SMART survey report in Maiwut County, Upper Nile State, South Sudan

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REACH Initiative with the support of Relief International

Donors:

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List of acronyms

AFI:	Acute Food Insecurity
AMN:	Acute Malnutrition
CDC:	Centers for Disease Control and Prevention
CDR:	Crude Death Rate
CFR:	Crude Fatality Rate
CHD:	County Health Department
CM:	Centimeters
CI:	Confidence interval
CMR:	Crude Mortality Rate

DEFF:	Design Effect
ENA:	Emergency Nutrition Assessments
EIBF:	Early Initiation of Breastfeeding
EBF:	Exclusive Breastfeeding
FCDO:	Foreign, Commonwealth and Development Office
FEWS NET:	Famine Early Warning Systems Network
FCS:	Food Consumption Score
FSL:	Food Security and Livelihoods
FSNMS:	Food Security and Nutrition Monitoring System
GAM:	Global Acute Malnutrition
GFD:	General Food Distribution
HFA:	Height for Age
HAZ:	Height for Age Z scores
HH:	Household
HHS:	Household Hunger Scale
IPC:	Integrated Phase Classification
IPC-AMN:	Integrated Phase Classification – Acute Malnutrition
RCSI:	Reduced Coping Strategy Index (rCSI)
RI:	Relief International
IRNA:	Inter-Agency Rapid Needs Assessment
IYCF:	Infant and Young Child Feeding
LCS:	Livelihood Coping Strategies
MAM:	Moderate Acute Malnutrition
MAD:	Minimum Acceptable Diet
MDD:	Minimum Dietary Diversity
MM:	Millimeter
MOH:	Ministry of Health
MUAC:	Mid Upper Arm Circumference
NIWG:	Nutrition Information Working Group
OTP:	Out-Patient Therapeutic Programme
PLW:	Pregnant and Lactating Women
PPS:	Probability Proportional to Size
RC:	Reserve Cluster
RRC:	Relief and Rehabilitation Commission
SAM:	Severe Acute Malnutrition
SD:	Standard Deviation (measure of spread around the mean)
SMART:	Standardized Monitoring and Assessment of Relief and Transitions

SMOH:	State Ministry of Health, Maiwut County
TEM:	Technical Error of Measurement
TSFP:	Targeted Supplementary Feeding Programme
U5MR:	Under Five Mortality Rate
UNHCR:	United Nations High Commissioner for Refugees
UNICEF:	United Nations International Children's Emergency Fund
UNS:	Upper Nile State
Vit A:	Vitamin A
VASD:	Vitamin A Supplementation and Deworming
WASH:	Water, Sanitation, and Hygiene
WFH:	Weight for Height
WHO:	World Health Organization
WHZ:	Weight for Height Z Scores

EXECUTIVE SUMMARY

Maiwut County is located in Upper Nile State along the eastern floodplain of the White Nile, and falls within the northeastern maize, cattle, and fishing livelihood zone, with a population of 147,823[1]. The area is characterized by grasslands, forests, and swampy terrain, with predominantly agro-pastoral livelihoods. While about 70% of households previously relied on farming, this has declined to around 65%, with consistently low cereal yields of approximately 0.5 metric tonnes per hectare. Key crops include maize, sorghum, cowpeas, pumpkins, and okra, alongside livestock such as cattle, goats, and poultry. The ethnic groups: Eastern Jikany Nuer (Gaat Jaak/Gajaak: Cie-Chaany, Cie-Wau, and Cie-Thieng) and Koma[2]. Classified in IPC AMN Phase 4 (Critical)[3], the county faces severe access constraints due to impassable roads, though the Jikou River remains an important transport route.

Survey objective

The overall objective of the survey was to estimate the prevalence of malnutrition among children aged 6-59 months, mortality rates among populations, and the potential factors contributing to malnutrition and mortality in Maiwut County.

[1] Conflict Sensitivity Resource Facility (CSRF) South Sudan, Maiwut County, Upper Nile State, April 2021 (last update 2025)
[2] Ibid
[3] Integrated Food Security Phase Classification (IPC), IPC Acute Food Insecurity and Malnutrition Analysis (September 2025 – July 2026), South Sudan, (November 2025)

Survey methodology

The survey was a cross-sectional study, and it employed a two-stage cluster sampling. Stage one was the selection of clusters based on Probability Proportional to Size (PPS), whereas stage two was the selection of households within the selected clusters using simple random sampling. Villages were considered as the smallest geographical units (clusters) and the sample sizes for anthropometry and mortality were calculated using ENA for SMART software (January 11th, 2020 version). The final number of clusters covered was 40 with 12 households assessed.

Summary of findings

Between March 16th and 24th, 2026, REACH and Relief International (RI) conducted a SMART survey in Maiwut County, and a total of 479 households and 507 children aged 6-59 months were assessed for malnutrition in 40 villages (clusters). A summary of findings in comparison to a previous similar survey is presented in the table below.

Table 1- Executive Summary Table

Category	Indicator	n	N	(%) (95% CI)
Wasting	Prevalence of global malnutrition by WHZ (<-2 z-score and/or oedema)	74	491	15.1 (11.2 - 20.0)
	Prevalence of severe malnutrition (<-3 z-score and/or oedema)	17	491	3.5 (2.0 - 6.0)
	Prevalence of global malnutrition by MUAC (< 125 mm and/or oedema)	33	507	6.5 (4.6 - 9.1)
	Prevalence of severe malnutrition (< 115 mm and/or oedema)	6	507	1.2 (0.6 - 2.5)
	Prevalence of combined GAM (WHZ <-2 and/or MUAC < 125 mm and/or oedema)	92	507	18.1 (14.3 - 22.7)
	Prevalence of combined SAM (WHZ < -3 and/or MUAC < 115 mm and/or oedema	27	507	5.3 (3.5 - 8.0)
Stunting	Prevalence of stunting (<-2 z-score)	80	473	16.9 (13.8 - 20.6)
	Prevalence of severe stunting (<-3 z-score)	3.4	473	3.4 (1.9 - 5.9)

Underweight	Prevalence of underweight (<-2 z-score)		97	495	19.6 (16.0 - 23.7)
	Prevalence of severe underweight (<-3 z-score)		29	495	5.9 (4.1 - 8.4
Mortality	Crude Death Rate (Deaths/10,000 people/day)		10	2958	0.38 (0.22-0.65)
	Under-5 Death Rate (Deaths/10,000 children U5/day)		2	561	0.40 (0.09-1.65)
Nutrition and Health Service Coverage	Measles card + mother confirmation (9-59 months)		128	510	26.7 (22.9-30.8)
	De-worming (children12-59 months)		393	510	92.5(89.6-94.6)
	Vitamin A Supplementation (6-59 months)		482	510	94.5(92.2-96.2)
Maternal Nutrition	Pregnant and Lactating Women (PLW) GAM		84		23.8(15.2-34.34)
IYCF Indicators					
Breastfeeding indicators	Ever breastfed (0-23 months)		166	166	92.2 (87.3-95.7)
	Early initiation of breastfeeding (0-23 months)	Immediately	83	166	50.0(42.2-57.9)
		First hour	57	166	34.3(27.2-42.1)
		First day	23	166	13.9 (9.0-20.1)
		After first day	2	166	1.2(0.2-4.3)
		Never	1	166	0.6 (0.0-3.3)
	Exclusive breastfeeding under 6 months (0-5 months)		93	166	56.0 (48.1-63.7)
	Continued breastfeeding (12-23 months)		43	115	37.4 (28.6-46.9)
Complementary feeding practices	Minimum dietary diversity 6–23 months		34	180	18.9(13.5-25.4)
	Minimum meal frequency 6–23 months		31	180	17.2(12.0-23.6)
	Minimum acceptable diet 6–23 months		13	180	7.2(3.9-12.0)
	Egg and/or flesh food consumption 6–23 months		118	180	10.0 (6.0-15.3)
	Sweet beverage consumption 6–23 months		53	180	29.4(22.9-36.7)

	Zero vegetable or fruit consumption 6–23 months	124	180	68.9(24.4-38.4)
Food Security and Livelihoods	**Food Consumption Score**			
	Acceptable	136	421	32.3 (28.0-36.9)
	Borderline	182	421	43.2 (38.6-48.0)
	Poor	103	421	24.5 (20.6-28.8)
	Household Hunger Scale			
	None	50	421	11.9 (9.1-15.3)
	Little	336	421	79.8 (75.7- 83.4)
	Moderate	31	421	7.4 (5.2-10.3)
	Severe	4	421	1.0 (0.4-2.4)
	Livelihood Coping Strategies			
	None	167	421	36.7 (35.1-44.4)
	Stress	195	421	46.3 (41.6-51.1)
	Crisis	8	421	1.9 (1.0-3.7)
	Emergency	51	421	12.1 (9.3-15.6)
WASH	**Water Sources (Improved and unimproved)**			
	Improved	154	479	32.2(28.1-36.5)
	Not Improved	325	479	67.9 (63.5 - 71.9)
	Time to collect water			
	Inside the compound	97	479	20.3 (16.9-24.1)
	Under 30 minutes	321	479	67.0 (62.7-71.1)
	30 minutes to 1 hour	58	479	12.1 (9.5-15.3)
	1 hour to half day	3	479	0.6 (0.2-1.8)
	Treatment method			
	boil	37	479	7.7 (5.7-10.5)
	Filter cloth	7	479	1.5 (0.7-3.0)
	none	434	479	90.6 (87.7-92.9)
	Don't Know	1	479	0.2 (0.0-1.2)
	Latrine usage			
	Pit latrine with slab	27	479	5.6 (3.9-8.1)

	Pit latrine without slab	5	479	1.0 (0.5-2.4)
	Shared latrine	5	479	1.0 (0.5 - 2.3)
	None / open defecation	441	479	92.1 (89.3-94.2)
	Don't Know	1	479	0.2 (0.0-1.2)
	Soap Access			
	Yes, confirmed	25	479	5.2 (3.6-7.6
	Yes, not confirmed	29	479	6.1(4.3-8.6
	None	395	479	82.5 (78.8-85.6
	Don't Know	30	479	6.3 (4.4-8.8)

CONTEXT & RATIONALE

Since its independence in 2011, the Republic of South Sudan has faced significant challenges, including outbreaks of civil war in 2013 and 2016, persistent subnational violence, and ongoing political contestation. These dynamics, compounded by weak public resource management, have constrained development and driven escalating humanitarian needs. The signing of the Revitalized Agreement on the Resolution of the Conflict in the Republic of South Sudan (R-ARCSS) in September 2018 and the formation of a Transitional Government of National Unity in February 2020 marked important steps toward stability. The transitional period has since been extended to February 2027, allowing additional time to implement the provisions of the peace agreement and prepare for national elections. Despite this progress, the peace process continues to face significant challenges, including the unification of armed forces and the drafting of a permanent constitution[4].

South Sudan remains in a severe humanitarian crisis driven by conflict and insecurity, high living costs, intercommunal violence, and widespread food insecurity. These factors have severely disrupted livelihoods and limited access to essential services. The ongoing influx of returnees and refugees from Sudan is further exacerbating the situation, causing widespread displacement, disruption of livelihoods, and chronically high levels of acute food insecurity and malnutrition. The Peace deal signed in September 2018 resulted in improved security and increased access to affected populations for humanitarian assistance, and an increase in refugees and Internally Displaced Persons (IDPs) returning to their communities[5]. However, as of July 2023, there remained an estimated 2.4 million refugees from South Sudan residing in neighboring countries (Uganda, Sudan, Ethiopia, Kenya, DRC)[6].

The latest IPC analysis for South Sudan (October 2025) revealed a continually severe health and nutrition situation in South Sudan. The analysis estimated 5.97 million people (42 percent of the total population analyzed) were experiencing high levels of acute food insecurity (IPC Phase 3 or above) between September

[4] Global Centre for the Responsibility to Protect, South Sudan – Populations at Risk (March 2026)
[5] World Bank, Overview: South Sudan
[6] UNHCR, South Sudan Refugee Crisis

and November 2025, with 1.3 million people facing IPC Phase 4 (Emergency)[7]. An estimated 28,000 people were classified in IPC Phase 5 (Catastrophe), including 17,000 people in Luakpiny/ Nasir (Upper Nile) and 11,000 people in Fangak (Jonglei). The most food insecure states with the highest number of people facing IPC Phase 3 or above (Crisis or worse) between December 2025 and March 2026 will include Upper Nile (57%) and Unity (56%). By June 2026, 2.11 million children in South Sudan are expected to suffer from acute malnutrition. Of those, 670,000 will likely face Severe Acute Malnutrition (SAM). The very high prevalence of acute malnutrition remains a public health concern.

Maiwut County is located in Upper Nile State, is one of 76 counties out of 80 to remain in critical (phase 4) in IPC AMN classification. Maiwut County borders Luakpiny/Nasir County to the west and Longochuk County to the north. It also shares a long eastern and southern border with Ethiopia. A primary road links Maiwut town southeast through Pagak to Gambella, Ethiopia, and northwest to Melut via Mathiang and Guel-Guk. During the 2024 rainy season and the 2025 dry season, this road was assessed as impassable, significantly constraining ground access. In addition, the Jikou/Jekow (Baro) River runs along Maiwut' s southern border at Turu and serves as a key route for riverine transport, ultimately flowing into the Sobat River. The UNHASS recognized heli-landing sites and airstrips is in Maiwut town and other landing sites are Jikou/Jekow (Pilual), Pagak, and Urieng. Maiwut County lies within the Northeastern maize, cattle, and fishing livelihood zone (FEWS NET, 2018) and extends along the eastern floodplain of the White Nile, characterized by grasslands, forests, and swampy areas. Livelihoods are predominantly agro-pastoral, with earlier assessments indicating that around 70% of households were engaged in farming (FAO/WFP, 2019); however, more recent FAO/WFP data show a decline to approximately 65% of households, alongside persistently low gross cereal yields of about 0.5 metric tonnes per hectare in both 2021 and 2022 (FAO/WFP, 2022; FAO/WFP, 2023). Key crops include maize, sorghum, cowpeas, pumpkins, and okra, while livestock production mainly involves cattle, goats, and poultry. Agricultural production is entirely rain-fed, with the main harvest occurring in March[8].

South Sudan acute malnutrition situation for first projection period (Oct 2025 - Mar 2026)

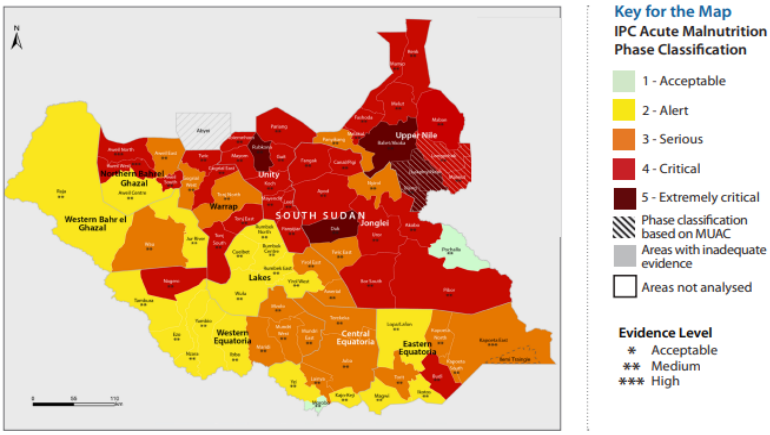
In the most recent IPC for Acute Malnutrition (IPC-AMN) report, published in November 2025[9], Maiwut County was classified as IPC AMN Phase 4 (Critical) in the most recent IPC-AMN analysis and was identified as one of the counties requiring updated representative data due to sustained critical levels and the absence of a recent SMART survey.", based on the data obtained from MUAC, for the analysis period (July-September 2025) as well as for the first (October 2025-March 2026) and second (April-June 2026) projections periods. The major drivers of acute malnutrition include high disease prevalence, poor sanitation, sub-optimal infant and young child feeding practices, and food insecurity.

[7] IPC, IPC Acute Food Insecurity and Malnutrition Analysis (September 2025 – July 2026), South Sudan, (November 2025)

[8] CSRF South Sudan, Maiwut County, Upper Nile State, April 2021 (last update 2025)

[9] IPC, IPC Acute Food Insecurity and Malnutrition Analysis (September 2025 – July 2026), South Sudan, (November 2025)

Figure 1 - South Sudan Acute Malnutrition Situation for first projection Period (Oct 2025 - March 2026)[10]

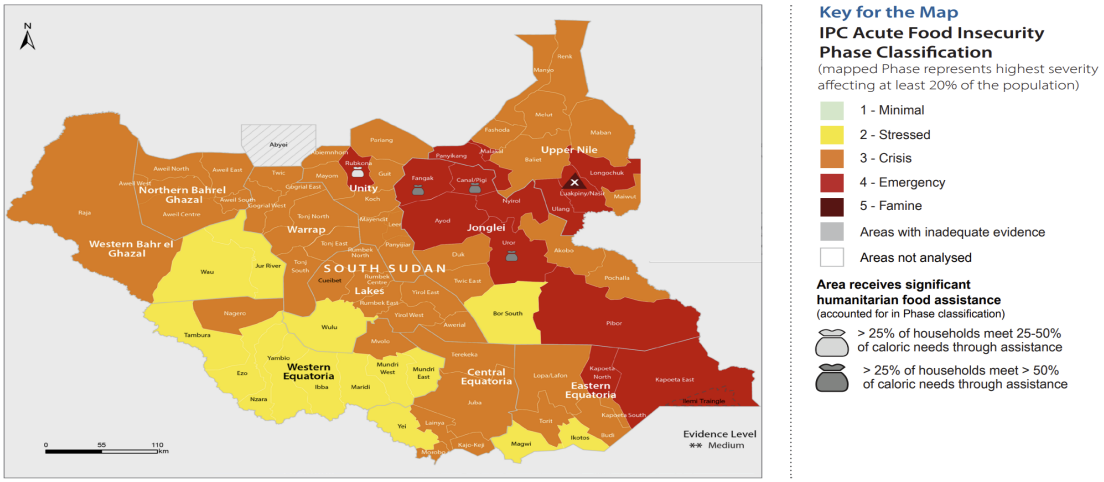


South Sudan acute food insecurity situation for the projection period (Dec 2025 - Mar 2026)

South Sudan's severe food insecurity and malnutrition condition is deteriorating. The situation is becoming worse as a result of the influx of refugees and returnees fleeing the conflict in neighboring Sudan. Large-scale violence is also driving considerable internal displacement, most recently in northern Jonglei State. The arrival of displaced persons places additional pressure on host communities' resilience to shocks. An estimated 5.97 million people (42 percent of the population analyzed) were classed in IPC Phase 3 or above (Crisis or worse) between September and November 2025. In the first projection period (December 2025 to March 2026), 5.86 million people (41 percent of the population analyzed) will likely experience IPC Phase 3 or above (Crisis or worse). An estimated 1.30 million people (9 percent of the analyzed population) in South Sudan are classified in IPC AFI Phase 4 (Emergency) in this period, while approximately 28,000 people are facing IPC AFI Phase 5 (Catastrophe) conditions. Nine counties, primarily in Jonglei and Upper Nile States, are classified in Emergency. In addition, 58 counties are in IPC AFI Phase 3 (Crisis), including Maiwut County and 12 counties in Phase 2 (Stressed). The most severely affected states, Upper Nile (57 percent), Unity (53 percent), and Jonglei (50 percent), account for more than half of the population facing high levels of acute food insecurity nationwide.

[10] IPC, IPC Acute Food Insecurity and Malnutrition Analysis (September 2025 – July 2026), South Sudan, (November 2025)

Figure 2 - South Sudan acute food insecurity situation for projection period (Dec 2025 - Mar 2026)[11].



Rationale/justification of the survey.

There has not been a SMART survey in Maiwut County since 2019. Since then, available information suggests a continuation of critical malnutrition levels. Since the last SMART survey was conducted over 6 years ago (December 2019) by ACF, there have been an influx of Sudanese refugees and South Sudanese returnees from Sudan and increase internally displaced persons (IDP) into Maiwut County, yet limited data on health and nutrition have been gathered. Furthermore, during the latest IPC Acute Malnutrition (AMN) analysis workshop (October 2025), Maiwut was classified in IPC AMN Phase 4 in the current and projection periods. This was based on a MUAC screening exercise conducted at the peak of the 2025 lean season with the prevalence of GAM rate on MUAC was 7.80% (2.9-19.4, 95% CI). In 2026, there is a need and an opportunity to conduct a SMART survey to determine the current nutrition situation of the population, and to provide robust, updated data on food security and public health-related aggravating factors to inform and guide relevant response in the county.

As there was no recent SMART survey conducted recently in Maiwut County, the parameters in the technical protocol were taken from the neighboring county Luakpiny/Nasir SMART survey conducted in 2022 to calculate the sample size of the survey. Accordingly, the Luakpiny/Nasir SMART survey revealed a Prevalence of GAM rate based on Weight-for-height Z-score of 15.9 % (95% CI 12.9-19.5), which is above the WHO emergency threshold of 15% There has been an increase in population displacement in Luakpiny/Nasir, similar to the situation in Maiwut County. When comparing livelihoods with the neighboring Gambella region in Ethiopia, the SMART+ survey conducted there reported a high GAM prevalence of 17.1% (95% CI: 14.1%–20.7%)[12], which exceeds the WHO emergency threshold of 15%. Most areas in Gambella share similar livelihood patterns with Maiwut County, supporting the relevance of these findings for contextualizing malnutrition risks in Maiwut. This GAM rate was used because the counties have common livelihood activities. Findings from the survey will support planning, targeting and response by Relief International, partners and key stakeholders on issues related to nutrition, health, WASH and FSL within the county.

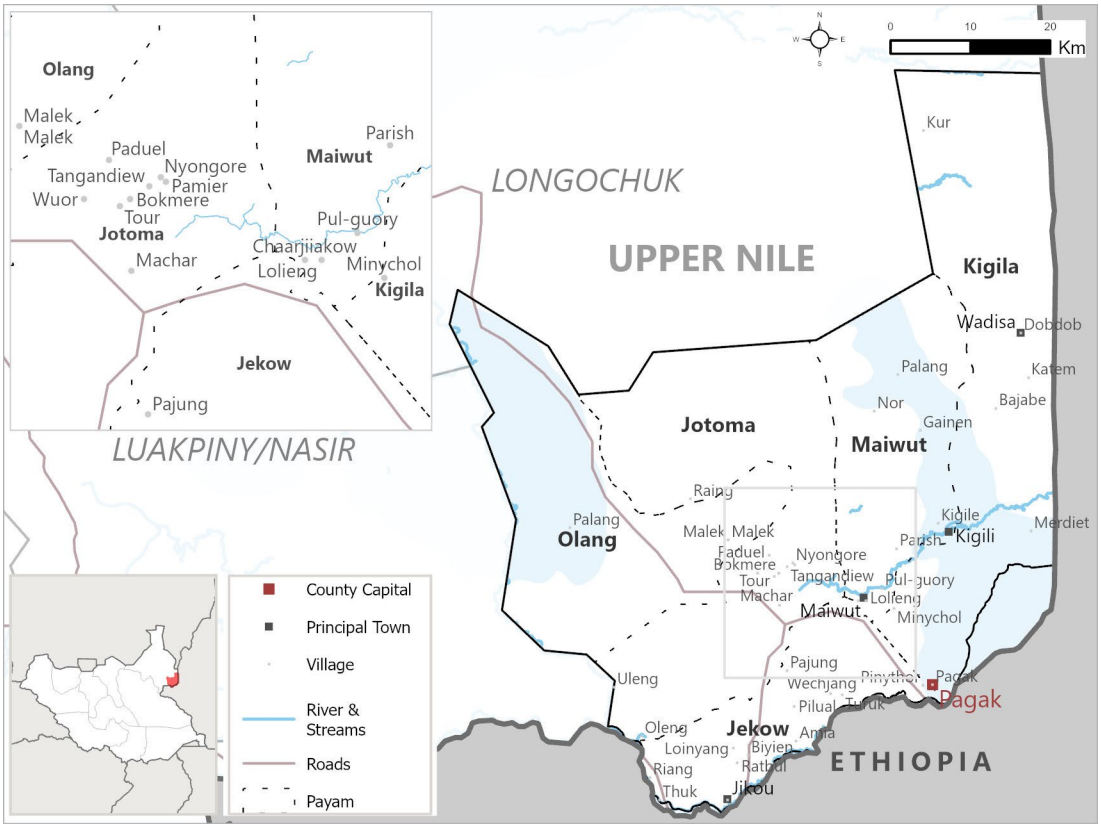
[11] IPC, IPC Acute Food Insecurity and Malnutrition Analysis (September 2025 – July 2026), South Sudan, (November 2025)

[12] Smart Plus, Aggregator, Plausibility Checks Report.

The nutrition situation in Maiwut County had not been regularly monitored through annual SMART surveys, with the last one conducted in December 2019. In order to fill the information gap on the current nutrition situation in Maiwut County, REACH Initiative and Relief International conducted a SMART survey from, , March 16th to March 26th of 2026, collecting anthropometric and mortality data, as well as key multi-sectoral indicators – on Food Security and Livelihoods (FSL), Water, Sanitation and Hygiene (WASH), and Health - to better understand the status of Acute Malnutrition (AMN) in Maiwut County, as well as its key drivers.

REACH Initiative, present in South Sudan since 2012, has been conducting needs assessments and providing evidence-based information to inform the humanitarian response in South Sudan. And since 2019, REACH has engaged with the Nutrition Information Working Group (NIWG), participating in the IPC Acute Malnutrition analysis workshops, and providing technical support to nutrition partners for SMART surveys implementation in the country. SMART survey is a methodology widely used in Sub-Saharan Africa to conduct timely nutrition surveys, by governments and humanitarian partners alike, in all types of contexts (emergency, development, displaced populations, etc.). SMART surveys are generally recommended to be conducted twice a year in relation to pre- and post-harvest periods, to accommodate seasonal malnutrition, and can be conducted at the national or regional level, and even on a smaller scale.

Figure 3 - Maiwut County Reference Map



Survey Objectives

General Objectives

To assess the nutrition situation and retrospective mortality rates amongst the overall population, and to analyse the possible factors contributing to acute malnutrition of the community in Maiwut County. In particular, the following are the specific objectives of the assessment:

Specific Objectives

1. To estimate the prevalence of acute malnutrition, stunting and underweight among children (boys and girls) aged 6 – 59 months in Maiwut County.
2. To estimate the retrospective Crude Mortality Rate (CMR) for the overall population and Under 5 Mortality Rate (U5MR) Maiwut County.
3. To estimate the coverage of various immunizations in Maiwut County including:
    - Vitamin A supplementation (for children 6-59 months)
    - Deworming (for children 12 to 59 months)
    - Measles vaccination coverage among children 9-59 months.
4. To assess childhood morbidity and health-seeking behaviors among households with children aged 6-59 months in Maiwut County.
5. To assess the nutritional status of women of reproductive age (15-49) in Maiwut County.
6. To assess IYCF Practices such as breastfeeding and complementary feeding among mothers who have children under the age of two years in Maiwut County.
7. To assess the WASH situation in Maiwut County (Main water source, distance/time to water source, water treatment status, access to soap, access to latrine).
8. To assess the food security and livelihoods situation in Maiwut County [Food Consumption Scores (FCS), Household Hunger Scale (HHS), main livelihoods, and Livelihood Coping Strategies (LCS)].
9. To formulate practical interventions and recommendations for both emergency and long-term programs of Nutrition actors in Maiwut County.

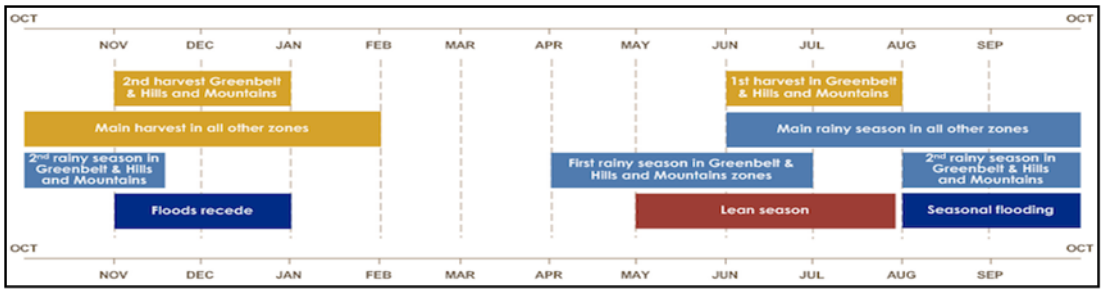
Survey Areas

The SMART survey will be implemented across the entire Maiwut County, covering all accessible payams and communities to ensure representative data collection for both anthropometric and mortality indicators.

Survey time

This survey was conducted during the post-harvest period (month of March 2026) according to the South Sudan seasonal calendar, a time when households are generally expected to have some produce available. Please refer to the South Sudan seasonal calendar in the image below for further understanding.

Figure 4 - South Sudan seasonal calendar[13]



METHODOLOGY

Survey Design

The survey applied a cross-sectional study design with a two-stage cluster sampling using the SMART methodology with the clusters being selected using the probability proportional to population size (PPS). Stage one sampling involved sampling the clusters (the smallest geographical units, in our case, villages) to be included in the survey, while the second stage sampling will involve selecting the households from the sampled clusters. The survey targets children 6-59 months and households in assessing the nutrition and mortality indicators, respectively.

Study Population

The target population for this survey was: 1) Children aged 6 – 59 months for the anthropometric, children aged 0 -23 months for Infant and Young Child Feeding (IYCF) practices, and 2) General population for the Mortality, Food Security and Livelihoods (FSL), Health, and Water, Sanitation and Hygiene (WASH) components, including in this group Pregnant and Lactating women (PLW) to investigate about child health seeking behavior components.

Table 2 - Indicators and Target Population

	Key Indicators	Target Population
1.	Prevalence of acute malnutrition 2-week retrospective child morbidity & health-seeking behaviour	Children 6 – 59 months
2.	Vitamin A supplementation	Children 6 – 59 months
3.	Measles coverage	Children 9 – 59 months
4.	Deworming	Children 12 – 59 months
5.	Prevalence of PLW acute malnutrition by MUAC	WRA (15 -49 years)
6.	Infant and young child feeding practices	Children 0-23 months

[13] Famine Early Warning Systems Network (FEWS NET), South Sudan, May 2026.

7.	Under-five mortality rate	Children 0-59 months
8.	Crude mortality rate	All people (households)
9.	FSL- HHS, FCS and LCS	All people (households)

Sample Size Estimation

Sample size calculation for the survey was based on the expected prevalence of Global Acute Malnutrition (GAM) and Mortality Rate in the survey areas. At the time of protocol development, no recent and representative SMART survey data were available for Maiwut County, the parameters used have been extracted from the previous survey reports conducted by REACH in Luakpiny/Nasir County in 2022, since they have the same domain, the upper confident interval will be used for Anthropometric Sampling. In line with SMART methodology guidelines, the most recent and reliable survey data from the same domain were used to inform key population assumptions, a neighboring population with similar characteristics. The Anthropometric and mortality sample sizes were calculated using Emergency Nutrition Assessment (ENA) software (January 11th, 2020, version) following SMART methodology.

2.3.1 Anthropometric Sample Size

Table 3 - Sample Size (Anthropometric)

Parameter	Maiwut County	Justification
Estimated Prevalence (%)	19.5	Since there was no recent SMART survey conducted in Maiwut county, the estimated GAM prevalence for Luakpiny/Nasir of 15.9% (12.9 – 19.5 95% CI) conducted in 2022 was used for sample size calculation for Maiwut County SMART Survey. This was based on findings from the Luakpiny/Nasir SMART survey, as both counties belong to the same analytical domain and share similar livelihood systems, food security conditions, access to health and nutrition services, and seasonal risk factors. The upper limit 19.5% was used due t0 the 2026 context on conflict and displacement is expected to be much worse compared to 2022. In the absence of recent SMART data for Maiwut County, SMART methodology recommends using the most recent and reliable survey data from the same domain to inform key assumptions.
Desired Precision	4.5	According to the SMART methodology guideline.
Design Effect	1.5	Consistent with SMART survey guidance, a design effect of 1.5 was used to account for clustering and heterogeneity within the Maiwut population, which includes host communities, South Sudanese returnees from Sudan, and internally displaced persons (IDPs) displaced by conflict.
Children to be Included	**486**	

Average Household Size	6.5	As per the Luakpiny/Nasir SMART survey and as well base on the context of South Sudan (NBS[14]) national Baseline Household Survey and Vitamin A Supplementation and Deworming (VASD).
% children Under-Five	19	The 19% of Children under five was considered based on National Expanded Programme on Immunization (EPI) estimate and Vitamin A Supplementation and Deworming (VASD)
% Non-Respondents	3	Anticipated non-response
Households to be Included	**451**	

2.3.2 Mortality Sample Size

Table 4 - Sample Size (Mortality)

Parameter	Maiwut County	Justification
Estimated death rate per 10,000/day	1.82	Based on the SMART survey conducted in Luakpiny/Nasir in 2022 by REACH (Maiwut Domain), the point prevalence for CMR was 1.82% (1.28 – 2.59 95% CI). Considering the population composition in Maiwut, which includes South Sudanese returnees from Sudan and conflict-affected internally displaced persons (IDPs), a point prevalence of 1.82% was recommended to account for a potentially higher mortality risk.
Desired Precision	0.65	As per the SMART guidelines.
Design Effect	1.5	In line with SMART survey methodology, a design effect (DEFF) of 1.5 is recommended to reflect the anticipated population heterogeneity in Maiwut, including host communities, South Sudanese returnees from Sudan, and internally displaced persons (IDPs).
Recall Period	90	A default three-month recall period was applied; this was adjusted once the survey started.
Population to be Included	**3002**	
Average Household Size	6.5	As per the Luakpiny/Nasir SMART survey and as well base on the context of South Sudan (NBS [(ibid)]) national Baseline Household Survey and VASD.
% Non-Respondents	3	Anticipated non-response
Households to be Included	**476**	

The maximum sample size is found to be the Mortality sample size calculation, and this was considered the final sample size, with **476 households** in Maiwut County to be included in the survey.

[14] National Bureau of Statistics (NBS), National Baseline Household Survey 2009—Report for South Sudan, 2012.

2.3.3 Number of Clusters

To determine the number of clusters required, the number of households that a team could comfortably survey in a day was estimated using the parameters found in Table 3 below:

Table 5 - Number of Households a team can sample in a day

Activity	Estimated Time
Departure from Office	**7:30 AM**
a. *Daily morning briefings*	*15 min*
b. *Travel to clusters*	*50 min*
c. *Introduction and HH list development*	*30 min*
d. *Lunch break*	*30 min*
e. *Total Time from one HH to another*	*5 min*
f. *Travel back to base*	*50 min*
Total time for HH listing, travelling and breaks (a + b + c + d + f)	175 min
Arrival back to Base	**5:30 PM**
Total available time in a day	10 hrs (600 minutes)
Available time for work	600 - 175 minutes= 425 minutes
Time taken to complete one questionnaire	*30 minutes*
Total time per household + e	*35 minutes*

Note: The above are only estimates based on past experience but will be updated after the pilot survey has been conducted and thus, slight changes may be expected.

Given the above, the number of households that a team can comfortably visit in a day is calculated as follows:

425 (min) / 35 (min) = 12.14 ~ **12 HH/per day**

Given the above, the number of clusters per survey area is presented in the table below:

Table 6 - Number of cluster per survey Area

	Maiwut County
Total number of HH based on sample size calculation	**476**
Total number of HH to be assessed per day per team	12
Clusters Needed	39.6
Rounded UP	**40**

Sampling Procedure: Selection of Clusters

A two-stage cluster sampling design was used to sample the survey clusters and households. In the first stage, clusters were assigned using Probability Proportional to Size (PPS). The sampling frame for the 1st

stage sampling was the list of villages with population estimates in each of the survey areas. The list of villages was entered into ENA for SMART software (January 2020 version), and clusters were assigned using probability proportional to size (PPS).

Sampling Procedure: Selection of Households and Children

Definition of household for the survey: The second stage sampling involves the selection of 12 households per cluster through a simple random sampling using a random number generator (RNG) installed in the data collection tablets. For this survey, a household (HH) will be defined as a group of people living together, who cook and eat from the same cooking pot. Polygamous families were defined based on the same, if each wife has her own pot, even if living in the same compound, this was treated as different households.

Household selection techniques: The standard definition of a household was shared with enumerators to guide them in developing the household listing within the cluster. On arrival in the selected clusters, the team leader met with the village elders. The team introduced themselves, explaining the survey objectives as well as expectations from the elders. Then either of the following two methods was used for household listing: (1) a verbal listing from one or more community leaders, and, if not possible, (2) a manual house-to-house listing. Each household was assigned a number, and the numbers were selected randomly using a random number generator application on smartphones. Twelve households were randomly selected from the complete list of households. These were the households that were visited by the survey team. The village guide and community leaders supported the teams in updating the list of households.

For clusters/villages with more than 150 households, segmentation was used to first select one portion of the cluster that represented the cluster. Selection of segments was done using either PPS or simple random sampling, depending on the population sizes of the specific segments. In the selected segment, the process of household selection followed the same procedure used in each cluster for selecting the 12 households. Households were selected using a random number generator software.

In selected households, all eligible children (aged 6–59 months) were measured, and the household questionnaire was administered. Absent households and households with absent children were re-visited, and information on the outcome was recorded on the cluster control form. This form was also used to record information on absent and non-responding households.

Survey Teams, Training, Data

Collection and Data Management

- Survey Teams: Six teams with four members (1 Team Leader, 1 measurer, 1 assistant, and 1 enumerator) in each team were involved in the execution of the survey. At each cluster, a local guide was employed to facilitate data collection at the household level. The survey teams were recruited by REACH with the involvement of local officials at Maiwut County level. To the extent possible, the team members were a mix of both male and female persons and were recruited from the local communities. REACH supervised the teams with technical support from Relief International.

- Training: The survey teams were trained for five days, with the training planned to start on March 9th 2026. The training covered various components including taking anthropometric measurements, sampling of households, data collection tools, digital data collection, data quality checks, and standardization exercises, among other themes. The training of the enumerators was facilitated by SMART-certified staff and staff with experience in conducting SMART surveys.

- Supervision: The overall management of the survey was done by REACH Initiative with support from Relief International. Maximum supervision of the survey teams was ensured to facilitate quality data.
- Data Entry and Management: Data was collected through REACH tablets using Kobo/ODK. The data collection tools were programmed and uploaded onto the tablets, which were used by the survey teams. The teams uploaded the collected data to a central server on a daily basis to allow the Survey Manager to review the data collected each day, clean the data, and provide feedback every morning to the teams.

NB: Backup manual forms were carried by each team as a contingency plan in any eventuality that teams faced challenges with the SMART phones

Data Quality

In order to ensure optimal and high data quality, a number of measures were put in place which includes:

The survey was conducted in accordance with the submitted protocol,

- Training of survey teams is done using standardised material as recommended by SMART Methodology
- Undertaking of standardisation test as part of the training; taking appropriate steps thereafter based on the performance of the survey teams
- Appropriate calibration of survey equipment, during the training and on every morning before proceeding to the field for data collection
- Plausibility checks were conducted on a daily basis and inform the daily debriefing sessions which was conducted every day

a) Data was collected a digital platform, and control checks and skip patterns were programmed to improve the data quality.
b) Anthropometry data was auto analysed using ENA software anthropometry section. The same software was used to analyse the mortality data.

Questionnaire

The survey adopted the data collection tools which have been developed by the Global SMART Team for both anthropometric and mortality surveys. Other indicators were collected using the modules in line with current Food Security and Nutrition Monitoring System (FSNMS) questionnaires as much as possible.

Data to be Collected

Anthropometry for children aged 6 -59 months

- Age: This was determined using birth/health cards/records if available and local calendar of events which was jointly developed by local leaders and survey enumerators.
- Sex: Male or female.
- Weight: Children's weights were taken without clothes using mother and child digital weighing scales (SECA scales with precision of 100gm).

- Height/length: Children were measured using the wooden UNICEF measuring boards (precision of 0.1cm). Children less than 2 years of age were measured lying down, while those greater than or equal to 2 years of age will be measured standing up.
- Mid-upper arm circumference (MUAC): MUAC measurements were taken at the mid-point of the left upper arm using both the child and adult MUAC tapes (precision of 0.1cm) for children 6-59 months and for women of reproductive age between 15-49 years of age.
- Bilateral pitting oedema: Was assessed by the application of normal thumb pressure on both feet for 3 seconds.
- Referral: All children with acute malnutrition and not already enrolled in treatment were referred using referral forms to existing TSFP and OTP programs in the county.

Demographics and Mortality: The following information will be collected for all current household members: age in years, sex, whether they were born, or had joined the household during the recall period of 90 days (will be amended in the field). For household members that left during the recall period, data was collected of their age in years, sex, and whether they had joined or born into the household during the recall period. For persons who have died during the recall period, will collect age in years, sex, whether born or joined the household during the recall period, as well as estimated cause and location of death.

*Health Interventions Data for children aged 6 -59 months***:** Vitamin A supplementation, deworming and measles immunization data was collected through health cards or recall.

Morbidity: Two-week retrospective morbidity data was collected from mothers/caregivers of all children (6-59 months) included in the anthropometric survey.

Food Security Indicators for the overall population:

a. **Food Consumption Scores (FCS):** is an indicator of the general quantity and quality of foods being consumed in a household, based on how many days any household members have consumed 9 distinct food groups within a 7-day recall period. Households are categorized into different categories of severity based on their responses. FCS is often used as a proxy for quality of food consumed. Standard FCS thresholds are <21 for 'poor', =>21 - <=35 for 'borderline' and >35 for 'acceptable'.
b. **Household Hunger Scale (HHS):** measures the perceived hunger by asking the frequency a household has experienced three common experiences associated with hunger in the past 30 days (no food in the house, slept hungry, gone whole day and night without food). HHS is often used as a proxy for quantity of food consumed. Thresholds and categories used for analysis are those used for IPC AFI in South Sudan.
c. **Livelihood Coping Strategies (LCS)** – measures what behaviours or actions that households are taking to cope with not having enough food or resources to get food. Ten coping strategies are asked about which are categorized as Emergency, Crisis, or Stress strategies.

WASH for the overall population – indicators on main water source, access to latrines, distance/time to water source, access to soap and water treatment were be asked.

Data Analysis

The anthropometric and mortality data were analysed using ENA for SMART (January 2020 version). The other additional data (immunization, maternal nutrition, morbidity, etc.) were analysed using other software

such as R and SPSS. Various statistics were used to summarize the data, including percentages, means, and medians, among others. The analysed data were presented in both tabular and graphical formats. The preliminary datasets were available within 7 days after the last day of data collection, and the preliminary report was available within 14 days. The preliminary report was reviewed internally before submission to the Nutrition Information Working Group (NIWG) for validation.

Ethical Considerations

Informed consent – All households were asked for informed consent prior to the survey. If a household did not wish to participate, it was counted as a non-response and the team moved to the next sampled household.

Keeping confidentiality of personally identifiable information (PII) – All personally identifiable information, such as names and Global Positioning System (GPS) data, was removed from any analysis after data collection concluded and was not shared either internally with HQ or externally with partners.

Referral – Children identified as having acute malnutrition (either by MUAC, weight-for-height, or oedema) were appropriately referred to health and nutrition services by the survey team leader.

Classifying malnutrition

Individual classification of nutritional status

Individual classifications for nutritional status by different anthropometric measurements are summarized in table 6 below for wasting, stunting, and underweight.

Table 7-Individual Malnutrition Classifications by WHO

Type of Malnutrition	Grade of Malnutrition	Anthropometric Indicators and Cutoffs
Wasting	Global Acute Malnutrition (GAM) Moderate & severe wasting	<-2 z-scores weight-for-height (WFH) and/or oedema
		<125mm mid-upper arm circumference and/or oedema
		Presence of bilateral pitting oedema
	Severe Acute Malnutrition (SAM) Severe wasting	<-3 z-scores weight-for-height (WFH) and/or oedema
		<115mm mid-upper arm circumference and/or oedema
		Presence of bilateral pitting oedema
Stunting	Global Chronic Malnutrition Global Stunting	<-2 z-scores height-for-age (HFA)
	Severe Chronic Malnutrition Severe Stunting	<-3 z-scores height-for-age (HFA)
Underweight	Global Underweight	<-2 z-scores weight-for-age (HFA)
	Severe Underweight	<-3 z-scores weight-for-age (HFA)
Maternal nutrition	Moderate and severe malnutrition	<230mm mid-upper arm circumference
	Severe acute malnutrition	<210mm mid-upper arm circumference

Population cut-offs for malnutrition

Table 7 below defines the population cut-offs for determining the severity of malnutrition when the prevalence of acute and chronic malnutrition is known. These levels are internationally agreed upon and provide an objective basis for developing responses to increased levels of acute and chronic

malnutrition[15]. To interpret proportions at a population level with meaning, absolute numbers are also necessary.

Table 8 - WHO/UNICEF Classification for Severity of Malnutrition by Prevalence Among Children 6-59 Months

LEVELS	PREVALENCE OF THRESHOLDS %		
	WASTING	UNDERWEIGHT	STUNTING
Very low	<2.5%	<2.5%	<2.5%
Low	2.5- <5%	2.5- <5%	2.5- <10%
Medium	5- <10%	5- <10%	10- <20%
High	10- <15%	10- <15%	20- <30%
Very high	>=15%	>=15%	>=30%

Table 9 - Integrated Phase Classification of Acute Malnutrition (IPC AMN) Classification or severity of Malnutrition Prevalence among Children 6-59 Months

<table>
<tr><th rowspan="2">IPC AMN Phase Classification</th><th colspan="3">PREVALENCE OF THRESHOLDS %</th></tr>
<tr><th>WASTING by GAM by Weight for Height z-score</th><th>WASTING by GAM by Mid-Upper Arm Circumference[16]</th><th>Priority Response Objective</th></tr>
<tr><td>Acceptable</td><td><5%</td><td rowspan="2"><5%</td><td>Maintain the low prevalence of acute malnutrition</td></tr>
<tr><td rowspan="2">Alert</td><td rowspan="2">5- <10%</td><td rowspan="3">Strengthen existing response capacity and resilience. Address contributing factors to acute malnutrition. Monitor conditions and plan response as required</td></tr>
<tr><td rowspan="2">5 - <10%</td></tr>
<tr><td>Serious</td><td>10- <15%</td><td>Urgently reduce acute malnutrition levels through scaling up treatment and prevention of affected populations</td></tr>
<tr><td rowspan="2">Critical</td><td rowspan="2">15- <30%</td><td>10 - <15%</td><td rowspan="2">Urgently reduce acute malnutrition levels through significant scale up and intensification of treatment and protection activities to reach additional population reached</td></tr>
<tr><td rowspan="2">>= 15%</td></tr>
<tr><td>Extremely Critical</td><td>>=30%</td><td>Urgently reduce acute malnutrition levels through addressing widespread acute malnutrition and disease epidemics by all means</td></tr>
</table>

Data cleaning and analysis

The anthropometric and mortality data were analysed using ENA for SMART (January 2020 version). The other additional data (immunization, maternal nutrition, morbidity etc.) were analysed using R. Various statistics were computed on the data, including percentages, means, and medians among others. The analysed data was presented in both tabular and graphical form. The preliminary datasets were made

[15] *World Health Organization (WHO), Physical Status: The use and interpretation of Anthropometry*. Report of a WHO expert committee, 1995. Chapter 5, p208 & 212

[16] IPC AMN classification by MUAC should only be done in the absence of GAM by WHZ data. Whether a higher or lower IPC AMN Phase is classified depends on the historical relationship between WHZ and MUAC in the unit of analysis. See IPC AMN Guidance for more details.

available within 7 days after the last day of data collection, and the preliminary report within 14 days. The preliminary report goes through REACH validation processes and was also submitted to the Nutrition Information Working Group (NIWG) for validation. During the data collection exercise, daily quality checks were performed to ensure the process was running smoothly and that enumerators were well-trained on the procedures to be performed. Moreover, specific checks on the anthropometric and mortality results were carried out, specifically the following:

- **Verify flagged children's data –** Input the anthropometric data into ENA and run the plausibility report. This should identify children without key measurements and, consequently, z-scores for further verification. If the data of a flagged child cannot be corrected, the entry remains in the dataset as it contributes to the overall quality score of the data.
- **Cleaning extreme MUAC values –** MUAC values <5cm or >20cm, or probable errors were removed for children 6-59 months.
- **Cleaning reported deaths –** During data analysis, all reported deaths were reviewed for consistency with the recall period. Only deaths that occurred within the 88-day recall period (from December 17, 2024, i.e., the appointment of the new commissioner for the county, to March 14, 2025) were included in the analysis. Any deaths reported to have occurred outside this timeframe were excluded, ensuring accurate mortality rate estimates aligned with the survey protocol.

RESULTS

1. Anthropometric results (based on WHO standards 2006):

A total of 507 children aged 6–59 months (256 boys and 251 girls) were assessed for nutritional status across 40 villages in Maiwut County.

Table 10 - Survey Sample and Non-Response

	Target	Achieved		Absent		Refused	
	N	N	% of Target	N	% of Target	N	% of Target
Children	486	507	104	0	0	0	0
Households	476	479	100.6	0	0	0	0
Villages	40	40	100	N/A	N/A	N/A	N/A

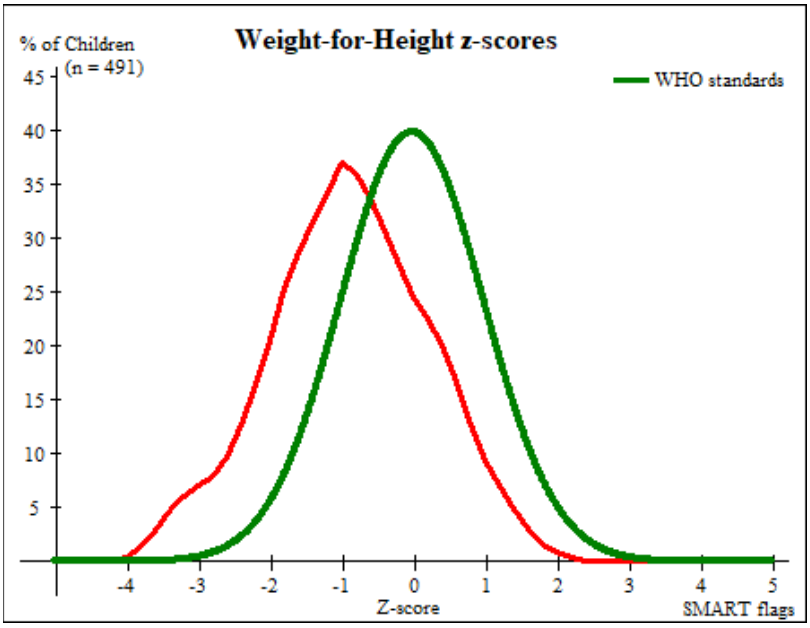
The Maiwut County SMART survey achieved an overall plausibility score of 11%, indicating good data quality according to SMART classification criteria. Overall, the survey results are considered robust, reliable, and suitable for interpretation and evidence-based decision-making.

To ensure data quality, outlier detection was conducted using a ±3 standard deviation threshold from the observed mean. Any measurements flagged by the SMART software as implausible for height, weight, or age were excluded from the final analysis, although they were retained in the dataset for reference.
Exclusion of z-scores from: No exclusion

Table 11 - Distribution of age and sex of sample

	Boys		Girls		Total		Ratio
Age (months)	**no.**	**%**	**no.**	**%**	**no.**	**%**	**Boy:girl**
6-17	68	48.9	71	51.1	139	27.4	1.0
18-29	58	55.2	47	44.8	105	20.7	1.2
30-41	65	52.0	60	48.0	125	24.7	1.1
42-53	44	48.9	46	51.1	90	17.8	1.0
54-59	21	43.8	27	56.3	48	9.5	0.8
Total	256	50.5	251	49.5	507	100.0	1.0

Figure 5 - Population age and sex pyramid



1.1: GAM by WHZ

The prevalence of Global Acute Malnutrition (GAM), defined as weight-height Z-score (WHZ) (WHZ<-2 and/or oedema) among children 6-59 months old, was estimated at 15.1% (11.2 - 20.0 95% C.I.) (see table 12 below), which is **categorized as "Critical" per IPC AMN classification**[17]. A GAM rate falling in the Critical phase requires significant scale-up and intensification of treatment and protection activities to reach additional population affected. In addition, the prevalence of Severe Acute Malnutrition (SAM) per WHZ among children aged 6-59 months was 3.5% (95% CI: 2.0- 6.0). One nutritional bilateral oedema case was observed during the assessment, verified by the supervisor, and referred for further care.

Table 12 - prevalence of Acute Malnutrition base on weight-for-height Z-scores (and/or Oedema) and by Sex

	All n = 491	**Boys** n = 249	**Girls** n = 242
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(74) 15.1 % (11.2 - 20.0 95% C.I.)	(41) 16.5 % (11.7 - 22.7 95% C.I.)	(33) 13.6 % (8.8 - 20.5 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(57) 11.6 % (8.2 - 16.2 95% C.I.)	(28) 11.2 % (7.5 - 16.6 95% C.I.)	(29) 12.0 % (7.6 - 18.4 95% C.I.)
Prevalence of severe	(17) 3.5 %	(13) 5.2 %	(4) 1.7 %

[17] IPC, Integrated Phase Classification (IPC) Technical Manual Version 3.1, Rome, August 2021.

malnutrition (<-3 z-score and/or oedema)	(2.0 - 6.0 95% C.I.)	(2.7 - 9.7 95% C.I.)	(0.6 - 4.3 95% C.I.)

The prevalence of oedema is 0.0 %

The overall Global Acute Malnutrition (GAM) rate was 15.1% (with a 95% confidence interval of 11.2% to 20.0%). Notably, the prevalence of Severe Acute Malnutrition (SAM) was slightly higher among boys compared to girls, consistent with global findings[18], whereas Moderate Acute Malnutrition (MAM) appeared to be evenly distributed between the two groups. Disaggregation by sex showed that GAM prevalence was slightly higher among boys at 16.5% (95% CI: 11.7%–22.7%) compared to girls at 13.6% (95% CI: 8.8%–20.5%). Similarly, SAM prevalence was higher among boys (5.2%) than girls (1.7%), consistent with findings commonly observed in similar contexts, whereas MAM prevalence appeared relatively evenly distributed between boys (11.2%) and girls (12.0%) lower slightly the 15% threshold set by the IPC acute malnutrition[19] for a "Serious" situation as they both fall within the 10% to 14.9% range, corresponding to Phase 3 according to the IPC-AMN.

Table 13 - Prevalence of Acute Malnutrition by age, base on weight-for-height Z-scores (and/or Oedema)

		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	133	11	8.3	19	14.3	103	77.4	0	0.0
18-29	102	3	2.9	14	13.7	85	83.3	0	0.0
30-41	123	1	0.8	10	8.1	112	91.1	0	0.0
42-53	86	0	0.0	7	8.1	79	91.9	0	0.0
54-59	47	2	4.3	7	14.9	38	80.9	0	0.0
Total	491	17	3.5	57	11.6	417	84.9	0	0.0

The analysis of acute malnutrition by age category shows notable differences between younger children (6–29 months) and older children (30–59 months), both in prevalence and contribution to overall caseload.

Table 13 presents the distribution of acute malnutrition based on weight-for-height z-scores (WHZ) and bilateral pitting oedema among children aged 6–59 months. No cases of kwashiorkor or marasmic kwashiorkor were identified in the surveyed population.

Overall, 26 children (5.1%) were classified as having marasmus (WHZ < -3 and no oedema), while 481 children (94.9%) were not severely malnourished (WHZ ≥ -3 and no oedema). No cases of oedema were reported in either WHZ category, indicating the absence of kwashiorkor

[18] Thurstans S, Opondo C, Seal A, Wells J, Khara T, Dolan C, Briend A, Myatt M, Garenne M, Sear R, Kerac M. *Boys are more likely to be undernourished than girls: a systematic review and meta-analysis of sex differences in undernutrition*. BMJ Glob Health. December 2020.

[19] IPC, Guidelines for Communicating the IPC's Acute Malnutrition Scale,

and marasmic kwashiorkor in the sample.

Table 14 - Distribution of Acute Malnutrition and Oedema based on Weight-for-height Z-scores

	<-3 z-score	**>=-3 z-score**
Oedema present	Marasmic kwashiorkor. 0 (0.0 %)	Kwashiorkor. 0 (0.0 %)
Oedema absent	Marasmic No. 26 (5.1 %)	Not severely malnourished. 481 (94.9 %)

1.2: GAM by MUAC

Prevalence of global acute malnutrition based on MUAC (<125mm) and/or oedema was 6.5% and of severe acute malnutrition MUAC (<115mm) and/or oedema was 1.2%

Table 15 - Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 507	**Boys** n = 256	**Girls** n = 251
Prevalence of global malnutrition (< 125 mm and/or oedema)	(33) 6.5 % (4.6 - 9.1 95% C.I.)	(13) 5.1 % (2.9 - 8.9 95% C.I.)	(20) 8.0 % (5.3 - 11.7 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(27) 5.3 % (3.7 - 7.7 95% C.I.)	(13) 5.1 % (2.9 - 8.9 95% C.I.)	(14) 5.6 % (3.3 - 9.2 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(6) 1.2 % (0.6 - 2.5 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(6) 2.4 % (1.1 - 5.0 95% C.I.)

1.3: Prevalence of acute malnutrition based on MUAC cut-offs and/or oedema by age

A higher proportion of the younger children aged 6-29 months had both severe and moderate acute malnutrition based on MUAC cut-offs (<125mm) than their older counterparts (30-59). Generally, MUAC is more inclined towards younger children than older children.

Table 16 - Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema

		Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	139	4	2.9	17	12.2	118	84.9	0	0.0
18-29	105	2	1.9	8	7.6	95	90.5	0	0.0
30-41	125	0	0.0	0	0.0	125	100.0	0	0.0
42-53	90	0	0.0	1	1.1	89	98.9	0	0.0
54-59	48	0	0.0	1	2.1	47	97.9	0	0.0
Total	507	6	1.2	27	5.3	474	93.5	0	0.0

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

Combined GAM (cGAM) is a composite measure that encompasses all cases of GAM identified by WHZ <-2, MUAC <125 mm, and/or bilateral pitting oedema. As shown in Table 17 below, the prevalence of cGAM based on these criteria was 18.1%, while cSAM was 5.3%. The overall prevalence of cSAM was 5.3% (27 children; 95% CI: 3.5–8.0), slightly higher among boys (6.6%; 17 children; 95% CI: 3.8–11.3) compared to girls (4.0%; 10 children; 95% CI: 2.3–6.9).

*Table 17 - Prevalence of combined GAM and SAM based on WHZ and MUAC cut off's (and/or oedema) and by sex**

	All n = 507	**Boys** n = 256	**Girls** n = 251
Prevalence of combined GAM (WHZ <-2 and/or MUAC < 125 mm and/or oedema)	(92) 18.1 % (14.3 - 22.7 95% C.I.)	(47) 18.4 % (13.6 - 24.3 95% C.I.)	(45) 17.9 % (12.5 - 25.0 95% C.I.)
Prevalence of combined SAM (WHZ < -3 and/or MUAC < 115 mm and/or oedema	(27) 5.3 % (3.5 - 8.0 95% C.I.)	(17) 6.6 % (3.8 - 11.3 95% C.I.)	(10) 4.0 % (2.3 - 6.9 95% C.I.)

*With SMART or WHO flags a missing MUAC/WHZ or not plausible WHZ value is considered as normal when the other value is available

Table 18 - Detailed numbers for combined GAM and SAM

	GAM		SAM	
	no.	**%**	**no.**	**%**
MUAC	13	2.6	3	0.6
WHZ	54	10.7	14	2.8
Both	20	3.9	3	0.6
Edema	0	0.0	0	0.0
Total	87	17.2	20	3.9

Total population: 507

1.5: GAM by WAZ

Underweight, as a nutritional indicator, assesses a child's weight relative to their age. According to the WHO 2006 growth standards, which formed the basis of this analysis, a weight-for-age Z-score falling under -2 SD and above -3 SD is classified as moderate underweight, while a Z-score below -3 SD is considered severe underweight. Underweight, defined as low weight-for-age, is a composite indicator reflecting both acute and chronic malnutrition, as a child may be underweight due to stunting, wasting, or a combination of both. A total of 495 children aged 6–59 months were included in the analysis.

The survey findings showed that the prevalence of underweight was 19.6%, falls below the "Medium" classification range (10% to <20%)[20], while severe underweight was 5.9%. These results indicate a moderate level of undernutrition among children in the surveyed population. Table 19below presents the detailed distribution of underweight and severe underweight among children aged 6–59 months.

Table 19 - Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 495	**Boys** n = 249	**Girls** n = 246
Prevalence of underweight (<-2 z-score)	(97) 19.6 % (16.0 - 23.7 95% C.I.)	(52) 20.9 % (16.0 - 26.7 95% C.I.)	(45) 18.3 % (12.8 - 25.4 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(68) 13.7 % (10.6 - 17.6 95% C.I.)	(36) 14.5 % (10.3 - 20.0 95% C.I.)	(32) 13.0 % (8.9 - 18.7 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(29) 5.9 % (4.1 - 8.4 95% C.I.)	(16) 6.4 % (4.0 - 10.2 95% C.I.)	(13) 5.3 % (3.2 - 8.7 95% C.I.)

Table 20 - Prevalence of underweight by age, based on weight-for-age z-scores

		Severe underweight (<-3 z-score)		**Moderate underweight (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**		**Oedema**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	136	9	6.6	23	16.9	104	76.5	0	0.0
18-29	101	7	6.9	12	11.9	82	81.2	0	0.0
30-41	122	6	4.9	13	10.7	103	84.4	0	0.0
42-53	88	3	3.4	12	13.6	73	83.0	0	0.0
54-59	48	4	8.3	8	16.7	36	75.0	0	0.0
Total	495	29	5.9	68	13.7	398	80.4	0	0.0

[20] WHO, Nutrition Landscape Information System (NLiS), 2025.

1.6: Prevalence of Stunting

Table 21 presents the prevalence of stunting among children aged 6–59 months based on height-for-age z-scores (HAZ), disaggregated by sex. Stunting reflects chronic malnutrition resulting from prolonged periods of inadequate nutrient intake and/or recurrent infections.

The prevalence of stunting among children 6–59 months was 16.9% (95% CI: 13.8 - 20.6), calculated with a SD of 1, which is classified as medium severity (10 to < 20%), indicating a medium public health concern. Moderate stunting was 13.5% and severe stunting 3.4%. Stunting was higher among boys (18.3%) than girls (15.5%), with boys also showing higher levels of both moderate and severe stunting overall.

Table 21 - Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 473	**Boys** n = 241	**Girls** n = 232
Prevalence of stunting (<-2 z-score)	(80) 16.9 % (13.8 - 20.6 95% C.I.)	(44) 18.3 % (13.5 - 24.2 95% C.I.)	(36) 15.5 % (11.5 - 20.6 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(64) 13.5 % (10.7 - 16.9 95% C.I.)	(34) 14.1 % (9.6 - 20.2 95% C.I.)	(30) 12.9 % (9.4 - 17.6 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(16) 3.4 % (1.9 - 5.9 95% C.I.)	(10) 4.1 % (2.3 - 7.5 95% C.I.)	(6) 2.6 % (1.0 - 6.5 95% C.I.)

Table 22 - Prevalence of stunting by age based on height-for-age z-scores

		Severe stunting (<-3 z-score)		**Moderate stunting (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	132	0	0.0	13	9.8	119	90.2
18-29	95	5	5.3	17	17.9	73	76.8
30-41	112	8	7.1	16	14.3	88	78.6
42-53	87	3	3.4	11	12.6	73	83.9
54-59	47	0	0.0	7	14.9	40	85.1
Total	473	16	3.4	64	13.5	393	83.1

1.7: Mean Z-scores, design effects and excluded subjects

Table 23 presents the mean z-scores, design effects, and data quality indicators for anthropometric measurements among children aged 6–59 months. The mean WHZ was -0.89 (±1.09), WAZ -1.04 (±1.16), and HAZ -0.84(±1.22), indicating an overall shift below the WHO reference population.

The design effects were within acceptable ranges (WHZ: 1.80; WAZ: 1.12; HAZ: 1), suggesting moderate clustering. No z-scores were missing or flagged as out of range, indicating good data quality and reliability of the anthropometric results.

Table 23 - Mean z-scores, Design Effects and excluded subjects

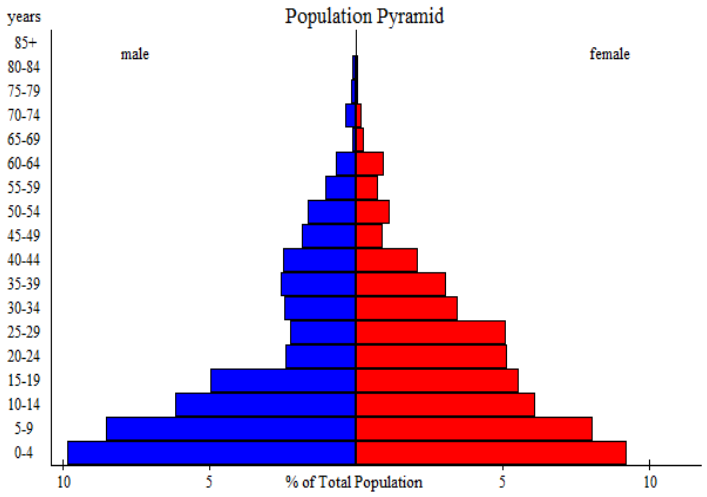
Indicator	n	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	491	-0.89±1.09	1.80	0	16
Weight-for-Age	495	-1.04±1.16	1.12	0	12
Height-for-Age	473	-0.84±1.22	1.00	0	34

* contains for WHZ and WAZ the children with edema.

1.8: Maiwut County Population Pyramid

The population pyramid indicates a young, expanding population with a high proportion of children (0–14 years). Sex distribution is balanced, but the female population between approximately 20–34 years appears disproportionately larger compared to the male population of the same age range, while the small elderly population suggests low life expectancy and high dependency burden.

Figure 6 - Population Pyramid



2. Mortality results (retrospective over 3 months/days prior to interview)

The mortality results indicate that the Crude Mortality Rate (CMR) was 0.38 deaths per 10,000 persons per day (95% CI: 0.22– 0.65), while the Under-Five Mortality Rate (U5MR) was 0.40 deaths per 10,000 children per day (95% CI: 0.09 –1.65). Both indicators are below emergency thresholds, suggesting that mortality levels were within acceptable ranges during the recall period, which was 25th December 2025.

Illness was the leading reported cause of death (80%), followed by injury/trauma (20%), with no unknown causes reported. Most deaths occurred in the current location (70%), while others occurred in the place of last residence (20%) or elsewhere (10%).

Table 24 - Mortality rates

Parameters for mortality	Results (95% CI)
CMR (deaths per 10 000/day	0.38 (0.22-0.65)
U5MR (deaths in children	0.40 (0.09-1.65)
Total number of HHs	479
Total number of HHs with children under five	378
Average household size	6.1
Mid-interval population size	2938.5
Number of Clusters19.6	40
Recall period (days)	90
Percentage of children under five	19.6
Birth Rate	0.76
In-migration Rate (Joined)	0.45
Out-migration Rate (Left)	5.41
Total deaths during the recall period	10
Total deaths during the recall period <5 years old	2

Table 25 - Cause of Death

Cause of deaths	%	Location of deaths	%
Illness	80	In the current location	70
Injury/traumatic	20	In place of the last residence	20
Unknown	0	Other	10

2.1: Additional variables

Data on child health, measles vaccination, deworming coverage, vitamin A supplementation, IYCF practices, the nutritional status of pregnant and lactating women, food security and

livelihoods, and WASH conditions in the sampled households were gathered simultaneously with the mortality data.

2.2: Children's Morbidity and Access to Health Care

Among children aged 6–59 months (n=129), 25.29% (95% CI: 21.72–29.24) were reported to have experienced at least one illness in the two weeks preceding the survey. This indicates that approximately one in every four children in the surveyed population had recently been ill, reflecting a moderate level of acute morbidity among young children in the assessment area. Morbidity among children 6–59 months was high, with fever (85.3%), diarrhoea (55.8%), and cough (37.2%) commonly reported in the two weeks preceding the survey. This elevated disease burden is likely contributing to increased risk of acute malnutrition and highlights the need for integrated health, nutrition, and WASH interventions.

Table 26 - Prevalence of reported illness in children in the two weeks prior to interview (n=129)

	6-59 months
Prevalence of reported illness	25.29% (95% C.I.21.72-29.24)

The observed morbidity level suggests a substantial and ongoing burden of common childhood illnesses, which may include conditions such as diarrhoea, acute respiratory infections, and febrile illnesses. The relatively narrow confidence interval indicates that the estimate is statistically stable and reliable, despite the limited sample size.

Table 27 - Symptom breakdown in the children in the two weeks prior to interview (n=129)

Proportion of children aged 6-59 months		% (95% CI)
Fever	85.30%	78.0-90.9
Diarrhoea	55.80%	46.8-64.6
Cough	37.20%	28.9-46.2
Other	9.30%	4.9-15.7
Measles	0%	100.0-100.0

Among children aged 6–59 months who were reported to have been ill in the two weeks preceding the survey (n=129), fever was the most commonly reported symptom at 85.3% (95% CI: 78.0–90.9). This was followed by diarrhoea at 55.8% (95% CI: 46.8–64.6) and cough at 37.2% (95% CI: 28.9–46.2). A small proportion of children were reported under "other" symptoms at 9.3% (95% CI: 4.9–15.7), while no cases of measles were reported (0%).

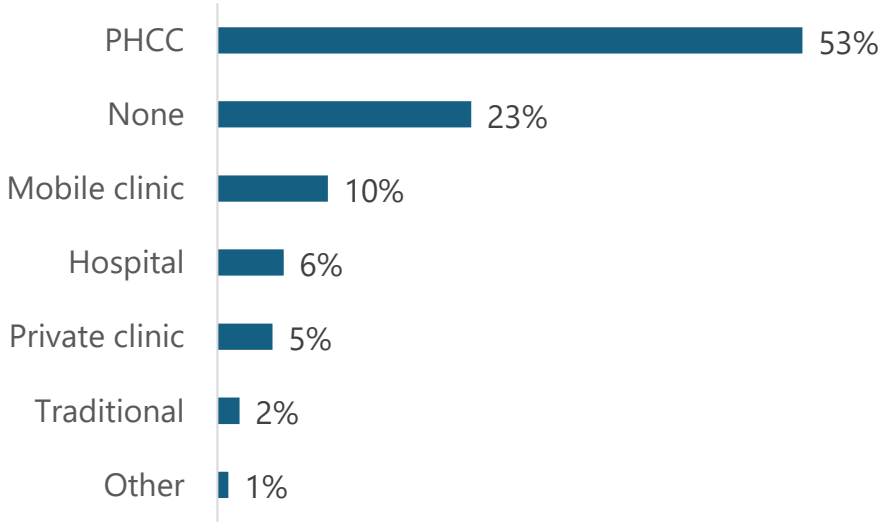
The substantial prevalence of diarrhoea (over half of reported illness cases) highlights ongoing challenges related to WASH conditions, including unsafe water, poor sanitation, and inadequate hygiene practices. Diarrhoeal disease remains a key driver of both acute morbidity and acute malnutrition, particularly through dehydration, nutrient loss, and reduced food intake. The

symptom profile among ill children aged 6–59 months indicates a triple burden of fever, diarrhoea, and respiratory infections, with fever being overwhelmingly predominant. This pattern strongly suggests a high transmission environment for infectious diseases, particularly malaria and waterborne illnesses. These conditions represent key drivers of acute malnutrition risk.

2.3: Health care seeking behavior reported by caretakers of sick children 6-59 months of age (N=129)

In Maiwut County, 34% of 378 children aged 6–59 months were reported ill in the two weeks prior to the survey, reflecting a morbidity pattern consistent with common childhood illnesses such as malaria, diarrhoea, and acute respiratory infections. Of the sick children, 85.2% were taken for treatment, mainly to Primary Health Care Centres (52.7%), followed by mobile clinics (10.1%) and hospitals (6.20%). A small proportion used private clinics (4.6%) or traditional healers (2.3%), while 23.3% received no care, indicating gaps in timely care-seeking and access, as seen from the graph below[21].

Figure 7 – Type of Treatment Sought



3. Nutrition and Health Program Coverage

Table 28 - Vaccination Results

		Vitamin A Supplementation (children 6–59 months) in the last 6 months		Deworming Treatment (children 12–59 months) in the last 6 months
	n	%	n	%
Vaccinated	482	94.5	393	92.5%

[21] Habtamu E, Chilo D, Desalegn D. *Determinants of wasting among children aged 6-59 months in Wonago woreda, south Ethiopia*. A facility-based unmatched case-control study. PLoS One. June 2022.

		(95% CI: 92.2-96.2)		(95% CI: 89.6-94.6)

Vitamin A supplementation coverage was assessed among 510 children aged 6–59 months. In Maiwut County, coverage was 94.5%, exceeding the WHO-recommended threshold of ≥80%, indicating high uptake of preventive nutrition services. Similarly, 92.5% of children received deworming treatment within the last six months, also surpassing the recommended 80% coverage standard[22].

Table 29 - Measles Vaccination Coverage for 9-59 months (N=480)

	Measles Vaccination (children 9–59 months)(with card)	**Measles Vaccination (children 9–59 months)(with card or confirmation from mother)**
YES Vaccinated	(No.128) 26.7% (95% C.I. 22.9- 30.8)	(No. 223) 46.5% (95% C.I. 42.0 – 50.9)

Measles vaccination coverage based on vaccination cards only was 26.8% (95% CI: 22.9–30.8%), indicating low documented immunization coverage. When including caregiver recall, coverage increased to 46.5% (95% CI: 42.0–50.9%).
The large discrepancy between card-based and recall-based estimates suggests poor documentation and low retention of vaccination cards, although it may also reflect underreported service uptake
Despite this adjustment, overall measles coverage remains well below the recommended ≥95% threshold for herd immunity, placing the population at significant risk of measles outbreaks.

3.1: Infant and Young Child Feeding Practice (IYCF)

Undernutrition remains one of the most significant underlying causes of child mortality globally, contributing to an estimated 2.7 million child deaths annually, or approximately 45% of all child deaths worldwide. This highlights the critical role of nutrition in child survival and overall public health outcomes, particularly in low-resource and emergency-affected settings.

Infant and Young Child Feeding (IYCF) practices are a central determinant of nutritional status and child survival. The period from birth to 24 months of age is recognized as a critical window of opportunity for growth, development, and prevention of irreversible damage. Optimal feeding practices during this period, including early initiation of breastfeeding, exclusive breastfeeding for the first six months of life, and timely, adequate, and safe complementary feeding thereafter, are essential to ensure healthy growth and development[23].

[22] Sphere, The Sphere Handbook, 2018.
[23] WHO, Infant and Young Child Feeding, December 2023.

Proxy IYCEF practices

Table 29 - Breastfeeding practices

S/N	Indicator		Age group	N	n	% (95% CI)
1	Ever breastfed		0-23 months	180	166	92.2% (87.3-95.7)
2.1	Early initiation of breastfeeding	Immediately	0-23 months	166	83	50.0% (42.2-57.9)
		First hour	0-23 months	166	57	34.3% (27.2-42.1)
2.2		First day	0-23 months	166	23	13.9% (9.0-20.1)
2.3		After first day	0-23 months	166	2	1.2% (0.2-4.3)
2.4		Never	0-23 months	166	1	0.6% (0.0-3.3)
3	Exclusive breastfeeding for the first 2 days		0-23 months	166	93	56.0% (48.1-63.7)
4	Continued breastfeeding		12-23 months	115	43	37.4% (28.6-46.9)
5	Bottle feeding		0-23 months	180	65	36.1% (29.1-43.6)

Ever Breastfed

When mothers were asked whether their children ever brestfed, out of 180 children surveyed, the results indicate that 92.2% (95% CI: 87.3–95.7) of children aged 0–23 months were ever breastfed, reflecting a high level of breastfeeding initiation and strong cultural acceptance of breastfeeding within the population. However, early initiation of breastfeeding remains suboptimal. Only 50.0% (95% CI: 42.2–57.9) of children were breastfed immediately after birth, while 34.3% (95% CI: 27.2–42.1) were initiated within the first hour, which is below recommended standards. A notable proportion of children experienced delayed initiation, with 13.9% starting within the first day and 1.2% after the first day, while a very small proportion (0.6%) were never breastfed.

Exclusive breastfeeding (EBF)

The World Health Organization Global Strategy for Infant and Young Child Feeding (IYCF) recommends exclusive breastfeeding for the first six months of life, as it provides infants with a safe, nutritionally complete, and readily available source of tailored to their developmental needs, Exclusive breastfeeding provides infants with a uniquely tailored, safe, and accessible food source, protecting them from a variety of health risks. Research indicates that infants in low- and middle-income countries who receive mixed feeding (both breast milk and other foods or liquids) before six months are nearly three times more likely to die than those who are exclusively breastfed[24]. Exclusive breastfeeding also protects against diarrhea, lower respiratory infections, acute otitis media, and childhood overweight and obesity.

[24] WHO, Guidelines on optimal feeding of low birth-weight infants in low- and middle-income countries, January 2011.

The findings from the Maiwut county shows that, 56.0% (n=93, (95% CI: 48.1-63.7) of children aged 0–5 months were exclusively breastfed. This figure is lower than the UNHCR's minimum standard for emergency contexts, which requires that at least 70% of infants aged 0–5 months be exclusively breastfed.

Continued breastfeeding

Continued breastfeeding is also vital during illness; while sick children often have little appetite for solid food, continued breastfeeding can help prevent dehydration while also providing the nutrients required for recovery.

Accordingly, children aged 12-23 months were assessed based on the recall period of the previous 24 hours and results showed high number of children or 37.4% (n=43, 95% CI: 28.6-46.9) had received continued breastfeeding compared against the collective target in 2030 by WHO to reach at least 80%[25].

Table 30 - Complementary feeding practices

S/N	Indicator	Age group	N	n	% (95% CI)
1	Introduction of solid, semi-solid or soft foods	6-8 months	30	11	36.7% (19.9-56.1)
2	Minimum dietary diversity	6-23 months	180	34	18.9% (13.5-25.4)
3.	Minimum meal frequency among breastfed and non-breastfed children (6-23 months	6-23 months	180	31	17.2% (12.0-23.6)
4	Minimum acceptable diet	6-23 months	180	13	7.2% (3.9-12.0)
5	Egg and/or flesh food Consumption	6-23 months	180	18	10.0% (6.0-15.3)
6	Sweet beverage consumption	6-23 months	180	53	29.4% (22.9-36.7)
7	Unhealthy food consumption	6-23 months	180	13	7.2% (3.9-12.0)
8	Zero vegetables or fruit Consumption	6-23 months	180	124	68.9%(24.4-38.4)

Minimum Dietary Diversity

WHO guiding principles recommend that children aged 6-23 months are fed a variety of foods to ensure that nutrient needs are met. Food group diversity is associated with improved linear growth in young children. A diet lacking in diversity can increase the risk of micronutrient deficiencies, which may have a damaging effect on children's physical and cognitive development[26].

In this regard, the survey findings showed that only 18.9% (n=34, 95% CI: 13.5% - 25.4%) of surveyed children received food from at least 5 of the 8 food groups (including breast milk) during

[25] WHO and United Nations International Children's Emergency Fund, Increasing commitment to breastfeeding through funding and improved policies and programmes—Global Breastfeeding Scorecard, 2019.
[26] WHO, Guiding principles for feeding non-breastfed children 6-24 months of age, January 2025.

the indicated recall period of 24 hours, as per IYCF guideline recommendation. These findings suggest that meals were likely not adequately diverse for most of the children aged 6-23 months, indicating limited nutrient diversity.

Minimum Acceptable Diet

The Minimum Acceptable Diet (MAD) is a measurement of how well children aged 6–23 months are fed. It is a combination of minimum dietary diversity and minimum meal frequency. According to the survey results in Maiwut, just 7.2% (n=13, 95% CI: 3.9-12.0) of surveyed children aged 6–23 months received a minimum acceptable diet, while 17.2% (n=31, 95% CI: 12.0-23.6) met the minimum meal frequency in the 24 hours prior to data collection.

4. Women's Nutritional Status by MUAC

Maternal malnutrition refers to the inadequate nutritional status of women during pregnancy and lactation, and remains a major public health concern in low- and middle-income settings due to its adverse effects on both maternal health and child growth and survival.

Among 84 PLW assessed, 23.8% (95% CI: 15.2–34.4%) were classified as acutely malnourished (GAM), while 76.2% (95% CI: 65.7–84.8%) were not malnourished. This indicates a critical public health concern, as approximately 1 in 4 PLW are affected by acute malnutrition, requiring urgent maternal nutrition interventions. The situation is compounded by low coverage of Targeted Supplementary Feeding Programs (20.2%), leaving the majority of PLW without adequate nutrition support. Most PLW were either pregnant or lactating, with a high proportion caring for infants under 6 months, further increasing nutritional vulnerability. These findings underscore the urgent need to scale up maternal nutrition interventions, strengthen TSFP coverage, and improve early identification and referral systems.

5. Water, Sanitation, and Hygiene (WASH).

The WASH conditions in the surveyed households were evaluated to provide a clearer picture of the current circumstances in Maiwut County.

5.1: The household's main source of drinking water.

The survey results show that households rely on a variety of drinking water sources, with 17.5% of respondents reporting boreholes or hand pumps as their main source, as summarized in Table 30 below.

Table 30 - Water Source

Indicator	Frequency	Percent	95% CI
Unprotected well	146	30.50%	26.5-34.7
Surface water	119	24.80%	21.2-28.9
Borehole	84	17.50%	14.4-21.2

Unprotected spring	43	9.00%	6.7-11.9
Piped Compound	23	4.80%	3.2-7.1
Tap	21	4.40%	2.9-6.6
Well spring	15	3.10%	1.9-5.1
Piped Dwelling	14	2.90%	1.8-4.9
Piped Neighbor	8	1.70%	0.9-3.3
Protected Well	4	0.80%	0.3-2.1
Rainwater collection	2	0.40%	0.1-1.5
Total	479	100.0%	100.0%

5.2: Access to improved and unimproved Water sources.

Only 32.2% of households reported access to improved water sources, while 67.9% relied on unimproved sources, indicating poor access to safe drinking water and heightened public health risks. This indicates that over two-thirds of households lack access to safe drinking water, which is a serious WASH concern. According to standards promoted by the World Health Organization and UNICEF[27], improved water access should be much higher to reduce public health risks.

Table 31 - Improve and Unimproved Water Sources

Indicator	Frequency	Percent	Cum. Percent
Improved	154	32.2%	28.1-36.5
Not Improved	325	67.9%	63.5-71.9
Total	479	100.0%	100.0%

5.3: Time taken to collect household water

Respondents were asked about the time spent collecting household water, including both travel and waiting time. The majority (67.0%) reported spending less than 30 minutes, indicating relatively good physical access to water sources. Additionally, 20.3% accessed water within their compound, while 12.1% spent between 30 minutes and 1 hour. Only a very small proportion (0.6%) reported spending between 1 hour and half a day, suggesting that prolonged water collection times are uncommon among the surveyed households (see Table Below).

Table 32 - Water Collect Time

Parameter	Frequency	Percent	95% CI
Inside Compound	97	20.30%	16.9-24.1
≤30 minutes	321	67.00%	62.7-71.1
30min < 1hr	58	12.10%	9.5-15.3
1hr < half day	3	0.60%	0.2-1.8

[27] WHO, Water Sanitation and Hygiene (WASH)—Impact, 2025.

Total	479	100.0%	100.0%

5.4: Water Treatment Methods

The findings indicate that the vast majority of households (90.6%) do not treat their drinking water before consumption. A small proportion reported boiling water (7.7%). Overall, water treatment practices remain very low among the surveyed households, suggesting a high potential risk of waterborne diseases (see Table below).

Table 33 - Water Treatment

Parameter	Frequency	Percent	95% CI
None	434	90.60%	87.7-92.9
Boil	37	7.70%	5.7-10.5
Filter Cloth	7	1.50%	0.7-3.0
Don't Know	1	0.20%	0.0-1.2
Total	479	100.0%	100.0%

5.5: Soap Access

The results reveal that access to soap among surveyed households is very limited. A large majority (82.5%) reported having no soap available. Only 5.2% of households had soap confirmed at the time of the survey, while 6.1% reported having soap that could not be verified. Additionally, 6.3% of respondents did not know or did not respond. Overall, these findings indicate critically low access to soap, which may negatively impact hygiene practices and increase the risk of disease transmission.

Table 34 - Soap Access

Parameter	Frequency	Percent	95% CI
None	395	82.50%	78.8-85.6
Don't Know	30	6.30%	4.4-8.8
Yes Not Confirmed	29	6.10%	4.3-8.6
Yes Confirmed	25	5.20%	3.6-7.6
Total	479	100.0%	100.0%

5.6: Latrine Access

The results show that access to sanitation facilities is extremely limited among surveyed households. Poor sanitation and hygiene are major contributing factors to malnutrition, particularly among children under five years of age. Inadequate access to sanitation facilities and poor hygiene practices increase exposure to faecal contamination, leading to a higher incidence of diarrheal diseases and intestinal parasitic infections.

These conditions, in turn, impair nutrient absorption and contribute to repeated episodes of illness, resulting in environmental enteric dysfunction (EED). EED reduces the efficiency of nutrient uptake in the gut, thereby compromising growth, immune function, and overall child

development. Consequently, poor WASH conditions create a direct and indirect pathway to both acute and chronic forms of malnutrition, reinforcing the cycle of growth faltering and increased vulnerability to disease[28].

The vast majority (92.1%) reported having no latrine and practicing open defecation. Only 5.6% had access to pit latrines with slabs, while 1.0% used shared latrines and another 1.04% relied on pit latrines without slabs. A negligible proportion (0.2%) did not know or did not respond. Overall, these findings highlight a critical sanitation gap and a high risk of sanitation-related diseases[29].

Table 35 - Latrine Access

Indicator	Frequency	Percent	95% CI
Open Defecation	441	92.1%	89.3-9.2
Pit with Slab	27	5.6%	3.9-8.08
Pit without Slab	5	1.0%	0.5-2.4
Shared Latrine	5	1.0%	0.5-2.3
Don't Know	1	0.2%	0.0-1.2
Total	479	100.0%	100.0%

This overwhelming reliance on open defecation indicates a critical level of environmental contamination, significantly increasing the risk of faecal-oral disease transmission, particularly diarrheal diseases, cholera outbreaks, and intestinal parasitic infections. In such contexts, the exposure of young children to contaminated environments contributes directly to recurrent infections, poor nutrient absorption, and increased risk of both acute and chronic malnutrition.

6. Household food security (FSL)

Household food security and livelihood (FSL) data were collected concurrently from the same households sampled for the survey to ensure consistency and enable triangulation of results. Standardized food security modules were administered at the household level alongside other survey components, capturing key indicators such as food consumption and livelihood coping behaviours. The use of a common sampling frame allowed for integrated analysis of food security outcomes within the broader SMART survey design, strengthening the interpretation of results in relation to nutritional status and underlying drivers of acute malnutrition.

6.1: Food Consumption Score (FCS)

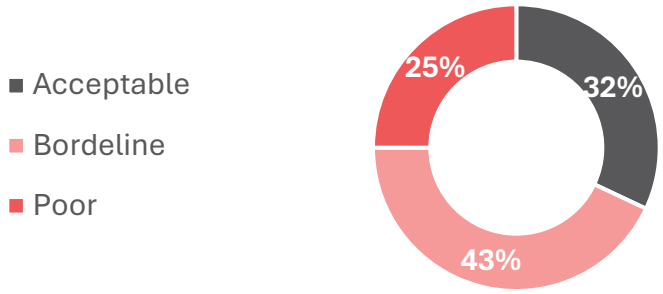
The Food Consumption Score (FCS) is a food security indicator that assesses household food consumption by considering the diversity, frequency, and nutritional value of foods consumed over a 7-day recall period. Based on this indicator, households are categorized into three

[28] Ntakarutimana, A., Kagwiza, J. N., Bushaija, E., Tumusiime, D. K., & Schuller, K. A. (2021). *Reduction of hygiene-related disease and malnutrition in Rwanda*. Journal of Social, Behavioral, and Health Sciences, 15, 76–86.
[29] WaterAid, Share, London School of Hygiene and Tropical Medicine, *Undernutrition and Water, Sanitation and Hygiene*, 2015.

groups: poor consumption (FCS = 0–21), borderline consumption (FCS = 21.5–35), and acceptable consumption (FCS > 35), following standards set by the World Food Programme.

Among the 421 households surveyed, only 32.3% (n=136) had acceptable food consumption, while the majority were classified as borderline (43.4%, n=182) and poor (24.5%, n=103). This indicates that nearly 67.7% of households have inadequate food consumption, highlighting widespread food insecurity and limited dietary diversity within the population.

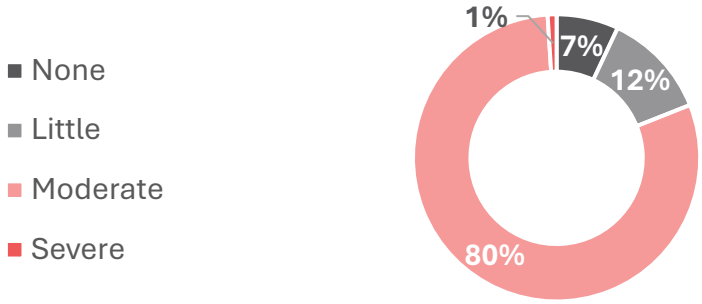
Figure 8 - Proportion of Households by Food Consumption Score (FCS) (n=421)



6.2 Household Hunger Scale (HHS)

According to standard HHS classification used in SMART surveys, households are grouped into three categories: no or little hunger (HHS 0–1), moderate hunger (HHS 2–3), and severe hunger (HHS 4–6). A 30-day (4-week or 1-month) recall period was used to assess the Household Hunger Scale, which consists of three questions measuring households' experiences of hunger at varying levels (never, rarely/sometimes, or often). As shown in the table below, the majority of households (79.8%) fell within the moderate hunger category, suggesting widespread experiences of food insecurity characterized by reduced meal quantity and quality, and occasional food-related hardship. A smaller proportion reported little hunger (11.9%), indicating relatively lower but still present food access constraints, while only (7.4%) report no hunger. A very small fraction of households (1%) were classified under severe hunger, reflecting extreme food deprivation experiences such as going without food or spending entire days without eating. Overall, the findings point to widespread moderate household-level food stress, with limited but notable pockets of severe deprivation, suggesting a food security situation characterized more by chronic access constraints than widespread extreme hunger.

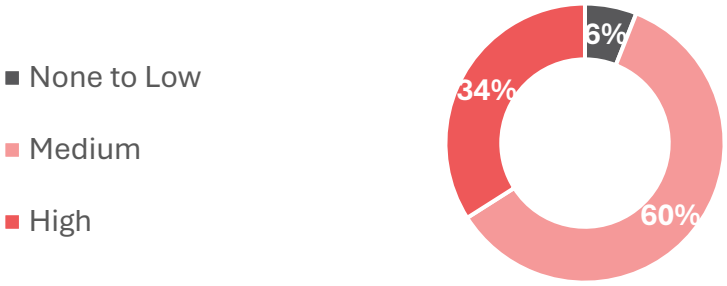
Figure 9 - Household Hunger Scale (HHS) (n=421)



6.3 Reduced Coping Strategy Index (rCSI)

The Reduced Coping Strategy Index (rCSI) findings indicate a high reliance on food-related coping mechanisms among households. The majority of households (59.86%) fall within the medium coping category, suggesting that households are regularly engaging in stress coping strategies, such as reducing meal portions or relying on less preferred foods. A substantial proportion (34.0%) is classified under high coping, reflecting severe stress on food access, where households are likely employing more extreme coping mechanisms that can negatively affect food consumption and livelihoods. Only 6.2% of households fall within the no to low coping category, indicating that very few households are able to meet their food needs without resorting to coping strategies.

Figure 10 - Reduced Coping Strategy Index (rCSI n=421)

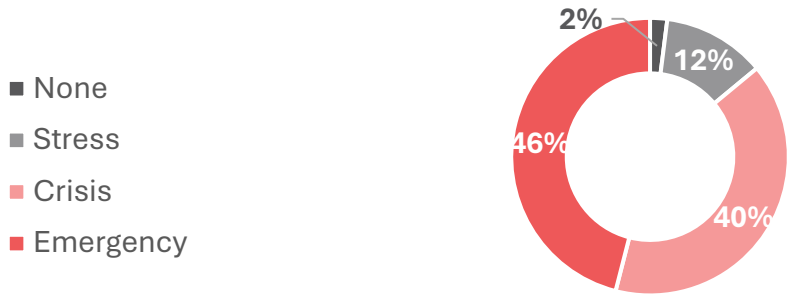


6.4: Livelihood Coping Strategies (LCS)

The Livelihood Coping Strategies results show that most households are relying on crisis (39.7%) and emergency (46.3%) coping strategies, with only a small proportion reporting no coping (1.9%) or stress-level coping (12.1%), indicating severe livelihood stress and depletion of coping capacity consistent with Crisis (IPC Phase 3) or worse conditions. This suggests widespread reliance on severe and often irreversible coping mechanisms such as asset stripping, distress

sales, and high-risk income generation to meet basic food and non-food needs.

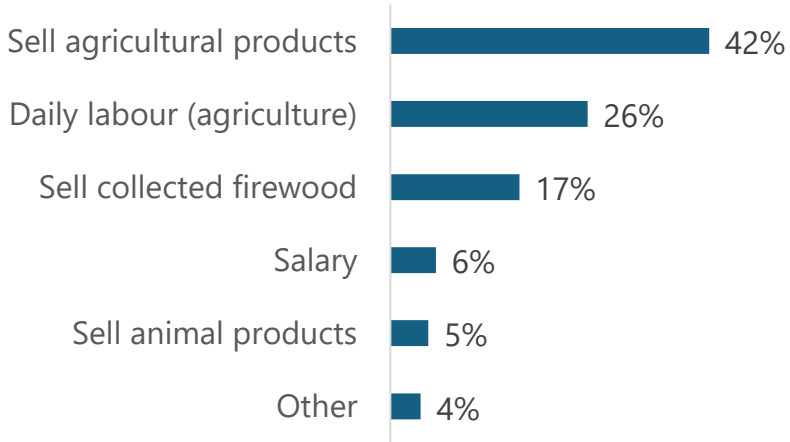
Figure 11 - Livelihood Coping Strategies (LCS) (n=421)



6.5: Household Income Source.

The data shows that most households rely on agriculture-related activities for income. The largest share comes from selling agricultural products (41.8%), followed by daily agricultural labor (25.7%) and selling collected goods like firewood or wild products (17.1%). Smaller proportions depend on salaries (6.4%) and selling animal products (5.2%). Very few households rely on trading (1.4%), other sources (1.2%), or skilled labor (0.7%), while remittances and humanitarian assistance (both 0.2%) contribute minimally.

Figure 12 - Household Income Source (n=421)



DISCUSSION

1. Nutritional status

The March 2026 SMART survey conducted in Maiwut County revealed a Global Acute Malnutrition (GAM) prevalence of 15.1% (95% CI: 11.2–20.0) based on WHZ and/or oedema, indicating a Critical nutrition situation according to the World Health Organization thresholds.

The Severe Acute Malnutrition (SAM) prevalence was 3.5% (95% CI: 2.0–6.0), further highlighting the severity of acute malnutrition in the county. The design effect of 1.8 was attributed to variations in malnutrition prevalence across clusters, with some clusters recording significantly higher malnutrition cases compared to others.

Compared to previous assessments, the current GAM prevalence is slightly higher than the December 2019 survey 11.5% (95% CI: 8.7–15.1), indicating a deterioration from a Serious to a Critical nutrition situation. However, due to the time gap between surveys, a statistical comparison was not conducted.

Analysis by age groups shows that both younger children (6–29 months) and older children (30–59 months) contributed equally to the burden of acute malnutrition. The prevalence was slightly higher among boys, although moderate wasting appeared similarly distributed between sexes.

MUAC-based estimates showed a lower GAM prevalence of 6.5% (95% CI: 4.6–9.1) and SAM of 1.2% (95% CI: 0.6–2.5), indicating that WHZ identified more cases of acute malnutrition than MUAC. The combined prevalence of GAM (WHZ and/or MUAC) was 18.1% (95% CI: 14.3–22.7), with SAM at 5.3% (95% CI: 3.5–8.0), reinforcing the importance of using both indicators for comprehensive screening.

The prevalence of underweight was 19.6% (95% CI: 16.0–23.7), classified as high according to WHO thresholds[30]. Stunting prevalence was 16.9% (95% CI: 13.8–20.6), categorized as low, this was calculated with a SD of 1, which is classified as medium severity (10 to < 20%, although the upper confidence interval falls within the medium range, indicating some uncertainty. Moderate stunting was 13.5%, while severe stunting was 3.4%. Stunting was higher among boys (18.3%) compared to girls (15.5%), suggesting possible gender-related disparities in chronic nutrition outcomes.

These findings reflect the combined effects of chronic and acute food insecurity, suboptimal infant and young child feeding practices, poor WASH conditions, and limited access to health services.

Despite the presence of humanitarian actors supporting nutrition, health, WASH, and food security interventions in Maiwut County, overall programme coverage remains limited relative to the scale of needs. The withdrawal of key partners, such as Samaritan's Purse (previously supporting WASH activities), raises concerns about the continuity of essential services, particularly in hard-to-reach and flood-prone areas. Given the high GAM prevalence and multiple underlying risk factors, any disruption in service delivery is likely to further exacerbate the already critical nutrition situation.

2. Mortality

The Crude Death Rate (CDR) was 0.38 deaths per 10,000 persons per day (95% CI: 0.22–0.65), indicating mortality levels below emergency thresholds. The Under-Five Death Rate (U5DR) was 0.40 deaths per 10,000 children per day (95% CI: 0.09–1.65), also below emergency levels, although the upper confidence interval suggests potential elevated risk among children under five. Overall, mortality findings do not indicate a critical or famine-level situation; however, they

[30] WHO, Malnutrition in Children.

should be interpreted alongside nutrition and food security indicators for a comprehensive IPC AMN classification.

Compared with the December 2019 SMART survey conducted by Action Against Hunger (ACF), the recent mortality findings indicate a slight improvement in the Crude Death Rate (CDR), while the Under-Five Death Rate (U5DR) remained relatively stable. The current survey recorded a CDR of 0.38 deaths per 10,000 persons per day (95% CI: 0.22–0.65), compared to 0.62 deaths per 10,000 persons per day (95% CI: 0.37–1.05) reported in December 2019. This suggests a reduction in overall mortality overtime.

Similarly, the current U5DR was 0.40 deaths per 10,000 children per day (95% CI: 0.09–1.65), which is comparable to the December 2019 ACF survey finding of 0.36 deaths per 10,000 children per day (95% CI: 0.09–1.49). Although the recent estimate is slightly higher, both results remain well below emergency thresholds, and the overlapping confidence intervals suggest that the difference may not be statistically significant. Overall, the mortality situation appears stable and below critical emergency levels.

3. Child Health and Program Coverage

Among children aged 6–59 months (n=129), 25.29% (95% CI: 21.72–29.24) were reported to have experienced at least one illness in the two weeks preceding the survey. This indicates that approximately one in four children had recently been ill, reflecting a moderate level of acute morbidity in the assessed population.

The observed morbidity level suggests a substantial and ongoing burden of common childhood illnesses, including diarrhoeal diseases, acute respiratory infections, and febrile illnesses. The relatively narrow confidence interval indicates that the estimate is statistically reliable, despite the modest sample size. However, 23.26% of sick children did not receive any care, indicating significant gaps in timely access to treatment. While care-seeking levels appear high, this does not necessarily reflect the quality, appropriateness, or timeliness of care received, which are critical factors in preventing complications and nutritional deterioration. Delayed or inadequate treatment may prolong illness duration and increase the risk of progression to acute malnutrition.

Vitamin A supplementation coverage among children aged 6–59 months was 94.51%, exceeding the WHO-recommended threshold of ≥80%, indicating strong performance of preventive nutrition services. Similarly, 92.47% of children received deworming treatment, also surpassing the recommended standard.

Measles vaccination coverage based on card verification alone was 26.67%, indicating low documented immunization coverage. When caregiver recall was included, coverage increased to 46.46%. The substantial discrepancy between card-based and recall-based estimates suggests poor documentation and low retention of vaccination cards, although it may also reflect underreporting of service utilization.

Despite this adjustment, overall measles vaccination coverage remains well below the WHO-recommended ≥95% threshold required for herd immunity. This places the population at significant risk of measles outbreaks, particularly in a context of high morbidity and vulnerability. Besides relatively strong coverage of Vitamin A supplementation and deworming, the persistence of high morbidity and low measles coverage highlights the need for integrated, multi-sectoral interventions addressing both immediate and underlying causes of malnutrition.

4. Infant and Young Child Feeding (IYCF) Practices.

Information on infant and young child feeding (IYCF) practices was collected in order to provide a snapshot of IYCF practices in the area. The results of the survey should therefore be interpreted with caution due to the small sample size. Although 56.02% of children under six months were exclusively breastfed, this falls short of the 70% minimum emergency standard[31] . Only 7.22% of children aged 6 – 23 months met the minimum acceptable diet (MAD), and 18.89% met minimum dietary diversity (MDD), indicating inadequate feeding quality and frequency, which might also contribute to the high rates of malnutrition. These low-level practices might be associated with poor or non-existent IYCF counselling at both health facility and community levels. Additionally, the lack of structured mother support groups or peer counselling networks may have contributed to limited promotion and support of exclusive breastfeeding. Furthermore, the absence or weak integration of IYCF messaging into routine nutrition, health, and protection services might have resulted in fragmented communication and insufficient reinforcement of optimal IYCF behaviors.

5. Causes of malnutrition

The nutrition situation is driven by a combination of inadequate dietary intake, disease burden, and systemic service delivery gaps, with PLW and infants most affected. Without urgent scale-up of integrated nutrition and health interventions, the situation is likely to worsen in the short term, particularly during seasonal stress periods.

6. WASH and Food Security

Water, Sanitation, and Hygiene (WASH) conditions in the surveyed population were extremely poor, with 90.61% of households not treating drinking water and 92.07% lacking access to safe sanitation facilities, leading to widespread open defecation. Only 5.22% of households had soap observed during household visits, indicating very limited hygiene capacity. These conditions significantly increase exposure to waterborne and hygiene-related diseases, particularly diarrhoeal illnesses, and act as major contributing factors to poor nutritional outcomes. As per the findings, the WASH situation represents a critical public health risk that likely exacerbates acute malnutrition and should be considered alongside nutrition and health indicators in IPC AMN analysis.

Food security conditions indicate significant vulnerability among households, with 43.2% reporting borderline or poor Food Consumption Scores (FCS), reflecting inadequate dietary

[31] UNHCR, Emergency Handbook, Designing nutrition programmes in emergencies, April 2025.

diversity and consumption gaps. The Household Hunger Scale shows that 79.8% of households experienced moderate hunger, while 7.4% reported severe or very severe hunger, indicating widespread food access constraints. Livelihood coping analysis further highlights stress, with 59.8% of households engaging in moderate coping strategies and 46.3% classified under emergency coping, suggesting the use of severe asset-depleting mechanisms. Agriculture is the primary livelihood source for 41.81% of households, indicating high dependence on rain-fed production and market-dependent income. These findings demonstrate substantial food insecurity stress, which likely contributes to elevated acute malnutrition levels and should be considered in IPC AMN classification alongside nutrition, mortality, and WASH indicators.

CONCLUSIONS

Based on the updated UNICEF/WHO classification, the prevalence of Global Acute Malnutrition (GAM) in Maiwut County is deemed "very high" at 15.1%, signaling a critical public health emergency that necessitates immediate and sustained intervention. This critical level of acute malnutrition requires the enhancement and expansion of treatment and preventive nutrition programs, particularly through the Community-Based Management of Acute Malnutrition (CMAM) services and community screening initiatives.

Food security indicators suggest significant food insecurity risks among households, as evidenced by poor dietary consumption patterns, limited diversity in food sources, and dependence on coping strategies. These unfavorable conditions impair nutrient intake and elevate risks of acute malnutrition, especially among children under five, pregnant, and lactating women.

The presence of high GAM rates, underweight, moderate stunting, and poor water, sanitation, and hygiene (WASH) conditions along with limited food access highlights the urgent need for an integrated, multi-sectoral response. Immediate actions should prioritize scaling up critical nutrition interventions, improving healthcare access, enhancing WASH infrastructure, and expanding food security and livelihood support, with a strategic focus on the most vulnerable demographics.

While current interventions are crucial, there is an imperative to broaden programmatic approaches to tackle chronic malnutrition, including underweight and stunting, by emphasizing preventive measures like Infant and Young Child Feeding (IYCF), maternal nutrition, and consistent growth monitoring.

Sustained implementation of integrated, multi-sectoral strategies is vital for addressing both immediate and underlying causes of malnutrition, such as high morbidity rates, inadequate diet, poor childcare practices, and unsafe water and sanitation conditions. Additionally, long-term solutions should prioritize access to essential services, resilient livelihoods, and strengthened social protection systems to mitigate structural vulnerabilities.

Moreover, emerging operational challenges related to funding shortages and potential service interruptions require urgent consideration, as they could severely affect the continuity of nutrition service delivery in critical areas like Maiwut. Ensuring uninterrupted services and effective transition strategies, alongside prompt responses by partners, is essential to avert exacerbation of malnutrition, health, and WASH metrics.

RECOMMENDATIONS & PRIORITIES

Sector	Problems Identified	Recommended Actions	Responsible Actors	Timeline
Nutrition	Critical level of acute malnutrition (GAM 15.1%, SAM 3.5%) among children 6–59 months	• The current nutrition interventions implemented by Relief International (RI) should be continued and scaled up to improve coverage. • Strengthening Community-Based Management of Acute Malnutrition (CMAM). Integrate OTP, TSFP, and SC services into a functional referral system. • Integrate Nutrition with Health Interventions. Strengthening Integrated Management of Childhood Illness (IMCI).	CHD, SMoH, WFP, UNICEF, Relief International (RI)	Short Term
	GAM prevalence of 6.5% by MUAC, which is "poor," falls in the category of (5-9). SAM is at 1.2 elevated risk of Mortality	• Community screening of under-fives, active case finding and defaulter tracing should be improved by the community nutrition workers and volunteers attached at the primary healthcare centers. • Ensure Quality Treatment Services (CMAM). Monitor key performance indicators (cure, default, death rates) against Sphere Association benchmarks[32] • Ensure uninterrupted supplies of RUTF, RUSF, and essential medicines	SMoH, MoA, WFP, NGOs (RI).	Medium to Long term
	High underweight (19.6%) and moderate stunting (16.9%) prevalence.	• Scale up Community-Based Management of Acute Malnutrition (CMAM), Ensure full coverage of OTP and TSFP services, with active case finding through MUAC screening at the community level.	SMoH, MoA, WFP, NGOs	Medium to Long term

[32] Sphere, The Sphere Handbook, 2018.

		• Strengthen routine screening, conduct regular MUAC and weight-for-age screening at community and facility levels to identify underweight children early. • Promote dietary diversity at the household level, Support access to nutrient-rich foods (animal protein, fruits, vegetables) through behavior change and food assistance where needed.		
IYCF	Suboptimal IYCF practices (e.g., MAD=7.22%, MDD=18.89% EBF=56.02)	• Strengthen Infant and Young Child Feeding (IYCF) interventions through intensified community-based awareness campaigns, mother-to-mother support groups, and routine counselling at health facility and outreach levels to promote optimal breastfeeding and complementary feeding practices. • Emphasis should be placed on improving Minimum Acceptable Diet (MAD) and Minimum Dietary Diversity (MDD) through nutrition education on locally available foods, appropriate meal frequency, and dietary diversification for children 6–23 months. In addition, efforts should be made to protect and promote exclusive breastfeeding (EBF) through continuous caregiver sensitization, engagement of community leaders, and integration of IYCF messaging into all maternal and child health services. • Targeted support for vulnerable households, especially during lean seasons, should also be considered to improve access to diverse and nutritious foods.	CHD, SMoH, UNICEF, WFP, Relief International.	Medium to Long term
WASH	Poor WASH conditions (90.61% no water treatment, 92.07% no latrine	• Immediate life-saving interventions focus on enhancing emergency water treatment through the distribution of chlorine tablets and filters, to improve access to safe drinking water.	UNICEF, WHO, CHD, SMoH, WASH Cluster partners	Short to Medium term, Immediate WASH interventions.

	access, 82.46% no soap)	• Strengthen awareness raising to the community on the dangers of open defecation and encourage the community members to dig a pit latrine at the household level. • Hygiene promotion through Social and Behavior Change Communication (SBCC) focuses on ongoing campaigns for handwashing after defecation, safe disposal of child feces, and safe water management. Community-Led Total Sanitation (CLTS) encourages community initiatives to eliminate open defecation and promote latrine usage. • Construct or rehabilitate household latrines, particularly in vulnerable or flooded areas.		
FSL	Moderate food insecurity (43.36% borderline or 24.47% poor FCS, 11.88% moderate hunger)	• Immediate food assistance is crucial and should focus on targeted support for households with poor and borderline Food Consumption Scores (FCS) through in-kind or cash/voucher assistance. • Priority must be given to nutritionally vulnerable groups, including households with children under five, pregnant and lactating women, and those already affected by malnutrition. • The aim should be to ensure diet quality by providing access to diverse and nutrient-rich foods, such as pulses and fortified foods, along with animal-source foods when feasible.	WFP, MoA, FAO, NGOs	Short to Medium term
	Risk of service disruptions due to the implementing partners' funding constraints, such as Samaritan	• The withdrawal of key partners in fragile contexts represents a critical shock to service delivery systems, particularly in hard-to-reach areas. • Ensuring continuity of life-saving interventions must be treated as a top priority within IPC-aligned response planning.	SMoH, UNICEF, WFP, Nutrition Cluster, WASH cluster, and FLS cluster	Immediate to short-term

	Purse's withdrawal from Maiwut County.	• Pre-position essential supplies, ensure availability of RUTF, supplementary foods, essential medicines, and WASH supplies prior to transition.		

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We sincerely acknowledge the support of the American people through the United States Agency for International Development (USAID) under its lifesaving humanitarian assistance programming for their financial support, which enabled Relief International, with technical support from REACH, to conduct this SMART survey. USAID's contribution was instrumental in enabling timely data collection, analysis, and evidence generation to inform response interventions in priority areas.

Special appreciation is extended to our implementing partner, Relief International, for hosting the REACH staff member, providing administrative and logistical support, ensuring internet access for data uploads, and availing a training venue free of charge. We further recognize the contributions of Mr. Santino Chiok Simon Diing (Health and Nutrition Coordinator), the MEAL team, nutrition staff, and the United Nations Children's Fund Nutrition Consultant for Upper Nile State, Mr. Benson Atukolo, for their technical input and support in enumerator selection.

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We are immensely grateful to the communities of Maiwut County, including village chiefs and all randomly selected participants, for their cooperation and willingness to take part in this survey. Their openness and engagement were essential to the successful completion of this assessment. We extend our sincere appreciation to mothers and caregivers who generously gave their time to respond to the questionnaires and allowed their children to be assessed, often while managing demanding household responsibilities. Their participation and trust form the foundation of the evidence generated through this exercise.

Finally, we commend all survey participants, supervisors, team leaders, enumerators, security focal points in Juba, and drivers whose dedication ensured the successful collection of high-quality data, even in remote areas requiring extensive travel.

APPENDICES

Appendix 1:Plausibility check

Maiwut County SMART survey Plausibility Report

Plausibility check for: SSD_202603_REACH_MAIWUT_ENA.as

Standard/Reference used for z-score calculation: WHO standards 2006

(If it is not mentioned, flagged data is included in the evaluation. Some parts of this plausibility report are more for advanced users and can be skipped for a standard evaluation)

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	**5** (3.2 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.824)
Age ratio(6-29 vs 30-59)	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.325)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (4)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (11)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (4)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>=1.20	
.				and	and	or	
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	**0** (1.09)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (-0.10)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**1** (-0.28)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**3** (p=0.001)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**11** %

The overall score of this survey is 11 %, this is good.

Appendix 2: Villages visited during the SMART survey

Assignment of Clusters

Payam (if known)	Boma (if known)	Village/Area/ Cluster Name	Population Estimate (individuals)	Cluster #
Maiwut	Lolieng	Telecentre	1128	1
Maiwut	Parish	Noor	1466	2
Maiwut	Charjekow	Kulong	2846	3
Maiwut	Matar	Matar	2139	4
Maiwut	Riangerup	Riangerup	2191	5
Maiwut	Maiwut 2	Maiwut2 centre	1488	6
Pagak	Pagaak	Pagak center	1463	7
Pagak	Pagaak	Chuiy	508	8
Pagak	Lerpiny	Lerpiny	1027	9
Pagak	Majiok	Majiok	1324	10
Pagak	Majiok	Gar	3520	11
Pagak	Matar	Udier	1021	12
Pagak	Merdiet	Wunthow	872	13
Uleng	Uleng	Uleng centre	1927	14
Uleng	Uleng	Langkey	1423	15
Uleng	Uleng	Machar	903	16
Uleng	Taang	Tur	1882	17
Uleng	Malek	Malek centre	3132	18
Uleng	Malek	Bek	2947	19
Uleng	Malek	Wachkal	934	20
Uleng	Wunhol	Wunhol centre	1934	21
Jotome	Jotome	Jotome centre	1952	22
Jotome	Jotome	Tach	901	23
Jotome	Wor	Wor centre	2541	24
Jotome	Wor	Kukjil	827	25
Jotome	Wunkir	Wunkir centre	5015	26,27
Jotome	Rol	Rol centre	1340	28
Jotome	Nyengore	Nyengore centre	3584	29
Jotome	Nyengore	Rotut	670	30
Kigile	Abajabi	Baibor	980	31
Kigile	Abajabi	Kalgit	1262	32
Kigile	Katen	Patuak	841	33

Kigile	Kutino	Malpaday	1312	34
Kigile	Maiwut Two	Raskor	1127	35
Kigile	Maiwut Two	Kuswar	784	36
Jekow	Lolnyang	Rok	650	37
Jekow	Tombore	Tombore	693	38
Jekow	Naktung	Nyongnyalgok	815	39
Jekow	Lorwie	Tuch	388	40

Appendix 3: Standardization Test Results

Standardisation test results					Precision				Accuracy		OUTCOME			
Weight		subjects	mean	SD	max	Technical error	TEM/mean	Coef of reliability	Bias from superv	Bias from median			From	From
		#	kg	kg	kg	TEM (kg)	TEM (%)	R (%)	Bias (kg)	Bias (kg)			Supervisor	Median
	Supervisor	10	10.6	2.9	0.1	0.05	0.5	100	0	0.08	TEM acceptable	R value good	Bias good	Bias acceptable
	Enumerator 1	10	10.6	2.9	0.2	0.08	0.7	99.9	0.12	0.08	TEM acceptable	R value good	Bias poor	Bias acceptable
	Enumerator 2	10	10.6	2.8	0.2	0.06	0.6	100	0.14	0.08	TEM acceptable	R value good	Bias poor	Bias acceptable
	Enumerator 3	10	10.6	2.9	0.2	0.09	0.8	99.9	0.10	0.07	TEM acceptable	R value good	Bias poor	Bias acceptable
	Enumerator 4	10	10.5	2.9	0.7	0.16	1.5	99.7	0.13	0.07	TEM poor	R value good	Bias poor	Bias acceptable
	Enumerator 5	10	10.6	2.9	0.7	0.25	2.4	99.2	0.14	0.13	TEM reject	R value good	Bias poor	Bias poor
	Enumerator 6	10	10.6	2.9	0.2	0.09	0.9	99.9	0.14	0.14	TEM acceptable	R value good	Bias poor	Bias poor
	Enumerator 7	10	9.8	3.6	14.2	3.18	32.3	22.5	0.83	0.77	TEM reject	R value reject	Bias reject	Bias reject
	Enumerator 8	10	10.6	2.9	0.3	0.11	1.1	99.9	0.17	0.13	TEM poor	R value good	Bias poor	Bias poor
	Enumerator 9	10	10.6	2.9	0.2	0.09	0.8	99.9	0.12	0.10	TEM acceptable	R value good	Bias poor	Bias acceptable
	Enumerator 10	10	10.6	2.9	0.8	0.24	2.2	99.3	0.16	0.13	TEM reject	R value good	Bias poor	Bias poor
	enum inter 1st	10x10	10.6	2.8	-	0.14	1.3	99.8	-	-	TEM acceptable	R value good		
	enum inter 2nd	10x10	10.5	3	-	1.44	13.7	77.4	-	-	TEM reject	R value reject		
	inter enum + sup	11x10	10.5	2.9	-	0.76	7.2	89.6	-	-	TEM reject	R value reject		
	TOTAL intra+inter	10x10	-	-	-	1.44	13.7	75.7	-	-	TEM reject	R value reject		
	TOTAL+ sup	11x10	-	-	-	1.37	13.1	77.8	-	-	TEM reject	R value reject		
Height		subjects	mean	SD	max	Technical error	TEM/mean	Coef of reliability	Bias from superv	Bias from median			From	From
		#	cm	cm	cm	TEM (cm)	TEM (%)	R (%)	Bias (cm)	Bias (cm)			Supervisor	Median
	Supervisor	10	88.8	11.2	0.4	0.13	0.1	100	0	2.04	TEM good	R value good	Bias good	Bias reject
	Enumerator 1	10	87.1	12.5	0.8	0.19	0.2	100	2.24	0.6	TEM good	R value good	Bias reject	Bias acceptable
	Enumerator 2	10	86.9	12.5	0.4	0.14	0.2	100	2.6	0.5	TEM good	R value good	Bias reject	Bias acceptable
	Enumerator 3	10	89.2	10.7	0.8	0.25	0.3	99.9	2.93	2.37	TEM good	R value good	Bias reject	Bias reject
	Enumerator 4	10	86.8	12.6	0.4	0.11	0.1	100	2.42	0.45	TEM good	R value good	Bias reject	Bias acceptable
	Enumerator 5	10	87.0	12.4	1.3	0.36	0.4	99.9	2.61	0.48	TEM good	R value good	Bias reject	Bias acceptable
	Enumerator 6	10	87.2	12.4	0.5	0.16	0.2	100	2.14	0.4	TEM good	R value good	Bias reject	Bias good
	Enumerator 7	10	87.0	12.4	0.5	0.16	0.2	100	2.34	0.21	TEM good	R value good	Bias reject	Bias good
	Enumerator 8	10	86.6	13.5	10.6	2.40	2.8	96.8	2.86	0.86	TEM reject	R value acceptabl	Bias reject	Bias poor
	Enumerator 9	10	87.9	12.1	0.8	0.21	0.2	100	1.61	1.25	TEM good	R value good	Bias reject	Bias poor
	Enumerator 10	10	87.0	12.9	10.1	3.24	3.7	93.7	3.4	1.41	TEM reject	R value poor	Bias reject	Bias reject
	enum inter 1st	10x10	87.2	12.1	-	2.6	3	95.4	-	-	TEM reject	R value acceptable		
	enum inter 2nd	10x10	87.3	12.2	-	2.81	3.2	94.7	-	-	TEM reject	R value poor		
	inter enum + sup	11x10	87.4	12.1	-	2.78	3.2	94.8	-	-	TEM reject	R value poor		
	TOTAL intra+inter	10x10	-	-	-	2.99	3.4	93.9	-	-	TEM reject	R value poor		
	TOTAL+ sup	11x10	-	-	-	3.04	3.5	93.6	-	-	TEM reject	R value poor		
MUAC		subjects	mean	SD	max	Technical error	TEM/mean	Coef of reliability	Bias from superv	Bias from median			From	From
		#	mm	mm	mm	TEM (mm)	TEM (%)	R (%)	Bias (mm)	Bias (mm)			Supervisor	Median
	Supervisor	10	136.6	10.4	2	0.95	0.7	99.2	0	1.40	TEM good	R value good	Bias good	Bias acceptable
	Enumerator 1	10	135.9	9.8	3	1.07	0.8	98.8	1.15	1.89	TEM good	R value acceptabl	Bias acceptable	Bias acceptable
	Enumerator 2	10	136.9	9.0	3	0.81	0.6	99.2	1.97	0.84	TEM good	R value good	Bias acceptable	Bias good
	Enumerator 3	10	136.0	9.6	4	1.26	0.9	98.3	2.60	1.78	TEM good	R value acceptabl	Bias poor	Bias acceptable
	Enumerator 4	10	137.1	8.8	1	0.59	0.4	99.5	2.01	1.03	TEM good	R value good	Bias poor	Bias acceptable
	Enumerator 5	10	137.4	9.6	3	0.95	0.7	99.0	2.10	1.40	TEM good	R value good	Bias poor	Bias acceptable
	Enumerator 6	10	137.1	9.4	3	1.07	0.8	98.7	2.56	1.59	TEM good	R value acceptabl	Bias poor	Bias acceptable
	Enumerator 7	10	136.3	9.9	8	2.32	1.7	94.5	1.26	0.96	TEM acceptable	R value poor	Bias acceptable	Bias good
	Enumerator 8	10	134.7	7.0	5	1.58	1.2	94.8	3.13	2.10	TEM good	R value poor	Bias reject	Bias poor
	Enumerator 9	10	135.1	8.1	6	1.99	1.5	94.0	2.96	2.06	TEM good	R value poor	Bias poor	Bias poor
	Enumerator 10	10	138.4	11.6	20	5.76	4.2	75.2	2.40	2.81	TEM reject	R value reject	Bias poor	Bias poor
	enum inter 1st	10x10	136.6	9.3	-	3.15	2.3	88.5	-	-	TEM poor	R value reject		
	enum inter 2nd	10x10	136.4	9.1	-	2.9	2.1	89.9	-	-	TEM poor	R value reject		
	inter enum + sup	11x10	136.5	9.3	-	2.95	2.2	89.7	-	-	TEM poor	R value reject		
	TOTAL intra+inter	10x10	-	-	-	3.77	2.8	83.1	-	-	TEM reject	R value reject		
	TOTAL+ sup	11x10	-	-	-	3.66	2.7	84.4	-	-	TEM reject	R value reject		
Suggested cut-off points for acceptability of measurements														
Parameter		MUAC mm	Weight Kg	Height cm										
individual	good	<2.0	<0.04	<0.4										
TEM	acceptable	<2.7	<0.10	<0.6										
(intra)	poor	<3.3	<0.21	<1.0										
	reject	>3.3	>0.21	>1.0										
Team TEM	good	<2.0	<0.10	<0.5										
(intra+inter)	acceptable	<2.7	<0.21	<1.0										
and Total	poor	<3.3	<0.24	<1.5										
	reject	>3.3	>0.24	>1.5										
R value	good	>99	>99	>99										
	acceptable	>95	>95	>95										
	poor	>90	>90	>90										
	reject	<90	<90	<90										
Bias	good	<1	<0.04	<0.4										
	acceptable	<2	<0.10	<0.8										
	poor	<3	<0.21	<1.4										

Appendix 4: Maiwut Local Calendar of Events – January 2026

MONTH OF YEAR	ANNUAL SEASONS	2021	2022	2023	2024	2025	2026
January	*New year and CPA 9th Celebration*		50	38	26	14	2
			Cattle migration to the riverside	*Cattle migration to the riverside*	*Cattle migration to the riverside*	*Cattle migration to the riverside*	*Appointment of CHD, and* Wildfire along the Pagak road that killed 7 people
Feb.	Long Dry Spell		49	37	25	13	1
			Dry Spell and VASD campaign	Dry Spell and VASD campaign	Dry Spell and VASD campaign, and Nuer Christian Youth Conference	Dry Spell and VASD campaign, and SDA Music Convention	Dry Spell and VASD campaign, and fighting in Dajo and the Polio Case.
March			48	36	24	12	0
			Land preparation and dry season	Land preparation and dry season	Land preparation and dry season	Land preparation and dry season	Land preparation and dry season
April	*Easter Holidays*	59	47	35	23	11	
		Beginning of Rainy Season and Cultivation	*Beginning of Rainy Season and Cultivation*	*Beginning of Rainy Season and Cultivation*	*Beginning of Rainy Season and Cultivation*	*Cultivation and Cholera Outbreak, and Election of Chiefs and Sub Chiefs*	
May	SPLA/M Day and Labor Day	58	46	34	22	10	
		SPLA/M Day and Labor Day	SPLA/M Day and Labor Day	SPLA/M Day and Labor Day, and the death of Elder Joak Nyout	SPLA/M Day and Labor Day	SPLA/M Day and Labor Day	
June		57	45	33	21	9	
		Farm Cultivation and Weeding	*Farm Cultivation and Weeding*	*Farm Cultivation and Weeding*	*Farm Cultivation and Weeding*	*Farm Cultivation and Weeding*	
July	*South Sudan Independence Day and Martyrs Day*	56	44	32	20	8	
		Martyrs Day	*Martyrs Day*	*Martyrs Day*	*Martyrs Day, and severe famine*	*Martyrs Day*	
August		55	43	31	19	7	
		Flooding	Flooding	Flooding	*flooding*	Harvesting	
September		54	42	30	18	6	
		Harvesting of crops	*Harvesting of crops and heavy flooding*	*Harvesting of crops*	*Harvesting of crops*	*Harvesting of crops and Appointment of UNS governor.*	
October	*St Daniel Comboni Day*	53	41	29	17	5	
		St Daniel Comboni Dayand the death of livestock	*St Daniel Comboni Day*	*St Daniel Comboni Day*	*General food distribution*	*St Daniel Comboni Day*	
November		52	40	28	16	4	

MONTH OF YEAR	ANNUAL SEASONS	2021	2022	2023	2024	2025	2026
		Death of livestock	Death of Livestock		Heavy Flooding		
December	*Christmas Celebration*	51	39	27	15	3	
		Measles and Polio Campaigning	*Measles and Polio Campaigning*	*VASD campaign, and Appointment of Commissioner*	*Measles and Polio Campaigning, and*	*Measles and Polio Campaigning, and*	

Appendix 5: Maps of the area