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Malnutrition Hotspots Mapping & Analysis in Isiolo County

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Nawiri

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List of Abbreviations and Acronyms

ASAL	Arid and Semi-Arid Lands
CRS	Catholic Relief Services
ENA	Emergency Nutrition Assessment
GAM	Global Acute Malnutrition
IPC	Integrated Phase Classification
MUAC	MID-Upper Arm Circumference
NAWIRI	Nutrition in ASALs Within Integrated Resilient Institutions
NCA	Nutrition Causal Analysis
NDMA	National Drought Management Agency
PPS	Proportionate to Population Size
SMART	Standardized Monitoring and Assessment of Relief and Transitions
USAID	United States Agency for International Development
WFH	Weight-for-Height
WHO	World Health Organization
WHZ	Weight-for-Height Z scores

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Executive Summary

Introduction

The overarching goal of Nawiri multisectoral activity is to sustainably reduce persistent acute malnutrition in Kenya's ASALs. The project aims to increase stakeholder understanding of the drivers of persistent acute malnutrition in Isiolo and Marsabit counties, through a collaborative learning process involving a wide range of actors. The learning is useful in designing context-sensitive, systems-driven, multi-sectoral approaches to sustainably reduce acute malnutrition.

This report summarizes the outcomes of the identification of acute malnutrition hotspots and establishes seasonality trends in Isiolo County. Isiolo County maintains high rates (above emergency threshold ≥15%) of acute malnutrition despite significant investment for both programming and research triggering humanitarian responses to the problem in the short term. The identification of acute malnutrition hotspots clusters and seasonality trends in Isiolo County that consistently show high levels of acute malnutrition will inform the targeting of subsequent Nawiri implementation activities and strategies.

Methodology

A retrospective systematic review of secondary data of children under five years from 2010-2020 was conducted to establish the levels of acute malnutrition at the county, subcounty and ward levels. Two sets of data were used: (a) Integrated Standardized Monitoring and Assessment of Relief and Transitions (SMART) to establish the level of global acute malnutrition (GAM) for identification of the malnutrition hotspots, and (b) MUAC data from sentinel surveillance sites by National Draught Management Authority (NDMA) to analyze malnutrition trends over the years and seasons. Granularization of data was applied from county to subcounty and ward levels.

MUAC data is collected monthly and therefore appropriate for trend analysis. Only data that met the quality parameters (representativeness, plausibility checks, number of clusters/sentinel sites, sample size, etc.) were included in the data set for analysis. Malnutrition hotspots were identified at the subcounty and ward levels whereas seasonality was conducted at the county and subcounty levels. GAM based on the weight for height (WHZ) and MUAC were the nutritional status outcome indicators used. Integrated Phase Classification (IPC) was used to categorize the severity of acute malnutrition.

Major findings

Malnutrition hotspots

Over the last ten years (2010 to 2020), Isiolo County has experienced persistent acute malnutrition (WHZ) among children under age five. The county showed a variation in the GAM rates from one year to another with the most critical years being 2011, 2017 and 2020. The rest of the years remained above acceptable levels tending to critical phase classification. At the subcounty level, Garbatulla had the highest number of years with GAM ≥15% mostly occurring between 2017 and 2020 making it the most vulnerable to malnutrition. Isiolo Central subcounty had the least number of years with GAM rates ≥15%.

At the ward level, Ngaremara and Oldonyiro wards in Isiolo Central subcounty showed the highest vulnerability to acute malnutrition (GAM ≥15%) in majority of the years (≥6 years) from 2012 to 2020. Second in vulnerability were Garbatulla and *Sericho* wards in Garbatulla subcounty with five years each with GAM ≥15%.

Next in vulnerability at the ward level was *Charri* in *Merti* sub-county with four years of GAM ≥15% and the least vulnerable was *Cherab* with three years of GAM ≥15%. Despite Isiolo Central subcounty showing lower levels of acute malnutrition, at the subcounty level, *Ngaremara* and *Oldonyiro* were the most vulnerable wards in the county. This indicates that granularity of data to wards is worthwhile to demonstrate where exactly the hotspots are situated. *Charri* and *Cherab* wards in *Merti* present a unique pattern in the distribution of acute malnutrition that is opposite of one another over the years – the years in which *Cherab* presents emergency levels of acute malnutrition *Charri* presents acceptable or near acceptable GAM levels and vice versa. This may be an indication of the differences in the drivers of acute malnutrition in these wards despite sharing similar administration units.

It should be noted that the analysis and identification of the malnutrition hotspots is limited by the fact that ideally the findings of SMART surveys should not be disaggregated by sub counties or wards because of the cluster sampling methodology used in the selection of the target population. Nonetheless, the data has been used to provide an indication of the hotspots in Isiolo County.

Acute malnutrition by seasonality

There are four seasons in a year in Isiolo County: dry season (January to March); long rains (April to June); dry and cool (July to September); and the short rains (October to December). The seasonality trend analysis was worked out based on GAM from SMART and MUAC data. For a majority of the years, SMART surveys were conducted during the dry season and therefore there is no representation of all the seasons in the SMART data. The GAM trend seasonality analysis based on SMART data is therefore indicative and not conclusive. The MUAC data from NDMA has also been used to analyze the trends of acute malnutrition across the seasons over the years from 2010 to 2019. MUAC data was collected monthly and therefore represents all the seasons in the year. The year 2020 data was not included in the analysis because only some of the seasons were represented in the data set at the time of the data analysis and hence the year was not comparable to the other years.

Based on SMART data, Isiolo County experienced high acute malnutrition rates during the dry season (January to March) that continued to remain high but at a decreasing magnitude into the long rains season (April to June) with marked reduction to the dry and cool season and with the lowest malnutrition rates observed during the short rains season. The findings of seasonal trends from computed average GAM based on MUAC data were similar to those from the SMART data – showing that the dry season presents the highest vulnerability for malnutrition.

Overall, seasonality trend analyses at subcounty level using GAM by MUAC showed that the rates were high during the dry seasons. Malnutrition seems to start increasing during the short rains and peaks in the dry season.

Conclusions

Isiolo County is a hotspot for acute malnutrition that manifests mostly in the dry season and reduces progressively to the long rains season and as the year advances. Garbatulla subcounty is the most vulnerable to acute malnutrition followed by Merti subcounty. Despite Isiolo Central subcounty being the least vulnerable, it has the most vulnerable wards, Oldonyiro and Ngaremara, that showed persistent high malnutrition rates in a majority of the years from 2010 to 2020. This is an important finding in that some of these malnutrition hotspots may be missed in the prioritization of interventions if findings are only presented at the higher administrative levels. Seasonality influences acute malnutrition with the highest GAM rates recorded during the dry season followed by the long rains season in some areas. Given the variability in vulnerability to acute malnutrition particularly at the ward level, this may be indicative of the likelihood of factors outside seasonality driving acute malnutrition. Furthermore, seasonality may influence the drivers of malnutrition differently in different geographical units.

1. Introduction

1.1 Background Information on Isiolo County

Isiolo County borders Marsabit County to the north, Samburu and Laikipia Counties to the west, Garissa County to the southeast, Wajir County to the northeast, Tana River and Kitui Counties to the south and Meru and Tharaka-Nithi Counties to the southwest. It covers an area of approximately 25,700 square kilometers. Isiolo town lies 285 kilometers north of Nairobi, the capital city of Kenya by road. Isiolo County is among the 23 arid and semi-arid lands (ASAL) of Kenya, located in the Pastoral Northeast cluster covering 25,336 square kilometers with an estimated population of 185,417.[1] The county consists of three sub counties namely *Isiolo Central, Garbatulla* and *Merti.* The county is hot and dry most months of the year with two rainy seasons. The short rains season occurs between October and December with the peak in November while the long rains season occurs between March and May with the peak in April. The county is characterized by recurrent droughts, hot and dry climate with low and erratic rainfall patterns. The dry season is characterized into short dry season (January to March) and long dry season (June to October). The county is highly dependent on the short rains season.[2] The county has three main livelihood zones: Pastoral, Agropastoral and Firewood/Formal employment representing 67%, 26% and 7% respectively as shown in Figure 1. Agricultural and livestock productivity is worsened by limited, unreliable and poorly distributed rainfall pattern. In recent years the rains have become erratic and unpredictable, making it difficult to plan on farming.[3]

Figure 1: Livelihoods in Isiolo County

[1] Republic of Kenya. Isiolo County Integrated Development Plan, CIDP 2018-2022. March 2018

[2] Ministry of Health. Integrated SMART Survey Isiolo County Kenya Report. January 2019

[3] Republic of Kenya. Isiolo County Integrated Development Plan, CIDP 2018-2022. March 2018

Resilience

Isiolo is vulnerable to many shocks affecting the county's resilience. Isiolo is one of the most vulnerable counties to climate change in Kenya. Some of the key vulnerabilities emanating from climate change include drought and unpredictable rainfall, floods, and spread of water and vector-borne diseases, loss of forests and wetland ecosystems, land degradation and desertification and scarcity of portable water. Drought and unpredictable rainfall impact negatively on the economy of the county leading to reduced crop yield, low livestock productivity, high livestock mortality, and loss of income for farmers, famine and malnutrition. These impacts are exacerbated by unsustainable use of ground water. The county's most arid areas of Merti and Sericho are affected by famine and malnutrition in the absence of mitigation measures against climate change.[4]

Some areas of the county experience increased precipitation in some seasons. The county is usually affected by flash floods with negative impacts such as sediment pollution, loss of fertility, landslides, erosion, disruption of hydropower systems, and destruction of other physical infrastructure. Loss of forests and wetland ecosystems leads to loss of biodiversity and ecosystem services. In the absence of mitigation, climate change reduces crop yields, and loss of livestock productivity.[5]

Food security situation

Isiolo like other ASAL counties faces chronic food insecurity. The food insecurity situation is often classified as stressed or a crisis based on the Integrated Phase Classification (IPC) Food Security and Malnutrition Analysis conducted twice yearly (long rains and short rains) assessment. The main drivers of food insecurity are poor rainfall amounts and distribution. This results in poor crop and livestock production and, consequently, to scarcity of rangeland resources triggering livestock migration in search of pasture in other grazing areas, leading to resource-based conflict among ethnic groups. Mudslides, landslides and floods in some areas lead to population displacement, damage to crops and disruption of markets. Additionally, outbreaks of livestock disease led to mortality and reduced livestock production. The damage by the desert locust (which invaded the country in 2019) to crops, pasture and browse is however negligible. The locust came when the crops and the pasture was mature.[6]

Nutritional situation

Despite improvements observed in recent years, Kenya experiences a high burden of malnutrition among children under age five. The ASAL counties bear a higher burden of malnutrition compared to other counties. The rate of wasting has consistently remained above the emergency threshold (>15 percent) despite the heavy presence of agencies and Development Partners implementing programs in these counties over a period of years to improve household health, nutrition and food security situation. Levels of acute malnutrition remain a serious public health concern in Isiolo County. The rate of malnutrition among the under-fives increased from 10.3% in January 2019[7] to 18.8% in February 2020.[8] The SMART survey of 2019 revealed that 7.1% of the women of reproductive age are malnourished.

According to the IPC for Acute Malnutrition conducted in August 2020, the nutrition situation in the ASAL largely remained the same within the same phase across counties compared to the 2019 short rains assessment. Isiolo was in critical acute malnutrition (IPC AMN Phase 4). The nutrition situation is projected to remain the same between September and November 2020. Though the nutrition situation is stable, malnutrition level remains unacceptably high.

[4] Republic of Kenya. Isiolo County Integrated Development Plan, CIDP 2018-2022. March 2018

[5] Republic of Kenya. Isiolo County Integrated Development Plan, CIDP 2018-2022. March 2018

[6] Republic of Kenya. Ministry of Health. Integrated Food Security Phase Classification (IPC). Acute Food Insecurity and Acute Malnutrition Analysis February-March 2020.

[7] Ministry of Health, Standardized Monitoring and Assessment in Relief and Transitions (SMART), January 2019.

[8] Ministry of Health, Standardized Monitoring and Assessment in Relief and Transitions (SMART), February 2020.

The findings on the rates of malnutrition demonstrate that despite the many programs being implemented in Isiolo by the government, and various implementing and Development Partners, the burden of malnutrition among children under age five remains high. According to the findings of SMART surveys and the IPCs the status of the drivers of poor nutrition in Isiolo County has not changed significantly. The main drivers to acute malnutrition include inappropriate infant feeding and childcare practices, sub-optimal coverage of health and nutrition services, and high level of morbidity in children less than five years old coupled with multiple shocks such as floods and mudslides. Other drivers of acute malnutrition include poor hygiene and sanitation practices. Poor hygiene and sanitation lead to an increase in water-borne diseases such as diarrhea and cholera outbreak. Pre-existing vulnerabilities such as low literacy levels, limited livelihood assets and poverty continue to expose households and communities to persistently high levels of malnutrition.9 Nutrition Causal Analysis (NCA) conducted in the county in 2013 showed that some of the causes of malnutrition in the county include but not limited to high child morbidity, inadequate quantity and diversity of age specific foods, in access to safe water attributed to heightened drought situation and poor hygiene.10 Currently, COVID-19 pandemic has disrupted basic social services like health and education as well as livelihood engagements for households. Interruption of the essential services was observed in the months of April and May 2020 with a drastic reduction in the number of clients seeking essential health and nutrition services. This was due to the fear and anxiety associated with COVID-19 pandemic testing and quarantine, misinformation on service availability across health facilities and the fear of contracting the disease at the health facilities. Nonetheless, an upward trend in the number of clients has been observed in June and July following community sensitization on availability and continuity of the provision of health services.11

[9] Republic of Kenya. Ministry of Health. Integrated Food Security Phase Classification (IPC). Acute Food Insecurity and Acute Malnutrition Analysis, February-March 2020.

[10] Ministry of Health, Standardized Monitoring and Assessment in Relief and Transitions (SMART), January 2019.

[11] Republic of Kenya. Ministry of Health. Integrated Food Security Phase Classification (IPC); Acute Food Insecurity and Acute Malnutrition Analysis, August 2020.

2. Background to The Nawiri Project

2.1 Project goal: To sustainably reduce levels of persistent acute malnutrition in Kenya's arid and semi-arid lands (ASALs)- Isiolo, Marsabit, Turkana & Samburu

2.2 Project implementation

The five-year project (October 2019- September 2024) will be implemented in two phases:

- First phase (Yr. 1-2) will be collaborative learning and design to build evidence towards immediate and underlying drivers and remedies to sustainably reduce levels of acute malnutrition in the county.
- Second phase (Yr. 3-5) will be using the learning derived from the first phase to jointly design effective multi-sectoral approaches to sustainably reduce acute malnutrition. The design of the project is such that county government takes lead process and facilitated by implementing partners.

2.3 Justification for the malnutrition hotspots malnutrition analysis and mapping

The identification of hotspots clusters with consistently high levels of acute malnutrition in Isiolo and Marsabit counties will enable Nawiri in the targeting and implementing interventions and strategies in geographical areas where the project would have the greatest impact.

3. Methodology for Malnutrition Hotspots Analysis and Mapping and Seasonality Trend Analysis

3.1 Design

A retrospective systematic review of secondary data of children under five years of age from 2010 to 2020 was conducted to establish nutritional status at the county, subcounty and ward levels. The ten year-period was considered adequate to allow for comparability of malnutrition thresholds across time, seasons and populations. The disaggregation of nutritional status data by subcounty and ward levels allowed for the analysis and identification of the malnutrition hotspots and for seasonal trend analysis.

Two sets of data were used(a) Integrated Standardized Monitoring and Assessment of Relief and Transitions (SMART) to establish the level of global acute malnutrition (GAM) for the analysis and identification of the malnutrition hotspots and (b) MUAC data from sentinel surveillance sites by National Drought Management Authority (NDMA) to analyze malnutrition trends over the years and seasons at the county, subcounty and ward levels. MUAC data is collected monthly and therefore appropriate for trend analysis. The SMART data was also used but to a limited extent, in establishing seasonal trends because the majority of the surveys were conducted during the same season, the dry season following short rains season.

3.2 Indicators for hotspots mapping and for seasonal trend analysis

Outcome indicators: The indicator used for global acute malnutrition (GAM) is Weight-for-Height Z-scores (WHZ-Scores) derived from the raw anthropometry data from SMART surveys conducted in Isiolo County during the period 2010-2020. GAM based on MUAC data was used to establish levels of malnutrition for the same period and for trend analysis over time and seasons.

3.3 Data Quality

3.3.1 SMART data

Data representativeness (indicators shown in Table 1) was an important consideration in the selection of data for analysis and identification of malnutrition hotspots at the county, subcounty and ward levels. Data was derived from SMART surveys conducted in the county between 2010 and 2020. In the first stage of sampling, SMART surveys adopted the Proportionate to Population Size (PPS) sampling technique to ensure proportionate distribution of clusters/villages. The second stage involves simple random sampling of households with the target population – children 6 to 59 months old; therefore, SMART surveys if appropriately conducted are representative of the study population. The data from the SMART surveys were scrutinized for quality and representativeness before being included in the hotspots analysis. The data quality parameters used included the Design Effect (DEF) which is used to determine the homogeneity/heterogeneity of the distribution of acute malnutrition, where DEF <1.3 indicates homogeneity and ≥1.3 heterogeneity. Other quality checks used for inclusion of the SMART data for analysis included: having an acceptable Plausibility score (<15); having a minimum of number of 25 clusters per analysis unit; GAM interpreted using SMART flags and WHO Child Growth Standards 2006; and GAM interpreted using MUAC or oedema and GAM based on WHZ was given higher evidence level than GAM based on MUAC shown in Table 1.

Available data from SMART surveys that met the quality parameters (Table 1) was considered and both raw and processed data was used to determine the hotspots in Isiolo County. The raw data from SMART surveys conducted over the years had already been cleaned and validated by the national Nutrition Technical Information Working Groups (NTIWG) and was confirmed to have met the thresholds for the quality criteria. All data met the quality parameters and included in the analysis. Most of the sampling was done at county level and sample sizes met the quality criteria at county and subcounty levels. The ward sample sizes however did not meet the minimum criteria for sample size hence has been used as indicative of vulnerability to acute malnutrition at that level.

The SMART data was sourced from the Ministry of Health which is the custodian of these data.

Table 1: Thresholds for data quality checks and representativeness

Parameters	Quality and representativeness control	Remarks
Evidence (Data Source from surveys	Representative surveys with PPS sampling for representativeness and comparability Meet minimum number of clusters/ sample size (25 clusters)	All SMART survey data met the criteria
Weight and height data	Acceptable Plausibility scores (<15) using ENA	Plausibility test met
MUAC data (NDMA)	MUAC data must present age, sex and numerical measurements and NOT color codes	All data met the criteria
	Age appropriateness (6-59 months)	Flags by age were 4219, approximately 4% removed
	MUAC measurements (70-220mm)	Records removed- 649 (<1%)
	Standard deviation (>18mm)	NONE of the units of analysis (county and sub-county) had SD > 18
Classification of acute malnutrition	GAM by WHZ, MUAC or Edema GAM based on WHZ gets higher evidence level than the GAM based on MUAC	GAM based on WHZ was used to classify acute malnutrition while MUAC data used to analyze GAM trends across the seasons
Disaggregation of data from higher administrative level (county) and data reanalyzed for lower administrative level e.g., subcounty, or ward	Decision on the use of estimates and the reanalysis was based on the Design Effect (DEFF) DEFF at the higher admin level of <1.3 indicated homogeneity in findings and same estimates applied to lower levels (no need for reanalysis) If DEFF at the higher admin level is ≥1.3 and <1.7 indicated heterogeneity in findings and need to reanalyze for lower administration levels Need to have at least five clusters and 100 children per unit of analysis DEFF of the reanalyzed estimates should be DEFF <1.3	Data at ward level did not meet the disaggregation criteria and hence used as indication of vulnerability due to low number of children and clusters. They were however comparable at the ward level due to the PPS approach in sampling.

3.3.2 MUAC data

Data aggregation and quality checks

The national drought management authority (NDMA) collects information on monthly basis from sentinel sites in the ASALs in Kenya as part of the early warning system that has been in place since the 90s. MUAC for children 6 to 59 months old is one of the many indicators that information is collected on. For the seasonality trend analysis, the focus was on the period January 2010 to December 2019. In 2015, the early warning system adopted online technology aimed at ensuring a more robust system of data collection, analysis and dissemination. During the transition period the number of sentinel sites was reduced in the ASAL counties with sites in Isiolo County reducing from 15 to 7 (Table 2). In addition to the constitutional changes in 2010 that saw the formation of Devolved County governments and realignment of geographical boundaries, the change of database system meant that two distinct data sets existed and needed aggregation to inform the analysis of seasonality of acute malnutrition.

Alignment of the sub counties, wards and sentinel sites codes/names had to be done to ensure data completeness and accuracy. During this process, at the ward level, the NDMA MUAC data was filtered for at least five sentinel sites with ≥200 and ≥100 children in non-pastoral and pastoral communities respectively (Table 1) and analyzed to show evolution and trends of acute malnutrition across the seasons over the years. The data sets were aggregated to ensure that analysis could be conducted with the following quality checks put into consideration; appropriate MUAC measurements (70 to 220 mm), age in months (6 to 59 months), and sex of the children. The MUAC data was cleaned on Microsoft excel based on age appropriateness, MUAC measurements and standard deviation (>18 mm). The filtered data was then used to analyze seasonal trends over the years 2010 to 2020).

Data alignment of the sentinel sites to the three sub counties and data cleaning

Data alignment of the sentinel sites was done based on the three sub counties namely *Merti, Isiolo* Central and *Garbatulla* for the period 2010 to 2015 and 2016 to 2019 (Table 2). To ensure the data was usable for determining the seasonality of acute malnutrition, the following quality parameters were applied to the data sets:

1. Determining the completeness of the data sets for every month for the period of analysis. Data was missing for the period January to April 2016; thus, the dry season of 2016 is not part of the analysis in the acute malnutrition seasonality trends.
2. Records with sex of child not indicated were excluded from analysis, accounting for 110 (0.09%) records excluded from analysis.
3. Records with missing or incorrect MUAC measurements i.e., below 70 mm or above 220 mm were excluded from the analysis that is 765 (0.6%). The cut-off points used are based on ENA for SMART MUAC cut-offs for children 6 to 59 months of age.
4. 3028 (2.6%) records were removed from the analysis because they were missing age and/or had incorrect age i.e., below or above 6 to 59 months.

Finally, a total of **118, 628** records were available for data analysis.

Table 2: Sentinel Sites distribution in Isiolo County 20210 to 2020

Sub counties	2010 to 2015	2016 to 2020
Garbatulla	6	2
Isiolo Central	6	3
Merti	3	2
Total	**15**	**7**

3.4 Data Analysis

3.4.1 Data analysis and malnutrition hotspots mapping based on SMART data

A data repository consisting of raw SMART surveys from Isiolo County was developed from the data provided by the Ministry of Health. After scrutiny for quality, a worksheet was developed on Microsoft Excel and data analyzed to provide GAM WHZ over the specified years and months when the data was collected. This enabled consolidation of data by season over the specified period to study the trends and identify the malnutrition hotspots. The analyzed GAM levels were compared to those presented in the processed data, presented in the SMART survey reports (as a further quality check) and no discrepancies were found. The worksheet also provided entries for acute malnutrition classification based on the Intergraded Phase Classification (IPC) thresholds (shown in Table 3). The IPC acute malnutrition is color coded to give a pictorial magnitude of GAM. Acute malnutrition was estimated from a combination of the weight for height (WFH) index values (and/or oedema) ENA software and cut off-points based on WHO (2006) Child Growth Standards. GAM was defined by WFH < -2 SD and/or existing bilateral edema.

IPC classification of acute malnutrition (Table 3) was adopted to summarize and indicate severity and vulnerability to acute malnutrition over the years and seasons.

Table 3: Classification of acute malnutrition table (IPC Version 3.0)

Range	GAM WHZ phase	IPC Categories
<5	**1**	Acceptable
5-9.9	**2**	Alert
10- 14.9	**3**	Serious
15-29.9	**4**	Critical
>=30	**5**	Extremely critical

3.4.2 Trend analysis of malnutrition based on MUAC data

Data was analyzed at county and subcounty levels to establish the seasonality trends of malnutrition over the four seasons in the county over the period 2010 to 2020. The seasons are similar to those used by NDMA for early warning system based on precipitation and vegetation cover index. The cut-off point for malnutrition was MUAC <125 mm.

3.5 Strengths of the data

A notable strength of the analysis is that the SMART data used for hotspots mapping was of high quality as it adhered to all the data quality parameters and therefore no data was excluded from the analysis. ENA for SMART software has inbuilt quality checks that ensure that quality data is collected, and analysis done appropriately. Furthermore, the Division of Nutrition and Dietetics (DND) has Technical Working Groups at both national and county levels which validate the design, implementation and reporting of the SMART surveys.

3.6 Limitations of the data

1. Missing SMART data, particularly for the period 2010 to 2012 limited the ability to conduct a systematic review of the historical data for certain seasons and areas e.g., in Merti subcounty.

2. Nutrition SMART surveys are conducted on a yearly or on a need-basis and thus are limited for use in determining seasonality of acute malnutrition.

3. The majority of the SMART surveys were conducted during the same season (mainly during the dry season) thus limiting comparability between seasons and years.

4. Nutrition SMART surveys are only representative at county level thus limiting data granularity to the ward level. The findings at ward-level are therefore only indicative of the vulnerability to acute malnutrition.

5. Realignment of MUAC data was important for this analysis, this process was however, limited by variations in geographical boundaries of the unit of analysis in the period before and after 2015 as well as changes in NDMA's data management system.

4: Findings

4.1 Hotspots mapping based on GAM WHZ-Isiolo County 2010-2020

Isiolo County experienced three years of high acute malnutrition with GAM rates of ≥15% indicating critical phase of acute malnutrition in the years 2011 (18.3%), 2017 (21.3%) and 2020 (18.8%) respectively. The rest of the years presented serious classification phases (GAM 10-14.9%) of acute malnutrition except for 2013 which presented an alert phase (Table 4).

Table 4: Isiolo County GAM WHZ and IPC acute malnutrition based on SMART data

GAM WHZ												
Season	**Month**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Dry and cool season	Sep	13.5 %	18.3									
Dry season	Jan								21.3			
Dry season	Feb					10.8	13.5	12.7		14.8	10.3	18.8
Long rains	May			11.0 %	9.5 %							

Malnutrition trends in Isiolo County (Figure 2) indicate an increase in GAM WHZ in 2011 from 2010 followed by reduction in acute malnutrition in the years 2012 and 2013. There was an increase in 2014 with the highest peak in malnutrition in the year 2017. Reduction in acute malnutrition was again observed in the years 2018 and 2019 only to sharply increase in 2020 (Figure 2). It should be noted however, that the data was not collected at the same season over the years but in the majority of the years data was collected during the short dry season (January to February).

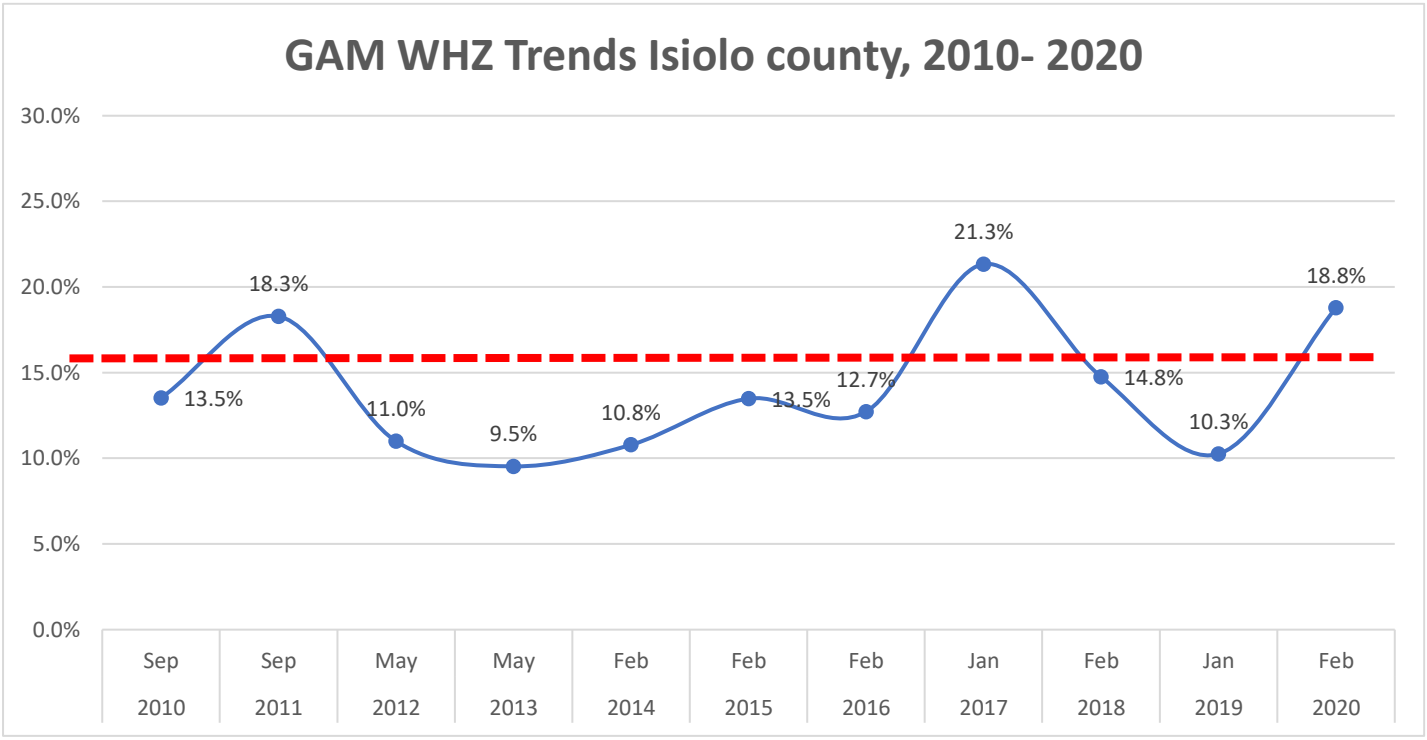

Figure 2: GAM trends in Isiolo County from 2010 to 2020

4.2 Malnutrition hotspots analysis by sub counties

Isiolo County is divided into three sub counties: *Garbatulla, Isiolo Central* and *Merti*. In the past ten years (2010 to 2020) each of the sub counties has experienced different levels of severity of acute malnutrition. Garbatulla subcounty is the most vulnerable to acute malnutrition with four years of GAM rates above the emergency thresholds GAM (≥15%). Most of the emergency phases (three out of four) occurred between 2017 and 2020. The highest GAM rate (28.8%) was recorded in 2017, followed by 2011 (18.3%), 2018 (18.3%) and 2020 (17.3%). Furthermore, Garbatulla experienced serious phases of acute malnutrition in the years 2010, 2015 and 2016 with GAM rates of 13.5%, 10.8% and 14.0% respectively (Table 4).

For Merti and Isiolo Central sub counties, there was no data available for the years 2010 and 2011. Merti is the second most vulnerable subcounty with three years of GAM above the emergency threshold (GAM ≥ 15%) experienced in the years 2012, 2015 and 2020 at 17.2%, 15.6% and 21.5% respectively. For six years, the GAM rates in Merti were classified as serious (10-14.9% GAM). Isiolo Central subcounty is the least vulnerable to malnutrition having recorded GAM emergency levels 19.7% and 18.6% in 2017 and 2020 respectively with five years of acute malnutrition phases classified as serious (Table 5).

The year 2020 was particularly vulnerable with all the sub counties recording GAM rates above the emergency threshold ≥15%. This was followed by 2017 when Garbatulla and Isiolo Central sub counties recorded GAM rates ≥15%. Merti was the only subcounty with a GAM rate of ≥15% in 2012 (Table 5).

Table 5: GAM WHZ by subcounty and IPC acute malnutrition

GAM WHZ													
Row Labels	Season	Month	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Garbatulla	Dry and cool season	Sep	13.5%	18.3%									
Garbatulla	Dry season	Jan								28.8%		7.4%	
Garbatulla	Dry season	Feb					8.4%	10.8%	14.0%		18.3%		17.3%
Garbatulla	Long rains	May			4.2%	8.7%							
Isiolo/Central	Dry season	Jan								19.7%		10.2%	
Isiolo/Central	Dry season	Feb					11.8%	14.3%	12.0%		13.9%		18.6%
Isiolo/Central	Long rains	May			11.2%								
Merti	Dry season	Jan								14.2%		14.7%	
Merti	Dry season	Feb					13.2%	15.6%	12.7%		13.3%		21.5%
Merti	Long rains	May			17.2%	10.7%							

Overall trend analysis among the sub counties shows that the highest GAM rates between 2010 and 2020 were observed in Garbatulla in 2017. This was followed by a general reduction in acute malnutrition in all the three sub counties in 2018 and 2019 and a sharp rise into emergency levels in 2020 which had the greatest burden in Merti followed by Isiolo central and lastly Garbatulla (Figure 3).

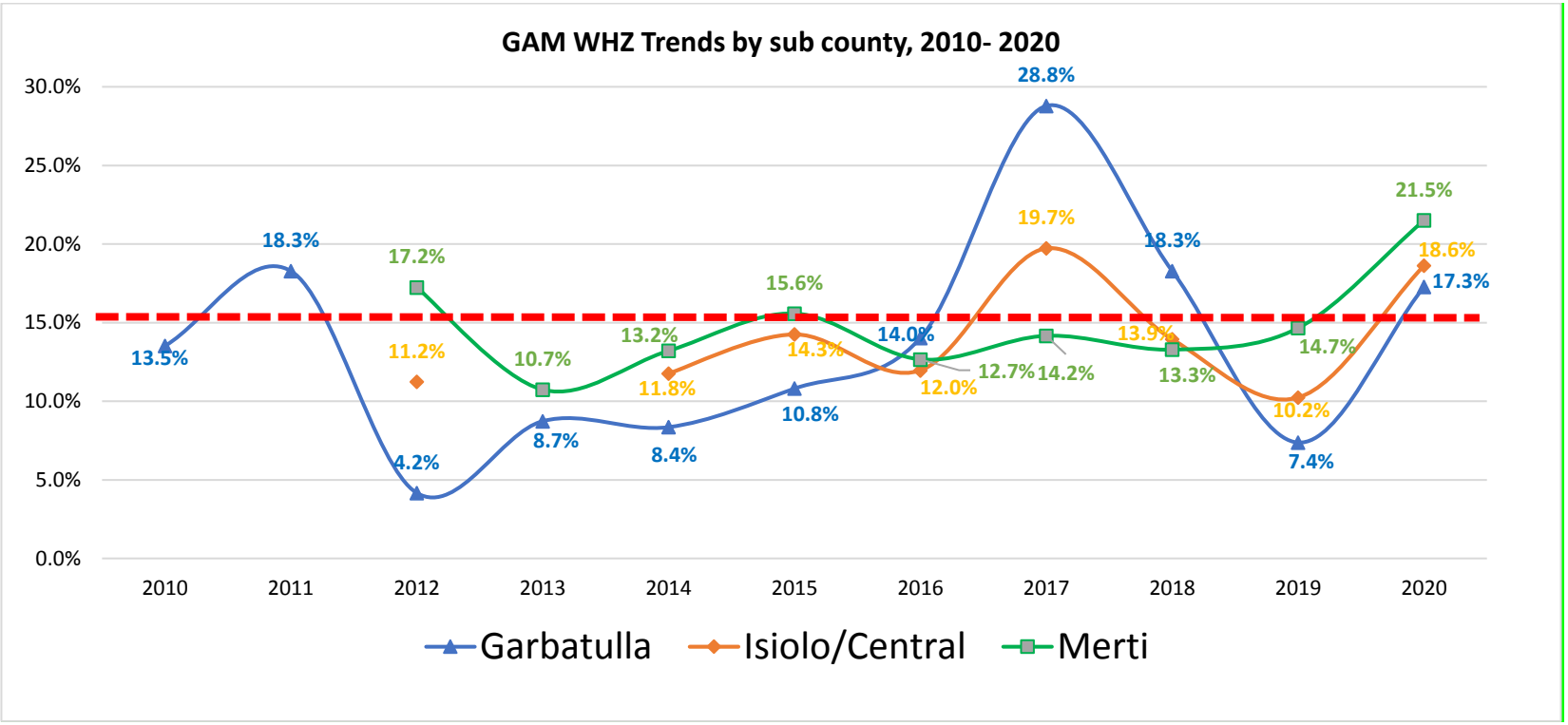

Figure 3: GAM trends of acute malnutrition by subcounty in Isiolo County from 2010 -2020

4.3 Malnutrition hotspots by wards per subcounty

Data was granulated to ward level for hotspots analysis within the sub counties. These findings should be interpreted with caution since the sample sizes were not adequate for statistical viability. The values should therefore be interpreted as indicative of vulnerability to acute malnutrition at ward level.

4.3.1 Garbatulla subcounty ward

Garbatulla is composed of three wards: *Garbatulla, Kinna* and *Sericho*. Of the three wards, Garbatulla and *Sericho* wards experienced higher vulnerability to acute malnutrition compared to Kinna. The two wards recorded five years with GAM levels ≥15% as indicated in Table 6. Garbatulla ward showed the highest vulnerability with three years of critical phases of acute malnutrition in the years 2010 (15.2%), 2011 (17.4%), 2018 (24.1%) and 18.5% in 2020. Furthermore, the year 2017, acute malnutrition in Garbatulla was classified as extremely critical phase having a GAM rate of 37.0%. Additionally, serious phases of GAM (10-14.9%) were observed in 2013, 2014 and 2016 in Garbatulla.

Sericho ward was second in vulnerability experiencing critical phases of acute malnutrition in the years 2010 (15.0%), 2011(23.1%), 2016 (17.6%), and 2020 (20.5%) and one year of extremely critical phase in 2017 (33.3%). Kinna ward recorded the lowest vulnerability with one critical phase in 2017 (16.1%) and five serious phases (GAM 10-14.9%) in the years 2010, 2011, 2018, 2019 and 2020 (Table 6).

Table 6: GAM WHZ and IPC acute malnutrition by wards in Garbatulla Subcounty

				GAM WHZ across the years										
Subcounty	**WARD**	**Month**	**Season**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Garbatulla	**Garbatulla**	Jan	Dry season								37.0%		1.5%	
	Garbatulla	Feb	Dry season					14.6%	8.0%	14.6%		24.1%		18.5%
	Garbatulla	May	Long rains			0.0%	10.5%							
	Garbatulla	Sep	Dry and cool season	15.2%	17.4%									
	Kinna	Jan	Dry season								16.1%		14.0%	
	Kinna	Feb	Dry season					4.2%	10.1%	9.8%		12.5%		12.8%
	Kinna	May	Long rains				6.9%							
	Kinna	Sep	Dry and cool season	10.4%	14.3%									
	Sericho	Jan	Dry season								33.3%		6.7%	
	Sericho	Feb	Dry season						14.3%	17.6%				20.5%
	Sericho	May	Long rains			8.3%	8.8%							
	Sericho	Sep	Dry and cool season	15.0%	23.1%									
	Sericho	Feb	Dry season					6.3%						

Overall trend analysis shows a rise in acute malnutrition recorded in all the wards in 2011 followed by a decrease in 2012 and then gradual increase that remained below 15% GAM levels in 2013 and 2016 except for Sericho ward that recorded GAM of 17.6% in 2016. A sharp and highest rise in acute malnutrition was observed in all the three wards in 2017 followed by reduction in GAM to less than 15% by 2019. However, a sharp increase in GAM above 15% was observed in 2020 in Garbatulla and Sericho wards but was lower in Kinna at 12.8% (Figure 4.3). Data was however not available for Kinna ward for the year 2012.

Overall, 2017 and 2020 were the most vulnerable years to malnutrition (Figure 4).

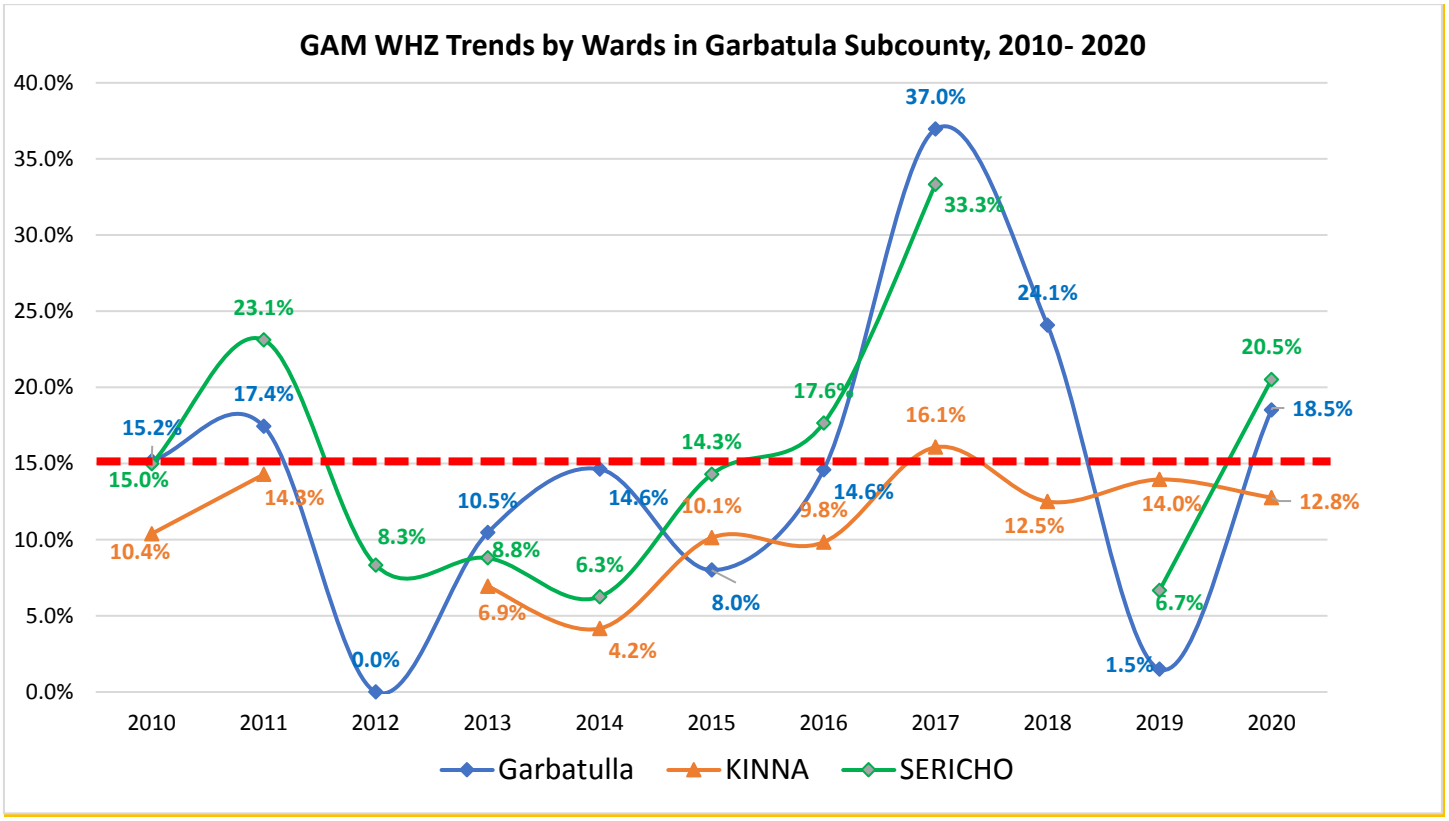

Figure 4: GAM WHZ trends by wards in Garbatulla subcounty, 2010-2020

4.3.2 Isiolo Central subcounty wards

Isiolo Central subcounty is composed of five wards: *Burat, Ngaremara, Oldonyiro, Wabera* and *Bulla Pesa*. Out of the five wards, *Oldonyiro* is the most vulnerable with seven years of critical or extremely critical phases of acute malnutrition. This was in the years 2012 (17.0%), 2013 (18.2%), 2015 (20.8%), 2016 (19.0%), 2017 (22.0%), 2019 (15.1%) and 2020 (21.1%). The second most vulnerable ward is *Ngaremara* that indicated six years of GAM ≥15% in the years 2014 (16.1%), 2015(18.9%), 2016(17.4%), 2017(23.3%), 2018 (22.2%) and 2020(28.1%). The third most vulnerable ward is *Burat* and *Wabera* that each recorded two critical phase classification years from 2012 to year to 2020 (Table 7).

Table 7: GAM WHZ and IPC acute malnutrition by wards in Isiolo Central Subcounty, 2012-2020

GAM WHZ	WARD	Month	Season	2012	2014	2015	2016	2017	2018	2019	2020
Isiolo/Central	Burat	Jan	Dry season					26.7%		9.1%	
	Burat	Feb	Dry season		13.8%	11.9%	7.4%		9.6%		18.4%
	Burat	May	Long rains	8.5%							
	Ngaremara	Jan	Dry season					23.3%		10.0%	
	Ngaremara	Feb	Dry season		16.1%	18.9%	17.4%		22.2%		28.1%
	Ngaremara	May	Long rains	8.7%							
	Oldonyiro	Jan	Dry season					22.0%		15.1%	
	Oldonyiro	Feb	Dry season		18.2%	20.8%	19.0%		12.5%		21.1%
	Oldonyiro	May	Long rains	17.0%							
	Wabera	Jan	Dry season					17.1%		5.1%	
	Wabera	Feb	Dry season		3.9%	4.7%	4.5%		9.2%		16.9%
	Wabera	May	Long rains	13.8%							
	Bulla Pesa	Jan	Dry season					9.4%		11.9%	
	Bulla Pesa	Feb	Dry season		6.8%	14.9%	11.5%		16.1%		8.6%
	Bulla Pesa	May	Long rains	8.1%							

Trend analysis shows that acute malnutrition increased from 2013 to 2017 particularly in *Oldonyiro* and *Ngaremara* wards, which peaked in 2017 and 2020 respectively. Most of the wards showed a decrease in acute malnutrition in 2018 and 2019 followed by a sharp increase above 15% GAM in 2020 except for Bulla Pesa and Wabera that registered GAM rates ≤10% most of the years (Figure 5).

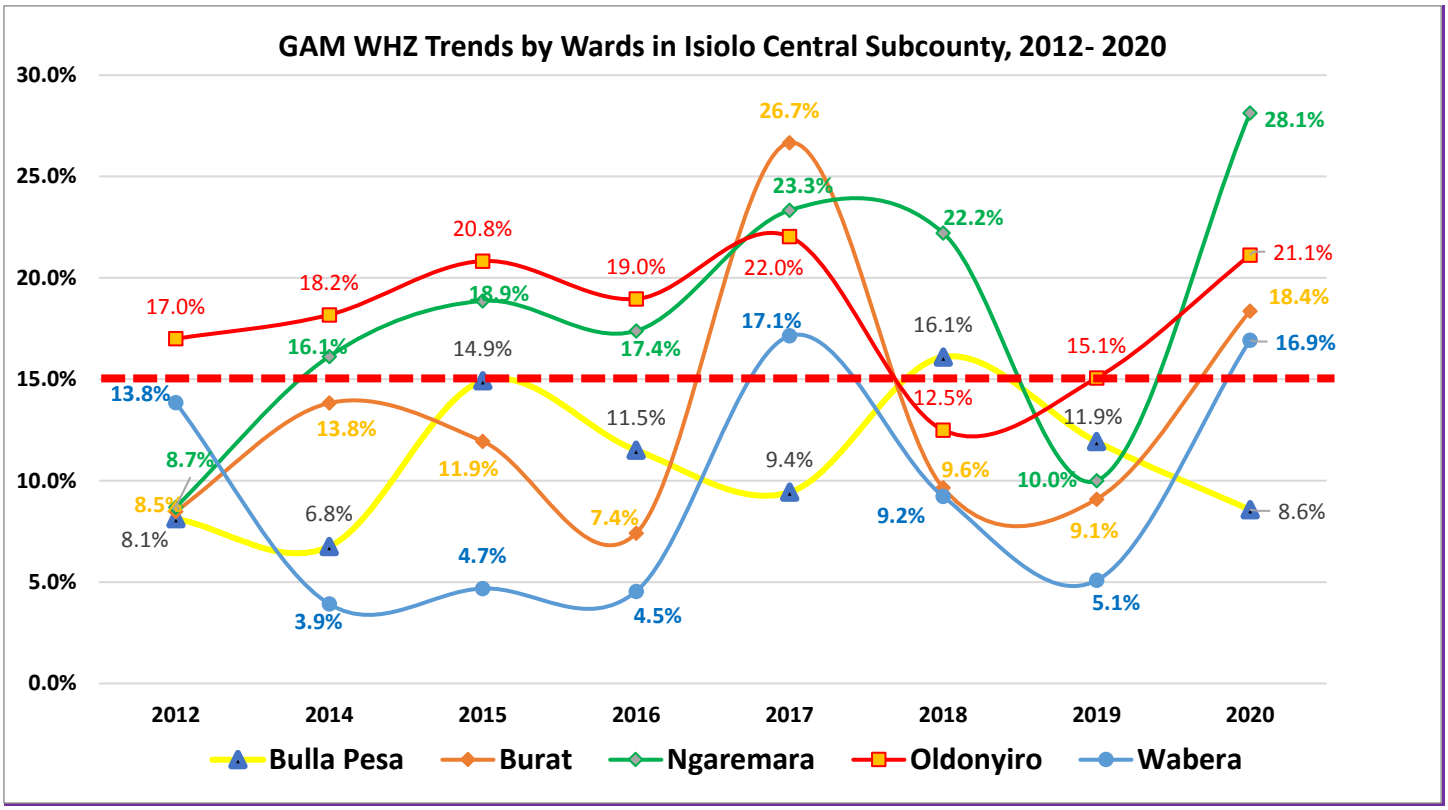

Figure 5: GAM WHZ Trends by wards in Isiolo Central Subcounty, 2012 to 2020

4.3.3 Merti Subcounty wards

Merti is composed of two wards: Charri and Cherab. Charri demonstrated higher vulnerability with four years of critical and extremely critical phases of acute malnutrition in the years 2012 (22.9%), 2018 (15.6%), 2019 (26.1%) and 2020 (27.3%). In contrast, Cherab showed three alternate emergency years in 2015 (16.5%), 2017 (21.9%) and 2020 (15.7%) shown in Table 8.

Table 8: GAM WHZ and IPC acute malnutrition by wards in Merti Subcounty, 2012 to 2020

				GAM WHZ								
Subcounty	**WARD**	**Month**	**Season**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Merti	**Charri**	Jan	Dry season						6.5%		26.1%	
	Charri	Feb	Dry season				14.7%	12.8%		15.6%		27.3%
	Charri	May	Long rains	22.9%	12.9%							
	Cherab	Jan	Dry season						21.9%		3.2%	
	Cherab	Feb	Dry season			13.2%	16.5%	12.5%		10.9%		15.7%
	Cherab	May	Long rains	11.6%	8.6%							

A trend analysis of the GAM rates over the ten years in Cherab remained less than 15% from 2013 to 2016 but with a sharp rise to 21.9% in 2017 followed by a decrease through 2018 and 2019 and a sharp increase in 2020. Chari on the other hand indicated an opposite trend to that of Cherab recording a decrease in the rate of acute malnutrition from 2012 with the lowest peak in 2017 followed by a sharp continuous rise between 2018 to 2020 with the highest GAM rate (27.3%) in 2020 (Figure 6). Data was not available for Chari in 2014.

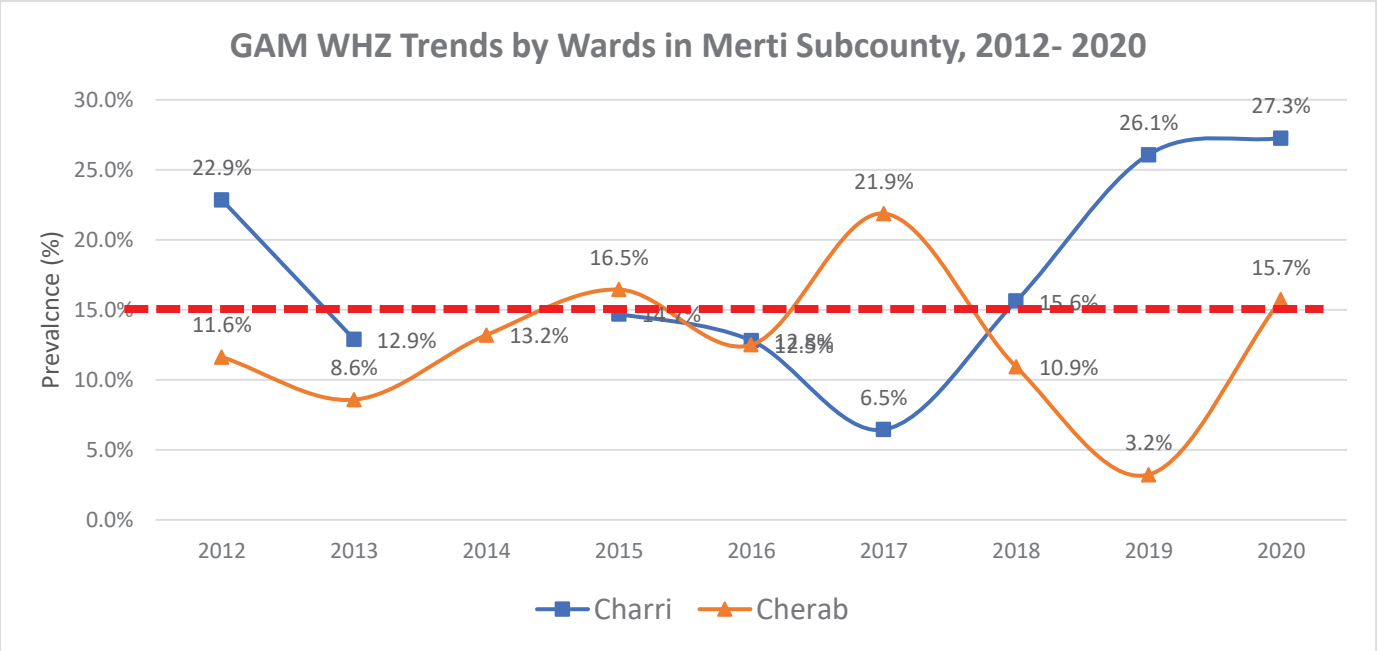

Figure 6: GAM WHZ Trends by wards in Merti Subcounty, 2012-2020

4.4 Acute Malnutrition (WHZ) By Seasonality Based on Smart Data

There are four seasons in a year in Isiolo County: dry season (January to March), long rains (April to June), dry and cool (July to September) and short rains (October to December). The SMART surveys were conducted mostly once a year and mainly during the dry season, January to March. The rationale for conducting the surveys during this season is that since Isiolo relies majorly on the short rains seasons as a buffer between the two dry seasons, should the short rains fail, then there is high likelihood of increased food insecurity and therefore heightened levels of acute malnutrition during the dry season. The SMART surveys are therefore conducted during the dry season for monitoring acute malnutrition and likely drivers in Isiolo County. The SMART data is therefore not very appropriate in showing seasonality trends of acute malnutrition; this was a limitation in the analysis and therefore should be interpreted with caution.

4.4.1 Acute malnutrition by seasonality in Isiolo County

Two SMART surveys were conducted during the long rains season in 2012 and 2013 and a similar number during the dry and cool season in 2010 and 2011. The majority of the surveys (six) were conducted during the dry seasons. The overall observation is that the GAM rates tended to be higher during the dry seasons (Figure 7) an indication that the children were more vulnerable during this season compared to the long rains and dry and cool seasons. The findings should be interpreted with caution since no data was collected during the dry and cool season and also the number of surveys differed by season, with the dry season having more surveys than the other two seasons.

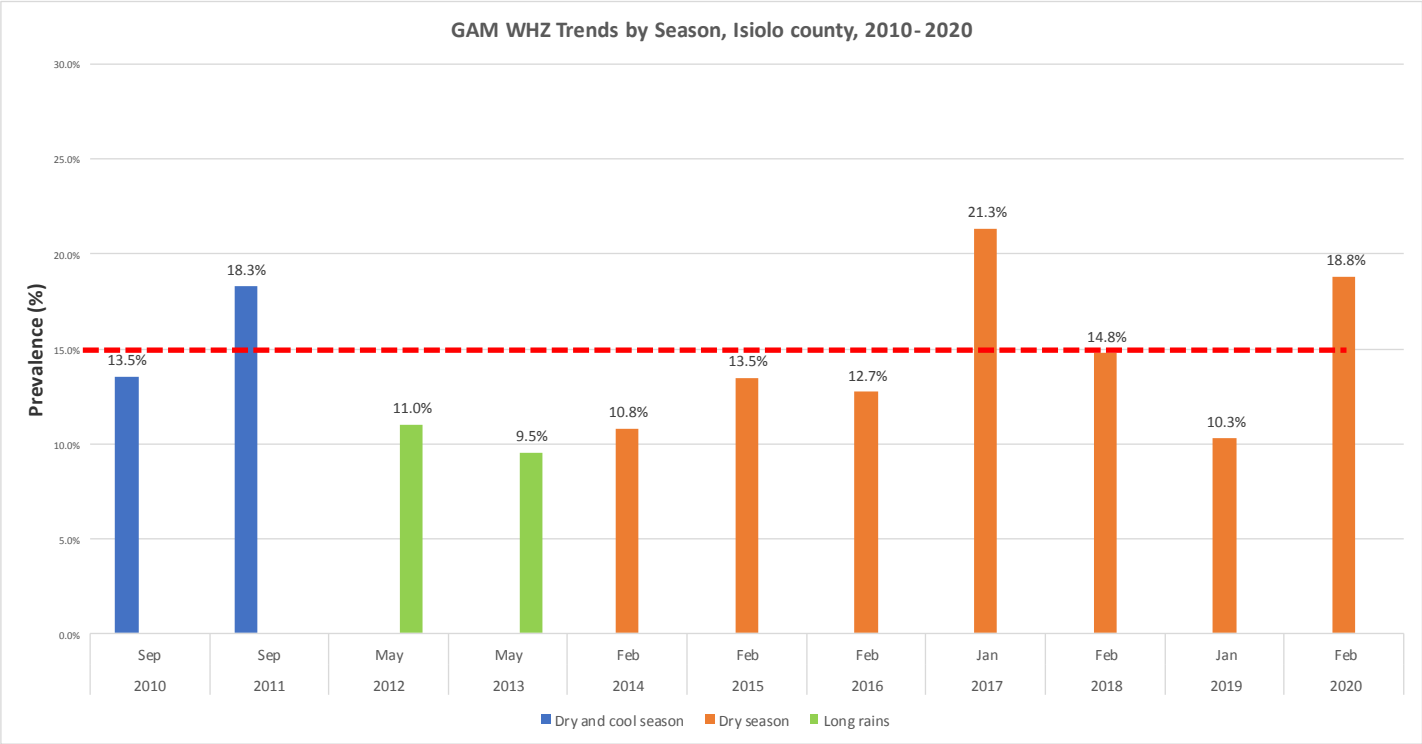

Figure 7: GAM WHZ trends by season in Isiolo County

4.4.2 Acute malnutrition by seasonality in Isiolo Subcounties

At the subcounty level, the majority of the surveys were conducted during the dry season with seven surveys of such surveys conducted in each of the subcounties *Garbatulla, Isiolo Central* and *Merti.* Four surveys were conducted during the long rains: two in Garbatulla and a similar number in *Merti,* and only one in Isiolo Central. During the dry and cool season surveys were conducted only in Garbatulla; and these were two in number. The overall trend analysis shows that malnutrition rates were highest during the dry season in all the subcounties (Figure 8) implying that overall, dry seasons confer the highest risk of vulnerability to acute malnutrition in children.

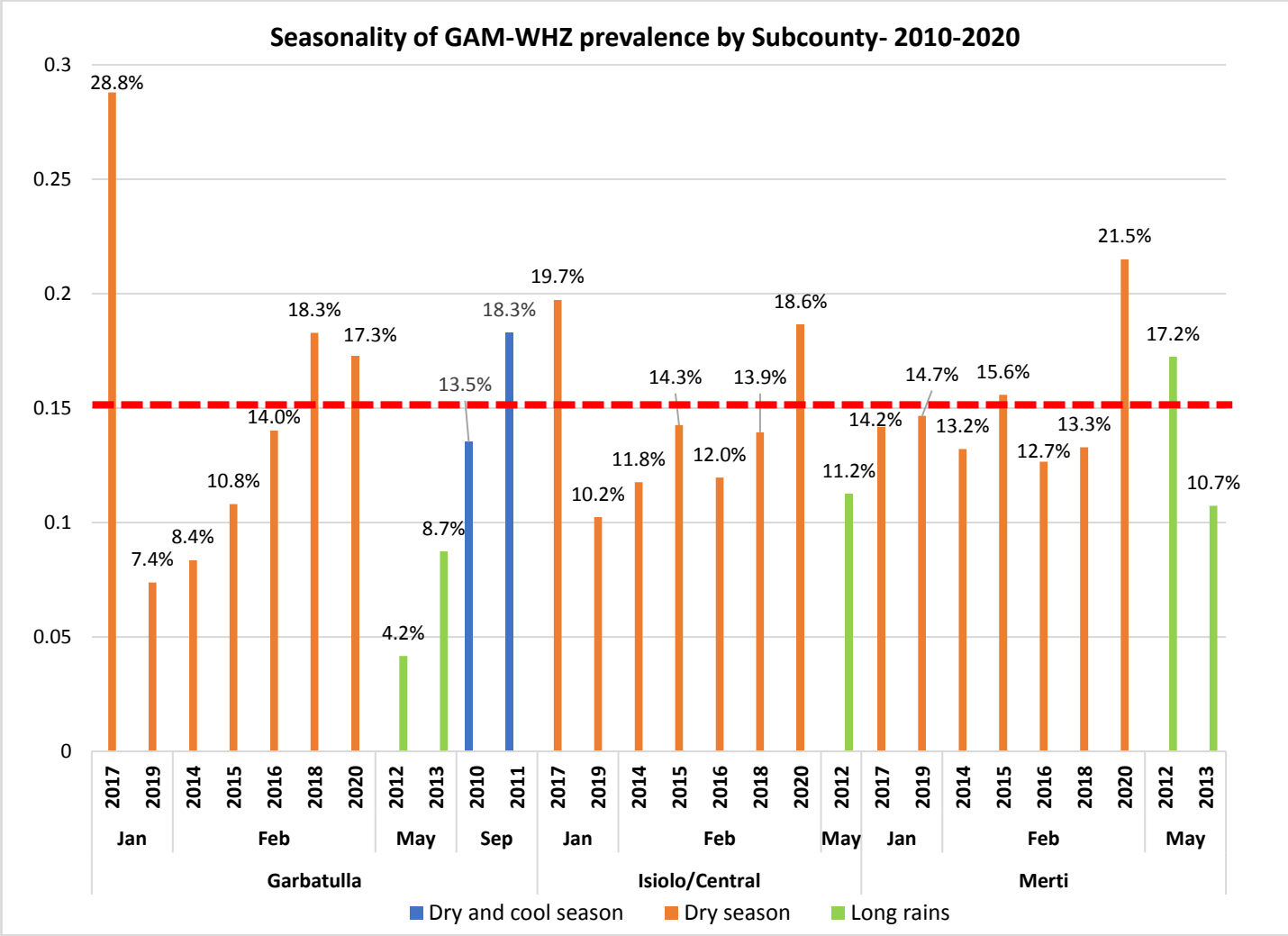

Figure 8: GAM WHZ by seasonality by subcounty

4.4.3 Acute malnutrition by seasonality at ward level

The evolution or trend analysis of acute malnutrition is reported by wards in each of the subcounties.

4.4.3.1 Isiolo Central subcounty wards

Similar trends in acute malnutrition by seasonality observed at county and subcounty levels were also observed at ward level with highest GAM rates experienced during the dry season. Most of the surveys over the ten-year period were conducted during the dry seasons except for 2012 when surveys were conducted during the long rains in all the wards. As a whole, the GAM rates tended to be high (≥15%) during the dry seasons compared to the long rains season an indication that during the dry season the children are particularly vulnerable to acute malnutrition (Figure 9).

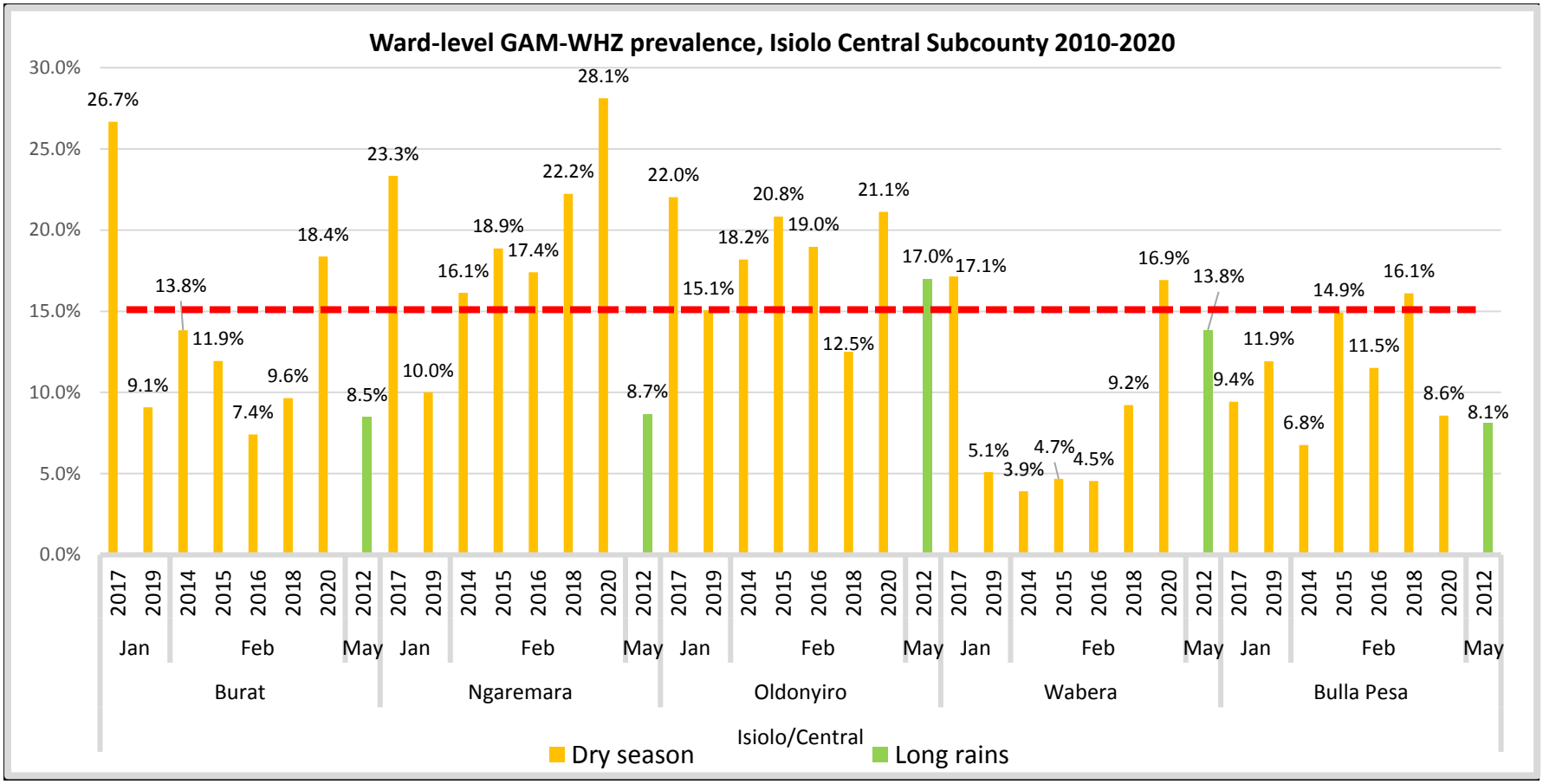

Figure 9: GAM WHZ by seasonality by wards in Isiolo Central Subcounty

4.4.3.2 Garbatulla subcounty wards

In Garbatulla subcounty, GAM rates (WHZ) ≥15% was mostly observed during the dry seasons. It was only in 2011 in Garbatulla and Sericho wards that GAM rates ≥15% were observed during the cool dry season (Figure 10). These findings confirm further the vulnerability to malnutrition during the dry season.

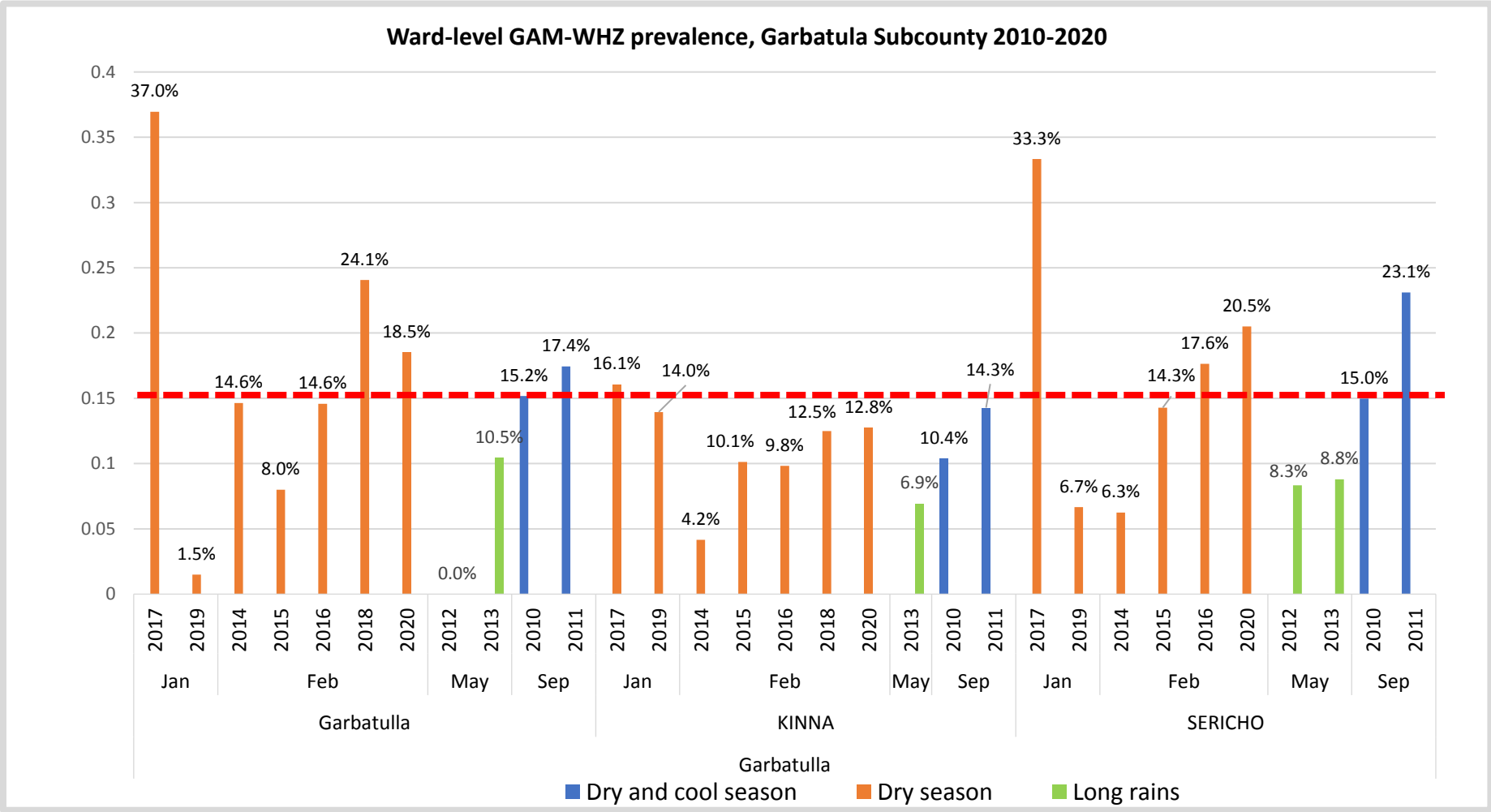

Figure 10: GAM WHZ by seasonality by wards in Garbatulla Subcounty

4.4.3.3 Merti Subcounty wards

Again, the findings show higher vulnerability to malnutrition during the dry season over the period 2010 to 2020 compared to the long rains season. Nonetheless, it should be noted that no data was collected during the other two seasons (dry and cool and short rains) between the years2010 and 2020.

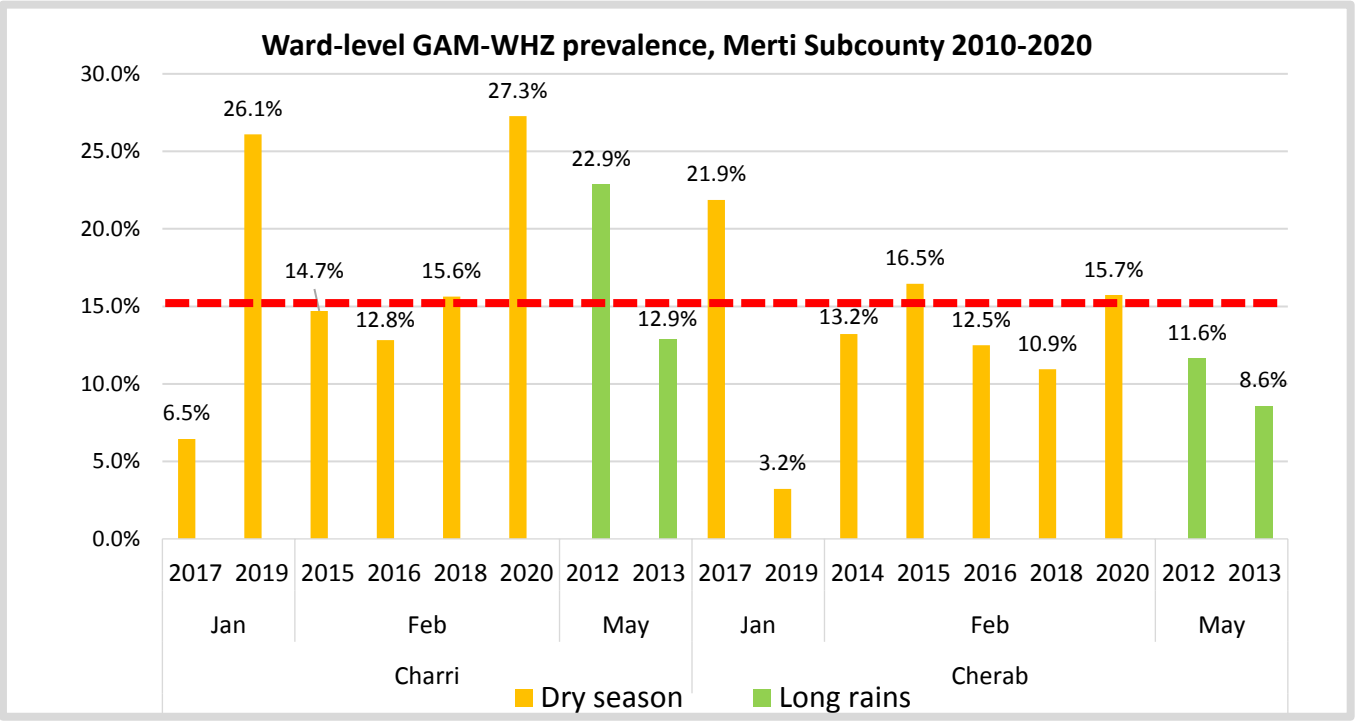

Figure 11: GAM WHZ by seasonality by wards in Merti Subcounty

Overall, Garbatulla is the most vulnerable subcounty to malnutrition and is a malnutrition hotspot in Isiolo County. At the ward level, *Garbatulla* and *Sericho* in Garbatulla subcounty are the most vulnerable to malnutrition or hotspots. In Merti subcounty, Chari is the malnutrition hotspots. It is interesting to note that despite Isiolo central not identified as a malnutrition hotspot, at the ward level *Ngaremara* and *Oldonyiro* were identified as hotspots with most persistent GAM ≥15% in most of the years (Figure 12).

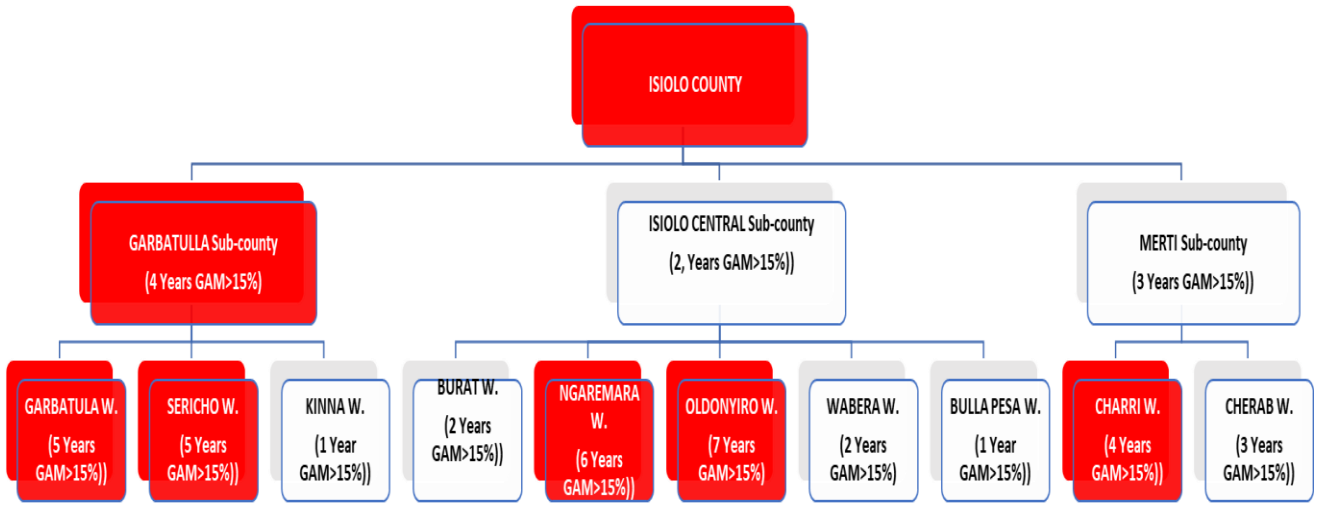

Figure 12: Flow chart showing vulnerability at subcounty and ward levels

4.5 Seasonal trend analysis of acute malnutrition based on MUAC data from 2010 to 2020

Monthly MUAC data from NDMA has been analyzed and presented to show evolution of acute malnutrition across the annual seasons from 2010 to 2019.

4.5.1 Seasonal trends analysis of GAM by MUAC in Isiolo County

Trend analysis was conducted based on GAM rates from MUAC data collected monthly from the NDMA sentinel sites. This data is more comprehensive and appropriate for seasonal trend analysis because the data covers all the months and therefore seasons of the year.

Stacked area chart has been used to display the trends of malnutrition across the seasons per year and over the ten-year period. During most of the years the highest acute malnutrition rates were experienced during the dry season (January to March). The GAM rates decreased in magnitude during the long rains season (April to June) and continued decreasing through the dry and cool season and were lowest during the short rains (Figure 13). However, in 2016, 2017 and 2019, acute malnutrition was lowest in the dry season and progressively increased during the long rains, dry and cool, and short rains seasons, contrary to what was experienced in the other years.

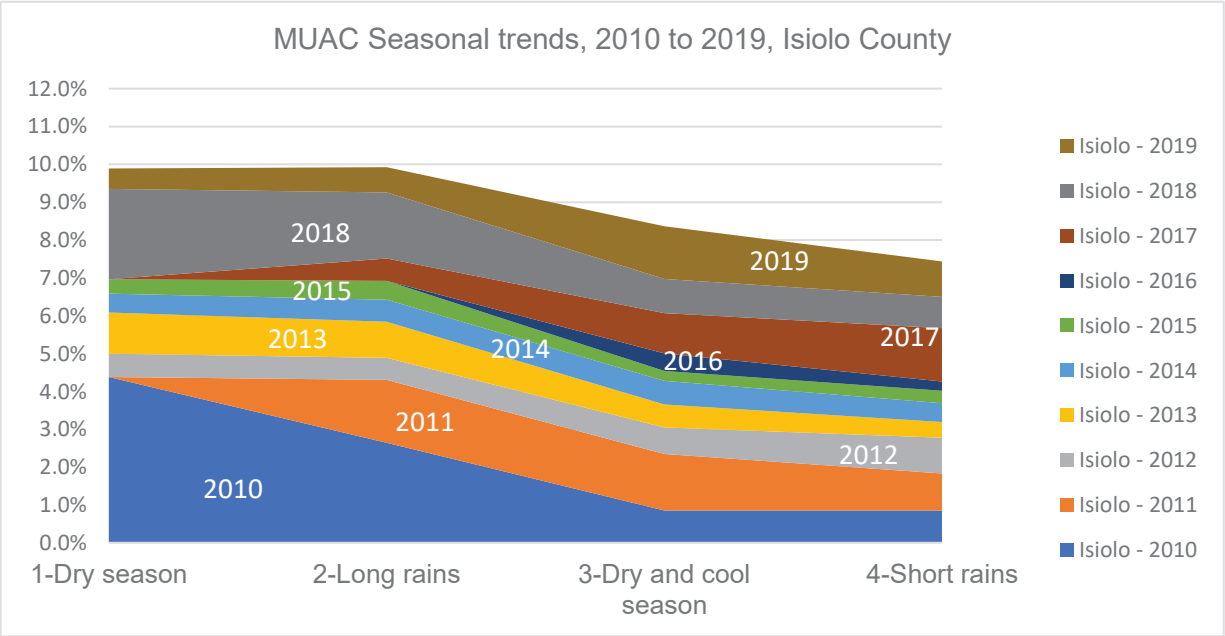

Figure 13: Trend analysis of acute malnutrition by seasonality in Isiolo County

To illustrate the seasonality trends further, the average GAM rate was computed and displayed using the area chart. The analysis showed the highest level of malnutrition at the beginning of the dry season and decreased over the other seasons being lowest during the short rains season at the end of the year (Figure 14). Again, this data shows that the dry season presents the highest risk for acute malnutrition in Isiolo County.

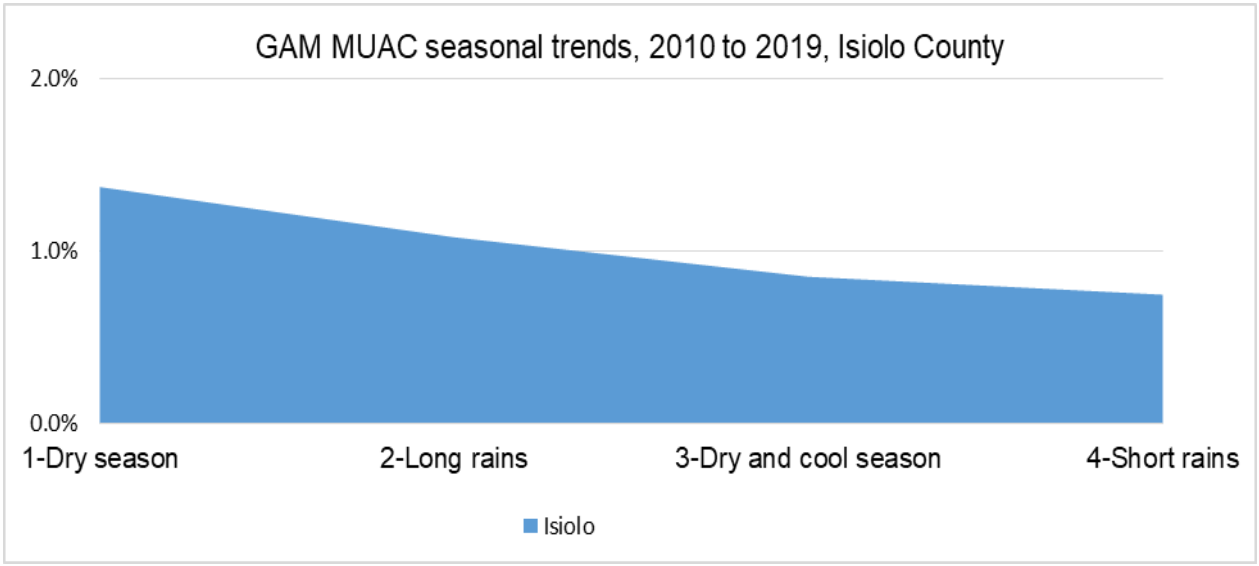

Figure 14: Trends of acute malnutrition in Isiolo County

4.5.2 Seasonal trend analysis of GAM by MUAC in Garbatulla Subcounty

Considering the area under the curve, in six out of ten years (2010, 2012, 2013, 2014, 2015 and 2018), acute malnutrition was highest during the dry season (January to March) and then decreased into the other season progressively to the dry and cool season followed by a slight increase in the short rains season. The other four years (2011, 2016, 2017 and 2019) exhibited low acute malnutrition levels during the dry season but was highest during the long rains and dry and cool seasons of the year (April to September) with a decrease in the short rains season (Figure 15). These findings imply that seasonality does not impact on nutritional status of the children in a similar manner from one year to another and therefore there are other factors that come into play to influence nutritional status of children.

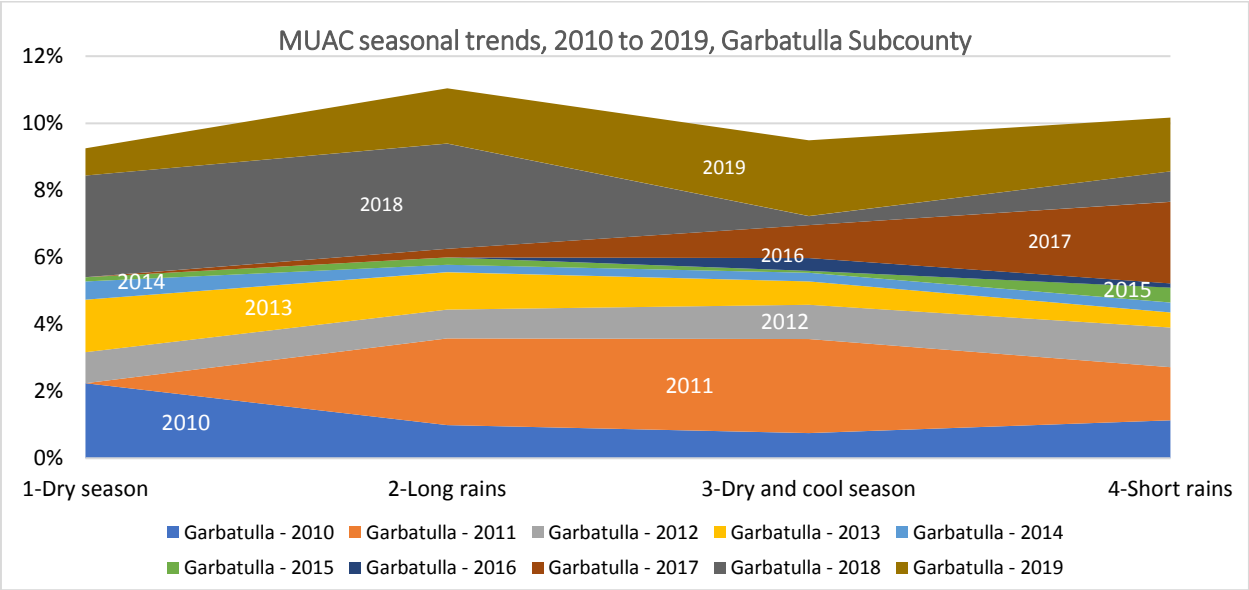

Figure 15: Evolution of acute malnutrition by seasonality in Garbatulla subcounty

Based on average GAM the dry season (January to April) recorded the highest level of GAM that remained fairly high during the long rainy season before a decrease in the dry and cool season. The lowest rate of malnutrition was recorded during the rainy season that registered the lowest rates (Figure 16). Again, this is an indication that the dry season poses the greatest risk to malnutrition.

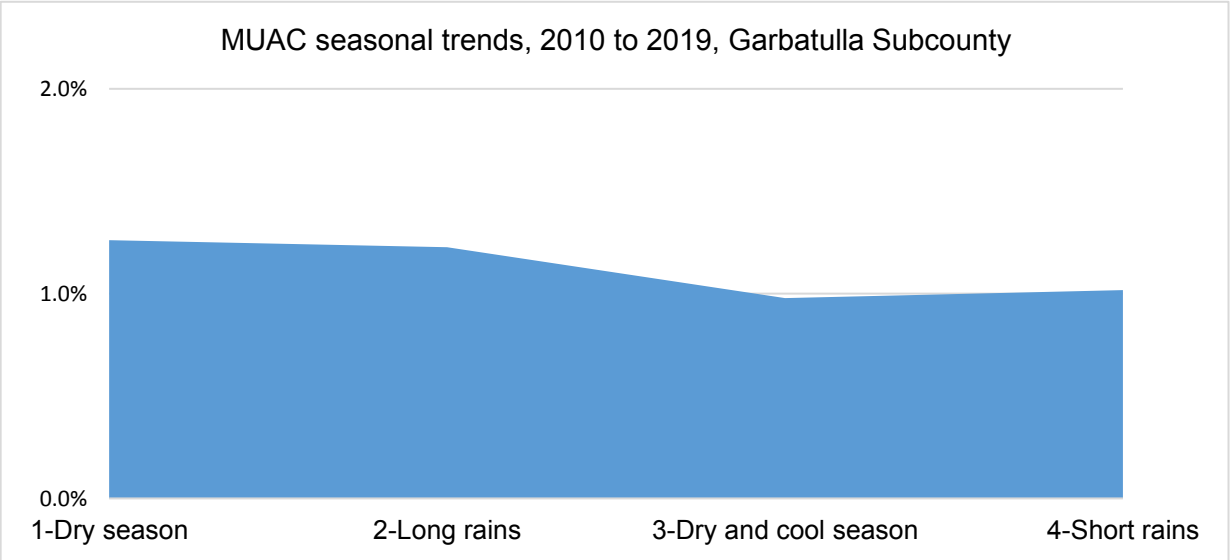

Figure 16: Trends of acute malnutrition in Garbatulla Subcounty

4.5.3 Seasonal trend analysis of GAM by MUAC in Isiolo Central subcounty

Trend analysis demonstrates that the highest GAM rates were observed during the long rains and the lowest rates during the short rains. The long rains and dry and cool seasons (May to September) are the most vulnerable seasons for acute malnutrition in a majority of the years (Figure 17).

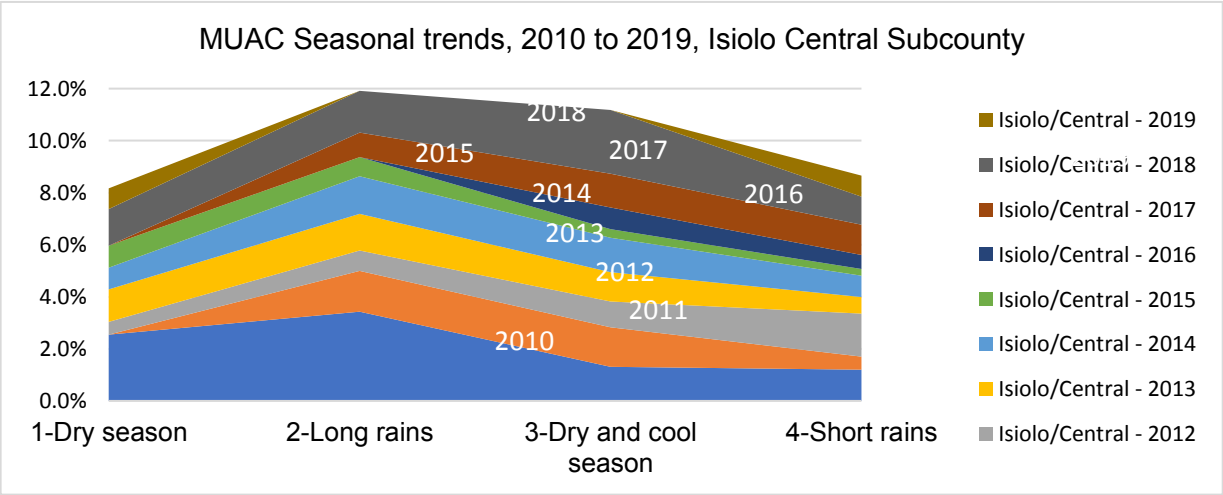

Figure 17: Evolution of acute malnutrition by seasonality in Isiolo Central Subcounty

Based on MUAC average, acute malnutrition rates are highest during the dry and long rains seasons decreasing during the dry and cool seasons and lowest during the short rains. The dry and long rains seasons are the most vulnerable for acute malnutrition in Isiolo Central during the ten-year period (Figure 18).

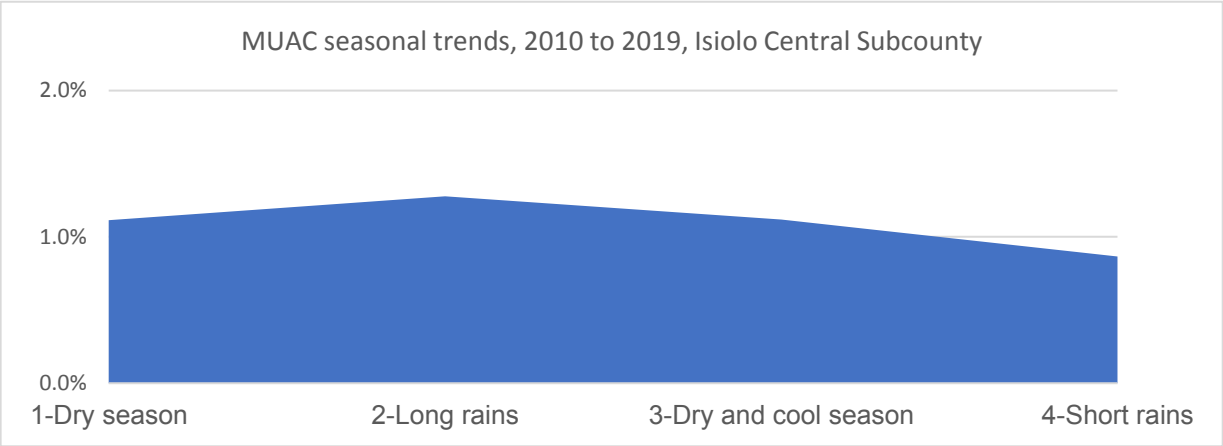

Figure 18: Trends of acute malnutrition in Isiolo central Subcounty

4.5.4 Seasonality trend analysis of GAM rates by MUAC in Merti Subcounty.

In most of the years, acute malnutrition was high in the dry season particularly in the years 2010, 2012 and 2018. The GAM rates were lowest during the long rains season for a majority of the years (Figure 19).

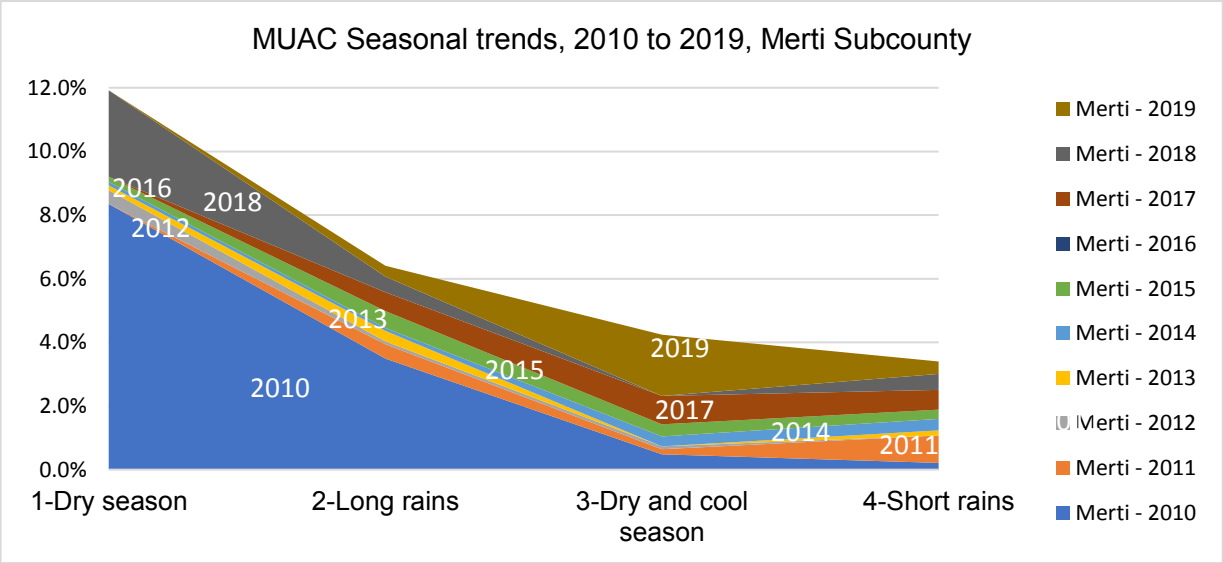

Figure 19: Evolution of acute malnutrition by seasonality in Merti Subcounty

Computed GAM averages over the ten years showed that, the dry season is the most vulnerable for acute malnutrition and the short rains season had the lowest GAM rates (Figure 20).

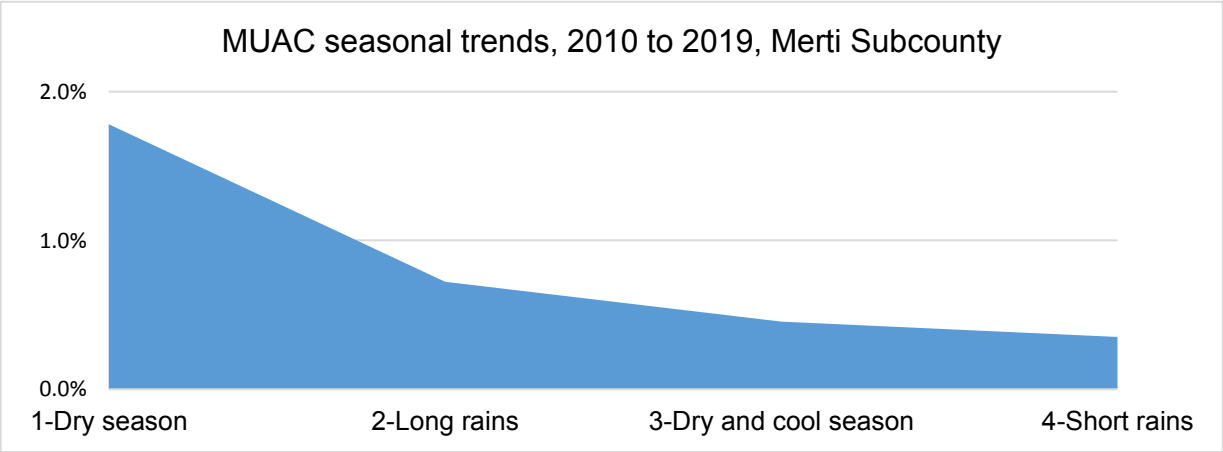

Figure 20: Seasonality trends of acute malnutrition in Merti subcounty

4.5.5 Comparison of vulnerability to acute malnutrition by seasonality by GAM (MUAC) and GAM (WHZ)

The risk of seasonality was compared between GAM by MUAC and GAM by WHZ to determine the seasons with most vulnerability to acute malnutrition. The dry season (January to March) presented a common major risk for acute malnutrition in Isiolo County and Isiolo Central, Garbatulla and Merti Subcounties. Isiolo Central presented the long rains season as the major risk season by MUAC verses dry season by WHZ (Table 219).

Indicator	Seasons	Isiolo County	Garbatulla sub-county	Isiolo central sub-county	Merti sub-county
GAM (WHZ)	Dry				
	Long rains				
	Dry and cool				
	Short rains				
GAM (MUAC)	Dry				
	Long rains				
	Dry and cool				
	Short rains				
Risk	**Color codes**				
Major risk					
Minor risk					
Not a risk					
No data					

Table 9: Comparison of vulnerability to acute malnutrition by seasonality between MUAC and WHZ indicators

4.6 Summary of Findings and Conclusions

4.6.1 Identification of malnutrition hotspots in Isiolo County disaggregated by subcounty and wards

Over the last ten years (2010 to 2020), Isiolo County has experienced persistent acute malnutrition (WHZ) among children under five years of age. The county showed either critical (15-29.9% GAM) or serious (10-14.9% GAM) phases of acute malnutrition as per of acute malnutrition version 3.0.[12]

There was variation in the GAM rates from one year to another with the most critical years being 2011, 2017 and 2020. The rest of the years remained above acceptable levels tending to critical phase classification. At the subcounty level, Garbatulla had the highest number of months per year with GAM ≥15 occurring mostly between 2017 and 2020 making it the most vulnerable to malnutrition. Isiolo central subcounty had the least number of years with GAM rates over ≥15.

At the ward level, Ngaremara and Oldonyiro wards in Isiolo Central subcounty showed the highest vulnerability to acute malnutrition (GAM ≥15%) in majority of the years (≥6 years) from 2012 to 2020. Second in vulnerability were Garbatulla and Sericho wards in Garbatulla subcounty with five years each with GAM ≥15%. Third in vulnerability at ward level was Charri in Merti subcounty with four years of GAM ≥15% and the least vulnerable was Cherab with three years of GAM ≥15%. Despite Isiolo central subcounty showing lower levels of acute malnutrition, at the ward level, Ngaremara and Oldonyiro were the most vulnerable wards in the county. This indicates that granularity of data to wards is worthwhile to demonstrate where exactly the hotspotss are situated. Charri and Cherab wards in Merti present a unique pattern in the distribution of acute malnutrition that is opposite of one another over the years – the years in which Cherab presents emergency levels of acute malnutrition, Charri presents acceptable or near acceptable GAM levels and vice versa. This may be an indication of the differences in the drivers of acute malnutrition in these wards despite sharing similar administration units.

It should be noted that the analysis and identification of the malnutrition hotspots is limited by the fact that ideally the findings of SMART surveys should not be disaggregated by subcounty or wards because of the cluster sampling methodology used in the selection of the target population. Nonetheless, the data has been used to provide an indication of the hotspots in Isiolo County.

4.6.2 Acute malnutrition by seasonality

There are four seasons in a year in Isiolo County: dry season (January to March), long rains (April to June), dry and cool (July to September) and the short rains (October to December). The seasonality trend analysis was worked out based on GAM from SMART and MUAC data. For a majority of the years, SMART surveys were conducted during the dry season and therefore there is no representation of all the seasons in the SMART data. The GAM trend seasonality analysis based on SMART data is therefore indicative and not conclusive. The MUAC data from NDMA has also been used to analyze the trends of acute malnutrition across the seasons over the years from 2010 to 2019. MUAC data was collected on a monthly basis and therefore represents all the seasons in the year. The year 2020 data was not included in the analysis

[12] Integrated Food Security Phase Classification (IPC), Technical Manual Version 3.0- Evidence and Standards for Better Food Security and Nutrition Decisions 2019.

because only some of the seasons were represented in the data set at the time of the data analysis and hence the year was not comparable to the other years.

Based on SMART data, Isiolo County experienced high acute malnutrition rates during the dry season (January to March) that continued to remain high but at a decreasing magnitude into the long rains season (April to June) with marked reduction to the dry and cool season and with the lowest malnutrition rates observed during the short rains season. The findings of seasonal trends from computed average GAM based on MUAC data were similar to those from the SMART data – showing that the dry season presents the highest vulnerability for malnutrition for Garbatulla and Merti Subcounties while the rainy season presents the highest vulnerability in Isiolo Central subcounty.

Overall, seasonality trend analyses at the subcounty level using GAM by MUAC showed that the rates were high mostly during the dry seasons. Malnutrition seems to start increasing during the short rains and continues and peaks in the dry season.

4.6.3 Conclusions

Isiolo County is a hotspot for acute malnutrition that manifests mostly in the dry season and reduces progressively to the long rains season and as the year advances. Garbatulla subcounty is the most vulnerable to acute malnutrition followed by Merti subcounty. Despite Isiolo Central subcounty being the least vulnerable, it has the most vulnerable wards, Oldonyiro and Ngaremara, that showed persistent high malnutrition rates in a majority of the years from 2010 to 2020. This indicates variability in the rate of malnutrition in the geographical administrative levels and units. This is an important finding in that some of these malnutrition hotspotss may be missed in the prioritization of interventions if findings are only presented at the higher administrative levels. Seasonality influences acute malnutrition with the highest GAM rates recorded during the dry season followed by the long rains season in some areas. Given the variability in vulnerability to acute malnutrition by seasonality particularly at the ward level, there is a likelihood of factors outside seasonality driving malnutrition levels. Furthermore, seasonality may influence the drivers of malnutrition differently in different geographical units.