AFGHANISTAN

Nutrition, ITCF, WASH, FSL & Mortality SMART Survey Report

Helmand Province, Afghanistan

13-23 October 2019

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Abbreviations

ACF/AAH	Action Contre la Faim / Action Against Hunger
AYSO	Afghan Youth Services Organization
ARDHO	Afghanistan Research Development & Health Organization
AIM- WG	Assessment Information Management Working Group
BPHS	Basic Package of Health Services
BRAC	Bangladesh Rural Advancement Committee
BSU	Basic Sampling Unit
CBA	Childbearing age
CDR	Crude Death Rate
CI	Confidence Interval
EBF	Exclusive Breastfeeding
ECHO	European Commission for Humanitarian Aid
ENA	Emergency Nutrition Assessment
EPHS	Essential Public Health Services
EPI	Expanded Program on Immunization
FCS	Food Consumption Score
FSL	Food Security and livelihood
GAM	Global Acute Malnutrition
HHs	Households
HAZ	Height for Age Z-score
IDPs	Internally Displaced Populations
ID	Index of Dispersion
IMAM	Integrated Management of Acute Malnutrition
IYCF	Infant and Young Child Feeding
MSF	Médecins Sans Frontières
MSI	Marie Stopes International
MoPH	Ministry of Public Health
MUAC	Mid-Upper Arm Circumference
MW	Mean Weight
NNS	National Nutrition Survey
NSIA	National Statistics and Information Authority
OPD-MAM	Outpatient Department for Moderate Acute Malnutrition
OPD-SAM	Outpatient Department for Severe Acute Malnutrition
OW	Observed weight
PLW	Pregnant and Lactating Women
PND	Public Nutrition Directorate
PPHD	Provincial Public Health Directorate
PNO	Public Nutrition Officer
PPS	Probability Proportional to Size
PSU	Primary Sampling Unit
RC	Reserve Cluster
rCSI	Reduced Coping Strategy Index
SAM	Severe Acute Malnutrition
SD	Standard Deviation
SMART	Standardized Monitoring and Assessment of Relief and Transitions
TSFP	Targeted Supplementary Feeding Program
U5DR	Under-five Death Rate
UNICEF	United Nations Children's Fund
WASH	Water Sanitation and Hygiene
WFP	World Food Program
WAZ	Weight for Age Z-Score

W/H	Weight for height
WHO	World Health Organization
WHZ	Weight for Height Z–score

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1. EXECUTIVE SUMMARY

Helmand is one of the 34 provinces of Afghanistan. It is located in the southern part of Afghanistan. The province is divided into fourteen districts: Garmseer, Nawa, Nadali, Greshk (Nahri Seraj), Khana Shin, Marjah, Naw zad, Sangin, Mosa Qala, Wasir, Kajake, Baghran, and Disho. Lashkar Gah is the capital of the province. The total population of the province estimated at 13,955,514[1] inhabitants.

The survey applied a two-stage cluster sampling strategy using the SMART methodology based on probability proportional to population size (PPS). Stage one sampling involved the sampling of the Villages/clusters to be included in the survey while the second stage sampling involved the selection of the households from the sampled clusters. The smallest geographical unit in Helmand defined a cluster. Total 1,135 children 0-59 months were assessed and among them, 1,048 were children aged 6-59 months.

The data collection took place from 13 to 23 October 2019 (11 days) during the fall season. It was a cross-sectional population-representative survey following the Standardized Monitoring and Assessment of Relief and Transition (SMART) methodology. The final report presents the analysis and interpretation of the nutritional status of children under five, the nutritional status of women aged 15-49 years old, pregnant and lactating women (PLW), infant and young child feeding (IYCF) practices, measles's immunization coverage, water, sanitation, and hygiene (WASH) situation and retrospective mortality rates. The summary of the key findings presented in table 1 below.

Table 1: Summary of Findings

Malnutrition prevalence – Children 6-59 months)	
Indicator	**Prevalence**
GAM prevalence among children 6-59 months per WHZ <-2SD*	13.5 % (10.5-17.1 95% C.I.)
SAM prevalence among children 6-59 months per WHZ <-3SD	3.2 % (2.1-4.8 95% C.I.)
GAM prevalence among children 6-59 months per MUAC <125 mm	15.5 % (12.9-18.5 95% C.I.)
SAM prevalence among children 6-59 months per MUAC <115 mm	7.0 % (5.4-9.0 95% C.I.)
Combined GAM prevalence among children 6-59 months per WHZ <-2SD and/or MUAC <125mm and/or Oedema	21.3% (17.8-24.9 95% CI)
Combined SAM prevalence among children 6-59 months per WHZ <-3SD and/or MUAC <115 mm and/or Oedema	7.7% (6.0-9.6 95% CI)
Stunting among children 6-59 months per HAZ <-2SD**	53.7%

[1] CSO updated population 1398

Underweight among children 6-59 months per WAZ <-2SD	32.0 % (28.8 - 35.4 95% C.I.)
Severe Underweight among children 6-59 months per WAZ <-3SD	12.3 % (10.3 - 14.6 95% C.I.)

*GAM and SAM prevalence by any indicator include cases of nutritional oedema
**HAZ prevalence calculated with an SD of 1

Nutritional status of Women 15-49 years old	
Indicator	**Result**
MUAC among all (CBA) women 15-49 years per MUAC <230mm	20.5%
MUAC among pregnant women per MUAC <230 mm	17.7%
MUAC among lactating women per MUAC <230 mm	21.4%
MUAC among all pregnant and lactating women per MUAC <230mm	21.3%

Crude and Under Five Death Rate (Death/10,000/Day)	
Indicator	**Result**
Crude Death Rate (CDR)	1.65 (1.12.-2.42 95% CI)
Under five Death Rate (U5DR)	0.86 (0.39-1.85 95% CI)

Infant and Young Children Feeding Practices	
Indicator	**Result**
Initiation of breastfeeding within 1 hour of birth among children 0-23 months	49.6%
Exclusive breastfeeding among infants 0-5 months	34.5%
Continued breastfeeding at 1 year among children 12-15 months	73.5%
Continued breastfeeding at 2 years among children 20-23 months	78.7%
Introduction of solid, semi-solid, or soft foods (6-8 months)	35.8%

Child Immunization	
Indicator	**Result**
Second dose measles vaccination among children 18-59 months confirmed by vaccination card	12.1%

Second dose measles vaccination among children 18-59 months confirmed by caregiver recall	55.1%
Second dose measles vaccination among children 18-59 months confirmed by vaccination card or caregiver recall	67.2%

2. BACKGROUND

Helmand is one of the 34 provinces of Afghanistan located in the southern part of the Country. The province is divided into fourteen districts: Garmseer, Nawa, Nadali, Greshk, Khana shin, Marjah, Naw Zad, Sangin, Mosa Qala, Wasir, Kajake, Baghran, and Disho. Lashkar Gah is the capital of the province. The total population of the province is estimated, 13,955,514[2] inhabitants. Helmand has borders with Kandahar, Nimroz, Farah, Ghor, and Daikundi provinces. The predominant tribe is the Pashtu although there are other minority tribes like Baluchi, Tajik and Hazara. The most commonly spoken language in the province is Pashtun. The Helmand Basin region is encompassed entirely by mountains - the Hindu Kush to the North, the East Iranian ridges to the West, and the mountains of Baluchistan Province to the East and South. The lower portion of the Basin is located in the worldwide subtropical dry zone.

2.1. LIVELIHOODS

The Helmand River is the most significant geographic feature of the Basin. The River is considered as the lifeline of the region, has supported civilizations for over 6,000 years. It is the primary source of water for the region and drains 40% of Afghanistan's land area. It is also central to agriculture in the region; its basin is home to 13% of the irrigated land in the country. The main summer crops grown in the province are Carrots, Cauliflowers, Cucumbers, Eggplant, Melon, Okra, Onions, Garlic, Pepper, Potato, Tomato, Apricot, Grapes, Raisins, Mulberry, Pomegranate, Apples, Almonds, Walnuts and pistachios; the winter crops are wheat, barley, potato, and mustard. However, the growing of Opium in the province is taking precedence due to its better price and ease of cultivation and more so preservation for better market prospects. The vegetables normally grown in summer includes okra, tomato, eggplant, pepper, pumpkins, cucumbers and others. The winter vegetables are onion, cauliflower, turnip, spinach, radish, carrot, cabbage, etc. Most of the pomegranate and crops produced supplied to Kabul and other parts of Afghanistan. Some of the crops and vegetables also sold locally.

2.2. Health, Nutrition and Food Security Situation

According to 2013 National nutrition survey (NNS 2013) malnutrition prevalence was classified as serious in Helmand province; GAM was 14.5% (9.95-20.79 95% CI) while SAM prevalence was 7.1% (4.37-11.27 95% CI) In the current Nut-SMART survey GAM prevalence was at 13.5% (10.5-17.1 95% CI) and SAM was 3.2% (2.1- 4.8 95% CI) based on WHZ score. Therefore, we can say that nearly 1 in 5 Children under five are suffering from the Global Acute malnutrition at risk of dying.

[2] CSO updated population 1397

Helmand is also one of the most affected provinces by the drought (especially in the Northern Districts) and is highly affected by Violent armed conflict; both conditions threaten the food security and livelihoods of 94 per cent of the rural population whose main source of income is crop production. The majority of Helmand Districts and areas considered insecure; the continuous conflicts have reduced the income of the households by 44.7 per cent in the past year. There are also a large number of IDPs, who put additional stress on food supplies for the population. The drought-hit Helmand especially hard: surface water, which comes from precipitation, decreased by 83 per cent as compared to last year. Helmand overall classified in Phase3[3].

Currently, more than eight national and international organizations are providing nutrition and health services in the province such as UNICEF, WFP, WHO, MSF, MSI, AYSO BRAC, ARDHO, and ARC. The most important health services are BPHS and EPHS, which are implementing by BRAC, AYSO, and MSF under the SEHATMANDI project in the entire province. A total of 78 Health facilities are providing IMAM program in the entire districts of the province.

2.3. Implementation of the survey

Data collection was implemented by ARDHO and AYSO teams in Helmand province from 13 to 23 October 2019 (fall season) *[The Months of Mezan 1398 in Solar Calendar*] with technical support of AAH. This SMART survey covered all the 14 districts of the province with close coordination of MoPH (PND, Research and Evaluation General Directorate and provincial public health directorate) and their local authorities. The survey covered the secure and partially secure villages while excluded few insecure and inaccessible villages (881 or 12.9%), hence the survey actually covered 87.1% of the entire province composed of 5,970 out of 6,851 total villages.

2.4. Survey Justification

Helmand is affected by the current drought (especially in the Northern Districts) and is highly affected by violent armed conflict; both conditions threaten the food security and livelihoods of the rural population whose main source of income is crop production. The majority of Helmand considered insecure, and the continuous conflicts have reduced the income of the households in the past year. Helmand is also among provinces with scant recent updated information; the most recent assessment was in 2015 the GAM rate based on the WHZ showed that 10.0% (7.6-13.2 95% CI) of the population was suffering from malnutrition, and 12.9% (9.4-17.5 95% CI) of the population had a MUAC of less than 125mm[4], which also indicates high level of acute malnutrition. Over 15% of the households have a poor food consumption score, and 60.6% of households were engaging in emergency livelihood coping strategies. There are also a large number of IDPs, who put additional stress on food supplies for the population. In Helmand, like many other provinces, community income has decreased by 46.6% as compared to last year. The drought-hit Helmand especially hard: surface water, which comes from precipitation, decreased by 83% as compared to last year. Helmand province currently classified in Phase 3.[5]

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3 IPC _Acute Food insecurity analysis report 2018
[4] AAH Rapid SMART survey December 2017
[5] IPC, Acute Food Security Analysis Report August 2018

Since nutritional status frequently deteriorates due to several factors including poor food access and availability, poor water and sanitation as well as high morbidity among the affected populations, this SMART survey carried out in order to have a better understanding of the current nutrition status of the community and monitor the nutrition and mortality situation in Helmand province.

Results will be key in understanding the on-going worsening humanitarian situation. The survey will be used to inform and guide specific responses on some of the community needs and areas to focus on improving the on-going and planned interventions.

Given that, AAH has considerable years of expertise in conducting surveys in Afghanistan. and is an active member of the AIM-WG, Small Scale Nutrition survey steering committee as well as an active member of the National Nutrition Cluster, AAH is the technical lead to carry out assessment surveys in the Country; the current survey in Helmand province was made possible with ECHO financial support. On the other side, it is an opportunity for AAH to build the capacity of national agencies ARDHO and AYSO in conducting of SMART survey in the upcoming period; the capacity building is one of the mandates of AAH in giving support to the cluster

3. SURVEY OBJECTIVES:

3.1. General objective

The overall objective of the survey is to assess the nutritional status among the vulnerable population (under-five children & PLWs), crude and under-five retrospective death rates in Helmand province.

3.2. Specific objectives

- To estimate the prevalence of undernutrition (Stunting, Wasting, Underweight) among children under 5 years of age.
- To estimate the Crude Death Rate (CDR) and under-five Death Rate (U5DR).
- To determine core Infant and Young Child Feeding (IYCF) practices among children aged <24 months.
- To estimate second dose measles vaccination coverage among children 18-59 months.
- To determine the nutritional status of pregnant and lactating women (PLW) and women of reproductive age (15-49 years) based on MUAC assessment.
- To assess Water, Sanitation, and Hygiene (WASH) proxy indicators: households level main drinking water sources and caregiver handwashing practices.
- To assess the food security situation through the Food Consumption Score (FCS) and the Reduced Coping Strategies Index (rCSI).

4. METHODOLOGY

4.1. Survey Design

The survey design was a cross-sectional study using the SMART methodology with two-stage clusters sampling.

4.2. Survey Population

The target population for this survey were children under 5 years of age for the anthropometry; 0-59 months for the U5DR caregivers/women with children 0-23 months for IYCF practices; households and their members for the CDR, WASH and FSL questionnaire.

4.3. Survey Area

The survey was carried out in all districts of Helmand province. However, if there are inaccessible areas (areas that are not reachable and completely insecure for actual data collection), they were excluded from the sampling frame.

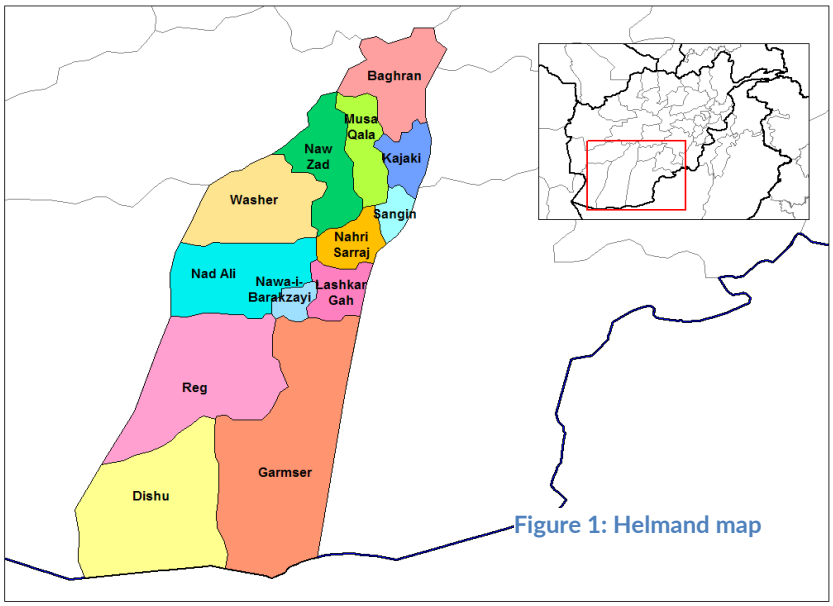

Figure 1: Helmand map

4.4. Sample Size

The anthropometry and mortality sample sizes were determined by using ENA for SMART software version 2011 (updated 9th July 2015) on the basis of estimated prevalence rates of malnutrition (GAM), estimated death rate, desired precision, design effect, average household size and percentage of <5's in the population. The parameters for the sample size calculation are outlined in Tables 2 and 3 below.

Table 2: Parameters for sample size calculation of anthropometry and percentage of non-response rate.

Parameters for Anthropometry	Value	Assumptions Based on Context
The estimated prevalence of GAM (%)	8.7%	There was no updated data for Helmand. Therefore, an estimate of the prevalence of GAM [8.7% (6.9-10.9 95% CI)] calculated by using the latest available data from the neighbour provinces and has similarities in the cultures and health access.
Desired precision	±3	Based on SMART recommendation and consistent with survey objectives in order to estimate the prevalence.
Design Effect	1.5	Based on SMART recommendation and considering the population living in the province is relatively homogenous.
Children to be included	**554**	**Minimum sample size-children aged 6-59 months.**
Average HH Size	7	Based on Helmand SMART survey 2015
% Children under five	17.3%	Based on CSO updated population 1397 (2018)
% Non-response Households	6%	Based on the Helmand Rapid SMART assessment 2017
Households to be included	**540**	**Minimum sample size-Households to be surveyed.**

Table 3: Sample size calculation for mortality surveys

Parameters for Mortality	Value	Assumptions based on context
Estimated Death Rate /10,000/day	0.5	There is no updated mortality data available, therefore based on the SMART recommendation of 0.5 CDR for the planning stage.
Desired precision /10,000/day	±0.3	Based on SMART recommendation and supportive of survey objectives to the estimated death rate.
Design Effect	1.5	Based on SMART recommendation and considering the population living in the province is relatively homogenous.
Recall Period in days	137	The starting point of the recall period is 4th June 2019 (14th Jawza 1398) (Eid Ramadan) and the mid-point of data collection was on the 18th of October 2019 (13th to 23rd October. 2019).
Population to be included	**2,544**	**Population**
Average HH Size	7.0	Based on Helmand SMART survey 2015
% Non-response Households	6.0%	Based on the Helmand Rapid SMART assessment 2017
Households to be included	**387**	**Households to be included**

As per the SMART survey methodology, the higher household sample of the two is adopted, hence a total of 540 households as per the SMART sample calculation.

The number of households completed per day was determined according to the time the team could spend in the field excluding transportation, other procedures and break times. The details in table 3 below taken into consideration when performing the calculation based on the context:

Table 4: Household selection per day _Working timetable.

Total working time	8:30 AM to 4:30 PM (8 Hours (480 minutes))
Time for transportation (round trip) (A)	1.5 hour (90 minutes)
Coordination with village elder and preparation of HH list (B)	30 minutes
Time for a break and pray (C)	1 hour (60 minutes)
The total time prior to the survey (D)= A+B+C	180
Total time available for work (E)= 480-180	300Min
The average duration of the HH interview (F)	20 minutes
Distance from one HH to another HH (G)	6 minutes
Total time for interview per HH (H)= F+G	26 Minutes
Number of households covered by day (I) =D/H	11.5≈12
Total Cluster=Total HH 540/11.5	46.8≈47
Total households	47*12=564 HHs

4.5. Sampling procedures

The survey was applied a two-stage cluster sampling using the SMART methodology based on probability proportional to size (PPS).

First stage sampling (Selection of clusters)

The first stage sampling was the selection of clusters using probability proportional to size (PPS). An updated sampling frame of primary sampling units (villages list) was obtained from the Basic Package of Health Services (BPHS) providers in consultation with PPHD. All inaccessible and completely insecure villages excluded from the sampling frame. All the clusters (from the updated sampling frame) with their respective population sizes were entered into ENA for SMART (July 9, 2015 version) and 47 clusters were selected for the survey. Five Reserve Clusters (RCs) were also automatically selected by ENA software and were to be used if more than 10% of the cluster were not accessible; since all the 47 clusters were accessible, the RCs were not used.

Second stage sampling (Selection of households)

Based on the context, a household defined as a group of people living under the same roof and sharing food from the same cooking pot[6]. In polygamous households, those living and eating in different houses considered as separate HHs. Wives living in different houses and eating from the same cooking pot considered as one household.

Before the arrival of the team prior to the data collection, the community social workers mobilized the selected villages/clusters. Upon the teams' arrival at the villages, the survey team introduced themselves and the objectives of the survey to the village leaders/chiefs at the respective villages, and in collaboration with the village leaders/chiefs, the team estimated the total number of households in the village.

Sample households selected using systematic random sampling as per the recommendation of the SMART methodology. This household selection method is preferred because it is objective, easy for monitoring and makes the process more transparent to the local community and could not find the updated list of the households.

Segmentation was done in villages with large numbers of households i.e. greater than 150 households, after which one segment was randomly selected by the PPS method. The segmentation was done based on existing administrative units e.g. neighbourhoods, streets, or natural landmarks like a river, road, mountains or public places like schools, and masjid. The survey team got consent from selected households; if they were, agree than start data collection from any convenient household of the 12 randomly selected households to carry out anthropometric[7], mortality, IYCF, WASH and FSL questionnaires. Household revisits were done to households in which eligible children (under five) or entire household members were found to be absent during the first attempt. A cluster control form was used to record all these missed, refused and absent households.

5. ORGANIZATION OF THE SURVEY

5.1. Survey Coordination and Collaboration

[6] WFP household definition

[7] Will be conducted in households with children aged 0-59 months & PLW.

Survey methodology shared, validated and approved by the AIM-WG. Meetings held with the respective administrative authorities on the arrival of the survey teams in the field to brief them on the survey objective, methodology and procedures as well as get relevant updated information on security, access and village level population.

5.2. Survey Teams

Six teams each comprising of four members collected data in all the selected clusters in the province. Each team was composed of one team leader/supervisor, two measurers, and one interviewer/community mobilizer. Each team had one female surveyor to ensure acceptance of the team amongst the surveyed households, particularly for IYCF questionnaires. Each female member of the survey team accompanied by a mahram as per the cultural requirement to facilitate the work of the female data collectors outside their homes. In each selected village, one or more community members were requested to lead and guide the survey team within the village in locating the selected households

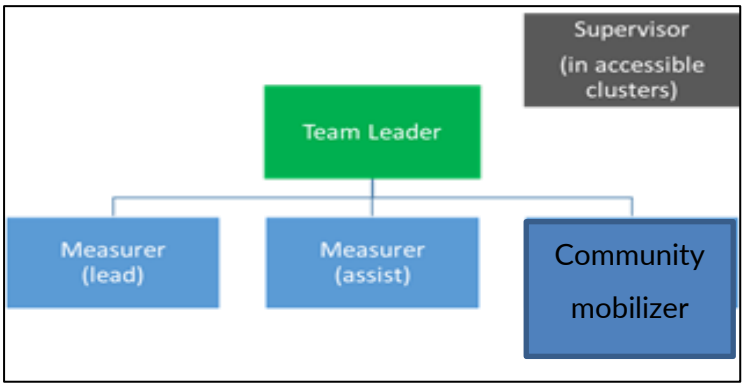

Figure 2: Survey Team Composition

5.3. Training of the Survey Teams

The survey teams were trained for seven days in Lashkar Gah district, the capital of Helmand province. The majority of the population speaks and understands the Pashto language; therefore, the survey conducted in Pashto for interviews as well as during the training. Two AAH technical staff facilitated the training. The training mainly focused on field procedures, sampling methods, how to fill the survey questionnaire/tool, development and usage of event calendar and anthropometric measurements. A standardization test conducted over the course of 1 day, measuring 10 children in order to evaluate the accuracy and the precision of the team members in taking the anthropometric measurements. The pilot survey conducted on the last day of the training in order to evaluate their work in real field conditions. Feedback was provided to the team regarding the results of the field test, particularly in relation to digit preferences and data collection. Refresher training on anthropometric measurements, the filling of the questionnaires and the household's selection was organized on the last day of the training to ensure overall comprehension before going to the field.

A field guidelines document with instructions including household definition and selection provided to each team member. All documents, such as local event calendar, questionnaires or consent forms translated into Pasto, the local language for better understanding and to avoid direct translation during the data field collection, the questionnaires were back-translated using a different translator and pre-tested prior to the data collection.

6. DATA COLLECTION

6.1. Data collection tool & indicators

The standard Afghanistan AIM-WG data collection formats and questionnaires for anthropometric, IYCF, WASH and FSL used in this survey. The Pashto version of the questionnaire used. Anthropometric data collected from all children within the eligible age range (0-59 months). However, mortality data (individual mortality questionnaire), food security and as well as WASH data were collected from all sampled households regardless of whether they had children or not. The indicators assessed and the corresponding target population presented in Table 5 below.

Table 5: Standardized Integrated SMART Indicators Updated 2018

Indicator	Target Population
Anthropometry	
Acute Malnutrition by WHZ	Children 0-59 and 6-59 months
Chronic Malnutrition by HAZ	
Underweight by WAZ	
Acute Malnutrition by MUAC	Children 6-59 months
Acute Malnutrition by Combined criteria (WHZ and/or MUAC and/or Oedema)	
Mortality	
Crude Mortality Rate (CDR)	Entire population
Under Five Death Rate (U5DR)	Children under five
IYCF	
Early Initiation of Breastfeeding	Children <24 months
Exclusive Breastfeeding (EBF)	Infants 0-5 months
Continued Breastfeeding at 1 Year	Children 12-15 months
Continued Breastfeeding at 2 Years	Children 20-23 months
Health	
Measles Vaccination (2 doses)	Children 18-59 months
WASH	
Access to improved and unimproved drinking water	Household
Hand washing practices among caregivers (use of soap or ash)	Caregivers of children under five
The proportion of caregivers washing their hands during critical times	

FSL	
Food Consumption Score (FCS)	Household
Reduced Coping Strategy Index (rCSI)	
Food Security Situation (FCS & rCSI)	
Mean consumption of food groups per 7 days recall (from FCS data)	
Women of Reproductive Age & PLW	
MUAC	Women 15-49 years and PLW

6.2. Data collection methods

6.2.1. Anthropometric data

- Age of child- Children's ages recorded in months using a local events calendar in case age documentation (vaccination cards, birth certificates) was not available.
- Sex of child (m/f): was determined by asking directly of respondents. The sex information confirmed by observation during measurement.
- Height/Length- length was taken for children below two years of age. These were measured lying horizontally on the length measuring board. Height was taken for children two years and above, their height was taken while standing. Height and length were measured using a standard 130 cm long height/length board. Before taking the height/length, subjects were requested to take off their shoes and hats (if wearing them) and stand in a position against the height board, which has been placed on a flat level surface. Measures we selected during the training based on the standardization test performance in terms of accuracy and precision. Heights/length was taken following the recommended steps described in the Nutrition Survey (SMART Methodology). Height was recorded to the nearest 0.1cm.
- Weight: Weight was measured by using a calibrated SECA scales, 100g precision and recorded to the nearest 0.1 kilograms.
- Nutritional Oedema: Nutritional Oedema was diagnosed by applying normal thumb pressure to the top of the foot for three seconds. If there is oedema, an impression remains for some time (at least a few seconds) where the oedema fluid has been pressed out of the tissue. The child was only recorded as edematous if both feet present with pitting oedema. Any suspected oedema case was reported and verified by the survey supervisor and took pictures as a confirmation for the survey manager.
- MUAC (Mid Upper Arm Circumference): MUAC was measured using a three-colour-coded (red, yellow, green) flexible, non-elastic 26.5cm long tape, graduated with 1 mm precision. MUAC was measured at the mid-point of the left upper arm of all children 6-59 months old. The reading of the measurement was recorded to the nearest 1mm.

Table 6: Definition of Acute Malnutrition, Chronic Malnutrition, and Underweight (WHO Reference 2006)

Severity	ACUTE MALNUTRITION (WHZ)	CHRONIC MALNUTRITION (HAZ)	UNDERWEIGHT (WAZ)
GLOBAL	<-2 z-score and/or oedema	<-2 z-score	<-2 z-score
MODERATE	<-2 z-score and ≥ -3 z-score	<-2 z-score and ≥ -3 z-score	<-2 z-score and ≥ -3 z-score
SEVERE	<-3 z-score and/or oedema	<-3 z-score	<-3 z-score

Table 7: WHO Definition of Acute Malnutrition According to Cut-off Values for MUAC

Severity	MUAC (mm)
GLOBAL	<125 (and/or oedema)
MODERATE	≥ 115 and < 125
SEVERE	<115 (and/or oedema)

Table 8: Combined Definition of Acute Malnutrition According to Both criteria:

Severity	Indications
GLOBAL	WHZ<-2 Z score + MUAC<125 mm
SEVERE	WHZ <-3 Z score + MUAC <115 mm

The prevalence of malnutrition as identified by WHZ, HAZ and WAZ have also been classified by the WHO in terms of severity of public health significance. The thresholds are presented in table 9 below.

Table 9: Classification for Severity of Malnutrition by Prevalence among Children Under-Five

LABELS	PREVALENCE THRESHOLDS (%)			
	WASTING	OVERWEIGHT	STUNTING	UNDERWEIGHT[8]
Very low	<2.5	<2.5	<2.5	
Low	2.5-<5	2.5-<5	2.5-<10	<10
Medium	5-<10	5-<10	10-<20	10-19.9
High	10-<15	10-<15	20-<30	20-29.9
Very high	≥15	≥15	≥30	≥30

[8] WHO threshold

6.2.2. Measles Immunization

Measles vaccination status: Caregivers of all children 18-59 months were asked if the child received a second dose of measles vaccinations, which was subsequently verified by reviewing the vaccination card, if available. If the vaccination card was not available, then recall of the caregiver option was considered.

6.2.3. Mortality data

Retrospective mortality- this section was collecting data on the number of people currently in the sampled households, those who were present at the beginning of the recall period, birth and passing away. The method also takes into account the number of people who joined or left the households during the recall period.

CDR refers to the number of persons in the total population that died over the mortality recall period (100 days). ENA Software calculates it for SMART using the following formula

$$\boldsymbol{CDR = \frac{Nb\ of\ deaths * 10000\ persons}{population\ at\ mid - interval * time\ inerval\ in\ days}}$$

U5DR refers to the number of children under five years that die over the same mortality recall period.

$$\boldsymbol{U5DR = \frac{Nb\ of\ deaths\ of\ U5s * 10000\ U5s}{population\ of\ U5s\ at\ mid - interval^{9} * time\ interval\ in\ days}}$$

6.2.4. Maternal Nutrition

Women in childbearing age were assessed for their nutritional status based on MUAC measurements. The nutritional status of pregnant and lactating mothers was derived using the MUAC cut-off of 230 mm.

6.2.5. Infant and Young Child Feeding

Caretakers of children <24 months were interviewed to understand the infant and young child feeding practices of their children.

6.2.6. Water, Sanitation, and Hygiene

Water Quality: Household heads were asked what is their current main source of drinking water, to assess if households are relying on improved or unimproved water sources.

Hand washing practices: Caregivers were asked to demonstrate how they washed their hands to assess the use of soap or ash and water when washing hands. Caregivers were also be asked on what occasions they washed their hands to assess hand-washing practices at five critical moments.

6.2.7. Food Security

Food Consumption Score (FCS): Heads of sampled households were interviewed to assess the food groups consumed by the household in the past 7 days to calculate the FCS.

Reduced coping strategy Index (rCSI): Heads of sampled households were interviewed to understand if during the past 7 days, the household did not have enough food to eat, and what coping strategies were used in response to this to calculate the rCSI.

6.2.8. Data Quality Control and Assurance

[9] Mid interval population an average of population-time factoring in and out migration since some household member stayed a fraction of the recall period.

Each questionnaire and data sheet was checked each night prior to the data entry. The data was entered on a daily basis and missing or flag data identified. Based on the results the supervisors gave feedback to enumerators, and where possible, were requested to go back to the households with missing or dubious results. The different team revisited clusters with unusual findings to clarify the reports. Daily evening meetings were held to provide feedback to the teams on the day performance and address challenges.

6.3. Ethical considerations

All relevant local authorities were informed of the study objectives, methodology and their roles and their permission sought. Verbal consent was sought from the caretakers of the children and household heads for voluntary participation in the survey. The identity of the participants was kept anonymous. The opinion and the rights of those who didn't wish to participate in the survey were respected. The interviewers took time to introduced themselves and established rapport with the community leaders and members; all the information collected was treated with strict confidentiality. All children diagnosed as severely or moderately malnourished were referred to a nearby health facility, each team was provided with referral sheets to facilitate the referrals.

6.4. DATA ENTRY AND ANALYSIS

The Anthropometry and mortality data entry and analysis were done using ENA for SMART software (July 9, 2015 version). ENA for SMART data analysis is automatic and a results summary is generated instantly. All other data was entered and analyzed using Microsoft excel.

6.5. Limitation of the survey

- Insecurity key distress and of concerns for both AAH and ARDHO /AYSO survey teams in the largely insecure province.
- Most of the children did not have vaccination cards or birth certificates, so the survey teams were using the event calendar. But due to low education as well as, intransigent and intractable insecurity which leads to stressed households and caregivers in the community disrupting normal social & economic lifestyle which negatively affects recollections for their childbirth events or normal seasonality. This was the mean challenge for accurate age determination hence the age distribution and specification indicator that really on age viz HAZ and WAZ were outliers 55 and 23 respectively.
- The survey focal point was not able to receive the data in a timely manner due to difficult geographical terrain, access and insecurity especially in Baghran, Sangeen, Washir, Khana Shen, Garmseer and Musakala districts.
- Due to insecurity, the SMART technical team was not able to have direct supervision and support of the survey teams in the field.
- A total of 881 villages (12.9%) were excluded from the original provincial sampling frame due to insecurity and lack of access.
- Some clusters had a high number of malnourished cases (pockets of malnutrition) as well as poor distributions causing the high index of dispersion (ID) and Design Effect (DEFF), which was not possible to do further investigated properly due to lack of access and time constraints.

7. SURVEY FINDINGS

7.1. Survey Sample

Overall, the survey assessed all the 47 planned clusters and 556 households. A total of 4,315 individuals, 820 women of Child-Bearing Age (CBA), 1,135 under-five children (0-59 months).

Of the target 556 households assessed, only 14 households were absent or refused to participate in the survey, resulting in a non-response rate of 1.5%.

Table 10: Proportion of household and child sample achieved

# of planned HHs	# of surveyed HHs	Achieved % (planned/surveyed)	# of Children 6-59 months	# of surveyed children 6-59 months	Achieved % (planned/surveyed)
564	556	98.5%	554	1,039	187.5%

The mortality questionnaires designed to gather demographic data, capture in and out-migration. The survey findings show the average household size was at 7.6 and the proportion of the under-five children in the population was 27.4% see table 11 below for more details.

Table 11: Demographic data summary

Indicator	Values
Total number of clusters	47
Total number of HHs	556
Total number of HHs with children under five	517
Average household size	7.6
Female % of the population	47%
Male % of the population	53%
Children under five % of the population	27.4%
Birth Rate	1.25
In-migration Rate (Joined)	0.07
Out-migration Rate (Left)	0.61

Households also assessed on the residential status. Among 557 HHs, 77.7% were residential, 20.7% were Internal displaced, 1.1% were refugees and 0.5% were nomadic in the surveyed population.

Table 12: Household residential status proportions

Residential Status of Households N= 556	Resident	432	77.7%
	IDP	115	20.7%
	Refugee	6	1.1%
	Nomad	3	0.5%

As the age and sex of all household members were assessed, it was possible to disaggregate the population by sex and five-year age interval, as presented in Figure 3 below. The pyramid is wide at the base and narrows towards the apex, indicating a generally youthful population and older population life expectations are lower. The survey result shows boys and girls are equally represented.

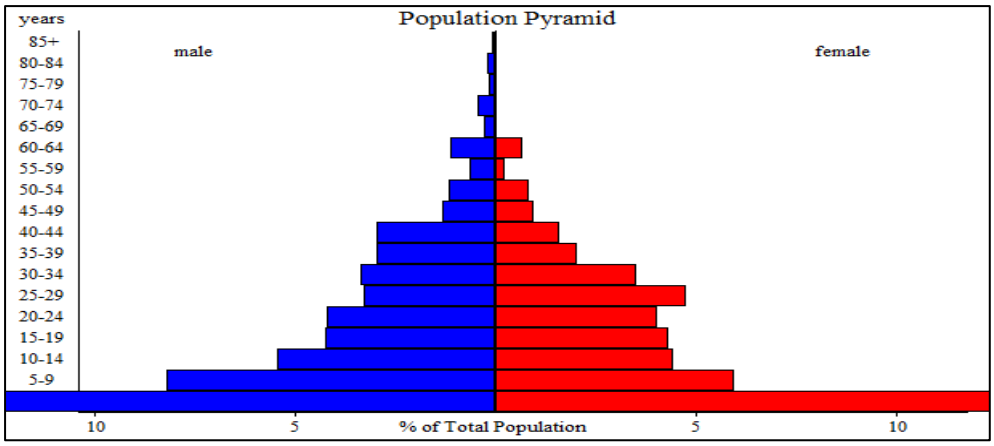

Figure 3: Helmand province Population Pyramid

Table 13: Distribution of Age and Sex among Children 6-59 months

	Boys		Girls		Total		Ratio
AGE (months)	no.	%	no.	%	no.	%	Boy:Girl
6-17	135	49.5	138	50.5	273	26.0	1.0
18-29	110	45.6	131	54.4	241	23.0	0.8
30-41	120	50.6	117	49.4	237	22.6	1.0
42-53	96	48.5	102	51.5	198	18.9	0.9
54-59	43	43.4	56	56.6	99	9.4	0.8
Total	504	48.1	544	51.9	1048	100.0	0.9

7.2. Data Quality

The survey data check analysis was done based on SMART flags[10]; the overall score was 20% categorized as acceptable but on the borderline. The standard deviation, design effect, missing values, and flagged values are listed for WHZ, HAZ, and WAZ in Table 14 below. The SD of WHZ was 1.19, the SD of WAZ was 1.13 but the SD of HAZ was 1.3, which is outside the normal range of 0.80-1.20. The rest of the indicators were in the normal range. However, Age ratio of 6-29 months to 30-59 months was 0.96 (the value should be around 0.85) was significantly different with p-value = 0.044, which means the 6- 29 months children were over-represented compared to the 30-59 months group, perhaps due to older children being out of households with their parents due to the harvest of corns and pomegranate. The design effect for the WHZ and HAZ was 2.34 and 2.29 respectively and ID was more than 1 with p-value is less than 0.05, it means there was significant heterogeneity between the surveyed clusters. Due to this heterogeneity, cases of malnutrition (both wasting and stunting) were not randomly distributed among the clusters and some pockets of malnutrition observed in the survey data. The complete plausibility report is in Annex 5.

Table 14: Mean Z-scores, Design Effects, Missing and Out-of-Range Data of Anthropometric Indicators among Children 6-59 Months.

Indicator	N	Mean z-scores ± SD	Design effect (z-score < -2)	Z-scores not available*	Z-scores out of range
Weight-for-Height*	1,039	-0.58±1.19	2.34	1	8
Weight-for-Age*	1,025	-1.56±1.13	1.24	0	23
Height-for-Age	993	-2.09±1.30	2.79	0	55

* contains for WHZ and WAZ the children with oedema.

7.3. Prevalence of Acute Malnutrition

7.3.1. Acute Malnutrition by WHZ

The prevalence of GAM per WHZ among children 6-59 months in Helmand was 13.5 % (10.5 - 17.1 95% C.I.) as presented in Table 15 below and categorized in the high-level public health classification. This prevalence seems slightly higher in boys than girls, but not statistically significant.

The Index of Dispersion (ID) indicates the degree of distribution of malnourished cases in the clusters, in this survey the ID was greater than 1 and p-Value is less than 0.05, it means there were malnutrition pockets and clustering in certain cluster an indication of subpopulation; this could be associated with intermittent yet chronic insecurity due to security operations and associated violence leading to population displacements. The population, therefore, is

[10] SMART flags as observation +/- 3 SD from the observed mean

becoming more heterogeneous as displaced people adopt new livelihoods as a coping strategy; the design effect was 2.34 higher than normally anticipated 1.5.

Table 15: Prevalence of Acute Malnutrition by WHZ (and/or Oedema) by Severity and Sex among Children 6-59 months, WHO 2006 Reference

Indicators	All n = 1039	Boys n = 499	Girls n = 540
Prevalence of global acute malnutrition (<-2 z-score and/or oedema)	(140) 13.5 % (10.5 - 17.1 95% C.I.)	(85) 17.0 % (13.0 - 22.0 95% C.I.)	(55) 10.2 % (7.5 - 13.8 95% C.I.)
Prevalence of moderate acute malnutrition (<-2 to ≥-3 z-score)	(107) 10.3 % (8.0 - 13.2 95% C.I.)	(65) 13.0 % (9.7 - 17.3 95% C.I.)	(42) 7.8 % (5.7 - 10.5 95% C.I.)
Prevalence of severe acute malnutrition (<-3 z-score and/or oedema)	(33) 3.2 % (2.1 - 4.8 95% C.I.)	(20) 4.0 % (2.5 - 6.3 95% C.I.)	(13) 2.4 % (1.3 - 4.6 95% C.I.)

*There were 0.0% oedema cases in the sample

The prevalence of acute malnutrition by WHZ was also assessed among children 0-59 months. The GAM & SAM rates were 13.1 % (10.3–116.5 95% C.I.) and 3.1 % (2.0-4.6 95% C.I.) respectively as presented in Table 16 below.

Table 16: Prevalence of Acute Malnutrition by WHZ (and/or oedema) by Severity and Sex among Children 0-59 months, WHO 2006 Reference

Indicators	All n = 1107	Boys n =538):	Girls n = 569
Prevalence of global acute malnutrition (<-2 z-score and/or oedema)	(145) 13.1% (10.3-16.5 95% CI)	(89) 16.5% (12.8-21.1 95% CI)	(56) 9.8% (7.2-13.3 95% CI)
Prevalence of moderate acute malnutrition (<-2 to ≥-3 z-score)	(111) 10.0% (7.8-12.8 95% CI)	(68) 12.6% (9.6-16.5 95% CI)	(43) 7.6% (5.5-10.2 95% CI)
Prevalence of severe acute malnutrition (<-3 z-score and/or oedema)	(34) 3.1% (2.0- 4.6 95% CI)	(21) 3.9% (2.5- 6.0 95% CI)	(13) 2.3% (1.2- 4.3 95% CI)

*There were 0.0% oedema cases in the sample

When disaggregated by age group, the group with the highest MAM and SAM was 6-17 months, as presented in Table 17 below. The age group with the lowest MAM was 54-59 months. Results of this disaggregation suggest that the younger age groups (6-17) were more vulnerable to acute malnutrition than the older age group.

Table 17: Prevalence of Acute Malnutrition per WHZ Severity and Age Group

Age (months)	N	Severe wasting* (WHZ <-3)		Moderate wasting (WHZ ≥-3 to <-2)		Normal (WHZ ≥-2)		Oedema	
		n	%	N	%	N	%	n	%
6-17	271	14	5.2	38	14.0	219	80.8	0	0.0
18-29	237	9	3.8	24	10.1	204	86.1	0	0.0
30-41	236	6	2.5	22	9.3	208	88.1	0	0.0
42-53	197	2	1.0	20	10.2	175	88.8	0	0.0
54-59	98	2	2.0	3	3.1	93	94.9	0	0.0
Total	1,039	33	3.2	107	10.3	899	86.5	0	0.0

*There were 0 oedema cases in the sample

The WHZ distribution curve (in red) as compared to the WHO 2006 reference WHZ distribution curve (in green) presented in demonstrates a shift to the left, suggesting a malnourished population Figure 5 below. Figure 4 illustrates the mean WHZ for age categories and more affected children were 6-17 months (271).

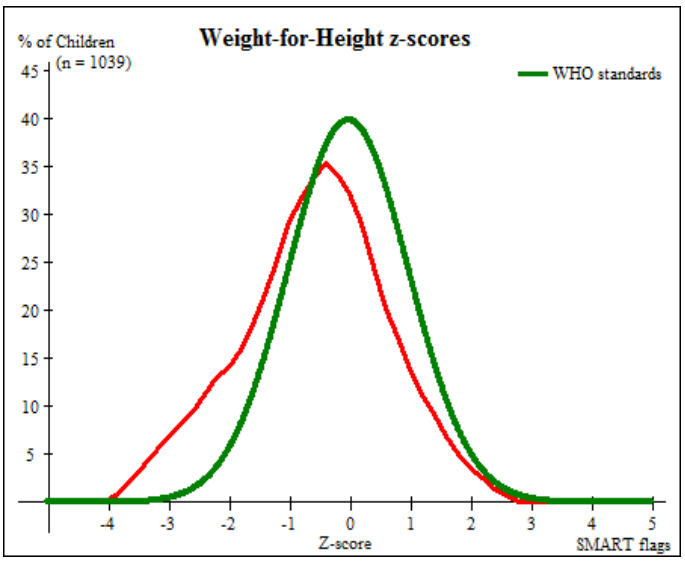

Figure 4: Distribution of WHZ Sample Compared to the WHO 2006 WHZ Reference Curve

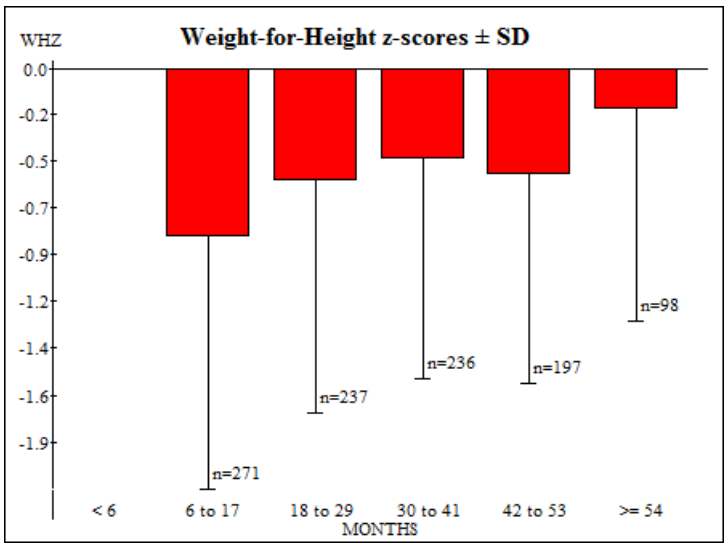

Figure 5: Means WHZ by age groups

7.3.2. Acute malnutrition by MUAC

A total of 1048 children 6-59 months old had their MUAC measurements taken, one child MUAC was missed during data collection. The prevalence of GAM per MUAC among children 6-59 months in Helmand was 15.5 % (12.9-18.5 95% C.I.), as presented in Table 18 below.

Table 18: Prevalence of Acute Malnutrition by MUAC (and/or oedema) by Severity and Sex among children 6-59 months

Indicators	All n = 1047	Boys n = 503	Girls n = 544
Prevalence of global malnutrition (<125 mm and/or Oedema)	(162) 15.5 % (12.9-18.5 95% C.I.)	(73) 14.5 % (11.4 - 18.3 95% C.I.)	(89) 16.4 % (13.2 - 20.1 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm to ≥115 mm, no Oedema)	(89) 8.5 % (6.7-10.7 95% C.I.)	(36) 7.2 % (5.2-9.7 95% C.I.)	(53) 9.7 % (7.2-13.1 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or Oedema)	(73) 7.0 % (5.4-9.0 95% C.I.)	(37) 7.4 % (5.3-10.1 95% C.I.)	(36) 6.6 % (4.7-9.3 95% C.I.)

When disaggregated by age group, the group with the highest MAM and SAM was 6-17 months, as presented in Table 19 below. Disaggregation suggests that the younger age groups (6-29) were more Vulnerable to acute malnutrition compared to older groups (30-59) according to MUAC criterion.

Table 19: Prevalence of Acute Malnutrition per MUAC and/or Oedema by Severity and Age Group

Age (months)	N	Severe wasting* (MUAC<115 mm)		Moderate wasting (MUAC ≥115 mm and <125 mm)		Normal (MUAC ≥125 mm)		Oedema	
		N	%	N	%	N	%	N	%
6-17	272	35	12.9	54	19.9	183	67.3	0	0.0
18-29	241	24	10.0	24	10.0	193	80.1	0	0.0
30-41	237	12	5.1	6	2.5	219	92.4	0	0.0
42-53	198	2	1.0	2	1.0	194	98.0	0	0.0
54-59	99	0	0.0	3	3.0	96	97.0	0	0.0
Total	1047	73	7.0	89	8.5	885	84.5	0	0.0

7.3.3. Acute Malnutrition by Oedema

No Oedema case observed in the sample. Table 20 below illustrates data for the presence and absence of oedema cases.

Table 20: Distribution of Severe Acute Malnutrition per Oedema among Children 6-59 Months

	WHZ <-3	WHZ>=-3
Presence of Oedema*	Marasmic kwashiorkor No. 0 (0.0 %)	Kwashiorkor No. 0 (0.0 %)
Absence of Oedema	Marasmic No. 40 (3.8 %)	Not severely malnourished No. 1007 (96.2 %)

*There was no oedema case in the sample

7.3.4. Combined Global Acute Malnutrition (cGAM) by WHZ and/or MUAC and/or Oedema

The prevalence of Combined GAM & among children 6-59 months in Helmand was 21.3% (18.0-25.1 95% CI) and 3.0% respectively as presented in Table 21 below. Although there is no globally established threshold for Combined GAM & SAM it could be a more useful indicator for programming to better determine people in need as it reflects the indicators used for admissions at the field level.

Table 21: Prevalence of combining Acute Malnutrition by WHZ + MUAC by Severity and Sex among Children 6-59 months

Indicators	All 1,038	Boys 498	Girls 540
Prevalence of combined GAM (WHZ <-2 and/or MUAC < 125 mm and/or oedema)	(221) 21.3 % (17.8 - 24.9 95% C.I.)	(115) 23.1 % (18.3 - 28.1 95% C.I.)	(106) 19.6 % (16.1 - 23.4 95% C.I.)
Prevalence of combined MAM (WHZ <-2 and >=-3, MUAC < 125 mm and >= 115 mm, no oedema)	(141) 13.6 % (11.1 - 16.2 95% C.I.)	(76) 15.3 % (11.6 - 19.4 95% C.I.)	(65) 12.0 % (9.3 - 15.2 95% C.I.)
Prevalence of combined SAM (WHZ < -3 and/or MUAC < 115 mm and/or oedema	(80) 7.7 % (6.0 - 9.6 95% C.I.)	(39) 7.8 % (5.8 - 10.3 95% C.I.)	(41) 7.6 % (5.5 - 10.2 95% C.I.)

*There were not oedema cases in the sample

7.3.5. Enrolment in nutrition program _ OPD SAM/MAM cases

The proportion of children identified as acutely malnourished by MUAC only and their corresponding treatment enrolment status is presented in Table 22 below. Overall, out of 162 6-59 months old children identified as acutely malnourished based on MUAC only 24.7% children (27 MAM cases and 13 SAM cases) were already enrolled in the IMAM program at the time of the survey; 75.3% were not enrolled in nutrition treatment services and referred to the nearest health facilities.

Table 22: Proportion of Acutely Malnourished Children 6-59 Months enrolled in a Treatment Program

Sample	Enrolled in an OPD SAM	Enrolled in an OPD MAM	Enrolled in an IPD SAM	Not Enrolled/Referred
Acutely malnourished children 6-59 months by MUAC or oedema (N=162)	(13) 8.0%	(27) 16.7 %	(0) 0.0%	75.3%

7.4. Prevalence of Chronic Malnutrition

The SD of HAZ 1.3 was outside the normal range (0.8-1.2) and the distribution was problematic. Hence, the prevalence of stunting observed is not reliable and might not be representing the true situation. Maybe this was due to no exact birth date documents that affected the H/A Z-score; not helped much by the low knowledge of the mothers/caretakers about their children's age nor the events surrounding their birth. Only 9% of children had an

exact birth date. The calculated stunting rate with an SD of one was 53.7%. According to UNICEF-WHO thresholds 2018[11], this prevalence categorized as very high. The observed stunting is in Annex 6.

7.5. Prevalence of Underweight

The prevalence of underweight per WAZ among children 6-59 months in Helmand was 32.0 % (28.8 - 35.4 95% C.I), as presented in Table 25 below. The prevalence of severe underweight per WAZ among children 6-59 months was 12.3 % (10.3-14.6 95% C.I.). According to WHO severity thresholds[12], underweight prevalence categorized at very high public health severity.

Table 23: Prevalence of Underweight by WAZ by Severity and Sex among Children 6-59 months, WHO 2006 Reference

Indicators	All n = 1025	Boys n = 490	Girls n = 535
Prevalence of underweight (WAZ <-2 SD)	(328) 32.0 % (28.8 - 35.4 95% C.I.)	(172) 35.1 % (30.1 - 40.5 95% C.I.)	(156) 29.2 % (25.5 - 33.1 95% C.I.)
Prevalence of moderate underweight (WAZ <-2 and >=-3 SD)	(202) 19.7 % (17.0 - 22.7 95% C.I.)	(99) 20.2 % (16.4 - 24.6 95% C.I.)	(103) 19.3 % (15.9 - 23.1 95% C.I.)
Prevalence of severe underweight (WAZ <-3SD)	(126) 12.3 % (10.3 - 14.6 95% C.I.)	(73) 14.9 % (11.7 - 18.8 95% C.I.)	(53) 9.9 % (7.8 - 12.6 95% C.I.)

When disaggregated by age group, the age group with the highest severe underweight was 6-17 months, as presented in Table 26 below. The age group with the lowest severe underweight was 42-53 months.

Table 24: Prevalence of Underweight per WAZ by Severity and Age Group

Age (months)	N	Severe underweight (WAZ <-3)		Moderate underweight (WAZ ≥-3 to <-2)		Normal (WHZ ≥-2)	
		N	%	N	%	N	%
6-17	262	49	18.7	46	17.6	167	63.7
18-29	233	29	12.4	46	19.7	158	67.8
30-41	235	29	12.3	48	20.4	158	67.2
42-53	197	11	5.6	50	25.4	136	69.0
54-59	98	8	8.2	12	12.2	78	79.6
Total	1025	126	12.3	202	19.7	697	68.0

7.6. Malnutrition prevalence among Women (15-49 years old) and PLWs based on MUAC criterion

All women of childbearing age (15-49 years) were included in the survey. A total of 820 women were assessed for nutrition status based on MUAC. The analysis looked at all women 15-49 years, further disaggregating the sample by physiological status (pregnant, lactating, both). Approximately 21.3% of pregnant and lactating women are malnourished. For more details, see table 25 below.

[11] <2.5 very low, 2.5-<10 low, 10-<20 medium , 20-<30 high and ≥30 very high

[12] <10 low, 10-<20 medium, 20-<30 high and ≥Very high

Table 25: Prevalence of Acute Malnutrition among Women per MUAC

Sample	N	MUAC <230 mm	
		N	%
All women 15-49 years	820	168	20.5%
Pregnant women	186	33	17.7%
Lactating women	304	65	21.4%
Pregnant and lactating women*	45	16	35.6%
Non-pregnant and non-lactating women	285	54	18.9%
All PLWs	535	114	21.3%

**Women those were simultaneously pregnant and lactating*

7.7. Retrospective Mortality

The crude death rate for the surveyed population was 1.65 (1.12-2.42), this is categorized as an emergency as per WHO emergency thresholds of 1.0/10,000/day and U5DR were at 0.86 (0.39-1.85) which is lower than WHO emergency threshold of 2/10,000/day. The design effect was 3.41, implying there was significant heterogeneity between the sampled clusters. Approximately 40% of the deaths were due to traumatic/injury (Bomb blast and ongoing conflict) especially in the insecure districts, this ties well with the fact that the highest death was in the age groups of >= 18 years old and among males; 57.9% of the deaths were due to illness (TB, cancer & Heart attack, etc.).

Table 26: Death Rate by Age and Sex with Reported Design Effect

Population	Death Rate (/10,000/Day)	Design Effect
Overall	1.65 (1.12-2.42)	3.61
By Sex		
Male	2.29 (1.50-3.47)	3.11
Female	0.92 (0.56-1.52)	1.57
By Age Group (in years)		
0-4	0.86 (0.39-1.85)	1.95
5-11	0.66 (0.28-1.55)	1.27
12-17	0.49 (0.16-1.48)	1.00
18-49	1.57 (1.01-2.42)	1.68
50-64	7.35 (3.59-14.25)	2.62
65-120	21.77 (8.33-42.60)	3.97

7.8. Infant and Young Child Feeding (IYCF) Practices

Indicators for IYCF practices were collected from all caregivers with children less than 24 months. A total of 405 children under two years were surveyed in the province; the results of the core IYCF indicators assessed summarized in Table 27 below.

The proportion of infants breastfed within one hour of birth was 49.6% suggesting half of the infants were breastfed within an appropriate amount of time after birth hence likely to have received colostrum. This is suboptimal, it means only one every two children receive colostrum, majority missing out on the recommended early initiation of breastfeeding to ensure infants benefit from the rich protective factor in colostrum. The proportion of infants 0-5 months exclusively breastfed was 34.5%.

Table 27: Infant and Young Child Feeding Practices

IYCF Indicator	N	n	Results
Timely initiation of breastfeeding, Children 0-23 months	452	224	49.6%
Exclusive breastfeeding (Infants 0-5 months)	87	30	34.5%
Continued breastfeeding at one year, Children 12–15 months	113	83	73.5%
Continued breastfeeding at two years Children 20-23 months	47	37	78.7%

While asking questions about breastfeeding practices, caregivers of infants 0-5 months were also asked if the infant had consumed liquids or soft, semi-soft, or solid foods in the past day. Figure 11 below presents the liquids most frequently displacing breastmilk. Highly consumed liquid among the families was 41.4 % water and followed by 17.2% of other liquid.

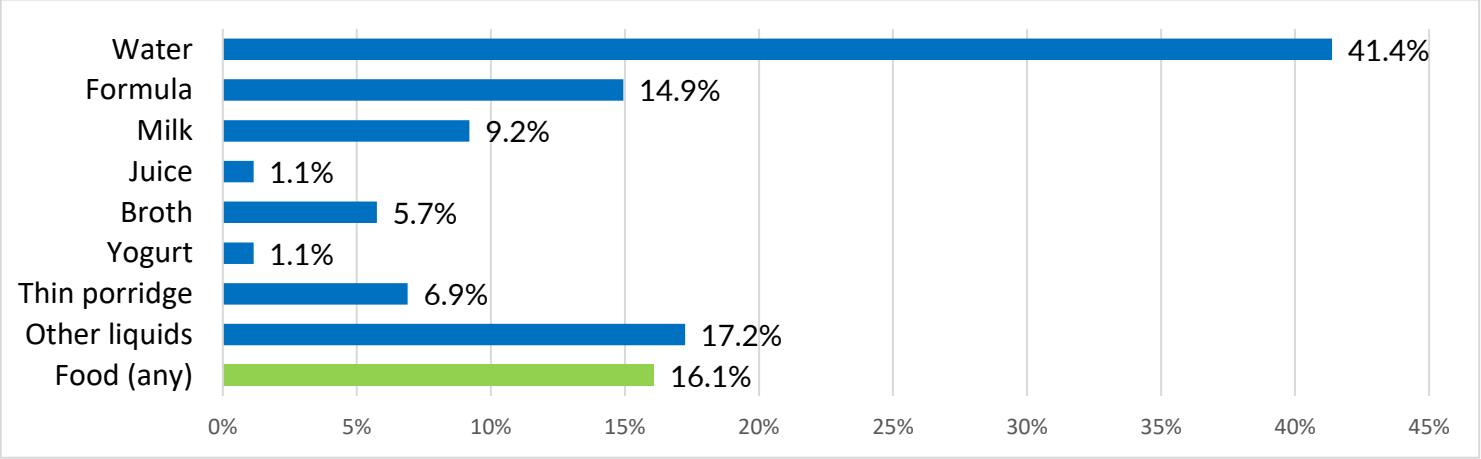

Figure 4: Liquids or Food Consumed by Infants 0-5 Months

7.9. Child Immunization Status

In Helmand province, the survey results indicated that 67.2% of children 18-59 months had received the second dose measles immunization, as confirmed either by vaccination card or caregiver recall. Table 30 below illustrates data on the second dose measles of immunization coverage in Helmand province.

Table 28: Second Dose Measles Immunization Coverages among Children 18-59 Months

Indicator		Frequency	%
Second Dose Measles Immunization (N=775)	Yes by card	94	12.1%
	Yes by recall	427	55.1%
	Yes by card *or* recall	**521**	**67.2%**
	No	93	12.0%
	Don't know	161	20.8%

7.10. Water, Sanitation, and Hygiene

7.10.1. Households drinking water sources

Households were asked to identify their main source of drinking water, which was then categorized as improved or unimproved during analysis. Among all (556) households surveyed, 397 (71.4%) relied mainly on an improved water source, mainly borehole with a hand pump; the remaining 159 (28.6%) relied on were using an unimproved water source, most commonly well with a bucket.

Table 29: Household Main Drinking Water Source

Main Drinking Water Source N= 556	Frequency	%
Improved Water Source	397	71.4%
Unimproved Water Source	159	28.6%

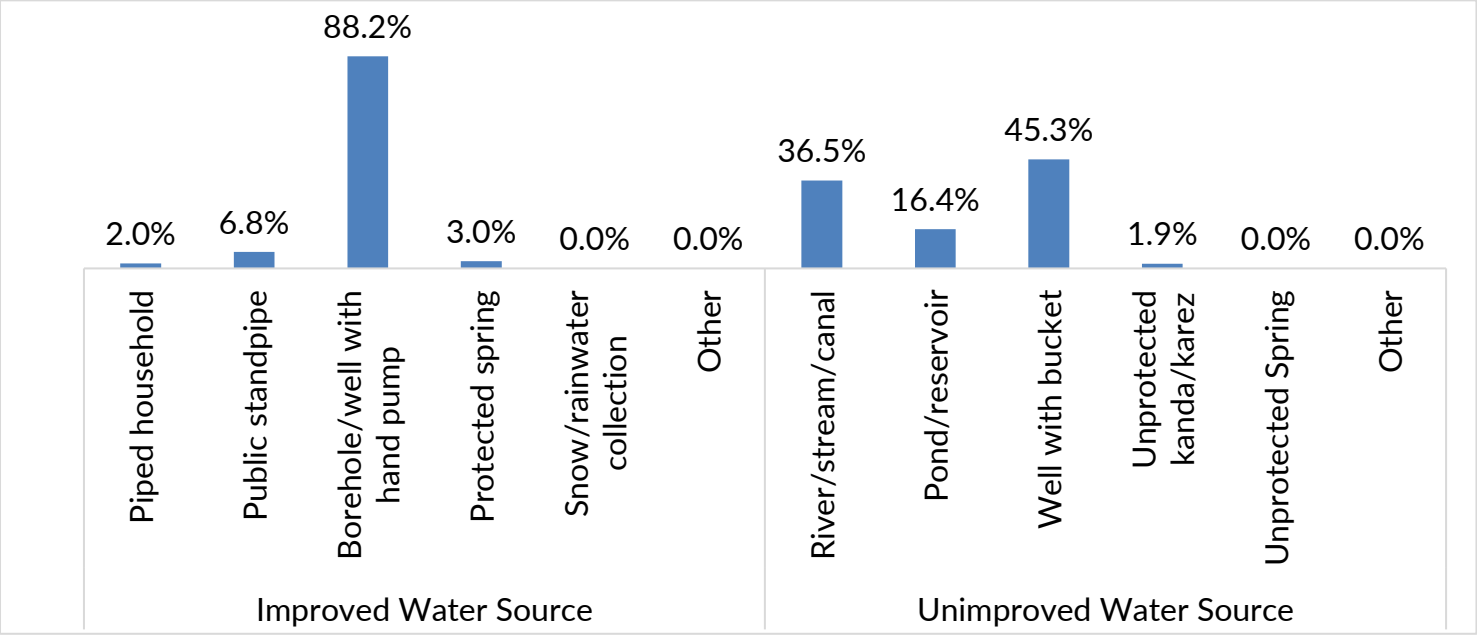

Figure 5: Household Use of Improved and Unimproved Drinking Water Sources

7.10.2. Hand Washing Practices (Use of Soap or Ash) among Caregivers

Caregivers demonstrated how they washed their hands for the interviewer. Overall, 54.8% of caregivers demonstrated the correct and recommended washing their hands with soap/ash and water. For more details, refer to table 30.

Table 30: Hand Washing Practices (Use of Soap or Ash) among Caregivers

Hand washing practices by caregivers, N= 820	Frequency	%
Uses soap or ash with water	449	54.8%
Uses only water	357	43.5%
Nothing	14	1.7%

7.10.3. Hand Washing During Critical Moments among Caregivers

Hand washing practice was asked to all women aged 15-49 years. Caregiver responses about when they routinely wash their hands were assessed at five critical moments. Overall, 24.9% of caregivers reported washing their hands during the five critical moments, suggesting a low understanding of the importance of handwashing at these moments. Poor handwashing practice is directly linked to the higher prevalence of morbidity and malnutrition.

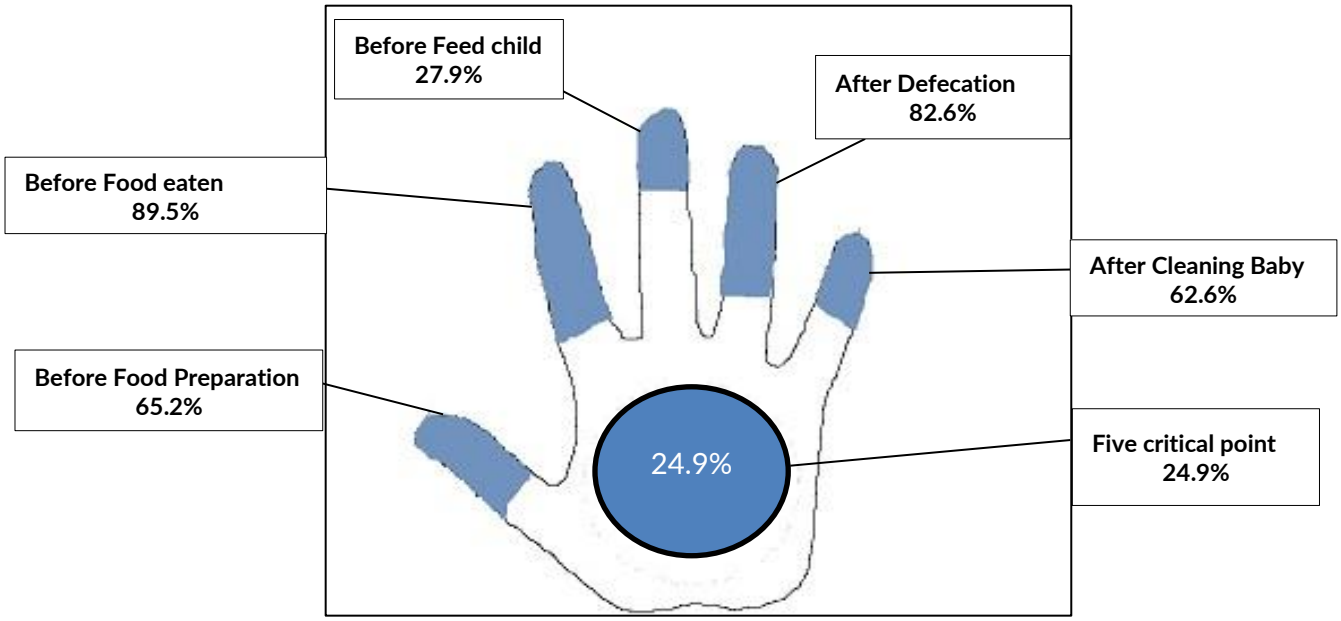

Figure 6: Hand Washing Practices by Caregivers at Critical Moments

7.11. Food Security

7.11.1. Food Consumption Score

In Helmand Province, 18.5% of households reported consuming the frequency and quality of food groups suggesting an acceptable consumption score, 63.5% a borderline consumption score, and 18.0% a poor consumption score, as presented in Figure 11 below.

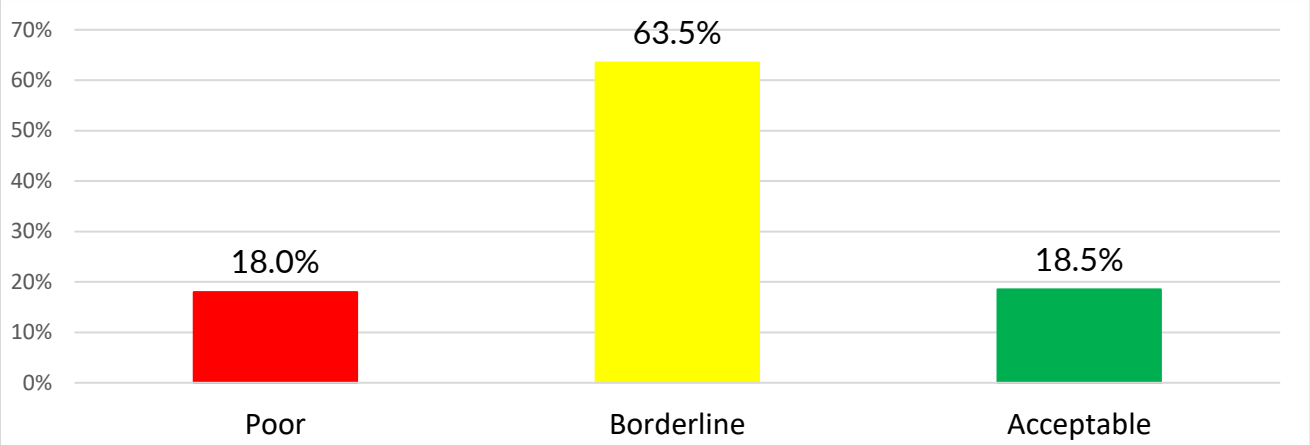

Figure 7: Household Food Consumption Score

Among surveyed households, the most frequently consumed food group was cereals (100.0%), Oil (99.3%), as presented in Figure 12 below.

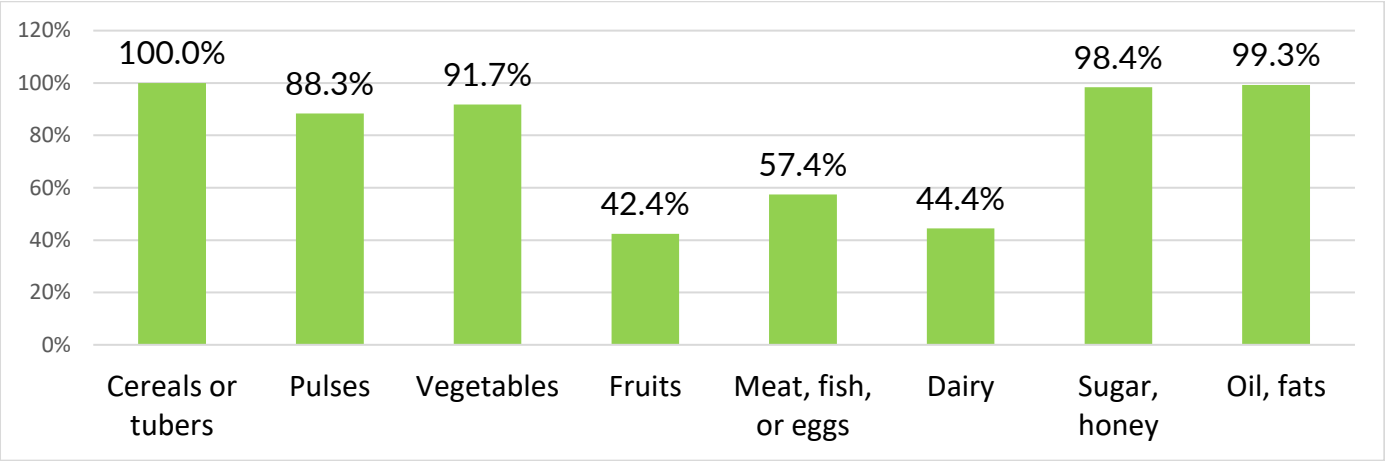

Figure 8: Frequency of Food Groups Consumed by Households

7.11.2. Reduced Coping Strategies Index

Among surveyed households, 41.5% reported not having sufficient food or money to buy food in the week prior to the survey. The most commonly reported food-related negative coping strategy was consuming less preferred foods (23.0%), followed by borrowing food (20.7%) and then relying on restricted food for adults (10.4%) as presented in Table 34 below.

Table 31: Reduce Coping Strategy Index Categories

Household Coping Strategies N=556	Frequency	%
Reported insufficient food or money to buy food per 7-day recall	231	41.5%
Relying on less preferred and less expensive foods	128	23.0%
Borrowing food, or rely on help from a friend or relative	115	20.7%
Limiting portion size at mealtimes	48	8.6%
Restricting consumption by adults in order for younger children to eat	58	10.4%
Reducing the number of meals eaten in a day	19	3.4%

Calculated and weighted as per the rCSI, it was estimated that 75.4% of households relied on no or low coping strategies, 18.2% relied on medium coping strategies, and 6.5% relied on high coping strategies, as presented in Figure 9 below.

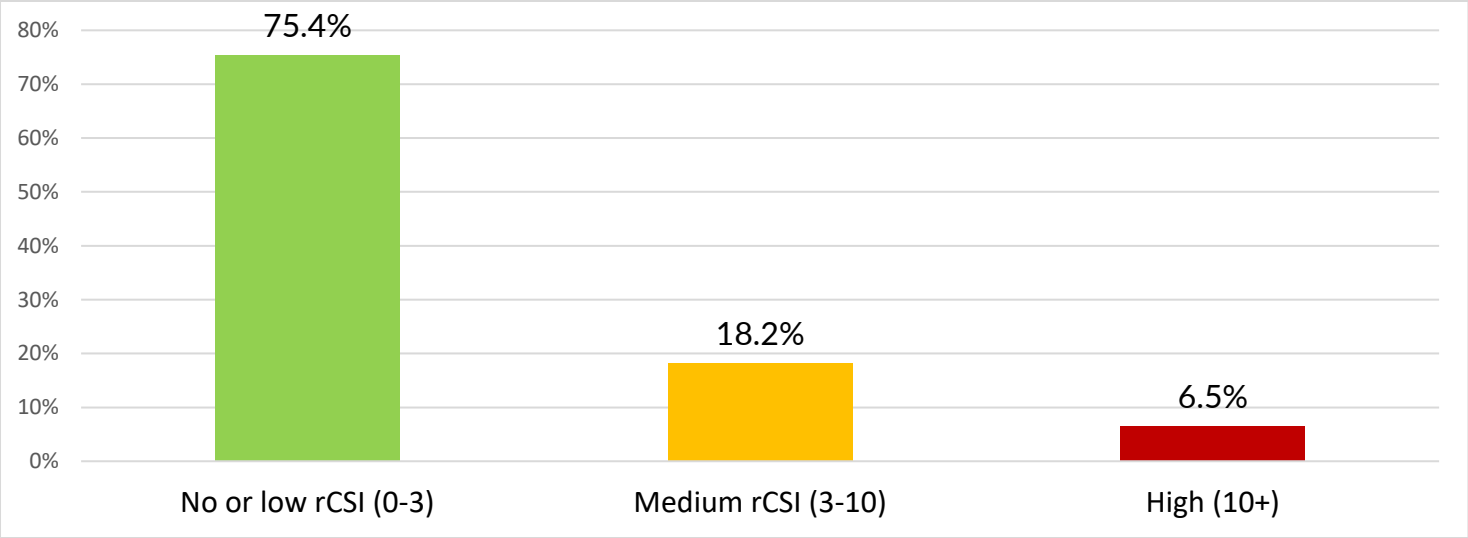

Figure 9: Household Reduced Coping Strategies Index

7.11.3. Food Security Classification

The triangulation of FCS and rCSI attempts to capture the interaction between household food consumption and coping strategies required to more appropriately reflect the food security situation in Helmand province. Based on this triangulation, 14.7% of households were severely food insecure, 15.3% moderately food insecure, and 70.0% of households considered food secure, as presented in Figure 10.

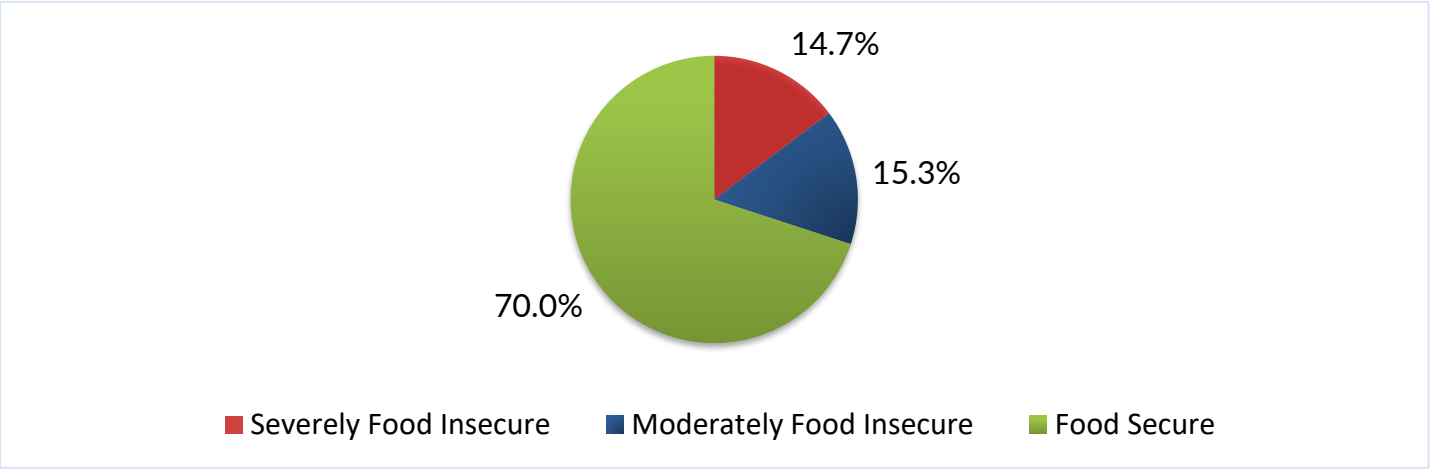

Figure 10: Food Security Classification Assessed by FCS & rSCI

8. DISCUSSION

8.1. Undernutrition of under-five children

The results of this survey showed a GAM prevalence of 13.5% (10.5-17.1 95% CI) and a SAM prevalence of 3.2% (2.1-4.8 95% CI), the situation classified as high based on UNICEF-WHO severity threshold. The SAM rate based on WHZ is classified above the international emergency threshold (>2%) and the same time it is higher than (3.0%) threshold established by the MoPH, the Nutrition Cluster and the AIM-WG as the cut-off threshold after above which a response should be prioritized in the Afghanistan context.

The GAM prevalence by MUAC is 15.5% (12.9-18.5 95% CI) and the SAM prevalence is at 7.0% (5.4- 9.0 95% CI). In this particular survey, the GAM prevalence as expressed by MUAC is higher than as expressed by WHZ.

Estimation of the prevalence of malnutrition based on Combined GAM continues to add motivation to the importance of the independence of GAM and WHZ in the identification of malnutrition ensuring greater coverage of children. Based on combined GAM/WHZ, the malnutrition rate is 21.3% (18.0-25.1 95% CI), while the combined SAM rate is 7.7% (6.0-9.6 95% CI). This implies one in four children is malnourished indicating a need for strengthening and scaling up the existing IMAM program with a strong focus both moderate and severe wasting management through extending the program coverage for both OPD MAM and OPD SAM.

Stunting as a long-term consequence of sub-optimal nutrition that children experience due to inadequate feeding practices, repeated infections, and inadequate psychosocial stimulation. Stunting has been one of the major health challenges for the Helmand province as it is in Afghanistan. Data review since 2013 shows gradually increasing trend over time in stunting rates in Helmand province.

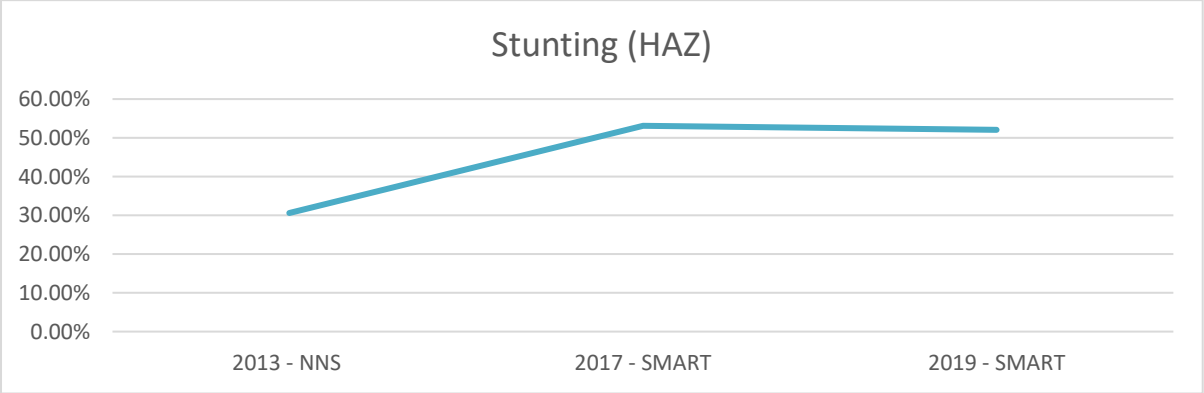

Figure 11: Stunting Over-time

The prevalence of chronic malnutrition among children 6-59 months was 52.1% (46.7-57.3 95% CI) with 1.3 SD; based on the relatively high SD above the recommended threshold 0.8-1.2 is recommended to adopt calculated prevalence assuming SD of one, in this case, the stunting is 53.7%. This is s classified as very high according to the UNICEF-WHO 2018 thresholds. In other words, around one in every two is suffering from chronic malnutrition in Helmand province and therefore not reaching his optimal growth and development.

8.2. Maternal nutrition status

Maternal undernutrition is one of the main contributory factors for low birth weight babies. Babies who undernourished in the womb face the risk of dying during their early months and years. Those who survive have are likely to remain undernourished throughout their lives and to suffer a higher incidence of chronic disease. Children born underweight also tend to have cognitive disabilities and a lower IQ, affecting their performance in school and their job opportunities at adults, which eventually affects the province. Acute malnutrition among pregnant and lactating women in the province is always of concern; there is no globally defined cut-off for acute malnutrition among women. The results demonstrated that 21.3% of pregnant and lactating women were currently suffering from acutely malnourished. In other words, in one each five pregnant and lactating women are suffering from acute malnutrition based on MUAC (<230mm).

8.3. Health, immunization and IYCF practice

Immunization is an important component of BPHS end EPHS in the public health intervention that protects children against illness and disability in long term associated. Based on this survey, 67.2% of the surveyed children between 18 to 59 months were immunized against measles. This shows a relatively low immunization coverage as per national target of 90.0%, it calls for concerted effort and attention to increase measles immunization coverage.

Early initiation of breastfeeding has benefits for child survival and beyond. Breastfeeding promotes child survival, health, brain and motor development. While breastfeeding has lifelong benefits for both the mother and child, the risks of not breastfeeding is particularly pronounced in early in life[13]-[14]-[15] Early initiation of breastfeeding and exclusive breastfeeding for the first six months of life prevents neonatal and infant deaths largely by reducing the risk of infectious diseases. This risk reduced; because of colostrum, the first milk, and breast-milk contain a large number of protective factors that provide passive and active protection to a wide variety of known pathogens. Colostrum is particularly rich in these protective factors and its ingestion within the first hour of life prevents neonatal mortality. The survey showed a lower rate of early initiation of breastfeeding within 1 hour at approximately 49.6% of children 0-23 months WHO recommends mothers to exclusive breastfeed infants for the first six months of life to achieve optimal growth, development and good health? The survey shows that exclusive breastfeeding was very low at 34.5%of children 0-5 months in the province.

8.4. Death Rates

The retrospective crude mortality rate was 1.65 (1.12-2.42) which is above the WHO alert thresholds of 1/10,000/day; the under-five death rate was at 0.86 (0.39-1.85)) and lower than the WHO alert threshold of 2/10,000/day. Most deaths among adults were due to trauma/injuries (40%) and predominantly among males reflecting the outcome of ongoing fights between governments and AOGs in the province. Further analysis indicates most of the death were persons above 18 years of age.

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[13] **Edmond, K.M**. et al. Delayed breastfeeding initiation increases risk of neonatal mortality. Pediatrics. 117: 380-386 (2006).
[14] **Horta, B.L. et** al. Evidence on the long-term effects of breastfeeding. Systematic reviews and meta-analysis. Geneva, World Health Organization, 2007.
[15] **Mullany, L.C.** et al. Breast-feeding patterns, time to initiation, and mortality risk among newborns in Southern Nepal. J Nutr 138: 599-603 (2008).

8.5. Water sanitation and hygiene

An essential component of proper handwashing is the use of soap, without which it is difficult to reduce incidents of diarrhoea. Soap eliminates diarrhoea-inducing pathogens from the skin. Research in refugee settings has shown that in households where soap was present, fewer children had diarrheal diseases regardless of whether they actually used soap. In Helmand province, the handwashing practice at the five critical times was 24.9% of the CBA (15-49) women, which indicates low practice. On the other side, 54.8% of the women used soap or detergent materials, a sign of low hygiene behaviour in the community and subsequently high risk for morbidity and mortality.

9. CONCLUSION

Helmand province, in southern Afghanistan, has long been among the country's provinces most badly affected by violence. Security is one of the main concerns in the province with a number of armed groups active there. Consequently, as might have been expected, the humanitarian situation deteriorated since the last survey in 2015. War-related injuries are a daily occurrence but access to medical services is challenging, as the conflict has left the healthcare system in tatters. As a result, the crude mortality rate is nearly double the emergency threshold and young men are disproportionally affected a glaring pointer to the conflict.

The insecurity has led to population displacements and the province is now home to thousands of internally displaced persons (IDPs). The Office of the UN High Commissioner for Refugees (UNHCR) has said that some 28,000 people became IDPs in the month of May 2019 alone[16]. Most of the humanitarian indicators are on the worst side; malnutrition among children under five is a critical public health classification calling for prompt intervention; nearly a third of woman are wasted; IYCF indicators for infants are suboptimal with only a third exclusively breastfeed The current programming coverage is limited mainly due to poor access due to insecurity, so is nearly all public health programming e.g. immunization coverage.

As a sign of resilience, food insecurity is precarious but staple; in the difficult environment agriculture and other livelihood activities continue to flourish especially along Helmand River. Consequently, only 18% of the population were classified as having poor consumption score, and 75.4% of households relied on no or low coping strategies. In terms of food security classification, 14.7% of households were severely food insecure, 15.3% moderately food insecure, and 70.0% of households considered food secure. Perhaps the livelihood is boosted by the dangerous but very lucrative growing of poppy mainly for export; the province is listed one of the world's largest opium-producing regions, responsible for around 42% of the world's total production[17]. The province is classified as Stressed acute Food insecurity (IPC Phase 2), and require livelihood support as opposed to most other provinces that are classified in crises and Emergency phase requiring urgent humanitarian action.

Majority of the households (70%) also have access to clean drinking water; however, hygiene practices remains a challenge.

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[16] UNHCR Global trendsReport on forced displacements 2018/2019

[17] Afghanistan Drug Report published with the held of UN office drugs and Crime

With security situation not expected to improve any time soon, resilience and life-saving intervention need to be scaled up. Fortunately, local-based National NGOs have some degree of acceptance hence access to the majority of the districts hence could be an avenue improve on coverage of humanitarian interventions and as well as build the local capacity to deliver services in the long term.

9. RECOMMENDATIONS

Indicators	Recommendation	Actor	Timeline (Start date)
Nutrition	• Develop a mapping of existing capacities and a training plan to address sustainable capacity-development needs. • Scale up nutrition services through deployment/decentralization of mobile teams/outreach in hard to reach areas where access is limited/or far from existing health facilities and increase coverage through decentralized health facilities such as SHC, HP • Increase of community awareness regarding nutrition to ensure nutrition messages are included in health information messages; distribute IEC materials focused on EXB, early initiation of breastfeeding, appropriate complementary feeding practice the facility level and community level. • Increase of the community screening and referral pathway from the community to HFs through training of community health workers, FHAG (Family Health Action Groups) and Mother (Mother MUAC) on MUAC screening, identification of malnutrition and referrals. • Strengthen community outreach activities, and active case-finding campaign through capacity building of community health workers (on job/formal training, and provision of MUAC tape and referral slips). • Expand mobile health and nutrition services to the remote and hard-to-reach areas in the districts of Helmand province. • Expansion of Nutrition services to increase	BPHS IP, ACF, DoPH, MSF, UNICEF, WFP and Nutrition Cluster	**2020**
Health	• Creating awareness in the communities specially mothers about the advantages of vaccination by strengthening EPI outreaching activities and active follow-up of the absent children during the vaccination days.	BPHS IP, ACF, DoPH, PMT	**2020**

WASH	- Enhance and upgrading handwashing behaviour practice with soap and water for all (men, women, girls and boys) at all critical times, this will lead to a reduction of the diseases that causes poor hygiene practice and poor sanitation through raising public awareness and sensitisation sessions in community level. - In long-term improved water source/infrastructures (construction new water points and rehabilitation the existing), to protect the water sources from external contamination in particular from faecal matter. - Distribution of Bio-sand filters in those communities with high unimproved water source utilization: Water purification with water filters or any other system to be free from faecal coliform and the NTU (Nephelometric Turbidity unit) be < 5 NTU. - Establishment and Re-activation of the water resource user associations (WRUAs)with .close coordination with PRRD/MRRD - Women involvement in the planning, designing and implementation of WASH interventions through allocating membership in WRUAs to ensure better access and uptake of improve drinking water. - Expanding the Community Lead Total Sanitation "CLTS" to improve access to latrines and avoid open defecation, in order to reduce incidence of disease caused by contact to faeces.	**ACF, BPHS IP, DoPH and all WASH sector Actors and WASH Clusre**	**2020**

Food Security	• **Poultry backyard activities:** (distribution of poultry with full package according to FSAC cluster "pullets, feeds, drinker, feeder and…" it will help with the most vulnerable population and crisis for their dietary diversity. • **Cash for work activities or asset creation:** Under these activities, communities will find jobs opportunities and they will receive cash for food according to food basket, and or they will receive food for work. • **Distribution of full package of agriculture:** In case of distribution of full package (50 kg wheat seed, 50 kg DAP and 50 kg Urea). Most of the population and farmers in Helmand province have agriculture occupation and they will strength their livelihood situation and will be decreased such crisis in future.	**BPHS IP, PPHD, ACF, FSL Cluster and FSL sector Actors**	**2020**

10. ANNEXES

Annex-1: Standard Integrated SMART Survey Questionnaire (English)

*Household defined as all people eating from the same pot and living together (WFP definition)

Household Questionnaire

Date (dd/mm/year)				Cluster Name			
Cluster Number		Team Number			HH Number		
Start date/event of recall period: 4 June 2019 (14 Jawza 1398) (EID RAMADAN)							
1	2	3	4	5	6	7	8
No.	Name	Sex (m/f)	Age (years)	Joined on or after	Left on or after	Born on or after	Died on or after
List all current household members*							
1	Head of household						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							

18							
19							
20							
List all household members which left since the start of the recall period							
1					Y		
2					Y		
3					Y		
4					Y		
5					Y		
List all household members which died since the start of the recall period							
1							Y
2							Y
3							Y

Date (dd/mm/year)			Cluster Name		
Cluster Number		Team Number		HH Number	

Q1. What is the household resident status? 1=Resident of this area 2=Internally displaced 3=Refugee 4=Nomadic	
Q2. What is the main source of drinking water used by household members? Record one of the options (the main source) according to the respondent 1=Piped household water connection 2=Public standpipe 3=Borehole/well with a hand pump 4=Protected spring 5=Snow/rainwater collection 6=River/stream/canal water 7=Pond/reservoir water 8=Well with bucket 9=Unprotected Kanda/karez 10=Unprotected spring 98=Other (specify)	

Q3. What foods have been eaten in the household in the last 7 days? On how many days of the last 7 days was the food eaten?		
Food items are not read aloud, complete based on respondent's account	Number of days eaten of the last 7 days (0-7)	Total
Cereals or tubers (bread, wheat, rice, maize, potatoes, etc.)	○ ○ ○ ○ ○ ○ ○	
Pulses (beans, lentils, peas, etc.)	○ ○ ○ ○ ○ ○ ○	
Vegetables	○ ○ ○ ○ ○ ○ ○	
Fruit	○ ○ ○ ○ ○ ○ ○	
Meat, fish, or eggs	○ ○ ○ ○ ○ ○ ○	
Dairy (milk, yoghurt, cheese, etc.)	○ ○ ○ ○ ○ ○ ○	
Sugar, honey	○ ○ ○ ○ ○ ○ ○	
Oil, fats	○ ○ ○ ○ ○ ○ ○	

Q4. In the past 7 days, have there have been times when you did not have enough food or money to buy food? If yes, what did you do?	Number of days of the last 7 days (0-7)	Total
Rely on less preferred and less expensive food	○ ○ ○ ○ ○ ○ ○	
Borrow food, or rely on help from a friend or relative	○ ○ ○ ○ ○ ○ ○	
Limit portion size at mealtimes	○ ○ ○ ○ ○ ○ ○	
Restrict consumption by adults in order for small children to eat	○ ○ ○ ○ ○ ○ ○	
Reduce the number of meals eaten in a day	○ ○ ○ ○ ○ ○ ○	

Date (dd/mm/year)			Cluster Name		
Cluster Number		Team Number		HH Number	

Child Questionnaire 0-59 months

1	2	3	4	5	6	7	8	9	10
Child ID	Sex (f/m)	Birthday (dd/mm/yyyy)	Age (months)	Weight (00.0 kg)	Height or length (00.0 cm)	Measure (l/h)*	Bilateral edema	MUAC (000 mm) Left-arm	With clothes (y/n)
1									
2									

3									
4									
5									
6									
7									
8									

*Note only if the length is measured for a child who is older than 2 years or height is measured for a child who is younger than 2 years, due to unavoidable circumstances in the field

Child (6-59 months) ID Number					
For any child that is identified as acutely malnourished (WHZ, MUAC, or oedema) Q5. Is the child currently receiving any malnutrition treatment services? Probe, ask for enrollment card and observe the treatment food (RUTF / RUSF) to identify the type of treatment service 1=OPD SAM 2=OPD MAM 3=IPD SAM 4=No treatment 98=Don't know					
If the child is not enrolled in a treatment program, refer to the nearest appropriate treatment centre Q6. Did you refer the child? 1=yes 0=no					

Date (dd/mm/year)			Cluster Name		
Cluster Number		Team Number		HH Number	
Child (18-59 months) ID Number					

Q7. Has the child received two doses of measles vaccination? (on the upper right arm) Ask for vaccination card to verify if available 1=Received two doses as confirmed by vaccination card 2=Received two doses as confirmed by caregiver recall 3=Has did not receive two doses 98= don'know					

Child (<24 months) ID Number					
Q8. How long after birth was the child first put to the breast? 1=Within one hour 2=In the first day within 24 hours 3=After the first day (>24 hours) 98=Don't know					
Q9. Was the child breastfed yesterday during the day or night? This includes if the child was fed expressed breastmilk by the cup, bottle, or by another woman (these are also considered “yes”) 1=Yes 0=No 98=don'know					
Q10. Did the child have any liquid drink other than breastmilk yesterday during the day or night? Do not read options, a probe by asking open questions and record all that apply. Vitamin drops, ORS, or medicine as drops are not counted 1=Yes 0=No					
Plain water					
Infant formula					
Powdered or fresh animal milk					
Juice or soft drinks					
Clear broth					
Yoghurt					
Thin porridge					
Any other liquids (tea, coffee, etc.)					
Q11. Did the child have any solid, semi-solid, or soft foods yesterday during the day or night? 1=Yes 0=No 98=Don't know					

Date (dd/mm/year)		Cluster Name	
Cluster Number	Team Number		HH Number

Caregiver HH Member ID Number					
Q12. Can you show me how you wash your hands? Observe the caregiver as they wash their hands. Do not probe or read the answers, record the most appropriate response 1=Yes 0=No					
Uses soap or ash with water					
Uses only water					
Uses nothing					
Other (specify)					

Caregiver HH Member ID Number					
Q13. When do you usually wash your hands? Do not probe or read the answers, record all appropriate responses 1=Yes 0=No					
After defecation					
After cleaning baby`s bottom					
Before food preparation					
Before eating					
Before feeding children (including breastfeeding)					

Woman (15-49 years) HH Member ID Number					
Q14. Status of woman 1=Pregnant 2=Lactating 3=Pregnant and lactating 4=None					
MUAC measurement (mm)					
General comments (optional)					

Annexe 2: List of clusters

Province Name	HF/Name	District Name	Geographical unit	Population size	Cluster
Helmand	CHC Karteh Lagan- Fixed	Lashkargah	علوی مسجد	1184	1
Helmand	CHC Karteh Lagan Outreach	Lashkargah	عبدالباقی	1505	2
Helmand	Ainak BHC Outreach	Lashkargah	حاجی میرزاخان	98	3
Helmand	IDP CHC Outreach	Lashkargah	شهزاده خان	502	4
Helmand	IDP BHC Outreach	Lashkargah	ډاکترمحمدګل	1075	5
Helmand	BHC Qala Bust Outreach	Lashkargah	حاجی نیک محمد	688	6
Helmand	Baba jee BHC Outreach	Lashkargah	محمد لعل	237	7
Helmand	Bolan BHC Fixed	Lashkargah	روستم	387	8
Helmand	Bolan BHC Outreach	Lashkargah	حاجی اغاصاحب	774	9
Helmand	Bust PH	Lashkargah	میراحمدخان	1097	10
Helmand	Bust PH	Lashkargah	حاجی تورجان	1720	RC
Helmand	Outreach دسره میاشت کلینک	Lashkargah	الله نور	573	11
Helmand	Khalach CHC Fixed	Nawa	حاجی کبیرخان	258	12

Helmand	Khalach CHC Outreach	Nawa	محمد عوض	215	13
Helmand	Basolan BHC Outreach	Nawa	حاجی عبدالرحمن جان اغا	303	14
Helmand	Kharaba BHC Fixed	Nawa	حاجی دستگیر اکا	115	15
Helmand	Nad Ali CHC Fixed	Nad Ali	حاجی صالح محمد	129	16
Helmand	Nhd Ali CHC Mobile team	Nad Ali	لعل محمد	97	17
Helmand	Nhd Ali CHC Mobile team	Nad Ali	نظر	76	18
Helmand	Chah Angeera BHC Fixed	Nad Ali	حاجی ولی جان	545	RC
Helmand	Loy Manda BHC Fixed	Nad Ali	اغا خیل	140	19
Helmand	Outreach SHC Naqil Abad	Nad Ali	حاجی ارمحمد	307	20
Helmand	Outreach MarjaCHC	Marja	حاجی شاه وزیر کلی	710	21
Helmand	Outreach MarjaCHC	Marja	سیف الرین	358	22
Helmand	Mobile MarjaCHC	Marja	حاجی ډاکتر صاحب	410	23
Helmand	Outreach Comp Maja SHC	Marja	محمدابراهیم	315	24
Helmand	Outreach Bolak 9 SHC	Marja	نظرجان	151	RC
Helmand	Fixed Center Malgeer CHC	Grish/ Nahriseraj	عزیزاکا	279	RC

Helmand	Outreach Malgeer CHC	Grish/ Nahriseraj	حاجی وزیر	75	25
Helmand	Outreachr Shuraki BHC	Grish/ Nahriseraj	وزیراکا	266	26
Helmand	Outreach BHC Mirmandab	Grish/ Nahriseraj	محمدگل	799	27
Helmand	Fixed CenterGereshk DH	Gereshk/ Nahriseraj	حاجی سرور خان	323	28
Helmand	OutreachrGereshk DH	Gereshk/ Nahriseraj	حاجی عزیز	1229	RC
Helmand	Fixed Center SHC Abbazan	Gereshk/ Nahriseraj	امام باړه کلان	8602	29
Helmand	DH Hazarjuft Outreach	Hazarjuft/Garamser	محمدخان	688	30
Helmand	DH Hazarjuft Outreach	Hazarjuft/Garamser	حاجی خداینظر	645	31
Helmand	Outreach Darweshan BHC	Hazarjuft / Garamser	مستری خدایرحم	538	32
Helmand	Outreach BHC MeyanPushta	Hazarjuft / Garamser	حاجی امان الله	215	33
Helmand	Fixed BHC Sara Qala	Khanashin	حاجی نادر اکا	645	34
Helmand	Fixed BHC See yaka	Deshow	امان الله	323	35
Helmand	Outreach CHC Poza	Sangeen	حاجی روښان	190	36
Helmand	Fixed SHC Katozay	Sangeen	حاجی ستار	287	37
Helmand	Necha BHC Fixed	Kajaki	مزدورکه خشک	205	38

Helmand	Fixed DH Mosa Qala	Mosa Qala	ده کاریز	2150	39
Helmand	Outreach DH Musaqala	Mosa Qala	هوسکه سرکیله	1475	40
Helmand	Fixed BHC Kani Manda	Mosa Qala	کانی مانده	3226	RC
Helmand	Outreach CHC Nawzad	Nawzad	ده یک	430	41
Helmand	Fixed Center Teznay BHC	Nawzad	گدازی	430	42
Helmand	Outreach BHC Gurz	Nawzad	بیانیم مارپیچ	645	43
Helmand	OutreachQasem Abad BHC	Nawzad	برنگ باوړی	2315	44
Helmand	Outreach BHC Siya poshta	Washir	حاجی عبدالحمید	853	45
Helmand	Fixed Center Baghran CHC	Baghran	دو رودی	452	46
Helmand	Fixed Center Garday BaghranBHC	Baghran	سرشلمین+F38F329 :F5885	1434	47

Annexe 3: Standardization Test Result

Weight		subjects	mean	SD	max	Technical error	TEM/mean	Coef of reliability	Bias from superv	Bias from median	Results
	#	kg	kg	kg	TEM (kg)	TEM (%)	R (%)	Bias (kg)	Bias (kg)		
	Supervisor	9	16.5	3.2	0.1	0.02	0.1	100	-	1.15	TEM good
	Enumerator 1	9	16.4	3.2	0.5	0.18	1.1	99.7	-0.05	1.1	TEM poor
	Enumerator 2	9	16.4	3.2	0.4	0.16	1	99.7	-0.04	1.11	TEM poor
	Enumerator 3	9	16.4	3.2	0.3	0.08	0.5	99.9	-0.02	1.13	TEM acceptable
	Enumerator 4	9	16.3	3	0.2	0.06	0.4	100	-0.19	0.96	TEM acceptable
	Enumerator 5	9	16.4	3.2	0.1	0.04	0.2	100	-0.04	1.11	TEM acceptable
	Enumerator 6	9	16.4	3.2	0.1	0.03	0.2	100	-0.07	1.08	TEM good
	Enumerator 7	9	16.4	3.1	0.4	0.12	0.7	99.8	-0.08	1.07	TEM poor
	Enumerator 8	9	16.4	3.2	0.4	0.15	0.9	99.8	-0.07	1.08	TEM poor
	Enumerator 9	9	16.5	3.2	0.5	0.18	1.1	99.7	0	1.15	TEM poor
	Enumerator 10	9	16.5	3.2	0.1	0.05	0.3	100	0.04	1.19	TEM acceptable
	Enumerator 11	9	16.5	3.3	0.2	0.08	0.5	99.9	0.03	1.18	TEM acceptable

	Enumerator 12	9	16.5	3.3	0.1	0.04	0.2	100	0.01	1.16	TEM acceptable
	Enumerator 13	9	16.5	3.3	0.2	0.06	0.4	100	0.04	1.19	TEM acceptable
	Enumerator 14	9	15.5	2.8	0.1	0.02	0.2	100	-0.98	0.17	TEM good
	Enumerator 15	9	16.5	3.2	0.2	0.06	0.4	100	0.03	1.18	TEM acceptable
	Enumerator 16	9	16.5	3.3	0.3	0.09	0.6	99.9	0.03	1.18	TEM acceptable
	Enumerator 17	9	16.5	3.2	0.1	0.04	0.2	100	0.03	1.18	TEM acceptable
	enum inter 1st	17x9	16.4	3.1	-	0.73	4.5	94.4	-	-	TEM reject
	enum inter 2nd	17x9	16.4	3.1	-	0.73	4.5	94.4	-	-	TEM reject
	inter enum + sup	18x9	16.4	3.1	-	0.71	4.4	94.7	-	-	TEM reject
	TOTAL intra+inter	17x9	-	-	-	0.74	4.5	94.3	-0.08	1.08	TEM reject
	TOTAL+ sup	18x9	-	-	-	0.72	4.4	94.6	-	-	TEM reject
	Supervisor	9	16.5	3.2	0.1	0.02	0.1	100	-	1.15	TEM good

Height	Subjects	mean	SD	max	Technical error	TEM/mean	Coef of reliability	Bias from superv	Bias from median	result	Subjects
	#	cm	cm	cm	TEM (cm)	TEM (%)	R (%)	Bias (cm)	Bias (cm)		#
	Supervisor	9	104.7	10.7	0.1	0.06	0.1	100	-	-0.43	TEM good
	Enumerator 1	9	104.8	10.6	0.3	0.09	0.1	100	0.11	-0.32	TEM good
	Enumerator 2	9	104.6	10.7	0.9	0.31	0.3	99.9	-0.08	-0.52	TEM good
	Enumerator 3	9	104.6	10.7	1	0.3	0.3	99.9	-0.05	-0.48	TEM good
	Enumerator 4	9	104.7	10.8	0.8	0.25	0.2	99.9	0.07	-0.37	TEM good
	Enumerator 5	9	104.5	10.7	0.8	0.25	0.2	99.9	-0.16	-0.59	TEM good
	Enumerator 6	9	104.3	10.8	0.9	0.38	0.4	99.9	-0.39	-0.83	TEM good
	Enumerator 7	9	104.7	10.7	0.8	0.27	0.3	99.9	0.04	-0.39	TEM good
	Enumerator 8	9	104.4	10.6	1.4	0.43	0.4	99.8	-0.29	-0.72	TEM acceptable
	Enumerator 9	9	104.5	10.7	0.9	0.3	0.3	99.9	-0.18	-0.61	TEM good
	Enumerator 10	9	104.6	10.9	0.9	0.32	0.3	99.9	-0.02	-0.45	TEM good
	Enumerator 11	9	104.9	10.5	0.3	0.11	0.1	100	0.21	-0.22	TEM good
	Enumerator 12	9	104.6	10.7	0.8	0.24	0.2	99.9	-0.08	-0.52	TEM good

	Enumerator 13	9	104.5	10.6	1.9	0.46	0.4	99.8	-0.18	-0.61	TEM acceptable
	Enumerator 14	9	104.6	10.8	0.1	0.02	0	100	-0.08	-0.52	TEM good
	Enumerator 15	9	104.3	10.7	0.7	0.25	0.2	99.9	-0.33	-0.76	TEM good
	Enumerator 16	9	104.5	10.7	0.1	0.03	0	100	-0.2	-0.63	TEM good
	Enumerator 17	9	104.6	10.6	0.7	0.18	0.2	100	-0.09	-0.53	TEM good
	enum inter 1st	17x9	104.6	10.5	-	0.42	0.4	99.8	-	-	TEM good
	enum inter 2nd	17x9	104.6	10.4	-	0.44	0.4	99.8	-	-	TEM good
	inter enum + sup	18x9	104.6	10.4	-	0.43	0.4	99.8	-	-	TEM good
	TOTAL intra+inter	17x9	-	-	-	0.51	0.5	99.8	-0.1	-0.53	TEM acceptable
	TOTAL+ sup	18x9	-	-	-	0.5	0.5	99.8	-	-	TEM acceptable
MUAC	**Subjects**	**mean**	**SD**	**max**	**Technical error**	**TEM/mean**	**Coef of reliability**	**Bias from superv**	**Bias from median**	**result**	**Subjects**

	#	mm	mm	mm	TEM (mm)	TEM (%)	R (%)	Bias (mm)	Bias (mm)		#
	Supervisor	9	153.7	7.8	1	0.53	0.3	99.5	-	0.72	TEM good
	Enumerator 1	9	154.4	8.1	4	1.76	1.1	95.2	0.72	1.44	TEM good
	Enumerator 2	9	155.2	8.9	8	2.86	1.8	89.7	1.44	2.17	TEM poor
	Enumerator 3	9	154.1	7.8	5	2.01	1.3	93.3	0.33	1.06	TEM acceptable
	Enumerator 4	9	153.8	8.7	6	2.36	1.5	92.6	0.06	0.78	TEM acceptable
	Enumerator 5	9	153.7	7.8	5	1.53	1	96.2	-0.06	0.67	TEM good
	Enumerator 6	9	153.5	9.4	4	1.68	1.1	96.8	-0.22	0.5	TEM good
	Enumerator 7	9	155.1	8.5	5	1.72	1.1	95.9	1.33	2.06	TEM good
	Enumerator 8	9	153.4	7.7	3	1.13	0.7	97.8	-0.33	0.39	TEM good
	Enumerator 9	9	154.4	7.7	5	1.96	1.3	93.6	0.67	1.39	TEM good
	Enumerator 10	9	153.5	10	4	1.9	1.2	96.4	-0.22	0.5	TEM good
	Enumerator 11	9	154.1	10.2	15	3.64	2.4	87.3	0.39	1.11	TEM reject
	Enumerator 12	9	154.2	8.1	2	0.91	0.6	98.7	0.44	1.17	TEM good
	Enumerator 13	9	149.9	9	8	3.15	2.1	87.6	-3.78	-3.06	TEM poor

	Enumerator 14	9	152.4	7.9	6	1.49	1	96.5	-1.28	-0.56	TEM good
	Enumerator 15	9	155.9	7.7	5	1.35	0.9	96.9	2.22	2.94	TEM good
	Enumerator 16	9	154.5	9.7	5	1.93	1.2	96	0.78	1.5	TEM good
	Enumerator 17	9	150.7	9.2	8	2.55	1.7	92.3	-3	-2.28	TEM acceptable
	enum inter 1st	17x9	153.9	8.9	-	3.35	2.2	85.9	-	-	TEM reject
	enum inter 2nd	17x9	153.5	8.2	-	3.09	2	85.7	-	-	TEM poor
	inter enum + sup	18x9	153.7	8.5	-	3.15	2.1	86.4	-	-	TEM poor
	TOTAL intra+inter	17x9	-	-	-	3.86	2.5	79.7	-0.03	0.69	TEM reject
	TOTAL+ sup	18x9	-	-	-	3.77	2.5	80.3	-	-	TEM reject

Suggested cut-off points for acceptability of measurements					
	Parameter		MUAC mm	Weight Kg	Height cm
	Individual	good	<2.0	<0.04	<0.4
	TEM	acceptable	<2.7	<0.10	<0.6
	(intra)	poor	<3.3	<0.21	<1.0

		reject	>3.3	>0.21	>1.0	
	Team TEM	good	<2.0	<0.10	<0.5	
	(intra+inter)	acceptable	<2.7	<0.21	<1.0	
	and Total	poor	<3.3	<0.24	<1.5	
		reject	>3.3	>0.24	>1.5	
	R value	good	>99	>99	>99	
		acceptable	>95	>95	>95	
		poor	>90	>90	>90	
		reject	<90	<90	<90	
	Bias	good	<1	<0.04	<0.4	
	From sup if good	acceptable	<2	<0.10	<0.6	
	outcome, otherwise	poor	<3	<0.21	<1.4	
	from median	reject	>3	>0.21	>1.4	

Annexe 4: Local Event Calendar

1398	میاشتی	1397	میاشتی	1396	میاشتی	1395	میاشتی	1394	میاشتی	1393	میاشتی	میاشتو نومونه
دآزادی ورځ گوجنی سره ځله	3	دآزادی ورځ گوجنی سره ځله	15	دآزادی ورځ گوجنی سره ځله	27	دآزادی ورځ گوجنی سره ځله	39	دآزادی ورځ گوجنی سره ځله	51			اسد (میانی)
گلان زیات وی ، روژه مبارکه دتریاکونیش دغنموژیریدل ، توت پخیری ، دبادام گل	6	گلان زیات وی ، روژه مبارکه دتریاکونیش دغنموژیریدل ، توت پخیری ، دبادام گل	18	گلان زیات وی ، روژه مبارکه دتریاکونیش دغنموژیریدل ، توت پخیری ، دبادام گل	30	گلان زیات وی ، روژه مبارکه دتریاکونیش دغنموژیریدل ، توت پخیری ، دبادام گل	42	گلان زیات وی روژه مبارکه دتریاکونیش دغنموژیریدل توت پخیری ، دبادام گل	54			ثور (برات)
دغنمولو، دمکاتبورخصتی دجواروکرل ، آلوچه پخیری دغنموتریشل ، گوچنی اختر	5	دغنمولو، دمکاتبورخصتی دجواروکرل ، آلوچه پخیری دغنموتریشل ، گوچنی اختر	17	دغنمولو، دمکاتبورخصتی دجواروکرل ، آلوچه پخیری دغنموتریشل ، گوچنی اختر	29	دغنمولو، دمکاتبورخصتی دجواروکرل ، آلوچه پخیری دغنموتریشل ، گوچنی اختر	41	دغنمولو، دمکاتبورخصتی دجواروکرل ، آلوچه پخیری دغنموتریشل ، گوچنی اختر	53			جوزا(روژه)
نوی کال دتریاکوگل شروع کیږی ، دشتی شنی کیږی پسرلنی بارانونه ، دکوچیانوراتگ دتوتانودپانووخت سیزده بدل	7	نوی کال دتریاکوگل شروع کیږی ، دشتی شنی کیږی پسرلنی بارانونه ، دکوچیانوراتگ دتوتانودپانووخت سیزده بدل	19	نوی کال دتریاکوگل شروع کیږی ، دشتی شنی کیږی پسرلنی بارانونه ، دکوچیانوراتگ دتوتانودپانووخت سیزده بدل	31	نوی کال دتریاکوگل شروع کیږی ، دشتی شنی کیږی پسرلنی بارانونه ، دکوچیانوراتگ دتوتانودپانووخت سیزده بدل	43	نوی کال دتریاکوگل شروع کیږی ، دشتی شنی کیږی پسرلنی بارانونه ، دکوچیانوراتگ دتوتانودپانووخت سیزده بدل	55			حمل دخدای تعالی میاشت

شروع گرمی ، مکتبونه رخصتیږی، میوه پخیږی، کوچنی اختر، دناروغیو موسم سره خله	4	شروع گرمی ، مکتبونه رخصتیږی، میوه پخیږی، کوچنی اختر، دناروغیو موسم سره خله	16	شروع گرمی ، مکتبونه رخصتیږی، میوه پخیږی، کوچنی اختر، دناروغیو موسم سره خله	28	شروع گرمی ، مکتبونه رخصتیږی، میوه پخیږی، کوچنی اختر، دناروغیو موسم سره خله	40	شروع گرمی ، مکتبونه رخصتیږی، میوه پخیږی، هندوانه پخیږی، کوچنی اختر، دناروغیو موسم سره خله	52			سرطان(کوچنی اختر)
انگورپخیږی، محرم ، دمکتبونوشروع لوی اختر	2	انگورپخیږی، محرم ، دمکتبونوشروع لوی اختر	14	انگورپخیږی، محرم ، دمکتبونوشروع لوی اختر	26	انگورپخیږی، محرم ، دمکتبونوشروع لوی اختر	38	انگورپخیږی، محرم ، دمکتبونوشروع لوی اختر	50			سنبله(لوی اختر)
		دنباتاتوپانی زیږیږی ، شنی خونی جوړیږی ، ونی پانی تویوی تریاک کرل کیږی	12	دنباتاتوپانی زیږیږی ، شنی خونی جوړیږی ، ونی پانی تویوی تریاک کرل کیږی	24	دنباتاتوپانی زیږیږی ، شنی خونی جوړیږی ، ونی پانی تویوی تریاک کرل کیږی	36	دنباتاتوپانی زیږیږی ، شنی خونی جوړیږی ، ونی پانی تویوی تریاک کرل کیږی	48			عقرب (سفره)
دهواتغیر، انارپخیږی جواری اوپنبه رسیږی سروری جهارشنبه ، دبامونوکاکل	1	دهواتغیر، انارپخیږی جواری اوپنبه رسیږی سروری جهارشنبه ، دبامونوکاکل	13	دهواتغیر، انارپخیږی جواری اوپنبه رسیږی سروری جهارشنبه ، دبامونوکاکل	25	دهواتغیر، انارپخیږی جواری اوپنبه رسیږی سروری جهارشنبه ، دبامونوکاکل	37	دهواتغیر، انارپخیږی جواری اوپنبه رسیږی سروری جهارشنبه ، دبامونوکاکل	49			میزان (حسن حسین)
		هوایخیږی ، غنم کرل کیږی	11	هوایخیږی ، غنم کرل کیږی	23	هوایخیږی ، غنم کرل کیږی	35	هوایخیږی ، غنم کرل کیږی	47	59	هوایخیږی ، غنم کرل کیږی	قوس (لمری خور)
		زردکی پخیږی، دبادونوشروع		زردکی پخیږی، دبادونوشروع		زردکی پخیږی، دبادونوشروع		زردکی پخیږی، دبادونوشروع			زردکی پخیږی ، دبادونوشروع	
		لاندی کول ، دبخاریوکینول سپینه څله	10	لاندی کول ، دبخاریوکینول سپینه څله	22	لاندی کول ، دبخاریوکینول سپینه څله	34	لاندی کول ، دبخاریوکینول سپینه څله	46	58	لاندی کول ، دبخاریوکینول سپینه څله	جدی (دوهمه خور)

[illegible]	57	توره ځله ، یخ بی حده زیات وی	45	توره ځله ، یخ بی حده زیات وی	33	توره ځله ، یخ بی حده زیات وی	21	توره ځله ، یخ بی حده زیات وی	9	توره ځله ، یخ بی حده زیات وی		

Annex 5: Plausibility Check Report

Plausibility check for: AFG_AAH_Helmand_ENA_102019_14.11.2019.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         0 (0.8 %)
Overall Sex ratio        Incl    p    >0.1  >0.05    >0.001   <=0.001
(Significant chi square)                0      2        4       10         0 (p=0.217)
Age ratio(6-29 vs 30-59) Incl    p    >0.1  >0.05    >0.001   <=0.001
(Significant chi square)                0      2        4       10         4 (p=0.044)
Dig pref score - weight  Incl    #    0-7   8-12     13-20     > 20
                                        0     2        4        10         0 (7)
Dig pref score - height  Incl    #    0-7   8-12     13-20     > 20
                                        0     2        4        10         0 (7)
Dig pref score - MUAC    Incl    #    0-7   8-12     13-20     > 20
                                        0     2        4        10         0 (5)
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        10 (1.19)
Skewness  WHZ            Excl    #    <±0.2 <±0.4    <±0.6    >=±0.6
                                        0     1        3         5         0 (-0.18)
Kurtosis  WHZ            Excl    #    <±0.2 <±0.4    <±0.6    >=±0.6
                                        0     1        3         5         1 (-0.26)
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        20 %
```

The overall score of this survey is 20 %, this is acceptable.

There were no duplicate entries detected.

Percentage of children with no exact birthday: 91 %
Anthropometric Indices likely to be in error (-3 to 3 for WHZ, -3 to 3 for HAZ, -3 to 3 for WAZ, from observed mean - chosen in Options panel - these values will be flagged and should be excluded from analysis for a nutrition survey in emergencies. For other surveys this might not be the best procedure e.g. when the percentage of overweight children has to be calculated):

Line=2/ID=2: HAZ (0.972), WAZ (1.644), Age may be incorrect
Line=11/ID=1: HAZ (3.338), WAZ (1.770), Age may be incorrect
Line=52/ID=2: HAZ (1.035), Age may be incorrect
Line=57/ID=5: HAZ (1.214), Age may be incorrect
Line=58/ID=1: HAZ (1.025), Age may be incorrect
Line=63/ID=4: HAZ (-5.959), Height may be incorrect
Line=66/ID=2: **WHZ (-4.942)**, HAZ (1.313), Height may be incorrect
Line=92/ID=1: HAZ (-6.074), WAZ (-4.611), Age may be incorrect
Line=107/ID=1: HAZ (-5.822), Age may be incorrect
Line=122/ID=1: HAZ (2.620), Age may be incorrect
Line=123/ID=2: HAZ (1.625), Age may be incorrect
Line=124/ID=1: HAZ (1.518), Age may be incorrect
Line=129/ID=2: HAZ (1.015), Age may be incorrect
Line=144/ID=5: WAZ (1.767), Age may be incorrect
Line=156/ID=4: HAZ (3.759), WAZ (2.561), Age may be incorrect
Line=193/ID=3: HAZ (1.350), Age may be incorrect
Line=201/ID=2: HAZ (1.453), Age may be incorrect
Line=225/ID=1: HAZ (-5.437), WAZ (-5.328), Age may be incorrect
Line=229/ID=3: HAZ (-5.818), WAZ (-5.079), Age may be incorrect
Line=230/ID=1: HAZ (-6.309), WAZ (-4.859), Age may be incorrect
Line=231/ID=1: HAZ (8.655), WAZ (3.080), Age may be incorrect
Line=234/ID=1: HAZ (1.879), Age may be incorrect
Line=235/ID=2: HAZ (-5.269), Age may be incorrect
Line=252/ID=1: WAZ (-4.590), Age may be incorrect
Line=255/ID=4: HAZ (-5.387), Age may be incorrect
Line=259/ID=3: HAZ (-5.284), Age may be incorrect
Line=263/ID=1: HAZ (2.740), WAZ (2.370), Age may be incorrect
Line=321/ID=3: HAZ (1.818), Height may be incorrect
Line=345/ID=2: HAZ (1.707), WAZ (2.600), Age may be incorrect
Line=404/ID=1: HAZ (3.566), WAZ (1.692), Age may be incorrect

Line=423/ID=3: HAZ (0.984), Height may be incorrect
Line=451/ID=3: HAZ (-5.888), Height may be incorrect
Line=487/ID=3: HAZ (1.152), Age may be incorrect
Line=514/ID=1: **WHZ (2.581)**, Height may be incorrect
Line=521/ID=2: HAZ (2.663), Height may be incorrect
Line=532/ID=2: **WHZ (-4.140)**, HAZ (-5.782), WAZ (-6.076)
Line=544/ID=1: **WHZ (-3.640)**, Weight may be incorrect
Line=562/ID=3: HAZ (-6.161), WAZ (-5.079), Age may be incorrect
Line=579/ID=1: HAZ (-6.362), WAZ (-4.956), Age may be incorrect
Line=580/ID=1: HAZ (-6.498), WAZ (-5.892), Age may be incorrect
Line=593/ID=3: HAZ (-5.620), Height may be incorrect
Line=603/ID=3: **WHZ (-9.355)**, WAZ (-7.176), Weight may be incorrect
Line=604/ID=4: HAZ (-5.589), WAZ (-5.198), Age may be incorrect
Line=613/ID=1: WAZ (-5.450), Age may be incorrect
Line=617/ID=1: HAZ (1.909), Age may be incorrect
Line=622/ID=2: HAZ (-5.083), WAZ (-5.070), Age may be incorrect
Line=631/ID=1: HAZ (-5.200), Height may be incorrect
Line=636/ID=2: **WHZ (-3.723)**, Weight may be incorrect
Line=664/ID=3: HAZ (1.559), Age may be incorrect
Line=688/ID=3: HAZ (-5.273), Age may be incorrect
Line=704/ID=3: HAZ (1.535), Age may be incorrect
Line=732/ID=2: HAZ (-5.265), Age may be incorrect
Line=738/ID=2: HAZ (1.472), Age may be incorrect
Line=753/ID=1: HAZ (1.189), Height may be incorrect
Line=820/ID=2: HAZ (-5.356), Age may be incorrect
Line=830/ID=1: HAZ (-5.268), WAZ (-4.798), Age may be incorrect
Line=955/ID=3: HAZ (1.743), Age may be incorrect
Line=965/ID=3: HAZ (-5.431), Height may be incorrect
Line=1004/ID=2: HAZ (1.108), Height may be incorrect
Line=1020/ID=3: HAZ (1.087), Age may be incorrect
Line=1042/ID=2: WAZ (-4.663), Weight may be incorrect
Line=1043/ID=3: HAZ (-6.733), Age may be incorrect
Line=1088/ID=3: **WHZ (-4.650)**, Weight may be incorrect
Line=1092/ID=1: **WHZ (-4.521)**, Weight may be incorrect

Line=1102/ID=2: HAZ (-5.383), Age may be incorrect
Percentage of values flagged with SMART flags:WHZ: 08 %, HAZ: 5.2 %, WAZ: 2.2 %
Age distribution:
Month 6 : #####
Month 7 : ##########
Month 8 : ###########
Month 9 : ###########
Month 10 : ######
Month 11 : ##########
Month 12 : ################
Month 13 : ###########
Month 14 : ################
Month 15 : ###########
Month 16 : #########
Month 17 : ###########
Month 18 : ####################
Month 19 : #####
Month 20 : #########
Month 21 : ####
Month 22 : ####
Month 23 : ########
Month 24 : ##################
Month 25 : ##################
Month 26 : ###########
Month 27 : ###########
Month 28 : ##########
Month 29 : ######
Month 30 : ###########
Month 31 : ####
Month 32 : ####
Month 33 : ######
Month 34 : ####
Month 35 : ####
Month 36 : ################################

Month 37 : ##########
Month 38 : ######################
Month 39 : ####
Month 40 : #########
Month 41 : ###
Month 42 : ##########
Month 43 : ###
Month 44 : ####
Month 45 : #####
Month 46 : ####
Month 47 : ####
Month 48 : ##################################
Month 49 : ##########
Month 50 : ##########
Month 51 : ##########
Month 52 : ##
Month 53 : ######
Month 54 : #######
Month 55 : ######
Month 56 : ######
Month 57 : ########
Month 58 : ###########
Month 59 : ##########
Age ratio of 6-29 months to 30-59 months: 0.96 (The value should be around 0.85).:
p-value = 0.044 (significant difference)

Statistical evaluation of sex and age ratios (using Chi squared statistic):

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	135/117.2 (1.2)	138/126.5 (1.1)	273/243.7 (1.1)	0.98
18 to 29	12	110/113.1 (1.0)	131/122.1 (1.1)	241/235.2 (1.0)	0.84
30 to 41	12	120/110.8 (1.1)	117/119.6 (1.0)	237/230.3 (1.0)	1.03
42 to 53	12	96/109.0 (0.9)	102/117.7 (0.9)	198/226.7 (0.9)	0.94
54 to 59	6	43/53.9 (0.8)	56/58.2 (1.0)	99/112.1 (0.9)	0.77
6 to 59	54	504/524.0 (1.0)	544/524.0 (1.0)		0.93

The data are expressed as observed number/expected number (ratio of obs/expect)
Overall sex ratio: p-value = 0.217 (boys and girls equally represented)

Overall age distribution: p-value = 0.061 (as expected)
Overall age distribution for boys: p-value = 0.120 (as expected)
Overall age distribution for girls: p-value = 0.418 (as expected)
Overall sex/age distribution: p-value = 0.013 (significant difference)
Distribution of month of birth
Jan: ##################
Feb: ##################
Mar: ##############
Apr: ############################
May: ############
Jun: ##############
Jul: ###################
Aug: ##############################
Sep: ##########################
Oct: ##
Nov: ###################
Dec: ##############
Digit preference Weight:
Digit .0 : ####################################
Digit .1 : ##
Digit .2 : ##
Digit .3 : ##
Digit .4 : ############################
Digit .5 : ##############################
Digit .6 : ##########################
Digit .7 : ######################
Digit .8 : ################################
Digit .9 : ############################
Digit preference score: **7** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic) p-value for chi2: 0.000 (significant difference)
Digit preference Height:
Digit .0 : ##############################
Digit .1 : ##
Digit .2 : ##
Digit .3 : ##

Digit .4 : ##################################
Digit .5 : ###################################
Digit .6 : ########################
Digit .7 : ########################
Digit .8 : ##############################
Digit .9 : ########################
Digit preference score: **7** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic) p-value for chi2: 0.000 (significant difference)

Digit preference MUAC:

Digit .0 : ##
Digit .1 : ##################################
Digit .2 : ##
Digit .3 : ##
Digit .4 : ##############################
Digit .5 : ##
Digit .6 : ##########################
Digit .7 : ##############################
Digit .8 : ##############################
Digit .9 : ##############################
Digit preference score: **5** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.001 (significant difference)

Evaluation of Standard deviation, Normal distribution, Skewness and Kurtosis using the 3 exclusion (Flag) procedures

.	no exclusion	exclusion from reference mean (WHO flags)	exclusion from observed mean (SMART flags)
WHZ			
Standard Deviation SD:	1.26	1.23	1.19
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	14.0%	14.0%	13.5%
calculated with current SD:	13.4%	12.7%	11.7%
calculated with a SD of 1:	8.2%	8.0%	7.8%
HAZ			
Standard Deviation SD:	1.56	1.50	1.30
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	51.7%	51.5%	52.1%
calculated with current SD:	51.6%	51.3%	52.8%
calculated with a SD of 1:	52.5%	51.9%	53.7%
WAZ			
Standard Deviation SD:	1.25	1.23	1.13
(The SD should be between 0.8 and 1.2)			

Prevalence (< -2)

observed:	32.7%	32.6%	32.0%
calculated with current SD:	37.1%	36.6%	35.0%
calculated with a SD of 1:	34.0%	33.6%	33.1%

Results for Shapiro-Wilk test for normally (Gaussian) distributed data:

WHZ	p= 0.000	p= 0.000	p= 0.000
HAZ	p= 0.000	p= 0.001	p= 0.000
WAZ	p= 0.000	p= 0.000	p= 0.000

(If p < 0.05 then the data are not normally distributed. If p > 0.05 you can consider the data normally distributed)

Skewness

WHZ	-0.55	-0.27	-0.18
HAZ	0.42	0.24	0.02
WAZ	-0.26	-0.16	-0.17

If the value is:
-below minus 0.4 there is a relative excess of wasted/stunted/underweight subjects in the sample
-between minus 0.4 and minus 0.2, there may be a relative excess of wasted/stunted/underweight subjects in the sample.
-between minus 0.2 and plus 0.2, the distribution can be considered as symmetrical.
-between 0.2 and 0.4, there may be an excess of obese/tall/overweight subjects in the sample.
-above 0.4, there is an excess of obese/tall/overweight subjects in the sample

Kurtosis

WHZ	1.97	-0.01	-0.26
HAZ	2.27	0.35	-0.53
WAZ	0.84	0.51	-0.23

Kurtosis characterizes the relative size of the body versus the tails of the distribution. Positive kurtosis indicates relatively large tails and small body. Negative kurtosis indicates relatively large body and small tails.
If the absolute value is:
-above 0.4 it indicates a problem. There might have been a problem with data collection or sampling.
-between 0.2 and 0.4, the data may be affected by a problem.
-less than an absolute value of 0.2 the distribution can be considered as normal.

Test if cases are randomly distributed or aggregated over the clusters by calculation of the Index of Dispersion (ID) and comparison with the Poisson distribution for:

WHZ < -2: ID=2.34 (p=0.000)
WHZ < -3: ID=1.54 (p=0.010)
GAM: ID=2.34 (p=0.000)
SAM: ID=1.54 (p=0.010)
HAZ < -2: ID=1.88 (p=0.000)
HAZ < -3: ID=2.23 (p=0.000)
WAZ < -2: ID=0.93 (p=0.605)
WAZ < -3: ID=1.09 (p=0.315)

Subjects with SMART flags are excluded from this analysis.
The Index of Dispersion (ID) indicates the degree to which the cases are aggregated into certain clusters (the degree to which there are "pockets"). If the ID is less than 1 and p > 0.95 it indicates that the cases are UNIFORMLY distributed among the clusters. If the p value is between 0.05 and 0.95 the cases appear to be randomly distributed among the clusters, if the ID is higher than 1 and p is less than 0.05 the cases are aggregated into certain cluster (there appear to be pockets of cases). If this is the case for Oedema but not for WHZ then aggregation of GAM and SAM cases is likely due to inclusion of oedematous cases in GAM and SAM estimates.

Are the data of the same quality at the beginning and the end of the clusters?

Evaluation of the SD for WHZ depending upon the order the cases are measured within each cluster (if one cluster per day is measured then this will be related to the time of the day the measurement is made).

```
Time                                          SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.06 (n=47, f=0)  ###########
02: 1.09 (n=46, f=1)  ############
03: 1.06 (n=43, f=0)  ###########
04: 1.20 (n=40, f=0)  ################
05: 1.18 (n=45, f=1)  ################
06: 1.34 (n=42, f=0)  ######################
07: 1.38 (n=46, f=0)  ########################
08: 1.27 (n=45, f=0)  ###################
09: 1.22 (n=41, f=0)  ################
10: 1.36 (n=45, f=2)  ######################
11: 0.82 (n=43, f=0)  #
12: 1.17 (n=46, f=0)  ################
13: 1.27 (n=42, f=1)  ###################
14: 1.19 (n=42, f=1)  ################
15: 1.16 (n=44, f=0)  ###############
16: 1.19 (n=41, f=0)  ################
17: 1.10 (n=41, f=0)  ############
18: 1.14 (n=42, f=0)  ##############
19: 1.49 (n=38, f=0)  ##############################
20: 1.34 (n=34, f=0)  ######################
21: 1.29 (n=33, f=0)  ####################
22: 1.38 (n=27, f=0)  ########################
23: 1.29 (n=22, f=0)  ####################
24: 1.40 (n=22, f=1)  ########################
25: 2.51 (n=16, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
26: 1.15 (n=17, f=0)  OOOOOOOOOOOOOOO
27: 1.09 (n=12, f=0)  OOOOOOOOOOOO
28: 1.10 (n=09, f=0)  ~~~~~~~~~~~~~
29: 1.64 (n=09, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
30: 1.78 (n=08, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
31: 1.19 (n=04, f=0)  ~~~~~~~~~~~~~~~~
32: 1.25 (n=03, f=0)  ~~~~~~~~~~~~~~~~~~~
33: 1.33 (n=03, f=0)  ~~~~~~~~~~~~~~~~~~~~~~
34: 0.75 (n=03, f=0)
(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked
"f" are the numbers of SMART flags found in the different time points)
```

Analysis by Team

Team	**1**	**2**	**3**	**4**	**5**	**6**
n =	180	147	169	129	217	206
Percentage of values flagged with SMART flags:						
WHZ:	0.0	2.7	0.6	0.0	0.5	0.0
HAZ:	1.1	6.1	7.1	7.8	3.2	3.4

WAZ:	0.0	2.7	0.0	3.9	0.9	1.9
Age ratio of 6-29 months to 30-59 months:						
	1.12	1.19	0.88	1.15	0.87	0.78
Sex ratio (male/female):						
	1.25	0.91	1.22	0.82	0.74	0.79
Digit preference Weight (%):						
.0 :	5	12	14	13	10	13
.1 :	10	7	15	12	17	17
.2 :	13	14	11	12	11	18
.3 :	12	8	11	12	18	12
.4 :	11	7	9	8	9	5
.5 :	6	17	11	9	6	10
.6 :	12	9	8	8	6	5
.7 :	9	10	4	10	8	2
.8 :	13	9	9	12	9	7
.9 :	9	7	7	6	7	11
DPS:	9	10	10	7	13	16

Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)

Digit preference Height (%):						
.0 :	3	7	19	9	12	7
.1 :	14	13	9	13	23	7
.2 :	18	14	11	12	12	13
.3 :	22	9	11	9	15	8
.4 :	13	17	7	12	6	7
.5 :	6	11	14	9	7	16
.6 :	9	9	5	6	5	9
.7 :	6	6	6	15	6	10
.8 :	4	7	5	9	10	16
.9 :	6	7	12	8	5	8
DPS:	20	11	14	9	18	11

Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)

Digit preference MUAC (%):						
.0 :	8	4	29	13	9	9
.1 :	11	9	9	8	13	7

.2 :	17	10	2	10	19	10
.3 :	11	19	10	12	14	11
.4 :	8	12	9	6	6	13
.5 :	7	3	24	10	10	12
.6 :	8	11	4	11	7	8
.7 :	13	11	4	8	7	10
.8 :	9	9	5	12	6	11
.9 :	8	12	3	10	8	10
DPS:	10	14	29	7	13	6

Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)

Standard deviation of WHZ:

SD	1.46	1.31	1.05	1.02	1.25	1.23

Prevalence (< -2) observed:

%	23.9	18.5	10.1	10.9	10.6	11.2

Prevalence (< -2) calculated with current SD:

%	25.7	16.3	8.8	8.4	10.6	8.9

Prevalence (< -2) calculated with a SD of 1:

%	17.1	9.9	7.8	7.9	6.0	4.9

Standard deviation of HAZ:

SD	1.52	1.60	1.53	1.83	1.39	1.58

observed:

%	41.7	52.4	58.0	44.2	56.2	54.9

calculated with current SD:

%	48.7	47.7	53.4	48.9	58.5	50.8

calculated with a SD of 1:

%	48.0	46.3	55.2	48.0	61.7	51.3

Statistical evaluation of sex and age ratios (using Chi squared statistic) for:

Team 1:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	27/23.3 (1.2)	26/18.6 (1.4)	53/41.9 (1.3)	1.04
18 to 29	12	25/22.4 (1.1)	17/18.0 (0.9)	42/40.4 (1.0)	1.47
30 to 41	12	21/22.0 (1.0)	13/17.6 (0.7)	34/39.6 (0.9)	1.62
42 to 53	12	19/21.6 (0.9)	17/17.3 (1.0)	36/38.9 (0.9)	1.12
54 to 59	6	8/10.7 (0.7)	7/8.6 (0.8)	15/19.3 (0.8)	1.14
6 to 59	54	100/90.0 (1.1)	80/90.0 (0.9)		1.25

The data are expressed as observed number/expected number (ratio of obs/expect)
Overall sex ratio: p-value = 0.136 (boys and girls equally represented)
Overall age distribution: p-value = 0.290 (as expected)
Overall age distribution for boys: p-value = 0.747 (as expected)
Overall age distribution for girls: p-value = 0.346 (as expected)
Overall sex/age distribution: p-value = 0.080 (as expected)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	27/16.3 (1.7)	17/17.9 (0.9)	44/34.2 (1.3)	1.59
18 to 29	12	14/15.7 (0.9)	22/17.3 (1.3)	36/33.0 (1.1)	0.64
30 to 41	12	16/15.4 (1.0)	18/16.9 (1.1)	34/32.3 (1.1)	0.89
42 to 53	12	10/15.1 (0.7)	10/16.7 (0.6)	20/31.8 (0.6)	1.00
54 to 59	6	3/7.5 (0.4)	10/8.2 (1.2)	13/15.7 (0.8)	0.30
6 to 59	54	70/73.5 (1.0)	77/73.5 (1.0)		0.91

The data are expressed as observed number/expected number (ratio of obs/expect)
Overall sex ratio: p-value = 0.564 (boys and girls equally represented)
Overall age distribution: p-value = 0.091 (as expected)
Overall age distribution for boys: p-value = 0.020 (significant difference)
Overall age distribution for girls: p-value = 0.350 (as expected)
Overall sex/age distribution: p-value = 0.003 (significant difference)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	20/21.6 (0.9)	18/17.7 (1.0)	38/39.3 (1.0)	1.11
18 to 29	12	21/20.9 (1.0)	20/17.1 (1.2)	41/37.9 (1.1)	1.05
30 to 41	12	25/20.4 (1.2)	16/16.7 (1.0)	41/37.1 (1.1)	1.56
42 to 53	12	20/20.1 (1.0)	18/16.4 (1.1)	38/36.6 (1.0)	1.11
54 to 59	6	7/9.9 (0.7)	4/8.1 (0.5)	11/18.1 (0.6)	1.75
6 to 59	54	93/84.5 (1.1)	76/84.5 (0.9)		1.22

The data are expressed as observed number/expected number (ratio of obs/expect)
Overall sex ratio: p-value = 0.191 (boys and girls equally represented)
Overall age distribution: p-value = 0.474 (as expected)
Overall age distribution for boys: p-value = 0.733 (as expected)
Overall age distribution for girls: p-value = 0.593 (as expected)
Overall sex/age distribution: p-value = 0.169 (as expected)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	22/13.5 (1.6)	20/16.5 (1.2)	42/30.0 (1.4)	1.10
18 to 29	12	11/13.0 (0.8)	16/15.9 (1.0)	27/29.0 (0.9)	0.69
30 to 41	12	13/12.7 (1.0)	17/15.6 (1.1)	30/28.4 (1.1)	0.76
42 to 53	12	8/12.5 (0.6)	16/15.4 (1.0)	24/27.9 (0.9)	0.50
54 to 59	6	4/6.2 (0.6)	2/7.6 (0.3)	6/13.8 (0.4)	2.00
6 to 59	54	58/64.5 (0.9)	71/64.5 (1.1)		0.82

The data are expressed as observed number/expected number (ratio of obs/expect)
Overall sex ratio: p-value = 0.252 (boys and girls equally represented)
Overall age distribution: p-value = 0.041 (significant difference)
Overall age distribution for boys: p-value = 0.087 (as expected)
Overall age distribution for girls: p-value = 0.286 (as expected)
Overall sex/age distribution: p-value = 0.007 (significant difference)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	17/21.4 (0.8)	29/29.1 (1.0)	46/50.5 (0.9)	0.59
18 to 29	12	19/20.6 (0.9)	36/28.1 (1.3)	55/48.7 (1.1)	0.53
30 to 41	12	29/20.2 (1.4)	19/27.5 (0.7)	48/47.7 (1.0)	1.53
42 to 53	12	20/19.9 (1.0)	26/27.0 (1.0)	46/46.9 (1.0)	0.77
54 to 59	6	7/9.8 (0.7)	15/13.4 (1.1)	22/23.2 (0.9)	0.47
6 to 59	54	92/108.5 (0.8)	125/108.5 (1.2)		0.74

The data are expressed as observed number/expected number (ratio of obs/expect)
Overall sex ratio: p-value = 0.025 (significant excess of girls)
Overall age distribution: p-value = 0.862 (as expected)
Overall age distribution for boys: p-value = 0.225 (as expected)
Overall age distribution for girls: p-value = 0.277 (as expected)
Overall sex/age distribution: p-value = 0.003 (significant difference)

Team 6:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	22/21.2 (1.0)	28/26.7 (1.0)	50/47.9 (1.0)	0.79
18 to 29	12	20/20.4 (1.0)	20/25.8 (0.8)	40/46.2 (0.9)	1.00
30 to 41	12	16/20.0 (0.8)	34/25.3 (1.3)	50/45.3 (1.1)	0.47
42 to 53	12	19/19.7 (1.0)	15/24.9 (0.6)	34/44.6 (0.8)	1.27
54 to 59	6	14/9.7 (1.4)	18/12.3 (1.5)	32/22.0 (1.5)	0.78
6 to 59	54	91/103.0 (0.9)	115/103.0 (1.1)		0.79

The data are expressed as observed number/expected number (ratio of obs/expect)
Overall sex ratio: p-value = 0.094 (boys and girls equally represented)
Overall age distribution: p-value = 0.077 (as expected)

Overall age distribution for boys: p-value = 0.603 (as expected)
Overall age distribution for girls: p-value = 0.027 (significant difference)
Overall sex/age distribution: p-value = 0.002 (significant difference)

Evaluation of the SD for WHZ depending upon the order the cases are measured within each cluster (if one cluster per day is measured the n this will be related to the time of the day the measurement is made).

Team: 1

```
Time                                        SD for WHZ point                0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 01: 0.63
(n=08, f=0)
02: 0.89 (n=08, f=0)  ####
03: 1.34 (n=07, f=0)  ########################
04: 1.20 (n=08, f=0)  ##################
05: 1.76 (n=08, f=1)  ######################################## 06: 0.97 (n=07, f=0)  #######
07: 1.52 (n=08, f=0)  ##############################
08: 1.39 (n=07, f=0)  ##########################
09: 1.22 (n=08, f=0)  ###################
10: 1.26 (n=07, f=0)  ###################
11: 0.55 (n=07, f=0)
12: 1.42 (n=08, f=0)  ##########################
13: 1.40 (n=07, f=0)  ##########################
14: 1.34 (n=07, f=0)  ########################
15: 1.10 (n=08, f=0)  ############
16: 1.34 (n=07, f=0)  ######################
17: 1.52 (n=07, f=0)  ##############################
18: 1.27 (n=08, f=0)  ####################
19: 1.19 (n=06, f=0)  ################
20: 1.15 (n=08, f=0)  ###############
21: 1.45 (n=07, f=0)  ############################
22: 1.36 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOO
23: 1.88 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
24: 2.38 (n=05, f=1)  ##################################################################
26: 1.25 (n=04, f=0)  OOOOOOOOOOOOOOOOOO
(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked "f"
are the numbers of SMART flags found in the different time points)
```

Team: 2

```
Time                                        SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.19 (n=06, f=0)  ################
02: 0.69 (n=05, f=0)
03: 1.03 (n=05, f=0)  ##########
04: 1.35 (n=04, f=0)  ########################
05: 0.36 (n=06, f=0)
06: 0.58 (n=05, f=0)
07: 1.34 (n=06, f=0)  ########################
08: 1.01 (n=06, f=0)  #########
09: 1.30 (n=05, f=0)  ####################
10: 1.86 (n=06, f=0)  ##############################################
11: 0.54 (n=06, f=0)
12: 1.53 (n=06, f=0)  ##############################
```

```
13: 2.07 (n=05, f=1)  ##################################################
14: 1.41 (n=06, f=1)  ##########################
15: 0.90 (n=06, f=0)  ####
16: 1.32 (n=06, f=0)  ######################
17: 1.65 (n=05, f=0)  ####################################
18: 1.11 (n=06, f=0)  #############
19: 1.88 (n=06, f=0)  ###############################################
20: 1.36 (n=04, f=0)  ########################
21: 1.00 (n=03, f=0)  OOOOOOOO
22: 1.27 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOO
23: 1.42 (n=04, f=0)  ############################
24: 0.65 (n=04, f=0)
25: 0.45 (n=03, f=0)
26: 1.24 (n=03, f=0)  OOOOOOOOOOOOOOOOOOO
27: 0.56 (n=03, f=0)
28: 0.84 (n=02, f=0)  OO
29: 1.70 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
30: 1.40 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOO
31: 1.84 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked
"f" are the numbers of SMART flags found in the different time points)
```

Team: 3

```
Time                                          SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.69 (n=08, f=0)
02: 1.01 (n=08, f=0)  #########
03: 0.55 (n=07, f=0)
04: 1.31 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOO
05: 0.77 (n=07, f=0)
06: 0.46 (n=05, f=0)
07: 1.39 (n=08, f=0)  ########################
08: 1.12 (n=07, f=0)  #############
09: 1.77 (n=04, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
10: 1.83 (n=07, f=1)  ############################################
11: 0.79 (n=06, f=0)
12: 0.70 (n=08, f=0)
13: 0.31 (n=08, f=0)
14: 0.96 (n=06, f=0)  #######
15: 1.29 (n=08, f=0)  ####################
16: 0.57 (n=08, f=0)
17: 0.44 (n=06, f=0)
18: 1.02 (n=07, f=0)  #########
19: 1.43 (n=07, f=0)  ##########################
20: 1.48 (n=06, f=0)  ############################
21: 1.48 (n=06, f=0)  ############################
22: 0.93 (n=06, f=0)  #####
23: 0.69 (n=06, f=0)
24: 0.71 (n=03, f=0)
25: 0.05 (n=02, f=0)
26: 1.43 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOO
27: 1.71 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

```
28: 0.11 (n=02, f=0)
29: 0.05 (n=02, f=0)
30: 1.02 (n=02, f=0)  ~~~~~~~~~
(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked
"f" are the numbers of SMART flags found in the different time points)
```

Team: 4

```
Time                                          SD for WHZ
point                0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.87 (n=07, f=0)  ###
02: 0.78 (n=07, f=0)
03: 1.41 (n=07, f=0)  ########################
04: 0.65 (n=07, f=0)
05: 1.23 (n=07, f=0)  ##################
06: 1.46 (n=07, f=0)  ############################
07: 0.72 (n=06, f=0)
08: 1.31 (n=07, f=0)  ####################
09: 0.84 (n=07, f=0)  ##
10: 0.33 (n=07, f=0)
11: 0.91 (n=07, f=0)  #####
12: 1.28 (n=06, f=0)  ####################
13: 1.06 (n=05, f=0)  ###########
14: 0.51 (n=06, f=0)
15: 1.16 (n=05, f=0)  ###############
16: 0.94 (n=04, f=0)  ######
17: 0.32 (n=06, f=0)
18: 1.34 (n=05, f=0)  ########################
19: 1.40 (n=04, f=0)  ########################
20: 1.81 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
21: 0.91 (n=03, f=0)  OOOOO
22: 1.79 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked
"f" are the numbers of SMART flags found in the different time points)
```

Team: 5

```
Time                                          SD for WHZ
point                0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.28 (n=09, f=0)  ####################
02: 1.54 (n=09, f=1)  ################################
03: 0.99 (n=09, f=0)  ########
04: 1.06 (n=09, f=0)  ###########
05: 0.87 (n=09, f=0)  ###
06: 1.63 (n=09, f=0)  ##################################
07: 1.72 (n=09, f=0)  ######################################
08: 1.02 (n=09, f=0)  #########
09: 0.75 (n=09, f=0)
10: 1.20 (n=09, f=0)  #################
11: 0.89 (n=08, f=0)  ####
12: 1.25 (n=09, f=0)  ###################
13: 0.79 (n=09, f=0)
14: 1.54 (n=08, f=0)  ################################
15: 1.24 (n=09, f=0)  ###################
16: 1.13 (n=08, f=0)  ##############
```

```
17: 1.16 (n=09, f=0)  ###############
18: 1.45 (n=08, f=0)  ###########################
19: 1.21 (n=08, f=0)  #################
20: 0.95 (n=08, f=0)  ######
21: 1.63 (n=08, f=0)  ###################################
22: 1.32 (n=07, f=0)  ######################
23: 1.54 (n=07, f=0)  ###############################
24: 0.88 (n=06, f=0)  ###
25: 1.08 (n=05, f=0)  OOOOOOOOOOOO
26: 1.43 (n=04, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOO
27: 0.46 (n=03, f=0)
28: 1.05 (n=02, f=0)  ~~~~~~~~~~
(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked
"f" are the numbers of SMART flags found in the different time points)
```

Team: 6

```
Time                                             SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.30 (n=09, f=0)  #####################
02: 0.76 (n=09, f=0)
03: 1.14 (n=08, f=0)  ##############
04: 1.45 (n=09, f=0)  ###########################
05: 0.92 (n=08, f=0)  #####
06: 1.77 (n=09, f=0)  #########################################
07: 1.38 (n=09, f=0)  ########################
08: 1.10 (n=09, f=0)  #############
09: 1.74 (n=08, f=1)  #######################################
10: 1.05 (n=09, f=0)  ##########
11: 0.96 (n=09, f=0)  #######
12: 0.95 (n=09, f=0)  ######
13: 1.11 (n=08, f=0)  #############
14: 1.24 (n=09, f=0)  ##################
15: 1.41 (n=08, f=0)  #########################
16: 1.00 (n=08, f=0)  #########
17: 1.08 (n=08, f=0)  ############
18: 0.64 (n=08, f=0)
19: 1.77 (n=07, f=0)  #########################################
20: 1.87 (n=05, f=1)  #############################################
21: 0.87 (n=06, f=0)  ###
22: 1.32 (n=06, f=0)  ######################
23: 0.33 (n=02, f=0)
24: 1.71 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
25: 0.81 (n=04, f=0)
26: 0.71 (n=03, f=0)
27: 2.06 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
29: 2.60 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
30: 1.31 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~
(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked "f"
are the numbers of SMART flags found in the different time points)
```

(for better comparison it can be helpful to copy/paste part of this report into Excel)

Annex 6: Plausibility Check Report

Table 32: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 994	**Boys** n = 477	**Girls** n = 517
Prevalence of stunting (<-2 z-score)	(517) 52.0 % (46.7 - 57.3 95% C.I.)	(264) 55.3 % (48.1 - 62.3 95% C.I.)	(253) 48.9 % (43.5 - 54.4 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(261) 26.3 % (23.4 - 29.4 95% C.I.)	(129) 27.0 % (22.7 - 31.9 95% C.I.)	(132) 25.5 % (22.3 - 29.0 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(256) 25.8 % (21.5 - 30.6 95% C.I.)	(135) 28.3 % (22.6 - 34.7 95% C.I.)	(121) 23.4 % (19.1 - 28.4 95% C.I.)

Table 33: Prevalence of stunting by age based on height-for-age z-scores

		Severe stunting (<-3 z-score)		**Moderate stunting (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	248	58	23.4	62	25.0	128	51.6
18-29	227	66	29.1	55	24.2	106	46.7
30-41	228	76	33.3	68	29.8	84	36.8
42-53	195	44	22.6	45	23.1	106	54.4
54-59	96	12	12.5	31	32.3	53	55.2
Total	994	256	25.8	261	26.3	477	48.0