores fell below -3 standard deviations from the median of the WHO-GS or had bilateral oedema were classified as severely wasted (to reflect SAM)
- A cut-off point of <12.5cm MUAC was used to denote GAM among the under-fives.

Weight-for-age (WFA) – Underweight

The measure of underweight gives a mixed reflection of both the current and past nutritional experience by a population and is a very useful tool in growth monitoring.

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

Height-for-age (HFA) – Stunting

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

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

Malnutrition among care Givers

The measure of nutritional status of care givers reflect likely hood of the child being malnourished. Usually, the interest is in pregnant and lactating women as it influences the outcome of the unborn and care for the breastfeeding infant. Their nutritional status is measured using Mid Upper Arm circumference and those who have a MUAC of <210mm is considered malnourished.

Survey data validation process

Data quality was ensured through:

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

3. SURVEY RESULTS AND DISCUSSIONS

3.1   Household Demographic Characteristics

The survey covered 632 households and a population of 3048 with 500 children aged 6 – 59 months. The mean household size was 4.8 while the proportion of children under the age of five years at 16.4. All respondents were resident of Laikipia County. Close to 80 percent of the respondents were married, 8.1 percent being single while 8.3 percent were widowed. The distribution across the sub counties were varied as shown in table 3.

Household characteristics	Laikipia East	Laikipia west	Laikipia North	County
Total population				3048
Average HH size				4.8
Proportion of children <5 years	15.9	20.1	19.9	19.2
HH status (Resident)	100	100	100	100
Male headed HHs	72.3	80.2	84.1	79.9
Marital status (married)	72.3	80.2	84.1	79.9

The distribution of the population by age group show Laikipia west has the highest proportion of children under the age of five years while Laikipia East has the least with 15.9 percent. Figure 2 show population distribution across the county.
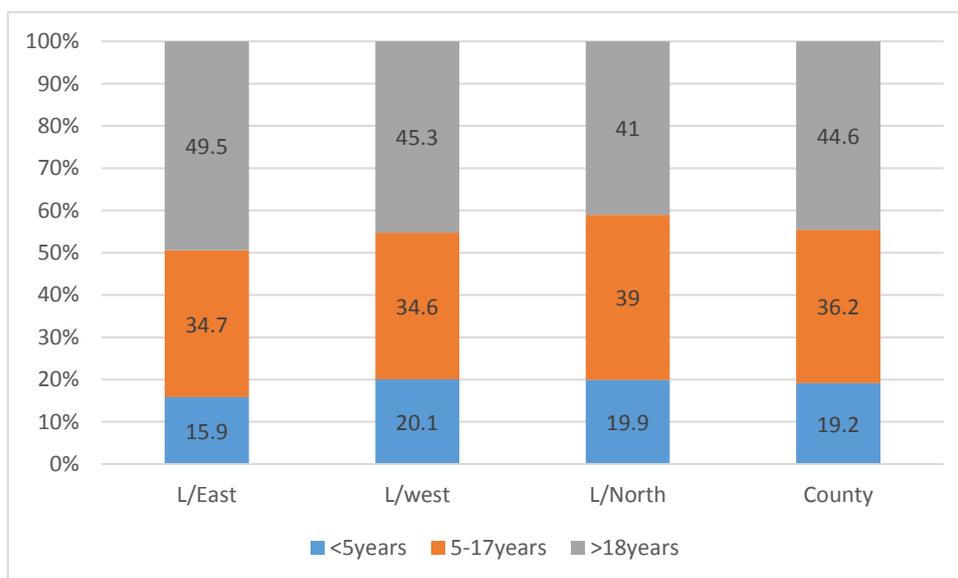
Figure 2. Age group distribution in Laikipia County

3.2   Distribution of Children by Age and Sex

The distribution of children by sex showed boys and girls being equal with girls slightly more (51.8%). The overall ratio of boys to girls was 0.9 which was within the recommended range of 0.8 – 1.2, an indication of an unbiased sample. The ratio of boys to girls for most of the other age categories were also within the accepted range with the exception of 30 – 41 and 54-59 months whose ratio of boys to girls was unbalanced at 0.7. This could be attributed to boys being away from home at the time of survey. The distribution of the sampled children by age groups did not vary much from expected values. The slight variation among the various age groups as shown in table 3 could be attributed to inability

to get older children which was occasioned by the fact that some were either grazing livestock or had gone visiting relatives living elsewhere.

Table 3. Distribution of age and sex of sampled children

	Boys		Girls		Total		Ratio
AGE (mo)	no.	%	no.	%	no.	%	Boy:girl
6-17	64	51.2	61	48.8	125	25.1	1.0
18-29	64	50.0	64	50.0	128	25.7	1.0
30-41	44	42.7	59	57.3	103	20.7	0.7
42-53	54	49.5	55	50.5	109	21.9	1.0
54-59	14	42.4	19	57.6	33	6.6	0.7
Total	240	48.2	258	51.8	498	100.0	0.9

3.3 Nutritional Status of Under-Five Children

3.3.1 Prevalence of acute malnutrition (weight-for-height z-score –WHO Standards 2006)

The Global Acute Malnutrition (GAM) levels in Laikipia County indicate a serious situation at 11.4 percent (95% CI: 8.8 – 14.7) while Severe Acute Malnutrition (SAM) was at 2.2 percent (95% CI: 1.1 – 4.6). The prevalence of malnutrition was higher among boys compared to girls although there was no statistical difference as shown in table 4.

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

	All n = 490	Boys n = 236	Girls n = 254
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(56) 11.4 % (8.8 - 14.7 95% C.I.)	(30) 12.7 % (9.4 - 17.0 95% C.I.)	(26) 10.2 % (6.9 - 15.0 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(45) 9.2 % (6.5 - 12.9 95% C.I.)	(23) 9.7 % (6.6 - 14.2 95% C.I.)	(22) 8.7 % (5.4 - 13.6 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(11) 2.2 % (1.1 - 4.6 95% C.I.)	(7) 3.0 % (1.2 - 7.0 95% C.I.)	(4) 1.6 % (0.6 - 4.1 95% C.I.)

The prevalence of oedema is 0.0 %. Design effect. 1.04.

The high levels of acute malnutrition are attributed mainly to food insecurity owing to drought conditions that have affected Laikipia North Sub County and parts of Laikipia West. The nutrition status is likely to deteriorate in the coming months as the drought conditions persist during the lean season. The situation is further compounded by health workers strike which has affected service delivery including IMAM program.

3.3.2 Prevalence of Acute malnutrition by MUAC

The prevalence of global malnutrition by MUAC shows similar pattern as Global Acute Malnutrition based on weight for height as boys having higher prevalence compared to girls.

Table 5. Prevalence of acute malnutrition based on MUAC (and/or oedema)

	All n = 500	Boys n = 241	Girls n = 259
Prevalence of global malnutrition **(< 125 mm and/or oedema)**	(26) 5.2 % (3.3 - 8.0 95% C.I.)	(15) 6.2 % (3.2 - 11.6 95% C.I.)	(11) 4.2 % (2.4 - 7.4 95% C.I.)
Prevalence of moderate malnutrition **(< 125 mm and >= 115 mm, no** **oedema)**	(23) 4.6 % (2.8 - 7.5 95% C.I.)	(14) 5.8 % (2.9 - 11.3 95% C.I.)	(9) 3.5 % (1.9 - 6.2 95% C.I.)
Prevalence of severe malnutrition **(< 115 mm and/or oedema)**	(3) 0.6 % (0.2 - 1.8 95% C.I.)	(1) 0.4 % (0.1 - 3.1 95% C.I.)	(2) 0.8 % (0.2 - 3.1 95% C.I.)

The prevalence rates when compared with weight for height are suggestive that MUAC is a late indicator of malnutrition and hence a predictor for mortality among children.

3.3.3 Prevalence of Underweight

Low weight-for-age which arises from insufficient weight gain relative to age is a function of short stature, thinness or both[3]. The prevalence of underweight was 20.1 percent with boys exhibiting higher prevalence (24.1%) compared to girls (16.4%). Severe underweight was also higher among boys as shown in table 6.

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

	All n = 493	Boys n = 237	Girls n = 256
Prevalence of underweight **(<-2 z-score)**	(99) 20.1 % (16.4 - 24.3 95% C.I.)	(57) 24.1 % (18.5 - 30.6 95% C.I.)	(42) 16.4 % (12.5 - 21.3 95% C.I.)
Prevalence of moderate **underweight** **(<-2 z-score and >=-3 z-score)**	(73) 14.8 % (12.0 - 18.2 95% C.I.)	(41) 17.3 % (12.6 - 23.4 95% C.I.)	(32) 12.5 % (9.1 - 17.0 95% C.I.)
Prevalence of severe underweight **(<-3 z-score)**	(26) 5.3 % (3.7 - 7.4 95% C.I.)	(16) 6.8 % (4.5 - 10.0 95% C.I.)	(10) 3.9 % (2.1 - 7.1 95% C.I.)

3.3.4 Prevalence of Stunting

Height-for-age is another anthropometric indices commonly used as an indicator for malnutrition. Stunting (low height-for-age), results from extended periods of inadequate food intake, poor dietary quality, increased morbidity, or a combination of the above factors[4]. Stunting in childhood leads to reduced adult size and reduced work capacity. This, in turn, has an impact on economic productivity at the national level[5]. The prevalence of stunting was 25.1 percent with severe stunting at 5.9 percent. The rates of stunting is comparable to the national average of 26 percent.

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[3] World Health Organization (2006). WHO child growth standards: methods and development. Geneva
[4] Gibson RS (2005). Principle of Nutrition Assessment. Oxford university press
[5] ACC/SCN (1997). Third Report on the World Nutrition

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

	All n = 478	Boys n = 230	Girls n = 248
Prevalence of stunting **(<-2 z-score)**	(120) 25.1 % (21.3 - 29.3 95% C.I.)	(68) 29.6 % (23.5 - 36.5 95% C.I.)	(52) 21.0 % (16.2 - 26.7 95% C.I.)
Prevalence of moderate stunting **(<-2 z-score and >=-3 z-score)**	(92) 19.2 % (16.1 - 22.9 95% C.I.)	(52) 22.6 % (17.5 - 28.8 95% C.I.)	(40) 16.1 % (11.9 - 21.5 95% C.I.)
Prevalence of severe stunting **(<-3 z-score)**	(28) 5.9 % (4.1 - 8.4 95% C.I.)	(16) 7.0 % (4.3 - 11.0 95% C.I.)	(12) 4.8 % (2.8 - 8.1 95% C.I.)

3.3.5   Maternal Nutrition status and Iron-Folate Supplementation

A total of 483 care givers participated in the survey of which 43 percent were either pregnant and/or lactating women. Maternal malnutrition has been associated with high risk of low birth weights and it is recommended that before, during and after birth, the maternal nutrition status should be adequate.

The nutritional status of care givers as measured by mid upper arm circumference (MUAC) showed a prevalence of 3.5 percent (MUAC<21cm). The prevalence among pregnant and lactating women was slightly higher at 4.8 percent

Uptake of iron and folate supplements among women during the last pregnancy in the last two years was high at 79.2 percent. The mean number of days the IFAS was taken was 61.5. However, the findings show poor adherence to the recommended minimum of 90 days which found only a third had taken for more than the recommended period as shown in table 8

Table 8. Iron-folate supplementation during last pregnancy

Categories of IFA consumption	No of women	Proportion (%)
<90 days	118	67.4
90>180 days	53	30.2
>180 days	4	2.4

The results suggest the need for health education among pregnant women on the benefits of iron and folate supplements. This may likely increase adherence and lower prevalence of anaemia and subsequent complications during child delivery.

3.4   Child Health and Immunization

3.4.1   Immunization Coverage

Immunization is an important and a powerful, cost-effective preventive health measure to improve on child survival. All of the recommended vaccinations should be given before children reach their first birthday. The survey used three antigens as a proxy for immunization coverage. These were; BCG, Oral Polio vaccination (1 and 3) and measles (9 & 18 months) vaccine. The coverage for all antigens except measles at 18 months was high

and above the national target of 80 percent as shown in table 9. The low coverage for measles at 18 months could be linked to low awareness among caregivers on the existence of the schedule coupled with poor health seeking behaviour.

Table 9. Immunization coverage in Laikipia County

Vaccine	By card	By recall	No
BCG (scar) – N=506	87.5		7.2
OPV1 – N=502	57.5	34.4	8.3
OPV3 – N=502	55.8	33.6	9.6
Measles (9month) – N=471	53.9	36.3	9.8
Measles (18 months) – N=373	28.2	20.6	51.2

3.4.2   Vitamin A supplementation and deworming coverage

The national guideline recommends that a child should be supplemented at-least twice a year (every six months)[6]. The dosage offers protection against common childhood infections and substantially reduces mortality.

Vitamin supplementation coverage was determined both for over the last six months and one year. The findings show low coverage with close to half (48.9%) of children 6 – 59 months receiving two doses in the past one year. Similarly coverage for 6 – 11 months was at 66.1 percent and lower compared to the national set target of 80 percent as shown in table 10.

Table 10. Vitamin A and deworming coverage in Laikipia County

No. of times (past one year)	
6 – 59 months – Once	50.9
12 – 59 months – Twice	48.9
6 – 11 months – Once	66.1
Deworming	
12 – 59 months – once	36.8
12 – 59 months – twice	13.1

Deworming is an important practice that gets rid of worms that compete for nutrients in the body and causing iron deficiency anaemia. Deworming coverage for the county was at a low of 49.9 percent.

3.4.3   Child Morbidity and Health seeking behaviour

The burden of diseases as reported for children two weeks prior to the survey in the county show relatively low rates with about a third (34.2%) being ill. The leading cause of morbidity in the county was Acute Respiratory Infections with over two thirds (68.6%) as shown in figure 3. Watery diarrhoea accounted for 14.5 percent while fever was responsible for 10.5 percent.

Health seeking behaviour was relatively good with 73.3 percent of children who were ill seeking assistance from various sources. Treatment for watery diarrhoea with recommended

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[6] The Kenya National Technical Guidelines for Micronutrient Deficiency control, August 2008.

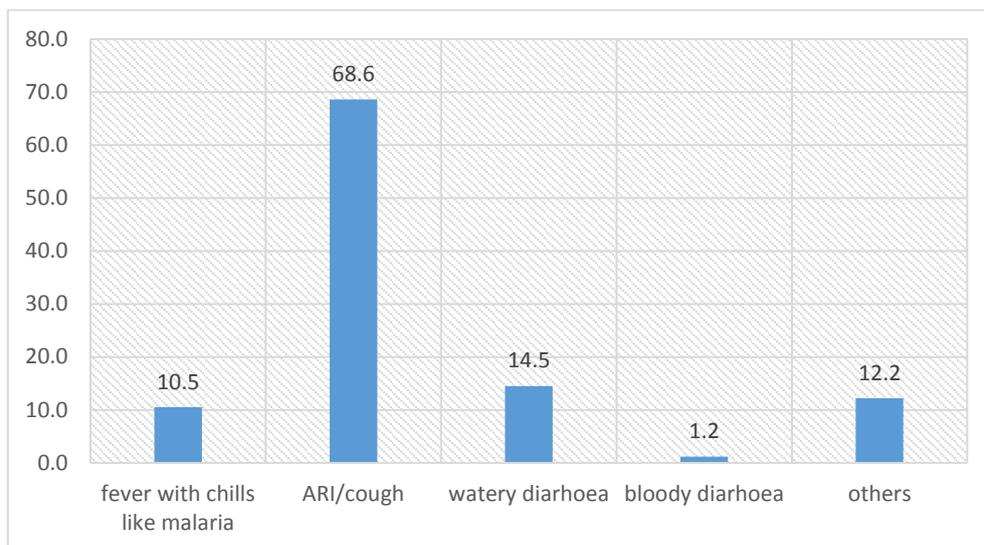zinc and ORS was 61.6 percent an indication of good understanding of diarrhoea management.

Figure 3. Prevalence of diseases among children in Laikipia County

Majority of caregivers sought treatment from public health facilities as shown in figure 3. Private clinics were the second most visited with 19 percent. Traditional systems of treatment accounted for 4.8 percent while those who sought medicine from shops were 2.4 percent. The findings are in line with distribution of health facilities where majority are public health facilities. Moreover, the findings show that caregivers have good health seeking behaviour.
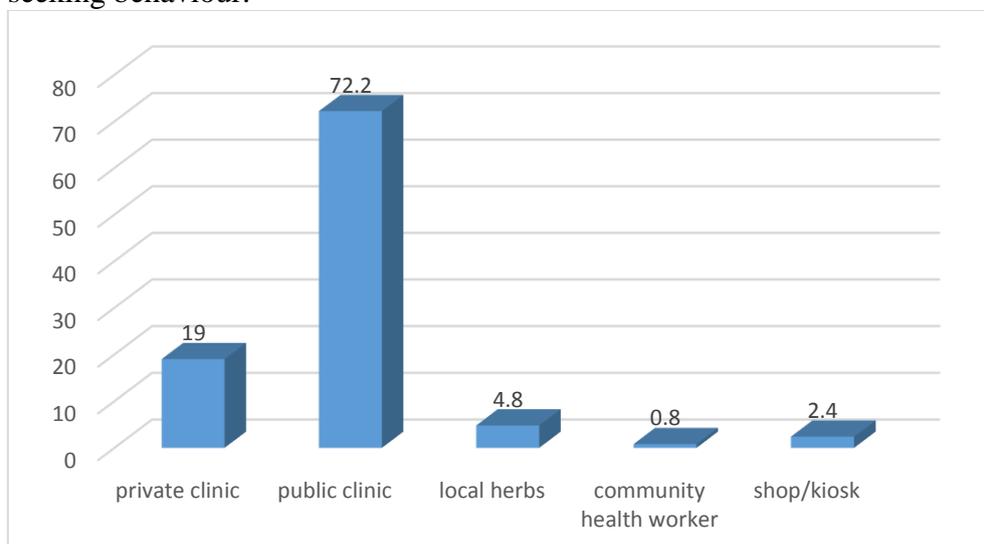

Figure 4. Health seeking behavior in Laikipia County

3.5   Household Water Access and Sanitation

3.5.1   Main sources of Water

The major sources of water in the county are varied by geographical location as indicated in figure 5. Overall 36.7 percent of households obtained water from unprotected sources (river/pans) while 26.3 percent obtained from boreholes/wells. In addition, 14.2 percent had

access to piped water while 10.1 percent obtained from springs. Access to safe water remain a challenge for the county with only half of the population (50.6%) accessing safe water. Laikipia East had the highest number of Households with access to safe water at 60.9 percent. Laikipia North and West had 46.1 percent of households with access to clean and safe water.
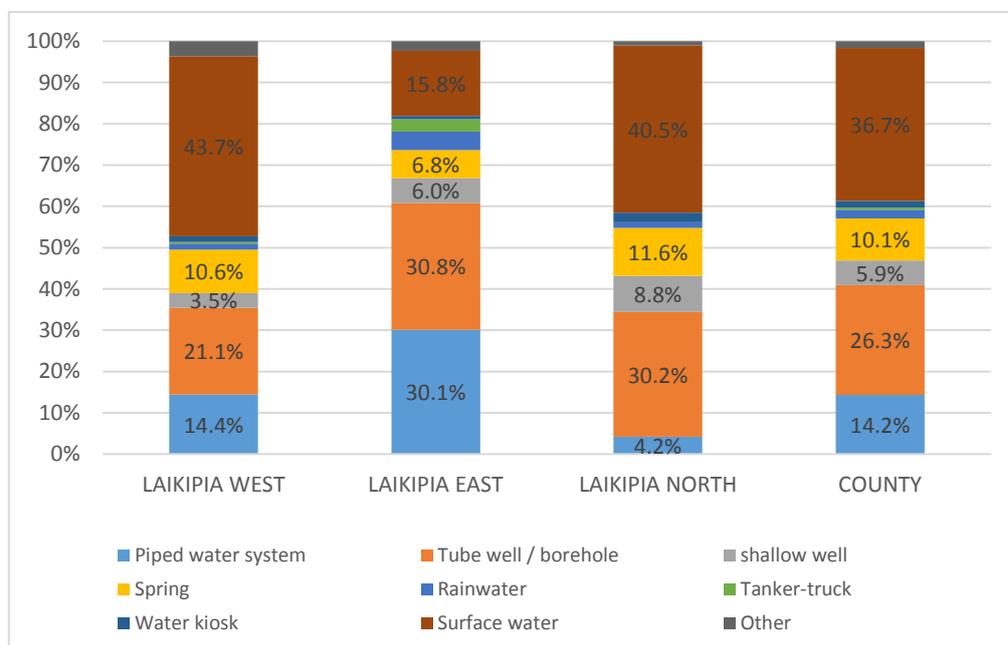

Figure 5. Main Source of water in Laikipia County

The main sources of water in Laikipia North Sub County were boreholes (30.2%), surface water (water pans & rivers-40.5%) and springs (11.6%). In Laikipia west, the main sources were rivers and pans (43.7%), boreholes (21.1%) and piped water system (14.4%). Laikipia East had the highest number of households accessing clean and safe water (60.9%). Water treatment before drinking is very low across the county with only 25.9 percent treating water. Among those who treated water, boiling was the most preferred method at 22.3 percent.

The distances to and fro water source as a proxy for water access indicate unstable situation for majority of households in the county and vary by location. In Laikipia North 27.4 percent of households indicated traveling for more than two kilometres in search of water while in Laikipia East was 23.3 percent (figure 6). Laikipia East also had the highest number of households travelling less than half a kilometre in collecting water (46.6%) a factor attributed to proximity to urban centres which have access to piped water.
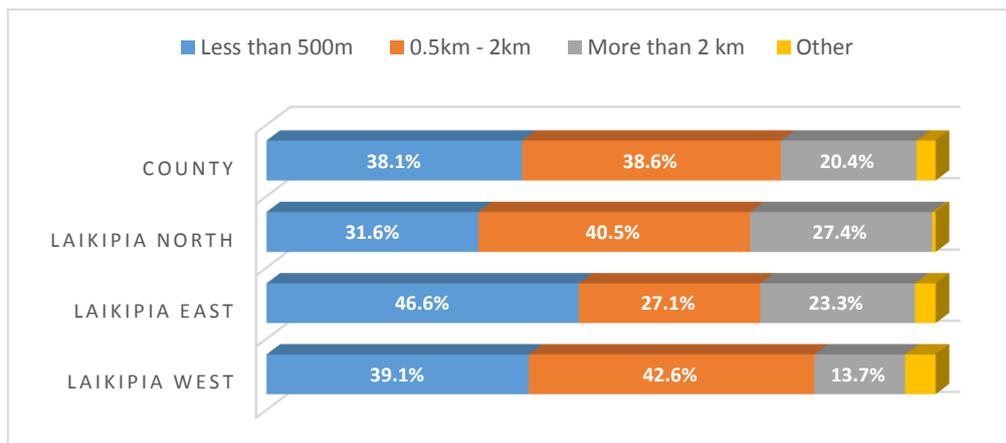
Figure 6. Distance to main water source

Close to a third (30.1%) of households in the county indicated queuing for water with a similar pattern across the three sub counties as shown in figure 7. The time spent queuing for water however varied by Sub County. Laikipia East had the highest number (38.6%) spending more than an hour while Laikipia West had the lowest number (25.3%) queuing for water.
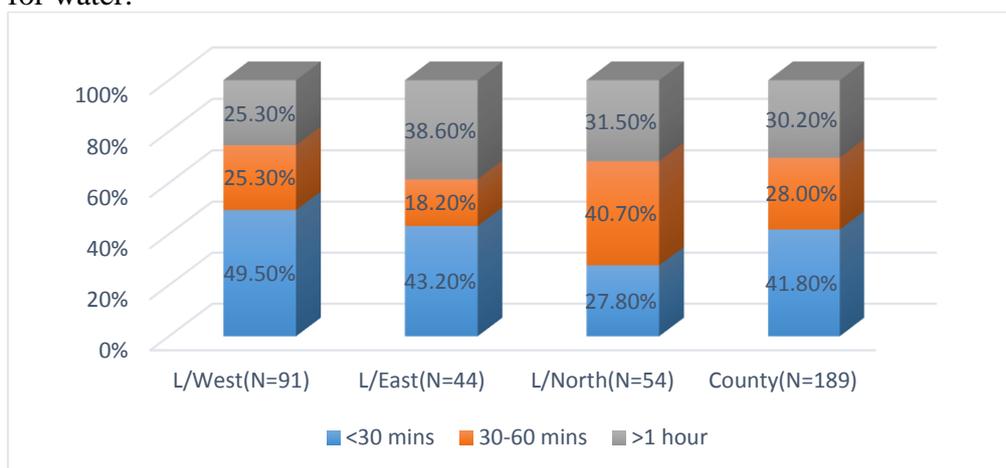

Figure 7. Average time HHs spent Queuing for water

The average water consumption per person per day was 12.2 litres in the county. Laikpia East had an average of 15.8 litres while the lowest was recorded in laikipia North at 9.5 litres and laikipia West at 13.0 litres which is below sphere standards of 15 litres per person per day.

3.1.1 Access to Toilet and Hand washing practices

Access to toilet facilities as a proxy of safe human waste disposal is relatively high in the county at 72.8 percent and is comparable to the national coverage of 74.3 percent[7]. Laikipia East had the highest coverage of 97 percent while Laikipia West had coverage of 84.8 percent. However, Laikipia North had the lowest coverage at 41.9 percent. The low latrine coverage is attributed to nomadic lifestyle of the population and could be linked to the high prevalence of waterborne diseases due to contamination of water sources. Figure 8 shows latrine coverage as a proxy indicator for safe human waste disposal.

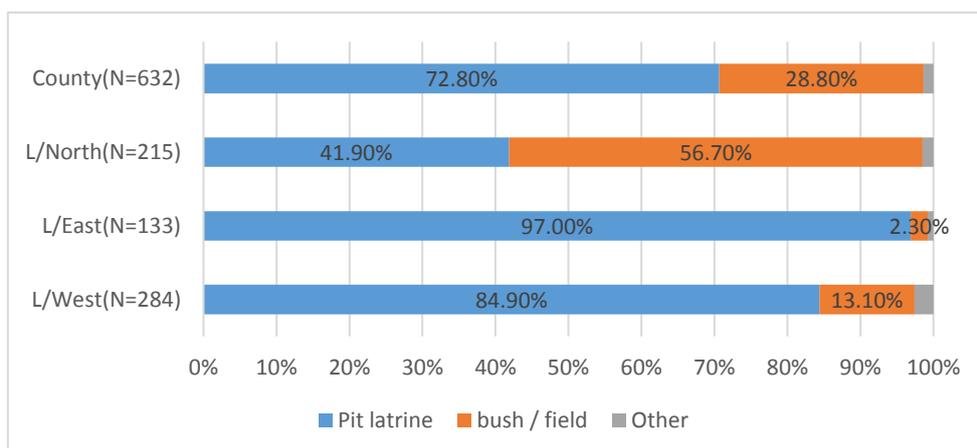[7] Population and housing census report, 2009

Figure 8. Latrine coverage in Laikipia County

Hand washing practices at critical times is very low among households surveyed in the county. The proportion of households washing hands after toilet was 53.6 percent while hand washing before eating was the highest at 66.8 percent. Washing of hands with soap and water was 49.7 percent as shown in table 11.

Table 11. Hand Washing practices in Laikipia County

	No. Of HHs	proportion
After toilet	336 HHs	53.6
Before cooking	250 HHs	39.9
Before eating	419 HHs	66.8
After taking children to the toilet	44 HHs	7.0
Hand washing in all 4 critical times	12 HHs	1.9
Hand washing by soap and water	314 HHs	49.7

The findings call for elaborate strategy to improve on hand washing practices in the county as it contributes significantly to reduction of diseases associatec with contamination.

3.6   Livelihood and Food Security Indicators

3.6.1   Main livelihood activities

The survey findings show livestock keeping, farming and casual waged labour as the main livelihoods in the county (figure 9). However, the main livelihoods vary by sub county with more than half (53.5%) of the population in Laikipia North engaging in pastoralism. In Laikipia East, agricultural farming constitute 36.1 percent of the population while 24 percent are engaging in casual labour.
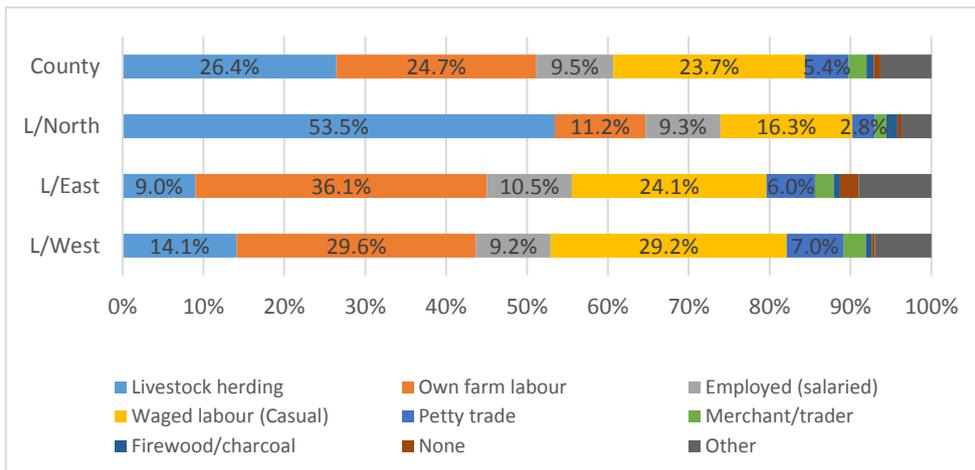
Figure 9. Main livelihoods in Laikipia County

Laikipia West has both agricultural farming and waged labour as the main livelihood with 58.8 percent combined. The statistics from the survey indicate that a significant proportion of the population are engaging in unsustainable livelihoods (casual labor, petty trade, charcoal). Laikipia North that shows pastoralism as the main livelihood apparently exhibited higher levels of acute malnutrition compared to other areas with agricultural farming as main livelihood.

3.6.2 Main source of income

The major sources of income in the surveyed areas in the last three months follows similar pattern as livelihoods as depicted in figure 10.
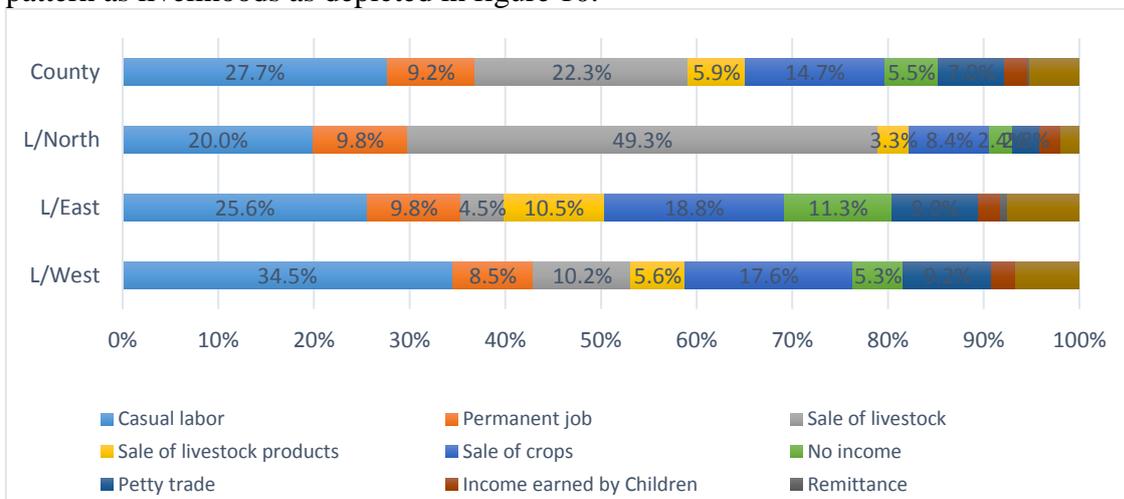

Figure 10. Main source of income in Laikipia County

Casual labour, sale of livestock and sale of crops were the main sources of income in the county. Laikipia north had close to half of the population relying on sale of livestock for income while Laikipia North had a third of the population engaging in casual labour for income. The over-reliance on sale of livestock and livestock products is a pointer to population engaging in unsustainable livelihood. Further, casual labour is increasingly becoming a significant source of income across the sub counties signifying a shift in livelihood and a pointer to urbanization in these areas.

3.6.3   Main dominant food and sources

The main staple food reported during the survey in the county was cereals (91.3%). Markets played an important role across the surveyed areas with over 96 percent of households indicating purchase as their main source of food.

3.6.4   Household Dietary Diversity

A 24-hour dietary diversity score was calculated to determine the housholds economic capacity to consume various foods in the county. The most counsumed food groups were; oils and fats (87.3%), vegetables (80.7%), dairy products (69.9%) and sugars/sweets (66.(%).

The average days for the consumption of cereals was 6.4, protein (4.8), fruits and vegetables (5.8) and oils (6.2). the consumption of iron rich and vitamin A rich foods was very low with average of 0.95 and 0.7 days respectively.
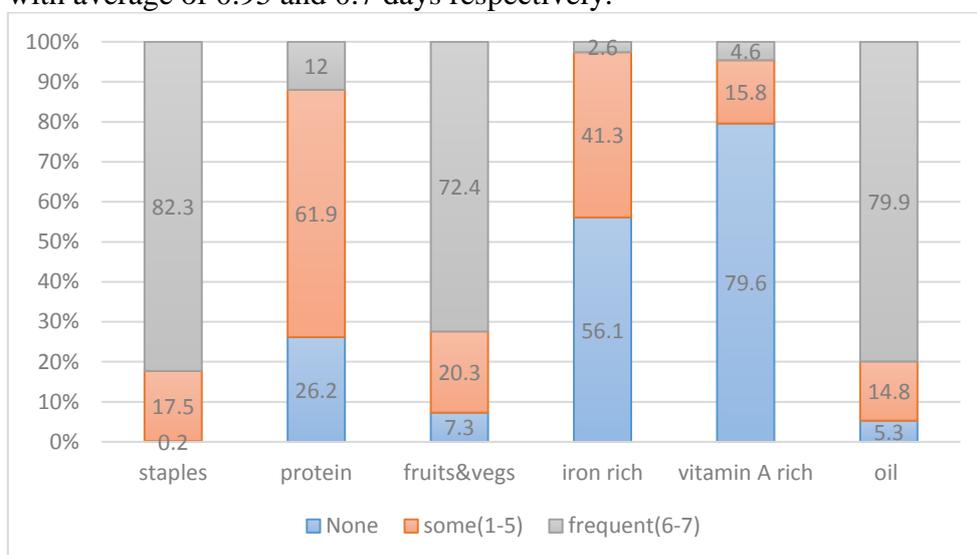

Figure 11. Frequency for consumption of micronutrient rich foods

Staples (82.3%), fats/oils (79.9%), fruits and vegetables (72.4%) were the most frequently consumed micronutrient rich foods in the county as shown in figure 11.

Dietary diversity is indicator of social economic status with households consuming more food groups associated with a higher social economic status. Overall, 43.7 percent of surveyed households consumed more than five food groups while only 7.7 percent consumed less than three food groups as shown in figure 12.
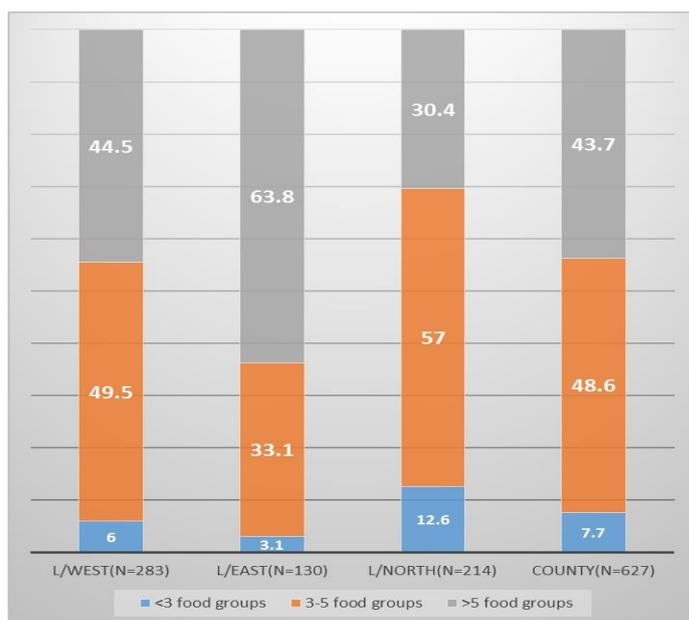

Figure 12. Dietary diversity score in Laikipia County

Across the sub counties, the dietary diversity score varied. Laikipia East had the most households consuming more than 5 food groups (63.8%) while lowest was Laikipia North with 43.7 percent. The highest number of households consuming less than three food groups (12.6%) was recorded in Laikipia North. Food consumption score as measured over the past seven days show that majority of households in the county had acceptable food consumption. The same was observed in the three sub counties where laikipia East had the highest number of households with acceptable food consumption (94.6%) while Laikipia North had 76.2 percent of households with acceptable food consumption score as shown in figure 10.
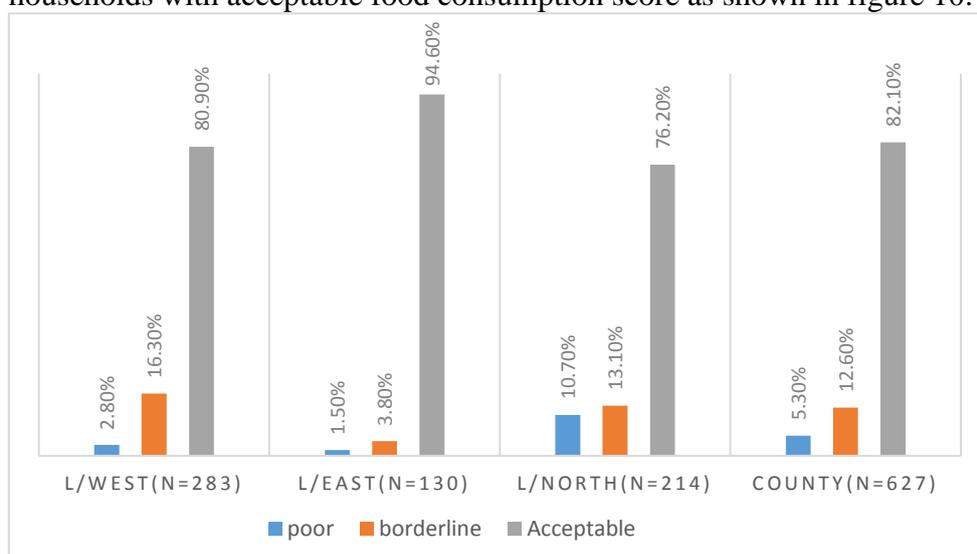

Figure 13. Food Consumption score in Laikipia County

3.6.5 Women Dietary Diversity

Minimum dietary diversity for Women (MDD-W) is an indicator to measure whether women 15 – 49 years of age have consumed at least five out of ten defined food groups the previous day. It is a proxy indicator for higher micronutrient adequacy, one important dimension of diet quality[8]. From the survey findings, only 28.3 percent of women were found to have consumed five food groups or more.

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[8] FANTA III, Minimum Dietary Diversity for Women (MDD-W)

4. CONCLUSION AND ECOMMENDATIONS

Laikipia County (Laikipia North and West)			
Conclusion	**Probable cause**	**Recommendations**	**By Who**
Serious levels of GAM and SAM of 11.4% and 2.2% based on WHO classification as well as high prevalence of underweight	**Household food insecurity** • Inadequate food intake at HH level as reflected in low dietary diversity with a mean dietary diversity 4.8 which reflect households inability to acquire a variety of food. • Livestock migration to dry season grazing areas in search of pasture and water there by reducing milk availability at household level for young children in Laikipia North Sub County.	• Short term intervention for food insecure households and households with malnourished children included in "*chakula kwa jamii*" program. • Medium /long term strategy in addressing fragile and unsustainable livelihood owing to climate change. • Intensify and increase community outreach programs to actively screen for cases of malnutrition specifically targeting hard to reach areas of Laikipia North. • Strengthen community health strategy and train community health workers on nutrition screening for malnutrition. • Scale up IMAM services in the two districts and increase health and nutrition education targeting feeding practices among mothers.	
Low vitamin A, Deworming coverage and zinc supplementation for diarrhoea management	• Inadequate knowledge on the part of care givers on the importance of vitamin A supplementation and deworming. • Lack of sensitization on the importance of zinc in diarrhoea management among care givers and stock out/lack of zinc	• Strengthen health education on the importance vitamin A, deworming and zinc supplementation. • Sensitization of health workers on	

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	tablets at health facilities.	the need for documentation of both Vitamin A and deworming services on child health booklet. • Capacity strengthening on zinc supplementation in management of diarhoea	
Inadequate household water access and poor water treatment as well as poor hand washing practices mostly in Laikipia North and West Sub Counties	• Fewer water sources and far from settlement areas thus long trekking distances to water source for a significant part of the population in North and West. • Lack of water treatment chemicals as well as attitude/cultural practices towards water treatment before drinking and hand washing at critical times.	• Increase access to water through construction of water pipeline to near settlements. • Conduct/scale up health education targeting behaviour change. • Provision of water treatment chemicals to households obtaining water from unsafe sources.	
Low access to latrine facilities and poor waste disposal in Laikipia North sub county	• Inadequate capacity, tough terrain and cultural practices related to human waste disposal.	• Community sensitization on the importance of proper human waste disposal • Advocate for more toilets in the community to increase access	
Low uptake of iron and folate supplements	• Inadequate knowledge on the importance of iron and folate among pregnant women/after taste upon taking of the supplements. • Cultural practices/traditional beliefs/attitude/poverty towards skilled delivery. • In accessibility to health facilities owing to long distances from settlement areas and poor infrastructure (roads)	• Address skewed access to health services through construction and equipping of health facilities. • Intensify community education addressing cultural aspects that are a barrier • Information education and communication on importance of iron/folate in pregnancy	