Final Report
Anthropometric and Retrospective mortality SMART survey Luakpiny/Nasir County, Upper Nile State

July 2022

"Working to bring hope & development to the people of South Sudan"

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List of abbreviations

ADRA	Adventist Development and Relief Agency
BHA	Bureau of Humanitarian Assistance
CMR	Crude Mortality Rate
CHD	County Health Department
CI	Confidence interval (at 95% throughout report)
CMR	Crude Mortality Rate
DDG	Digital Data Gathering
EBF	Exclusive Breastfeeding
ENA	Emergency Nutrition Assessments
FCDO	Foreign Commonwealth & Development Office
FCS	Food Consumption Score
FSL	Food Security and Livelihoods
FSNMS	Food Security and Nutrition Monitoring System
GAM	Global Acute Malnutrition
HFA	Height for Age
HAZ	Height for Age Z scores
HH	Household
IPC	Integrated Phase Classification
IYCF	Infant and Young Child Feeding
LCS	Livelihood Coping Strategies
MAM	Moderate Acute Malnutrition
MDD	Minimum Dietary Diversity
MM	Millimetre
MUAC	Mid Upper Arm Circumference
NGO	Non-Governmental Organisation
NIWG	Nutrition Information Working Group
ODK	Open Data Kit
OTP	Out-Patient Therapeutic Programme
PLW	Pregnant and Lactating Women
PPS	Probability Proportional to Size
RC	Reserve Cluster
RI	Relief International
RRC	Relief and Rehabilitation Commission
SAM	Severe Acute Malnutrition
SD	Standard Deviation (measure of spread around the mean)
SFP	Supplementary Feeding Programme
UNOSAT	United Nations Satellite Centre
WHO	World Health Organisation
WAZ	Weight for Age
WHZ	Weight for Height

Table of Contents

List of Tables

List of Figures

Executive Summary

This SMART survey was conducted in Luapiny/Nasir country, in order to assess the prevalence of acute malnutrition among children 6-59 months and retrospective mortality with REACH taking the lead of data collection in coordination with UNKEA and RI with prior communication with NIWG from July 22nd to July 31st, 2022. A total of 704 children aged 6-59 months were measured to get the anthropometric data to assess the acute malnutrition status of 468 households residing in the county-specific clusters. While 562 children were planned to be included in the survey, a total of 704 (125%) children from a total of 36 clustered villages were measured. This happened because the reserve clusters (RCs) were activated; 33 out of 34 originally planned clusters were surveyed, plus 3 RCs, totaling 36 clusters in the final sample.

Table 1. Summary of survey findings

Anthropometry - Children 6-59 months based on WHO 2006 standard		
Index	WHZ - scores	**(%)**
WHZ - score	Prevalence of global acute malnutrition (<-2 z-score and/or oedema)	(109) 15.9 % (12.9-19.5 95% CI)
	Prevalence of moderate acute malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(91) 13.3 % (10.5-16.6 95% CI)
	Prevalence of severe acute malnutrition (<-3 z-score and/or oedema)	(18) 2.6 % (1.8-3.8 95% CI)
WAZ - scores		
WAZ - score	Prevalence of underweight (<-2 z-score)	(63) 9.1 % (7.1-11.5 95% C.I.)
	Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(54) 7.8 % (6.0-10.0 95% C.I.)
	Prevalence of severe underweight (<-3 z-score)	(9) 1.3 % (0.7-2.5 95% C.I.)
HAZ - scores		
HAZ - score	Prevalence of stunting (<-2 z-score)	(36) 5.6 % (4.0-7.7 95% C.I.)
	Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(36) 5.6% (4.0-7.7 95% C.I.)
	Prevalence of severe stunting (<-3 z-score)	(0) 0.0 % (0.0-0.0 95% C.I.)
MUAC		
MUAC	Prevalence of global malnutrition (< 125 mm and/or oedema)	(39) 5.5 % (3.3-9.1 95% CI)
	Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(31) 4.4% (2.7-7.2 95% CI)
	Prevalence of severe malnutrition (< 115 mm and/or oedema)	(8) 1.1 % (0.5-2.8 95% CI)

Mortality, retrospectively 93 days recall period			
Mortality rate	CMR Deaths/10,000 people/day	(n= 51)	1.82 (1.28-2.58)
	U5 MR Deaths/10,000 children U5/day	(n= 4)	0.57 (0.21-1.51)
Measles, Deworming and vitamin A supplementation	Measles (N= 689) card + mother confirmation	(n= 601)	87.2% (84.8-89.8)
	De-worming (N= 658) (children12-59 months)	(n= 568)	86.3% (83.6-89.1)
	Vitamin A (N= 727)	(n= 601)	82.7% (79.9-85.3)
Morbidity in the last 14 days (two weeks) (n= 490) 67.4% (64.0-70.8)			
Types of illness	Fever	(n= 382)	78.0% (74.3-81.2)
	Diarrhoea	(n= 137)	28.0% (24.1-32.0)
	Cough/difficulty of breathing	(n= 173)	35.3% (30.8-39.4)
	Conjunctivitis	(n=31)	6.3% (4.3-8.8)
	Skin infection	(n= 41)	8.4% (5.9-10.8)

1.0 Background

1.1 Background information

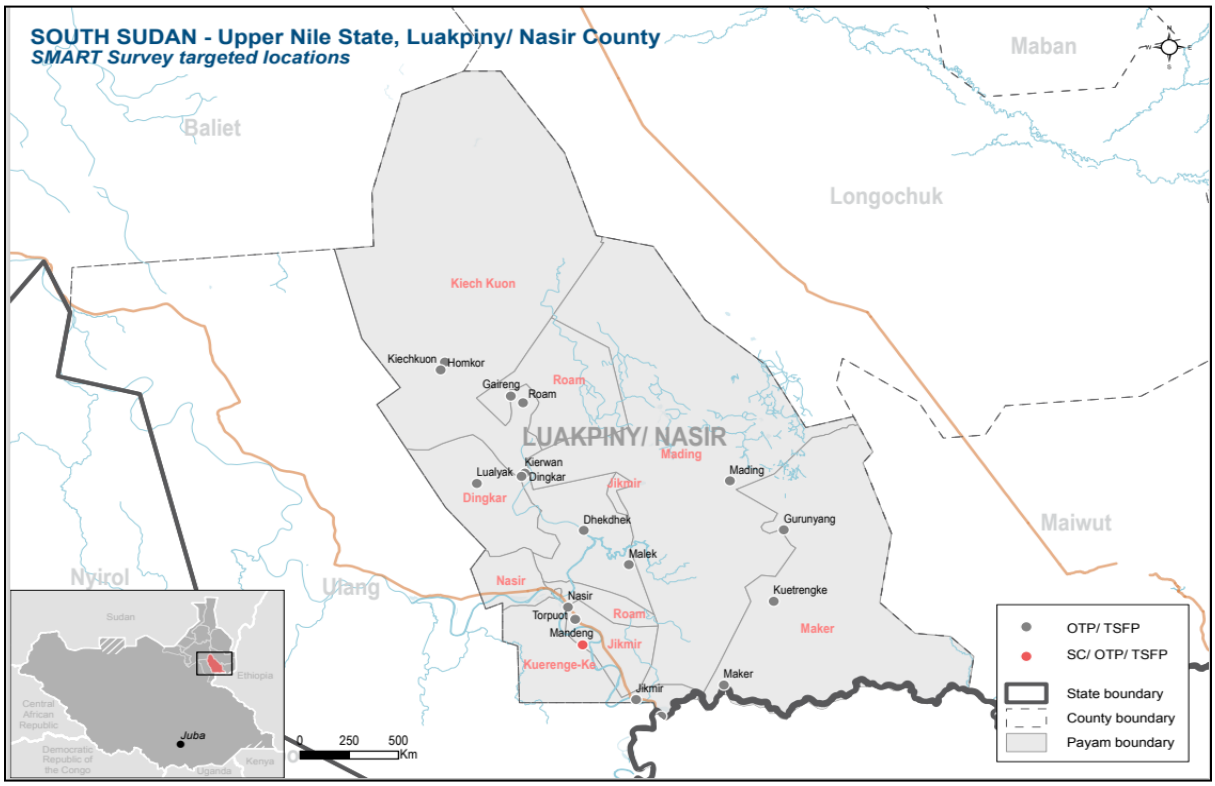


Figure 1 LuakPiny/Nasir County

Luakpiny/Nasir County is located in Upper Nile State and borders Ethiopia to the southeast, Maiwut County to the east, and Baliet and Ulang Counties to the west. The Pibor and Baro Rivers intersect at the county's southern border and flow into the Sobat River, which flows past Nasir town. All three rivers serve as major riverine transportation routes. The 2022 population projection for Nasir County was 293,794 people compared to 260,703 in 2020 and 210,002 in the 2008 census. The main ethnic group living in Nasir County are the Jikany Nuer. Based on the recent IPC Analysis conducted in March 2022, all of the 12 counties in Upper Nile state were classified either in Integrated Phase Classification (IPC) Acute Malnutrition (AMN) Phase 3 ("Severe") or Phase 4 ("Critical"); Luakpiny/Nasir is one of the counties that was classified as Critical (IPC AMN Phase 4).

The Sobat Basin seasonally floods during the rainy season and provides excellent pasture during the dry season. Agriculture forms the primary economic activity in Luakpiny/Nasir county, with the main livelihoods being agropastoral; approximately 50% of households engage in farming as their primary livelihood, while some engage in cultivation and livestock rearing, particularly cattle. In addition, with Luakpiny/Nasir county being located alongside the Pibor and Baro rivers, fishing also serves as a livelihood source for some communities[1].
The Universal Network for Knowledge and Empowerment Agency (UNKEA) has been present in

[1] https://www.csrf-southsudan.org/county_profile/luakpiny-nasir/

Nasir since 2002 and has been implementing the health and nutrition programming since 2011. Relief International (RI) has been present in Luakpiny/Nasir County since May 2018 and is supporting nutrition and water, sanitation, and hygiene (WASH) programming, as well as mobile health services in Nasir County. UNKEA is supporting the Out-Patient Therapeutic Programme (OTP) sites and Rl is supporting Targeted Supplementary Feeding Program (TSFP) programs in Nasir County. Among the other NGOs present in the county is the Adventist Development and Relief Agency (ADRA), who is providing education, protection, and food security and livelihood (FSL) programming. Lastly, World Vision is providing general food distributions and Nile Hope is supporting peace building in the county.

REACH, a joint initiative of IMPACT, ACTED and the United Nations Satellite Centre (UNOSAT), provides data and analysis on contexts of crisis in order to inform humanitarian action. REACH is an initiative of ACTED in South Sudan and has worked in South Sudan since 2012, conducting needs assessments and providing evidence-based information to inform the humanitarian response. Since 2019, REACH has engaged with the Nutrition Information Working Group (NIWG), participated in IPC AMN analysis workshops, and provided technical support to nutrition partners for SMART survey implementation in the country.

he previous SMART Survey in Luakpiny/Nasir county was conducted in 2016. Findings from this assessment showed a GAM rate of 21.8% (18.5-25.5, 95% CI), which above the World Health Organisation (WHO) emergency threshold of 15%. Since then, the nutrition situation in the county has been an information gap for implementing partners.To fill this information gap, REACH, in collaboration with UNKEA and RI, planned to implement a SMART survey from approximately July 11th to July 31th, to collect anthropometric and mortality data, as well as data for key multi-sectoral indicators (FSL, WASH, Health) to better understand the status of AMN in Luakpiny/Nasir County, as well as its key drivers.

1.2 Survey Objectives

Specific Objectives

1. To estimate the prevalence of acute malnutrition, stunting and underweight among children (boys and girls) aged 6 – 59 months
2. To estimate the prevalence of acute malnutrition among pregnant and lactating women (PLW) in Luakpiny/Nasir County.
3. To estimate retrospective Crude Mortality Rate (CMR) and Under 5 Mortality Rate (U5MR) in Luakpiny/Nasir County
4. To estimate the coverage of various immunisation campaigns in Luakpiny/Nasir County, including:
    - Vitamin A supplementation (for children 6-59 months)
    - Deworming (for children 12 to 59 months)
    - Measles vaccination (among children 9-59 months).
5. To assess childhood morbidity and health seeking behaviors among children aged 6-59 months in Luakpiny/Nasir County.
6. To assess the WASH situation in Luakpiny/Nasir County (, including main water source, distance/time to water source, water treatment status, access to latrine)

7. To assess infant and young child feeding (IYCF) practices, such us breastfeeding and complementary feeding, among mothers who have children under the age of two years in Luakpiny/Nasir County.
8. To assess the FSL situation in Luakpiny/Nasir County, (including the 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 programmes of UNKEA and RI in Luakpiny/Nasir County.

1.3 Survey Areas

The SMART survey was implemented in Luakpiny/Nasir County, which covers Nasir (County HQ), Dingkar, Jikmir, Kiech, Kuerenge-Ke, Mading, Maker, and Roam

2. Methodology

The SMART methodology was employed to undertake the nutrition and retrospective mortality survey in Luakpiny/Nasir County. The survey was designed using SMART methodology with probability proportional to size (PPS) at the first stage of sampling. The SMART methodology provides a basic integrated method for assessing nutritional status and mortality rate in emergency situations and provides the basis for understanding the magnitude and severity of humanitarian crises.

Anthropometric measurements and mortality assessments were undertaken simultaneously for this survey. In addition, data collection included key indicators on child morbidity, FSL, WASH, and IYCF, to provide a snapshot of the potential underlying causes of malnutrition in the area.

2.1. Survey Design

The survey employed a two-stage cluster sampling approach, following a probability proportional to population size (PPS) strategy, using SMART methodology within each cluster. Stage one sampling involved the sampling of the clusters to be included in the survey, while the second stage sampling concerned the selection of the households from the sampled clusters.

2.1.1 Sample size calculation

The sample size was calculated using the Emergency Nutrition Assessment (ENA) software for SMART (Jan 11th 2020 version). The following parameters were considered to determine the sample size for the anthropometry and mortality surveys: 1) anticipated malnutrition rates, 2) the desired precision, 3) the design effect, 4) the average household size, 5) the proportion of children under five years old, and 6) the expected non-response rate.

Table 2 Sample size calculation for the anthropometric and mortality assessments

Table 2a Sample size for the anthropometric assessment

Parameter	Luakpiny/Nasir County	Justification
Estimated Prevalence (%)	18.1%	Based on the SMART survey conducted in Longechuk County in September 2019 by Action Against Hunger (same domain as Nasir). In this assessment, the measured prevalence of acute malnutrition was found to be 14.6% (11.6-18.1 95% CI). For the current assessment, the higher CI was used as the situation in the region (and Nasir) has reportedly deteriorated since 2019 due to tensions and flooding. In addition, the 2019 SMART survey was conducted in the pre-harvest season, while the current survey was set to be conducted in the lean season, likely indicating a worse nutrition situation.
Desired Precision	4.5	Based on the last SMART survey guide.
Design Effect	1.5	Based on SMART survey guidelines.
Children to be Included	**459**	
Average Household Size	8.4	The average HH size used for the FSNMS Round 27 was 8.4. We have decrease bit a bit to account for population movements ahead of the rainy season and the flooding which is known to cause population movement in Nasir.
% Children Under-Five	21.7%	The % children Under-Five for the SMART survey conducted in Longochuk was 21.7%. We are using a slightly lower estimate based on the assumption that there is a higher population movement in the lean season in Nasir compared to the pre-harvest season, which would impact the proportion of children under 5 years old.
% Non-Respondents	3%	Taken from the SMART survey conducted by Action Against Hunger in September 2019 in Longuchuk (same domain as Nasir).
Households to be Included	**289**	

Table 2b Sample size for the mortality assessment

Parameter	Luakpiny/Nasir County	Justification
Estimated death rate per 10,000/day	1.30	Using the SMART survey conducted by AAH, there is significant increase in the mortality since the same domain there is increase in mortality rate in Nasir County.
Desired Precision	0.4	Per the SMART guidance
Design Effect	1	Based on SMART survey conducted in Longochuk by AAH (same domain as Nasir)
Recall Period	93	Will be Updated When The SMART survey start
Population to be Included	**3654**	
Average Household Size	8.4	The average HH size used for the FSNMS Round 27 was 8.4. We have decrease it a bit to account for population movements ahead of the rainy season and the flooding which is known to cause population movement in Nasir.
% Non-Respondents	3%	Taken from the SMART survey conducted by Action Against Hunger in September 2019 in Longuchuk (same domain as Nasir).
Households to be Included	**448**	

Hence, as per the SMART guidelines, the maximum sample yield of the Anthropometric or the Mortality Survey was taken. Accordingly, the maximum sample size is returned by the anthropometric sample size calculation and this will be considered the final sample size, with **448 households** as the situation in Luakpiny/Nasir county have deteriorate.

2.2 Cluster Selection and/or Assignment

A cross-sectional, two-stage cluster survey was employed to collect nutritional and mortality data as well as contextual data. The ENA for SMART Surveys software (January 11th 2020 version) was used to determine the cluster selection using the updated village-level population data of the County.

The villages included in the sample frame were entered into the software with their respective population figures. The SMART software then randomly assigned 34 clusters, with the chance of each village being chosen proportional to its population size (PPS). This was done to avoid selection of villages with small population sizes to have unfair chance of being selected than villages with a larger population, which might introduce selection bias by not giving every household an equal chance of being selected.

Accordingly, 34 villages (smallest geographical units) were identified as a sample universe to be assigned as survey clusters. In addition, 3 RCs were included in the survey due to the fact that one of the assigned clusters became inaccessible due to flooding and the sample size for children did not reach the planned size. The details of clusters assignment can be found in Annex 3 of this report.

2.3 Second stage of sampling:

2.3.1 Household selection

Definition of household for the survey: A household was defined for this survey as a group of people living together, who cook and eat from the same cooking pot the day prior to data collection. Polygamous families were defined based on the same logic; if each wife has her own pot, even if living in the same compound, they were treated as different households.

Standard SMART protocols were used during the field work. Every day when arriving in a randomly selected cluster, the team sought the village leader/chief and introduced the objective of the survey. The standard definition of a HH as per the protocol was shared to aide in developing the HH listing within the cluster. One of two methods was used for household listing: 1) a verbal listing from one or more community leaders, or, if not possible, 2) a manual house to house listing. Thirteen households were then randomly selected from the complete list of HHs using the random number generator in Smart

phones. These HHs were then visited by the survey team. The village guide and community leaders supported the teams with updating their list of households.

For clusters with more than 150 HHs, segmentation was done to select one portion of the cluster that will represent the larger cluster. In this survey, only 2 clusters were found to have more than 150 HHs: Dording and Kuereng. Selection of segments was done using either PPS or simple random sampling, dependent on the population sizes of the specific segments.[2] Within each of these selected segments, the same process of HH selection as used in the other clusters was followed.

2.3.2 Selection of children

In every household visited, the mother/caregiver was interviewed. If there was more than one wife in the household and they cook separately, they were considered as independent households, but if they eat from the same cooking pot, then they were considered as a single household. In selected households, all eligible children (aged 6-59 months) were measured, and the household questionnaire was applied for each child in this age range. Empty households and households with absent children were re-visited and information of the outcome recorded on the cluster control form. This form was also used to record information on empty and non-responding households.

2.4 Survey Teams, Training, Data Collection and Data Management

Survey Teams

In total, the assessment was conducted by seven teams with four members in each team (one team leader, one measurer, one assistant, one tablet). For each cluster, local guides were employed to facilitate data collection at the household level. The survey teams were recruited by RI with the involvement of the UNKEA and local officials at the Luakpiny/Nasir County level. As much as possible, the teams sought to hire a mix of both male and female enumerators. However, it proved difficult to find female recruits; only two female enumerators, recruited from local communities, participated in the data collection. Supervisors consisted of a mix of RI, UNKEA and REACH staff.

Training

The survey teams were trained from July 16th to July 21st, 2022. The training was originally planned to be conducted starting from 12th July but was delayed by payment negotiations that were still ongoing at the original start date. The training covered various components including taking anthropometric measurements, sampling of households, data collection tools, digital data collection, data quality checks, and

[2] 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 use

standardisation exercise among other themes. The training of the enumerators was facilitated by SMART certified-staff and staff with experience conducting SMART surveys.

Supervision

The overall management of the survey will be done by REACH Initiative with support from RI and UNKEA. Maximum supervision of the survey teams will be ensured to facilitate quality data.

Data Entry and Management

Data was collected through android tablets using Open Data Kit (ODK) software. The data collection tools were programmed and uploaded on tablets, which were used by the survey teams. The teams uploaded the collected data to a central server on daily basis to allow the Survey Manager to review and clean the collected data on a daily basis, which gave them the opportunity to provide feedback every morning to the teams as part of data quality assurance. In some cases, the daily upload was impossible due to network connectivity issues.

2.5 Data Quality

In order to ensure optimal and high data quality, a number of measures were put in place, such as conducting comprehensive training for survey teams; conducting standardization tests (which was done twice due to fact that the first trial was not in the acceptable quality range); practical field exercises (pre-test survey questionnaires); close supportive supervision; calibration of survey equipment; daily plausibility checks (sometimes this was interrupted due to connectivity issues); and sharing feedback with the teams before proceeding to the field.

2.6 Classifying malnutrition

2.6.1 Weight-for-height

Weight-for-height z-scores (WHZ) were calculated to give the prevalence of acute malnutrition or wasting. Wasting can be assessed by comparing a child's weight with the height that would be expected from a healthy child of the same height and sex.

Table 3 Wasting as defined by WHO

Global Acute Malnutrition (GAM) Moderate & severe wasting	<-2 z-scores weight-for-height (WFH) and/or oedema
Severe Acute Malnutrition (SAM) Severe wasting	<-3 z-scores weight-for-height (WFH) and/or oedema

2.6.2 Mid-upper arm circumference (MUAC)

MUAC is a simple and important tool as it is the best predictor of those cases most at risk of dying once the MUAC falls below 115 mm. However, it is not a sensitive early predictor of malnutrition[3]. Any child aged between 6-59 months whose arm circumference is less than 125 mm may be acutely malnourished, and any child (6-59 months) with an arm circumference of less than 115 mm may be severely malnourished.

2.6.3 Height-for-age

Height-for-age z-scores were calculated to give the prevalence of chronic malnutrition, or stunting. Stunting can be assessed by comparing a child's height with the height of a healthy child of the same age. Stunting is an indication of long-term nutritional deprivation, where growth is being compromised to conserve nutrients and energy for the maintenance of the body. As seen in the Table below, stunting is defined as <-2 z-scores, whereas severe stunting is defined as <-3 z-scores.

To compute the HAZ, it is also necessary to know the exact age of the child, which was a limitation of this survey therefore this data should be interpreted with caution. Even though an events calendar was used when estimating each child's age to the nearest month SMART rated the quality of the age data as unacceptable.

Table 4 Stunting as defined by WHO

Global Chronic Stunting	<-2 z-scores height-for-age (HFA)
Severe Chronic Stunting	<-3 z-scores height-for-age (HFA)

2.6.4 Weight-for-age

Weight-for-age z-scores were calculated to give the prevalence of under nutrition or underweight. Underweight is assessed by comparing a child's weight with the weight of a healthy child of the same age. Underweight is defined as <-2 z-scores, whereas severe underweight is defined as <-3 z-scores.

Similar to the HAZ, it was necessary to know the exact age of the child to accurately determine whether or not it could be considered underweight, which was a challenge as 20% of children did not have an exact birthdate. Even though an events calendar was used when estimating each child's age to the nearest month, SMART rated the quality of the age data as "unacceptable". Therefore, this data should be interpreted with

[3] WHO/UNICEF. WHO child growth standards and the identification of severe acute malnutrition in infants and children: A joint statement. 2009.

caution.

2.6.5 Population cut-offs for malnutrition

The table below defines the population cut-offs for determining the severity of malnutrition when the prevalence of acute and chronic malnutrition is known. These levels are internationally agreed upon and provide an objective basis for developing responses to increased levels of acute and chronic malnutrition[4]. To meaningfully interpret proportions at a population level, absolute numbers are also necessary.

Table 5: Classification for Severity of Malnutrition by Prevalence among Children 6-59 moths5

LEVELS	PREVALENCE OF THRESHOLDS %		
	WASTING	OVERWEIGHT	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%

[4] *Physical Status: The use and interpretation of Anthropometry. Report of a WHO expert committee, 1995. Chapter 5, p208 & 212*
[5] *Threshold classification according to WHO 2018*

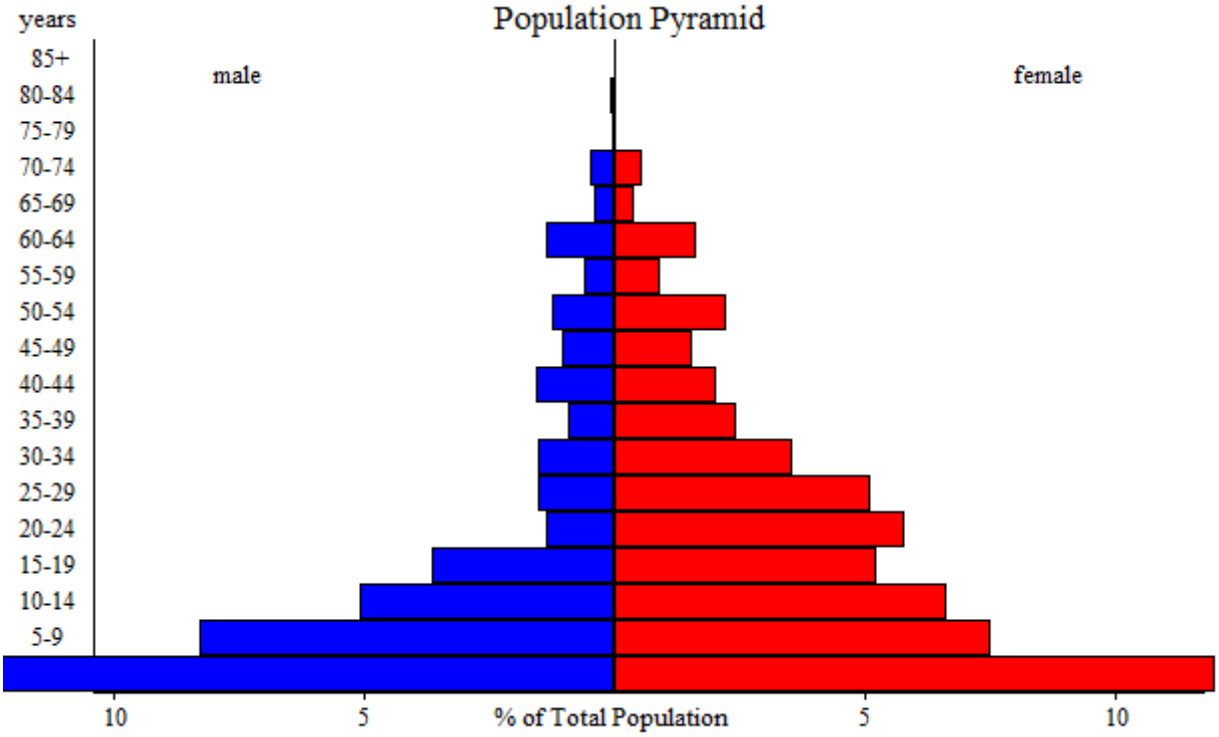
3. Results

3.1 Demographic characteristics of sampled households

A total 468 households and 3019 population were included in the survey. The average household size was 6.5 individuals per household. The majority of households (57.8%) were found to be female headed.

In total, 87% of households had children, while percentage of children aged 6-59 months are 26.6%. In total, 704 children were surveyed.

Figure 2 General population pyramid



3.2 Anthropometric results (based on WHO standards 2006):

A total of 704 children aged 6-59 months (366 boys and 338 girls) were measured to assess acute malnutrition status from 468 households in 36 villages (clusters) in Luakpiny/Nasir. The plan for this survey was to reach 34 clusters with 448 household and 459 children. However, due flood-related accessibility constraints in the area, one of the original clusters was dropped. As a result, RCs were activated, leading to a total of 36 clusters with 468 households and 704 children.

With respect to outliers, the data has been checked with +/-3 from the observed mean and those identified as outliers were flagged by SMART software as not being plausible if either for heigh, weight, or age was incorrect. The SMART flags were excluded from

the analysis but not from the data. In total, 18 data entries were flagged for the WHZ, and so data from 686 children was analysed. For similar reasons, in weight-for-age of 693 children, and heigh-for-age of 643 children, was eventually analysed

Table 6 - Distribution of age and sex of sample

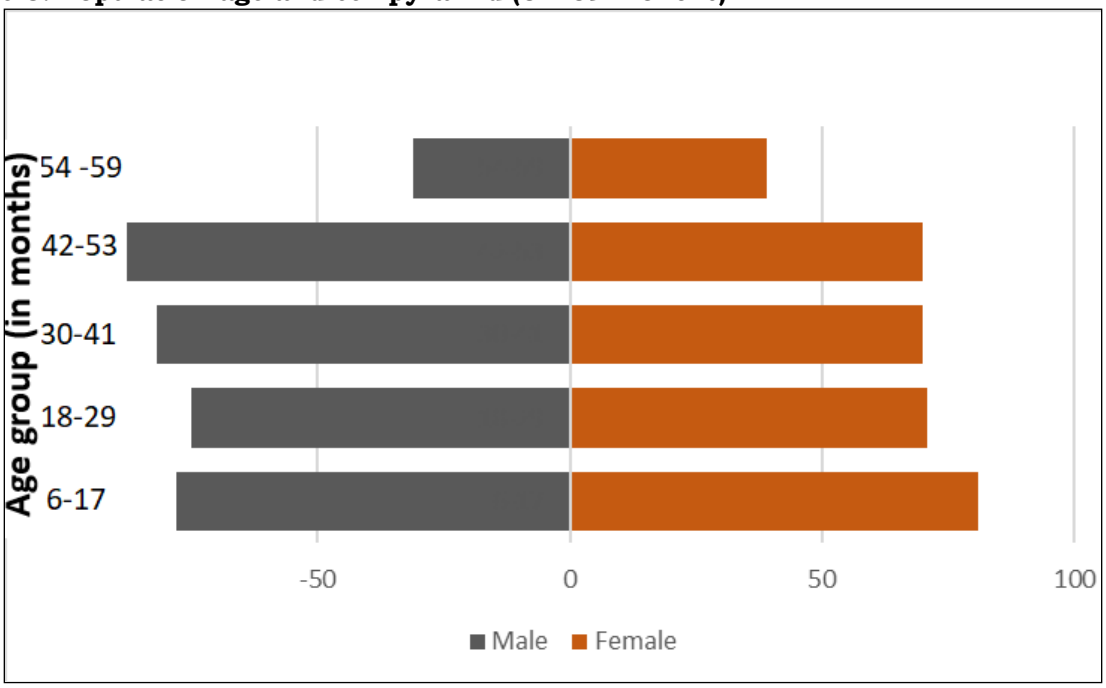
	Boys		Girls		Total		Ratio
AGE (months)	**no.**	**%**	**no.**	**%**	**no.**	**%**	**Boy:girl**
6-17	81	49.1	84	50.9	165	23.4	1.0
18-29	77	51.7	72	48.3	149	21.2	1.1
30-41	87	55.4	70	44.6	157	22.3	1.2
42-53	89	55.3	72	44.7	161	22.9	1.2
54-59	32	44.4	40	55.6	72	10.2	0.8
Total	366	52.0	338	48.0	704	100.0	1.1

According to statistical evaluation of sex and age ratio in the ENA SMART plausibility check, the overall sex ratio had a p-value of 0.29, which indicates boys and girls are equally represented in the sample. The age ratio of 6-29 months-old children to 30-59 months-old children is around 0.81 with the p-value of 0.474 (as expected). The overall age distribution for boys had a p-value of 0.465 (as expected), Overall age distribution for girls had a p-value of 0.872 (as expected), while the overall sex/age distribution is as expected at a p-value of 0.197. In general, the overall score of the survey is 14%, indicating a good quality survey that is reliable for further analysis and to inform programme decision-making.

A total of 704 children aged 6-59 months (366 boys and 338 girls) are measured to assess acute malnutrition from 466 households. In the original survey protocol it was planned to measure 562 children for this study however; given the fact that we have activated and used all the reserve clusters latterly we ended up surveying 704 (125%) of children were measured from 36 clustered villages (33 Original & 3 RCs).

Data was checked for outliers (values that lie +/-3 SD from the observed mean). Outliers were flagged by the SMART software as not being plausible values of either weight, height or age was incorrect. The SMART flags were excluded from the analysis but not from the data. There was no flagged data in weight-for-height z-score however, 686 children were analyzed. In addition, in weight-for-age 693 children and height-for-age 643 children were analyzed.

Figure 3. Population age and sex pyramid (6 – 59 Months)



3.2.1 Prevalence of Acute malnutrition:

Prevalence of acute malnutrition by WH z- score based on WHO standard 2006
Weight-for-Height (W/H) is the nutrition index that reflects short-term growth failure (acute malnutrition, wasting) and is defined by a child's weight (kg) and its height or length (cm) in relation to a standard or reference population of the same height/length. Acute malnutrition prevalence is estimated from the weight for height (W/H) index values combined with the presence of oedema. The WFH indices are expressed in Z-scores, in line with the WHO standard.

Global acute malnutrition is defined as <-2 z scores weight-for-height and/or oedema, severe acute malnutrition is defined as <-3 z scores weight-for-height and/or oedema). It is also used in the classification of global, moderate, and severe acute malnutrition (GAM, MAM, and SAM). Exclusion of z-scores from observed mean SMART flags: WHZ -3 to 3; HAZ -3 to 3; WAZ -3 to 3

Table 7. Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

	All n = 686	**Boys** n = 355	**Girls** n = 331
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(109) 15.9 % (12.9 - 19.5 95% C.I.)	(66) 18.6 % (14.4 - 23.6 95% C.I.)	(43) 13.0 % (9.1 - 18.2 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(91) 13.3 % (10.5 - 16.6 95% C.I.)	(57) 16.1 % (12.2 - 20.8 95% C.I.)	(34) 10.3 % (6.6 - 15.7 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(18) 2.6 % (1.8 - 3.8 95% C.I.)	(9) 2.5 % (1.5 - 4.4 95% C.I.)	(9) 2.7 % (1.5 - 4.9 95% C.I.)

The prevalence of oedema is 0.0 %

The prevalence of Global Acute Malnutrition (GAM) defined as Weight-for-height Z scores (WHZ<-2 and/or oedema) among children 6-59 months was estimated 15.9% (12.9 – 19.5 95% CI) as presented in the Table 7 above and was categorised as very high. The GAM rate exceeds WHO emergency threshold (>15%). The prevalence of SAM per WHZ among children 6-59 months was 2.6% (1.8 – 3.8 95% CI). No nutritional bilateral oedema case was observed during the assessment.

When disaggregated by age group, the highest GAM rates are found in the age group of 6-29 months, as presented in Figure 4 below. As the data shows the GAM rate for younger children is 17.3% which is higher compared to older age children 14.7% it shows that youngest group are at more risk of malnutrition than those older counterpartsN.

Figure 4. Prevalence of GAM disaggregated by age group (age in months)

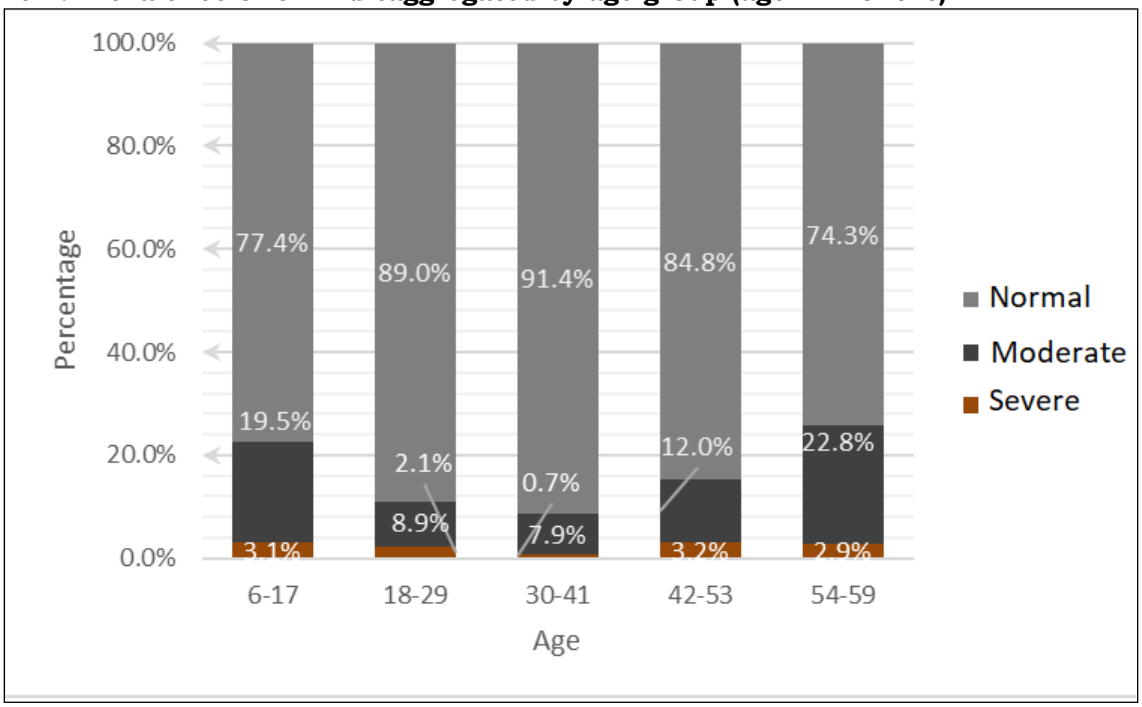
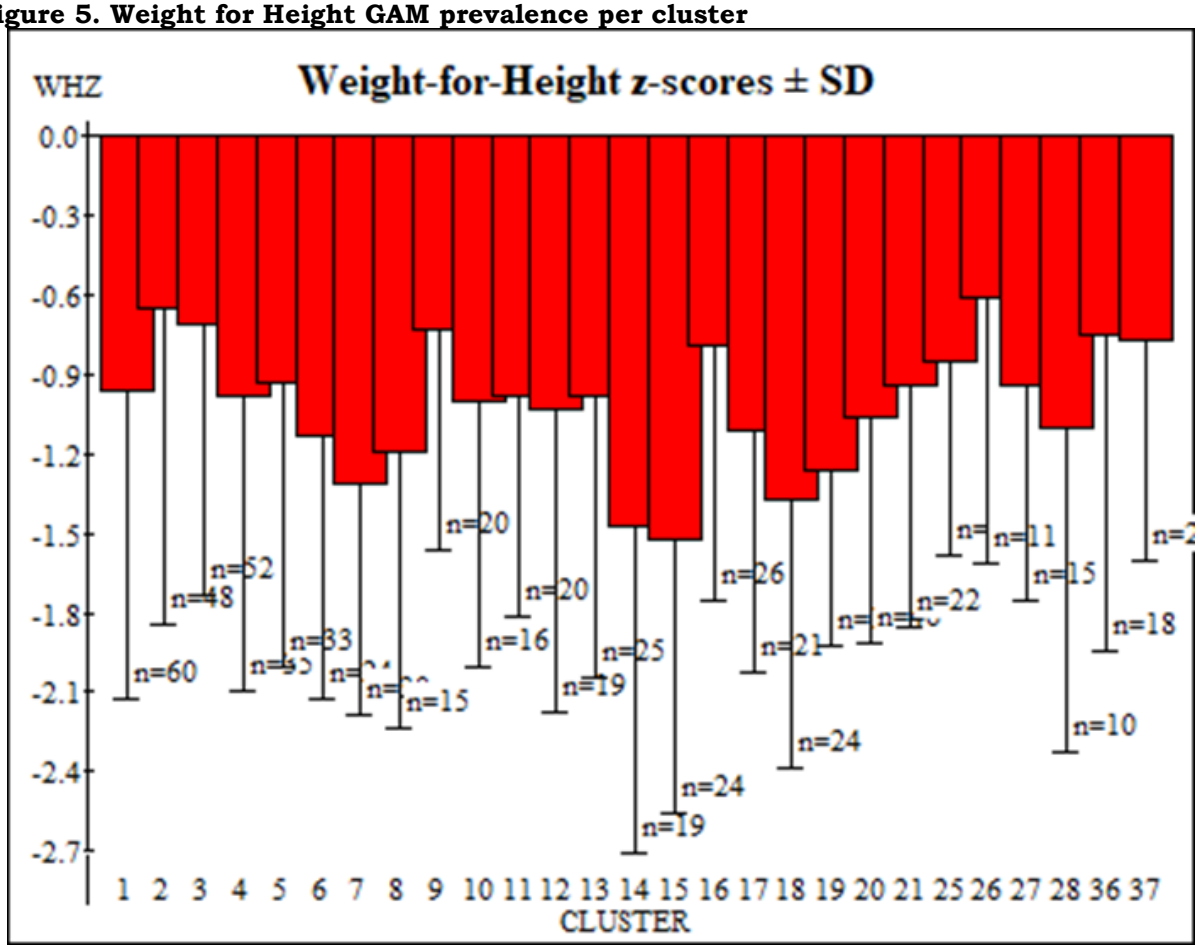


Table 8. Prevalence of acute malnutrition by age, based on weight-for-height *z*-scores and/or oedema

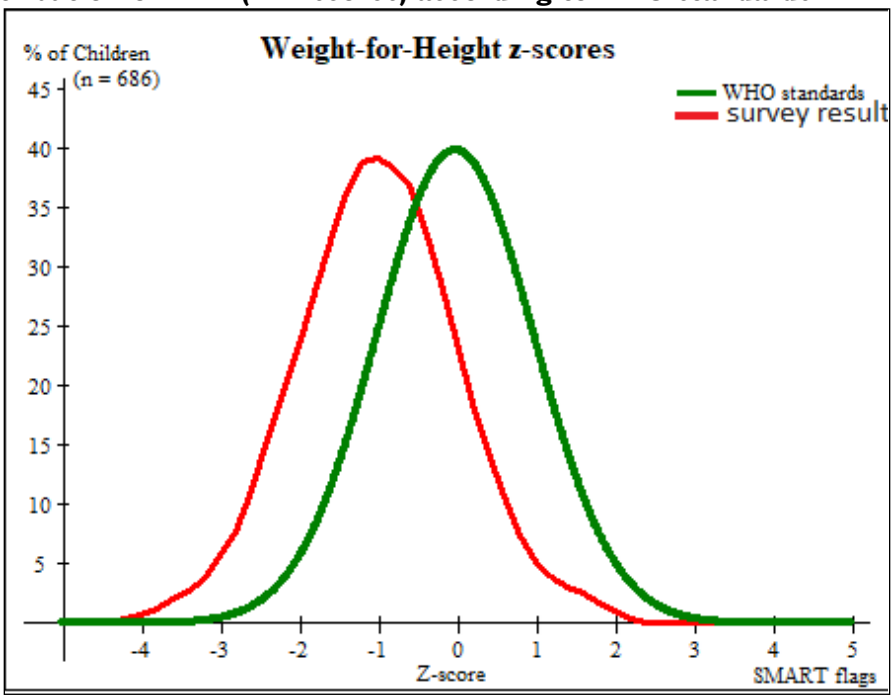
Age (mo)	Total no.	Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
		No.	%	No.	%	No.	%	No.	%
6-17	159	6	3.8	31	19.5	122	76.7	0	0.0
18-29	146	3	2.1	13	8.9	130	89.0	0	0.0
30-41	152	1	0.7	12	7.9	139	91.4	0	0.0
42-53	158	5	3.2	19	12.0	134	84.8	0	0.0
54-59	71	3	4.2	16	22.5	52	73.2	0	0.0
Total	686	18	2.6	91	13.3	577	84.1	0	0.0

Figure 5. Weight for Height GAM prevalence per cluster



If we see the distribution of malnutrition across clusters, we can observe that in cluster 14 and cluster 15 there is a high GAM prevalence, there seems to be a pocketed malnutrition in cluster 14 and cluster 15. This might be associated with the fact that during the survey time it was witnessed there has been flooding in Benytit (cluster 15) and Torkech (Cluster 14) which make accessibility to Health and Nutrition Facilities difficult and all the Nutrition sites were closed. This might have contributed to high prevalence of acute malnutrition in Kuetreng-ke Payam.

Figure 6. Distribution of WFH (in z-scores) according to WHO standards



The mean weight-for-height z- score was -1.01 indicates that the nutritional status of U5 population is poor as compared with WHO 2006 standard as the curve shifted to the left side from the normal curve. The standard deviation (SD) of the z-scores is 1.01, which is below the cut-off point of 1.2 indicating that the quality of the data is acceptable. The value for skewness and kurtosis rated as 0.04 and 0.12 and both the skewness and kurtosis lie within the excellent range of ±0.2 that the distribution can be considered as normal.

Table 9. Distribution of acute malnutrition and oedema based on weight-for-height z-scores

	<-3 z-score	**>=-3 z-score**
Oedema present	Marasmic kwashiorkor. 0 (0.0 %)	Kwashiorkor. 0 (0.0 %)
Oedema absent	Marasmic No. 25 (3.6 %)	Not severely malnourished. 679 (96.4 %)

Table 10. Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex

	All n = 704	**Boys** n = 366	**Girls** n = 338
Prevalence of global malnutrition (< 125 mm and/or oedema)	(39) 5.5 % (3.3 - 9.1 95% C.I.)	(20) 5.5 % (3.0 - 9.7 95% C.I.)	(19) 5.6 % (3.2 - 9.8 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(31) 4.4 % (2.7 - 7.2 95% C.I.)	(16) 4.4 % (2.2 - 8.6 95% C.I.)	(15) 4.4 % (2.5 - 7.9 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(8) 1.1 % (0.5 - 2.8 95% C.I.)	(4) 1.1 % (0.3 - 3.7 95% C.I.)	(4) 1.2 % (0.3 - 4.0 95% C.I.)

MUAC is a measurement of mid-upper arm circumference of a child, which is good indicator of acute malnutrition and mortality. Prevalence of global acute malnutrition based on MUAC (<125mm) and/or oedema among children 6-59 months as presented in Table 10 is 5.5% (3.3-9.1 95% C.I) and severe acute malnutrition MUAC (<115mm) and/or oedema was 1.1 (0.5-2.8 95% CI).

Table 11. Prevalence of acute malnutrition by age, based on MUAC cut off's and/or oedema

Age (mo)	Total no.	Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
		No.	%	No.	%	No.	%	No.	%
6-17	165	7	4.2	26	15.8	132	80.0	0	0.0
18-29	149	0	0.0	2	1.3	147	98.7	0	0.0
30-41	157	0	0.0	2	1.3	155	98.7	0	0.0
42-53	161	1	0.6	0	0.0	160	99.4	0	0.0
54-59	72	0	0.0	1	1.4	71	98.6	0	0.0
Total	**704**	**8**	**1.1**	**31**	**4.4**	**665**	**94.5**	**0**	**0.0**

Table 12. Prevalence of combined GAM and SAM based on WHZ and MUAC cut off's (and/or oedema) and by sex

	All n = 704	Boys n = 366	Girls n = 338
Prevalence of combined GAM (WHZ <-2 and/or MUAC < 125 mm and/or oedema)	(123) 17.5 % (14.1 - 21.4 95% C.I.)	(71) 19.4 % (15.2 - 24.4 95% C.I.)	(52) 15.4 % (11.0 - 21.2 95% C.I.)
Prevalence of combined SAM (WHZ < -3 and/or MUAC < 115 mm and/or oedema	(23) 3.3 % (2.2 - 4.8 95% C.I.)	(12) 3.3 % (1.9 - 5.5 95% C.I.)	(11) 3.3 % (1.8 - 5.8 95% C.I.)

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

Table 13. Detailed numbers for combined GAM and SAM

	GAM		**SAM**	
	no.	**%**	**no.**	**%**
MUAC	14	2.0	5	0.7
WHZ	84	11.9	15	2.1
Both	25	3.6	3	0.4
Oedema	0	0.0	0	0.0
Total	123	17.5	23	3.3

Total Population: 704

3.2.2 Underweight (WAZ):

Table 14. Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 693	**Boys n = 357**	**Girls n = 336**
Prevalence of underweight (<-2 z-score)	(63) 9.1 % (7.1 - 11.5 95% C.I.)	(39) 10.9 % (7.9 - 14.9 95% C.I.)	(24) 7.1 % (4.8 - 10.5 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(54) 7.8 % (6.0 - 10.0 95% C.I.)	(34) 9.5 % (6.8 - 13.3 95% C.I.)	(20) 6.0 % (4.0 - 8.8 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(9) 1.3 % (0.7 - 2.5 95% C.I.)	(5) 1.4 % (0.5 - 3.9 95% C.I.)	(4) 1.2 % (0.5 - 3.0 95% C.I.)

Table 15. Prevalence of underweight by age, based on weight-for-age z-scores

Age (mo)	Total no.	Severe underweight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
		No.	%	No.	%	No.	%	No.	%
6-17	158	5	3.2	24	15.2	129	81.6	0	0.0
18-29	148	2	1.4	11	7.4	135	91.2	0	0.0
30-41	154	0	0.0	7	4.5	147	95.5	0	0.0
42-53	161	1	0.6	9	5.6	151	93.8	0	0.0
54-59	72	1	1.4	3	4.2	68	94.4	0	0.0
Total	693	9	1.3	54	7.8	630	90.9	0	0.0

3.2.3 Prevalence of chronic malnutrition/stunting (HAZ)

Table 16. Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 643	Boys n = 328	Girls n = 315
Prevalence of stunting (<-2 z-score)	(36) 5.6 % (4.0 - 7.7 95% C.I.)	(23) 7.0 % (4.8 - 10.2 95% C.I.)	(13) 4.1 % (2.5 - 6.8 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(36) 5.6 % (4.0 - 7.7 95% C.I.)	(23) 7.0 % (4.8 - 10.2 95% C.I.)	(13) 4.1 % (2.5 - 6.8 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)

Stunting measures the number of children whose linear growth has been impaired by chronic malnutrition over a prolonged period of time (during pregnancy and/or their first years of life). It assesses to what degree (Z-score) a child's height for age deviates from the height of a child of the same age and sex in the 2006 WHO Growth Standards. In Luakpiny/Nasir SMART survey the prevalence shows 5.6% (4.0 – 7.7 95% C.I.) HAZ. As per WHO standard this is low compared to the minimum threshold of 20%.

Table 17. 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	686	-1.00±1.01	1.36	0	18
Weight-for-Age	693	-0.59±1.09	1.00	0	11
Height-for-Age	643	0.03±1.34	1.00	0	61

* contains for WHZ and WAZ the children with edema.

3.2.4 Women's Nutritional Status by MUAC

The survey tried to assess the nutritional status of women of reproductive age (15-49) by measuring their MUAC during the household survey. Accordingly, 53% of them (n=359 95% CI 48.9-56.9) are pregnant and lactating women. Out of the total 359 PLW 21% (n=74 95% CI 16.4%-24.6%) are pregnant women while the remaining 79% (n=285 95%CI 75.2-83.6) are lactating women. From the total lactating women 23.2% (n=66 95%CI 18.2-28.1) have children under 6 months old while the remaining 76.8% (n=219 95%CI 71.9-81.8) have children equal & above 6 months old.

In order to assess the nutritional status of women of reproductive age a total of 359 pregnant and lactating women measured using MUAC to identify PLW nutritional status. This is important because when this PLW are malnourished they fell to provide the required nutritional intake for infant especially for those under 6 months children. Accordingly, about one-fourth of PLW nutritional status seems be malnourished as 21.2% (n=76 95%CI 17.0-25.3) are below 230mm MUAC measurement.

3.3 Mortality

Table 18. Mortality Demographic Information, (468 households interviewed, recall period of 93 days)

HOUSEHOLD INFORMATION			
Total population		**Children 0-59 months**	
Total number HH residents	3019	Number 0-5 years	758
Total number people joined HH in recall period	200	Number 0-5yrs joined HH during recall period	37
Total number people left HH in recall period	426	Number 0-5 years left HH during recall period	18
Total number births during recall period			40
Total number deaths during recall period	51	Number 0-5 years deaths during recall period	4
Crude mortality rate (deaths/10,*000*/day)	1.82 (1.28-2.58)	Under-5 mortality rate (deaths/10,000/day)	0.57 (0.21-1.51)
Design effect	1.53	Design effect	1.00

To have some idea on the health situation of the under 5 children and older groups, A proxy indicator of mortality is taken for this survey. The mortality survey was conducted alongside the nutrition survey, in which a SMART methodology with two stage cluster sampling methodology was used. Unlike the nutrition assessment, in the mortality

study, all households with or without U5 children during the survey period were included in the study.

As it is required to have a specific timeframe to study the retrospective mortality assessment, a recall period of 93 days was used, by taking this year's easter celebration, which was 18th April 2022, to the date of data collection start day of 18th July 2022. This specific benchmark was taken due to the fact that majority of the residents are assumed to celebrate this holiday and can easily remember it.

The information on Mortality was collected on 13 randomly selected households across 36 clusters/villages we have included in our sampling and the summary of the result as presented in the Table 21 above, a total of 466 households and 3019 individuals were included in the 93 days retrospective mortality rates estimation.

Hence, crude mortality (CMR) rate was estimated at 1.82 deaths/10,000 people/day while under five years mortality rate (U5MR) is estimated at 0.57 deaths/10,000 children/day. Accordingly, the crude mortality rate (CMR) is above emergency threshold of >=1.14 as per WHO guideline that the county is classified under emergency level.

Table 19. Causes and Location of deaths

Causes of death	%	Location of death	%
Unknown	17.6%	In current location	74.5%
Injury/traumatic	5.9%	During migration	3.9%
Illness	76.5%	In place last residence	17.6%
		Other (not in either of those)	3.9%

3.4 Children's morbidity

In order to assess the prevalence of main disease in children 6-59 months a retrospective morbidity data was collected in those children with two weeks recall period. Accordingly, the survey result showed that 67.4% (64-70.8 95% CI) of children had at least one episode of illness in the 2 weeks recall period to the survey. As per the finding fever, cough and diarrhoea are the most prevalent illnesses reported accounted for 78%, 35.3% and 28% respectively.

Table 20. Prevalence of reported illness in children in the two weeks prior to interview (n= 775)

	6-59 months
Prevalence of reported illness	67.4% (64.0 – 70.8 95% C.I.)

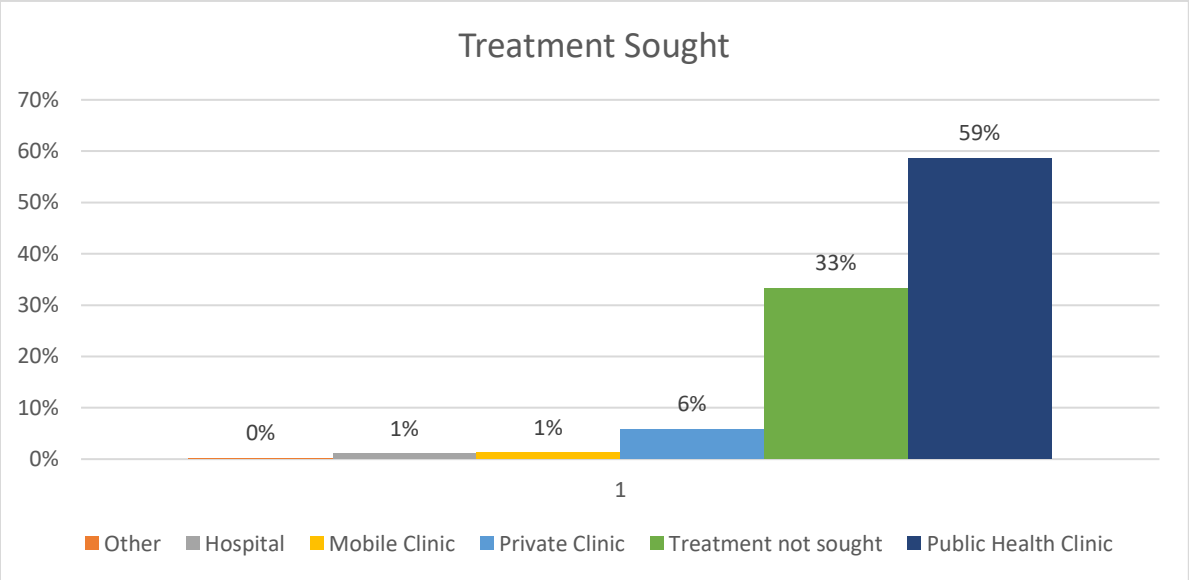
Table 21. Symptom breakdown in the children in the two weeks prior to interview (n= 490)

	6-59 months
Diarrhoea	28% (24.1 - 32.0, 95% C.I.)
Cough	35.3% (30.8 - 39.4,95% C.I.)
Fever	78% (74.3 - 81.2, 95% C.I.)
Pneumonia	5.7% (4.3 - 8.8, 95% C.I.)
Conjunctivitis	6.3% (3.7 - 8.0, 95% C.I.)
Skin Infection	8.4% (5.9 - 10.8, 95% C.I.)

Children 6-59 months who had been sick since two weeks the survey period are more likely to be malnourished than their counterparts who had not been ill. Generally, ill children are more at risk of malnutrition than the healthy children and those ill children are 1.415 times at risk of malnutrition than with that of healthy one.

The survey results revealed that majority (327) of the children seek treatment at various places depending on the distance. Among the children who had been sick (67%, n= 327), nearly two-third of were taken to health facility for treatment. Almost similar amount got their treatment either in public/private clinic, mobile clinics or hospitals. Among the children who were sick, about one-third have not sought for treatment at all as it can be seen in the figure below.

Figure 7. Treatment sought

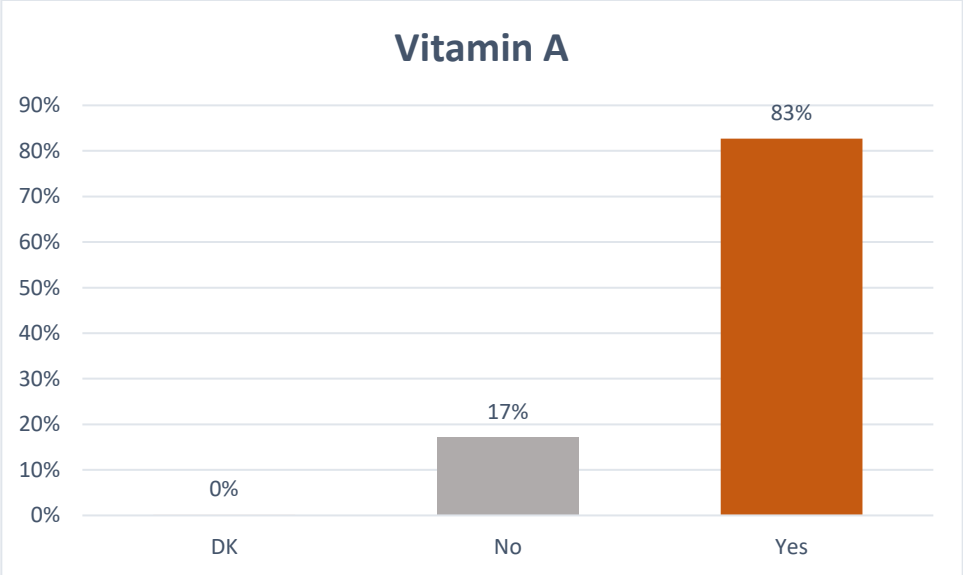


3.5 Vaccination Results

Table 22. Vaccination coverage: Vitamin A for 6-59 months, deworming for 12-59 months and measles for 9-59 months

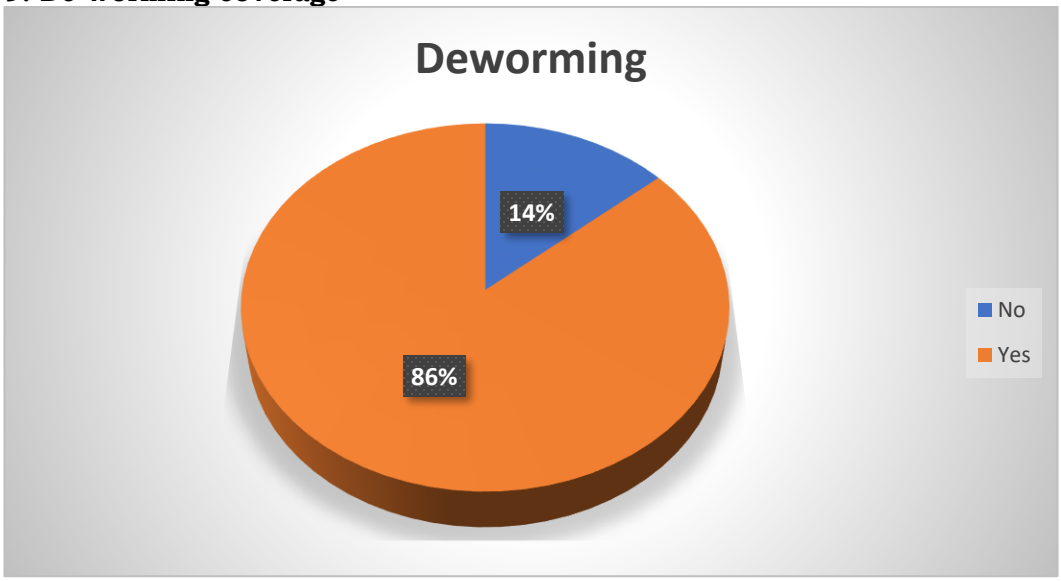
	Vitamin A Supplementation = 727	Deworming = 658	Measles (based on vaccination card) = 689	Measles (With card + Caretaker Confirmation) = 689
YES	(No. 601) 82.7% (79.9 – 85.3 95% C.I.)	(No. 568) 86.3% (83.6 – 89.1 95% C.I.)	(No. 20) 2.9% (1.7 – 4.4 95% C.I.)	(No. 601) 87.2% (84.8 – 89.8 95% C.I.)

Figure 8. Vitamin A coverage



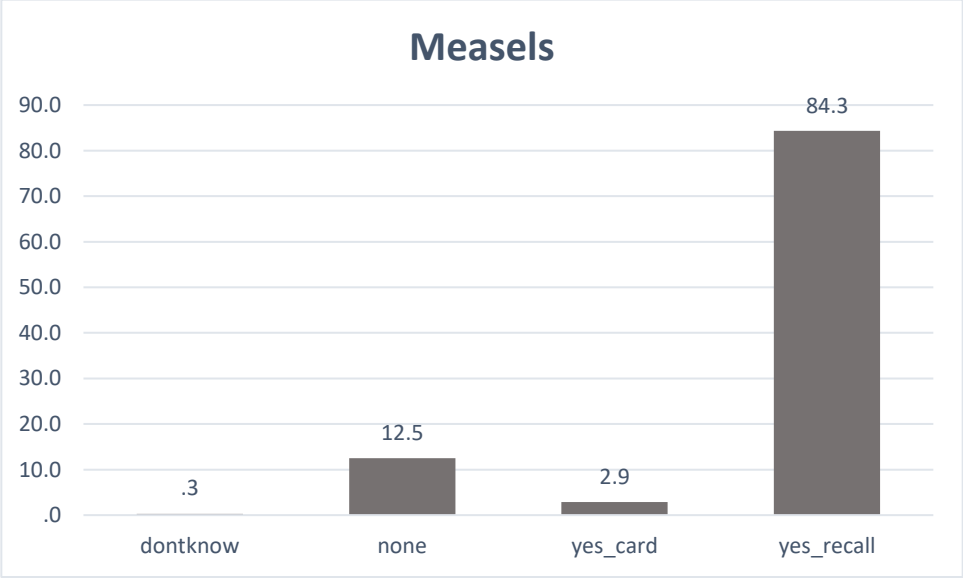
In order for mothers/care takers to understand what we are trying to ask, during the assessment the survey team showed a vitamin 'A' capsule and de-worming tablets for mothers and caregivers to recall whether their children had received Vitamin 'A' and de–worming or not in the past six months. As presented in the table 25 above, among children 6-59 months 83%, (n= 601 95% CI 79.9 - 85.3) of the children reported as having received vitamin 'A' supplementation and around 86.3%, (n= 568 95% CI 83.6 - 89.1) of children age 12-59 months received de-worming once in the last six months.

Figure 9. De-Worming coverage



Measles vaccination was assessed through checking a vaccination card and recall by mothers of children 9-59 months of age. As the response, only of 2.9%, (n= 91, 1.7 - 4.4 CI 95%) of caretakers of the children were able to show vaccination card. The large majority of respondents were able to recall the vaccination to be at 84.3%, (n= 581, 81.6 – 86.9 CI 95%) of mothers confirmed that their children had been vaccinated for measles. As a result measles vaccination by card plus mothers' confirmation reached found out to be 87.2%, (n= 601, 84.8 – 89.8 CI 95%).

Figure 10. Measles coverage



3.6 Infant and Young Child Feeding Practice (IYCF)

Infant and young child feeding practices directly affect the nutritional status of children under two years of age and, ultimately, impact child survival. Improving infant and young child feeding practices in children 0–23 months of age is therefore critical to improve nutrition, health, and development of children.

Information regarding child feeding practices was collected for all children aged 0 – 23 months but analysed as described below. The sample sizes obtained in this type of survey for IYCF practices are small and the results should therefore only be interpreted as a guide and not taken as representative of the population's knowledge and practices. Due to this reason no comparisons have been made against previous survey results.

In this survey infants and young children feeding practices among aged 0-23 month's children was assessed and mother of 287 children interviewed. The mothers/care takers were interviewed about the infant and young child feeding practices of their children between the ages of 0-23 months in line with WHO guideline. The findings of the survey are presented in the following table and discussions.

3.6.1 Ever Breastfed

When mothers were asked whether their children were ever breastfed, 92.7% of children of 0-23 months group were ever breastfed. Out of those ever breastfed children, 91.4% of the children had reportedly been initiated to breastfeeding immediately within one hour as per WHO recommendation.

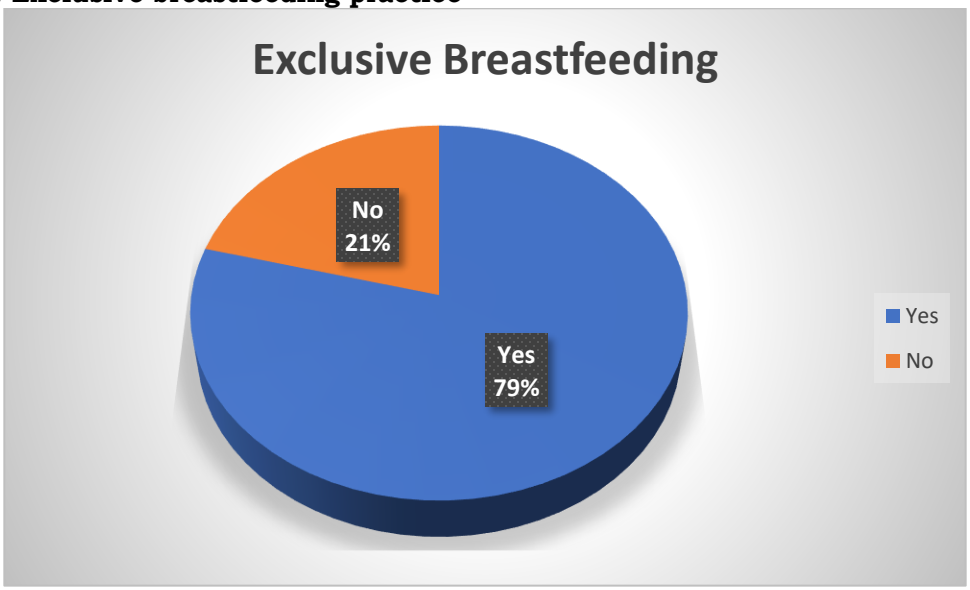
Table 23. IYCF : Child ever breastfed and early initiation of breastfeeding

IYCF (Ever Breastfed & early Initiation)				
Indicator value	Age group	n	%	95% CI
Child ever breastfed	0-23 months	266	92.7	89.5 – 95.5
Breastfeeding initiation	0-23 months	243	91.4	87.6 – 94.7

3.6.2 Exclusive breastfeeding (EBF)

Exclusive breastfeeding (feeding infants only with breastmilk and no other fluids or food except medicines) for the first 6 months of a baby's life is one of the most effective measures for ensuring a child's health and survival. Breastmilk alone satisfies the nutritional and fluid requirements of an infant for the first complete six months of life. The indicator measures the proportion of children following this recommended practice. Accordingly, the mothers/care takers were asked of their children if they are exclusively breastfed and 79.1% (n=34 95%CI 67.4-90.7) of children under 6 months of age have been exclusively breasted. According to UNHCR's standards, the proportion of exclusively breastfed infants (0-5 months) in emergency context should be >= 70%.

Figure 11. Exclusive breastfeeding practice



From those saying they have been feeding infants (0-5 months age) other than breastmilk, the major ones mentioned to be fed to infants are liquid milk 12% and water 9%.

3.6.3 Continued breast feeding

Continued breastfeeding beyond six months should be accompanied by consumption of nutritionally adequate, safe and appropriate complementary foods that help meet nutritional requirements when breast milk is no longer sufficient. Children who are still breastfed after one year of age can meet a substantial portion of their energy needs with the breast milk in their diet. Continued breastfeeding is also vital during illness: while sick children often have little appetite for solid food, continued breastfeeding can help prevent dehydration while also providing the nutrients required for recovery. Continued breastfeeding could prevent half of all deaths caused by infectious diseases between six and 23 months of age. Continued breastfeeding is consistently associated with higher performance in intelligence tests among children and adolescents, with children breastfed longer than 12 months benefiting the most. Accordingly, children aged 12-23 months were assessed base 5n the recall period of the previous 24 hours and the finding suggested that 93.4% of children have continued to be breastfed as illustrated in the table below.

Table 24. Continued breastfeeding of 12-23 months of children

Continued breastfeeding practice (12-23 months)				
Indicator value	Age group	n	%	95% CI
Continued breastfeeding	12-23 months	145	93.5	89.7 – 97.4

3.6.4 Complementary feeding practices

Complementary foods should be introduced at six months of age. Young children need at least four meals per day, as they are not able to absorb larger quantities of nutrients in larger meals. Therefore, improved feeding of children under two years of age is particularly important because they experience rapid growth and development and are vulnerable to illness.

At the age of 6 months, breastmilk is no longer sufficient to meet babies' nutritional needs and if complementary feeding is not introduced on time, they are at risk of undernutrition. Thus, introduction to solid and semi-solid foods was analysed for children aged 6-8 months revealed that just at 18.4% (n= 7, 95% CI 7.9 – 31.6).

3.6.5 Minimum dietary diversity

Minimum dietary diversity was analysed for children 6-23 months of age. Among currently breastfed children aged 6-23 months, very little number of children which accounts to just 3.8% (n= 9, 95% CI 1.7-6.3) were fed from four or more food groups while, overwhelming majority of the children 96.2% (n= 230, 95% CI 93.7-98.3) have eaten from less than 4 food groups which is below WHO recommended standard number of food groups.
This finding imply that for majority of the children, the meals did not have an adequate range of food groups and were thus likely to be limited in the diversity of nutrients received.

3.6.6 Minimum meal frequency

WHO guiding principles for feeding the breastfed child recommend that breastfed infants aged 6–8 months be provided complementary foods 2–3 times per day and breastfed children aged 9–23 months be provided complementary foods 3–4 times per day with additional nutritious snacks offered 1–2 times per day. Guiding principles on feeding the non-breastfed child increase that recommendation to 4–5 meals per day for non-breastfed children. Feeding meals/snacks less frequently than recommended can compromise total energy and micronutrient intake, which in turn may cause growth faltering, stunting and micronutrient deficiencies.

Accordingly, the survey findings show that for children 6-8 months is 34.2% (n=13 95%CI 18.5-50.0) have received minimum meal number in a day, for children 9-23 months is 19.6% (n=39 95%CI 14.6-25.6) and for children 6-23 months is 21.9% (n=52 95%CI 16.9-27.4).

Those findings revealed that, generally, only about one-fifth of children are only getting the required amount food that helps for their physical and mental growth as majority

are not taking the required meal frequency as per WHO and UNICEF 2021 guideline[6].

3.6.7 Minimum Acceptable Diet

WHO guiding principles on feeding the breastfed child and the non-breastfed child recommend that children aged 6–23 months be fed meals at an appropriate frequency and in a sufficient variety to ensure, respectively, that energy and nutrient needs are met. This indicator combines information on minimum dietary diversity and minimum meal frequency, with the extra requirement that non-breastfed children should have received milk at least twice on the previous day.

Accordingly, when we see the survey findings minimum acceptable diet which considers both amount and type of food children 6-23 have taken, it is extremely low and found to be just only 3.4% (n=8 95%CI 1.3-5.9). finding is also low compared to similar SMART survey conducted in the same area.

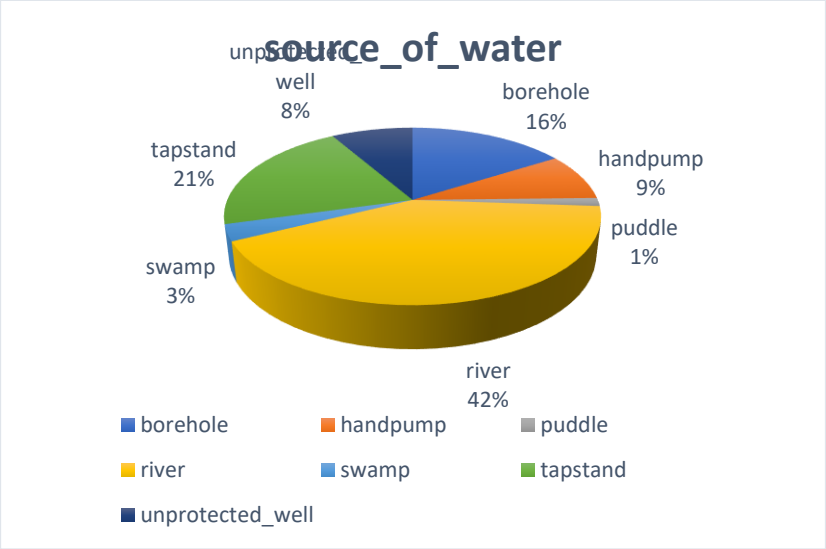
3.7 WATER, SANITATION AND HYGIENE (WASH)

3.7.1 Source of Drinking Water

Safe drinking water is necessary to measure because waterborne diseases are among the leading causes of morbidity and mortality among children. The major concerns are exposure to risk of water-borne diseases from water contaminations with faecal and other pathogens. The survey tried to identify the source of drinking water and the results revealed that almost half of the target groups 47.1% (n= 220, 95% CI 42.8-51.6) are getting their drinking water from safe sources. The picture below shows the major sources of water for the respondents.

Figure 12. Source of water

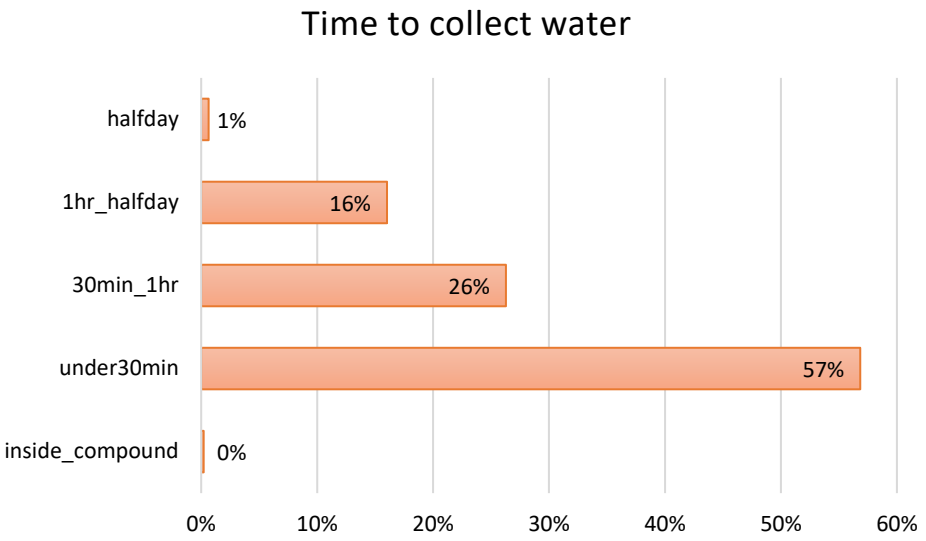
[6] https://www.who.int/publications/i/item/9789240018389



3.7.2 Time to collect water

The other important indicator assessed in relation to the above indicator is the time it took the households to collect water keeping in mind that considerations of queuing time and variation between villages with respect to distance are not included or taken in to consideration during the analysis. Accordingly, the survey findings from the sampled households shows that, a little bit above half 56.8% (n= 266) of households can access the water source within less than 30 minutes followed by those households who can access the source of water between 30 minutes and 1 hour with 26.3% (n=123). Only 16% (n= 75) of households travel one hour or more to access the nearest water source. The households whom responded that either they have water source in their compound or may took them half a day to access it are insignificant contributing to less than 1% of the response collectively (n=4).

Figure 13. Time to collect water from their main source



3.7.3 Water treatment used

Unsafe water is among the main sources of life-threatening, waterborne diseases. This indicator therefore assesses the prevalence of households using effective methods for treating drinking water as one of the major identified child morbidity issue is incidence of diarrhoeal disease in the survey area among other factors. Much can be done to turn this situation around by improving access to safe water, promotion of water treatment, improving sanitation and hygiene promotion as well as focusing on the home management of childhood illness.

Effective water treatment is essential prior to consumption so as to minimize risks of water borne infections. The large majority of the households 95.3%, (n= 446) do nothing to the water prior to consumption collected either from improved or unimproved sources at household level. Very few households use chlorine and boiling water as water treatment mechanism 2.1% (n=10) and 0.4% (n=2) respectively. The remaining (2.2 %, n=10) uses clothes to filter water.

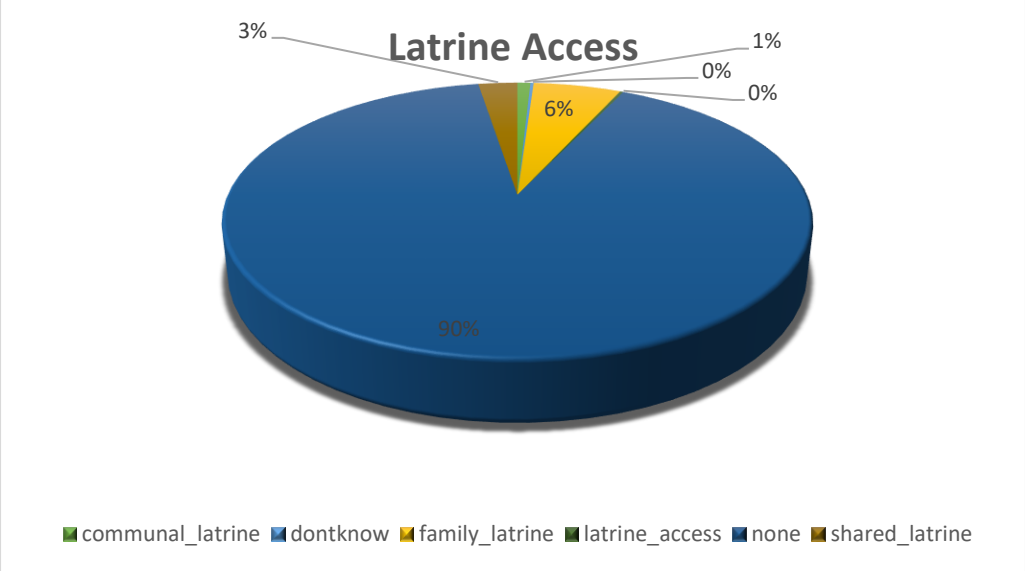
3.7.4 Hygiene and sanitation

The composite indicator measures the affected population's access to a sufficient number of safely located latrines with functioning hand washing facilities - a crucial precondition for ensuring a sanitary environment and preventing diseases. Lack of access to safe latrines in the households is a major factor for increased morbidity leading to high malnutrition and mortality rates. When the households were asked if they have access to safe excreta disposal in their households, an overwhelming majority of them (n=424, 90.4%, 95% CI 87.4 – 93.0) has responded they don't have a such sanitation facilities. On the other hand, only 5.8% (n=27, 95%CI, 3.6 – 7.9) have access to family latrines while the remaining 3.6% uses communal latrine.

A complementary indicator for the above is access to soap by households for effective hand washing practice. Washing hands with soap is the most effective way of preventing life-threatening diarrhoeal diseases. The indicator therefore assesses the proportion of

households having soap available for their use. Accordingly, the finding shows that 20.7% (n=97, 95% CI 16.7 – 24.6) have access to soap but not confirmed by enumerators, 2.1% (n=10, 95% CI 0.9 -3.6) have access to soaps which is also confirmed by enumerators while the remaining 77.1% (n=361, 95% CI 73.3 – 81.0) does not have access to soaps.

Figure 14. Latrine access



3.8 Food Security and Livelihoods (FSL)

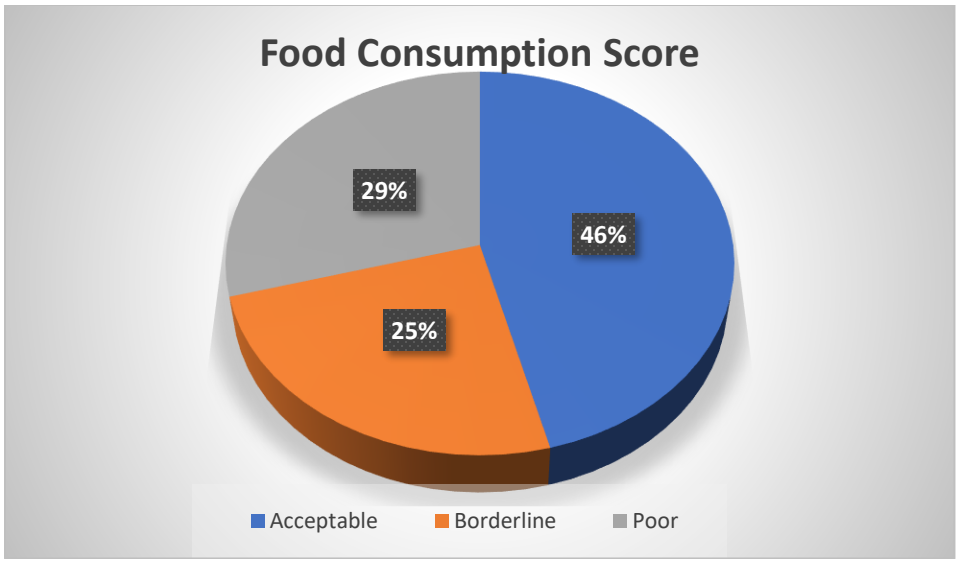
3.8.1 Food Consumption Score

The Food Consumption Score (FCS) is a more complex indicator of a household's food security status, as it considers not only dietary diversity and food frequency but also the relative nutritional importance of different food groups. As it is a recommended core indicator for consumption threshold comparative to overall country's consumption trend. As per WFP 2008 food consumption score analysis[7], households are classified as poor (0-21 score), borderline (21.5-35 score) and acceptable (>=35.5 score).

Accordingly, our Luakpiny/Nasir SMART survey findings shows that the majority of the households fall in the acceptable 45.9% (n=215, 95% CI, 41.5 – 50.4) followed by poor consumption 29.3% (n=137, 95% CI, 25.4 – 33.1) and then borderline with 24.8% (n=116, 95% CI, 20.9 – 28.6) as depicted in the illustration below.

Figure 15. Food Consumption Score

[7] https://www.indikit.net/document/8-food-consumption-analysis

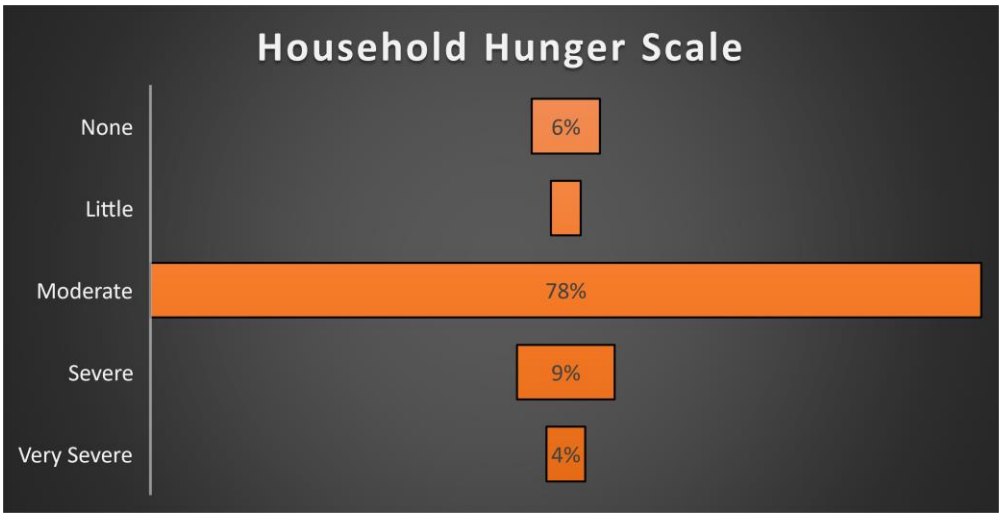


3.8.2 Household Hunger Scale

The indicator measures the scale of households' food deprivation. It is based on a (validated) idea that the experience of household food deprivation causes predictable reactions that can be captured through a survey and summarized on a scale. It focuses on the food quantity dimension of food access and does not measure dietary quality.

The Household Hunger Scale (HHS) is a simple indicator used to measure household hunger in food insecure areas. Using this composite indicator, a respondent can score between zero and six depending on their answers. Individuals scoring from zero to one experiences the least hunger and respondents scoring six experiences the most hunger. The findings show that 12.8% (n=60, 95%CI, 9.8 – 15.8) have experienced sever hunger in their households, while out of these, 3.6% have faced very severe/critical hunger. The large proportion of the households 78% (n= 365, 95%CI, 74.1 – 81.8) have faced moderate household hunger level. Very few have faced little to none hunger scale of 2.8% and 6.4% respectively. Figure 16 below shows the details of the findings.

Figure 16. Percentage of Households per Household Hunger Scale



3.8.3 Household Income Source

This indicator is a proxy indication of where a household earns its income, and is an indicator of livelihoods diversity. Broadly speaking, income is composed of earnings from productive activities and transfers. It is customary to distinguish four main components in the measurement of income i.e. wage income from labour services, rental income from the supply of land, capital, or other assets; self-employment income; and, current transfers from government or non-government agencies, or other households.

Accordingly, the survey findings shows that the main sources of income for households residing in Nasir county are livestock, fishing, natural resources and agriculture with 28.2%, 23.6%, 18.2% and 11.1% respectively which accounts for more than 80% of total incomes for these households.

4. Discussion and Conclusion

4.1 Nutritional status

The prevalence of Global Acute Malnutrition (GAM) based on weight for height z-scores in WHO standard was estimated at 15.9% (95% CI 12.9-19.5) and Severe Acute Malnutrition (SAM) was estimated at 2.6%.(95% CI 1.8-3.8). The prevalence GAM (WHZ) falls under very high category (>15%) of emergency-threshold classification as per the latest update WHO/UNICEF 2018 threshold.

4.2 Mortality

The crude mortality rate (CMR) and under five mortality rate (U5MR) were 1.82 (95% CI 1.27 – 2.59) and 0.57 (95% CI 0.21-1.51) respectively. The finding shows that CMR was above the WHO's emergency thresholds of 1/10,000/day while U5MR is below WHO's emergency threshold of 2/10,000/day.

When compared with mortality rate of May 2016 SMART survey conducted in Nasir where CMR was 1.80 (95%CI 1.29 – 2.52) it is slightly higher as well compared to a recent SMART survey conducted in Longchuk county in 2018 a relatively similar area to Nasir county which the results revealed 0.93 (95% CI 0.73 – 1.17). In general, those results shows that the area have a relatively higher CMR than other. On the other hand, U5MR is low compared to previous survey in the area which was 2.57 (95% CI, 1.55 – 4.24) conducted on May 2016 and also from the survey conducted in Longchuk in 2018 in which the result was 1.03 (95% CI 0.54 – 1.95). it is also lower than national average of 1.9%.

Majority of the deaths occurred in current location (74.5%) and the main cause of death is associated with illness (76.5%).

The people in Nasir county, specifically during the recall, were finding it hard to access the health services in the area due to long distance from the health facility as well as unable to access transport to health facilities due to heavy flood and infrastructural damage. Some people even walk 3 to 4 hours to access the health facility.

Secondly there has been diseases outbreak in the areas specifically malaria & diarrhea, so that is why many people died also due to luck of drugs in the facilities as it make it difficult to replenish them frequently during such difficult times due to the fact that most of road access and boat access are interrupted and as well there has been revenge killing in the County where many people are killed as well.

4.3 Morbidity and health care practices

The prevalence of morbidity in the survey samples is very high as more than half of the children (67.4%) when the respondents were asked if children have been sick in the past two weeks period. This is an indication that in Nasir county is not asuch safe place for children under 5 years of age. From the reported illness symptoms, the top three identified in this survey are fever 78% (74.3 - 81.2, 95% C.I.), cough 35.3% (30.8 - 39.4,95% C.I.) and diarrhea 28% (24.1 - 32.0, 95% C.I.)

Diarrhea, as it can be seen in the above finding consists of a third of illness symptoms which has a major impact on the nutritional status of the patient. Frequent bouts of diarrhea for example can quickly result in loss of weight and deterioration of the nutrition status of the young child. When a child has diarrhea, absorption and intake of food are reduced while there is a higher need of energy. Therefore, children who are exposed for Diarrhea plus acutely malnourished cases need a special attention as they need more energy and thus more food to recover.

With respect to health seeking behavior, the findings are encouraging as nearly two-third (67%) of respondents sought for treatment in health facilities. On the other hand, the remaining one-third (33%) of the respondents did not seek for those sick children what so ever.

4.4 Infant and young children feeding practice

New born children should be fed exclusively from breast milk as it have all the necessary nutritional requirements that a child of age 0-6 months requires. Exclusive breastfeeding during this age is very important for the child to get all the nutritional requirements and prevent from exposure to different illnesses that might affect it through additional food sources. This is to say, providing other foods or liquids to a child increases the risk of morbidity as it exposes the baby to pathogens and contaminants. Accordingly, the survey findings showed that 79.1% of 0-6 months children were exclusively breasted while the remaining 21.9% have taken other foods/fluids. On the other hand, continued breastfeeding for children 6-8 months which helps to decrease the child's risk of disease exposure and helps the infant to get the required nutrition intake that might not get from consumed foods, is encouraging as it stands high at 94.4%.

Minimum dietary diversity for children 6-23 months of age was critically low which is 3.8% (n= 9, 95% CI 1.7-6.3) of children were fed from four or more food groups while, the majority of the children 96.2% (n= 230, 95% CI 93.7-98.3) were fed below the WHO recommended number of food groups (<4). These findings imply that for majority of the children, the meals did not have an adequate range of food groups and were thus likely to be limited in the diversity of nutrients received.

4.5 Water, Sanitation and Hygiene Access and practice

One of the contributing factors to poor nutritional status is access to safe water and hygienic practices by households. In Nasir county, about half (47.1%) of households are getting their drinking water from accepted water sources assumed to be safe to consume while the remaining 52.9% of households are getting water from unsafe sources. In terms of time taking to collect water a little bit above mid-point (56.8%) are accessing water sources with less than 30 minutes. Only 16% of households travel more than 1 hour to fetch water which is above sphere acceptable standards.

The other major indicator with regard to water quality consumed is use of water treatment chemicals in which in this survey it not a such encouraging as 95.3% of households will do nothing to the collected water instead use it as is.

Household's excreta disposal and usage as per the survey finding is as low as 9.6% in sanitation facilities. Similarly, access to soap at household level is only at 22.8% that might imply that households are not practicing proper hand washing practice which is essential.

4.6 Food Security and Livelihoods

Food consumption score findings shows that about one-third (29.3%) of households fall in poor consumption category while 24.8% of households fall in the borderline category. When we see the severity of hunger in household's about 12.8% of households faced severe hunger which implies that they have very little or none food to sustain their life unless emergency supply provided to them. The alarming issue on this regard is that the larger proportion (78%) of households have faced moderate household hunger level which may imply in total about 90% of households are food insecure.
The main sources of income for households in Nasir county are livestock, fishing, natural resource and agriculture.

In conclusion, the current nutrition situation is above the emergency threshold and it calls for strengthening the ongoing health and nutrition program in the county to prevent acute malnutrition and also to address the risk factors that exacerbate the situation further. In addition, on those risk factors associated with acute malnutrition such as high morbidity, food insecurity, use & access of safe water, poor hygienic and sanitation practices should be addressed at the county level in particular and country level in general.

5. Recommendations and priorities

Malnutrition

- ⇨ Efforts have to be made to strengthen nutrition service delivery in the County. More nutrition centers/sites has to be established to areas close to the community.
- ⇨ Strengthen targeting of acutely malnourished children through the on-going nutrition intervention program SC/OTP in Nasir County who are already severely malnourished and to prevent those that are at risk of becoming severely malnourished in active case finding until household food security is restored and critical public health issues are addressed.
- ⇨ Strengthen the community mobilization activities by involving the community to own the program through active participation in active case finding, defaulter tracing, home visits and follow up of the children and through regular review meeting.

Child morbidity

- ⇨ Health promotion programmes through hygiene promoters should be strengthened so that children are brought to health facilities for care and treatment.
- ⇨ Community sensitization on water treatment utilization is vital and actors working on WASH in the county should consider scaling up in such intervention

IYCF

- ⇨ Around a fifth of the children are not being exclusively breastfed as per the survey finding. Children should only be getting breast milk up to 6 months as they can get all the required nutritional needs and protected from pathogens likely through other food items. As such, a community sensitization should be strengthened to improve exclusive breastfeeding practice.
- ⇨ Children from age 6-8 should be introduced to complementary foods as their body requires additional nutrients apart from the breastmilk. The survey finding shows just only 18.4% of caretakers are proving complementary foods to these children which is critically low. Hence, nutrition actors working in the area should prioritize this activity to improve complementary feeding practices.
- ⇨ Children aged 6-23 months require additional food apart from breastmilk to address their nutritional requirements for both physical and mental growth during this window period. According to WHO and UNICEF 2021 IYCF guideline children of this age at least need to have five out of eight defined food groups to address their dietary diversity requirements with minimum meal frequency depending on their age groups and whether they are breastfed or not so that they could have minimum acceptable diet. As the survey result shows that very low minimum dietary diversity for 6-23 months children 3.8%, only 21.9% minimum meal frequency and just 3.4% of children had received minimum acceptable diet. Hence, as this is very important to the wellbeing and proper development of children as well their productivity in later ages, much effort should be exerted in sensitizing the community on the importance of providing children with the required meal varieties and amount in different mechanisms such as cooking demonstrations and mother to mother support groups by nutrition actors in the ground.

WASH

- ⇨ About 52% of households are getting their drinking water from unsafe sources coupled with almost all (95.3%) are not using any water treatment chemical, it might expose households to water borne diseases which have a direct correlation with children's nutrition and morbidity as well as high mortality rate. Hence, focus should be given to increasing access to safe water sources and increasing awareness of households water treatment mechanisms utilization.
- ⇨ The excreta disposal and soap access & utilization is extremely low. Hence, strong effort is required in hygiene promotion practice in the county on specific focus on use of improved latrine use and use of soap for hygienic practices.

Annexes

Annex 1. Plausibility Report

Plausibility check for: SSD2202b - LuakpinyNasir SMART Survey compiled.as

Standard/Reference used for z-score calculation: WHO standards 2006
(If it is not mentioned, flagged data is included in the evaluation. Some parts of this plausibility report are more for advanced users and can be skipped for a standard evaluation)

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	**5** (2.6 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.291)
Age ratio(6-29 vs 30-59)	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.474)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (4)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (10)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (9)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>=1.20	
.			and	and	and	or	
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	**0** (1.01)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (0.04)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (0.12)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**5** (p=0.000)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**14** %

The overall score of this survey is 14 %, this is good.

Annex 2. Assignment of Clusters

Geographical unit	Pop Size	Cluster		Geographical unit	Pop Size	Cluster
Maker	2245	1		Malek	1145	
Reatguk	1676			Boreel	1200	
Nyawech	2578			Buol	1473	
Kalibalek	2444	2		Dukmar	5725	22
Tickthin	1768			Tin	700	
Tip	3558	3		Koat	3645	
Gurnyang	1796			Dhek dhek	3900	23
Nyarianga	1495	4		Homkor	3500	RC
Wichdieng	1490			Kiechkuon	3534	
Dukmar	1390			Dhek dhek	2440	24
Wechluak	1300			wech deng	2157	
Kuetrengke	7110	5,6		kok rok	3900	25
Nordeng	6720	7		can-cow	1900	
Wichbuoni	6907	8		koat 2	1800	26
Wakrial	6820	9		Ngueny	2800	
Dhorguongni	6977	10,11		Koat 1	1770	
Mandeng	4590			Tuch-key	977	27
Gerguir	3331	12		Pul-rieli	996	
Wechdeng	3980	13		Kuole-dew	2700	
Torkech	4000	14		jiech lang	1400	28
Torpuot	4400			Roam	1200	
Benytik	2101	15		Waath	1157	
Dungkok	3913			Chammuony	179	
Nornyarew	800	16		Kiercemialek	2179	
Nyarewthua	1300			Thokjok	1166	29
Jikmir	6000	RC		Thoar	1100	
Buol	4220	17		Gaireng 2	1180	
Nyeinygok	3016			Gaireng 1	1282	
Wechdoth	1000	18		dingkar	2044	30
Makak	2154			Dhalap	2000	
Bukteng	3070			Rupguar	1100	
Dualdong	2391	19		Nayaar	1200	31
Malual	1000			Meer 1	2199	
Thankkol	1118			Rupreel	1121	
Koatrach	1139	20		Mer 2	1435	
Thongbuong	1249			Lualyak	1400	32
Ngoanykel	1201			Nasir	3949	
Kierwan	1536			Ket bek	3121	33
Gum	1200			Luak-wien	5016	RC
Manbath	1200	21		Dhor-ding	4121	34
Juong	800			Wech yuel	3521	

Annex 3. Evaluation of Enumerators

Weight:

	Precision: Sum of Square [W1-W2]	Accuracy: Sum of Square [Enum.(W1+W2)-(Superv.(W1+W2)]	No. +/- Precision	No. +/- Accuracy
Supervisor	1.64		2/6	
Enumerator 1	0.81 OK	3.17 OK	1/6	4/5
Enumerator 2	21.05 POOR	20.63 POOR	4/5	5/5
Enumerator 3	21.42 POOR	33.72 POOR	3/5	4/3
Enumerator 4	1.11 OK	1.53 OK	3/5	3/4
Enumerator 5	3.02 OK	3.70 OK	2/8	5/3
Enumerator 6	0.50 OK	2.64 OK	1/8	6/4
Enumerator 7	30.79 POOR	135.13 POOR	3/7	4/5
Enumerator 8	0.81 OK	2.09 OK	0/7	2/7
Enumerator 9	0.30 OK	3.64 OK	1/2	3/6
Enumerator 10	9.71 POOR	112.65 POOR	4/6	5/4
Enumerator 11	27.29 POOR	34.05 POOR	1/7	2/7
Enumerator 12	16.59 POOR	25.63 POOR	4/3	4/4

Height:

	Precision: Sum of Square [H1-H2]	Accuracy: Sum of Square [Enum.(H1+H2)-Superv.(H1+H2)]	No. +/- Precision	No. +/- Accuracy
Supervisor	230.35		3/7	
Enumerator 1	7.58 OK	175.63 OK	5/4	2/8
Enumerator 2	300.86 OK	391.53 OK	6/2	3/7
Enumerator 3	12.95 OK	234.52 OK	4/4	5/5
Enumerator 4	3.15 OK	224.36 OK	5/1	5/5
Enumerator 5	9.90 OK	207.79 OK	2/7	3/6
Enumerator 6	2.12 OK	319.99 OK	7/2	4/6
Enumerator 7	2.47 OK	272.80 OK	6/2	3/6
Enumerator 8	14.53 OK	224.08 OK	6/3	4/6
Enumerator 9	228.82 OK	417.89 OK	5/5	5/5
Enumerator 10	24.31 OK	233.14 OK	6/3	4/6
Enumerator 11	32.69 OK	513.54 OK	6/3	9/1

Enumerator 12	9694.84 POOR	8385.51 POOR	6/4	3/7

MUAC:

	Precision: Sum of Square [MUAC1-MUAC2]	Accuracy: Sum of Square [Enum.(MUAC1+MUAC2)-Superv.(MUAC1+MUAC2]	No. +/- Precision	No. +/- Accuracy
Supervisor	2.39		4/6	
Enumerator 1	0.85 OK	5.34 OK	4/4	1/9
Enumerator 2	13.78 POOR	23.41 POOR	4/4	6/4
Enumerator 3	0.74 OK	5.07 OK	6/3	9/1
Enumerator 4	3.61 OK	11.62 POOR	3/3	2/7
Enumerator 5	5.52 POOR	8.59 POOR	5/5	4/6
Enumerator 6	0.94 OK	4.35 OK	6/2	3/7
Enumerator 7	11.21 POOR	11.46 POOR	7/2	7/3
Enumerator 8	1.17 OK	5.62 OK	5/1	3/7
Enumerator 9	1.32 OK	3.93 OK	6/1	6/4
Enumerator 10	6.50 POOR	5.61 OK	4/5	9/1
Enumerator 11	730.08 POOR	705.95 POOR	7/3	1/8
Enumerator 12	7.18 POOR	3.23 OK	4/6	5/5

For evaluating the enumerators the precision and the accuracy of their measurements is calculated.
For precision the sum of the square of the differences for the double measurements is calculated. This value should be less than two times the precision value of the supervisor.
For the accuracy the sum of the square of the differences between the enumerator values (weight1+weight2) and the supervisor values (weight1+weight2) is calculated. This value should be less than three times the precision value of the supervisor.
To check for systematic errors of the enumerators the number of positive and negative deviations can be used.

Annex 4. Seasonal Calendar

Month		Annual Events / Season	2017	2018	2019	2020	2021	2022
1	Jan	New Year		53 Post harvest	41 Post harvest	30 Post harvest	18 Post harvest	6 Post harvest
2	Feb			52 Beginning of cattle camp migration	40 Beginning of cattle camp migration	29 Beginning of cattle camp migration	17 Beginning of cattle camp migration	5 Beginning of cattle camp migration
3	Mar	International Women day		51 Beginning of land preparation and clearing bushes	39 Beginning of land preparation and clearing bushes	28 Beginning of land preparation and clearing bushes	16 Beginning of land preparation and clearing bushes	4 Beginning of land preparation and clearing bushes
4	Apr	Easter holiday		50 Cows taken to the river banks and cattle camps for pasture	38 ows taken to the river banks and cattle camps for pasture	27 cows taken to the river banks and cattle camps for pasture	15 Cows taken to the river banks and cattle camps for pasture	3 Cows taken to the river banks and cattle camps for pasture
5	May	16 May Matyrs Day and SPLA day		49 Final land tilling and preparation	37 Final land tilling and preparation	26 Final land tilling and preparation	14 Final land tilling and preparation	2 Final land tilling and preparation
6	Jun			48 Beginning of cultivation activities for the season	36 Beginning of cultivation activities for the season	25 Beginning of cultivation activities for the season	13 Beginning of cultivation activities for the season	1 Beginning of cultivation activities for the season
7	Jul	9th July Independence Day and Matrys day	59 Cultivation	47 Cultivation	35 Cultivation	24 Cultivation	12 Cultivation	0 Beginning of the season rain
8	Aug	Eid El Adha	58 Maize crops ready for consumption	46 Maize crops ready for consumption	34 Maize crops ready for consumption	23 Maize crops ready for consumption	11 Maize crops ready for consumption	
9	Sep		57	45	33	22	10	
10	Oct	Danniel Comboni Day	56 pre-harvest period	44 pre-harvest period	32 pre-harvest period	21 Pre-harvest and flooding period	9 Pre-harvest and flooding period	
11	Nov		55 Removal of bark of gum Arabic	43 Removal of bark of gum Arabic	30 Removal of bark of gum Arabic	20 The rain stops	8 The rain stops	
12	Dec	X-Mas celebration	54 X-Mas	42 X-Mas	31 X-Mas	19 X-Mas	7 X-Mas	