

REPUBLIC OF KENYA



GOVERNMENT OF MAKUENI COUNTY



MAKUENI COUNTY INTEGRATED SMART SURVEY REPORT

JUNE 2023



Kenya
Red Cross



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List of Acronyms

| | |
|----------------|--|
| ANC | Antenatal Care |
| ARI | Acute Respiratory Infections |
| ASAL | Arid and Semi-Arid Lands |
| BCG | Bacilli Calmette Guerin |
| BFCI | Baby Friendly Community Initiative |
| CDH | County Director of Health |
| CECM | County Executive Committee Member |
| CHMT | County Health Management Team |
| CHS | Community Health Services |
| CHV | Community Health Volunteer |
| CI | Confidence interval |
| CIDP | County Integrated Development Plan |
| cIMCI | community Integrated Management of Childhood Illnesses |
| CLTS | Community led Total Sanitation |
| cm | Centimetre |
| CMAM | Community Management of acute Malnutrition |
| CMR | Crude Mortality Rate |
| CNC | County Nutrition Coordinator |
| CNTF | County Nutrition Technical Forum |
| CNAP | County Nutrition Action Plan |
| COH | Chief Officer Health |
| CSG | County Steering Group |
| CSI | Coping strategy index |
| DD | Dietary Diversity |
| ENA | Emergency Nutrition Assessment |
| EPI | Expanded Program on Immunizations |
| EWS | Early Warning System |
| FCS | Food Consumption Score |
| FEWSNET | Famine Early Warning Systems Network |
| FFA | Food For Asset |
| FSL | Food security and livelihood |
| GAM | Global Acute Malnutrition |
| GoK | Government of Kenya |
| HAZ | Height for Age -Z score |
| HDD | Household Dietary Diversity |
| HH | Household |
| HiNi | High Impact Nutrition Interventions |
| IMAM | Integrated Management of Acute Malnutrition |
| IPC | Integrated Food Security Phase Classification |

| | |
|---------------|--|
| IYCF | Infant Young Child Feeding |
| KHIS | Kenya Health Information System |
| KIHBS | Kenya Integrated Household and Budget Survey |
| KDHIS | Kenya Demographic Health Indicator Survey |
| KNBS | Kenya National Bureau of statistics |
| MAM | Moderate Acute malnutrition |
| MDD | Minimum Dietary Diversity |
| MAD | Minimum Acceptable Diet |
| MMF | Minimum Meal Frequency |
| MUAC | Mid Upper Arm Circumference |
| NDMA | National Drought Management Authority |
| NGO | Non-governmental Organization |
| ODK | Open Data Kit |
| OPV | Oral polio Vaccine |
| OTP | Outpatient Therapeutic Programme |
| RUSF | Ready To use Supplementary food |
| RUTF | Ready To Use Therapeutic Food |
| SAM | Severe Acute Malnutrition |
| SCHMT | Sub-County Health Management Team |
| SCNO | Sub County Nutrition Officer |
| SD | Standard Deviation |
| SFP | Supplementary Feeding Programme |
| SMART | Standardized Monitoring and Assessment of Relief and Transitions |
| SPSS | Statistical package for Social Sciences |
| CMR | Crude Mortality Rate |
| UNICEF | United Nations Children’s Fund |
| WASH | Water Sanitation and Hygiene |
| WAZ | Weight for Age -Z score |
| WFP | World Food Programme |
| WHH | Welt Hunger Hilfe |
| WHO | World Health Organization |
| WHZ | Weight for Height -Z score |
| WRA | Women of Reproductive Age |
| WVK | World Vision Kenya |

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We are cognisant of the effort and hard work of the survey teams composed of the enumerators, team leaders and coordinators in ensuring collection of high-quality data as well as the County Health Management team (CHMT) for validating the methodology and results of the survey and for putting together this report.

God Bless you all.

Dr. Kiio S. Ndolo
Chief Officer
Department of Health Services
Makueni County

FOREWORD

The SMART (Standardized Monitoring and Assessment of Relief and Transitions) survey is a widely utilized standard methodology for conducting surveys to assess nutrition status in humanitarian settings. It combines several assessment methods to provide a comprehensive understanding of the nutritional situation of the population of interest. These include; anthropometric measurements, dietary assessment, mortality and morbidity assessment, household food security and infant and young child feeding practices. These parameters, after analysis inform nutrition services and food security decision-making and planning to curb and avert human suffering that might result from disasters and calamities.

Makueni County being one of the 23 arid and semi-arid counties in Kenya is prone to frequent droughts resulting from failed consecutive rainfall seasons. These droughts are a threat to household food security, and contribute to acute malnutrition especially among children under 5 years and among pregnant and lactating women. According to the 2022 Short Rain Assessment (SRA), indicative phase classification for the county was “Crisis phase” (IPC phase 3). This mirrored the nutritional assessment of Integrated Phase Classification according to Acute Malnutrition classification 3 (IPC AMN 3).

Other similar nutrition assessments conducted in the county also revealed an increase in admission of acute malnutrition cases in the health facilities from 8,607 to 14,495 cases (68.4% increase) (Kenya Nutrition Situation Overview February 2023). Additionally, according to the Kenya Demographic Health Survey 2022, wasting among children under five years almost doubled from 2.1% in 2014 to 4% in 2022. Largely, data from household surveys is generally accepted to be most reliable for program planning and evidence-based decision-making. However, the last SMART household survey was conducted 12 years ago in the county; therefore, there is a need for a comprehensive household survey to validate and authenticate above findings in order to justify and support nutrition and food security decision-making and planning.

Dr. Paul Musila
County Executive Committee Member
Department of Health Services
Makueni County

1.0 EXECUTIVE SUMMARY

Makueni County is in the lower eastern region of Kenya, bordering Machakos County to the North, Taita Taveta County to the South, Kitui County to the East and Kajiado County to the West. It covers an area of 8034 km² with an estimated population of 989,124 (Census, 2019). The county has three main livelihood zones namely Marginal Mixed Farming, Mixed Farming crop/livestock and Mixed Farming coffee/dairy/irrigation represented at 40%, 30% and 30% respectively. The county consists of six sub counties namely; Makueni, Kilome, Mbooni, Kaiti, Kibwezi East and Kibwezi West.

Makueni County faces significant challenges related to child malnutrition. Stunting (chronic malnutrition) is prevalent, indicating long-term nutritional deficiencies. Wasting (acute malnutrition) and underweight are also observed in some areas, highlighting acute nutritional issues. Malnutrition is majorly attributed to food insecurity; poor infant and young child feeding practices; limited access to clean water and sanitation; low health service coverage and awareness; low socioeconomic status and cultural beliefs and practices.

The department of health of Makueni County, in partnership with nutrition partners and Nutrition Information Working Group (NIWG) conducted a County wide SMART survey covering all six sub counties between June 26th – July 3rd, 2023. The target population for this survey was the children 6-59 months of age and women of reproductive age 15-49 years. The main goal of the survey was to assess the nutritional status of children aged 6-59 months and women of reproductive age (15-49 years) and to estimate the crude and under-five mortality rates in Makueni County. The specific objectives included, determination of the prevalence of acute and chronic malnutrition, the immunization coverage for Measles, Oral Polio Vaccines (OPV 1 and 3), vitamin A supplementation and deworming, the prevalence of common illnesses and the coverage of zinc and ORS for management of diarrhoea in children aged 6-59 months. Others included establishment of the coverage of iron / folic acid supplementation among pregnant women, determination of the nutritional status of women of reproductive age (15-49 years) and collection of contextual information on possible causes of malnutrition such as household food security, education, water, sanitation and hygiene (WASH) practices.

Summary of finding were as shown in the table below

| INDICATOR | MAKUENI COUNTY |
|-----------------------|-----------------------|
| ANTHROPOMETRIC | |
| Clusters | 68 |
| HHs Targeted | 793 |
| HHs Reached | 841 |
| Total People Reached | 3450 |

| | |
|--|---|
| Prevalence of global malnutrition | (21) 6.2 % (3.8 - 9.7 95% C.I.) |
| Prevalence of severe malnutrition | (4) 1.2 % (0.4 - 3.1 95% C.I.) |
| Prevalence of global malnutrition by MUAC | (10) 2.9 % (1.5 - 5.4 95% C.I.) |
| Prevalence of severe malnutrition by MUAC | (2) 0.6 % (0.1 - 2.3 95% C.I.) |
| Global underweight | (40) 11.7 % (8.5 - 15.9 95% C.I.) |
| Severe Underweight | (3) 0.9 % (0.3 - 2.7 95% C.I.) |
| Global Stunting | (60) 17.6 % (13.8 - 22.2 95% C.I.) |
| Severe Stunting | (7) 2.1 % (1.0 - 4.1 95% C.I.) |
| IMMUNIZATION | |
| Measles Coverage at 9 Months by Card | 83.94% |
| Measles Coverage at 9 Months by Recall | 13.94% |
| Measles Coverage at 18 Months by Card | 76.78% |
| Measles Coverage at 18 Months by Recall | 14.61% |
| BCG by scar | 98.01% |
| OPV 1 by Card | 84.62% |
| OPV 1 by Recall | 14.25% |
| OPV 3 by Card | 85.19% |
| OPV 3 by Recall | 12.82% |
| Zinc Supplementation | 100% |
| Vitamin A Supplementation (6-11 Months)-Once | 82.35% |
| Vitamin A Supplementation (12-59 Months) - Twice | 63.41% |
| Vitamin A (6 – 59 months) | 65.24% |
| Deworming (12-59 months) | 91.17% |
| CHILD MORBIDITY | |
| Sickness two weeks prior to survey | 54.13% |
| Fever | 37.37% |
| Acute Respiratory Infection | 62.63% |
| Watery diarrhoea | 4.74% |
| Bloody diarrhoea | 0.0% |
| MATERNAL NUTRITION | |
| MUAC <21cm for WRA | 3.10% |
| MUAC (21 < 23 cm) For WRA | 9.61% |
| MUAC <21cm for PLW | |

| | |
|---|--------|
| Iron Folate Supplementation | 97.12% |
| W-MDD <5 food groups | 75.98% |
| FOOD SECURITY | |
| Poor FCS | 2.49% |
| Border FCS | 9.98% |
| Good FCS | 87.53% |
| HDD < 3 food groups | 6.29% |
| HDD 3-5 food groups | 34.80% |
| HDD > 5 food groups | 58.91% |
| CSI | 13.06% |
| WASH | |
| Piped water system | 16.29% |
| Borehole/protected spring/protected shallow wells | 19.98% |
| Earth pan/dam | 4.04% |
| Earth pan/dam with infiltration well | 2.73% |
| Harvested water (Jabiya) | 10.23% |
| Others | 1.90% |
| Piped water system | 16.29% |
| River/spring | 30.68% |
| Unprotected shallow well | 6.30% |
| Water trucking / Boozer | 2.02% |
| Water vendor | 5.83% |
| Pit latrine | 95.48% |
| Flush / pour flush | 2.62% |
| No facility / bush / field | 1.31% |
| Aware of handwashing | 98.10% |
| Hand washing at 4 critical times | 9.70% |
| Water treatment | 26.99% |

Conclusion

The current survey indicates that the majority (65.08%; 61.80% - 68.23%) of the households are at IPC two (2) Stressed, which is an indication that actions are required for disaster risk reduction and to protect livelihoods. This an improvement compared to the food security assessment report which classified the county as IPC 3 in 2022. This is confirmed by the fact that the majority (58.91%) of the households ate from more than 5 food groups in a day with a majority of the Households (87.53%) having a good Food consumption score. However, Majority of women (75.98%) are consuming less than 5 food groups in a day. Most (76%) of the women of reproductive age have a poor minimum dietary diversity (<5 food groups) despite most

households (58.9%) having a high dietary diversity score. The survey reported that most of the households have unstable sources of income hence making the households vulnerable to food security shocks. There is need to work towards strengthened resilience building and disaster risk reduction.

Recommendation

The survey provides recommendations aimed at enhancing nutrition, water, hygiene, sanitation, and food security interventions across the county. These includes mobilizing resources for nutrition services, scaling up malnutrition management sites, and promoting breastfeeding initiatives.

In addition, actions geared towards strengthening coordination, policy review (County Nutrition Action Plan), and advocating for increased budget allocation are outlined. Promotion of climate-smart agriculture, supporting farmers, and improving water access through borehole repair and water harvesting are suggested. Also, emphasis on capacity building, Monitoring and Evaluation (Research, surveys and assessments), and initiation of community-led programs to create a holistic approach to addressing the county's challenges effectively were key.

2.0 INTRODUCTION

2.1. Background Information

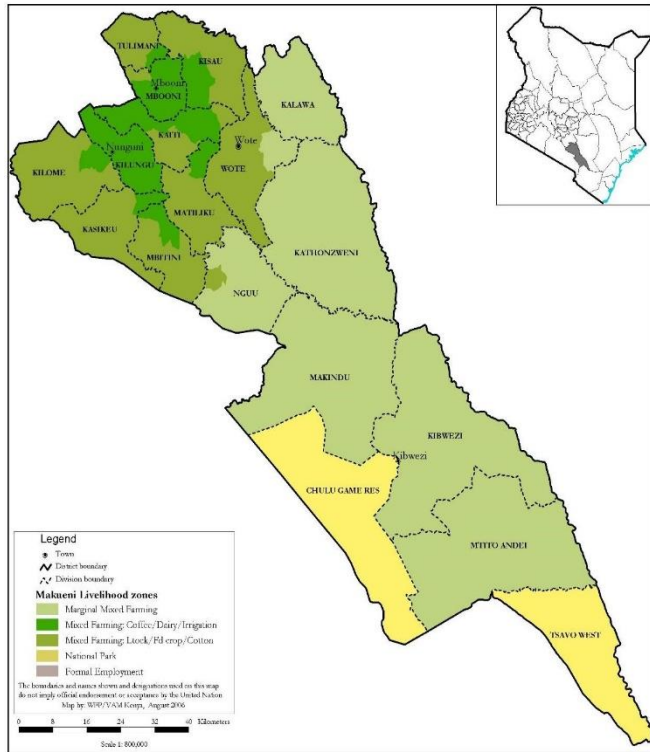


Figure 1: County by Administrative and livelihoods

Makueni County is in the lower eastern region of Kenya. The County has six parliamentary constituencies namely Mbooni, Kaiti, Makueni, Kilome, Kibwezi West and Kibwezi East which also double as the sub-counties. The County has (30) thirty administrative wards: (Mbooni 6, Makueni 7, Kaiti 4, Kilome 3, Kibwezi West 6 and Kibwezi East 4). Makueni has two municipalities namely Wote and Emali-Sultan Hamud.

It borders Machakos County to the North, Taita Taveta County to the South, Kitui County to the East and Kajiado County to the West. The County headquarter is at Wote town which is approximately 140 Kms from Nairobi. The County covers an area of 8034 km² out of which 474.1km² form the Tsavo

West National Park and 724.3 km² forming Chyulu Game Reserve. The climatic conditions are generally arid and semi-arid with distinctive highlands of Kilungu and Mbooni and the rest comprise expansive dry lowlands. It lies 1.8000⁰ to the south and 37.6167⁰ to the east.

The County has a projected population of 1,076,586 persons translating to 127 persons per square kilometre (KNBS, 2019)

2.2. Population Breakdown and Description

Table 1 highlights the breakdown of basic demographic data. Makueni County's population is projected at 1,076,586 with females being 52% and male 48%. Total households are 216,294.

Table 1: Basic Demographic population data/ Population description

| Description | Population Proportion - % | 2022 | 2023 |
|------------------------|---------------------------|---------|---------|
| Population growth rate | | 1.2 | 1.5 |
| Population total | | 1055183 | 1076586 |
| Population: Female | 52 | 548696 | 559821 |
| Population: Male | 48 | 506487 | 516757 |

| | | | |
|---|------|---------|----------|
| Households | 5 | 102788 | 216294 |
| Population surviving infants (under 1 year) | 2.2 | 23665 | 24115 |
| Population under 5 years | 14.2 | 149836 | 152874 |
| Population under 15 years | 44 | 464279 | 473694 |
| Population 15-24 years | 17 | 179381 | 183019 |
| Women of childbearing age (15–49 years) | 23 | 242692 | 247612 |
| Estimated number of pregnant women | 2.4 | 25129 | 25622 |
| Estimated deliveries | 2.3 | 24397 | 24869 |
| Estimated live births | 2.3 | 24397 | 24869 |
| Neonates 0- 28 days | 1.4 | 14562 | 15072 |
| Population 25-59 years | 32 | 323670 | 344517 |
| Population over 60 years | 6.8 | 71866 | 73324 |
| Estimated emergency obstetric complications | 0.2 | 2051 | 2093 |
| Estimated post abortion cases (24.1 of emergency obstetric complications) | 24.1 | 494 | 504 |
| Population 6-11 months (50% of <1yrs) | 50% | 111833 | 12057.5 |
| Population 12-59 months (80% of < 5yrs) | 80% | 1119869 | 122299.2 |
| Population 6-59 months (90% of < 5yrs) | 90% | 134853 | 137586.6 |

(Source: KHIS, 2022/2023)

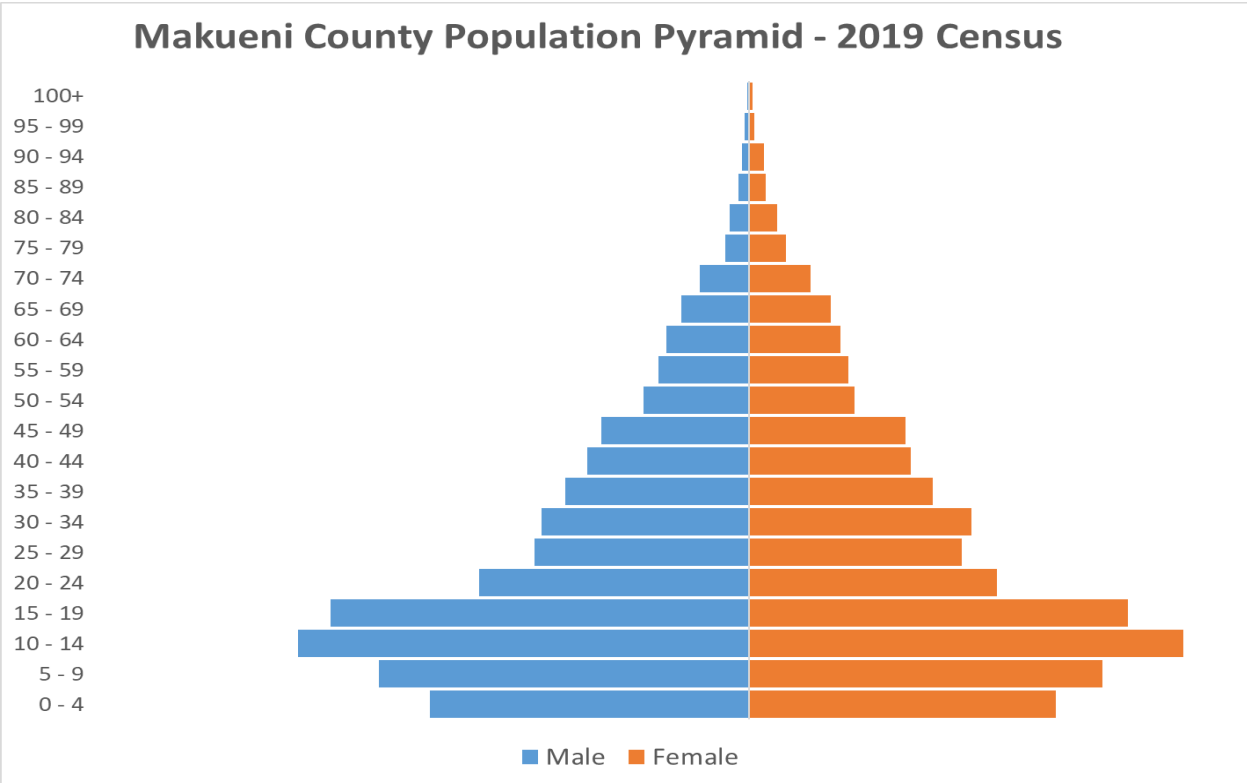


Figure 2:Age Group Structure

2.3. Climatic conditions and livelihood zones

The climatic condition of Makueni County is generally arid and semi-arid, with distinctive highlands of Kilungu and Mbooni and the rest comprising expansive plains and dry lowlands. Fig 3 below illustrates the Makueni County seasonal calendar

| | | | | | | | | | | | |
|--|-----|-----|---|-----|-----|---|-----|------|---|-----|-----|
| <ul style="list-style-type: none"> ▪ Short rains harvests ▪ Short dry spell ▪ Reduced milk yields ▪ Increased HH Food Stocks | | | <ul style="list-style-type: none"> ▪ Planting/Weeding ▪ Long rains ▪ High Calving Rate ▪ Milk Yields Increase | | | <ul style="list-style-type: none"> ▪ Long rains harvests ▪ A long dry spell ▪ Land preparation ▪ Increased HH Food Stocks ▪ Kidding (Sept) | | | <ul style="list-style-type: none"> ▪ Short rains ▪ Planting/weeding | | |
| | | | | | | | | | | | |
| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |

Figure 3: Seasonal calendar: Makueni County

There are three livelihood zones: Mixed Farming (coffee/dairy) which occupies 30%; mixed farming (food crop/Livestock) 30% and marginal mixed farming comprising 40% of the land.

2.4. Maternal, Infant and Young Child Nutrition status and assessment

Malnutrition in childhood and pregnancy has many adverse consequences for child survival and long-term well-being. It also has far-reaching consequences for human capital, economic productivity, and overall national development. The consequences of malnutrition should be a significant concern for policymakers both at the national and county level. According to the the 2018 Global Nutrition Report, Kenya was clustered among 41 countries, 29% of countries experiencing the triple burden of malnutrition (GOK, MOH, 2018) which is characterized by the co-existence of both undernutrition and overnutrition as manifested by stunting, wasting, underweight, micronutrient deficiencies, overweight and obesity including diet related non-communicable diseases.

Over the past years, Kenya has witnessed an improvement in the nutritional status of children where stunting declined from 35% in 2008/09 to 26% in 2014; wasting from 7% to 4% and underweight from 16% to 11% (KDHS, 2014). Despite the reduced child under nutrition, there are regional disparities where some counties with the lowest stunting rates are at 15% while those with highest are at 45%. 9 (19%) of the counties have a stunting prevalence of above 30%, a level categorized as very high and of public health significance.

A total of 28% of adults aged 18–69 years are either overweight or obese, with the prevalence in women being 38.5% and men 17.5%. Similar trends are evident between KDHS 2008 and KDHS 2014. The proportion of women who were overweight increased from 25% to 33% and those who were obese increased from 7% to 10%.

The SMART (Standardized Monitoring and Assessment of Relief and Transitions) survey is a widely utilized standard methodology for conducting surveys to assess nutrition status in humanitarian settings. It combines several assessment methods to provide a comprehensive understanding of the nutritional situation of the population of interest. These include; anthropometric measurements, dietary assessment, mortality and morbidity assessment, household food security and infant and young child feeding practices. These parameters, after analysis inform nutrition services and food security decision-making and planning to curb and avert human suffering that might result from disasters and calamities.

2.5. Justification of the survey

Makueni County being one of the 23 arid and semi-arid counties in Kenya is prone to frequent droughts resulting from failed consecutive rainfall seasons. These droughts are a threat to household food security, and contribute to acute malnutrition especially among children under 5 years and among pregnant and lactating women. According to the 2022 Short Rain Assessment (SRA), indicative phase classification for the county was “Crisis phase” (IPC phase 3). This mirrored the nutritional assessment of Integrated Phase Classification according to Acute Malnutrition classification 3 (IPC AMN 3). Other similar nutrition assessments conducted in the county also revealed an increase in admission of acute malnutrition cases in the health facilities from 8,607 to 14,495 cases (68.4% increase) (Kenya Nutrition Situation Overview February 2023). Additionally, according to the Kenya Demographic Health Survey 2022, wasting among children under five years almost doubled from 2.1% in 2014 to 4% in 2022.

Largely, data from household surveys is generally accepted to be most reliable for program planning and evidence-based decision-making. However, the last SMART household survey was conducted 12 years ago in the county; therefore, creating a need for a comprehensive household survey to validate and authenticate above findings in order to justify and support nutrition and food security decision-making and planning.

2.6. Objectives of the SMART Survey

The Survey was conducted in the entire county in all the three livelihood zones with the main objective of assessing the nutritional status of children aged 6-59 months and estimate the crude and under-five mortality rates in Makueni County. The specific objectives were:

1. To determine the prevalence of acute and chronic malnutrition in children aged 6-59 months.
2. To determine the nutritional status of women of reproductive age (15-49 years) based on MUAC.
3. To determine the immunization coverage for measles, Oral Polio Vaccines (OPV 1 and 3), and vitamin A supplementation in children aged 6-59 months
4. To determine the deworming coverage for children aged 12-59 months.
5. To establish coverage of iron and folic acid supplementation during the previous pregnancy among pregnant and lactating women.

6. To determine the possible drivers of malnutrition such as household food insecurity, water, sanitation and hygiene practices.
7. To establish the minimum dietary diversity for women of reproductive age.
8. To assess the minimum dietary diversity, minimum meal frequency and minimum acceptable diet for children aged 6-23 months
9. To estimate the crude and under-five mortality rates for the County

2.7 SURVEY METHODOLOGY

2.7.1. Survey Area

The target geographical area for the survey was the entire Makeni County. Data was collected from all the 6 sub counties among the sampled households. It covered all the 3 livelihood zones namely Marginal Mixed Farming, Mixed Farming (coffee/dairy) and Mixed Farming (crops/livestock).

2.7.2. Survey design

The survey used a cross-sectional survey design of a two-stage cluster sampling methodology based on Standardized Monitoring and Assessment of Relief and Transitions (SMART) approach. Stage one sampling involved the selection of the clusters to be included in the survey while the second stage sampling involved the selection of the households from the sampled clusters at the village level.

2.7.3. Study Population

The target population for the survey was children aged 6-59 months for the anthropometric component and women of reproductive age between 15 – 49 years for the maternal nutrition component. Households were also targeted for food security and WASH.

2.7.4. Sample size

The anthropometric survey sample size was calculated using the **ENA for SMART software 2020 (version January 11, 2020)**. The anthropometry and mortality rate sample size computations gave a sample size of 793 and 581 households respectively. As a result, the anthropometry sample was used as the overall Survey sample. Non achievement of the minimum acceptable coverage of 80% of target under five population with anthropometry sample from the sampled 61 clusters led to activation of the 7 reserve clusters making a total of 68 clusters.

2.7.5. Sampling procedure: selecting clusters

The sampling procedure applied a two-stage sampling: -

First stage Cluster involved random selection of clusters from the sampling framed based on the probability proportional to population size (PPS) methodology. The names of the updated list of villages and their respective populations were entered into the ENA for SMART software (Jan 11th 2020 version) from which 61 clusters and 7 reserve clusters were generated.

Second stage sampling applied random sampling to select households at the village level. The

survey teams developed a sampling frame in each of the village sampled during the 1st stage sampling in case such a list never existed with guidance from Village managers. 13 households were selected randomly from the updated list of households in the village/cluster.

Considering that the County population distribution and the movement of the teams from one household to another, a target of 13 Households per team per day was feasible.

2.7.6. Sampling procedure: selecting households and children

Sample size was calculated using ENA for SMART software 2020 (version January 11, 2020) as indicated in the table 2 below.

Table 2: Sample size calculation

| | Makueni County | Rationale |
|--------------------------------|----------------|---|
| Estimate (GAM) | 6.0 | The situation may have worsened slightly above the KDHS rate of 4.0. NDMA April bulletin indicates the County as being in a normal state. County anticipated to be in medium nutrition situation. |
| Desired Precision | 3 | Rule of the thumb (Generally do not expect high rates of GAM) |
| Design Effect | 1.5 | Rule of thumb |
| Estimated Number of Children | 393 | As per ENA output |
| Average HH Size | 4.0 | From the 2019 census report |
| Non-Response Rate (%) | 3 | |
| Proportion of Children Under 5 | 14.2 | KHIS 2023 |
| Estimated Number of Households | 793 | As per ENA output |
| Number of Households per Day | 13 | 13 households were considered practical per team per day |
| Number of Cluster | 61 | Computed from the Number of HHs per Day |
| Number of Teams | 9 | Teams collected data for 7 days with 5 teams being engaged for an 8 th day |

Mortality sample size was calculated as described in the table 3 below.

Table 3: Mortality sample size calculation

| | Makueni County | Rationale |
|--------------------------------|----------------|---|
| Estimate mortality rate | 0.301 | KNBS 2019 (conversion of 5.5 deaths/1,000 at half year population) |
| Desired Precision | 0.3 | Rule of the thumb |
| Design Effect | 1.5 | Rule of thumb |
| Recall Period(days) | 83 | This was based on good Friday (7 th April, 2023) as the recall event |
| Non-Response Rate (%) | 3 | |
| Average Household Size | 4.0 | KNBS 2019 |
| Estimated Number of Households | 581 | As per ENA output |

| | | |
|-------------------------------------|------|-------------------|
| Estimated Population to be included | 2256 | As per ENA output |
|-------------------------------------|------|-------------------|

2.7.7. Case definitions and inclusion criteria

- **Household [HH]:** A household was defined as a group of people who live together under one roof and eat from the same cooking pot.
- **Date of Birth/Age** was estimated through verifying vaccination or birth registration card. A local calendar of events was also used to estimate age and recorded in months.
- **Weight [in kg]:** Children were weighed to the nearest 0.1 kg by using an Electronic Scale. The children who could easily stand were asked to stand on the weighing scale and their weight recorded. In a situation where the children could not stand, the double weighing method was applied.
- **Height/Length [in cm]:** A measuring board was used to measure bareheaded and barefoot children. The precision of the measurement was 0.1 cm. Children less than 2 years of age were measured lying down and those equal to or above 2 years of age were measured standing up.
- **Mid Upper Arm Circumference [MUAC]** was recorded among children 6-59 months and pregnant and lactating women with children aged 0-23 months to the nearest mm. All subjects were measured on the left arm using standard MUAC tapes.
- **Oedema:** The presence of oedema among children 0-59 months was recorded as “yes” or “no”. The presence of oedema was checked by applying moderate thumb for three continuous seconds on the tops of both feet. Any suspected cases required confirmation by multiple team members, a supervisor if present, and photo documented when possible.
- **Diarrhea:** Diarrhea was assessed through a two-week recall. Diarrhea was defined as passage of three or more loose or liquid stools in a day in children aged 6-59 months.
- **Measles vaccination in children 9-59 months:** Measles vaccination was assessed among children aged 9-59 months by checking for the measles vaccine on the EPI card if available or by asking the caregiver to recall if no EPI card was available.

Case definitions IYCF indicators

- **Minimum dietary diversity:** Percentage of children 6–23 months of age who consumed foods and beverages from at least five out of eight defined food groups during the previous day. The eight food groups used for tabulation of this indicator are:
 1. breast milk.
 2. grains, roots, tubers, and plantains.
 3. pulses (beans, peas, lentils), nuts and seeds.
 4. dairy products (milk, infant formula, yogurt, cheese).
 5. flesh foods (meat, fish, poultry, organ meats).
 6. eggs.
 7. vitamin-A rich fruits and vegetables; and
 8. Other fruits and vegetables.

- **Minimum meal frequency:** Proportion of breastfed and non-breastfed children 6–23 months of age who received solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more.
 - 1.0 Minimum meal frequency for non-breastfed children [6-23 months] [≥ 4 full meals]
 - 2.0 Minimum meal frequency for breastfed children [6-8 months] [≥ 2 full meals]
 - 3.0 Minimum meal frequency for breastfed children [9-23 months] [≥ 3 full meals]
- **Minimum acceptable diet:** Percentage of children 6–23 months of age who consumed a minimum acceptable diet during the previous day.

Table 4: Case definitions of Acute Malnutrition, Stunting and Underweight used for analysis, according to WHO standards, 2006.

| Malnutrition Status | Malnutrition Status Classification | | | | |
|---------------------|------------------------------------|------------------------------|----------------------------|----------------------------|--------------------------|
| | Acute Malnutrition | | Chronic Malnutrition | Underweight | Overweight |
| | Weight/ Height [WHZ] | MUAC | Height/Age [HAZ] | Weight/Age [WAZ] | Weight/ Height [WHZ] |
| Global | WHZ < -2 SD and/or Oedema | MUAC < 125 mm and /or Oedema | HAZ < -2 SD | WAZ < -2 SD | WHZ > 2 SD |
| Moderate | WHZ < -2SD to \geq -3 SD | 115 mm \leq MUAC < 125 mm | HAZ < -2SD to \geq -3 SD | WAZ < -2SD to \geq -3 SD | WHZ > 2SD to \leq 3 SD |
| Severe | WHZ < -3 SD and/or Oedema | MUAC < 115 mm and /or Oedema | HAZ < -3 SD | WAZ < -3 SD | WHZ > 3 SD |

Table 5: WHO and/ UNICEF Classification for the Severity of Malnutrition by Prevalence among Children under Five

| Indicators | Prevalence Thresholds Level [%] ¹ | | | | |
|--------------------|--|----------|----------------|-------------|-------------------|
| | Very high | High | Medium | Low | Very low |
| Wasting [WHZ] | ≥ 15 | 10 – 15 | 5 - <10 | 2.5- <5 | <2.5 |
| Overweight [WHZ] | ≥ 15 | 10 – 15 | 5 - <10 | 2.5- <5 | <2.5 |
| Stunting [HAZ] | ≥ 30 | 20 - <30 | 10 - <20 | 2.5- <10 | <2.5 |
| | Critical | | Serious | Poor | Acceptable |
| *Underweight [WAZ] | ≥ 30 | | 20- < 30 | 10- <20 | <10 |

*As per WHO classification

Table 6: Classification for MUAC in PLW

| Severity | Women- MUAC [mm] |
|----------|-------------------|
| Global | <210 mm |
| Moderate | ≥ 160 to < 210 mm |
| Severe | <160 mm |

Table 7: Thresholds level for Minimum Dietary Diversity [MDD-W] for women [15-49yrs]

| Minimum Dietary Diversity for Women [MDD-W] | Thresholds |
|---|------------|
| Good | ≥ 5 |
| Poor | 0-4 |

Source: *Minimum Dietary Diversity for Women: A Guide to Measurement*, FAO, USAID, FANTA, 2016

Special Cases

- **No children in the household:** Households and women questions were administered. No Household was replaced with another one.
- **Abandoned Household:** Generally, abandoned households had not been occupied for a long period and were considered as household abandoned if no one lived there last night and no one was expected to come back. All abandoned households were removed before HH listing and selection.
- **Absent Household:** Household recently inhabited but found empty at the time of data collection was considered as absent. Absent household was not replaced with another one, as non-response rate is comprised into the sample size calculation. A household was marked absent after at least two re-visits before leaving the villages.
- **Absent eligible children and women:** If any eligible children or women were absent, the team revisited the houses at the end of the day before leaving the village. Regardless of child presence in the households, team collected the other household related information.
- **Children with disability/handicap:** All data that was not influenced by the disability were collected. Team determined if it is possible to measure all anthropometry indicators: If not possible to measure height and weight, then team gave an ID number, recorded data as missing and reported the reason.

2.7.8. Data Collection

Data collection was done between June 26th – July 3rd, 2023, where a standardized questionnaire was administered to the respondents. Household questionnaire was used to collect quantitative data. The following data were collected:

1. Anthropometry (weight, height, oedema, MUAC, age, sex) for children aged 6-59 months and MUAC for women of reproductive age.
2. Vaccination information (OPV1 and 3, measles, BCG, and Vitamin A supplementation).
3. Incidences of childhood illnesses in the last 2 weeks prior to the survey.

4. Food security information (Household Dietary Diversity Score, Women dietary Diversity Score, Food consumption Score, Food consumption Score-Nutrition and Coping strategy Index)
5. Water and sanitation Hygiene (Latrine access and coverage, water treatment and hand washing)

The survey adopted the data collection tools recommended in the nutrition survey guidelines with a few modifications to cater for all the objectives of the survey.

2.7.9. Survey Team Composition

The survey team consisted of team leaders, survey enumerators and field coordinators from all the partners as indicated in the table below.

Table 8: Survey Team composition

| Activity | Number | Actors |
|--------------------|-----------|--|
| Team leaders | 9 | Department of Health, World vision |
| Survey Enumerators | 18 | Department of Health, World vision |
| Coordinators | 4 | Department of Health, Red Cross, NITWG, World vision, UNICEF, Nutrition International, WHH |
| Village guides | 70 (61+9) | 1 in each selected cluster and 1 guide per team during the pilot |

The survey employed a Multi-stakeholder approach to ensure full participation in the proposed Makueni SMART survey; county government departments, NDMA, Partners and community members. Each team was composed of 2 enumerators and one team leader. The team coordinators were from MOH & partners staff. The enumerators were selected competitively through the support of the Department of Health and World Vision.

The teams underwent a comprehensive training for 4 days. The training entailed sampling methods; anthropometric measurements; interviewing techniques; and completion of questionnaires & taking of photos of oedematous cases by use of tablets. Standardization and pilot test formed part of the training. The standardization involved each Enumerator taking the anthropometric measurements of 10 children twice. The standard SMART survey pre-test was administered accordingly; In the pre-test, each team was required to complete at least two household questionnaires in purposively selected villages near the training venue that were part of the sampled clusters. Anthropometric questionnaire and household questionnaire mounted on mobile phone application (Kobo) was used to collect the survey data

2.7.10. Data management and aggregation

Data management and aggregation was supported by the technical teams from Makueni County Department of Health and NITWG with technical support from UNICEF and World Vision. Data

was recorded into Kobo and aggregated into an online server on a daily basis. The anthropometry and mortality data thereafter were downloaded from the server, and exported to Excel and ENA for SMART software for quality checks. Data for nutritional anthropometry collected using Kobo collect mobile application was uploaded to the server on a daily basis. Daily plausibility checks were done to ensure quality. Anthropometric and mortality data was analyzed using ENA for SMART software 2020 (version January 11, 2020), while other data sets was analyzed using SPSS software version 23.0, Epi info and Microsoft excel.

Table 9: Survey workplan

| Activity | Responsible Person | Timeline |
|--|---|--|
| County initial planning meeting | DOH/Partners | 30/05/2023 |
| Sharing of Methodology with CNTF/CSG/CHMT | DOH/Partners | 31/05/2023 |
| Presentation of methodology with NITWG for review and approval | DOH/CIWG | 02/06/2023 |
| Recruitment of survey team | DOH/WVK | 09/06/2023 |
| Training survey team | DoH, NIWG/ Partners/ Line Ministries and NDMA | 19 th – 22 nd /06/2023 |
| Field data collection | DoH, Partners, NDMA | 26th June to 3 rd July |
| Data analysis | DOH/IWG/Partners | 28/06/2023 |
| Report Writing | DOH/IWG/Partners | 3 rd – 7 th /07/2023 |
| Presentation of the preliminary findings and draft report to CSG/CNTF/CHMT | DOH/CIWG | 12/07/2023 |
| Presentation of the preliminary findings to NITWG | DOH | 13/07/2023 |
| Writing of final report | DOH/CIWG | 14/07/2023 |

2.7.11. Data Analysis and Report Writing

Data analysis was done using ENA for SMART Jan 2020 version, Excel and SPSS Statistical software version 20. Anthropometric results were presented based on the WHO 2006 reference standards.

2.7.12. Ethical consideration

Sufficient information was provided to the local authorities about the survey including the purpose and objectives of the survey, the nature of the data collection procedures, the target group, and

survey procedures. Verbal consent was obtained from all adult participants and parents/caregivers of all eligible children in the survey. The decision of caregiver to participate or withdrawal was respected. Privacy and confidentiality of survey respondent and data was protected.

3.0: SURVEY RESULTS

3.1. Demographics

The survey was conducted in 841 household in 68 clusters with an average size of 4.1 persons. 254 (30.20%) of the sampled households had children below five years with the proportion of the under 5 children standing at 9.2%, a no significant difference with the KNBS data of 2019 (9.4%). The survey had an overall data quality for anthropometric measurements of 3% indicating excellent performance. The teams were able to visit all the sampled HH plus the reserve clusters.

Table 10: Survey coverage against the plan

| Planned | | | Achieved | | |
|------------|----------------------------------|-----------------|------------|----------------------------------|----------------------|
| No. of HHs | No. of Children (Sample Size) | No. of Clusters | No. of HHs | No. of Children (Sample Size) | No. of Clusters |
| 793 | 393 | 61 | 841 (106%) | 351 (89.3%) | 68 (including 7 RCs) |

3.1.1. Marital and Residency Status

Majority of the households during the survey period (90.3%) were permanent residents while 8.7% were pastoralist residents. Over three quarters of the respondents (81.0%) were married with 7.0% of them being windowed and similar proportion was single while 3.0% were divorced.

3.1.2. Main Occupation and Current Income Source for the Household Heads

Majority of the household heads (62.12%) were waged labourer's and crop farmers with 31.83% and 30.29% proportion respectively. 10.33% were however salaried with 11.28% having their main occupation as others. Additionally, most of the household's main current source of income was Casual labour (35.87%) followed by sales of crops (19.00%) with very minimal number of households depending on sale of livestock (2.49%) and their products (2.02%).

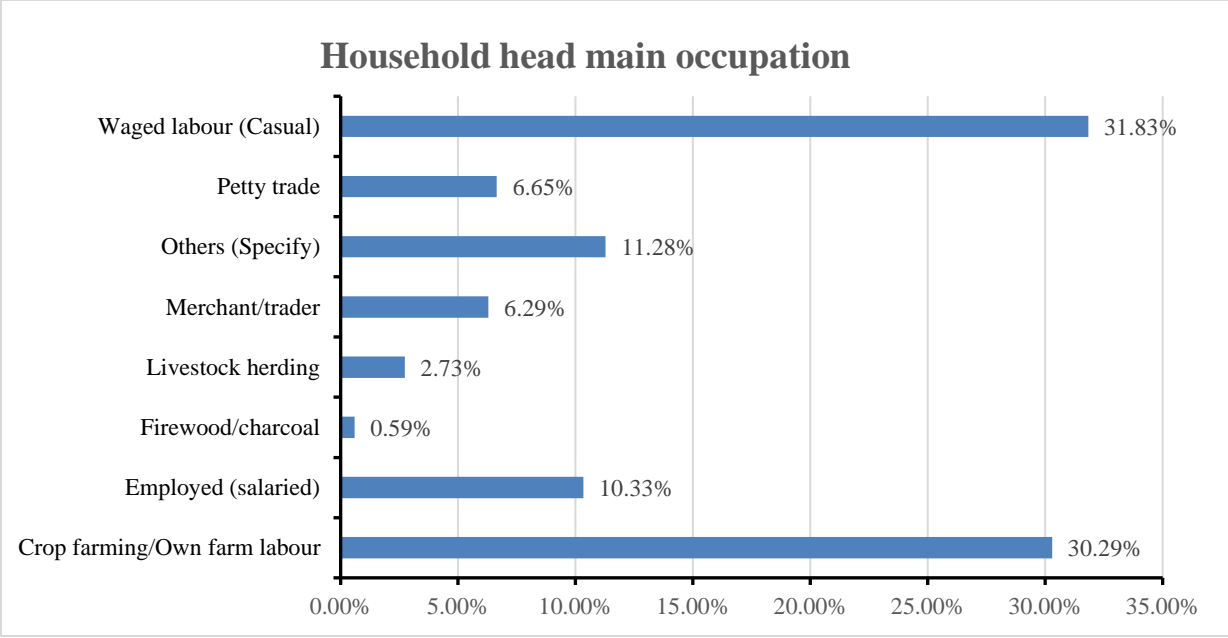


Figure 4: Household head main occupation

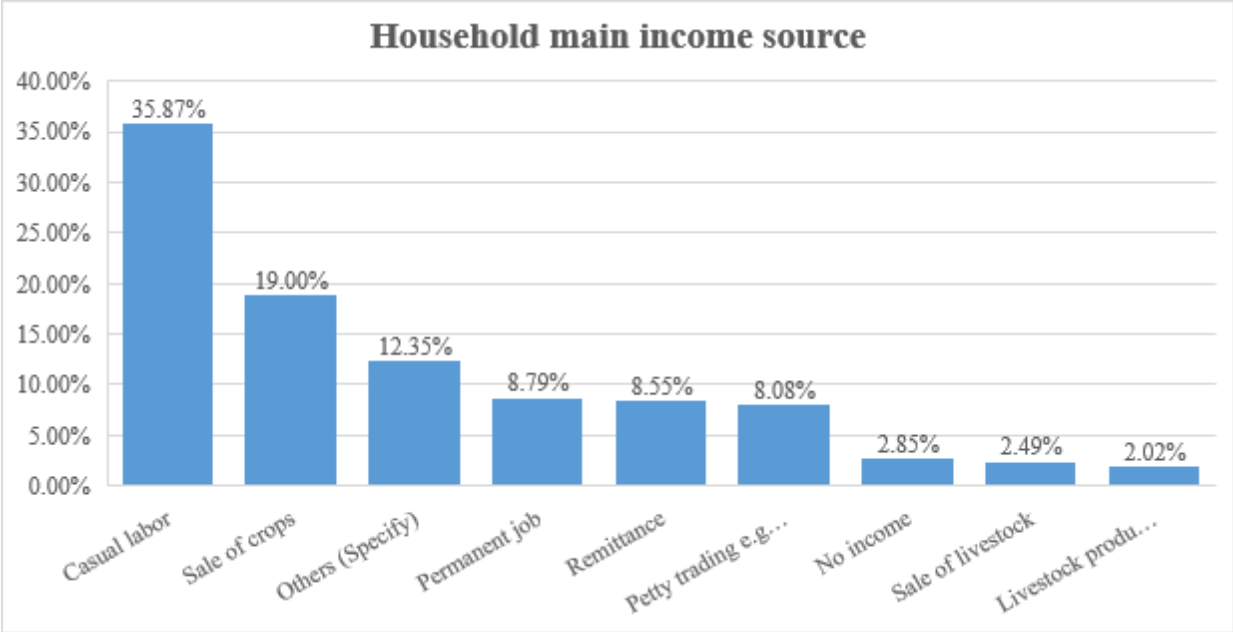


Figure 5: Main Income source of household head

3.2. Child Health and Nutrition

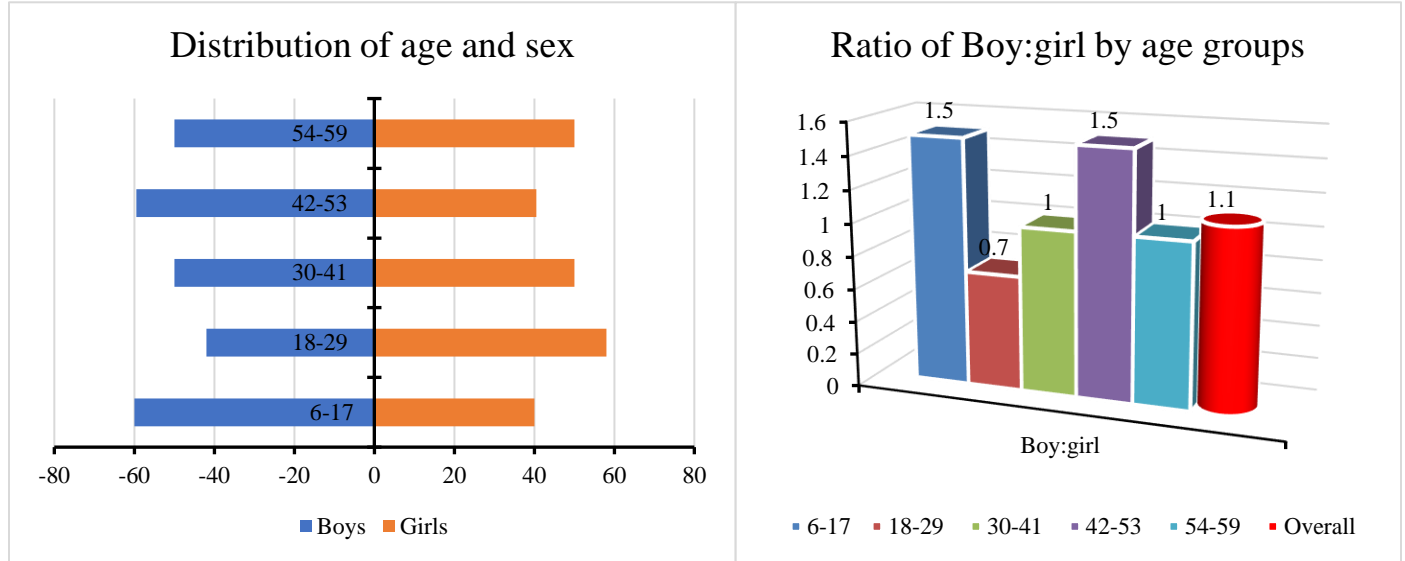
3.2.1. Anthropometry

During the Survey, 351 children aged 6 - 59 months representing 9.2% of the total population of the household sampled were assessed.

On Age and sex distribution of the sampled children, there were fewer younger children

selected in the sample with the age ratio of 6-29 versus 30-59 months thus affecting equal representation across the age cohorts. This was however purely by chance as thorough supervision of teams was done and there was no room for sampling bias. The overall sex ratio (boys: girls) was within the acceptable range of 0.6-1.4 where boys and girls were equally represented in the sample with an overall sex ratio of 1.1.

Figure 6: Distribution of age and sex of sampled children



3.2.2. Nutrition Status of Children 6- 59 months

A total of 341 children aged 6 to 59 months were included in the final analysis for Global Acute Malnutrition by weight-for-height and oedema while 348 were included for MUAC analysis. According to the survey, boys are more affected by malnutrition as compared to girls.

3.2.2.1. Prevalence of Acute Malnutrition based on weight-for-height z-score

The survey established a Global and Severe Acute malnutrition levels at **6.2 %** (3.8 - 9.7 95% C.I.) and **1.2 %** (0.4 - 3.1 95% C.I.) respectively which was classified as **Alert Phase** for AMN Integrated Phase classification. There was no oedema case identified during the survey. Table 11 below illustrate the classification of acute malnutrition based on presence or absence of oedema. The Weight for Height standard deviation was 0.40 ± 1.04 with a design effect of 1.21 (WHZ), indicating homogeneity. Boys are affected more than girls (8.2% and 3.8% respectively).

Table 11: Prevalence of acute malnutrition by WHZ

| | All n = 341 | Boys n = 182 | Girls n = 159 |
|---|----------------------------|----------------------------|--------------------------|
| | At 95% Confidence Interval | | |
| Prevalence of global malnutrition (<-2 z-score and/or oedema) | (21) 6.2 % (3.8 - 9.7) | (15) 8.2 % (5.0 - 13.3) | (6) 3.8 % (1.7 - 8.0) |
| Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema) | (17) 5.0 % (2.8 - 8.6) | (11) 6.0 % (3.2 - 11.0) | (6) 3.8 % (1.7 - 8.0) |
| Prevalence of severe malnutrition (<-3 z-score and/or oedema) | (4) 1.2 % (0.4 - 3.1) | (4) 2.2 % (0.8 - 5.6) | (0) 0.0 % (0.0 - 0.0) |

The prevalence of oedema is 0.0 %

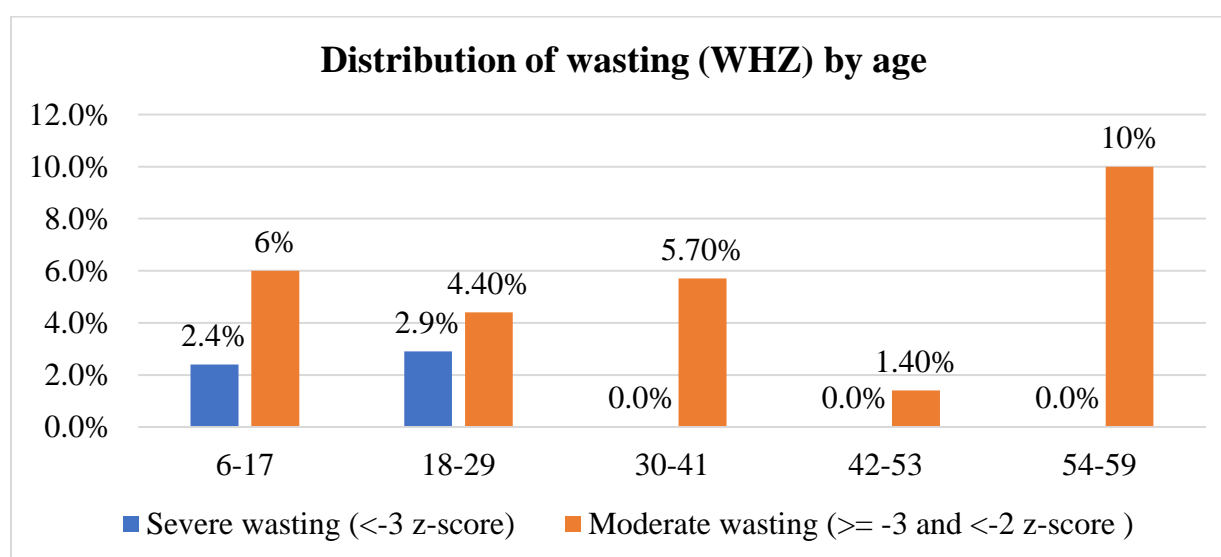


Figure 7: Distribution of wasting (WHZ) by age

3.2.2.2. Prevalence of Acute Malnutrition based on MUAC

Through the use of MUAC, the malnutrition levels for children aged 6 to 59 months resulted to GAM of 2.9 % (1.5 - 5.4 95% C.I) and SAM of 0.6 % (0.1 - 2.3 95% CI).

Table 12: Prevalence of acute malnutrition based on MUAC

| | All n = 348 | Boys n = 184 | Girls n = 164 |
|---|----------------------------|--------------------------|--------------------------|
| | At 95% Confidence Interval | | |
| Prevalence of global malnutrition (< 125 mm and/or oedema) | (10) 2.9 % (1.5 - 5.4) | (6) 3.3 % (1.5 - 7.0) | (4) 2.4 % (1.0 - 6.1) |
| Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema) | (8) 2.3 % (1.1 - 4.8) | (6) 3.3 % (1.5 - 7.0) | (2) 1.2 % (0.3 - 4.7) |
| Prevalence of severe malnutrition (< 115 mm and/or oedema) | (2) 0.6 % (0.1 - 2.3) | (0) 0.0 % (0.0 - 0.0) | (2) 1.2 % (0.3 - 4.8) |

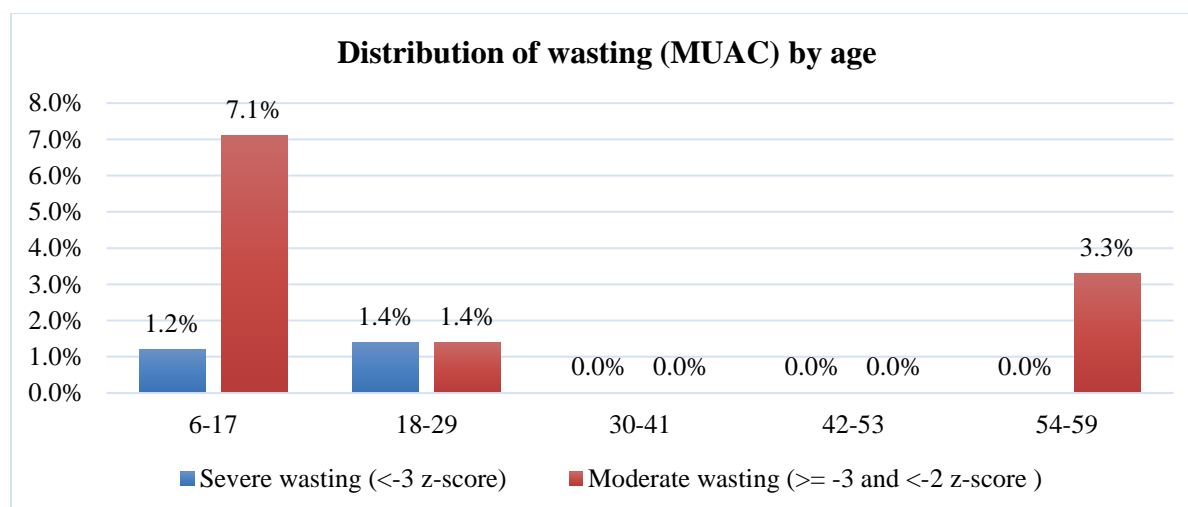


Figure 8: Distribution of wasting (MUAC) by age

The overall combined levels of acute malnutrition based on both weight-for-height Z-score and MUAC cut off was at 7.2% (4.8 - 10.6 95% C.I.) and 1.7 % (0.8 - 3.7 95% C.I.) for both GAM and SAM respectively.

Table 13: Combined GAM and SAM based on WHZ and MUAC cut off's (and/or oedema)

| | All n = 348 | Boys n = 184 | Girls n = 164 |
|---|-----------------------------------|----------------------------|--------------------------|
| | At 95% Confidence Interval | | |
| Prevalence of combined GAM (WHZ <-2 and/or MUAC < 125 mm and/or oedema) | (25) 7.2 % (4.8 - 10.6) | (16) 8.7 % (5.4 - 13.7) | (9) 5.5 % (3.0 - 9.7) |
| Prevalence of combined SAM (WHZ < -3 and/or MUAC < 115 mm and/or oedema) | (6) 1.7 % (0.8 - 3.7) | (4) 2.2 % (0.8 - 5.6) | (2) 1.2 % (0.3 - 4.8) |

3.2.2.3. Prevalence of underweight based on WAZ-score

The proportion of children aged 6-59 months who were underweight was 11.7 % (8.5 - 15.9 95% C.I.). Only a proportion of 0.9 % (0.3 - 2.7 95% C.I.) children were severely underweight as per the table below.

Table 14: Prevalence of underweight

| | All n = 343 | Boys n = 181 | Girls n = 162 |
|--|-----------------------------------|-----------------------------|----------------------------|
| | At 95% Confidence Interval | | |
| Prevalence of underweight (<-2 z-score) | (40) 11.7 % (8.5 - 15.9) | (26) 14.4 % (9.8 - 20.6) | (14) 8.6 % (4.8 - 15.1) |
| Prevalence of moderate underweight (<-2 z-score and >=-3 z-score) | (37) 10.8 % (7.6 - 15.0) | (25) 13.8 % (9.3 - 20.0) | (12) 7.4 % (4.0 - 13.4) |
| Prevalence of severe underweight (<-3 z-score) | (3) 0.9 % (0.3 - 2.7) | (1) 0.6 % (0.1 - 3.9) | (2) 1.2 % (0.3 - 4.9) |

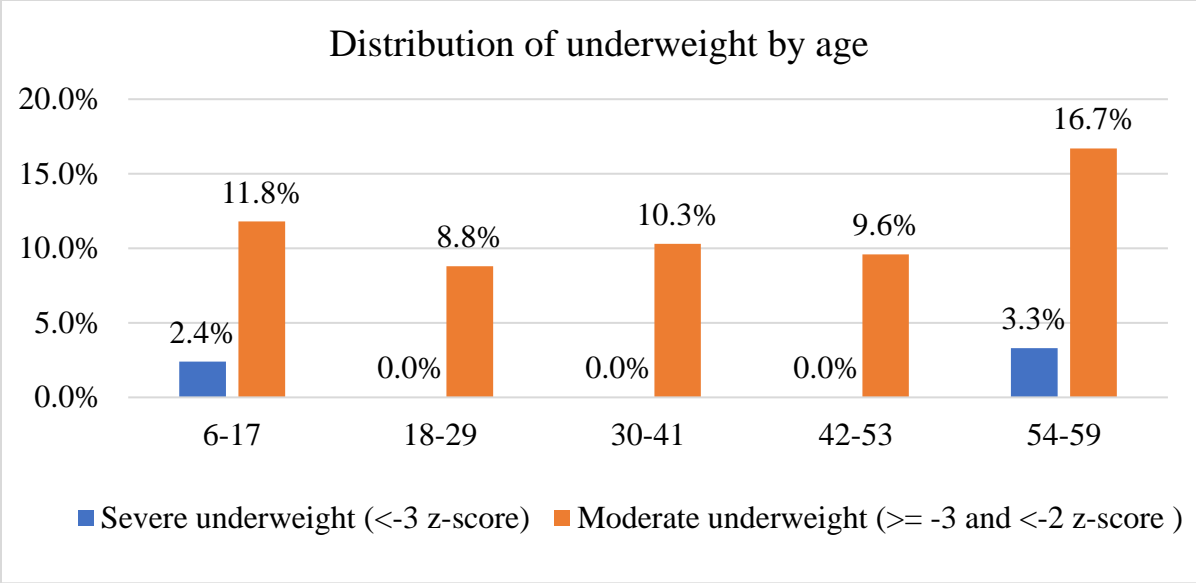


Figure 9: Distribution of underweight by age

3.2.2.4. Prevalence of stunting based on Height for Age Z- Score

Stunting levels as per the Survey stands at 17.6% (13.8 - 22.2 95% C.I.) with severe stunting being 2.1 % (1.0 - 4.195% C.I.). The proportion of boys affected as compared to girls has minimal significance difference (at 18.8% and 16.4% respectively). Moderate stunting has affected a larger proportion of children aged between 18-29 months (25.4%) and 30-41 months (16.1%) as compared to the other age groups.

Table 15: Prevalence of Stunting

| | All n = 340 | Boys n = 181 | | Girls n = 159 |
|---|-----------------------------------|------------------------------|--|------------------------------|
| | At 95% Confidence Interval | | | |
| Prevalence of stunting (<-2 z-score) | (60) 17.6 % (13.8 - 22.2) | (34) 18.8 % (13.6 - 25.3) | | (26) 16.4 % (11.5 - 22.8) |
| Prevalence of moderate stunting (<-2 z-score and >=-3 z-score) | (53) 15.6 % (12.1 - 19.9) | (31) 17.1 % (12.7 - 22.7) | | (22) 13.8 % (9.4 - 20.0) |
| Prevalence of severe stunting (<-3 z-score) | (7) 2.1 % (1.0 - 4.1) | (3) 1.7 % (0.5 - 4.9) | | (4) 2.5 % (1.0 - 6.3) |

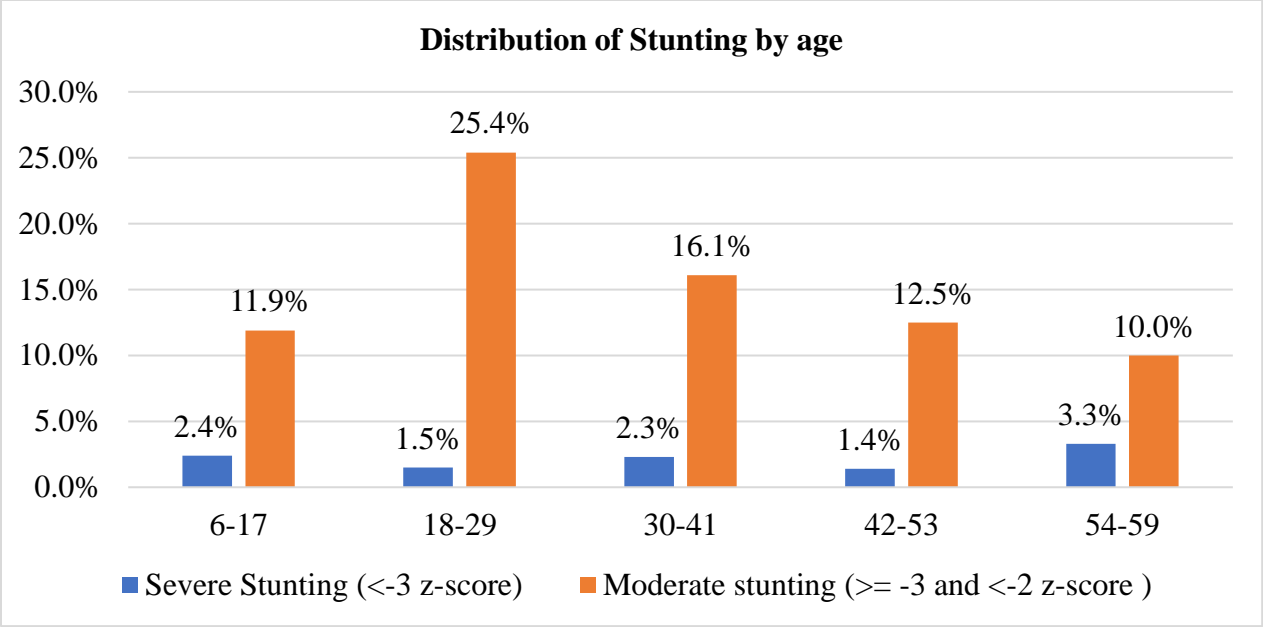


Figure 10: Distribution of Stunting by age

3.2.2.5. Prevalence of overweight based on WHZ- Score

Table 16: Combined GAM and SAM based on WHZ and MUAC cut off's (and/or oedema)

| | All n = 341 | Boys n = 182 | Girls n = 159 |
|---|-----------------------------------|--------------------------|--------------------------|
| | At 95% Confidence Interval | | |
| Prevalence of overweight (WHZ > 2) | (6) 1.8 % (0.8 - 3.8) | (4) 2.2 % (0.8 - 5.7) | (2) 1.3 % (0.3 - 5.0) |
| Prevalence of severe overweight (WHZ > 3) | (0) 0.0 % (0.0 - 0.0) | (0) 0.0 % (0.0 - 0.0) | (0) 0.0 % (0.0 - 0.0) |

3.3. Child Health

3.3.1. Mortality rates

The Crude Mortality rate (CMR) which is represented as the total deaths/10,000 people/day was at 0.45/10,000/day (0.26-0.78; 95% C.I.). On the other hand, Under-fives mortality rate was at 0.83/1,000/day (0.20-3.31; 95% C.I.)

3.3.2. Child morbidity

3.3.2.1. Incidence of disease among children 6-59 months

A proportion of 54.13% of households that were sampled reported occurrence of different types of illnesses. The survey findings on childhood illnesses indicated that two weeks prior to the survey URTIs/Cough symptoms topped the illnesses reported by sampled households (62.63%) followed by Fever (37.37%). Bloody diarrhoea was not reported in any household, however non-

bloody diarrhoea was at 4.74% with other illnesses constituting 12.63% of the sampled households.

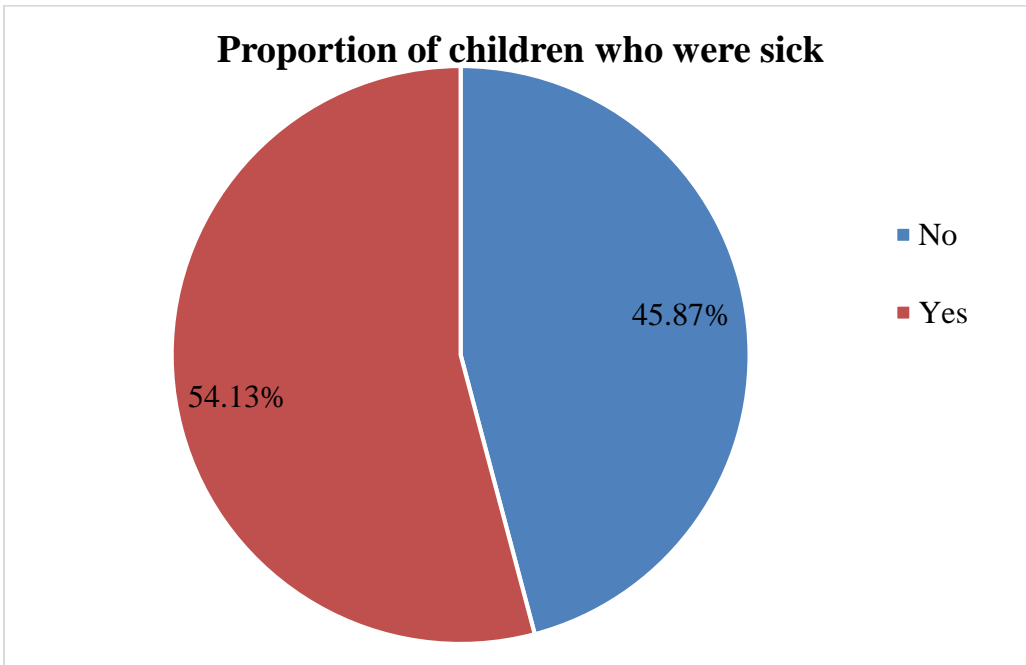


Figure 11: Proportion of children who were sick

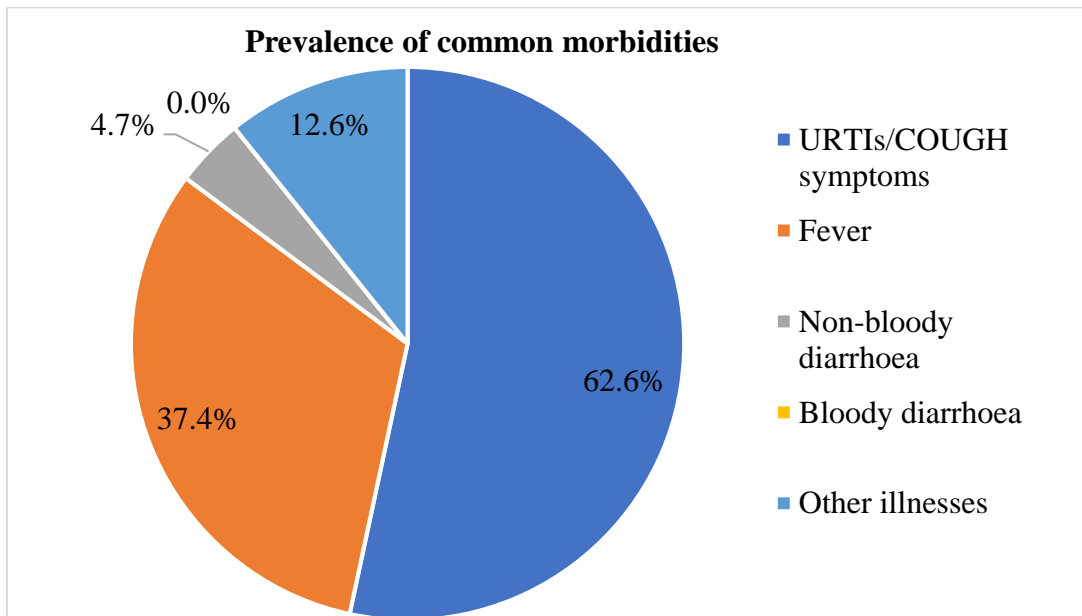


Figure 12: Prevalence of common morbidities

3.3.2.2. Health seeking behaviour

90% of the households that were interviewed during the Survey sought medical assistance. Of these, majority (64.91%) sought assistance from the public clinics, followed by private clinics and pharmacies (26.32%).

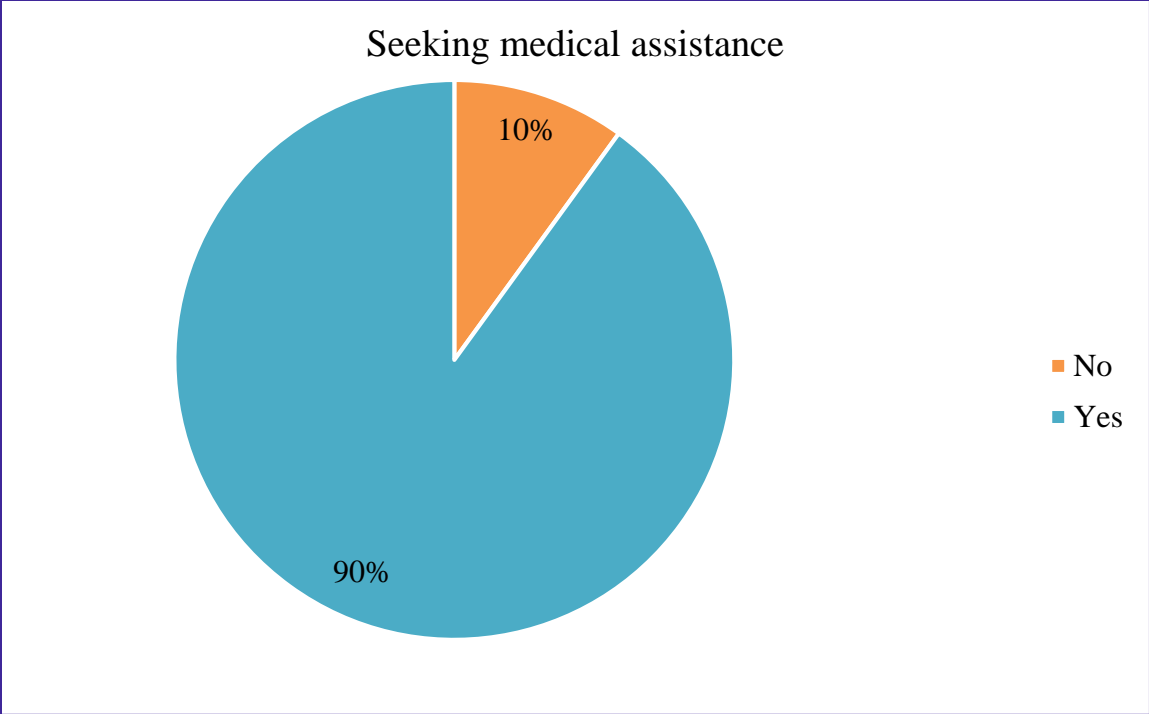


Figure 13: Health seeking behaviour

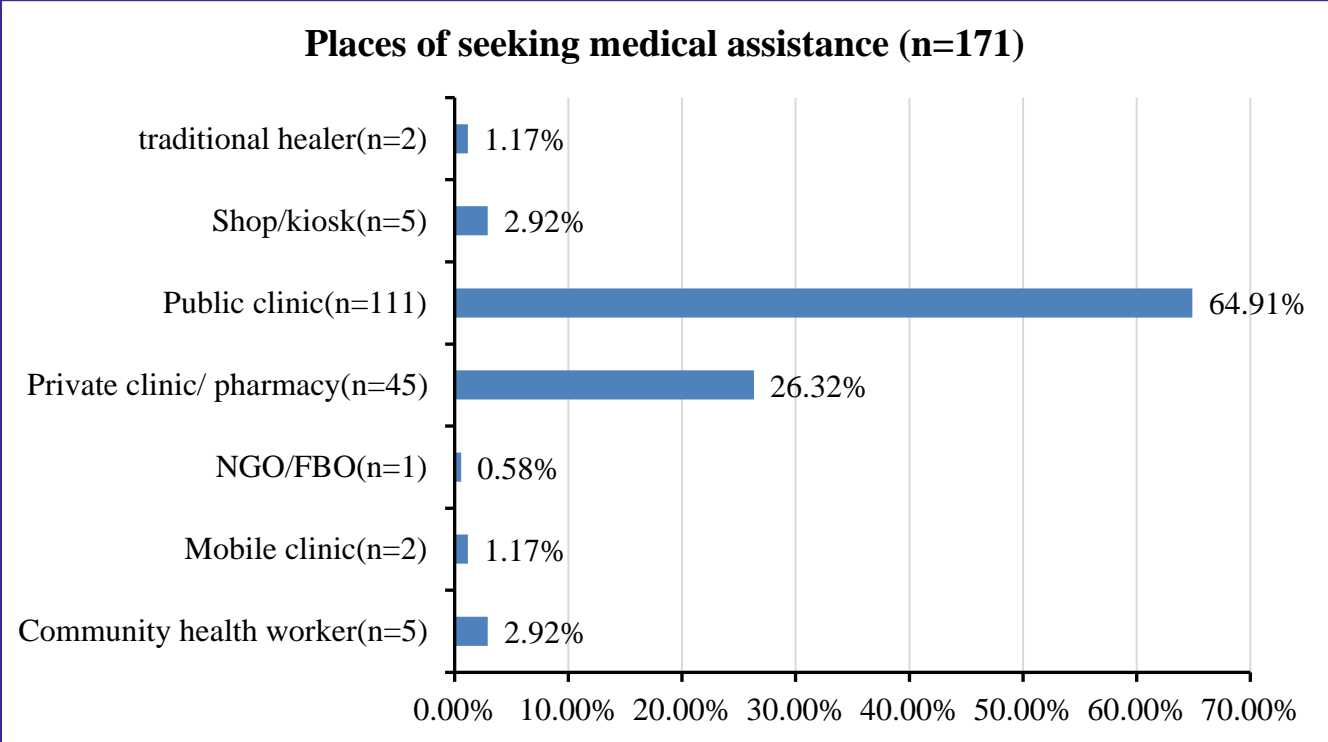


Figure 14: Health seeking behaviour by facilities

3.3.2.3. Management of Watery diarrhoea

88.89% of children who were diagnosed with diarrhoea were managed with ORS while 100% were provided with zinc indicating that 88.89% were managed with both Zinc and ORS.

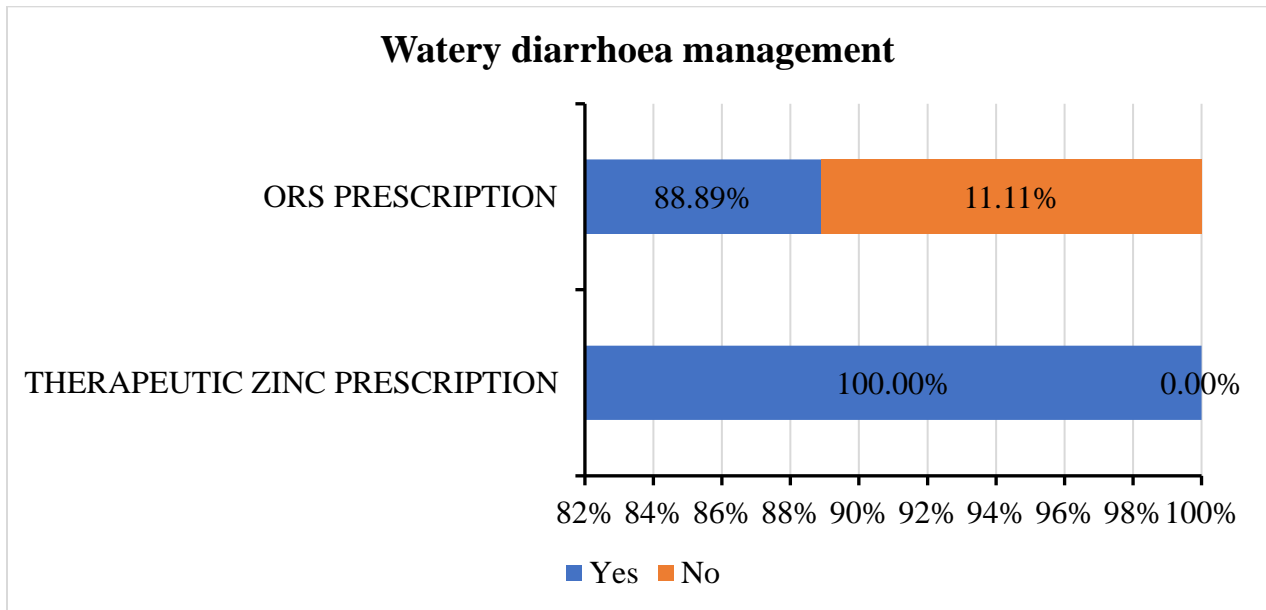


Figure 15: Watery diarrhoea management

3.3.3. Child Immunization

Information on immunization coverage was obtained in two ways: from written vaccination records, including the mother and Child Health Booklet, other health cards and from mothers' verbal reports.

The Proportion of Children Immunized with BCG in Makueni County was 98.01% as confirmed by presence of scar while the rest (1.99%) had no scar. For other vaccines, Measles vaccination at 9 months, 97.9% of the children had received the vaccination where 83.94% confirmed by card while 13.94% confirmed by recall. At 18 months, 91.4% had received measles vaccination where 76.78% were confirmed by card while 14.61% was by mothers' recall.

In terms of OPV 1, 98.8% had received the immunization where 84.62% was confirmed by card while 14.25% was by recall. For OPV 3, 98.0% had received the immunization where 85.19% was confirmed by card while 12.82% was confirmed by recall. Overall, there was reduced proportion of mothers who confirmed recipient of vaccines through recall hence minimizing biases. Further to this, a small proportion of children had not received different vaccines as shown in the graph below:

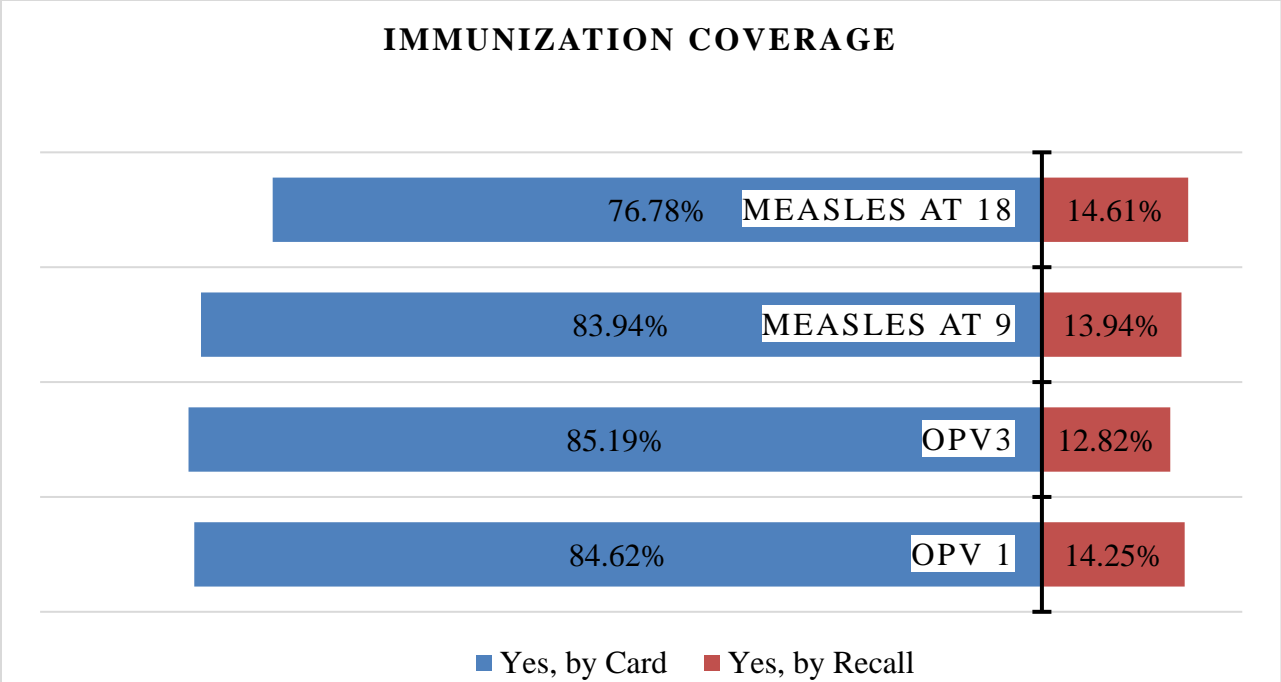


Figure 16: Immunization coverage

3.3.4. Vitamin A Supplementation

All children 6-59 months require to be supplemented vitamin A after every six months. This is usually done through health facilities, outreaches, community level or at the ECDE centres. Vitamin A coverage was assessed for the past one year (June 2022 to June 2023) and the results are as shown in figure 17. Coverage assessment was done through recall using a sample capsules and verified through the card too. 99.10% of interviewees had vitamin A supplementation indicated on their mother child booklet.

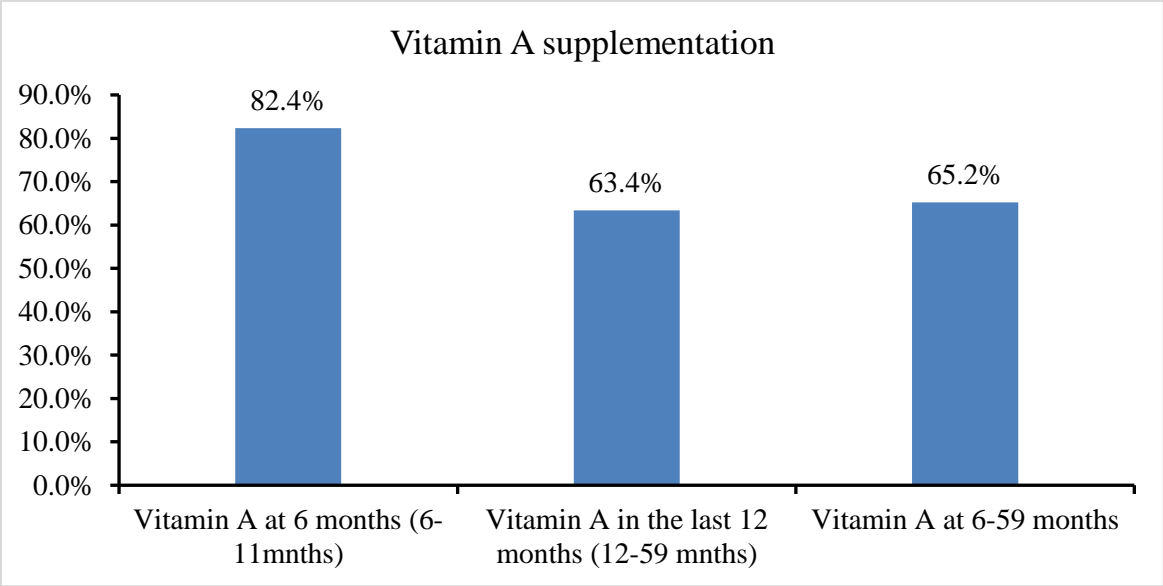


Figure 17: Vitamin A supplementation

Vitamin A supplementation for children aged 6-11 months was above 80% national target with that of children aged 12-59 months and overall coverage at 6-59 months stood at 63.4% and 65.2% respectively.

3.3.5. Deworming

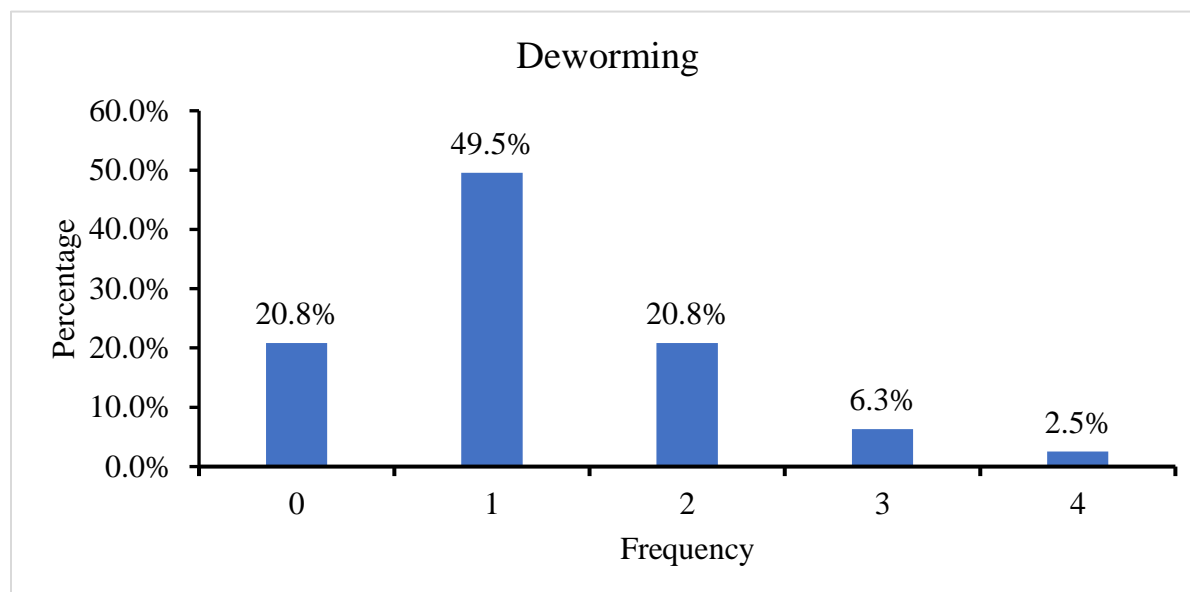


Figure 18: Deworming status

The proportion of children aged 12-59 months in Makueni County that were dewormed once was 49.5% with 20.8% having been dewormed twice. In addition, it was realized that a proportion of 20.8% of children 12-59 months were not dewormed.

3.4. Infant and Young Child Feeding (IYCF)

Table 17: Infant and Young Child Feeding practices

| Indicator | Age range | Frequency | Proportion | 95% CI |
|---|-----------|-----------|------------|---------------|
| Complementary feeding indicator | | | | |
| Minimum Dietary Diversity (MDD) | (6-23M) | 51 | 39.84% | 31.30%-48.87% |
| Minimum Meal Frequency (MMF) | (6-23M) | 80 | 62.50% | 53.51%-70.90% |
| Minimum Acceptable Diet (MAD) | (6-23M) | 34 | 26.56% | 19.15%-35.09% |
| Zero Vegetable Or Fruit Consumption (ZvF) | (6-23M) | 29 | 22.66% | 15.73%-30.89% |
| Unhealthy Food Consumption (UFC) | (6-23M) | 8 | 6.25% | 2.74%-11.94% |
| Sweet Beverage Consumption (SwB) | (6-23M) | 24 | 18.75% | 12.40%-26.60% |
| Egg And/Or Flesh Food Consumption (EFF) | (6-23M) | 22 | 22.66% | 15.73%-30.89% |

According to the survey findings, 39.84% and 26.6% of children aged 6-23 months attained a Minimum Dietary Diversity (MDD) and Minimum Acceptable Diet (MAD) respectively. 22.7% children (6-23 months) consumed zero vegetables or fruits with 6.25% consuming unhealthy foods.

3.5. Maternal health

Maternal health refers to the health of women during pregnancy, childbirth and the postnatal period. Each stage should be a positive experience, ensuring women and their babies reach their full potential for health and well-being.

3.5.1. Maternal physiological status

A total of 645 women of a reproductive age were interviewed in the survey. 20.47% were lactating mothers, 3.57% were pregnant and 75.97% were neither pregnant nor lactating. 137 women out of 645 were pregnant.

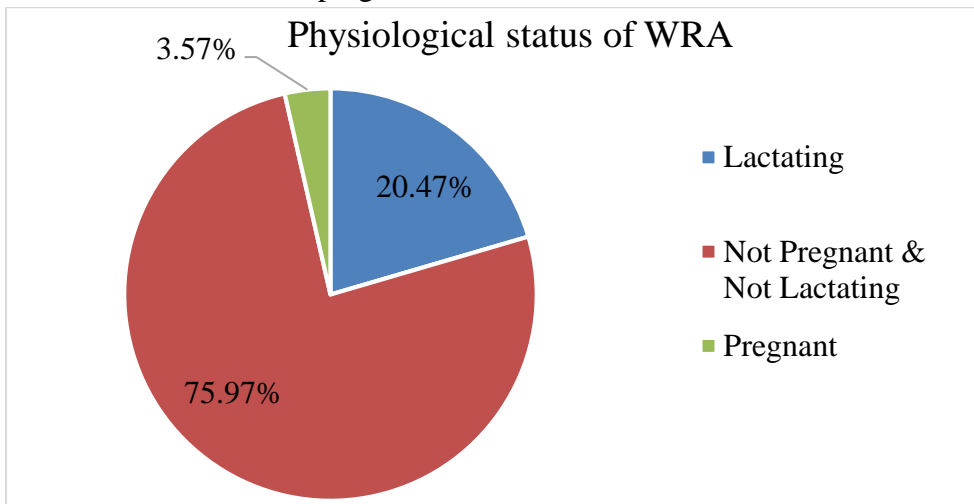


Figure 19: Physiological status of WRA

3.5.2. Maternal Nutrition status

Majority (87.29%) of the women of reproductive age have Normal maternal MUAC, 9.61% have Moderate wasting while 3.10% suffer severe wasting.

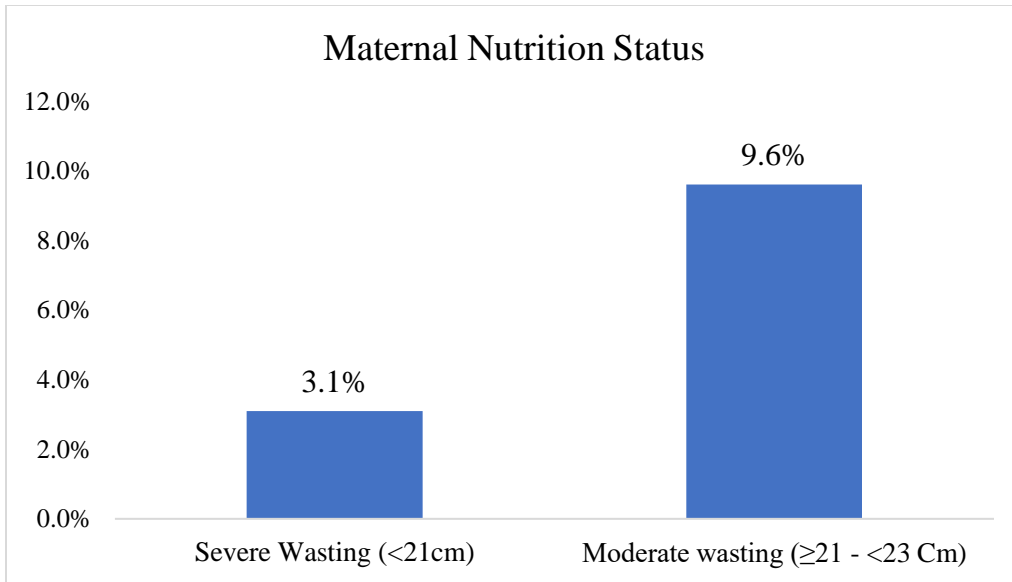


Figure 20: Maternal Nutrition Status

3.5.3. Antenatal Care (ANC) and IFAS Supplementation

The Survey indicated that 36.50% of 135 women attended ANC clinic between 1 to 3 months, 36.50% attend ANC clinic between 4 to 6 months and 10.22% attend ANC clinic between 7 to 9 months

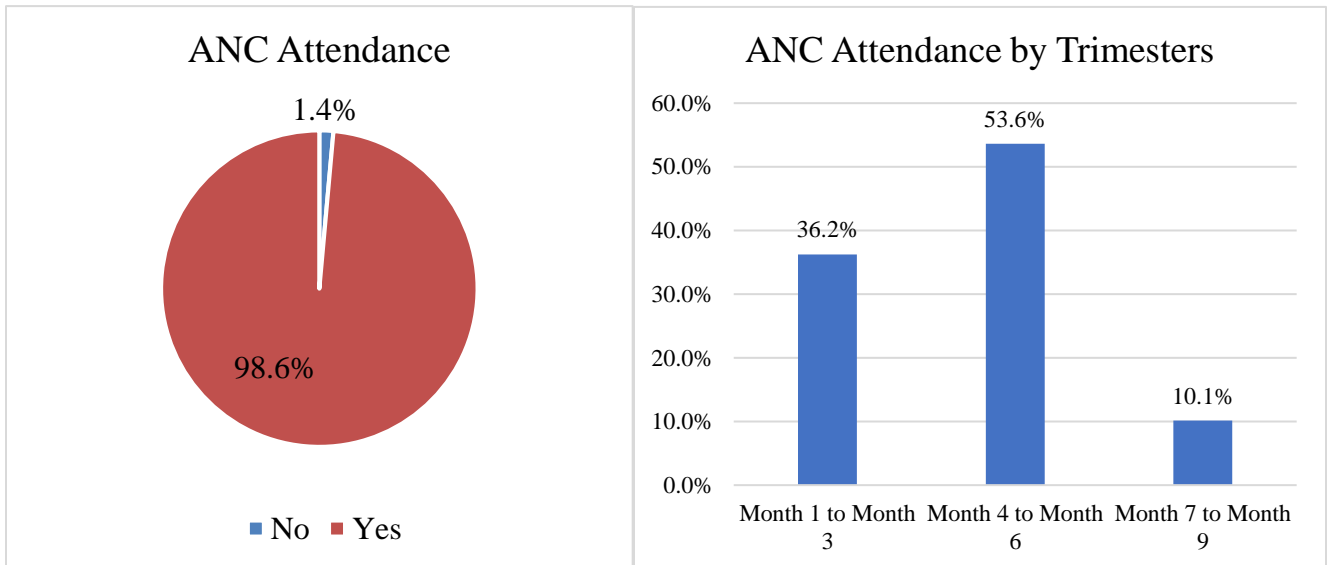


Figure 21: ANC Attendance

97.12% reported to have taken IFAS during pregnancy and 2.88% did not take the same. 79.4% of the women took IFAS more than 90 days. 13.2% took IFAS for 30 to 90 days and 7.4% took IFAS in less than 30 days. Majority of the women 75.98% are consuming less than 5 food groups in a day.

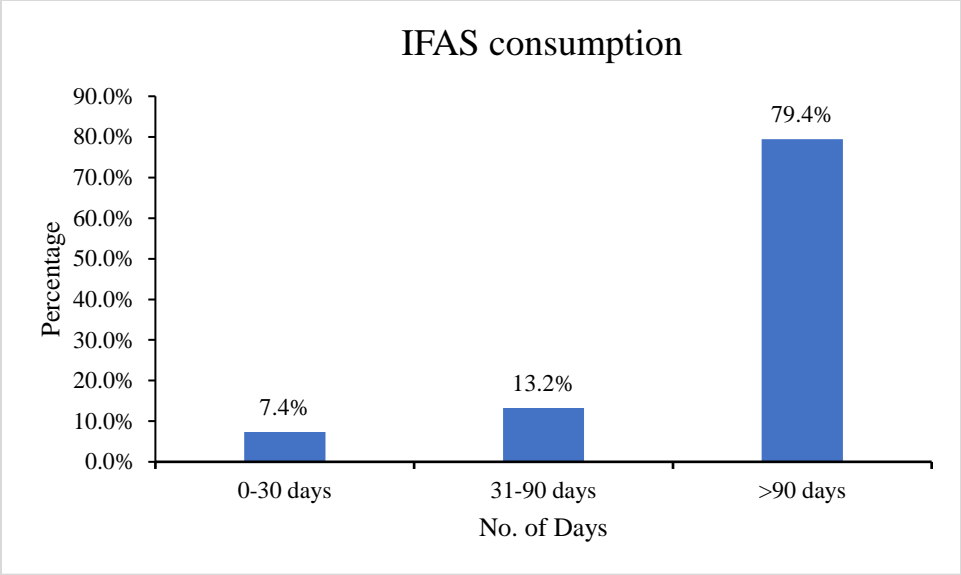


Figure 22:IFAS consumption

3.6. Food security, livelihoods and resilience

3.6.1. Household Dietary Diversity (Based on 24-hour Recall)

Based on the survey findings and analysis, majority of the Households in the County (58.91%) consumed more than five food groups within a recall period of 24 hours, 34.80% consumed between three to five food groups while 6.29% of the households consumed less than three food groups.

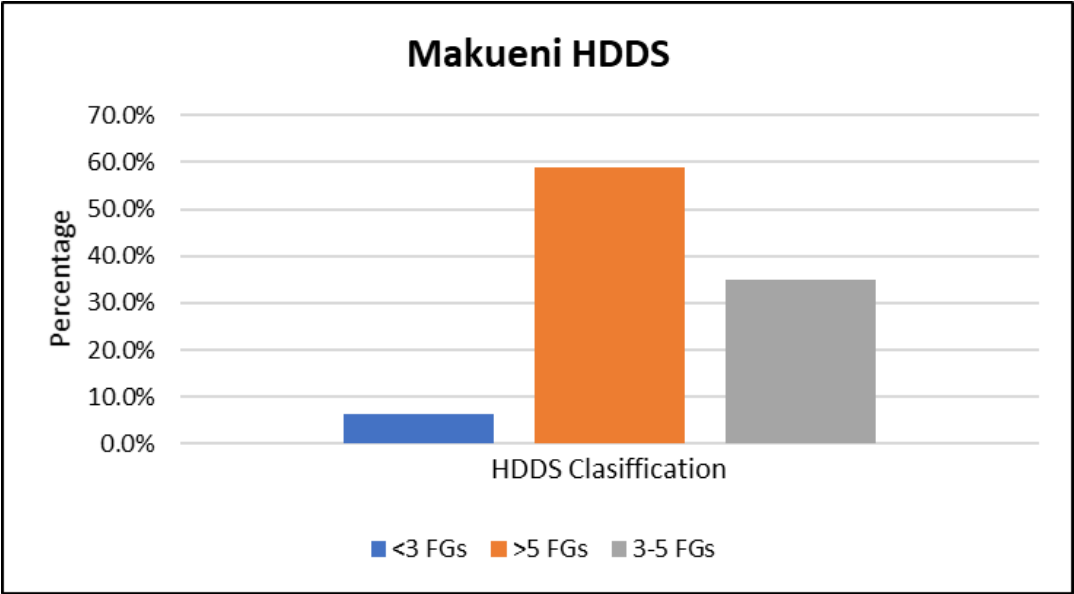


Figure 23:HH Dietary diversity score

3.6.2. Food Consumption Score

The Food Consumption Score is considered as a proxy indicator of current food security. It's a composite score based on dietary diversity, food frequency, food quantity and relative nutritional importance of different food groups. From the SMART survey done the results portrayed that a majority of the Households in the county (87.53%) had an Acceptable Food consumption score at the time the survey, 9.98% of the households were at borderline Food Consumption Score whereas the remaining 2.49% had a poor Food consumption score.

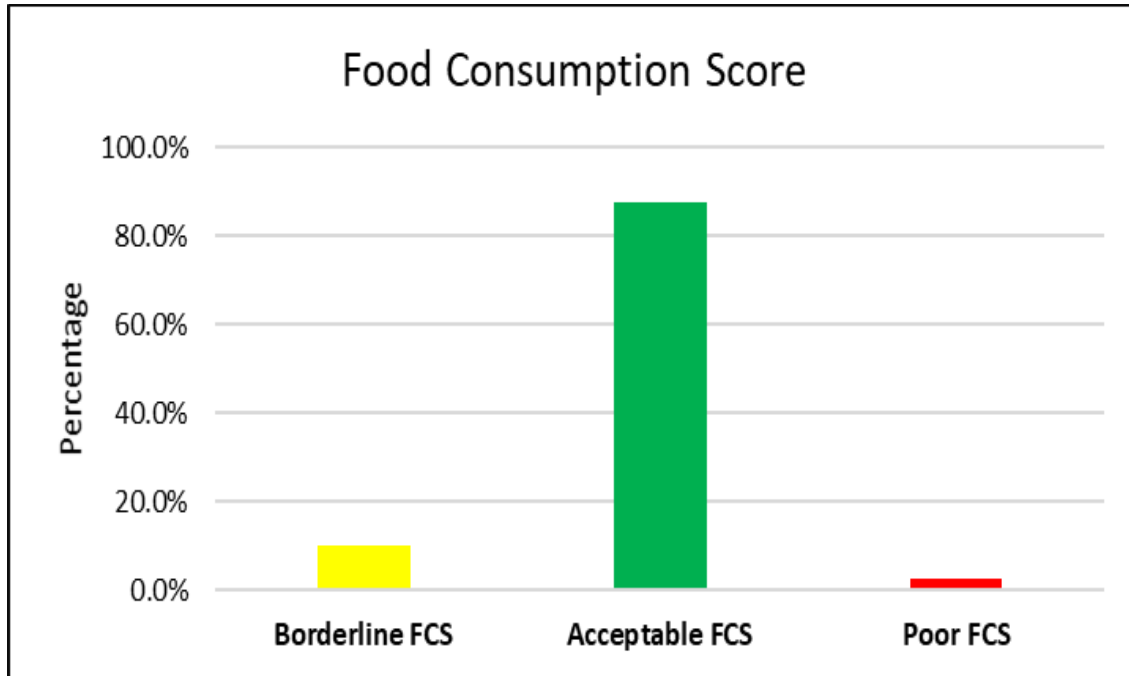


Figure 24: Food consumption score

3.6.3. Coping Strategy Index

Coping Strategy Index (CSI) is often used as a proxy indicator of household food insecurity. The indicator was used to assess how households were coping when negatively affected by a shock/crisis. At the time of the survey households across the different livelihood zone adopted various strategies to cope with reduced or declining access to food or money to buy food. From the survey done, 13.06% of the Households in the county were at IPC Phase 3-5 “Crisis”, 21.85% were at “Stressed” IPC Phase 2 while the majority were at 65.08% IPC phase 1 “Minimal”.

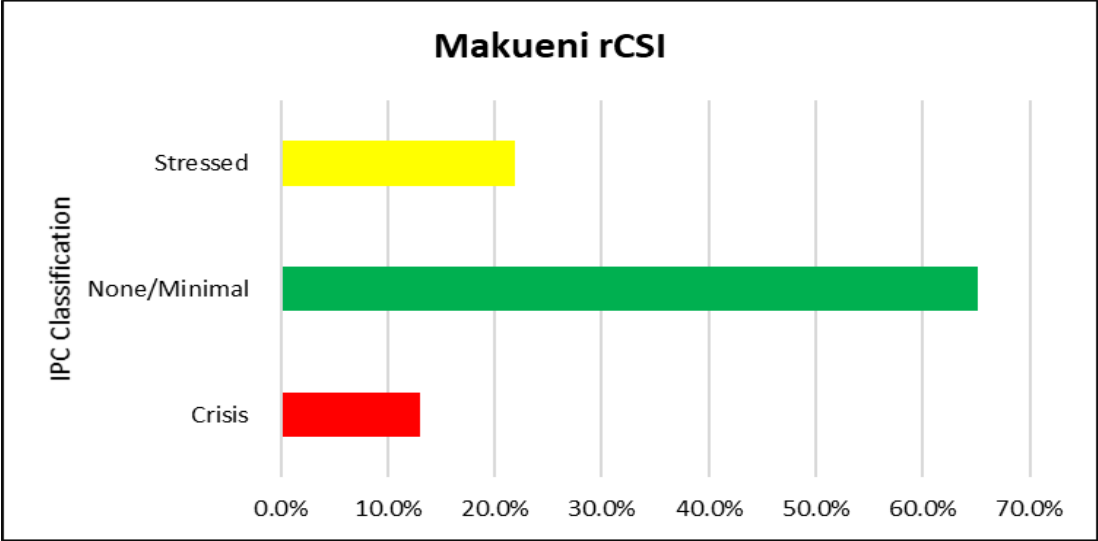


Figure 25:Coping strategy Index

3.6.4. Cash transfer

Cash transfer is a strategy which aims at cushioning the most vulnerable groups in the Society through financial support. According to the SMART survey, out of all the HH interviewed, only 10.2% were benefitting from the cash transfer program. Among the most popular types of cash transfer programs included, older persons program (Pesa ya wazee) at 69.8%, OVC program at 11.6% and People with severe disabilities at 7.0%.

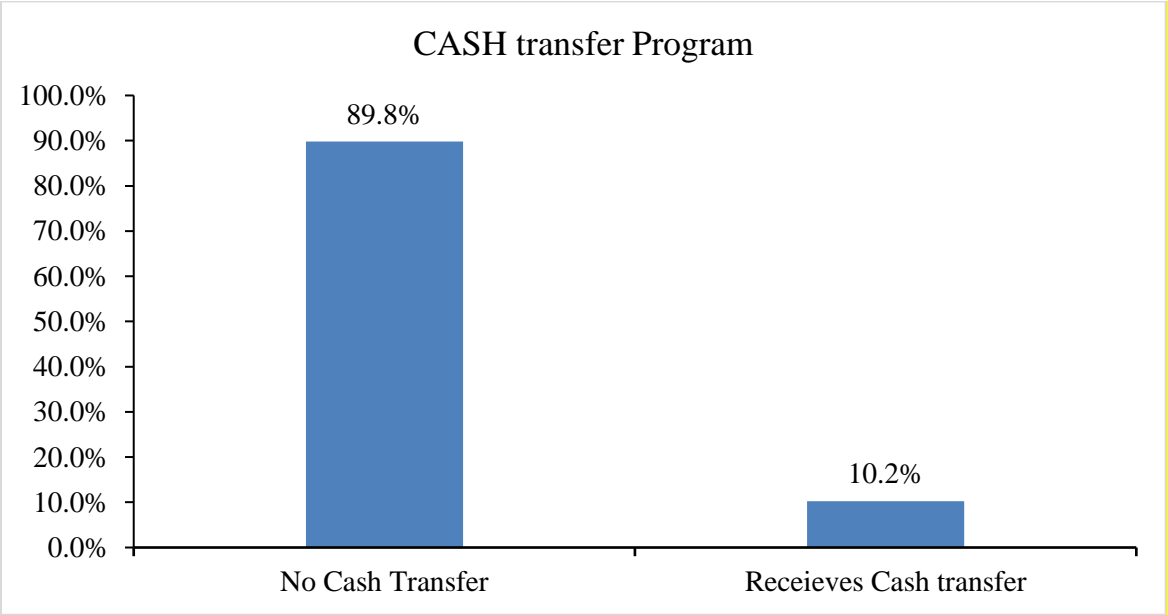


Figure 26:CASH Transfer Program

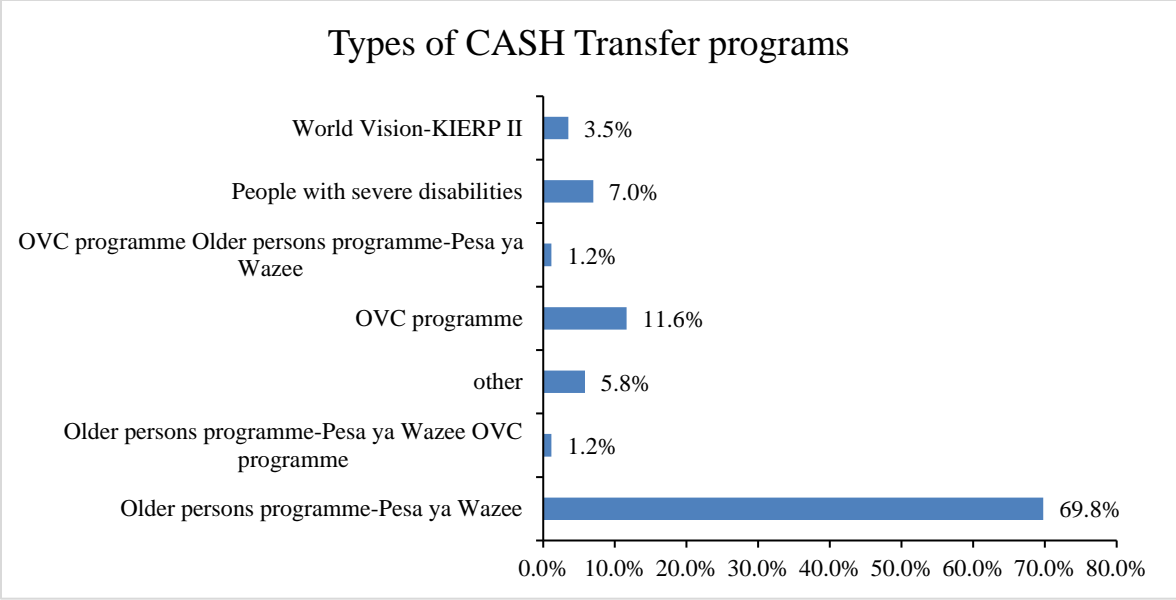


Figure 27:Types of Cash transfer programs

3.6.5. Food Consumption Score

Below are the rates of consumption of different food items in 842 households that were interviewed. It was noted that consumption of cereals (92.0%), oils/fats (86.5%) and sugar (82.8%) was adequate while that of Milk (70.8%), vegetables (62.8%) and pulses (60.9%) was relatively high.

However, the consumption of animal proteins except milk was quite low with meat/poultry ranking highest at 10.9%.

Condiments which has zero calories were consumed by almost half of the HHs (47.4%) interviewed.

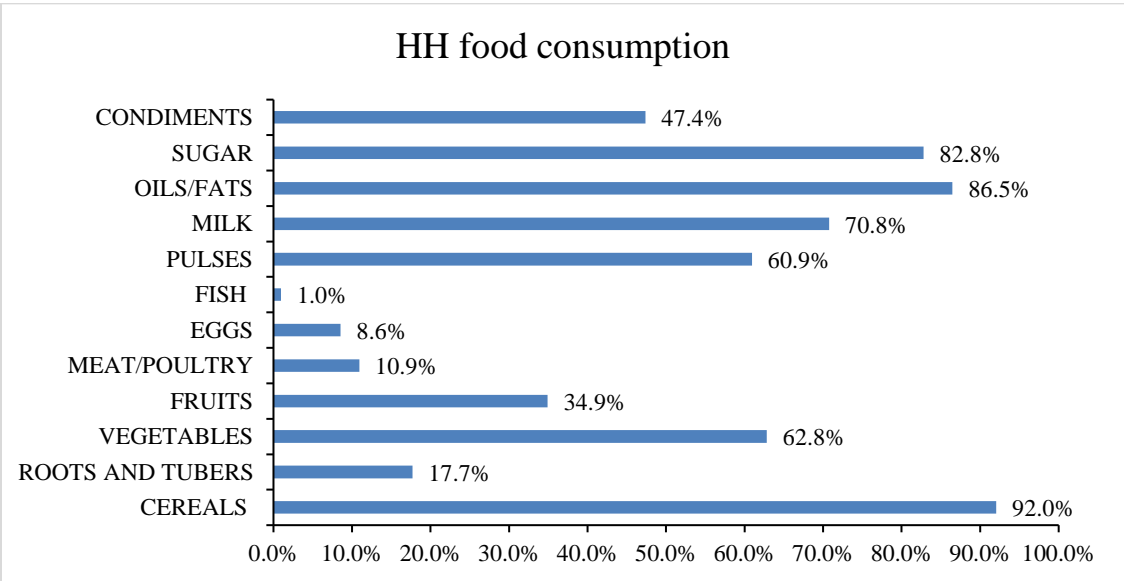


Figure 28:HH food consumption score

3.6.6. Family MUAC

Family MUAC also known as Mother MUAC is a community screening approach which empowers mothers, caregivers and other family members to screen their own children for malnutrition using colour coded MUAC tapes.

During the survey, it was realized that out of 842 mothers/caregivers who were interviewed, only 14.0% (118) mother had seen the MUAC tape. Of the 118, only 27.1% (32) mother had been sensitized on the use of the MUAC tape with only 8.47% (10) mothers confirmed having it. 90% (9) of the mothers who had the family MUAC tape indicated that they were using them with only 22.22% (2) saying that they ever referred cases to for further assistance.

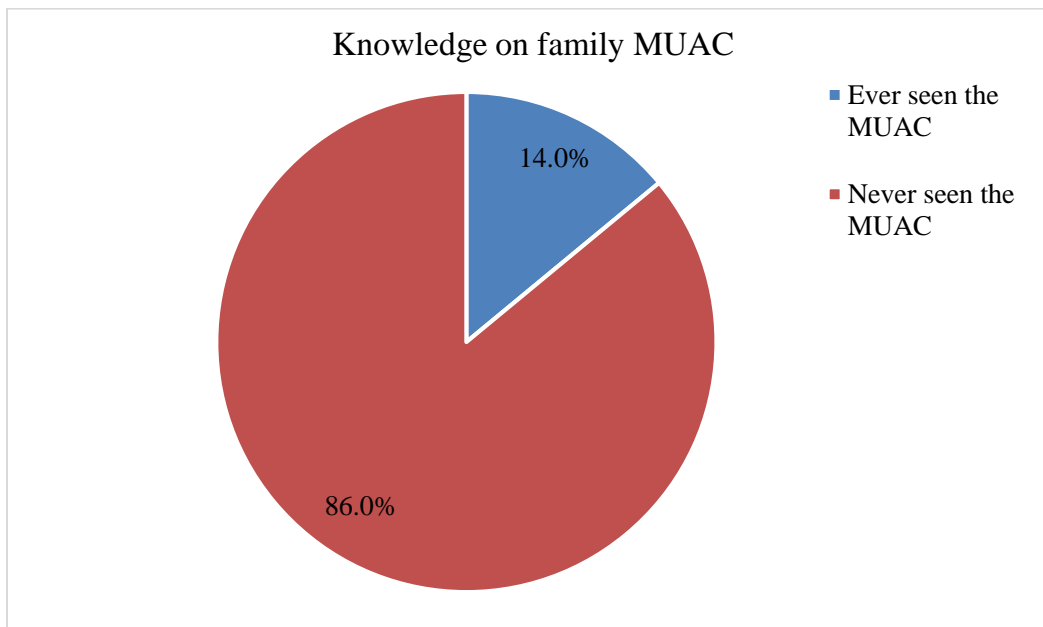


Figure 29: Knowledge on Family MUAC tape

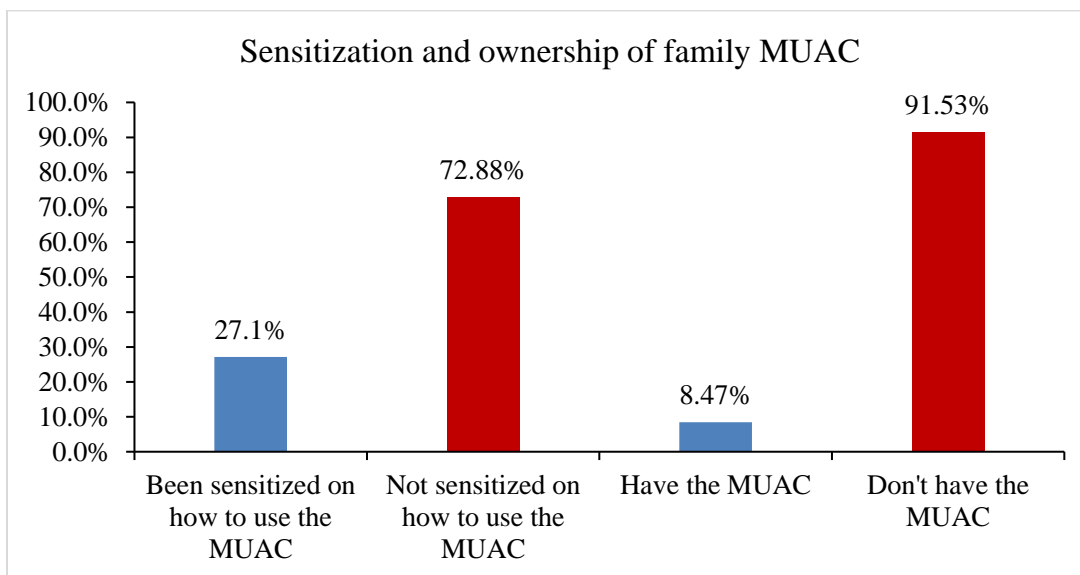


Figure 30: Mothers sensitized and owned family MUAC tape

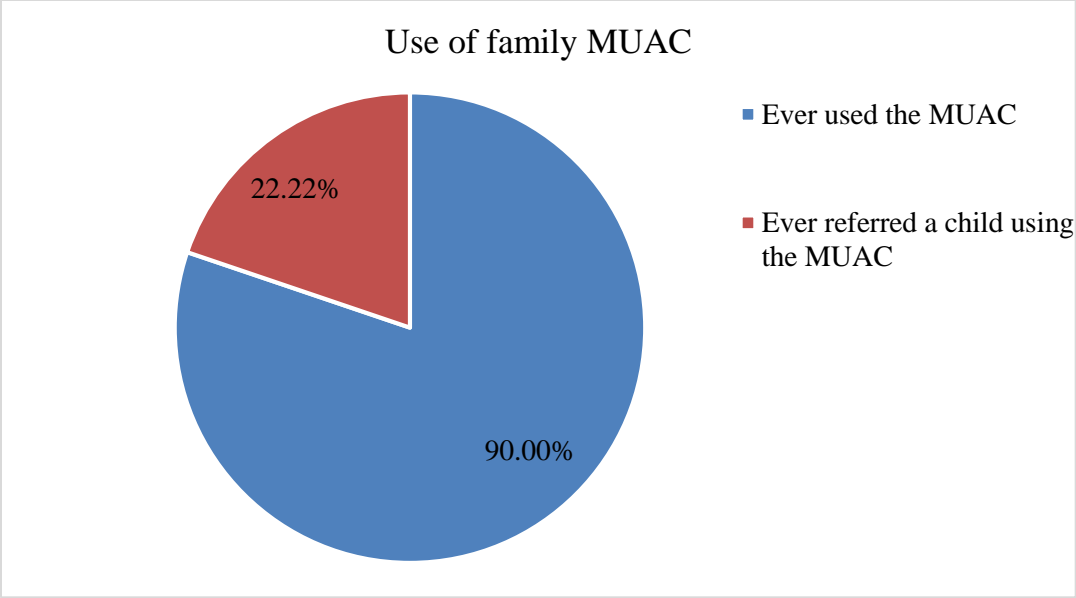


Figure 31: Use of family MUAC

3.7. Water, Sanitation and Hygiene (WASH)

This section presents the findings of the water, sanitation and hygiene indicators that included: main sources of drinking water, the trekking distance, queuing for water and the duration, water treatment types, the different types of hand washing facilities and hand washing at critical times with soap and water and sanitation/toilet facilities.

3.7.1. Main sources of drinking water

Access to safe drinking water was defined as the proportion of households using improved drinking water sources, this included water from the following sources, borehole / protected spring /protected shallow wells, Earth pan/dam, Earth pan/dam with infiltration well, harvested water, piped water system, river/spring, unprotected shallow well, water trucking / boozier, water vendor. The main sources of water for HH in the county include rivers/spring (30.68%), borehole/protected springs/shallow well (19.98%), piped water systems (16.29%), harvested water (Jabiya) (10.23%) The rest (22.52%) obtained water from unsafe sources such as river, earth pan, water tracking and unprotected shallow wells. Not unless the household drinking water from the unsafe sources is treated, members of the community are prone to be infected with water borne related illness such as diarrhoea, typhoid among other illnesses.

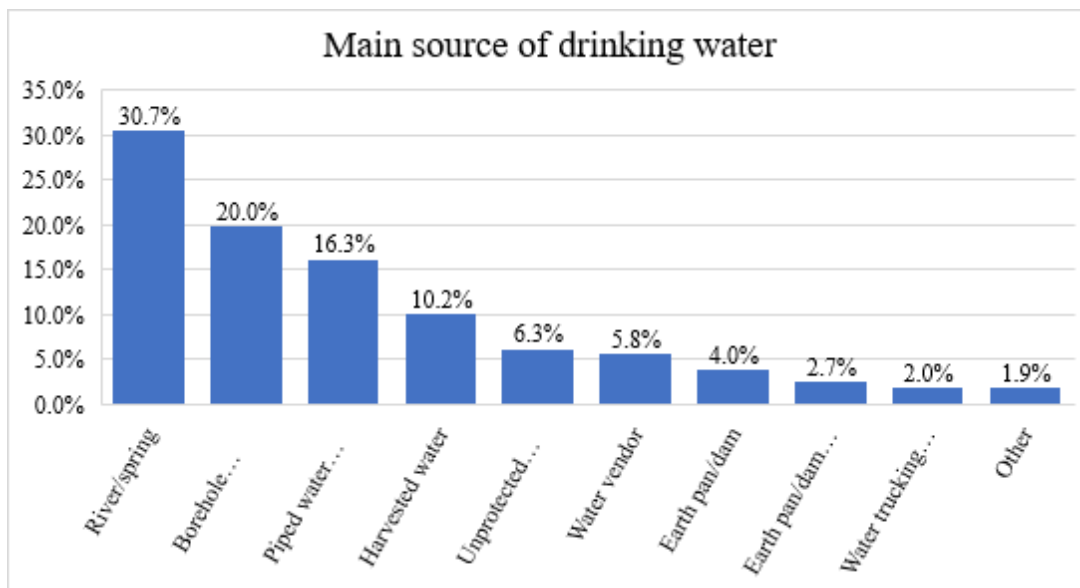


Figure 32: Main sources of water

3.7.2. Distance to water source and queuing time

According to SPHERE handbook for minimum standards for Water Sanitation and Hygiene, the maximum distance from any household to the nearest water point should be 500 meters. It also gives the maximum queuing time at a water source which should not be more than 15 minutes. From the study data analysis findings, it was found that, majority (49%) of the households trek a distance of less than 500 metres to access the water points. 36% have water points accessible in more than 500 metres to less than 2km while 12% have to trek more than 2km to access a nearest waterpoint-that is trekking for water fetching was between 1 to 2 hours as shown in the figure below. This shows that some time is lost during the process of meeting household water needs.

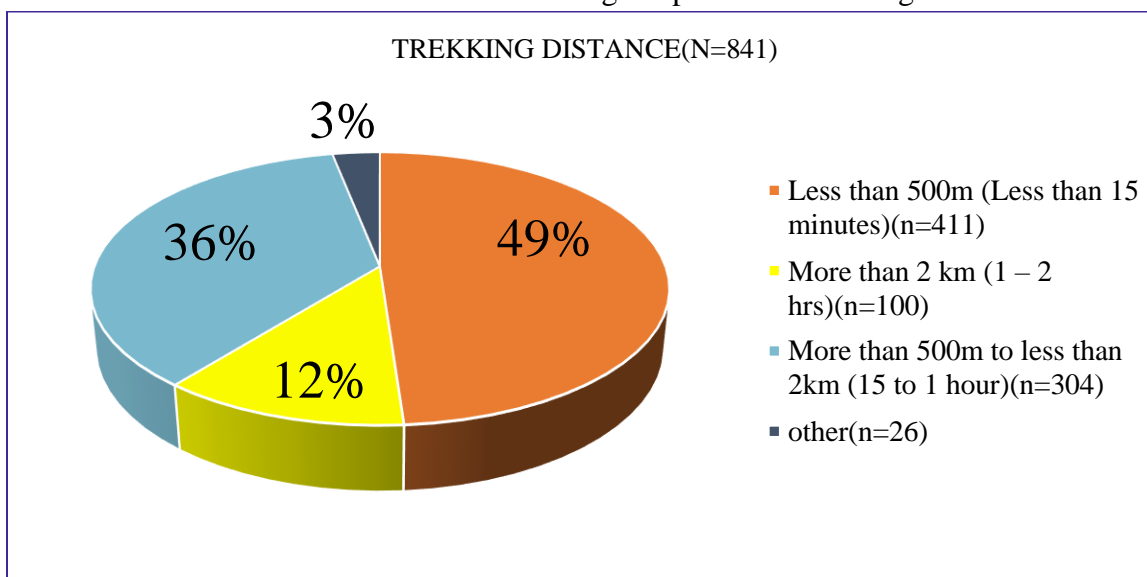


Figure 33: Trekking distance for water

3.7.3. Queuing for water at the source

This indicator measured the average time the respondents spend between arriving at the water source and starting to fill their water containers. Excessive queuing times are indicators of insufficient water availability due to either an inadequate number of water points or their insufficient yields. From the data analysis it was evidenced that majority of the households do not queue at the water points. For those who queue some wait for more than 1-hour, other wait for less than 30 minutes while other wait for duration between 30-60 minutes. From the study findings it is evidenced that some time which could have been used to do other economic value adding chores is lost while queuing to get water at the source.

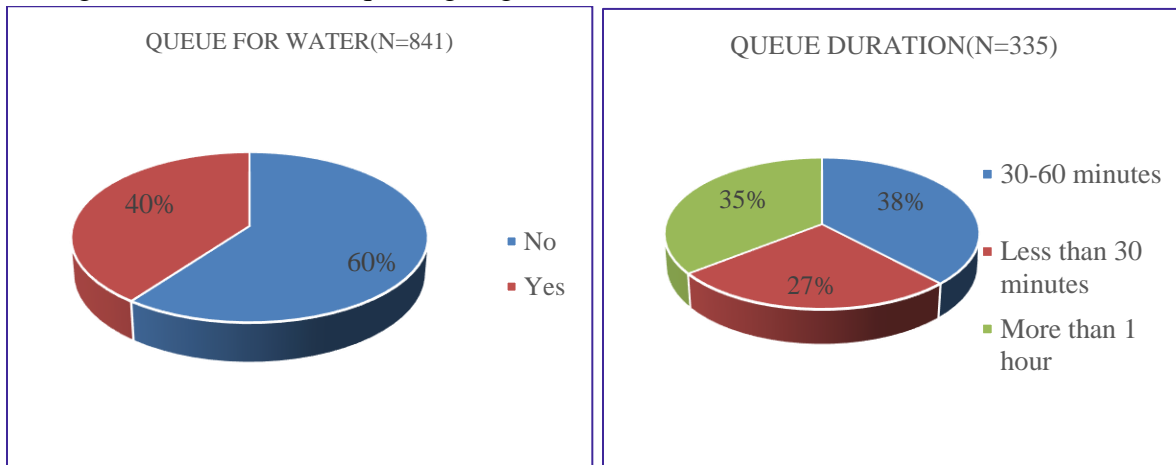


Figure 34:Duration of queuing for water

3.7.4. Water treatment

Safe water storage facilities prevent contamination of clean safe water while the water is being transported and stored for consumption. 27% of the HH treated their water before consumption where the majority (60%) did it by boiling, followed those that treated it by chemicals (38%). There was 1% that treat water via pot filtration or traditional methods. This indicates that the community might be prone to water borne and water related diseases that might arise due to consumption of untreated water.

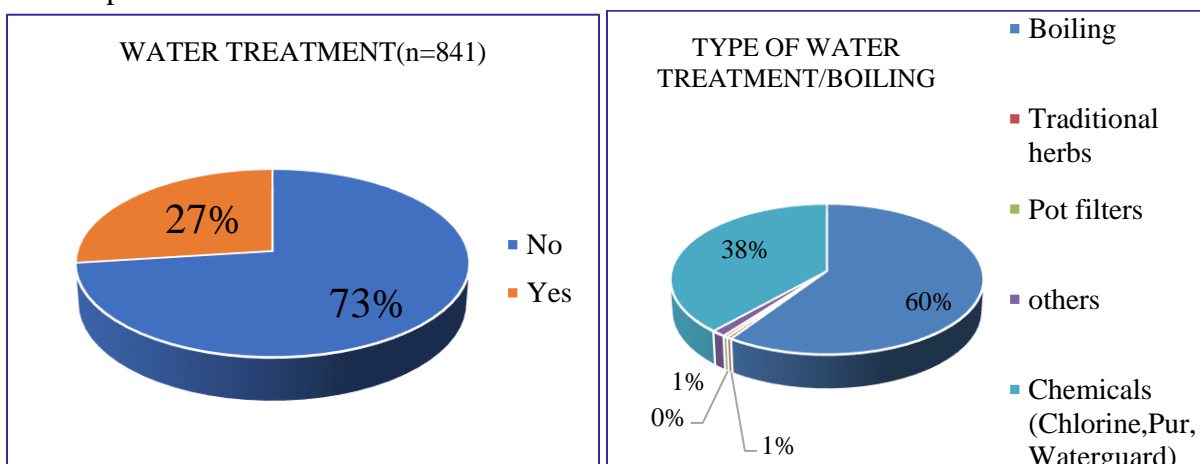


Figure 35:Water treatment

3.7.5. Household Per capita Water Consumption

The folks at Water Footprint Calculator say the average at-home water use is 60 gallons per person per day. But the US Geological Survey puts the average at 80-100 gallons per person. The wide range depends a lot on the habits of the individuals in your home. This can further be defined that all households - including those with private connections – are coping with the poor water supply situation by spending a lot on water and consuming relatively little, an average of 40 litres per capita per day (lcd). From the study it was found that, more than half (67.90%) of the HHs access less than 15lpppd. Based on this study finding, it’s evident that the community is lacking adequate water as per WHO standards which requires 20 lpppd.

Table 18:Water consumption

| PER CAPITA WATER CONSUMPTION | Frequency | Percent | 95% CI |
|------------------------------|-----------|---------|---------------|
| <15 lpppd | 571 | 67.90% | 64.66%-70.96% |
| ≥ 15 lpppd | 270 | 32.10% | 29.04%-35.34% |
| Total | 841 | 100.00% | |

3.7.6. Household flushing points

Good hygiene and Sanitation practices refers to provision and use of waste disposal facilities and services that safely dispose of human urine and excreta thereby preventing contamination of the environment. Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both at households and across communities (UNICEF, 2020). Most Households (96.86%) use Pit latrine as their relieving point.

It is also important to note that the county still has 1.07% households estimated not to have relieving facilities. This means that the community lead total sanitation approach is bearing fruits as only small proportion of the population is practicing open defecation.

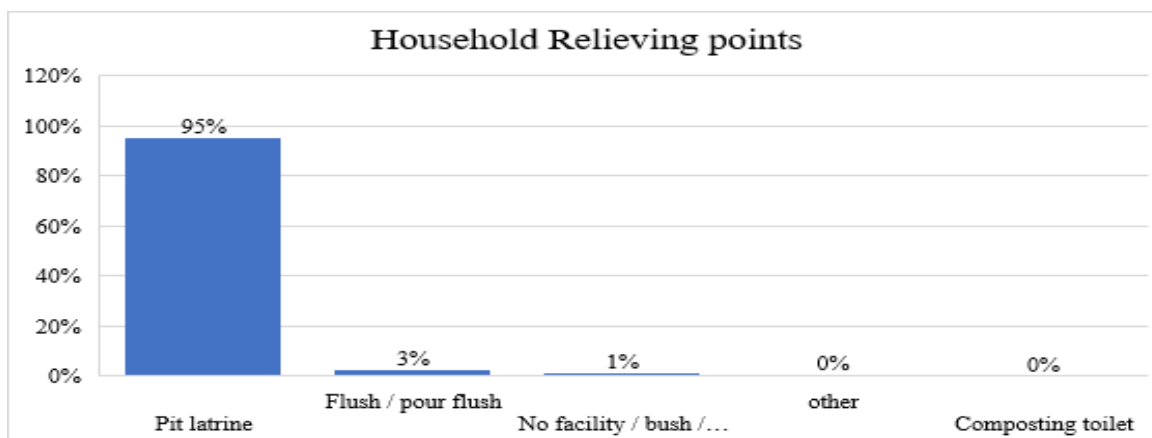


Figure 36:HH relieving points

3.7.7. Hand washing practice

The practice of proper hand hygiene and sanitation are very key in prevention of faecal oral diseases. Good hygiene refers to the practice of hand washing with soap and running water after defecation, disposal of child faeces, changing babies' nappies or pampers, prior to preparing and handling food and before eating. Hand washing with soap and running water is the single most cost-effective intervention in preventing diarrhoea diseases. The four critical hand washing moments include; after visiting the toilet/latrine, before cooking, before eating and after taking children to the toilet/latrine. Majority of the respondents in the County are practicing handwashing mostly after visiting the toilet and before eating. Handwashing before cooking is only practiced by 59.3% of the households while only 12.1% practice handwashing after taking children to the toilet. Worth noting that most of the respondents did not have young children.

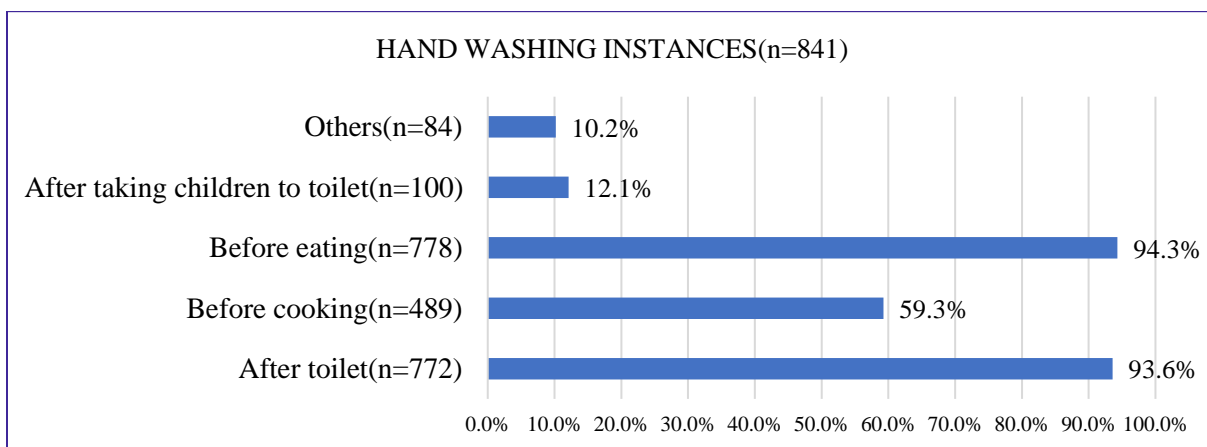


Figure 37: Hand washing practices

3.7.8. Presence of hand washing stations

Existing research shows that people with access to a handwashing facility are more likely to wash their hands (Behera *et.al* 2022). Furthermore, observation of handwashing materials by surveyors represents a more reliable proxy for measuring handwashing behaviour than asking individuals to report their own behaviour. This indicator therefore assesses the proportion of households with handwashing facilities with soap and running water at home. A greater proportion of the households didn't have hand washing facilities (22%) which are in use during all critical times for hand washing in preventing diseases

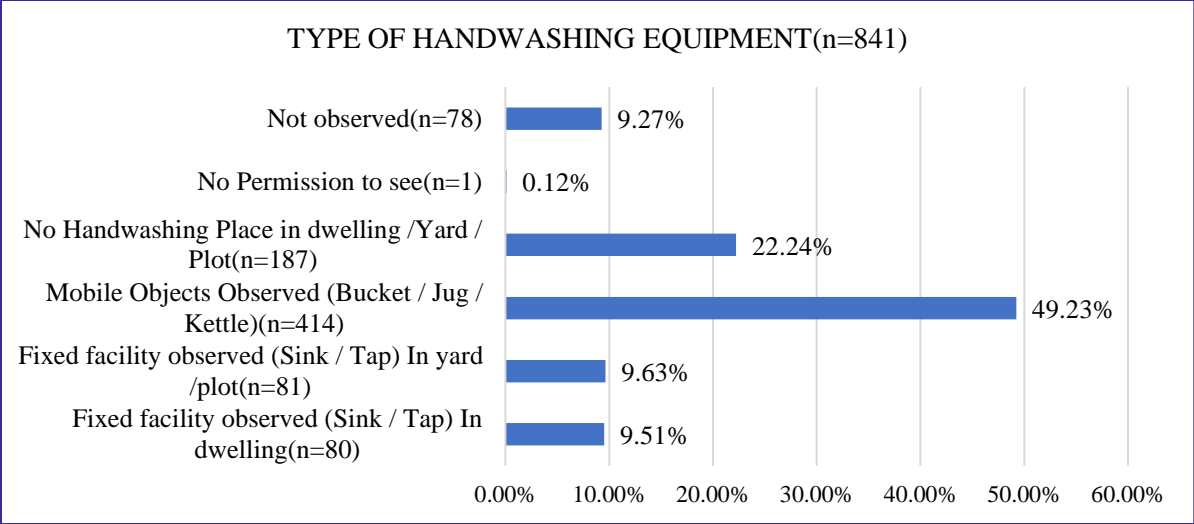


Figure 38: Type of hand washing equipment

3.7.9. Hand washing with soap and running water

Handwashing is one of the best ways to protect yourself and your family from getting sick. Learn when and how you should wash your hands to stay healthy. Washing hands can keep you healthy and prevent the spread of respiratory and diarrheal infections. The steps in handwashing with soap and water should be emphasized. Data analysis on hand washing with soap and water revealed that majority (78.06%) of the HHs in the county are washing hands with soap and water while.13.09% of the HHs are washing hands with water only.8.73% only use soap on instances when they can afford it.

Table 19: Use of soap for hand washing

| USE FOR HANDWASHING | Frequency | Percent | Cum. Percent | |
|---------------------------|-----------|---------|--------------|---------------|
| Soap and water | 644 | 78.06% | 91.27% | 75.11%-80.75% |
| Only water | 108 | 13.09% | 13.09% | 10.96%-15.56% |
| Other | 1 | 0.12% | 13.21% | 0.02% -0.68% |
| Soap when I can afford it | 72 | 8.73% | 100.00% | 6.99% -10.85% |
| Total | 825 | 100.00% | 100.00% | |

4.0 DISCUSSION

4.1 Nutrition Status

The sample sex ratio of the children 6-59 months involved in the survey was 1:1. This implies that no gender was more preferred in the survey than any other hence no bias.

The SMART survey results indicated that the County have a GAM prevalence of 6.2% (3.8 - 9.7 95% C.I.) as well as a SAM prevalence of 1.2% (0.4 - 3.1 95% C.I.). This GAM is slightly above the KDHS 2022 one which was 4.0%. Though the GAM rate is categorised as medium as per the WHO/UNICEF classification of acute malnutrition, the County has never recorded such levels of wasting. This is indicative of a worsening nutrition situation due to the prevailing drought situation as caused by the consecutive failed rainfall seasons. The survey also pointed out that the County had a stunting and underweight prevalence of 17.6% (13.8 - 22.2 95% C.I.) and 11.7% (8.5 - 15.9 95% C.I.) respectively. Whereas the stunting rate is slightly lower than KDHS 2022, it is clear that there is a problem of both chronic and acute malnutrition.

The County has experienced five failed rainfall seasons which has affected household food security, with about one quarter of the households in the county reporting moderate to severe hunger (25.42%)

4.1.1 Anthropometric results (based on WHO standards 2006)

Anthropometric data for children 6-59 months of the sampled households was assessed and recorded during the survey. Data analysed was of 348(184 boys and 164 girls).

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

Malnutrition classification by Z-Score: WHO (2006) Standard; -

- Severe acute malnutrition is defined by WFH < -3 SD and/or existing bilateral oedema on the lower limbs.
- Moderate acute malnutrition is defined by WFH < -2 SD and >-3 SD and no oedema.
- Global acute malnutrition is defined by WFH < -2 SD and/or existing bilateral oedema.

From the assessment the County Global malnutrition as per Z-scores was 6.2% which is at **Alert** for both genders. Boys were more affected at 8.2% as compared to girls at 3.8%.

Distribution of acute malnutrition and oedema based on weight-for-height z-scores

There were no cases of oedema or kwashiorkor. These results can be attributed to the presence of pulses among other food items in the region at the time of survey which was after the long rains.

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

Malnutrition classification by MUAC

- Severe malnutrition is defined by MUAC < 115 mm and/or presence of bilateral oedema
- Moderate malnutrition is defined by MUAC < 125 mm and \geq 115 mm and no oedema

- Global acute malnutrition is defined by MUAC <125 mm and/or existing bilateral oedema County Global Acute Malnutrition base on MUAC was 2.9% which is at **Alert**, data collected was from 348 (184 Boys and 164 Girls). This was an indication that use of MUAC would have left out some cases who were already wasted. This was in line with other studies that suggests that a single cut off for MUAC for children 6-59 months would introduce imprecision in the classification of their nutritional status. This possibility raises the concern that the application of the currently recommended single cut off for MUAC at all ages may fail to identify an unknown number of children at risk of SAM or MAM, thereby increasing the risk of missing potentially preventable morbidity and mortality.

Prevalence of combined GAM and SAM based on WHZ and MUAC cut off's (and/or oedema) and by sex*

Prevalence of GAM based on MUAC and Z scores was at 7.2% having total assessed as 341(184 Boys and 164 Girls).

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

Underweight is defined as low weight for age according to World Health Organization reference median. 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 visualize the trend of their children's increase in weight against age. A low WFA is referred to as underweight.

Children with weight for age less than -2SD in relation to the reference child are classified as underweight while those with less than -3SD are classified as severe underweight. Underweight has both elements of acute undernutrition (wasting) as well as chronic under nutrition(stunting). Prevalence of underweight was 11.7%.

Prevalence of Chronic Malnutrition (stunting) based on height-for-age z-scores and by sex

Stunting (low weight for age) is caused by long term insufficient nutrient intake accompanied by infections. Stunting generally occurs in the first 1000 days and the effects are mostly irreversible. Prevalence of stunting based on the assessed 340 (181 boys and 159 girls) was at 17.6%. This was an indication that children below five years are subjective to poor infant and young child feeding practices which are greatly attributed to chronic malnutrition.

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

According to WHO overweight is weight for height greater than 2 SD in relation to the reference child median. Prevalence of overweight was 1.8%.

4.2 Mortality

The overall Crude Mortality Rate (CMR) was 0.45/10,000 per day while the Under-fives Crude Mortality Rate (U5CMR) was 0.83/10,000 per day. This doesn't constitute an emergency threshold

according to Sphere Standards as per below classification.

- CMR > 1/10,000/Day
- U5CMR > 2/10,000/Day

Unknown causes of death were at 69.2%, injuries/Trauma constituting 7.7% and 23.1% caused by illnesses.

4.3 Child Health

4.3.1 Morbidity

Disease are categorized as immediate causes of malnutrition in the UNICEF conceptual framework. Disease can affect food intake and nutrient absorption within human body thus jeopardize immunity and further worsening the disease that leads to malnutrition. If not controlled, illnesses and malnutrition lead to a vicious cycle.

Majority (90%) of the households sought medical assistance where (64.91%) sought assistance from the public clinics. Diarrhea was reported by 4.74% of the households. Majority (88.89%) of children with Diarrhea were managed with ORS, and 100% managed with zinc. 88.89% were managed with both Zinc and ORS. This is a good indication of the County implementation of Nutrition Specific interventions (HINI).

There were 10% households who didn't seek medical services when ill. This can worsen the symptoms and make one prone to other infections and there is need for sensitization on the benefits of seeking medical health services on time.

4.3.2 Immunization

The survey reported good vaccination coverage with all the antigens; OPV 1(98.8%), OPV 3, 98.0% measles at 18 months (91.4%). This was similar with the KDHS 2022 results where all the three antigens performed well (97.8%, 84.9% and 93.9%) respectively. This is a good indication of the County in immunization interventions.

4.3.3 Vitamin A and Deworming

Over 140 million children are at greater risk of illness, hearing loss, blindness and even death if urgent interventions are put in place to provide them with life-saving vitamin A supplements. According to the new UNICEF report; "Coverage at a crossroads: New directions for vitamin A supplementation programmes", global coverage of vitamin A supplementation (VAS) has dropped to a six-year low, leaving more than one third of children unprotected from the distressing impacts of vitamin A deficiency. The Lancet medical journal lists vitamin A large-scale supplementation as a proven potential to reduce the number of preventable child deaths each year (Jones et al, 2003). As gear towards the achievement of 2030 Agenda for Sustainable Development and particularly ending preventable deaths in children under age 5, there is need for more urgent approaches to reprioritize this safe, cost-effective and evidence-based intervention.

According to Makeni County nutrition action plan (CNAP) 2018 -2023, the third priority objective is to reduce the prevalence of micro nutrient deficiencies especially through awareness,

food fortification and supplementation. In these interventions, Vitamin A deficiency has been identified as a key micronutrient of concern (CNAP, 2018 -2023). Furthermore, Improving the vitamin A status of deficient children enhances their resistance to disease and can reduce mortality from all causes by approximately 23 per cent (UNICEF, 2007). Vitamin A supplementation among children below the age of 5 years offers protection against common childhood infections and substantially reduces mortality hence improving the child's survival.

According to the survey results, Vitamin A coverage was still below the National target of 80% at 65.2% for 6 – 59 months. However, for children below 1-year coverage stood at 82.4% slightly above the national targeting. Efforts need to be put in place to improve on the overall coverage.

On the other hand, 49.53% of children aged 12-59 months were dewormed only once with 20.0% of them receiving none.

4.4 Infant and Young Child Feeding (IYCF)

Infant and Young Child Feeding is critical for the growth and development of the child. Children fed nutritious food grow well with minimal cases of infections due to improve immunity. During the survey, Infant feeding and complementary feeding practices were determined based on a 24-hour recall as recommended by WHO (2010) and the Kenya Ministry of Health (MoH) guidelines. According to the survey findings, 39.84% and 26.6% of children aged 6-23 months attained a Minimum Dietary Diversity (MDD) and Minimum Acceptable Diet (MAD) respectively. However, 22.7% children (6-23 months) consumed zero vegetables or fruits with 6.25% consuming unhealthy foods. These results are clearly outlining their contribution to increasing levels of underweight and stunting due to poor feeding practices. In addition, there has been consecutive failed seasons affecting dietary diversity among the children.

4.5 Maternal Health

It has been evidenced that implementation of the 10 High Impact Nutrition Interventions (HINI) at scale can avert 15% deaths in children younger than five years. Some of these strategies, has positive effects on child survival during 'the window of opportunity' which is also referred to as the 1000 days. Optimal maternal nutrition during pregnancy and enhanced nutrition package for the infant and young child focusing on promotion of exclusive breastfeeding are very key in ensuring child survival especially at 0-6 months. Pregnancy and lactation impose a big nutrient-needs on mothers, with which in the absence of adequate diet leads to utilization of body nutrient reserves leading to malnutrition of the mother.

Gestational malnutrition leads to low birth weights and may ultimately ends in poor child growth and development, hence creating an urgent need to address high rates of malnutrition among pregnant women. A high number of malnourished PLWs eventually increases the risk of growth retardation of the foetus and consequently an increase in low birth weight and malnutrition burden spreads to both the children and the caretakers. This is further aggravated by the fact that most of this children and mothers comes from the same household faced with food insecurity and related vulnerabilities.

4.5.1 Women physiological status

Among women of reproductive age (15-49 years) who were assessed 9.61% had moderate wasting (≥ 21 - < 23 cm). Majority of the women (75.98%) consumed less than 5 food groups in a day. This doesn't meet MIYCN Policy guidelines which recommends a minimum of 5 food groups per day. Maternal results from KDHS 2022 showed Makeni had 99.1% pregnant women who received antenatal care from a skilled provider, 75.7% had 4+ ANC visits and 93.1% took Iron containing supplements during pregnancy. From the June 2023 SMART Survey results, among 21.55% who reported to have attended ANC, only 36.50% who attended in their first three months of pregnancy. This differs from the 100% recommendations by MIYCN Policy Guidelines. Missing ANC means missing benefits from nutrition education and counselling on minimum healthy diets, monitoring weight gain during pregnancy and managing complications such as nausea and vomiting.

4.5.2 Iron and Folic Acid Supplementation (IFAS)

During pregnancy, women have increased need for iron to ensure they have sufficient iron stores to prevent iron deficiency. Iron supplementation is recommended in resource limited settings as an approach to prevent and correct iron deficiency and anaemia among pregnant women. WHO recommends daily consumption of 60mg elemental iron and 0.4mg folic acid throughout the pregnancy. The recommendations have been adopted by Kenya government in its 2013 policy guidelines on supplementation of iron folic acid supplementation (IFAS) during pregnancy. During the survey, it was realized that most of the mothers (97.12%) were reported to have taken IFAS during their pregnancy with only 2.88% not taking. 79.4% of the women took IFAS more than 90 days. 13.2% took IFAS for 30 to 90 days and 7.4% took IFAS in less than 30 days which can be a risk of neural tube defects and anaemia, hence the need for sensitization of IFAS intake to all pregnant women. Majority of the women 75.98% are consuming less than 5 food groups in a day which is a clear indication of less iron rich food being consumed. The results agree with KDHS 2022 results where 99.1% pregnant mothers received antenatal care from a skilled provider, with 75.7% having 4+ ANC visits and 93.1% of them took Iron containing supplements during their pregnancy.

4.6 Food Security and Livelihoods

The results showed there were 20.19 % of households which had moderate hunger, with 5.23% having severe hunger. This isn't in line with Food Security and Nutrition Sphere Standards; everyone has the right to be free from hunger and to have adequate food. Food security and nutrition responses should contribute to protecting and developing livelihood assets including land, equipment and machinery, raw materials knowledge and access to functioning markets. The results also showed 13.06% of the Households in the county are at IPC Phase 3-5 (**Crisis**).

The MIYCN Policy Guidelines recommends intake of at least 5 food groups per day. Of the 6.29% of the Households consuming less than 3 food groups in the last 24 hours, there is need to improve their livelihood that will eventually lead to improved nutrition and health status.

The households' main source of income in the sampled households was casual labour (38.9%) followed by the sale of crops at 19.0%. These sources of income depended on the seasonal labour

demands which places the households at a risk of household food insecurity when their source of income faces occasional shocks. With most of the household production dependent on rain-fed agriculture, the households are consistently prone to household food insecurity considering the recent rain patterns. The assessment of the main occupation of the household heads, who are the main breadwinners in the households shows that 30.3% rely on crop farming which also includes the farming of fruit farming, while 31.8% are dependent on waged labour, mostly casual labour. These places the households in a vulnerable position when there are failures in the rainy seasons and there is no produce to sell, and when the labour patterns are not favourable. It's worth noting that the household head's source of income is also used on other household expenditures including education and health which can leave little for food.

More than half (58.9%) of the households consumed food from more than 5 food groups 24 hours prior to the survey. The survey data collection was done at a period when the household's food availability was considered good for most of the households with the exception of a few livelihood zones. Cereals (92%) were the most consumed food group with pulses which were available after harvest also being consumed significantly by 60.9% of the households. It is positive to note a notably high consumption of milk products at 70.8% and vegetables at 62.8% of the households. However, despite the high production of fruits by the households in the survey area, only 34.9% of the households had consumed fruits in the previous day. This is possibly due to the fruits being considered more for sale than for consumption. The high consumption of cereals, milk products, and pulses alongside fats and vegetables places a majority of the households at a good food consumption score (87.5%).

Based on the above, the households appear food secure within this season, but the situation is likely to change as the current stocks will be depleted long before the next harvest season. The analysis of the reduced coping strategy shows almost two-thirds (65.1%) of the households applied little or no coping strategies a week prior to the survey. Additionally, more than two-thirds (74.6%) of the households experienced little or no hunger in the households one month prior to the survey. This however is expected considering the current season which included harvesting and does not communicate in the next few months. It's however important to plan interventions for the 13.1% of the households who are in crisis for coping strategies while there is still 20.2% and 5.2% of the household experiencing moderate and severe hunger at the households, respectively.

Addressing the underlying causes through interventions such as improving people's livelihood, assets creations among others will enable in reducing and preventing malnutrition.

4.7 Water Sanitation and Hygiene (WASH)

Safe water, sanitation and hygiene (WASH) are crucial for human health and well-being. People with inadequate WASH services suffer from or are exposed to a multitude of preventable illnesses. Lack of safe WASH negatively impacts quality of life and undermines fundamental human rights. Poor WASH services also weaken health systems, threaten health security and place a heavy strain on economies. Diarrhoea is the second leading cause of death among children aged under 5 years. Approximately 1.6 million deaths occur each year globally due to diarrhoea with the highest-burden occurring in developing countries and economically disadvantaged regions.

Adequate access to water facilitates safe food handling practices that prevent foodborne infections. Poor WASH contributes to undernutrition through diarrhoea, intestinal parasite infections, and possibly through environmental enteric dysfunction (inflammation of the gut lining).

4.7.1 Main sources of drinking water

Access to safe drinking water was defined as the proportion of households using improved drinking water sources, this included water from the following sources, borehole / protected spring /protected shallow wells, Earth pan/dam, Earth pan/dam with infiltration well, harvested water, piped water system, river/spring, unprotected shallow well, water trucking / boozer, water vendor. The main sources of water for HH in the county include rivers/spring (30.68%), borehole/protected springs/shallow well (19.98%), piped water systems (16.29%), harvested water (Jabiya) (10.23%) The rest (22.52%) obtained water from unsafe sources such as river, earth pan, water tracking and unprotected shallow wells. Due to the high proportion of the population relying on unsafe water sources, there is eminent need to sensitize the community on water treatment while at the same time ensure access to water treatment chemicals. Not unless the household drinking water from the unsafe sources is treated, members of the community are prone to be infected with water borne related illness such as diarrhoea, typhoid among other illnesses.

4.7.2 Distance to water source and queuing time

According to SPHERE handbook for minimum standards for Water Sanitation and Hygiene, the maximum distance from any household to the nearest water point should be 500 meters. It also gives the maximum queuing time at a water source which should not be more than 15 minutes. From the study data analysis findings, it was found that, majority (49%) of the households trek a distance of less than 500 metres to access the water points.36% have water points accessible in more than 500 metres to less than 2km while 12% have to trek more than 2km to access a nearest waterpoint-that is trekking for water fetching was between 1 to 2 hours as shown in the figure below. This shows that some time is lost during the process of meeting household water needs.

4.7.3 Queuing for water at the source

This indicator measured the average time the respondents spend between arriving at the water source and starting to fill their water containers. Excessive queuing times are indicators of insufficient water availability due to either an inadequate number of water points or their insufficient yields. From the data analysis it was evidenced that majority of the households do not queue at the water points. For those who queue some wait for more than 1-hour, other wait for less than 30 minutes while other wait for duration between 30-60 minutes. From the study findings it is evidenced that some time which could have been used to do other economic value adding chores is lost while queuing to get water at the source.

4.7.4 Water treatment

Safe water storage facilities prevent contamination of safe water while the water is being transported and stored for consumption. 27% did treat their water before consumption, of those who treated, the majority (60%) of the HHs treat their water by boiling, followed by HHs that treat

their water by boiling (38%). There is 1% that treat water via pot filtration or traditional methods. This indicates that the community might be prone to water borne and water related diseases that might arise due to consumption of untreated water. This extremely low proportion of households that was treating drinking water, coupled with the low latrine coverage and high rates of open defecation could be one of the main contributors of malnutrition in the County has already explained above (relationship between undernutrition and poor WASH).

Rivers/springs were the major sources of drinking water for the households. Most of the households 73% didn't treat their water before consumption. This can predispose them to infections that can deteriorate their health and nutrition status. 36% of the households had water points accessible in more than 500m to less than 2km while 12% had to trek more than 2km (1 to 2 hours) to access a nearest waterpoint. Among the 40% who queued for water 35% queued for more than one hour. The results having 67.90% of household who use less than 15 litres per person per day, notably only 9.7% of the household practiced handwashing in the critical points. This indicates the County is not in correspondence with SPHERE standards in matters of WASH for instant, the recommended minimum water is 15 litres per person per day and the distance of household to the nearest water point should be less than 500m and queuing time should be less than 30 minutes. There is need for the County to implement intervention on water catchment and treatment. Health promotion messages to the community is of importance to reduce the 4.74 % suffering from diarrhoea to zero.

4.7.5 Household Per capita Water Consumption

The folks at Water Footprint Calculator say the average at-home water use is 60 gallons per person per day. But the US Geological Survey puts the average at 80-100 gallons per person. The wide range depends a lot on the habits of the individuals in your home. This can further be defined that all households - including those with private connections – are coping with the poor water supply situation by spending a lot on water and consuming relatively little, an average of 40 litres per capita per day (lcpd). From the study it was found that, More than half (67.90%) of the HHs access less than 15lpppd. Based on this study finding, it's evident that the community is lacking adequate water as per WHO standards which requires 20 lpppd.

4.7.6 Household flushing points

Good hygiene and Sanitation practices refers to provision and use of waste disposal facilities and services that safely dispose of human urine and excreta thereby preventing contamination of the environment. Inadequate sanitation is a major cause of disease world-wide and improving sanitation is known to have a significant beneficial impact on health both at households and across communities (UNICEF, 2020). Most Households (96.86%) use Pit latrine as their relieving point. It is also important to note that the county still has 1.07% households estimated not to have relieving facilities. This means that the community lead total sanitation approach is bearing fruits as only small proportion of the population is practising open defecation.

4.7.7 Hand washing practice

The practice of proper hand hygiene and sanitation are very key in prevention of faecal oral diseases. Good hygiene refers to the practice of hand washing with soap and running water after defecation, disposal of child faeces, changing babies' nappies or pampers, prior to preparing and handling food and before eating. Hand washing with soap and running water is the single most cost-effective intervention in preventing diarrhoea diseases. The four critical hand washing moments include; after visiting the toilet/latrine, before cooking, before eating and after taking children to the toilet/latrine. Majority of the respondents in the County are practicing handwashing mostly after visiting the toilet and before eating. Handwashing before cooking is only practiced by 59.3% of the households while only 12.1% practice handwashing after taking children to the toilet. Worth noting that most of the respondents did not have young children. This practice predisposes most households to contamination.

4.7.8 Presence of hand washing stations

Existing research shows that people with access to a handwashing facility are more likely to wash their hands (Behera *et.al* 2022). Furthermore, observation of handwashing materials by surveyors represents a more reliable proxy for measuring handwashing behaviour than asking individuals to report their own behaviour. This indicator therefore assesses the proportion of households with handwashing facilities with soap and running water at home. A greater proportion of the households didn't have hand washing facilities (22%) which are in use during all critical times for hand washing in preventing diseases. Hand washing without soap does not offer effective protection against germs. This is an indication that still a large proportion of the community is exposed to contamination by diarrheal causing germs.

4.7.9 Hand washing with soap and running water

Handwashing is one of the best ways to protect yourself and your family from getting sick. Learn when and how you should wash your hands to stay healthy. Washing hands can keep you healthy and prevent the spread of respiratory and diarrheal infections. The steps in handwashing with soap and water should be emphasized. Data analysis on hand washing with soap and water revealed that majority (78.06%) of the HHs in the county are washing hands with soap and water while 13.09% of the HHs are washing hands with water only. 8.73% only use soap on instances when they can afford it.

5.0 CONCLUSION

The current survey indicates that the majority (65.08%; 61.80% - 68.23%) of the households are at IPC two (2) Stressed, which is an indication that actions are required for disaster risk reduction and to protect livelihoods. This an improvement compared to the food security assessment report which classified the county as IPC 3 in 2022. This is confirmed by the fact that the majority (58.91%) of the households ate from more than 5 food groups in a day with a majority of the Households (87.53%) having a good Food consumption score. However, Majority of women (75.98%) are consuming less than 5 food groups in a day. Most (76%) of the women of reproductive age have a poor minimum dietary diversity (<5 food groups) despite most households (58.9%) having a high dietary diversity score. The survey reported that most of the households have unstable sources of income hence making the households vulnerable to food security shocks. There is need to build resilience and disaster risk reduction.

The study findings indicate that prevalence of stunting among the children 6-59 months (<-2 z-score) was 17.6 % (13.8 - 22.2 95% C.I.) which is an improvement (20%) from 2022 KDHS. Prevalence of global malnutrition (<-2 z-score and/or oedema) is 6.2 % (3.8 - 9.7 95% C.I.), the highest (8.2 %) (5.0 - 13.3 95% C.I.) proportion being amongst the boys. The prevalence is however slightly higher than the prevalence observed in the KDHS (4.0%). The **prevalence** of severe malnutrition (<-3 z-score and/or oedema) was 1.2% (0.4 - 3.1 95% C.I.) based on WHZ based on the WHO/UNICEF 2018 classification of malnutrition. The point estimate indicates a medium nutrition situation while the CI indicates a normal to a medium situation.

Majority (87.29%) (84.49%-89.64%) of the women of reproductive age have normal maternal MUAC (>23cm). However, most (76%) of the women of reproductive age have a poor minimum dietary diversity (<5 food groups) despite most households (58.9%) having a high dietary diversity score. This is likely to affect the pregnant women and result in poor outcomes since only a small (22%) proportion of pregnant women in the county are attending their ANC clinics. It will be important to follow-up and successfully refer to the 78% who are still not attending their ANC at the clinics.

Vaccination coverage in the county is high and above the 80% national target for all vaccinations. However, the coverage of VAS is below the national target of 80% at 63.4% (6-59 months) and 65.2% for children 12-59 months and there is need to screen and accelerate Vitamin A supplementation to boost immunity and prevent diseases.

The main sources of water reported were Rivers (30%) and boreholes (20%) indicating half of the households not having stable water sources with only 27% of the households treated their drinking water. Most of the households' water consumption for cooking and drinking is below 15 lpppd (67.9%). This is depicted by the fact that handwashing before cooking is only practiced by 59.3% of the households while only 12.1% practice handwashing after taking children to the toilet This likely to significantly result in childhood illnesses mainly diarrhoea and ultimately high

malnutrition rates in the county. ARI/Cough symptoms topped the illnesses reported by HHs (62.63%) followed by fever with chills like malaria (37.37%). There is need to enhance access to clean water supply and education on hygiene practices.

6.0 RECOMMENDATIONS

This SMART survey findings were able to identify several recommendations to inform future programming activities and interventions geared at improving the nutritional status of children aged 6-59 months in Makueni County as illustrated in table 20 below:

Table 20: SMART Survey recommendations

| SURVEY FINDINGS | SHORT TERM RECOMMENDATIONS | MEDIUM TO LONG TERM | RESPONSIBLE |
|--|--|---|----------------------|
| SECTOR: HEALTH AND NUTRITION | | | |
| <p>-Prevalence of GAM was moderate at 6.2 % based on WHZ</p> <p>-Prevalence of stunting was medium at 17.6% based on HAZ</p> <p>-Poor score of WAZ (underweight) at 11.7%</p> <p>-9.61 % of the women aged 15-49 years had moderated wasting while 3.1% of the women had severe wasting (according to MUAC</p> | <ul style="list-style-type: none"> • Mobilise resources from government and partners to promote nutrition services in the county • Sensitize and train health care providers and community healthcare promoters on IMAM and cMAM Program • Scale-up IMAM sites in the county • Conduct mass screening and outreaches (intensified identification of acute malnutrition) • Quantify, procurement and prepositioning of commodities and equipment to diagnose and manage malnutrition • Scale-up Breastfeeding community initiatives (BFCI) and Breastfeeding facility initiatives (BFFI) • Strengthen coordination meetings (County Nutrition Technical Forum) • Scale-up Family MUAC approach from 8 wards to the rest of the 30 wards | <ul style="list-style-type: none"> • Advocate for biannual nutrition assessment activities (SMART surveys, SQUEC assessments) • Link the affected households to social safety nets and livelihoods • Enhance food security at household level by empowering communities on Agri-nutrition • Hiring of more health care providers and community health promoters to support nutrition interventions at the facility and community level. • Review county nutrition action plan (CNAP) • Advocacy on increased budget allocation to nutrition especially for procurement of nutrition commodities (RUTF and RUSF). • Strengthen multi-sectorial collaborations in order to promote nutrition sensitive interventions • Conduct nutrition financial tracking to establish allocation | Health and Nutrition |

| | | | |
|--|--|--|--|
| | <ul style="list-style-type: none"> Strengthen health and nutrition education targeting feeding practices among children and mothers. | <p>and utilization of nutrition funds in the County.</p> <ul style="list-style-type: none"> Initiate and support nutrition sensitive activities at the health facilities and the community (e.g. Kitchen gardens, demonstration gardens, etc) Initiate cash transfer programs for households with children affected by malnutrition (both acute and chronic) Conduct a coverage assessment to understand the barriers to effective IMAM programming in the county | |
| <p>Poor IYCF practices; Minimum dietary diversity (MDD) and Minimum Acceptable Diet (MAD) at 39.8% and 26.56% respectively -Zero consumption of vegetables/ fruits among children 6-59 months in the target HHs</p> <p>poor dietary diversity among women aged 15-49 year (76% women ate less than the recommended 5 food groups in a day)</p> | <ul style="list-style-type: none"> Training of health workers on BFCI/MIYCN Support MIYCN-E practices at community level Capacity building of caregivers on good nutrition and healthy diets. Capacity build CHV to deliver MIYCN messages at the community Initiate Mother to Mother Support groups to help pass MIYCN messages and promote self-support for MIYCN practices | <ul style="list-style-type: none"> Roll out of baby friendly community initiatives at the community level for delivery of key MIYCN messages and mentorship to caregivers. Linkage with Agriculture department to support integrated kitchen gardening and small animal rearing for diet diversification. Conduct an MIYCN KAP survey to extensively understand the MIYCN practices in the county including some barriers to effective programming | |
| | <ul style="list-style-type: none"> Training of CHVs on WASH module. Enhance routine Hygiene promotion at house level by CHVs. Procurement and distribution of water treatment chemicals to community during outreaches and routine household visits by CHVs and demonstration on how to use them. | <ul style="list-style-type: none"> Roll out ICCM to enhance case management at the community level. | |

| | | | |
|---|--|--|-----------------------------|
| | <ul style="list-style-type: none"> Restocking of Zinc supplement at the facility level. Re-training of health care workers on the IMCI package and ensure an effective implementation of the same | | |
| | <ul style="list-style-type: none"> Health education at health facility and community level. | <ul style="list-style-type: none"> Capacity build health workers on ORS and zinc supplementation in management of diarrhoea Radio talk show at local FM Roll out ICCM to enhance case management at the community level. | Health and Nutrition |
| Moderate Vitamin A supplementation and deworming coverage at 65.5% and 20.8% | <ul style="list-style-type: none"> Sensitization of health workers on the need for proper documentation Enhance communication between ECD providers and caregivers in order to create Sensitise CHVs on referral of eligible children to health facilities for vitamin A supplementation. Enhance better coordination of mass campaigns of VAS and deworming to avoid duplication and improve on the reporting | <ul style="list-style-type: none"> Support quarterly RDQA and Support supervision Conducted quarterly in-charges data review meetings | Health and Nutrition |
| SECTOR: WATER, HYGIENE AND SANITATION | | | |
| <p>-More than half of the HHs did not met the 15 litres per person per day water consumption according to Sphere and WHO standards</p> <p>- More than half of the HHs (51%) could not access water within the</p> | <ul style="list-style-type: none"> Mobilise resources from county government and partners for the procurement, preposition and distribution of aqua tabs (effervescent chlorine tablets) Integration of WASH into nutrition services Health education and hygiene promotion at facility and | <ul style="list-style-type: none"> Upscaling community led total sanitation activities (CLTs) Water surveillance and quality control -Frequent water sampling to ascertain fitness for human consumption in the county Multisectoral (Health, Water, Environment and Agriculture) collaboration to promote water quality and quantity | Health and Water Department |

| | | | |
|--|--|---|--|
| <p>recommended distance of less than 500 metres</p> <p>-Poor water treatment (Only 27%) treat water before drinking</p> | <p>Community level to strengthen WASH</p> | <ul style="list-style-type: none"> • Sensitize community n use of safe water sources • Radio talk show at local FM • Enhance accessibility of clean safe drinking water by sinking boreholes • Repair of broken boreholes • Create awareness on water harvesting technique during rainy season • Ensure water sources are well protected to ensure safety of water for human consumption • Sinking more boreholes and pipeline extension to villages with low access to water. | |
| <p>1.31% of HHs did not have any relieving facilities</p> <p>Only 9.7% of the HHs responded to practise handwashing in the 4 critical moments</p> <p>Majority of the HHs (87.64%) responded did not practise handwashing after taking their children to the toilet</p> | <p>· Community sensitization on the importance of proper human waste disposal</p> | <ul style="list-style-type: none"> • Use local administration to rein-force latrine construction and usage at every household. • Upscale implementation of Community Led Total sanitation | <p>Health department and interior and national government coordination</p> |
| <p>SECTOR: FOOD SECURITY AND LIVELIHOOD</p> | | | |
| <p>Proportion of HHs reporting moderate to severe hunger were 25%</p> <p>Food consumption score - almost 10% of HHs had borderline while 2.5% HHs had poor FCS</p> | <ul style="list-style-type: none"> • Enhance climate smart agriculture • Promote farming and utilisation of drought tolerant crops • Promote and carry out demonstrations on vertical gardens establishment | <ul style="list-style-type: none"> • Initiate and support nutrition sensitive activities at the health facilities and the community (e.g., Kitchen gardens, demonstration gardens, etc • Enhance food security at household level by | <p>County government of Makueni (department of agriculture)</p> |

| | | | |
|--|---|---|--|
| <p>-Coping Strategy Index: 21.7% of HHs were considered to be stressed (IPC-2) 13.6% of the HHs had a coping strategy index classified at IPC 3-5 (crisis)</p> <p>Almost half of the HHs sampled (41%) responded to access less than the recommended 5 food groups per day translating to HDDS IPC 2,3 and 4-5 classification)</p> | <ul style="list-style-type: none"> ● Develop county specific recipes and food preparation for the households ● Enable market-linkages for foodstuffs ● Sensitisation of post-harvest management ● Promotion of value addition ● Promote consumption of livestock products Training on crop husbandry ● Support vulnerable farmers acquire vegetable and biofortified legume planting materials to raise crops that can provide required micronutrients. | <p>empowering communities on Agri-nutrition</p> <ul style="list-style-type: none"> ● Linkage the affected households to social safety nets and livelihoods ● Link with Agriculture department to support integrated kitchen gardening, chicken rearing and keeping of small animals for diet diversification. | |
|--|---|---|--|