Research Methodology Note

Pilot MUAC Screening at Port and Road Monitoring Sites

Research Cycle ID: SSD1708

South Sudan

December 2020
Version 1.0

REACH Informing more effective humanitarian action

1. Executive Summary

Country of intervention	*South Sudan*					
Type of Emergency	□	Natural disaster	X	Conflict	□	Other *(specify)*
Type of Crisis	□	Sudden onset	□	Slow onset	X	Protracted
Mandating Body/ Agency	*UK Foreign, Commonwealth and Development Office (FCDO)*					
IMPACT Project Code	*32iAI/32DPW*					
Research Timeframe *Add planned deadlines (for first cycle if more than 1)*	1. Pilot/ training: 26/01/2021			6. Preliminary presentation: NA		
	2. Start collect data: 02/02/2021			7. Outputs sent for validation: 26/03/2021		
	3. Data collected: 12/03/2021			8. Outputs published: 02/04/2021		
	4. Data analysed: 17/03/2021			9. Final presentation: 09/04/2021		
	5. Data sent for validation: 17/03/2021					
Audience Type & Dissemination *Specify **who** will the assessment inform and **how** you will disseminate to inform the audience*	**Audience type**			**Dissemination**		
	□ Strategic			X General Product Mailing (e.g. mail to NGO consortium; HCT participants; Donors)		
	x Programmatic			X Cluster Mailing (Education, Shelter and WASH) and presentation of findings at next cluster meeting		
	x Operational			X Presentation of findings (e.g. at HCT meeting; Cluster meeting)		
	□ [Other, Specify]			X Website Dissemination (Relief Web & REACH Resource Centre)		
				□ [Other, Specify]		
Detailed dissemination plan required	□	Yes		x	No	
General Objective	To understand the nutrition status of persons in movement in South Sudan and to test whether this understanding can be arrived at by adapting an existing research cycle.					
Specific Objective(s)	1. To inform implementing humanitarian actors in locations of origin and intended destinations of malnutrition rates among people in movement. 2. To inform humanitarian coordination bodies of locations where populations with atypically high (or rising) malnutrition rates may be coming from or moving to (including as early warning). 3. To test whether nutrition screening at Port and Road Monitoring sites is a feasible method of obtaining high-quality data on the nutrition status of persons					

	in movement in South Sudan, and whether this data may serve as a proxy for locations of origin.
Research Questions	To be answered through data collection: 1. What is the prevalence of malnutrition among children under 5 and pregnant and lactating women traveling through select Port and Road Monitoring (PRM) sites in South Sudan? 2. To what extent, if at all, is the prevalence of malnutrition among children under 5 and pregnant and lactating women correlated with (changes in) humanitarian needs in locations of origin and intended destrinations? To be answered through pilot evaluation: 3. Is it logistically feasible to collect sufficient MUAC measurements of children and pregnant and lactating women at PRM sites to obtain representative data on the population in movement? 4. How can data on the prevalence of malnutrition among the target population be used to inform humanitarian programming in locations of origin and intended destinations?
Geographic Coverage	The pilot will take place at PRM sites in Kapoeta (Eastern Equatoria state) and Akobo (Jonglei state).
Secondary data sources	• IOM DTM flow monitoring data • REACH Area of Knowledge data • Health monitoring data • Nutrition services data • Nutrition surveys (e.g. SMART surveys) if available • Interagency Rapid Needs Assessments • Integrated Phase Classification (IPC) reports

Population(s) *Select all that apply*				
	□	IDPs in camp	□	IDPs in informal sites
	□	IDPs in host communities	x	IDPs in movement
	□	Refugees in camp	□	Refugees in informal sites
	□	Refugees in host communities	x	Refugees in movement
	□	Host communities	x	Other populations in movement

Stratification[1] *Select type(s) and enter number of strata*						
	□	Geographical #:_ _ _ Population size per strata is known? □ Yes □ No	□	Group #: _ _ _ Population size per strata is known? □ Yes □ No	□	Other Population size per strata is known? □ Yes x No

Data collection tool(s)				
	x	Structured (Quantitative)	□	Semi-structured (Qualitative)

	Sampling method	**Data collection method**
Structured data collection tool # 1 *Select sampling and data collection method and specify target # interviews*	□ Purposive □ Probability / Simple random □ Probability / Stratified simple random □ Probability / Cluster sampling □ Probability / Stratified cluster sampling	□ Key informant interview (Target #):_ _ _ _ _ □ Group discussion (Target #):_ _ _ _ _ □ Household interview (Target #):_ _ _ _ _ X Individual interview (Target #): census X Direct observations (Target #): census

[1] There will be no comparison between groups. Enumerators will attempt to take measurements for each pregnant or lactating woman and each child under five years of age passing through the PRM site. If that proves infeasible due to a lack of time or resources, they will implement methods for simple random sampling (e.g. measuring every third member of the target group that passes the data collection point). It is not possible to accurately predict how many people will pass through a PRM site on a given day.

	x	Census			□	[Other, Specify] (Target #):_ _ _ _ _
Data management platform(s)	x	IMPACT			□	UNHCR
	□	[Other, Specify]				
Expected ouput type(s)	□	Situation overview #: _ _	x	Report #: 1	□	Profile #: _ _
	□	Presentation (Preliminary findings) #: _ _	x	Presentation (Final) #: 1	□	Factsheet #: _ _
	□	Interactive dashboard #:_	□	Webmap #: _ _	□	Map #: _ _
	□	[Other, Specify] #: _ _				
Access	X	Public (available on REACH resource center and other humanitarian platforms)				
	□	Restricted (bilateral dissemination only upon agreed dissemination list, no publication on REACH or other platforms)				
Visibility *Specify which* ***logos*** *should be on outputs*	**REACH**					
	Donor: *UK Foreign, Commonwealth, and Development Office*					
	Coordination Framework: *Nutrition Cluster (to be confirmed)*					
	Partners: *To be confirmed*					

2. Rationale

2.1 Background

Information on malnutrition is crucially important in South Sudan, to inform programming as well as coordination at the national level. Increasing rates of malnutrition can serve as a warning sign of increasing humanitarian needs, allowing implementing actors to scale up services if needed, and flagging to coordination actors that additional support may be required in a specific area. However, nutrition data can be scarce in South Sudan, especially in hard-to-reach areas or other locations with limited humanitarian services. The information gap has widened due to the COVID-19 pandemic, which has negatively affected the delivery of humanitarian services and made it harder to collect nutrition data due to restrictions meant to combat the spread of the virus. REACH's Port and Road Monitoring (PRM) project potentially provides an avenue to help address the gap. This pilot will assess whether REACH South Sudan can use its existing monitoring structures to collect data on the nutrition status of populations in hard-to-reach areas of origin, and on potentially vulnerable populations such as internally displaced persons (IDPs) and refugees. Crucially, the pilot will help determine whether monitoring changes in malnutrition measured at PRM sites can provide early warning of increasing humanitarian needs, allowing locations to be referred to coordination bodies like the South Sudan Needs Analysis Working Group.

2.2 Intended impact

Should the pilot prove successful, REACH and the broader humanitarian coordination structure in South Sudan will have access to a source of nutrition data on two underrepresented groups: people in hard-to-reach areas, and people in movement, which may include IDPs, refugees, and returnees. This data will not be representative of overall malnutrition rates in the locations of origin. However, monitoring of 1) high proportions of malnutrition,[2] and 2) changes in data patterns will be used to identify signs of increasing humanitarian needs. This information can then be used for programming in origin and destination locations, as well as at the coordination level for determining the need for potential further monitoring or response scale-up. Depending on the success of the initial pilot, data collection may be expanded to other PRM sites in South Sudan; new PRM sites could be considered based on need and logistical considerations. Further monitoring and data collection will be needed to confirm that analysis of long-term trends can be used to accurately flag increasing humanitarian

[2] In the context of South Sudan, a plausible GAM proportion may fall between 10% and 30%. Observations on the high end of this range and those that exceed it will be followed up on to understand the overall dynamics leading to the observations, with the understanding that the data cannot be seen as representative of the population in the area(s) of origin.

needs. Finally, the aim is for data collected via this method to be incorporated into early warning systems for South Sudan, such as REACH's Integrated Needs Tracking system (INT) and Shocks Monitoring Index (SMI).

3. Methodology

3.1 Methodology overview

At REACH Port and Road Monitoring (PRM) sites, trained REACH enumerators will collect mid-upper arm circumference (MUAC) data from children under five and pregnant and pregnant women, alongside basic demographic information and information about movement history and intentions. Participants will be selected as they travel through the sites, where enumerators will be occupying a central area alongside regular REACH PRM enumerators to ensure that they are able to identify all members of the target population group and achieve census-level data. The collected data will be cleaned and analysed by REACH staff, using clearly defined standard operating procedures. Data analysis will result in basic nutrition indicators such as proportions of moderate acute malnutrition (MAM), severe acute malnutrition (SAM), and the composite indicator of global acute malnutrition (GAM). Pilot data collection will run between January and March 2021, during which time the REACH team will focus on two aims: 1) ascertaining the practical feasibility of MUAC data collection at PRM sites, and 2) exploring how best to use this type of data to inform the humanitarian response. In order to meet the second aim, secondary data review will be conducted (more details in section 3.3) to confirm whether malnutrition rates measured at PRM sites correlate with increased humanitarian needs in areas of origin and/or intended destinations. Two PRM sites have been selected as pilot locations, and data collection may be expanded should the pilot be successful.

3.2 Population of interest

The population of interest consists of individuals and households moving between different parts of South Sudan and/or surrounding countries, specifically children under five years of age and pregnant and lactating women. These two groups have been selected because they are the most common targets of MUAC screening, as sub-sections of the population that can give an adequate overview of overall nutrition needs. By extension, the pilot will help inform the extent to which nutrition data on persons moving through PRM sites can be used as a proxy for the nutrition needs and conditions of populations in their areas of origin.

3.3 Secondary data review

The REACH team will triangulate findings on the prevalence of malnutrition with available secondary data for the locations of origin and common destinations, including:

- Integrated Phase Classification (IPC) Acute Malnutrition (AMN) phases at the county level;
- Reports from local nutrition and health actors on available services and screening results;
- Available information on other humanitarian assistance, including food distribution cycles (and any disruptions to those cycles);
- REACH Area of Knowledge data, specifically as it pertains to:
    - Access to food
    - Reports of malnutrition
    - Reported shocks
- Other internal or external reports on food security, nutrition, and/or shocks in commonly named areas of origin or destination locations, including Inter-Agency Rapid Needs Assessments (IRNAs).

This data will be used to confirm whether high malnutrition rates or, alternatively, a change in measured malnutrition rates over time, correlate with other known indicators of malnutrition and increased humanitarian need such as low access to food, the presence of climatic shocks, and disrupted access to humanitarian aid. Further follow-up may be conducted with humanitarian actors in relevant locations.

3.4 Primary Data Collection

Data collection will be conducted slightly differently in the two pilot locations:

- In Akobo, the MUAC module will be implemented as a stand-alone survey, conducted by separate REACH enumerators alongside regular PRM data collection.
- In Kapoeta, the MUAC module will be integrated into the PRM questionnaire. The same REACH enumerators will cover both the PRM questions and the MUAC screening.

Using these two different methods will help answer the third research objective by testing how best to collect the data. If one method is found to be more practical than the other, changes may be made during the pilot. The standalone tool can be found in section 6 of this document.

Enumerators will attempt to take the measurements of all relevant persons moving through the PRM site. In order to achieve this, they will first purposively select all households with children under 5 years of age and/or pregnant and lactating women. They will then conduct a short household interview with each head of household or another adult present. This interview will cover questions about the household's location of origin and movement intentions. Then, with the consent of the adult household member and the participants, they will measure the mid-upper arm circumference of the relevant individuals. If the volume of people passing through the PRM site makes it infeasible to conduct these steps with all relevant households because there is insufficient time, enumerators will switch to simple random sampling. This will be done by selecting each nth household, with n dependent on the number of interviews that can be completed without unduly inconveniencing the participants. Records of the total number of households passing through the PRM site on any particular day will be available through the regular PRM data collection process, which will take place in parallel.

Enumerators will be trained by REACH staff experienced in collecting MUAC measurements.[3] After a short period of direct supervision, data will be checked and cleaned on a weekly basis, and concerns about data quality or common mistakes will be fed back to field teams. Enumerators will also be informed of relevant referral pathways, and may be asked to actively refer individuals to nutrition services in coordination with local partners.

3.5 Data Processing & Analysis

As mentioned previously, incoming data will be checked and cleaned on a weekly basis, in accordance with IMPACT Initiatives data cleaning minimum standards. Detailed Standard Operating Procedures are available in Annex 2 to this document. An Excel template for data cleaning and analysis is available on request. During the pilot, REACH staff will monitor incoming data and triangulate it with available secondary data. At the end of the pilot period, REACH will complete a report with relevant findings, as well as an evaluation of the success of the pilot. This evaluation will include recommendations on practical considerations as well, such as whether MUAC screening should be done separately or integrated into the regular PRM data collection tool. These recommendations will be based on consultations with enumerators and other field staff.

4. Key ethical considerations and related risks

The proposed research design meets / does not meet the following criteria:

The proposed research design…	***Yes/ No***	***Details if no (including mitigation)***
… Has been coordinated with relevant stakeholders to **avoid unnecessary duplication** of data collection efforts?	Yes	Coordination ongoing
… **Respects respondents, their rights and dignity** (*specifically by: seeking informed consent, designing length of survey/ discussion while being considerate of participants' time, ensuring accurate reporting of information provided*)?	Yes	

[3] Standard Operating Procedures for training and data collection can be found as Annex 1 to this document.

… Does not **expose data collectors to any risks as a direct result** of participation in data collection?	Yes	Data collection guidelines include extensive COVID-19 protection measures.
… Does not **expose respondents / their communities to any risks as a direct result** of participation in data collection?	Yes	Data collection guidelines include extensive COVID-19 protection measures.
… Does not involve **collecting information on specific topics which may be stressful and/ or re-traumatising** for research participants (both respondents and data collectors)?	No	Nutrition status may be a sensitive topic. Therefore, participants and/or parents will be asked for consent, the survey will be as short as possible, and participants will be reminded that they are free to stop data collection at any time.
… Does not involve **data collection with minors** i.e. anyone less than 18 years old?	No	Parents/guardians will be asked for consent, data will be anonymised and stored securely.
… Does not involve **data collection with other vulnerable groups** e.g. persons with disabilities, victims/ survivors of protection incidents, etc.?	Yes	The research design does not specifically target people in these groups.
… Follows IMPACT SOPs for management of **personally identifiable information**?	Yes	

5. Roles and responsibilities

Table 2: Description of roles and responsibilities

Task Description	*Responsible*	*Accountable*	*Consulted*	*Informed*
Research design	Assessment Specialist	*Research Manager*	*Nutrition Information Working Group, Country Coordinator, Research Design anf Data Unit*	*Local Health/Nutrition Actors, Relief and Rehabilitation Commission, Ministry of Health*
Supervising data collection	Field Officer	Assessment Officer	Research Manager, Local authorities, Health/Nutrition actors, Nutrition Information Working Group	Country Coordinator

Data processing (checking, cleaning)	Field Officer	Assessment Officer	Research Manager, Research Design and Data Unit	Country Coordinator
Data analysis	Assessment Officer	Research Manager	Field Officer, Field teams, Research Design and Data Unit	Nutrition Information Working Group
Output production	Assessment Officer	Research Manager	Field Officer, Field teams, Research Reporting Unit	Country Coordinator
Dissemination	Assessment Officer	Research Manager	Country Coordinator	Nutrition Information Working Group, Local Health/Nutrition actors
Monitoring & Evaluation	Assessment Officer	Research Manager	Country Coordinator	Donors
Lessons learned	Assessment Officer, Field Officer	Research Manager	Field teams, Nutrition Information Working Group	Country Coordinator, Donors, Research Design and Data Unit

Responsible: *the person(s) who executes the task*

Accountable: *the person who validates the completion of the task and is accountable of the final output or milestone*

Consulted: *the person(s) who must be consulted when the task is implemented*

Informed: *the person(s) who need to be informed when the task is completed*

6. Data Analysis Plan

RESEARCH QUESTIONS ADDRESSED USING THE PRM MUAC TOOL

Research questions	IN #	Data collection method	Indicator group / sector	Indicator / Variable	Questionnaire Question	Instructions	Questionnaire Responses	Data collection level	Sampling	Maps planned?
N/A	A.1.1	HH Interview	Key characteristics	Data collection base	Please specify your base	Select one	Akobo, Kapoeta, Maban, Nyal, Renk, Yambio, Other	Enumerator	NA	
	A.1.2	HH Interview	Key characteristics	Enumerator ID	Enumerator ID number:	Enter ID		Enumerator	NA	
	A.1.3	HH Interview	Key characteristics	Port type	Port or road monitoring?	Select one	Port, Road	Enumerator	NA	
	A.1.4	HH Interview	Key characteristics	Movement type	Entry, exit, or transit?	Select one	Entry, Exit, Transit	Enumerator	NA	
N/A	A2.1	HH Interview	Household information	Country of origin	What country are you originally from?	Select one	List of countries	Household	Census or simple random sampling	No
	A2.2	HH Interview	Household information	Region of origin	What region (e.g. state) in ${origin_country} are you originally from?	Select one	List of regions	Household	Census or simple random sampling	No
	A2.3	HH Interview	Household information	Number of boys	How many BOYS between 0 and 4 years are travelling with the household?	Integer		Household	Census or simple random sampling	No
	A2.4	HH Interview	Household information	Number of girls	How many GIRLS between 0 and 4 years are travelling with the household?	Integer		Household	Census or simple random sampling	No
	A2.5	HH Interview	Household information	Number of women	How many WOMEN between 18 and 59 years are travelling with the household?	Integer		Household	Census or simple random sampling	No
To what extent is the prevalence of malnutrition among children under 5 and pregnant and lactating women correlated with humanitarian needs in locations of origin and intended destinations?	B1.1	HH Interview	Movement details	Previous country	Which country are you coming from?	Select one	List of countries	Household	Census or simple random sampling	Yes
	B1.2	HH Interview	Movement details	Previous camp	Are you coming from a camp (PoC / IDP / refugee) in ${prev_country}?	Select one	Yes, No	Household	Census or simple random sampling	Yes
	B1.3	HH Interview	Movement details	Previous camp name	Which camp from ${prev_country} are you coming from?	Select one	List of camps	Household	Census or simple random sampling	Yes
	B1.4	HH Interview	Movement details	Previous camp - settlement	Which settlement in ${prev_camp} are you coming from?	Select one	List of settlements	Household	Census or simple random sampling	Yes

	B1.5	HH Interview	Movement details	Previous region	What region (e.g. state) in ${prev_country} are you coming from?	Select one	List of regions	Household	Census or simple random sampling	Yes
	B1.6	HH Interview	Movement details	Previous sub-region	What sub-region (e.g. county) in ${prev_region} are you coming from?	Select one	List of sub-regions	Household	Census or simple random sampling	Yes
	B1.7	HH Interview	Movement details	Final destination	Which country is your final destination?	Select one	List of countries	Household	Census or simple random sampling	Yes
	B1.8	HH Interview	Movement details	Destination camp	Are you going to a camp (PoC / IDP / refugee) in ${next_country}?	Select one	Yes, No	Household	Census or simple random sampling	Yes
	B1.9	HH Interview	Movement details	Destination camp - which	Which camp from ${next_country} is your final destination?	Select one	List of camps	Household	Census or simple random sampling	Yes
	B1.10	HH Interview	Movement details	Destination settlement - which	Which settlement in ${next_camp} is your final destination?	Select one	List of settlements	Household	Census or simple random sampling	Yes
	B1.11	HH Interview	Movement details	Destination region	What region (e.g. state) in ${next_country} is your final destination?	Select one	List of regions	Household	Census or simple random sampling	Yes
	B1.12	HH Interview	Movement details	Destination sub-region	What sub-region (e.g. county) in ${next_region} is your final destination?	Select one	List of sub-regions	Household	Census or simple random sampling	Yes
What is the prevalence of malnutrition among children under 5 and pregnant and lactating women traveling through select PRM sites in South Sudan?	**C1.1**	HH Interview	Child nutrition status	Child name	What is the FIRST NAME ONLY of child number #${child_pos}?	Text		Individual	Census or simple random sampling	No
	C1.2	HH Interview	Child nutrition status	Child sex	What is the sex of ${child_name}?	Select one	Male, Female	Individual	Census or simple random sampling	No
	C1.3	Child MUAC measurements	Child nutrition status	Child height (age proxy)	What is the approximate height of child ${child_name}?	Select one	Less than 65cm, Greater or equal to 65cm and less than 87cm , Greater or equal to 87cm and less than 110cm, Greater or equal 110cm	Individual	Census or simple random sampling	Yes

	C1.4	Child MUAC measurements	Child nutrition status	Child MUAC	Please measure the MUAC in cm, to the nearest tenth for ${child_name}	Decimal		Individual	Census or simple random sampling	Yes
	C1.5	Child MUAC measurements	Child nutrition status	Child oedema	Does ${child_name} have oedema?	Select one	Yes, No, Don't know	Individual	Census or simple random sampling	Yes
	C1.6	HH Interview	Child nutrition status	Child nutrition enrollment	Is ${child_name} CURRENTLY enrolled in any nutrition program?	Select one	Not in any program, Outpatient Therapeutic Feeding (OTP), Supplementary Feeding (TSFP), Inpatient care (Stabilization Centre), Don't know	Individual	Census or simple random sampling	No
What is the prevalence of malnutrition among children under 5 and pregnant and lactating women traveling through select PRM sites in South Sudan?	**C2.1**	HH Interview	PLW nutrition status	PLW name	What is the FIRST NAME ONLY of woman #${plw_pos} age 18-49 years?	Text		Individual	Census or simple random sampling	No
	C2.2	HH Interview	PLW nutrition status	PLW status	What is the status of ${woman_name}?	Select one	Pregnant, Breastfeeding, Pregant and breastfeeding, Not pregant or breastfeeding	Individual	Census or simple random sampling	No
	C2.3	HH Interview	PLW nutrition status	Breastfeeding child age	Is the child that ${woman_name} is breastfeeding less than 6 months old?	Select one	Child UNDER 6 months (<65cm), Child OVER 6 months (>=65cm)	Individual	Census or simple random sampling	No
	C2.4	PLW MUAC measurements	PLW nutrition status	PLW MUAC	Please measure MUAC in cm to the nearest tenth for ${woman_name}	Decimal		Individual	Census or simple random sampling	Yes
	C2.5	HH Interview	PLW nutrition status	PLW nutrition enrollment	Is ${woman_name} CURRENTLY enrolled in any nutrition program?	Select one	None, Supplementary Feeding (TSFP), Don't know	Individual	Census or simple random sampling	No

ANNEX 1: STANDARD OPERATING PROCEDURE (SOP) – DATA CLEANING, PRELIMINARY ANALYSIS AND WEEKLY REPORTING

Overview

This document describes the step-by-step instructions for checking the quality of the MUAC Screening PRM pilot data. This SOP covers assessing both the child and PLW data separately, which is to be received from the GIS department on request. See separate SOPs for *Field Data Collection and Training Enumerators*.

On a weekly basis, the following steps can be followed in the tabs of the MUAC Pilot Cleaning and Analysis Template excel file:

- Step1 raw_child_data – copy and paste the child data from GIS department into this tab starting at cell A2
- Step2 data_check_child – assess the quality of the child data
- Step3a clean_child_data – create a copy of the child dataset to clean
- Step3b deleted_child – cut and paste deleted child records
- Step3c child_cleaning_log – log any changes to the child dataset
- Step4 raw_plw_data – copy and paste the plw data from GIS department into this tab starting at cell A2
- Step5 data_check_plw – assess the quality of the PLW data
- Step6a clean_plw_data – create a copy of the plw dataset to clean
- Step6b deleted_plw – cut and paste deleted plw records
- Step6c plw_cleaning_log – log any changes to the plw dataset
- Step7 Preliminary Analysis – check the overall SAM, MAM, and GAM results for children and PLWs, by base or by base and movement type
- Step8 Report Template – a weekly or bi-weekly reporting template

Weekly Cleaning and Data Checking Procedure

Request the MUAC data export: Request from GIS department the most recent data export for the child and PLW MUAC. The data needs to be consolidated between the two tools: the integrated PRM tool, and the standalone tool.

New MUAC Cleaning and Analysis Template: Before starting, create a new copy of the template file and give it a file name with the following convention "SSD_MUAC_PILOT_CLEANING_.ANALYSIS_XXXX.xlsx" where XXXX is today's date.

Step 1 (raw_child_data): Copy and Paste Child Data

- Copy and paste the child data into the worksheet tab "Step1 raw_child_data" MUAC Data Checking Template. Copy the data starting at cell A2.
- Make sure that the pasted data matches correctly with the columns in the worksheet.
- Select the column with child_muac and child_muac_mm. Make sure the cell type is "Number" so formulas can appropriately read it.
- Delete all values in the child_name column. These are not to be shared.
- Sort the data by from lowest to highest in the "child_muac" column
- Do not change the headers or any formula cells in this worksheet. They should be locked. If the any of the protected cells or formulas need to be changed, the sheet can be unprotected with the password "muac".

Step 2 (data_check_child): Assessing Overall Data Quality – Check the summarized results in tab "data_check_child". Some checks will hep you identify OVERALL QUALITY ISSUES that may need addressing, not necessarily specific records that need cleaning/removal.

- **Check 1: Origin, Destination, Departure and Routes** – In these tables, all the unique origin, departure, destination locations and routes between these locations are listed along with the base that response was reported for.
    - Locations are written as "BASE: XXX ORIGIN: XXXX", and similar for other responses.
    - Review this list for any mistakes that don't make sense given the base that reported it.
    - Make sure to check responses with FIELD OFFICERS who are familiar with movements in these locations. They will know best if a movement doesn't make sense.
- **Check 2: Dates of Analysis** – This just shows the date range for your raw data. Make sure it is the date range you are trying to analyse.
- **Check 3: Check the Overall Counts of Children, by Age and Sex** – Just a quick visual check of the counts of age-eligible boys and girls. Some points to look for:
    - We expect approximately 2/3rds of the sample to be children ages 24-59 months. If many more children are 6-23months than 24-59months, verify with the teams.
    - We expect similar numbers of boys compared to girls.
- **Check 4, 5, 6: Check the Results by Base, Enumerator and Route respectively:** Several indicators are summarized to help assess the quality of the data. Review each of the below indicators to identify specific feedback or issues for the bases, and enumerators. Indicators included and how to interpret them are:

Indicator	Description	Interpretation	Response/Action
Min/Max Dates	The earliest and latest dates listed in the dataset	Make sure you are analysing the data you expect to analyse.	Check the correct raw data is in the raw_child_data tab.
% of children present	The proportion of children that were reported present at the time of interview, of the children under-5 years reportedly traveling with the household.	Should be close to 100% since only children traveling with the household should be recorded.	**If less than 90%**, follow up with with the base and enumerator.
# of children measured	The count of children with a MUAC measurement in the dataset.	Should be equivalent to all children 6-59 months that were present.	If an enumerator has a very different count of measured children compared to other enumerators, follow up with the FO/enumerator. If different than the number of children 6-59 months, check the data for irregularities.
# of children reported in each age group	The count of children in each age group in the dataset.	MUAC is more sensitive towards younger children than older ones, so it's necessary to check for a balanced sample. Ideally, roughly 2/3rds of measured children should be 24-59 months unless the local demographics show otherwise.	If an enumerator has a very different count of measured children compared to other enumerators, OR if the sample is not balanced (too many under-2 or too many over-2 children) than follow up with FO and enumerator.
% of children over-2 years of age	The proportion of children ages 24-59 months out of all children 6-59 months.		
Sex:Ratio	The ratio of boys to girls in the dataset. If no girls are present, it will display "All males"	MUAC is more sensitive towards girls than boys, so it's necessary to check for a balanced sample. In a balanced sample we expect to see similar amounts of boys and girls, unless the local demographics show otherwise.	If an enumerator has a very low or very high sex ratio of children, follow up with the team and enumerator.
Digit Preference Score (DPS)	A statistical measure describing the tendency to favour certain digits when taking measurements.	A high DPS means that enumerators are rounding their measurements inappropriately. Classifications based on the score are: 0-7 (Excellent), 8-12	If the DPS is very high and <20 children, don't interpret yet as the sample size is very small.

		(Good), 13-20 (Acceptable), >20 (Problematic).	If the DPS is high and >=20 children, check what digits are being favoured in the dps_chisquared tab. Give feedback to the FO and enumerator to avoid rounding.
% SAM	The proportion of children 6-59 months with a MUAC <11.5cm or with bilateral pitting oedema.	We do not expect SAM to be higher than MAM. We do not expect SAM to be extremely high either. In the South Sudan context, a plausible range may be between 0 - 5%. Above this range should be skeptical of the results.	If SAM is greater than or equal to MAM, follow up with the quality of the enumerator's MUAC measurements. If SAM is greater than 5%, follow up with the quality of the enumerator's measurements and verify if the results are accurate.
% MAM	The proportion of children 6-59 months with a MUAC >=11.5cm and <12.5cm.	We do not expect MAM to be less than SAM. We expect MAM is greater than SAM usually, and less than GAM.	If MAM is greater than GAM, check for calculation errors.
% GAM	The proportion of children 6-59 months with a MUAC <12.5cm or with bilateral pitting oedema.	We do not expect GAM to be extremely high in the South Sudan context. A plausible range may be from 0 – 10%.	If GAM is greater than 10%, follow up with the quality of the enumerator's measurements and verify if the results are accurate.
Mean MUAC (cm)	The average MUAC measurement	Compare the mean MUAC for an enumerator to the other enumerators to check if they are similar. If there is a large difference, greater than a few cm, it could indicate there is some difference or bias in that enumerator's measurements.	If there are large differences in mean MUAC, (more than 1-2 cm), follow up with the enumerator and FO on how measurements are being conducted.
Standard Deviation (SD) MUAC (cm)	The standard deviation of the MUAC measurement.	A high standard deviation can indicate there is low precision or consistency in how measurements are being conducted.	If the standard deviation is greater than 1.5cm or 11.5mm, follow up with the FO and enumerator and consider re-training to improve quality and consistency of measurements
# of outliers	An outlier value that is biologically implausible for most children under-5 years of age.	If the MUAC is recorded as less than 8.0cm or greater than 20.0cm, it is counted as an outlier. These are extreme, biologically implausible thresholds.	Every outlier should be cleaned, removed from the dataset and enumerators should be given feedback. If an outlier is found like this, it means there was a big measurement or data entry issue.

Step 3a, b, c: Data Cleaning

- Copy and paste the raw data into the clean data tab. The clean data tab is where you will make changes to the data. You will never manually make any change to the raw data.
- Delete the child_name column
- **Cleaning Data Entry Errors (CHANGING VALUES)**
    - Review the dataset line by line for data entry issues, such as unusual routes, origin, destination and departure locations.
    - If there is a value that needs changing, fill in the cleaning log following the instructions below. The make the change directly in the clean data tab:
        - Cleaning Date – the date you made the cleaning change
        - Entry – the entry number in the cleaning log (1, 2, 3, 4…)
        - Enumerator_ID – the ID number for the enumerator with the issue
        - Base – the base where the issue happened
        - Question – the column name where you are changing the value.
        - _index – this is the value in the _index column, identifying the unique child
        - Old_value – what is the value from the raw data
        - New_value – what is the NEW value you are changing to
        - Amanya Comment – Your description of the issue

    - AO/FO reply – The AO/FO comment confirming or adding to the issue after discussion with the enumerator.
- **Removing Outlier Records (DELETING ROWS)** – ideally this would be done also before assessing overall data quality, per above. Follow these steps:
    - Sort the dataset from smallest to largest by the "child_muac" column.
    - Identify any child with the muac_cm <8.0 or muac_cm >20.0cm
    - Cut the entire row and paste it into the tab "*deleted_child"*
    - Outlier records are those with biologically implausible MUAC measurements.
    - Sort the raw data by the "child_muac" column from smallest to largest. Cut the entire column
- Check the data line by line for inconsistencies. Is there any missing data? Is there any data that doesn't make sense?
- Identify any changes you need to make to the dataset in consultation with the Assessment Officers, Field Officers, and Enumerators. These will largely be data entry errors
- Every change you make to the

Step 4 (plw_child_data): Copy and Paste PLW Data

- Copy and paste the plw data into the worksheet tab "Step4 raw_plw_data" MUAC Data Checking Template. Copy the data starting at cell A2.
- Make sure that the pasted data matches correctly with the columns in the worksheet.
- Select the column with plw_muac and plw_muac_mm. Make sure the cell type is "Number" so formulas can appropriately read it.
- Delete all values in the plw_name column. These are not to be shared.
- Sort the data by from lowest to highest in the "plw_muac" column
- Do not change the headers or any formula cells in this worksheet. They should be locked. If the any of the protected cells or formulas need to be changed, the sheet can be unprotected with the password "muac".

Step 5 (data_check_plw): Assessing Overall Data Quality – Check the summarized results in tab "Step5 data_check_plw". Some checks will hep you identify OVERALL QUALITY ISSUES that may need addressing, not necessarily specific records that need cleaning/removal.

- **Check 1: Origin, Destination, Departure and Routes** – In these tables, all the unique origin, departure, destination locations and routes between these locations are listed along with the base that response was reported for.
    - Locations are written as "BASE: XXX ORIGIN: XXXX", and similar for other responses.
    - Review this list for any mistakes that don't make sense given the base that reported it.
    - Make sure to check responses with FIELD OFFICERS who are familiar with movements in these locations. They will know best if a movement doesn't make sense.
- **Check 2: Dates of Analysis** – This just shows the date range for your raw data. Make sure it is the date range you are trying to analyse.
- **Check 3: Check the Overall Counts of PLWs, by status** – Just a quick visual check of the counts of PLWs by pregnancy or lactating status. Note any extreme distribution, like all women being pregnant for example.
- **Check 4, 5, 6: Check the Results by Base, Enumerator and Route respectively:** Several indicators are summarized to help assess the quality of the data. Review each of the below indicators to identify specific feedback or issues for the bases, and enumerators. Indicators included and how to interpret them are:

Indicator	Description	Interpretation	Response/Action
Min/Max Dates	The earliest and latest dates listed in the dataset	Make sure you are analysing the data you expect to analyse.	Check the correct raw data is in the raw_child_data tab.

% of women present	The proportion of children that were reported present at the time of interview, of the children under-5 years reportedly traveling with the household.	Should be close to 100% since only women traveling with the household should be recorded.	**If less than 90%**, follow up with the base and enumerator.
# of PLWs measured	The count of children with a MUAC measurement in the dataset.	Should be equivalent to all pregnant women and women breastfeeding children less than 6 months that were present.	If an enumerator has a very different count of measured PLWs compared to other enumerators, follow up with the FO/enumerator. If different than the number of pregnant and lactating women of children <6m, check the data for irregularities.
# of PLW reported by status (pregnant, lactating, both, none)	The count of PLWs with different statuses in the dataset (pregnant, lactating, both, or none).	Generally only pregnant women and women breastfeeding children <6 months are considered nutritionally vulnerable, hence they are the target group for MUAC.	If an enumerator has a very different count of measured PLWs compared to other enumerators then follow up with FO and enumerator.
Digit Preference Score (DPS)	A statistical measure describing the tendency to favour certain digits when taking measurements.	A high DPS means that enumerators are rounding their measurements inappropriately. Classifications based on the score are: 0-7 (Excellent), 8-12 (Good), 13-20 (Acceptable), >20 (Problematic).	If the DPS is very high and <20 PLWs, don't interpret yet as the sample size is very small. If the DPS is high and >=20 PLWs, check what digits are being favoured in the dps_chisquared tab. Give feedback to the FO and enumerator to avoid rounding.
% SAM	The proportion of PLWs with a MUAC <21.0cm.	We do not expect SAM to be higher than MAM. We do not expect SAM to be extremely high either. I don't have a clear threshold or plausible range to share.	If SAM is greater than or equal to MAM, follow up with the quality of the enumerator's MUAC measurements.
% MAM	The proportion of PLW with a MUAC >=21.0cm and <23.0cm.	We do not expect MAM to be less than SAM. We expect MAM is greater than SAM usually, and less than GAM.	If MAM is greater than GAM, check for calculation errors.
% GAM	The proportion of children 6-59 months with a MUAC <12.5cm or with bilateral pitting oedema.	We do not expect GAM to be extremely high in the South Sudan context. A plausible range may be from 10– 30%.	If GAM is greater than 30%, follow up with the quality of the enumerator's measurements and verify if the results are accurate.
Mean MUAC (cm)	The average MUAC measurement	Compare the mean MUAC for an enumerator to the other enumerators to check if they are similar. If there is a large difference, greater than a few cm, it could indicate there is some difference or bias in that enumerator's measurements.	If there are large differences in mean MUAC, (more than 3-4 cm), follow up with the enumerator and FO on how measurements are being conducted.
# of outliers	An outlier value that is biologically implausible for most PLWs.	If the MUAC is recorded as less than 10.0cm or greater than 50.0cm, it is counted as an outlier. These are extreme, biologically implausible thresholds.	Every outlier should be cleaned, removed from the dataset and enumerators should be given feedback. If an outlier is found like this, it means there was a big measurement or data entry issue.

Step 6a, b, c: Data Cleaning

- Copy and paste the raw data into the clean data tab. The clean data tab is where you will make changes to the data. You will never manually make any change to the raw data.

- Delete the plw_name column
- **Cleaning Data Entry Errors (CHANGING VALUES)**
    - Review the dataset line by line for data entry issues, such as unusual routes, origin, destination and departure locations.
    - If there is a value that needs changing, fill in the cleaning log following the instructions below. The make the change directly in the clean data tab:
        - Cleaning Date – the date you made the cleaning change
        - Entry – the entry number in the cleaning log (1, 2, 3, 4…)
        - Enumerator_ID – the ID number for the enumerator with the issue
        - Base – the base where the issue happened
        - Question – the column name where you are changing the value.
        - _index – this is the value in the _index column, identifying the unique child
        - Old_value – what is the value from the raw data
        - New_value – what is the NEW value you are changing to
        - Amanya Comment – Your description of the issue
        - AO/FO reply – The AO/FO comment confirming or adding to the issue after discussion with the enumerator.
- **Removing Outlier Records (DELETING ROWS)** – ideally this would be done also before assessing overall data quality, per above. Follow these steps:
    - Sort the dataset from smallest to largest by the "plw_muac" column.
    - Identify any plw with the plw_muac <8.0 or plw_muac >20.0cm
    - Cut the entire row and paste it into the tab "*deleted_plw"*
    - Outlier records are those with biologically implausible MUAC measurements.
    - Sort the raw data by the "plw_muac" column from smallest to largest.
- Check the data line by line for inconsistencies. Is there any missing data? Is there any data that doesn't make sense?
- Identify any changes you need to make to the dataset in consultation with the Assessment Officers, Field Officers, and Enumerators. These will largely be data entry errors

Step 7: Preliminary Analysis

- Check the CDC summary tables in tab "Step7 *Preliminary analysis*". These tables will give you the results aggregated by base, or by base and movement type (entry, exit, transit).
- You can change the name of the base, or the type of movement (entry, transit, exit) in the head of each table to change the values for that table. You must use the EXACT name of the base or movement type as in the dataset for it to work.
- **Use of Unweighted vs. Weighted Result** – MUAC is more sensitive for younger children than older children, therefore if the sample is oversampled for children under 2 years of age, it can give a falsely inflated % GAM. Determine whether to use the weighted or unweighted result:
    - If the % of children over-2 years of age is <55%, the recommendation will show to use the WEIGHTED RESULT from the WEIGHTED TOTAL columns.
    - If the % of children under-2 years of age is >=55%, the recommendation will show to use the UNWEIGHTED RESULT from the TOTAL columns.
- Make sure to remove any outlier values from the dataset before using the weighted or unweighted result is they will bias your result.
- Use the results from this preliminary analysis tab to complete the weekly/bi-weekly report.

Step 8: Weekly/Bi-Weekly Reporting Form

- Complete the Template Report Outline provided in the tab "*Step8 Report*". Use the summary results from Step 2, Step 5 and Step 7 to answer the questions in this template.
- This report should be copy and pasted into a word document or an email, and shared with the following individuals:

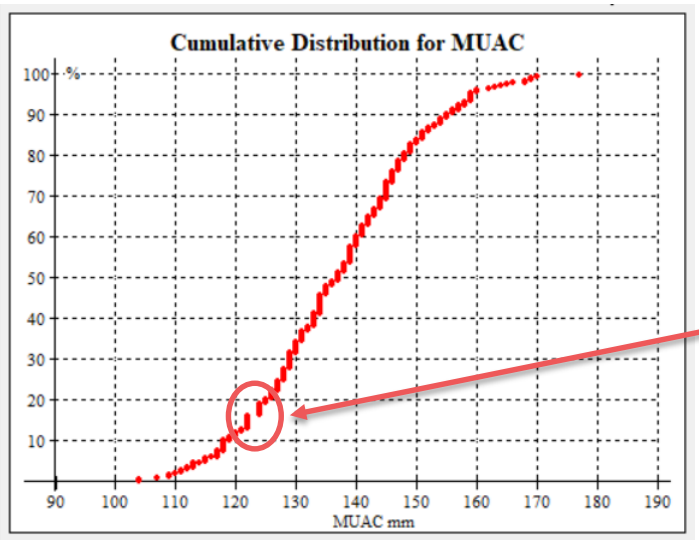
  - Ella Blom; Research Manager (ella.blom@reach-initiative.org)
  - RaeAnn Dietlin; PMP Officer (rachael.dietlin@reach-initiative.org)
  - Assessment and Field Officer for the participating bases.
- Incorporate any feedback from Ella on the results/report.
- MOST IMPORTANTLY, follow up on any base/enumerator issues directly with the AO/FO of that base and make sure any poor quality measurements are addressed.

OPTIONAL CHECKS

If time allows and you want to try to do additional data quality checks, you can plot a "cumulative distribution plot" of the MUAC data for a base or enumerator. I was having trouble automating this in the excel template, but this plot can be made in Excel manually, or checked in ENA. This plot will help you identify whether enumerators are "squeezing" the MUAC tape to get a measurement <11.5 or 12.5cm.

Below is an example plot. You can see:

- The MUAC reading in mm is on the X-axis
- The cumulative frequency is on the Y-axis
- If data is collected well, we expect a smooth S-shaped curve.
- If data is collected improperly, we can expect to see "bump" or disjointedness at a certain MUAC reading. For example, we see a "bump" in the graph below at 125cm, indicating enumerators are changing their measurements to avoid an exact reading of 125mm, or to include/exclude children from a MAM classification.



Example of "bump" at 125mm, indicating possible squeezing of MUAC tape to get MAM for child

ANNEX 2: STANDARD OPERATING PROCEDURE (SOP) – TRAINING AND DATA COLLECTION

Overview

This document describes the step-by-step instructions for training and data collection during the MUAC Screening PRM Pilot project. See separate SOPs for *Data Cleaning, Preliminary Analysis and Reporting*.

This SOP will cover the following topics:

- Preparations
- Data Collection Procedures
- COVID-19 Mitigation Protocols
- Training Sessions

Preparation

The following should be minimally organized or discussed prior to implementation of training and data collection.

Material Procurement:

- Training materials (flipchart paper, markers, tape)
- Administrative forms (attendance sheets, daily payment forms, etc.)
- Child MUAC tapes (3-4 per enumerator per day)
- Adult MUAC tapes (3-4 per enumerator per day)
- Marked height sticks (1 per enumerator)
- Tablets or smartphones (1 per enumerator)
- Referral forms for children and PLWs
- Masks for Data Collection (1x per enumerator per day, or 3-4 re-washable masks per enumerator)
- Hand sanitizer for Data Collection
- Masks for Standardization Test (20x for participants + 1x per enumerator team member)
- Hand sanitizer for Standardization Test (7ml per participant + 7ml per enumerator)
- Chlorine solution (0.1% chlorine solution on hand for sanitation)

Coordination

- Discussion with NIWG – get their formal or informal approval of the activity before data collection starts, including on COVID-19 mitigation procedures
- Discussion with local nutrition partners - Contact and discussion with local nutrition partner on referral procedures and forms. How do they want referrals to occur for transiting populations?
- Discussion with local health authorities – they should be informed if you are taking MUAC locally
- Discussion with local authorities – they should be informed of the purpose and implementation of the activity beforehand

Marking Height Sticks

- Mark the height sticks at the following lengths:
    - 65cm (approximate 6 months)
    - 87cm (approximates 24 months)
    - 110cm (approximates 59 months)

Training Logistics:

- Where is your training location? (check with ACTED/HSM team)
- Who will be trained and implement the activity for the 2-3 months? (check with ACTED/HSM team)
- Who will organize the standardization test? Do you have compensation for participating mothers (soap, SSP)?

Data Collection Procedures + COVID-19 Mitigation Procedures

Identifying Households to Interview:

- Teams will be stationed at the local port, bus stop, or other transit location.
- Ideally, every household with a child under 5 years of age, or with a pregnant or lactating woman, that comes through the transit location will be approached and interviewed, or as many as possible with the given human resources.
- One completed ODK form should be used for each travelling household.

Conducting the Interview:

- *Step 1: Introduction and Consent:*
  - *Clean your hands with hand sanitizer or with water and soap.*
  - *Explain the consent statement to the interviewee, and that the interview will only take 5 minutes.*

> *REACH is monitoring the port and the road to understand more about you, where you have come from, and the nutritional status of your household. Any information that you provide will be kept strictly confidential. This is voluntary and you can quit at any time during the interview. However, we hope that you will participate since your views are important. Do you have any questions? May I begin now?*

- *Step 2: Interview and MUAC Measurement*
  - *Stand 2 meters away from the interviewee, except when taking the MUAC measurement or using the height stick.*
  - *Wear masks at all times during the interview.*

- *Step 3: Concluding the Interview*
  - *Thank the interviewee for their time.*
  - *Wipe off the MUAC tapes and height sticks with a cloth dampened in a chlorine solution.*

Training

Length of Training: The training should last approximately 1 day for classroom activity + 1 day for field testing.

Recommended Training Agenda:

Time	Day 1	Day 2
9:00 – 10:00am	**Introduction to MUAC Pilot Project** • Project Objectives and Timeline • Organizational Chart • Contracts and Expectations	**Review**
10:00 – 11:00pm	**Measuring MUAC and Oedema**	**Standardization Session 2**

	• Explain and demonstrate proper procedure •	**(another 5 children)**
11:00 – 1:00pm	**Review of ODK Tool** • Introduction to ODK • Review questions and tool	
1:00 – 2:00pm	**LUNCH**	**LUNCH**
2:00 – 5:00pm	**Standardization Session 1** **(5 children)**	**Field Practice** • Teams will visit the port or bus stop and interview transiting households.

Conducting the Standardization Test: The standardization test is an essential training step to give enumerators feedback on their measurement technique.

- **Composition of Standardization Test -** Per recently released guidance on the resumption of nutrition data collection, standardization tests will be broken into two separate sessions, as described below:
  - 1st session – 5 children will be measured twice by a maximum of 5 teams or enumerators (Group 1). If there are more than 5 enumerators or teams (Group 2), then they will also measure the 5 children twice AFTER the first group is done.
  - 2nd session – 5 new children are measured twice by Group 1. The same 5 children are measured twice by Group 2.
  - Of the 10 children, half of them should be under-2 years of age; 5 of them should be over-2 years of age.
  - Of the 10 children, all children should be healthy (no malnourished or sick children).

- **Location and Setup**
  - Conduct the standardization test in a shaded outdoor area, or a large indoor space with open windows or ventilation.
  - Setup the caregivers and children at least 2-3 meters apart.
  - Each caregiver/child pair should get one child MUAC tape and one adult MUAC tape. These should stay at that station.

- **COVID-19 mitigation** – The following additional precautions should be taken during the standardization test:
  - Enumerators/teams must wear face masks during the standardization test.
  - Enumerators/teams, caregivers and children should sterilize with hand sanitizer prior to each round of the standardization test.
  - All caregivers should be provided a mask and agree to wear it during the test
  - All children older than 2 years should also be provided and wear a mask
  - Caregivers present at the test should NOT be individuals >65 years of age, or that have comorbidities such as chronic illnesses that could put them at risk for severe COVID-19 complications.
  - Caregivers and children should be screened for fever and asked if they had been in contact with any positive COVID cases in the last 14 days. If yes, then they should not participate.

- **Analyze the Standardization Test Results**
  - Have enumerators record their results on the standardization test form.
  - Enter the standardization test data into ENA in the "Training" tab, and produce the standardization test report.
  - Interpret the report to give appropriate feedback to the enumerators/teams on their measurements.

See Session 6.2 of the SMART Survey Manager training for details on interpretation. This can be found on the dropbox in 16_Nutrition > 3_Technical Reference > 1_SMART Resources > SMART Survey Manager Modules.