

Standardized Monitoring and Assessment of Relief & Transition (SMART) survey report in Akoka County, Upper Nile State

South Sudan | June 2026

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Donors:



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List of acronyms

AFI:	Acute Food Insecurity
AMN:	Acute Malnutrition
CDC:	Centers for Disease Control and Prevention
CFR:	Crude Fatality Rate
CHD:	County Health Department
CM:	Centimeters
CI:	Confidence interval
CMR:	Crude Mortality Rate
CSRF:	Conflict Sensitivity Resource Facility
DEFF:	Design Effect
ENA:	Emergency Nutrition Assessments
EIBF:	Early Initiation of Breastfeeding
EBF:	Exclusive Breastfeeding
EPI:	Expanded Program on Immunization
FANTA:	Food and Nutrition Technical Assistance Project
FCDO:	Foreign, Commonwealth and Development Office
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
HQ:	Headquarters
HSTP:	Health Sector Transformation Project
IPC:	Integrated Phase Classification
IPC-AMN:	Integrated Phase Classification – Acute Malnutrition
IRNA:	Inter-Agency Rapid Needs Assessment
IYCF:	Infant and Young Child Feeding
JMP:	Joint Monitoring Programme (WHO/UNICEF)
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
NBeG:	Northern Bahr El Ghazal
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)
SIDA:	Swedish International Development Agency
SMART:	Standardized Monitoring and Assessment of Relief and Transitions
SMOH:	State Ministry of Health
SPHERE:	Sphere Handbook
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
Vit A:	Vitamin A
WASH:	Water Sanitation and Hygiene
WAZ:	Weight for Age Z Scores
WFH:	Weight for Height
WHO:	World Health Organization
WHZ:	Weight for Height Z Scores

Executive Summary

Between June 11 and 16 of 2026, a SMART survey was conducted across all five Payams (Benthiang, Riang, Rom, Baichan and Akoka) in Akoka County, Upper Nile State, South Sudan. The survey employed a two-stage probability sampling that ensures representativeness of the target population: first, villages were identified using the probability proportional to population size (PPS) method of cluster sampling, then, households were selected using simple random sampling.

Anthropometric data was collected from 388 children aged 6-59 months from 320 households in 32 clustered villages in Akoka County and their nutritional status analyzed. Since the final sample size exceeded the minimum 309 children required as per the applied sampling methodology in the validated protocol, there was no need to activate any reserve clusters.

The Global Acute Malnutrition (GAM) prevalence based on weight for height z score (WHZ) and/or Oedema was estimated at 28.8% (95% CI: 23.7 – 34.4), placing the county in a critical but very close to catastrophe phase according to WHO thresholds and IPC AMN classification.

Severe Acute Malnutrition (SAM) was recorded at 9.8% (95% CI: 6.5 – 14.3). The nutrition situation remains precarious, with the GAM level having deteriorated within the same phase reported in the recent FSNMS Round 31 survey conducted in July 2025 (27.8% 95% CI: 19.3 – 38.2 GAM), signaling a worsening trend in acute malnutrition in the county.

The Crude Mortality Rate (CMR) was 1.18 per 10,000 persons per day (95% CI: 0.69 – 2.01) well above the emergency threshold signaling a concerning public health crisis in the county whereas and the Under-5 Mortality Rate (U5MR) was 1.16 (95% CI: 0.41 – 3.21), which below emergency thresholds but indicative of a worse situation combined with the nutritional status.

Table 1: Executive summary table

Category	Indicator	n	Total	(%) (95% CI)
Wasting	Prevalence of global malnutrition by WHZ (<-2 z-score and/or oedema)	109	379	28.8 (23.7 – 34.4)
	Prevalence of severe malnutrition (<-3 z-score and/or oedema)	38	379	9.8 (6.5 – 14.3)
	Prevalence of global malnutrition by MUAC (< 125 mm and/or oedema)	58	388	14.9 (9.5 – 22.8)
	Prevalence of severe malnutrition (< 115 mm and/or oedema)	14	388	3.6 (1.8 – 6.9)
	Prevalence of combined GAM (WHZ <-2 and/or MUAC < 125 mm and/or oedema)	133	388	34.3 (27.9 – 41.3)
	Prevalence of combined SAM (WHZ < -3 and/or MUAC < 115 mm and/or oedema)	49	388	12.6 (8.7 – 18.0)
Stunting	Prevalence of stunting (<-2 z-score)	NA	NA	6.2 calculated with SD of 1
Underweight	Prevalence of underweight (<-2 z-score)	82	384	21.4 (16.3 – 27.4)

	Prevalence of severe underweight (<-3 z-score)	22	384	5.7 (3.4 – 9.4)
Mortality	Crude Mortality Rate (Deaths/10,000 people/day)	22	1903	1.18 (0.69 – 2.01)
	Under-5 Mortality Rate (Deaths/10,000 children U5/day)	5	440	1.16 (0.41 – 3.21)
Nutrition and Health Service Coverage	Measles card + mother confirmation (9-59 months)	205	372	55.1 (50.0 – 60.1)
	De-worming (children 12-59 months)	180	347	51.9 (46.6 – 57.1)
	Vitamin A Supplementation (6-59 months)	196	386	50.8 (45.8 – 55.7)
Maternal Nutrition	Pregnant and Lactating Women (PLW) GAM	38	390	9.7 (7.2 – 13.1)
IYCF Indicators				
Breastfeeding indicators	Ever breastfed (0-23 months)	86	92	93.5 (86.5 – 97.0)
	Early initiation of breastfeeding (0-23 months)	40	92	43.5 (33.8 – 53.7)
	Exclusive breastfeeding under 6 months (0-5 months)	31	92	33.7 (24.9 – 43.8)
	Continued breastfeeding (12-23 months)	72	80	90.0 (81.5 – 94.8)
Complementary feeding practices	Minimum dietary diversity 6–23 months	35	86	40.7 (30.9 – 51.3)
	Minimum meal frequency 6–23 months	9	86	10.5 (5.6 – 18.7)
	Minimum acceptable diet 6–23 months	3	86	3.5 (1.2 – 9.8)
	Egg and/or flesh food consumption 6–23 months	48	86	55.8 (45.3 – 65.8)
	Sweet beverage consumption 6–23 months	17	86	19.8 (12.7 – 29.4)
	Zero vegetable or fruit consumption 6–23 months	63	86	73.3 (63.1 – 81.5)
Food Security and Livelihoods	Food Consumption Score			
	Acceptable	86	318	27.0 (22.5 – 32.2)
	Borderline	144	318	45.3 (39.9 – 50.8)
	Poor	88	318	27.7 (23.0 – 32.8)
	Household Hunger Scale			
	None	2	318	0.6 (0.2 – 2.3)
	Little	9	318	2.8 (1.5 – 5.3)
	Moderate	242	318	76.1 (71.1 – 80.5)
	Severe	43	318	13.5 (10.2 – 17.7)
	Very Severe	22	318	6.9 (4.6 – 10.3)
	Livelihood Coping Strategies			
	None	3	318	0.9 (0.3 – 2.7)
	Stress	0	318	0.0 (0.0 – 1.2)
	Crisis	5	318	1.6 (0.7 – 3.6)

	Emergency	310	318	97.5 (95.1 – 98.7)
WASH	Water Sources (Improved and unimproved)			
	Improved	100	318	31.4 (26.6 – 36.7)
	Not Improved	218	318	68.6 (63.3 – 73.4)
	Time to collect water			
	Inside the compound	8	318	2.5 (1.3 – 4.9)
	Under 30 minutes	91	318	28.6 (23.9 – 33.8)
	30 minutes to 1 hour	85	318	26.7 (22.2 – 31.9)
	1 hour to half day	131	318	41.2 (35.9 – 46.7)
	Half day	2	318	0.6 (0.2 – 2.3)
	Treatment method			
	boiling	13	318	4.1 (2.4 – 6.9)
	none	305	318	95.9 (93.1 – 97.6)
	Latrine usage			
	Pit latrine with slab	26	318	8.2 (5.6 – 11.7)
	Pit latrine without slab	47	318	14.8 (11.3 – 19.1)
	Shared latrine	5	318	1.6 (0.7 – 3.6)
	None / open defecation	240	318	75.5 (70.5 – 79.0)
	Soap Access			
	Yes, confirmed	7	318	2.2 (1.1 – 4.5)
	Yes, not confirmed	4	318	1.3 (0.5 – 3.2)
	None	307	318	96.5 (93.9 – 98.1)

Introduction

South Sudan, the world's youngest country since its independence in 2011, has faced recurrent conflict, displacement, climatic shocks, disrupted livelihoods, and chronically high levels of acute food insecurity and malnutrition since the onset of the civil war in 2013. Although the signing of the Revitalized Agreement on the Resolution of the Conflict in the Republic of South Sudan (R-ARCSS) in 2018 improved humanitarian access in several parts of the country, the humanitarian situation remains fragile and continues to deteriorate in many areas due to ongoing conflict, economic instability, flooding, disease outbreaks, and large-scale displacement.¹ According to the most recent IPC Projection Update (April–July 2026), approximately 7.8 million people — representing 55 % of the analyzed population — are projected to face IPC Acute Food Insecurity (AFI) Phase 3 or above (Crisis or worse), including 73,000 people in IPC Phase 5 (Catastrophe). Additionally, approximately 2.2 million children aged 6–59 months are estimated to be acutely malnourished and in need of treatment between July 2025 and June 2026, while around 1.2 million pregnant and breastfeeding women require treatment for acute malnutrition — placing an enormous and increasing burden on an already severely overstretched health and nutrition system.²

Akoka County is located in Upper Nile State and was historically administered under Baliet County prior to recent administrative changes.* The county lies within the eastern flood plains livelihood zone and is characterized by livelihoods predominantly dependent on subsistence agriculture, fishing, livestock rearing, and small-scale trade, with sorghum, maize, pumpkin, and cowpeas among the major crops cultivated. Similar to other counties in Upper Nile State, Akoka has experienced repeated and compounding shocks related to flooding, insecurity, displacement, disruption of markets and trade routes, and severely limited humanitarian access, all of which have negatively affected household food security and nutrition outcomes over successive seasons.³

The humanitarian and nutrition situation in Upper Nile State has deteriorated noticeably, driven by escalating conflict, displacement, flooding, disease outbreaks, market disruptions, and reduced humanitarian operational capacity. The IPC Projection Update indicates that Upper Nile State is among the most severely affected states in South Sudan, with approximately 66 % of the analyzed population projected to face IPC Phase 3 or above between April and July 2026. Conflict and insecurity have disrupted livelihoods, restricted humanitarian access, reduced availability of health and nutrition services, and contributed to rising food prices and poor market functionality across the state. Flooding and deteriorating WASH conditions have further

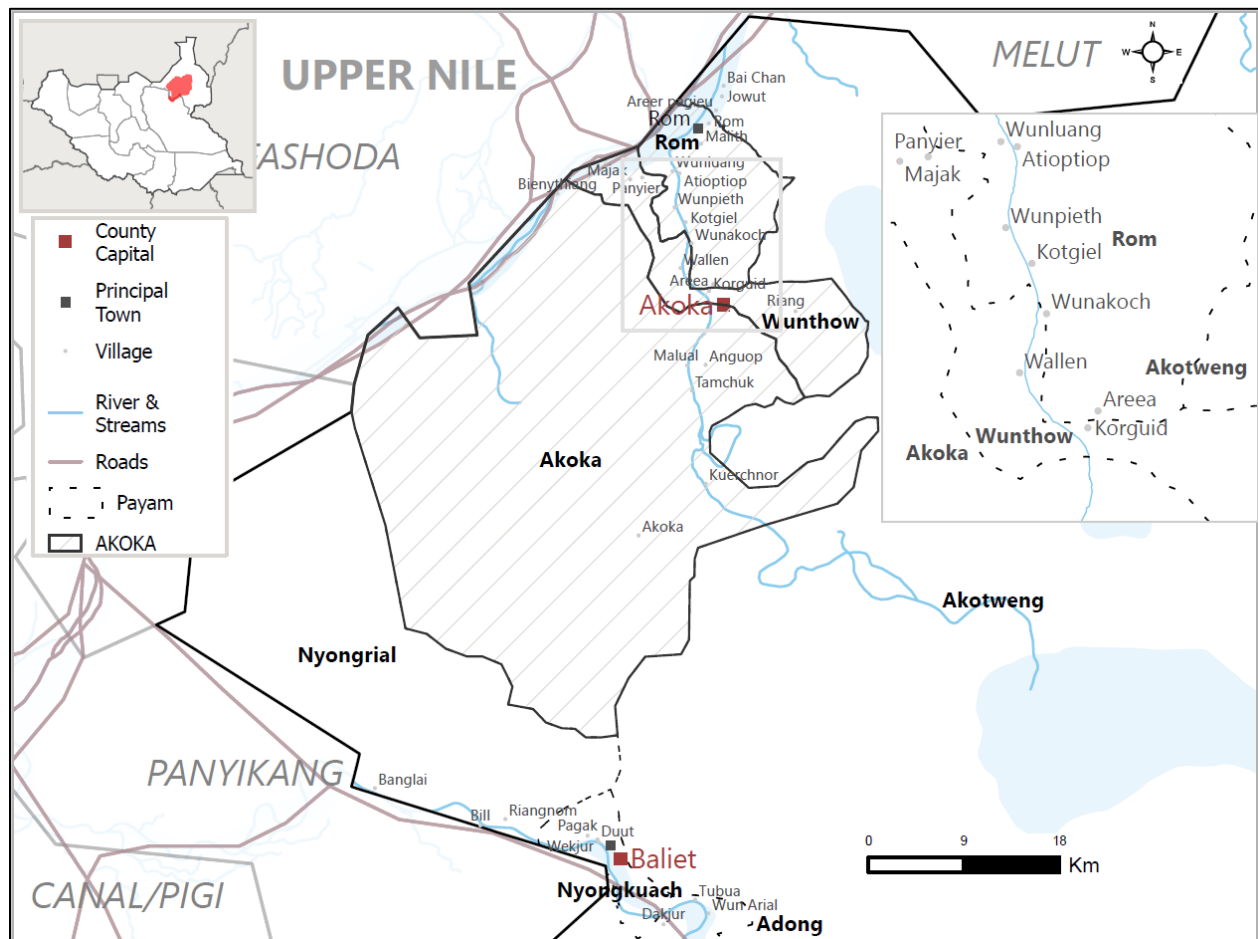
¹ [World Bank Group, South Sudan Overview](#)

² [Integrated Food Security Phase Classification \(IPC\), South Sudan: Acute Malnutrition Projection Update for April - June 2026, April 2026](#)

³ [Conflict Sensitivity and Resource Facility \(CSRF\) South Sudan, Baliet County, Upper Nile State Profile, April 2020](#)

aggravated disease outbreaks — including cholera⁴, malaria, diarrhea, and acute respiratory infections — which are recognized key underlying drivers of acute malnutrition.⁵

Figure 1: Akoka county reference map



**Disclaimer: Akoka County was historically administered as part of Baliet County; administrative boundaries and population estimates are subject to ongoing official verification.*

Against this backdrop, Akoka County has emerged as one of the highest-priority acute malnutrition hotspot areas in South Sudan. According to the IPC Acute Malnutrition (AMN) Projection Update for April–June 2026, Akoka County is currently classified in IPC AMN Phase 5 (Extremely Critical) — one of only a small number of counties nationwide to hold this classification — alongside Baliet, Luakpiny/Nasir, Ulang, Rubkona, Fangak, and Akobo. Critically, the IPC update notes that Akoka's situation has further deteriorated within IPC AMN Phase 5 compared to the previous analysis cycle, reflecting a worsening rather than stable emergency.

⁴ [UNICEF South Sudan Humanitarian Situation Report, February 2026](#)

⁵ [Integrated Food Security Phase Classification \(IPC\), South Sudan: Acute Malnutrition Projection Update for April - June 2026, April 2026](#)

The IPC-estimated Global Acute Malnutrition (GAM) prevalence for Akoka based on Weight-for-Height Z-score (WHZ) stood at 27.8% (95% CI: 19.3 – 38.2), significantly above the WHO emergency threshold of 15%, and indicative of a severe and active public health emergency.⁶ Concurrently, Akoka is classified in IPC AFI Phase 4 (Emergency), reflecting severe food consumption gaps and heightened vulnerability across the population. The IPC analysis identified several major drivers contributing to the worsening situation, including conflict and displacement, severe food insecurity, disruption of humanitarian assistance, limited access to health and nutrition services, high disease burden, poor sanitation and hygiene conditions, seasonal flooding, and prolonged market disruptions — with interruptions to life-saving nutrition interventions, including blanket supplementary feeding and therapeutic feeding services, further compounding the crisis.

Despite the severity and urgency of the nutrition situation in Akoka, a significant information gap remains regarding the current, representative nutritional status of the population and the contributing factors driving acute malnutrition at county level. No recent SMART survey data are available for Akoka County to adequately inform humanitarian response prioritization, program design, targeting, and resource allocation. In the absence of such data, and in line with NIWG technical guidance, the survey parameters for sample size estimation were drawn from the December 2024 REACH SMART survey in neighboring Malakal County, which shares broadly similar population, livelihood, socioeconomic, and contextual characteristics with Akoka, including riverine and floodplain livelihoods, exposure to flooding and displacement, food insecurity, and access constraints.

REACH Initiative, present in South Sudan since 2012, has been conducting multi-sectoral assessments and providing evidence-based information to support humanitarian planning and response across the country. Since 2019, REACH has actively engaged with the Nutrition Information Working Group (NIWG), supporting IPC Acute Malnutrition analyses, SMART survey implementation and protocol reviews, and nutrition information management across multiple states. In response to the critical nutrition situation and the urgent information gap in Akoka County, REACH Initiative conducted a SMART survey between June 11 – 16, 2026 to assess the current nutrition situation and its contributing factors among the population of Akoka County, covering anthropometric status, retrospective mortality, morbidity, food security and livelihoods, water sanitation and hygiene, health service coverage, and infant and young child feeding practices. The findings of this survey are intended to support evidence-based humanitarian response planning, program targeting and prioritization by nutrition and multi-sectoral actors operating in Upper Nile State, and to contribute to future IPC AMN analyses and advocacy for increased humanitarian support in one of South Sudan's most critical nutrition emergency settings.

⁶ Ibid

Survey Objectives

The overall objective of this survey was to determine the prevalence of acute malnutrition among children 6-59 months, and the retrospective mortality rates to inform humanitarian response with practical recommendations.

In particular, the following are the specific objectives of the assessment:

1. To estimate the prevalence of acute malnutrition, stunting and underweight among children (boys and girls) aged 6 – 59 months in Akoka County.
2. To estimate the retrospective Crude Mortality Rate (CMR) for the overall population and Under 5 Mortality Rate (U5MR) in all payams of Akoka County.
3. To estimate the coverage of various immunizations in Akoka County including:
 - Vitamin A supplementation for children aged 6 – 59 months
 - Deworming for children aged 12 to 59 months
 - Measles vaccination coverage among children aged 9 – 59 months.
4. To assess childhood morbidity and health-seeking behaviors among households with children aged 6 – 59 months in Akoka County.
5. To assess the nutritional status of pregnant and lactating women (PLW) in Akoka County.
6. To assess IYCF Practices such as breastfeeding and complementary feeding among mothers who have children under the age of two years in Akoka County.
7. To assess the WASH situation in Akoka 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 Akoka 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 Akoka County.

Methodology

This is a quantitative survey that follows the SMART survey protocol, and is representative of the entire population of Akoka county. A two-stage cluster sampling approach was employed, with probability proportional to population size (PPS) used to select clusters (villages). All villages in Akoka County were included in the sampling frame and their respective population sizes were considered to provide each sampling unit with equal chances of being selected.

Sampling strategy

For this survey, a two-stage cluster sampling strategy was used to ensure a representative sample, aligning with SMART survey guidelines. In the first stage, villages were selected proportionally to their population size (PPS), giving each village a chance of being chosen based on its relative population. In the second stage, households were randomly selected within each chosen cluster. The final number of households to be surveyed per cluster was determined by the calculation which factors in the daily capacity of each survey team along with other relevant considerations.

Sampling strategy: selection of clusters

The smallest geographic unit used for this study is referred to as a cluster, which is equivalent to a village from the administrative level. A list of all 25 villages, with populations ranging from 615 to 5,000 individuals with a total population of 36,294, was obtained from the Akoka County Health Department (CHD) and Relief and Rehabilitation Commission (RRC) in collaboration with local partner called Agency for Child Relief Aid (ACRA) . According to the calculation (see Table 5), 32 clusters were required to achieve the desired level of precision. Using the Emergency Nutrition Assessment (ENA) software and applying the Probability Proportional to Size (PPS) method, 32 villages were randomly selected as clusters from the list, along with 4 reserve clusters (RC).

For clusters with more than 150 HHs, segmentation was used to select one portion of the cluster to represent the entire cluster. The segments were chosen using either probability proportional to size (PPS) or simple random sampling (SRS), depending on whether the segment populations sizes were similar or different⁷.

⁷ As per the SMART Guidelines, if the Segments will have almost equal population sizes, then, SRS will be used; but if the population sizes will be different, then PPS method will be used.

Sampling strategy: selection of households

Definition of household for the survey: A household was defined as a group of people living together, who cook and eat from the same cooking pot. Polygamous families were also defined based on the same principle: if each wife had her own pot, even if they were living in the same compound, they were treated as different households.

Household selection techniques: From the selected villages, one of these two methods was used for household listing: (1) a verbal listing from one or more community leaders and, when not possible, (2) a manual house-to-house listing. Ten households were then randomly selected from the complete list of HHs using a random number generator (RNG) application.

In selected households, all eligible children (aged 6 – 59 months old) were measured for anthropometric indices, and the household questionnaire was administered. Houses found empty or absent with children were re-visited, and the outcome recorded on the cluster control form, which also noted any empty or non-responding households.

Table 2: Targeted Sample size (Anthropometric)

Parameter	Akoka County	Justification
Estimated Prevalence (%)	24.5%	From Malakal SMART survey conducted by REACH in December 2024 with GAM by WHZ of 24.5% (19.9 – 29.7, 95% CI as they are neighboring counties with similar characteristics.
Desired Precision	5	Reasonable precision for expected prevalence
Design Effect	1	From Malakal SMART survey conducted by REACH in December 2024
Children to be Included	309	
Average Household Size	4.6	From Malakal SMART survey conducted by REACH in December 2024
% children Under-Five	29.5%	From Malakal SMART survey conducted by REACH in December 2024
% Non-Respondents	3%	Expected non-response
Households to be Included	261	

Table 3: Targeted Sample size (Mortality)

Parameter	Akoka County	Justification
Estimated death rate per 10,000/day	0.48	The Neighboring Estimated CMR from the Malakal County SMART Survey was 0.48 (0.26-0.88, 95% CI)
Desired Precision	0.4	Applicable precision for CDR <1 as per the SMART guidelines.
Design Effect	1	From Malakal SMART survey
Recall Period	90	A default three-month recall period was applied; this was to be adjusted once the survey started.
Population to be Included	1394	
Average Household Size	4.6	From Malakal SMART survey conducted by REACH in December 2024
% Non-Respondents	3%	Expected non-response
Households to be Included	312	

Since the two different household sample sizes (anthropometric versus mortality) produced different numbers, the mortality sample size with the higher number of households was used for both anthropometry and retrospective mortality survey, with 312 households in Akoka county to be included in the survey.

Table 4: Calculation of household average per day

Activity	Estimated Time
Departure from Office	7:30 AM
a. Daily morning briefings	15 min
b. Travel to clusters	75 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	75 min
Total time for HH listing, travelling and breaks (a + b + c + d + f)	225 min
Arrival back to Base	5:30 PM
Total available time in a day	10 hrs (600 minutes)
Available time for work	600 – 225 minutes = 375 minutes
Time taken to complete one questionnaire	30 minutes
Total time per household + e	35 minutes

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

$$375 \text{ (min)} / 35 \text{ (min)} = \mathbf{10.7 \text{ HHs/per day} \sim 10 \text{ HHs}}$$

Accordingly, the number of clusters is presented in table 5 below:

Table 5: Number of clusters

The total number of households in the sample was then divided by the number of households to be completed in one day to determine the number of clusters to be included in the survey. The total number of clusters was obtained after dividing the total number of households.

$$(312/10) = \mathbf{31.2 \text{ clusters} \sim 32 \text{ clusters.}}$$

	Akoka
Total number of HHs based on sample size calculation	312
Total number of HHs to be assessed per day per team	10
Clusters needed	31.2
Clusters needed	32

Survey teams, training, data collection and data management

Survey teams: Six teams consisting of four members (1 Team Leader, 1 measurer, 1 assistant, 1 enumerator) were involved in the collection of the data. In each cluster, a local guide was employed on site to facilitate data collection at the household level. The survey teams were recruited by REACH with the involvement of partners such as ACRA and the local officials at both State and County level. To the extent possible, the team members were a mix of both men and women and were recruited from the local communities. Supervisors consisted of a mix of Relief and Rehabilitation Commission (RRC), State Ministry of Health (SMOH), County Health Department (CHD), ACRA staff and REACH staff.

Training: The survey teams were trained for five days between June 6th and 10th, 2026 before that data collection commenced between June 11th to 16th 2026. The training covered various components including basic concepts of malnutrition, taking anthropometric measurements, sampling of households, data collection tools, digital data collection, data quality checks, standardization exercise, pilot test, among other themes. The training of the enumerators was facilitated by SMART certified survey manager and staff with experience conducting SMART surveys.

Supervision: The overall management of the survey was done by REACH Initiative. Maximum supervision of the survey teams was ensured to facilitate quality data.

Data entry and management: Data was collected through REACH tablets using IMPACT Kobo account. The data collection tools were programmed and installed in the tablets which were used by the survey teams. The teams uploaded the collected data to a central server on a daily basis for the survey manager to clean and review each day for quality assurance. Feedback was then provided to the teams each morning.

Data quality

In order to ensure optimal and high data quality, several measures were put in place. The main ones included:

- a) The survey was done in accordance with the submitted protocol, ensuring the following:
 - i. That the training of survey teams was done using standardised material as recommended by SMART Methodology.
 - ii. That standardisation test was undertaken as part of the training; taking appropriate steps thereafter based on the performance of the survey teams.
 - iii. That appropriate calibration of survey equipment, during the training and on every morning before proceeding to the field for data collection, was followed.
 - iv. That plausibility checks were conducted on a daily basis and informed the daily debriefing sessions which were conducted every day.
- b) Data was collected through a digital platform with control checks and skip patterns put in place to create a logical flow in the HH questionnaire were programmed to improve the data quality.
- c) Anthropometry data was auto analysed using Emergency Nutrition Assessment (ENA) software (January 2020) anthropometry section. The same software was also used to analyse the mortality data.

Questionnaire

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

Data collected

1. Anthropometry (children 6-59 months).

- **Age:** determined using birth/health cards/records when available and the local calendar of events (see Appendix 4) which were jointly developed by local leaders and survey enumerators.
- **Sex:** Male or female
- **Weight:** Children's weights were taken without clothes and sometimes with light 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 2 years of age or older were measured standing up.
- **Mid-upper arm circumference:** 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 pregnant and lactating women.
- **Bilateral pitting oedema:** Bilateral pitting oedemas were assessed by the application of normal thumb pressure on both feet for 3 seconds.

2. **Demographics and mortality:** Every current household member's age in years, their sex, place of birth, and the date they joined the household were all variables gathered throughout the recall period. The age in years, the sex, and whether the household member was born into the family were gathered for those household members who departed during the recall period of 98 days. Age in years, sex, whether the deceased was born or joined the household during the recall period, estimated cause of death, and place of death were all variables recorded for those who passed away during the recall period of 98 days.

3. **Health interventions data:** Vitamin A supplementation, deworming, and measles immunization data were collected through health cards (when available) or recall of 6 months prior to data collection.

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

5. Food Security Indicators:

- a. **Food Consumption Scores (FCS):** An indicator of the general quantity and quality of foods being consumed in a household, based on how many days any household member has consumed 9 distinct food groups within a 7-day recall period. Households were categorized into 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 to ≤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 Acute Food Insecurity (AFI) in South Sudan⁸.
- c. **Livelihood Coping Strategies (LCS):** Measures behaviours or actions households are taking to cope with not having enough food or resources to get food for the recall period of 30 days. Ten coping strategies were probed for and then categorized as Emergency, Crisis, or Stress coping strategies.
6. **WASH** – indicators on main drinking water source, access to latrines, distance/time to main water source, and water treatment were asked.

Referral: During the collection of these anthropometric data, all children whose measurements indicated they were acutely malnourished, and who were not already enrolled in nutrition treatment programs, were referred to the relevant partners using referral forms to existing Targeted Supplementary Feeding Programme (TSFP) and Outpatient Therapeutic Programme (OTP) programs in the area.

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 6: 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)
	Moderate and severe malnutrition	<230mm mid-upper arm circumference

⁸ Household hunger scale categories are 1. Little to no hunger (0-1), 2. Moderate hunger (2-3) and Severe hunger (4-6)

Maternal nutrition	Severe acute malnutrition	<210mm mid-upper arm circumference
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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 malnutrition⁹. To interpret proportions at a population level with meaning, absolute numbers are also necessary.

Table 7: WHO/UNICEF Classification for Severity of Malnutrition by Prevalence among Children 6-59 months¹⁰

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 8: integrated Phase Classification of Acute malnutrition (IPC AMN) classifications for severity of malnutrition prevalence among children 6-59 months¹¹

IPC AMN Phase Classification	PREVALENCE OF THRESHOLDS %		
	WASTING by GAM by Weight for Height z-score	WASTING by GAM by Mid-Upper Arm Circumference ¹²	Priority Response Objective
Acceptable	<5%	<5%	Maintain the low prevalence of acute malnutrition
Alert	5- <10%		Strengthen existing response capacity and resilience. Address contributing factors to acute malnutrition. Monitor conditions and plan response as required
Serious	10- <15%	5 - <10%	Urgently reduce acute malnutrition levels through scaling up treatment and prevention of affected populations
		10 - <15%	

⁹ [Physical Status: The use and interpretation of Anthropometry. Report of a WHO expert committee, February 1995](#)

¹⁰ [Prevalence thresholds for wasting, overweight and stunting in children under 5 years. WHO 2018](#)

¹¹ [Integrated Phase Classification \(IPC\): Technical Manual version 3.1, IPC 2021](#)

¹² 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.

Critical	15- <30%		Urgently reduce acute malnutrition levels through significant scale up and intensification of treatment and protection activities to reach additional population reached
		>= 15%	
Extremely Critical	>=30%		Urgently reduce acute malnutrition levels through addressing widespread acute malnutrition and disease epidemics by all means

Data cleaning and analysis

The anthropometric and mortality data was 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 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 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 98-day recall period (from March 08, 2026 i.e. International Women's Day , to June 13, 2026) 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

A total of 318 households (102% compared to planned 312 HHs), representing 1,903 individuals, were included in the survey, with an average household size of 6 people. Among the surveyed households, 88% had children under five years old, resulting in 388 children included in the survey. Female-headed households made up 55% of the sample, while the remaining 45% were male-headed.

Table 9: Survey target, sample and non-response

	Target	Achieved		Absent		Refused	
	N	N	% of Target	N	% of Target	N	% of Target
Children	309	388	125	0	0	0	0
Households	312	318	102	0	0	3	0.94
Villages	32	32	100	N/A	N/A	N/A	N/A

Anthropometric Results

Of the 32 villages surveyed in Akoka County, 388 children aged 6 – 59 months (196 boys and 192 girls) were measured to assess malnutrition status.

To identify outliers, the data were checked at ± 3 standard deviations from the observed mean; any values flagged as not plausible for height, weight, or age by the SMART software were excluded from the analysis (though retained in the dataset). These SMART flags were excluded from the analysis but not from the data. **In total, 9 data points were flagged for the weight-for-height z-score, hence, the data for 379 children were analyzed. Similarly, 384 children were analyzed for weight-for-age (excluding 4), and 359 for height-for-age (excluding 29).** This analysis was conducted using WHO 2006 standards.

Table 10: Distribution of age and sex of sample

Age (mo)	Boys		Girls		Total		Sex Ratio
	N	%	N	%	N	%	Boy:girl
6-17	57	56.4	44	43.6	101	26.0	1.3
18-29	36	48.6	38	51.4	74	19.1	0.9
30-41	60	50.4	59	49.6	119	30.7	1.0
42-53	39	47.6	43	52.4	82	21.1	0.9
54-59	4	33.3	8	66.7	12	3.1	0.5
Total	196	50.5	192	49.5	388	100.0	1.0

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 28.8% (23.7 - 34.4, 95% CI) (see table 11 below), which is **categorized as “Critical” per IPC AMN classification**¹³. A GAM rate falling in the Critical phase requires significant scale-up and intensification of treatment and protection activities to reach additional population affected¹⁴. In addition, the prevalence of Severe Acute Malnutrition (SAM) per WHZ among children 6-59 months old was 9.8% (6.5 - 14.3, 95% CI). In this survey no nutritional bilateral oedema case was observed.

There is no prior SMART survey in Akoka County for direct comparison. The most recent nutrition data was from FSNMS Round 31 (July/August 2025), which indicated a GAM of 27.8% (95% CI: 19.3–38.2) based on 9 clusters. The current survey's estimate of 28.8% (32 clusters) suggests a worsening trend, though no statistical comparison is possible due to methodological differences. The situation remains alarming: Akoka is classified IPC AMN Phase 5 (Extremely Critical) — the highest severity level — with the confidence interval upper bound approaching Phase 5 thresholds by WHO classification ($\geq 30\%$ GAM). SAM prevalence of 9.8% is particularly high; geographic clustering of severe cases was most pronounced in Clusters 5 (Wunpith) and 6 (Payuel), both remote from the nearest nutrition centres (estimated 2–3 hours on foot), which likely limits access to treatment and contributes to case deterioration.

To triangulate these anthropometric findings, nutrition partner (ACRA) program monitoring data covering the three months preceding the survey (April–June 2026) were reviewed. Screening activity in Akoka County rose sharply over this period, from 595 children screened in April to 2,314 in May and 2,263 in June — a nearly fourfold increase consistent with the reported resumption of nutrition supplies from May onward following a complete stock-out between January and April. OTP admissions for SAM tracked closely with screening-identified caseloads in April and June (180 and 286 admissions respectively, matching screening findings almost exactly), though a gap emerged in May, when 347 children were screened SAM-positive but only 288 were admitted — a shortfall of roughly 59 children, likely reflecting continued RUTF supply constraints even after partial resumption. Where OTP discharges did occur, cure rates were high (92.9–100%) and defaulting low (0–4.8%), though these figures should be interpreted cautiously given that only a small share of each month's admitted cohort had completed treatment within the reporting window.

The most striking finding, however, concerns the MAM treatment pathway. Screening identified 1,074 children as SFP-eligible and a further 1,080 pregnant and lactating women as in need of supplementary feeding across the three months — yet program records show zero SFP or PLW

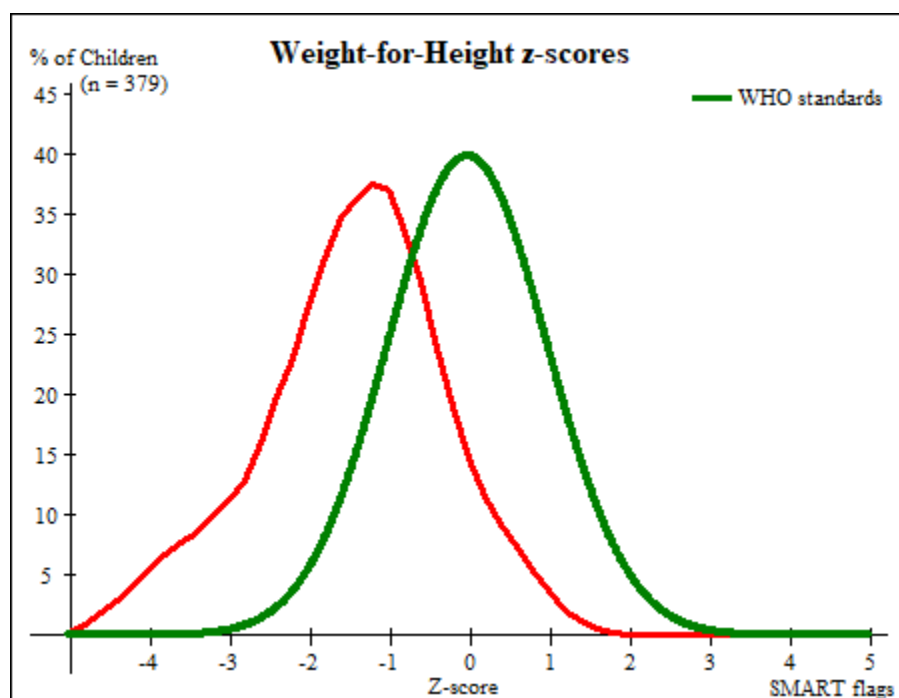
¹³ [Integrated Phase Classification \(IPC\): Technical Manual version 3.1, IPC 2021](#)

¹⁴ *ibid*

admissions for the entire period, across the partner's full catchment area. This indicates that the MAM case management pipeline was effectively non-functional throughout the quarter preceding the survey, independent of the partial SAM pipeline recovery. Given that untreated moderate acute malnutrition is a well-established pathway to severe acute malnutrition¹⁵, this near-total breakdown in MAM treatment access plausibly contributed to the exceptionally high SAM prevalence (9.8%) and combined SAM (12.6%) recorded in the survey, and offers a programmatic explanation — alongside geographic remoteness and caregiver referral reluctance in Wunpith and Payuel — for Akoka's continued deterioration within IPC Phase 5.

It is also important to note that these screening figures should not be read as an exhaustive account of need across Akoka County. The partner's screening and outreach capacity is itself constrained by the same access barriers identified in the survey — including the 2–3 hour walking distances to nutrition centres reported in Wunpith and Payuel — meaning that children in the most remote and underserved payams are likely underrepresented in both the screening and admission figures presented above. In practice, this suggests that the true burden of untreated MAM and SAM in Akoka may be even higher than the program data alone would indicate, reinforcing rather than undermining the concern raised by the survey's anthropometric findings.

Figure 2: Gaussian curve for Weight-for-Height z-scores



¹⁵ See Kesterton et al., "Children with Moderate Acute Malnutrition with No Access to Supplementary Feeding Programmes Experience High Rates of Deterioration and No Improvement: Results from a Prospective Cohort Study in Rural Ethiopia," PLOS ONE, The study found that nearly half of MAM cases without access to treatment either progressed to SAM or failed to recover, even during the most food-secure period of the year.

The Weight-for-Height Z-score mean and standard deviation were -1.45 and 1.14, respectively, indicating a higher prevalence of malnourished children compared to the WHO reference population. Measurement quality fell within the recommended range of 0.8 – 1.2 standard deviation, as outlined in the SMART guidelines. The surveyed community demonstrated a slight heterogeneity with regard to prevalence, with a Design Effect (DEFF) of 1.27, signalling there might be clustering of malnutrition cases between clusters/villages. Skewness and kurtosis values of -0.32 and 0.00, respectively, indicating a distribution that was close to normal. The slight negative skew suggests a marginally longer lower tail, which is consistent with populations experiencing acute malnutrition and does not indicate data quality concerns. The Kurtosis of zero indicates an appropriate distribution without excessive outliers or abnormally peaked Ness, supporting the overall plausibility of the anthropometric data.

Table 11: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All N = 379		Boys N = 188		Girls N = 191	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Prevalence of global malnutrition (<-2 z-score and/or oedema)	109	28.8 (23.7 - 34.4)	57	30.3 (24.1 - 37.3)	52	27.2 (20.3 - 35.4)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	71	18.7 (15.0 - 23.2)	33	17.6 (13.3 - 22.8)	39	20.4 (14.3 - 28.4)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	38	9.8 (6.5 - 14.3)	24	12.8 (8.1 - 19.6)	13	6.8 (3.3 - 13.4)

*The prevalence of oedema is 0.0%.

The overall Global Acute Malnutrition (GAM) rate was 28.8% (with a 95% confidence interval of 23.7% to 34.4%). Notably, the prevalence of Severe Acute Malnutrition (SAM) was slightly higher among boys compared to girls, consistent with global findings¹⁶, whereas Moderate Acute Malnutrition (MAM) appeared to be evenly distributed between the two groups. The overall findings for boys falls in "Extremely Critical" as the finding is showing 30.3% (24.1 - 37.3, 95% CI) corresponding to Phase 5 and girls exceed the 15% threshold set by the IPC acute malnutrition 2018¹⁷ for a "Critical" situation as the GAM prevalence fall within the 15% to 29.9% range, corresponding to Phase 4 according to the IPC-AMN.

¹⁶ [Boys are more likely to be undernourished than girls: a systematic review and meta-analysis of sex differences in undernutrition. PubMed Central, Dec 2020](#)

¹⁷ [Integrated Phase Classification \(IPC\): Technical Manual version 3.1, IPC 2021](#)

Table 12: Prevalence of acute malnutrition by age, based 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)	N	n	%	N	%	n	%	n	%
6-17	96	12	12.6	16	16.8	67	70.5	0	0.0
18-29	73	7	9.5	11	14.9	56	75.7	0	0.0
30-41	118	9	7.6	23	19.5	86	72.9	0	0.0
42-53	81	9	11.1	17	21.0	55	67.9	0	0.0
54-59	11	0	0.0	5	45.5	6	54.5	0	0.0
Total	379	37	9.8	72	19.0	270	71.2	0	0.0

Looking at the data, it seems that children in both age category i.e. 6-29 months vs 30 -59 months have been affected similarly on severe acute malnutrition. However the older (30 – 59 months) seems to be affected more with regard to moderate wasting. When examining the GAM prevalence by age category, both younger (6 – 29 Months) children and older children (30 – 59 months) were almost equally affected while it leans more to the older children as they contribute about 63% of the cases but care should be taken when interpreting this as those older children contribute about 55% of analyzed children.

GAM by MUAC

The Mid-Upper Arm Circumference (MUAC) was also used to measure global acute malnutrition among children 6-59 months. The prevalence of acute malnutrition by MUAC was defined by the proportion of children with MUAC < 125 mm and/or oedema, including Severe Acute Malnutrition (SAM) MUAC < 115 mm and Moderate Acute Malnutrition (MAM) MUAC $115 - < 125$ mm, based on the South Sudan MUAC cut-offs. The GAM prevalence by MUAC (< 125 mm and/or oedema) was 14.9% (95% CI: 9.5–22.8) and SAM by MUAC (< 115 mm) was 3.6% (95% CI: 1.8–6.9). Both SAM and MAM by MUAC were most prevalent among children aged 6–29 months — expected given that MUAC detects malnutrition more readily in younger children. WHZ identified nearly twice as many malnourished children as MUAC, reflecting different sensitivities of the two measurement methods.

Table 13: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

		All N = 388		Boys N = 196		Girls N = 192
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Prevalence of global malnutrition (< 125 mm and/or oedema)	58	14.9 (9.5 - 22.8)	33	16.8 (10.0 - 26.8)	25	13.0 (8.1 - 20.4)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	44	11.3 (6.9 - 18.1)	26	13.3 (7.7 - 22.0)	18	9.4 (5.5 - 15.4)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	14	3.6 (1.8 - 6.9)	7	3.6 (1.6 - 7.9)	7	3.6 (1.6 - 8.2)

Table 14: 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)	N	n	%	n	%	n	%	n	%
6-17	101	9	8.9	21	20.8	71	70.3	0	0.0
18-29	74	1	1.4	8	10.8	65	87.8	0	0.0
30-41	119	4	3.4	8	6.7	107	89.9	0	0.0
42-53	82	0	0.0	7	8.5	75	91.5	0	0.0
54-59	12	0	0.0	0	0.0	12	100.0	0	0.0
Total	388	14	3.6	44	11.3	330	85.1	0	0.0

This survey confirms that weight-for-height (WHZ) measurements identified more children (almost twice) with acute malnutrition (wasting) than MUAC) measurements. The overall prevalence of malnutrition detected via MUAC was consistently lower than what was found through WHZ. In both methods, severe and moderate wasting were most often found in children aged 6-29 months.

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

The combined prevalence of global and severe acute malnutrition based on WHZ and MUAC was assessed among 388 children under five. The table below provides detailed numbers for the combined GAM and SAM by WHZ and MUAC. The reported prevalence of combined GAM and SAM based on WHZ and MUAC cut-offs was 34.3% (27.9 - 41.3, 95% CI) and 12.6% (8.7 – 18.0, 95% CI) respectively.

Table 15: Prevalence of combined GAM and SAM based on WHZ and MUAC cut off's (and/or oedema) and by sex*

		All N = 388		Boys N = 196		Girls N = 192
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Prevalence of combined GAM (WHZ < -2 and/or MUAC < 125 mm and/or oedema)	133	34.3 (27.9 - 41.3)	71	36.2 (28.4 - 44.8)	62	32.3 (25.1 - 40.4)
Prevalence of combined SAM (WHZ < -3 and/or MUAC < 115 mm and/or oedema)	48	12.4 (8.6 - 17.5)	29	14.8 (9.7 - 21.8)	19	9.9 (5.5 - 17.1)

*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 16: Detailed numbers for combined GAM and SAM

	GAM		SAM	
	n	%	n	%
MUAC	24	6.2	11	2.8
WHZ	75	19.3	35	9.0
Both	34	8.8	3	0.8
Oedema	0	0.0	0	0.0
Total	133	34.3	48	12.4

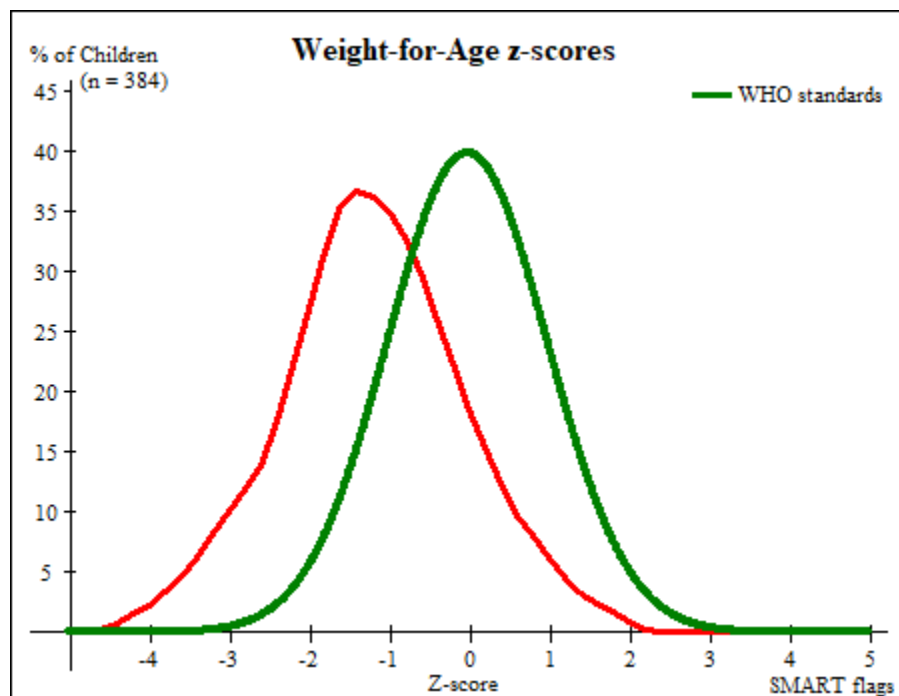
*Total sample size (N)= 388

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. The survey finding here revealed an overall underweight prevalence (both moderate and severe) of 21.4% (95% CI: 16.3 - 27.4), with detailed age and sex breakdowns presented in Tables 17 and 18 respectively. According to WHO standards, the reported prevalence of underweight, at 21.4% (95% CI: 16.3 - 27.4), falls within the "high" classification range (20% to <30%)¹⁸.

The burden of overall underweight was slightly higher among boys (24.0%, 95% CI: 17.7 – 31.6%) compared to girls (18.8%, 95% CI: 13.2 – 25.9%). However since the confidence intervals are overlapping there is not statistical evidence for the differences between the two groups.

Figure 3: Gaussian curve for Weight-for-Age z-scores



¹⁸ [Nutrition Landscape Information System \(NLiS\), WHO 2025](#)

Table 17: Prevalence of underweight based on weight-for-age z-scores by sex

		All N = 384		Boys N = 192		Girls N = 192
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Prevalence of underweight (<-2 z-score)	82	21.4 (16.3 - 27.4)	46	24.0 (17.7 - 31.6)	36	18.8 (13.2 - 25.9)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	60	15.6 (12.1 - 20.0)	33	17.2 (12.4 - 23.3)	27	14.1 (9.8 - 19.8)
Prevalence of severe underweight (<-3 z-score)	22	5.7 (3.4 - 9.4)	13	6.8 (3.7 - 12.0)	9	4.7 (2.1 - 10.1)

The overall underweight prevalence was slightly higher on boys than in girls.

Table 18: 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)	N	n	%	n	%	n	%	n	%
6-17	99	7	7.1	20	20.2	72	72.7	0	0.0
18-29	74	4	5.4	10	13.5	60	81.1	0	0.0
30-41	117	6	5.1	19	16.2	92	78.6	0	0.0
42-53	82	5	6.1	9	11.0	68	82.9	0	0.0
54-59	12	0	0.0	2	16.7	10	83.3	0	0.0
Total	384	22	5.7	60	15.6	302	78.6	0	0.0

Prevalence of Stunting

The survey revealed a stunting prevalence of 12.8% based on height-for-age z-scores among 359 children after the exclusion of 29 children whose z-scores were out of range. However, as the standard deviation (SD) of 1.32 falls outside the acceptable range of 0.8–1.2 recommended by SMART methodology, The recalculated stunting prevalence using an SD of 1 is reported as the point estimate. The recalculated prevalence of 6.2% is classified as low severity (<10%) according to the UNICEF/WHO 2021 classification of stunting. The analysis of stunting based on height for age z-scores was based on a total of 359 children after the exclusion of 29 children, whose z-scores were out of range.

Table 19: Prevalence of stunting based on height-for-age z-scores and by sex

		All N = 359		Boys N = 178		Girls N = 181
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Prevalence of stunting (<-2 z-score)	46	12.8 (9.7 - 16.8)	26	14.6 (9.3 - 22.2)	20	11.0 (7.5 - 16.1)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	39	10.9 (8.2 - 14.3)	22	12.4 (7.6 - 19.5)	17	9.4 (5.9 - 14.6)
Prevalence of severe stunting (<-3 z-score)	7	1.9 (0.9 - 4.3)	4	2.2 (0.9 - 5.6)	3	1.7 (0.5 - 5.0)

**Calculated prevalence of stunting with an SD of 1 is 6.2%*

The following table (Table 21) presents an analysis of anthropometric data for each indicator, including the design effect, means, standard deviation, and scores outside the expected range. The survey successfully attained the anticipated standard deviation (0.8 – 1.2) for weight-for-height and weight-for-age z-scores.

Table 20: 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	379	-1.45±1.14	1.27	0	9
Weight-for-Age	384	-1.20±1.11	1.71	0	4
Height-for-Age	359	-0.46±1.33	1.00	0	29

* contains for WHZ and WAZ the children with oedema.

Death rates and demographic results

Crude and under-five mortality rates can be used to assess the overall severity of the humanitarian crisis and the necessity for a countrywide public health information system. The survey, encompassing 1,903 individuals across all surveyed households, collected mortality data over a 98-day recall period. Specifically, the recall period spanned from March 08, 2026 — selected as the best option per enumerators recommendation which is International Women’s Day — to June 13, 2026, which is the midpoint of data collection. During the interviews, participants were asked to retrospectively report any deaths that occurred in their households during this timeframe.

Table 21: Mortality rates

CMR (total deaths/10,000 people/day): 1.18 (0.69 – 2.01, 95% CI)
U5MR (deaths in children under five/10,000 children under five/day): 1.16 (0.41 – 3.21, 95% CI)

During the recall period, 22 deaths were reported, of which 5 were among children under five. The CDR of 1.18/10,000/day exceeds the emergency threshold of 1.0, confirming an ongoing public health crisis in Akoka County. The U5MR of 1.16/10,000/day remains below the emergency threshold of 2, though the confidence interval is wide (0.41–3.21) due to the small number of child deaths. Illness accounted for 77.3% of deaths, injury/trauma for 18.2%, and unknown causes for 4.5%. Of all 22 deaths, 90.9% occurred at the current place of residence, consistent with limited access to health services rather than death during displacement. Males were disproportionately affected (CDR 1.56, 95% CI: 0.83–2.94) compared to females (CDR 1.02, 95% CI: 0.53–1.97), consistent with patterns observed in conflict-affected settings. Unusually high death counts in Clusters 3 and 28 (Rom Payam, n=4 and n=3 respectively) are contextually explained by extreme geographic remoteness and a reported 8-month essential medicine stock-out at HSTP-funded facilities in the area.

Table 22: General demographic information on mortality sample

Indicator	Results
Average Household Size	6
Mid-Interval Population	1,903
% of children Under-5 years	25
Birth Rate	2.68
Total Death	22

In-Migration Rate (Joined)	3.48
Out-Migration Rate (Left)	9.49
Design Effect for CDR	1.53

Table 23: Broad Causes of Death

Cause of death	%
Illness	77
Trauma/Injury	18
Others	5

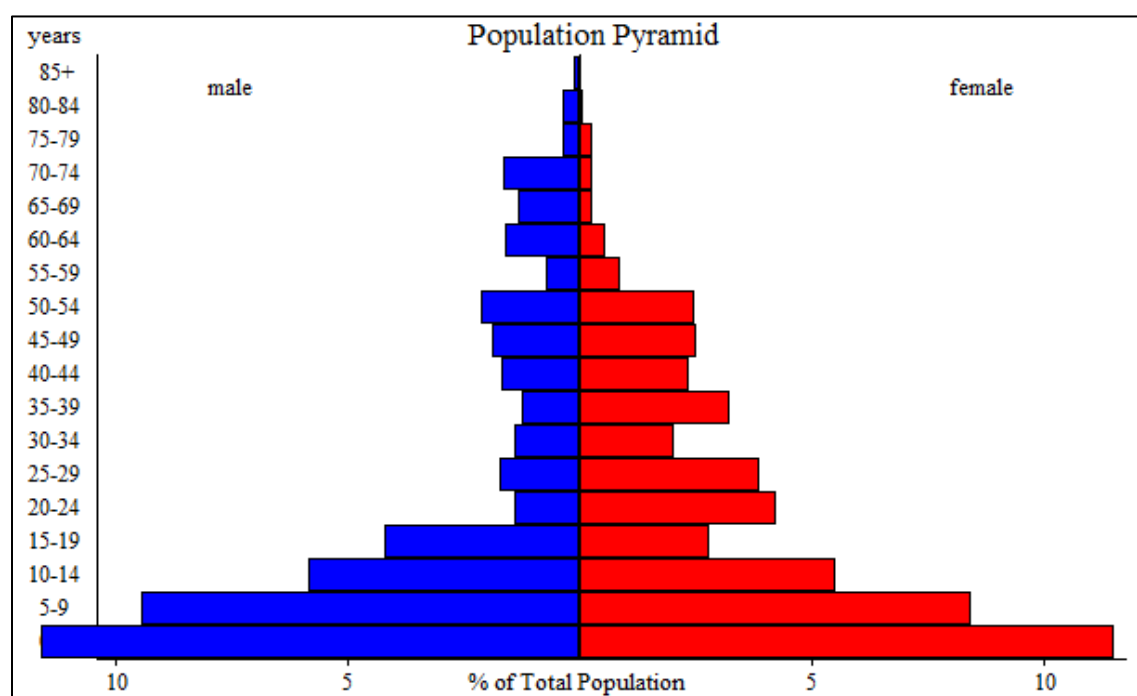
Table 24: Location of death

Location of reported deaths	n	%
Place of Current Residence	20	91
Place of Last Residence	2	9
During Migration	0	0
Other	0	0

Of the reported deaths, 20 out of 22 occurred in the respondent's current place of residence. On the other hand, majority of the deaths (77%) occurred during the recall period were attributed to illness, followed by injury/trauma and others by 18% and 5% respectively.

The population pyramid below provides a summary of the population distribution by sex and age groups in Akoka county.

Figure 4: Surveyed population pyramid for age and sex



Child Morbidity and Access to Health Care

To examine the prevalence of common diseases among children aged 6-59 months, we gathered retrospective morbidity data from the caregivers. This data was collected across a two-week recall period. The survey disclosed that 11.9% (95% CI: 8.6 - 15.2) of these children experienced at least one overall illness episode in the two weeks before data collection. Fever/suspected malaria, cough and diarrhoea emerged as the most common illnesses, representing 70.2%, 48.9% and 40.4% of all reported cases, respectively.

Table 25: Prevalence of reported illness in children in the two weeks prior to interview (N= 394, n=47)

Child Illness overall	Prevalence
Prevalence of reported illness	11.9% (8.6 – 15.2, 95% CI)

Table 26: Symptom breakdown among children for whom illness was reported in the two weeks prior to interview (N=47)

Illness type	Prevalence
Fever	70.2% (57.4 – 83.0, 95% CI)
Cough	48.9% (34.0 – 63.8, 95% CI)
Diarrhoea	40.4% (27.7 – 55.3, 95% CI)

In Akoka County, approximately one in ten children (11.9%, n=47) of the total 394 surveyed children aged 6–59 months had some kind of illness during the two weeks prior to data collection. From those children higher proportion (68.1%, n=32) were reportedly taken to a health facility by their respective caregivers or family members for treatment. The choice of facilities visited varied based on distance and accessibility. The most common response was to visit a Primary Health Care Centre (47 %) followed by private clinic and traditional healers, accounting for 13% and 9% of the response respectively. The remaining 32% of children reported to have illnesses were not taken to any health facility for treatment.

Table 27: Health care seeking behavior reported by caretakers of sick children 6-59 months of age (N=149)

Treatment Sought	Response
No treatment sought	31.9% (3.4 – 12.1, 95% CI)
Primary Health Care Centre	46.8% (32.0 – 61.7, 95% CI)
Private clinic	12.8% (4.3 – 23.4, 95% CI)
Traditional	8.5% (2.1 – 17.0, 95% CI)

According to national library of medicine study on determinants of wasting published on June 2022, Children of 6-59 months old who had been sick in the two weeks prior to data collection were more likely to be malnourished than their counterparts who had not been ill. Generally, ill children are more at risk of malnutrition than healthy children due to reasons such as reduced food intake, nutrient losses, diseases like measles and malaria, diarrheal diseases and health care access and care practices, etc.¹⁹.

Nutrition and Health Program Coverage

Table 28: Measles vaccination coverage for children 9-59 months (n=372)

	Measles (with card)		Measles (with card or confirmation from mother)	
	n	%	n	%
Vaccinated	70	18.8% (15.1 – 22.8, 95% CI)	205	55.1% (49.7 – 59.7, 95% CI)

Measles vaccination, deworming, and vitamin A supplementation are critical public health interventions, particularly for children, as they play a vital role in preventing illness and promoting overall health. Among the 372 children aged 9-59 months surveyed, only about half

¹⁹ [National Library of Medicine, May 1997](#)

(51%) were reported to have received measles vaccination, though only 19% of these cases were confirmed by vaccination card, highlighting a reliance on caregiver recall and the need to strengthen documentation and follow up.

Table 29: Vitamin A (children 6-59 months) and deworming treatment (children 12-59 months) coverage

	Vitamin A Supplementation last 6 months		Deworming Treatment last 6 months	
	n	%	n	%
Vaccinated	196	50.8% (45.6 – 55.4, 95% C.I.)	180	51.9% (47.0 – 57.3, 95% C.I.)

Vitamin A supplementation coverage was assessed among 386 children aged 6-59 months. In Akoka County, the reported coverage was 50.8%, way below the WHO-recommended emergency coverage threshold of 80%. Similarly, the proportion of children who received deworming was 51.9%, also falling well short of the WHO emergency standard of 80% coverage²⁰.

Infant and Young Child Feeding Practice (IYCF)

Optimal infant and young child feeding (IYCF) practices are fundamental to child survival, growth, and development. Appropriate feeding during the first two years of life is particularly critical, as it supports healthy growth, strengthens immunity, reduces morbidity and mortality, and contributes to improved cognitive development and long-term health outcomes. Globally, undernutrition remains an underlying factor in approximately 45% of deaths among children under five years of age, highlighting the importance of promoting recommended IYCF practices..²¹.

In this survey, IYCF practices were assessed among 92 children aged 0–23 months using the WHO and UNICEF (2021) revised indicators for assessing infant and young child feeding practices. Owing to the relatively small sample size, the findings should be interpreted as indicative rather than representative of the wider population. The results are presented in the following tables, figures, and accompanying discussion.²².

²⁰ [The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response, Sphere 2018](#)

²¹ [Infant and Young Child Feeding, WHO, December 2023.](#)

²² [Indicators for assessing Infant and Young Child feeding \(IYCF\) Practices, WHO 2021](#)

A summary of all findings is presented in table 31 below.

Table 30: Proxy IYCF practices

	Indicator	N	n	%	95% CI
Breastfeeding indicators					
1	Ever breastfed (0–23 months)	92	86	93.5	86.5 – 97.0
2	Early initiation of breastfeeding (0–23 months)	92	40	43.5	33.8 – 53.7
3	Exclusive breastfeeding under 6 months (0–5 months)	92	31	33.7	24.9 – 43.8
4	Continued breastfeeding at 1 year (12–15 months)	80	72	90	81.5 – 94.8
Complementary feeding practices					
5	Minimum dietary diversity 6–23 months	86	35	40.7	30.9 – 51.3
6	Minimum meal frequency 6–23 months	86	9	10.5	5.6 – 18.7
7	Minimum acceptable diet 6–23 months	86	3	3.5	1.2 – 9.8
8	Egg and/or flesh food consumption 6–23 months	86	48	55.8	45.3 – 65.8
9	Sweet beverage consumption 6–23 months	86	17	19.8	12.7 – 29.4
10	Zero vegetable or fruit consumption 6–23 months	86	63	73.3	63.1 – 81.5
11	Bottle feeding practice (0–23 months)	86	28	32.6	23.6 – 43.0

Ever Breastfed

When mothers were asked whether their children were ever breastfed, out of 92 children surveyed, 93.5% (n=86, 95% CI: 86.5 – 97.0) reported that they had breastfed their children aged 0-23 months at some point in their lifetime. This is a high rate of ever breastfeeding and might be reflective of a strong cultural norm of breastfeeding initiation in Akoka County. While this figure appears higher than the 89.4% recorded in Malakal County in December 2024, direct comparison should be interpreted with caution — Malakal's estimate was based on a larger sample of 160 children, nearly double the 92 assessed in Akoka, giving the Malakal figure greater statistical precision. Both surveys caution that IYCF results should be treated as indicative rather than statistically representative due to small sample sizes. Nonetheless, the high ever-breastfed rate in Akoka suggests that breastfeeding initiation is culturally well-established — though as the subsequent indicators demonstrate, initiation alone does not guarantee optimal feeding practices across the critical early childhood period.

Early initiation of breastfeeding

Despite the high rate of ever breastfeeding, only 43.5% (n=40, 95% CI: 33.8 – 53.7) of children aged 0–23 months were put to the breast within one hour of birth, as per WHO recommendation. This means the majority — 56.5% of children — missed the critical first-hour window during which early initiation protects the newborn from hypothermia, provides colostrum (the newborn's first immunisation), and establishes breastfeeding patterns associated with sustained exclusive breastfeeding and reduced neonatal mortality.

This figure is markedly lower than the 86.9% recorded in Malakal County in December 2024 — a gap of more than 43 % points — pointing to a genuine and significant deficit in skilled birth attendance and immediate postnatal breastfeeding support in Akoka County.

Exclusive breastfeeding (EBF)

The WHO Global Strategy for Infant and Young Child Feeding (IYCF) recommends exclusive breastfeeding for infants up to six months of age. 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.²³ Exclusive breastfeeding also protects against diarrhea, lower respiratory infections, acute otitis media, and childhood overweight and obesity.²⁴

In Akoka County, only 33.7% (n=31, 95% CI: 24.9 – 43.8) of children aged 0–5 months were exclusively breastfed. This figure falls critically below UNHCR's minimum standard for emergency contexts, which requires that at least 70% of infants aged 0–5 months be exclusively breastfed. Compared to Malakal County where exclusive breastfeeding stood at just 6.3% in December 2024, Akoka's rate — while still far below the recommended threshold — is notably higher, suggesting that exclusive breastfeeding practices, though suboptimal, are relatively more established in Akoka. The majority of infants in Akoka County are nonetheless being introduced to non-breast milk foods or liquids before six months of age, substantially increasing their exposure to infection and undernutrition risk in an already high-risk environment.

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 recovery²⁵.

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 90.0% (n=72, 95% CI: 81.5 –

²³ [Guidelines on optimal feeding of low birth-weight infants in low- and middle-income countries, WHO 2011](#)

²⁴ *ibid.*

²⁵ *ibid*

94.8) had received continued breastfeeding compared against the collective target in 2030 by WHO to reach at least 80%²⁶.

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.²⁷ 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.

In Akoka County, only 40.7% (n=35, 95% CI: 30.9 – 51.3) of children aged 6–23 months received food from at least four of the eight recommended food groups during the 24-hour recall period, as per IYCF guideline recommendations. This means that nearly six in ten young children are not receiving an adequately diverse diet, indicating severe limitations in nutrient variety across the majority of households with young children in the county. Compared to Malakal County where MDD stood at 45.6% in December 2024, Akoka's figure is slightly lower, suggesting a marginally worse dietary diversity situation — though both counties fall well short of acceptable levels, reflecting a shared structural challenge of limited food access and dietary knowledge across Upper Nile State..

Minimum Acceptable Diet

The Minimum Acceptable Diet (MAD) is a composite indicator measuring how well children aged 6–23 months are fed, combining minimum dietary diversity and minimum meal frequency. In Akoka County, only 10.5% (n=9, 95% CI: 5.6 – 18.7) of children aged 6–23 months met the minimum meal frequency threshold, and only 3.5% (n=3, 95% CI: 1.2 – 9.8) received a minimum acceptable diet — meaning 96.5% of young children failed to meet this basic feeding standard. This is among the lowest MAD values possible and reflects the compounding failure of both dietary diversity and meal frequency simultaneously.

Compared to Malakal County where MAD stood at 16.9% and MMF at 21.3% in December 2024, Akoka records substantially lower figures across both indicators — nearly five times lower for MAD and twice as low for MMF — pointing to a considerably more severe complementary feeding crisis in Akoka despite both counties sharing broadly similar contextual vulnerabilities. These findings, interpreted with the standard caution applicable to small IYCF sample sizes, nonetheless paint a consistent and alarming picture of catastrophic complementary feeding failure in Akoka County that demands urgent community-based nutrition programming.

²⁶ [Increasing commitment to breastfeeding through funding and improved policies and programmes, WHO and UNICEF 2019](#)

²⁷ [Guiding principles for feeding non-breastfed children 6-24 months of age, WHO 2005](#)

Women's Nutritional Status by MUAC

Nutritional status of pregnant and lactating women (PLW) was assessed using mid-upper arm circumference (MUAC) among 138 women in Akoka County. Malnourished PLW may be unable to meet the nutritional needs of infants, particularly those under six months of age, and face substantially elevated risks of adverse birth outcomes including low birth weight, preterm delivery, and impaired milk production — all of which directly compound child acute malnutrition.

Table 32: MUAC status among PLW

	MUAC for PLWs	n	Proportion (%)
Severe Acute Malnutrition	<21.0 cm	4	2.9%
Moderate Acute Malnutrition	<23.0 cm	33	23.9%
Global Acute Malnutrition	<23.0	37	26.8%
Normal	≥ 23.0 cm	101	73.2%

Among all PLW assessed, 26.8% (n=37, 95% CI: 20.1 – 34.8) were found to be acutely malnourished (MUAC < 23.0 cm), of whom 23.9% were classified as moderately acutely malnourished (MAM; MUAC ≥ 21.0 – < 23.0 cm) and 2.9% as severely acutely malnourished (SAM; MUAC < 21.0 cm). A GAM prevalence of 26.8% among PLW in Akoka County exceeds the emergency threshold of 20%, signalling severe nutritional stress among the most physiologically vulnerable segment of the adult population and representing a critical public health emergency in its own right.

Compared to Malakal County where PLW GAM stood at 22.2% in December 2024, Akoka records a higher prevalence — itself already above the emergency threshold in Malakal — indicating a deterioration in maternal nutritional status between the two neighbouring counties and survey periods. This level of PLW malnutrition, in a context of already emergency-level child wasting, substantially increases risks of adverse birth outcomes including low birth weight, preterm delivery, and reduced breastfeeding capacity, all of which perpetuate intergenerational malnutrition and further compound the severity of the nutrition crisis in Akoka County. Targeted supplementary feeding for PLW through the Targeted Supplementary Feeding Programme (TSFP), integrated with antenatal care services and community-based outreach, is urgently recommended to address the nutritional needs of this highly vulnerable group.

Contributing Factors

Water, Sanitation, and Hygiene (WASH)

Inadequate access to safe water, sanitation, and hygiene is estimated to account for approximately 50% of global malnutrition. Unsafe water causes diarrhoeal disease, which prevents children from absorbing the nutrients they need to survive and grow, while poor sanitation creates persistent environmental contamination that drives repeated infection cycles — a direct pathway to acute and chronic malnutrition²⁸. WASH data was collected from all 318 surveyed households in Akoka County.

Source of Drinking Water

Households were asked to identify their main source of drinking water, which was then classified as improved or unimproved according to standard WHO/JMP criteria. In Akoka County, only 31% (n=100, 95% CI: 26.6 – 36.7) of households reported using an improved drinking water source, while 69% (n=218, 95% CI: 63.3 – 73.4) relied on unimproved sources. Among unimproved sources, surface water was the single most commonly reported source at 24% (n=76) — representing the highest-risk category for waterborne disease transmission, as surface water is directly exposed to faecal contamination, runoff, and seasonal flooding with no treatment barrier whatsoever. This is particularly alarming in a context where the county lies within the eastern flood plains livelihood zone and where seasonal flooding is a recurrent shock. Beyond surface water, unprotected wells (19%, n=60) and unprotected springs (13%, n=41) accounted for the remaining majority of unimproved source usage.

Table 31: Main source of drinking water

Water source	Type	n	Percent	95%, C.I.
Piped dwelling	Improved	57	17.9	13.8 – 22.3
Borehole	Improved	38	11.9	8.8 – 15.7
Rain water collection	Unimproved	32	10.1	6.9 – 13.5
Surface water	Unimproved	76	23.9	19.2 – 28.6
Unprotected well	Unimproved	60	18.9	14.5 – 23.3
Unprotected spring	Unimproved	41	12.9	9.4 – 16.7
Total		318		

This represents a dramatically worse water access situation than observed in Malakal County, where 77% of households had access to improved water sources — more than double the proportion in Akoka. The near-total absence of water supply infrastructure in Akoka, combined

²⁸ [Water Sanitation and Hygiene \(WASH\), WHO 2025](#)

with the dominance of open surface water sources, creates conditions highly conducive to cholera, typhoid, and other waterborne diseases, directly compounding the acute malnutrition burden documented in this survey.

Time to collect water

Time to collect water was assessed as an indicator of the physical burden of water access and the practical limitations on water quantity available for drinking, cooking, and hygiene. Applying the JMP service ladder framework, households with water accessible within 30 minutes round trip (including those with water inside the compound) are classified as having a basic service, while those spending more than 30 minutes are classified as having a limited service at best — regardless of whether their source is improved or unimproved.²⁹

In Akoka County, only 31% of households had water accessible within 30 minutes or inside the compound — comprising 3% (n=8) with water inside the compound and 29% (n=91) within 30 minutes, both classified as basic service level. The majority — 67% — spent 30 minutes or more collecting water, classified as limited service or below, with the single largest category being 1 hour to half a day (41%, n=131). A small proportion reported collection times of half a day (0.6%, n=2) or more than half a day (0.3%, n=1). Studies have shown that households reporting a round-trip collection time of more than 30 minutes are nearly twice as likely to experience moderate-to-severe diarrhoea compared with households with shorter collection times, making this finding a direct contributor to the disease and malnutrition burden in Akoka County.

These figures fall well below the SPHERE standard of 500 metres or 30 minutes round trip and are substantially worse than Malakal County, where 48% of households could access water in under 30 minutes and only 7% spent more than an hour. The heavy water collection burden in Akoka falls disproportionately on women and girls, with significant implications for time poverty, school attendance, protection risks, and the physical capacity to maintain basic household hygiene.

Water treatment used

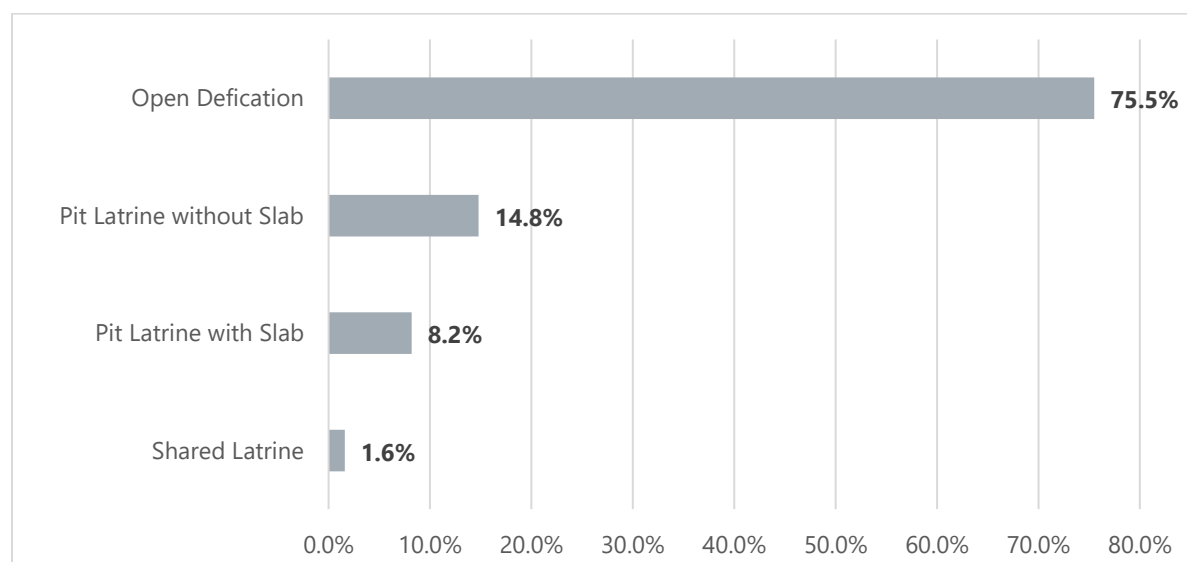
In Akoka County, 96% (n=305, 95% CI: 93.1 – 97.6) of households applied no treatment whatsoever to their drinking water before consumption. Only 4% (n=13, 95% CI: 2.4 – 6.9) reported boiling their water, and no other treatment methods — including chlorination, filtration, or solar disinfection — were recorded. This profile contrasts sharply with Malakal County, where 69% of households used chlorine to treat their water — largely driven by an active cholera outbreak response at the time of that survey — and only 24% applied no treatment. In Akoka, the near-universal absence of water treatment, combined with the dominance of unimproved and surface water sources, means that the overwhelming majority of households are consuming unsafe, untreated water with no mitigation whatsoever — a direct and immediate driver of waterborne disease risk across the county.

²⁹ [The WHO/UNICEF Joint Monitoring Programme for Water supply, Sanitation and Hygiene \(JMP\), WHO/UNICEF 2021](#)

Hygiene and sanitation

In Akoka County, 76% (n=240, 95% CI: 70.5 – 79.9) of households had no latrine facility and practiced open defecation — the highest-risk sanitation category for faecal-oral disease transmission. A further 15% (n=47) used pit latrines without slabs, and 2 % (n=5) used shared latrines. Only 8% (n=26, 95% CI: 5.6 – 11.7) of households had access to an improved sanitation facility (pit latrine with slab). Even Malakal County — where 53% of households practiced open defecation — shows a considerably better sanitation profile, with 29% using improved pit latrines with slabs. In Akoka, the open defecation rate is more than 22 percentage points higher than Malakal, and access to improved sanitation is less than a third of Malakal's level. The combination of near-universal open defecation with reliance on surface water sources and zero water treatment creates an extremely high-risk environment for environmental enteric dysfunction, cholera, and other enteric infections, all of which are directly linked to acute malnutrition through the infection-malnutrition cycle.

Figure 5: Percentage of households per type of latrine they reported having access to (N=318)



Soap access

In Akoka County, 97% (n=307, 95% CI: 93.9 – 98.1) of households had no soap whatsoever. Soap was confirmed present by enumerators in only 7 households (2%), and reported but unconfirmed in 4 households (1%). The contrast with Malakal County is stark — in Malakal, 19% of households had confirmed soap access, more than eight times higher than in Akoka. The virtual non-existence of soap in Akoka households eliminates the single most effective household-level barrier against faecal-oral disease transmission at precisely the moment when it is most needed — in a context of near-universal open defecation, untreated surface water consumption, and high child morbidity.

In general, the WASH situation in Akoka County represents a critical public health emergency in its own right. Across every indicator assessed — water source quality, collection time, treatment, sanitation, and soap access — Akoka County records some of the most severe deprivation levels documented in recent REACH survey work in South Sudan, consistently and significantly worse than the already concerning figures recorded in neighboring Malakal County. With 69% of households relying on unimproved sources dominated by open surface water, 96% not treating their water, 76% practicing open defecation, and 97% lacking soap, the conditions for endemic waterborne and diarrhoeal disease transmission are essentially unrestricted. These findings underscore the urgent need for integrated WASH and nutrition programming — including emergency water trucking or point-of-use treatment distribution, latrine construction, soap distribution, and sustained hygiene promotion — as inseparable components of the nutrition emergency response in Akoka County.

Food Security and Livelihoods (FSL)

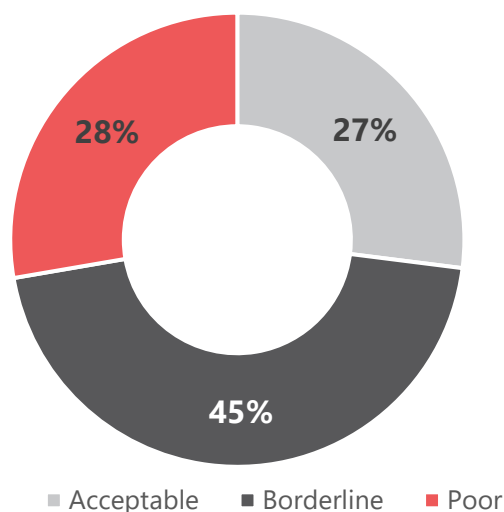
Food Consumption Score

Food security and livelihoods data was collected from 318 households across Akoka County during the survey period. The Food Consumption Score (FCS) was used to assess dietary quality and frequency at household level, classifying households into three categories: Acceptable, Borderline, and Poor food consumption.

Survey findings reveal a deeply concerning food security situation in Akoka County. Only 27% (n=86, 95% CI: 22.5 – 32.2) of households recorded an Acceptable FCS, indicating adequate dietary diversity and frequency. The majority of households — 45% (n=144, 95% CI: 39.9 – 50.8) — fell into the Borderline category, while 28% (n=88, 95% CI: 23.0 – 32.8) recorded a Poor FCS, reflecting severely inadequate food consumption. In total, 73% of surveyed households in Akoka County were food insecure at the time of the survey, combining Borderline and Poor FCS categories.

These figures are notably worse than those recorded in the neighboring Malakal County SMART survey conducted in December 2024, where 29% of households had Acceptable FCS and 71% were food insecure. While the gap between the two counties is not large in absolute terms, it is meaningful in context: Malakal County itself was classified as IPC Phase 4 (Critical) at the time of that survey, with 10,000 people in IPC Phase 5 — making Akoka's marginally worse FCS profile particularly alarming, as it suggests a food security situation that may match or exceed one of Upper Nile State's most severely affected counties.

Figure 6: Percentage of households per FCS category (N=318)

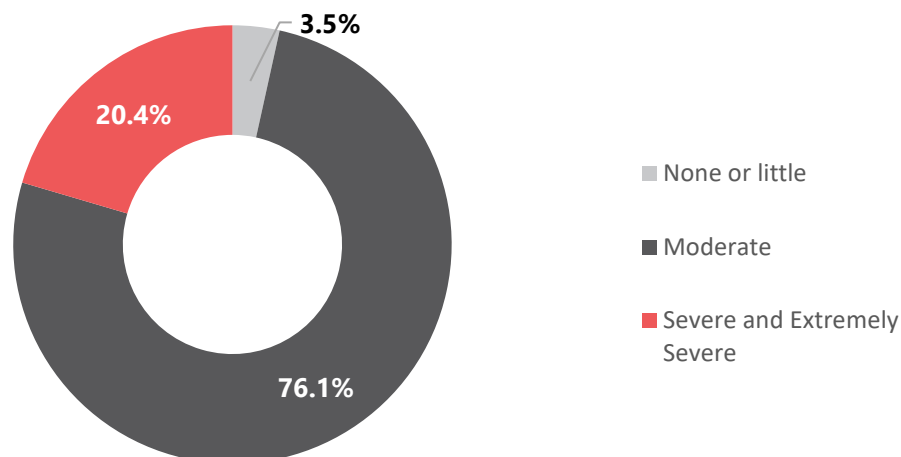


Household Hunger Scale (HHS)

The Household Hunger Scale (HHS) was used to assess the severity of hunger experienced at household level based on self-reported food deprivation behaviours in the 30 days preceding the survey. Results confirm an extreme hunger burden across Akoka County. Only 0.6% (n=2) of households reported no hunger experience, and a mere 2.8% (n=9) reported little hunger. The overwhelming majority — 76.1% (n=242, 95% CI: 71.1 – 80.5) — were in the Moderate hunger category, while 13.5% (n=43, 95% CI: 10.2 – 17.7) and 6.9% (n=22, 95% CI: 4.6 – 10.3) were in the Severe and Very Severe hunger categories respectively.

Critically, 20.4% of households in Akoka County experienced Severe or Very Severe hunger. This is a strikingly different profile from Malakal County, where only 0.7% of households were in the Severe category and none were classified as Very Severe. The presence of Very Severe hunger in Akoka — entirely absent in Malakal — and a Severe hunger rate nearly 30 times higher, points to a qualitatively different and more acute hunger crisis in Akoka County. The near-total absence of households free from meaningful hunger (0.6% with no hunger experience) underscores that food deprivation is not a marginal phenomenon in Akoka but a near-universal condition across the surveyed population.

Figure 7: Percentage of households per HHS category (N=318)

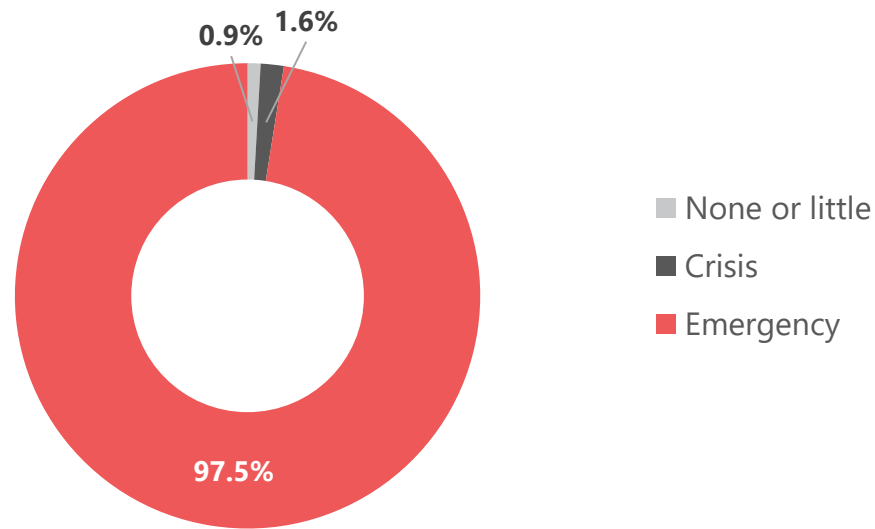


Household Income Source

The Livelihood Coping Strategies (LCS) indicator captures the severity of strategies households resort to in order to cope with food and income deficits, classified across four levels: None, Stress, Crisis, and Emergency. Findings from Akoka County are among the most extreme possible under this framework. A striking 98% (n=310, 95% CI: 95.1 – 98.7) of households were employing Emergency-level coping strategies at the time of the survey — the most severe classification, indicating depletion of assets, engagement in degrading or high-risk livelihood activities, and adoption of irreversible coping measures. Not a single household was recorded in the Stress category, and only 2% (n=5) were at Crisis level, with a marginal 0.9% (n=3) reporting no coping strategies required.

The contrast with Malakal County is stark. In Malakal, 59% of households were at Emergency level, 33% reported no coping strategies needed, and a combined 8% were at Stress or Crisis levels — indicating that a meaningful proportion of the population retained some livelihood buffer capacity. In Akoka, virtually the entire surveyed population has crossed into emergency coping territory, with no households recorded in the Stress category whatsoever. This near-universal adoption of Emergency-level coping strategies signals a complete collapse of household livelihood systems and an acute need for emergency food assistance, livelihood support, and social protection programming at scale.

Figure 8: Livelihood Coping Strategy (n=318)



Taken together, the three FSL indicators — FCS, HHS, and LCS — converge on a single, unambiguous conclusion: Akoka County is experiencing a severe, multi-dimensional food security crisis. With 73% of households food insecure, 20% experiencing Severe or Very Severe hunger, and 98% resorting to Emergency-level coping strategies, the food security situation in Akoka is significantly worse than what was observed in Malakal County — itself a Critical IPC Phase 4 county — and meets the criteria for a food security emergency by any of the three indicators assessed. These findings must be read alongside the emergency-level acute malnutrition prevalence, critically low preventive service coverage, and extremely poor IYCF practices documented in this survey, as together they reflect a deeply entrenched and multifactorial nutrition and food security crisis requiring urgent, coordinated, and sustained multi-sectoral response.

Discussion

Nutritional status

The June 2026 SMART survey in Akoka County revealed a GAM prevalence of 28.8% (95% CI: 23.7–34.4) by WHZ, indicating a Critical nutritional situation very close to the Extremely Critical threshold ($\geq 30\%$) per IPC AMN classification. SAM stood at 9.8% (95% CI: 6.5–14.3) — an exceptionally high figure that underscores the depth of the acute nutrition emergency. The combined GAM (WHZ and/or MUAC) of 34.3% and combined SAM of 12.6% further reinforce the scale of the crisis when both anthropometric indicators are used together.

The situation appears to have deteriorated from the IPC-estimated GAM of 27.8% (FSNMS Round 31, July 2025), though direct statistical comparison is not possible due to the difference in cluster counts (9 vs. 32) and methodology. The IPC classification of Akoka as Phase 5 (Extremely Critical) — and the note that it has further deteriorated within Phase 5 — is consistent with the survey findings. Both younger (6–29 months) and older (30–59 months) children were almost equally affected by acute malnutrition, though older children contribute approximately 63% of GAM cases (while accounting for 55% of the analyzed sample), reflecting the breadth of the nutritional crisis across all age groups.

The high SAM prevalence — at 9.8% by WHZ — is particularly notable. Geographic clustering of severe cases in Clusters 5 (Wunpith) and 6 (Payuel) is contextually explained by extreme remoteness from nutrition centers (estimated 2–3 hours on foot), which limits access to OTP services. Caregiver reluctance to accept referral forms — reported by teams in these areas due to perceptions that nutrition centers will not accept children without self-screening — further compounds treatment access barriers and represents an important program bottleneck to address.

Underweight prevalence at 21.4% falls in the 'High' WHO classification category. Stunting at 6.2% (recalculated with SD of 1) is classified as Low severity, which, in the context of very high acute malnutrition, suggests that the nutritional crisis in Akoka is primarily acute in nature — driven by recent and severe food insecurity — rather than the result of long-standing chronic deprivation. Despite the presence of humanitarian actors in Akoka, partner coverage remains limited and inadequate to meet the scale of identified needs, particularly in the most remote payams where access constraints severely limit service delivery.

These survey findings are consistent with, and partly explained by, a breakdown in the nutrition treatment pipeline over the preceding quarter. Program monitoring data from April–June 2026 shows that while SAM case detection and OTP admissions continued at reduced capacity, the MAM/SFP pathway was almost entirely non-functional despite high identified need — a gap that plausibly contributed to the deterioration from Phase 5 into near-Extremely-Critical status.

Mortality

The CMR of 1.18 per 10,000 persons per day (95% CI: 0.69–2.01) exceeds the emergency threshold of 1.0/10,000/day, confirming an active public health crisis. The U5MR of 1.16/10,000 children/day (95% CI: 0.41–3.21) remains below the emergency threshold of 2, though the wide confidence interval reflects the small number of child deaths (n=5) and cautions against interpreting this as reassuring. Illness accounted for the majority of deaths (77.3%), with 90.9% occurring at the current place of residence — consistent with limited access to health services rather than death during displacement.

The disproportionate male mortality (CMR 1.56 vs. 1.02 for females) is consistent with patterns observed in conflict-affected contexts in South Sudan, where men and older boys may face higher exposure to traumatic injury. The contextual explanation for elevated deaths in Clusters 3 and 28 (Rom Payam) — extreme geographic remoteness combined with an 8-month essential medicine stock-out at HSTP-funded facilities — represents an urgent and actionable finding. Restoring essential medicine supply to health facilities in Rom Payam is a critical immediate priority. The high out-migration rate (9.49/10,000/day) relative to in-migration (3.48/10,000/day) indicates significant population stress and movement, which may affect the stability of nutrition and mortality indicators over time.

Child Health and Program Coverage

Morbidity data showed that 11.9% of children had experienced at least one illness in the two weeks prior to data collection, with fever/suspected malaria (70.2%), cough (48.9%), and diarrhea (40.4%) being the most common presentations. Although 68.1% of sick children were reportedly taken to a health facility, 31.9% received no formal treatment — a significant gap in a high-morbidity context. The strong link between illness and wasting is well established: diarrhea impairs nutrient absorption and increases nutrient losses, while febrile illnesses increase metabolic demands while limiting food intake. In Akoka, where 75.5% of households practice open defecation and 95.9% consume untreated water, the high diarrheal burden is both expected and directly linked to the observed WASH conditions.

Coverage of key preventive interventions was critically low across all three indicators. Measles vaccination (card + recall) at 55.1%, Vitamin A at 50.8%, and deworming at 51.9% are all approximately half the WHO minimum of 80% — and dramatically lower than Malakal County (98.4%, 95.8%, and 82.6% respectively in December 2024), where an active EPI campaign was ongoing at the time of that survey. The consistently low coverage in Akoka reflects a systemic breakdown in routine child health service delivery and community outreach in the absence of active campaigns. The 36.3 percentage point gap between card-verified (18.8%) and recall-confirmed (55.1%) measles coverage also points to poor vaccination documentation and records management. In a population with emergency-level wasting, critically low coverage of these

three preventive services represents compounding vulnerability that must be urgently addressed through integrated EPI outreach campaigns.

Infant and Young Child Feeding (IYCF) Practices

IYCF findings reveal a deeply contradictory picture: strong breastfeeding culture coexisting with catastrophically inadequate complementary feeding. Ever breastfeeding (93.5%) and continued breastfeeding at one year (90.0%) are high and culturally embedded, likely serving as a critical dietary safety net in a context of extreme food insecurity. However, early initiation of breastfeeding stood at only 43.5% — a gap of more than 43 percentage points below Malakal County's 86.9% — indicating that the majority of infants miss the critical first-hour window, with significant implications for neonatal immunity and breastfeeding establishment. EBF at 33.7%, while far below the UNHCR minimum emergency standard of 70%,³⁰ is notably higher than Malakal's 6.3%, suggesting some baseline exclusive feeding practice exists in Akoka.

The complementary feeding indicators are among the most alarming findings in this survey. Only 10.5% met minimum meal frequency, 40.7% achieved minimum dietary diversity, and just 3.5% received a minimum acceptable diet — compared to 21.3%, 45.6%, and 16.9% in Malakal respectively. The finding that 73.3% of children consumed zero vegetables or fruit on the day of recall, and that bottle feeding was practiced in 32.6% of households, further illustrates the depth of the complementary feeding crisis. These extremely low figures, in the context of 97.5% of households at Emergency-level coping strategies and 73.0% food insecure, suggest that poor IYCF practices in Akoka are driven not only by knowledge gaps but by the near-total collapse of household food access. This calls for a dual-track response: urgent food security support alongside targeted IYCF behaviour change communication and counselling integrated across nutrition, health, and community outreach programming.

WASH and Food Security

WASH conditions in Akoka County are among the most severe documented in recent REACH survey work in South Sudan, consistently worse than neighboring Malakal County across every indicator. Only 31% of households had improved water sources compared to 77% in Malakal. Surface water — the highest-risk category — was the single most common source (24%), particularly alarming for a flood-plain county. A further 96% applied no water treatment compared to only 24% untreated in Malakal. With 76% practicing open defecation (vs. 53% in Malakal) and 97% lacking soap (vs. 21% in Malakal), Akoka presents a near-complete absence of basic hygiene barriers. Under the JMP service ladder, only 31% of households met the basic service threshold for water collection time — with households spending over 30 minutes nearly twice as likely to experience moderate-to-severe diarrhea. These WASH conditions are directly implicated in the high diarrheal burden and in the emergency-level child wasting and above-threshold CMR.

Food security findings reinforce the severity of the crisis. The FCS showed 73% food insecurity — marginally worse than Malakal's 71%. The HHS found that 20% experienced Severe or Very

³⁰ [Infant And Young Child Feeding Threshold: Emergency Handbook, UNHCR 2021](#)

Severe hunger — nearly 30 times Malakal's 1% severe hunger rate and with Very Severe hunger entirely absent in Malakal. Most strikingly, the LCS found that 98% of households were at Emergency-level coping — compared to 59% in Malakal and 33% in Malakal with no coping strategies needed — signaling a total collapse of household livelihood systems rather than seasonal food stress. The convergence of catastrophic WASH conditions with complete food security collapse provides the structural explanation for the emergency-level malnutrition and above-threshold mortality documented in this survey. Addressing nutrition outcomes in Akoka requires simultaneous, coordinated action across WASH, food security, and nutrition programming.

Conclusions

The June 2026 SMART survey findings confirm that Akoka County is facing one of the most severe and multi-dimensional humanitarian crises documented in recent REACH survey work across South Sudan. A GAM rate of 28.8% (95% CI: 23.7–34.4) by WHZ places Akoka in the Critical IPC AMN Phase — at the threshold of Extremely Critical — while the combined GAM of 34.3% and SAM of 9.8% by WHZ further underline the depth of the child nutrition emergency. The CMR of 1.18/10,000/day exceeds the emergency threshold, with 77.3% illness-related deaths reflecting the compounding effects of disease burden, inadequate health service access, and essential medicine stock-outs in the most remote payams.

These findings validate and extend the IPC AMN Phase 5 (Extremely Critical) classification for Akoka County. Preventive health service coverage is critically inadequate (measles 55.1%, Vitamin A 50.8%, deworming 51.9%) — all approximately half the WHO minimum threshold and dramatically lower than neighboring Malakal County. IYCF practices are severely suboptimal, with only 3.5% of children 6–23 months receiving a minimum acceptable diet and 73.3% consuming zero vegetables or fruit. Maternal nutrition is at emergency level, with 26.8% of PLW acutely malnourished — exceeding the 20% emergency threshold. WASH conditions are catastrophic across all indicators, with 67% of households using unimproved water dominated by open surface water, 96% applying no water treatment, 76% practicing open defecation, and 97% lacking soap. Food security has collapsed, with 98% of households at Emergency-level livelihood coping strategies and 20% experiencing Severe or Very Severe hunger — figures that far exceed even the already concerning levels in Malakal County.

Taken together, these findings paint a consistent and unambiguous picture of a protracted, multifactorial nutrition and humanitarian emergency in Akoka County that demands immediate, coordinated, and sustained multi-sectoral response. Any disruption to existing — already insufficient — services risks further and rapid deterioration in an already critical situation.

Recommendations and priorities

Problems Identified	Recommended Actions	Responsible Actors	Timeline
Critical acute malnutrition (GAM 28.8% WHZ; combined GAM 34.3%; SAM 9.8%) among children 6–59 months	- Strengthen and scale up OTP and TSFP services; prioritize geographic clusters with highest SAM clustering (Clusters 5 & 6) - Implement BSFP targeting children 6–59 months and PLW in highest-burden areas - Strengthen community-level active case finding, referrals, and follow-up	CHD, SMoH, UNICEF, WFP, Health Link, ACRA	Immediate to Short term
Emergency-level CMR (1.18/10,000/day); 77.3% illness-related deaths;	- Strengthen disease surveillance and mortality reporting systems - Deploy mobile health teams to remote payams inaccessible by foot within 2–3 hours	CHD, SMoH, WHO, UNICEF	Immediate
Critically low preventive service coverage (Measles 55.1%; Vitamin A 50.8%; Deworming 51.9%)	- Conduct integrated EPI outreach campaigns combining measles, Vitamin A, and deworming, prioritizing remote clusters - Strengthen vaccination card documentation and records management	CHD, SMoH, UNICEF, WHO	Short term
Emergency-level PLW malnutrition (GAM 26.8%; SAM 2.9%)	- Expand TSFP enrolment for acutely malnourished PLW - Integrate PLW MUAC screening into routine ANC visits - Strengthen ANC attendance through community mobilization	CHD, SMoH, UNICEF, WFP	Immediate to Medium term
Severely suboptimal IYCF practices (MAD 3.5%; EBF 33.7%; Early initiation 43.5%)	- Strengthen IYCF counselling through health workers and mother support groups - Integrate IYCF messaging into OTP/TSFP counselling, ANC, and community outreach	CHD, SMoH, UNICEF, Health Link	Short to Medium term
Catastrophic WASH conditions (68.6% unimproved water including 23.9% surface water; 95.9%	- Distribute point-of-use water treatment products and promote safe storage - Scale up latrine construction using community led total sanitation (CLTS) approach	UNICEF, WASH Cluster partners, CHD	Immediate to Medium term

no treatment; 75.5% open defecation; 96.5% no soap)	• Develop water points in remote payams to achieve <30 minutes collection time (JMP basic service level)		
Severe food insecurity and livelihood collapse (73.0% food insecure; 97.5% Emergency LCS; 20.4% Severe/Very Severe hunger)	• Implement or scale up GFD and CBT targeting most vulnerable households • Promote climate-resilient livelihood programming (agriculture, fishing, small-scale trade) • Integrate food security interventions with nutrition and health services	WFP, FAO, NGO partners	Immediate to Medium term
Risk of service disruptions and data gaps	• Conduct regular nutrition, WASH, and food security monitoring to track trends • Advocate for resource mobilization and continuity of life-saving services through Nutrition Cluster • Conduct follow-up SMART survey within 12 months	CHD, SMOH, NIWG, Nutrition Cluster, Sub-national cluster	Short to Long term

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Acknowledgements

REACH South Sudan extends sincere gratitude to all individuals and institutions whose contributions were vital to the successful implementation of this Nutrition and Mortality SMART survey in Akoka County, Upper Nile State, South Sudan.

We sincerely thank IMPACT Initiatives HQ for securing financial resource to enable REACH initiative South Sudan conduct this SMART survey through the grant obtained from The Swedish International Development Cooperation Agency (SIDA).

Special appreciation goes to our implementing partners on the ground — Agency for Child Relief Aid (ACRA) and Health Link — for their crucial support in facilitating survey team recruitment, community entry, data collection supervision, and logistics throughout the survey period.

We acknowledge the crucial support of the State Ministry of Health (SMOH), Upper Nile State Nutrition Focal Point, Akoka County Relief & Rehabilitation Commission (RRC), and the Akoka County Health Department (CHD) during survey preparation, field implementation, and preliminary findings presentation.

We thank the members of the South Sudan Nutrition Information Working Group (NIWG) for their technical guidance in survey protocol validation, approval, and findings review.

We are immensely grateful to the communities of Akoka County — including village chiefs, community leaders, and randomly selected individuals — who participated in the survey. We deeply appreciate the mothers and caregivers who responded to the questionnaire and allowed their children to be assessed, despite challenging living conditions and competing household demands.

Finally, we commend all survey participants — supervisors, team leaders, measurers, assistants, enumerators, and drivers — whose dedication ensured the successful collection of quality data in remote and difficult-to-access areas of Akoka County.

Appendices

Plausibility check for: SSD2501_REACH_Akoka_SMART_Survey.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 (% of out of range subjects)	Incl	%	0-2.5 0	>2.5-5.0 5	>5.0-7.5 10	>7.5 20	0 (2.3 %)
Overall Sex ratio (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	0 (p=0.839)
Age ratio(6-29 vs 30-59) (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	0 (p=0.739)
Dig pref score - weight	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	0 (6)
Dig pref score - height	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	2 (8)
Dig pref score - MUAC	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	2 (9)
Standard Dev WHZ .	Excl	SD	<1.1 and 0	<1.15 and 5	<1.20 and 10	>=1.20 or 20	5 (1.13)
.	Excl	SD	>0.9 0	>0.85 5	>0.80 10	<=0.80 20	
Skewness WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	1 (-0.31)
Kurtosis WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	0 (-0.01)
Poisson dist WHZ-2	Excl	p	>0.05 0	>0.01 1	>0.001 3	<=0.001 5	3 (p=0.007)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	13 %

The overall score of this survey is 13 %, this is good.

Appendix 2 - Assignment of Clusters

Payam	Village	Estimated Population size	Clusters
Rom	Areei	1250	1
Rom	Rom	1500	2
Rom	Keidin	1400	3,4
Rom	Payuel	1330	5
Rom	Donchuck	1450	RC
Rom	Wunpith	1400	6,7
Akoka	Angoub	2100	8,9
Akoka	Tamachuk	2200	10,11
Akoka	Paduer	3500	12,13,14,15
Akoka	Akoka	5000	16,RC,RC,17,18
Wunthon	Pakuei	950	19
Wunthon	Ajak	950	20
Wunthon	Panyiook	1081	21
Wunthon	Majak 1	1150	22,23
Wunthon	Majak 2	1100	24
Akotweng	Akotweng	1100	25
Akotweng	Bai-chan	1400	26
Akotweng	Peldiarorwei	900	27
Akotweng	Wuncil	1000	RC
Akotweng	Loyier	1000	28
Benthiang	Marial	710	29
Benthiang	Bienythiang	1600	30
Benthiang	Mina	615	31
Benthiang	Wunayuol	708	32

Appendix 3 – Standardization Test Results

Standardisation test results					Precision			Accuracy			OUTCOME			
Weight		subjects	mean	SD	max	Technical	TEM/mean	Coef of rel	Bias from	Bias from			From	From
		#	kg	kg	kg	TEM (kg)	TEM (%)	R (%)	Bias (kg)	Bias (kg)			Superviso	Median
	Superviso	10	13.3	2.1	1.6	0.37	2.8	96.8	0	0.11	TEM reject	R value ac	Bias good	Bias poor
	Enumerate	10	13.3	2.1	1.5	0.35	2.6	97.2	0.02	0.13	TEM reject	R value ac	Bias good	Bias poor
	Enumerate	10	13.3	2.1	1.6	0.37	2.8	96.8	0.01	0.12	TEM reject	R value ac	Bias good	Bias poor
	Enumerate	10	13.3	2.1	1.6	0.37	2.8	96.8	0.01	0.13	TEM reject	R value ac	Bias good	Bias poor
	Enumerate	10	13.3	2.1	1.6	0.37	2.8	96.8	0.01	0.13	TEM reject	R value ac	Bias good	Bias poor
	Enumerate	10	13.3	2.1	1.6	0.36	2.7	96.8	0.01	0.13	TEM reject	R value ac	Bias good	Bias poor
	Enumerate	10	13.3	2.1	1.6	0.37	2.8	96.8	0	0.13	TEM reject	R value ac	Bias good	Bias poor
	enum inte 6x10		13.4	2	-	0.02	0.2	100	-	-	TEM good	R value good		
	enum inte 6x10		13.2	2	-	0.03	0.2	100	-	-	TEM good	R value good		
	inter enun 7x10		13.3	2	-	0.02	0.2	100	-	-	TEM good	R value good		
	TOTAL intr 6x10	-	-	-	-	0.36	2.7	96.7	-	-	TEM reject	R value acceptable		
	TOTAL+ su 7x10	-	-	-	-	0.36	2.7	96.7	-	-	TEM reject	R value acceptable		
Height		subjects	mean	SD	max	Technical	TEM/mean	Coef of rel	Bias from	Bias from			From	From
		#	cm	cm	cm	TEM (cm)	TEM (%)	R (%)	Bias (cm)	Bias (cm)			Superviso	Median
	Superviso	10	98.2	10.5	1.1	0.33	0.3	99.9	0	0.17	TEM good	R value go	Bias good	Bias good
	Enumerate	10	98.2	10.5	1.2	0.4	0.4	99.9	0.1	0.15	TEM accep	R value go	Bias good	Bias good
	Enumerate	10	98.2	10.5	0.8	0.28	0.3	99.9	0.09	0.17	TEM good	R value go	Bias good	Bias good
	Enumerate	10	98.2	10.5	1.1	0.36	0.4	99.9	0.09	0.18	TEM good	R value go	Bias good	Bias good
	Enumerate	10	98.2	10.5	1	0.31	0.3	99.9	0.09	0.21	TEM good	R value go	Bias good	Bias good
	Enumerate	10	98.2	10.6	1.2	0.37	0.4	99.9	0.08	0.22	TEM good	R value go	Bias good	Bias good
	Enumerate	10	98.3	10.5	0.9	0.32	0.3	99.9	0.07	0.24	TEM good	R value go	Bias good	Bias good
	enum inte 6x10		98.3	10.3	-	0.15	0.2	100	-	-	TEM good	R value good		
	enum inte 6x10		98.1	10.4	-	0.13	0.1	100	-	-	TEM good	R value good		
	inter enun 7x10		98.2	10.3	-	0.13	0.1	100	-	-	TEM good	R value good		
	TOTAL intr 6x10	-	-	-	-	0.37	0.4	99.9	-	-	TEM good	R value good		
	TOTAL+ su 7x10	-	-	-	-	0.37	0.4	99.9	-	-	TEM good	R value good		
MUAC		subjects	mean	SD	max	Technical	TEM/mean	Coef of rel	Bias from	Bias from			From	From
		#	mm	mm	mm	TEM (mm)	TEM (%)	R (%)	Bias (mm)	Bias (mm)			Superviso	Median
	Superviso	10	141.9	6.3	11	3.14	2.2	74.9	0	1.65	TEM poor	R value re	Bias good	Bias acceptable
	Enumerate	10	141.9	6.3	11	3.28	2.3	72.8	0.2	1.72	TEM poor	R value re	Bias good	Bias acceptable
	Enumerate	10	142.1	6.1	12	3.31	2.3	71	0.42	2.02	TEM reject	R value re	Bias good	Bias poor
	Enumerate	10	142	6.4	11	3.26	2.3	74.4	0.29	1.9	TEM poor	R value re	Bias good	Bias acceptable
	Enumerate	10	142.1	6.2	11	3.15	2.2	74.2	0.28	1.99	TEM poor	R value re	Bias good	Bias acceptable
	Enumerate	10	141.8	6.5	11	3.06	2.2	77.6	0.33	1.85	TEM poor	R value re	Bias good	Bias acceptable
	Enumerate	10	141.9	6.1	11	3.12	2.2	73.8	0.23	1.83	TEM poor	R value re	Bias good	Bias acceptable
	enum inte 6x10		140.4	6	-	0.56	0.4	99.1	-	-	TEM good	R value good		
	enum inte 6x10		143.5	6	-	0.6	0.4	99	-	-	TEM good	R value acceptable		
	inter enun 7x10		142	6.1	-	0.53	0.4	99.2	-	-	TEM good	R value good		
	TOTAL intr 6x10	-	-	-	-	3.25	2.3	72	-	-	TEM poor	R value reject		
	TOTAL+ su 7x10	-	-	-	-	3.23	2.3	72.2	-	-	TEM poor	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+inte) 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										
reject		>3	>0.21	>1.4										

Appendix 4 – Local Event Calendar

Month of Year	2021		2022		2023		2024		2025		2026	
Jan			New year/9 th CPA Day	53	New year/9 th CPA Day	41	New year/ / Death of Paramount Chief Dhiu Duang	29	New year/9 th CPA Day	17	New year/CPA day/Nation wide tension with Sudan	5
Feb			Opening of school/Back to school campaign for Post Covid	52	Opening of school/Road Construction	40	Pope Visit to South Sudan/Opening of school	28	Opening of school	16	Cholera Vaccination Campaign/Opening of school	4
Mar			International Women Day/Ramadan/ Opening of School	51	IWD/Ramadan/ Opening of School	39	International Women Day/Ramadan/Opening of School	27	International Women Day/Ramadan/Opening of School	15	Opening of School	3
April			Easter Holidays/Farm Clearance	50	Easter Holidays/Farm Clearance	38	Easter Holidays/Farm Clearance	26	Easter Holidays/Farm Clearance	14	Easter	2
May			16 th SPLA Day/Planting of sorghum/Starting of rainy season	49	16 th SPLA Day/Planting of sorghum/Starting of rainy season	37	16 th SPLA Day/Planting of sorghum/Starting of rainy season	25	16 th SPLA Day/Planting of sorghum/Starting of rainy season	13	Polio Campaign/ 16 th SPLA Day	1
June			Weeding/Planting of G'nuts/Eid aladha	48	Weeding/Planting of G'nuts/Eid	36	Weeding/Planting of G'nuts/Eid aladha	24	Weeding/Planting of G'nuts/Eid aladha	12	Eid aladha	0
July	South Sudan Independence day/Martyres Day	59	/South Sudan Independence day/Martyres Day	47	/South Sudan Independence day/Martyres Day	35	/South Sudan Independence day/Martyres Day	23	/South Sudan Independence day/Martyres Day	11		
Aug	Eid Maria/Weeding of Deng Lual	58	Eid Maria/Weeding of Deng Lual	46	Eid Maria/Weeding of Deng Lual	34	Eid Maria/Weeding of Deng Lual	22	Eid Maria/Weeding of Deng Lual	10		
Sept	Start of harvesting	57	Start of harvesting/	45	Start of harvesting	33	Start of harvesting	21	Start of harvesting/ Visit of Akoka Commisioner	9		
Oct	Comboni day/Post Harvest	56	Comboni day/Post Harvest	44	Comboni day/Post Harvest	32	Comboni day/Post Harvest/Measels	20	Comboni day/Post Harvest	8		
Nov	Start of dry season/ Offering days of traditional magic	55	Start of dry season/ Offering days of traditional magic	43	Start of dry season/ Offering days of traditional magic	31	Start of dry season/ Offering days of traditional magic	19	Start of dry season/Deworming camp/Offering days of traditional magic	7		
Dec	Christmas Celebration	54	Christmas Celebration/Tuany Reec	42	Christmas Celebration	30	Christmas Celebration	18	Visits of the newly appointed Commissioner/Christmas	6		