AFGHANISTAN

Integrated Nutrition, IYCF, Mortality and WASH SMART Survey

Final Report

Rural areas, Kabul Province, Afghanistan

17th January to 27th December 2019

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Acronyms and Abbreviations

AAH	Action Against Hunger
AfDHS	Afghanistan Demographic Health Survey
AIM-WG	Assessment Information Management Working Group
ARI	Acute Respiratory Infection
BPHS	Basic Package of Health Services
BSU	Basic Sample Unite
CDR	Crude Death Rate
CHW	Community Health Worker
CI	Confidential Interval
CSO	Central Statistics Organization
DOPH	Directorate of Public Health
ECHO	EUROPEAN COMMISION Humanitarian Aid
ENA	Emergency Nutrition Assessment
EPHS	Essential Package of Health Services
EPI	Expanded Program on Immunization
GAM	Global Acute Malnutrition
GCMU	Grand Contract Management Unite
HAZ	Height per Age Z score
HCS	Health Sub centre
HH	Household
IMAM	Integrated Management of Acute Malnutrition
IP	Implementer
IPC	Integrated Phase Classification
IPD	Inpatient Department
IYCF	Infant and Young Child Feeding

MAM	Moderate Acute Malnutrition
MoPH	Ministry of Public Health
MOVE	Move welfare organization
MUAC	Mid Upper Arm Circumference
OPD	Outpatient Department
OW	Observed Weight
PHO	Provincial Health Officer
PLW	Pregnant and Lactating Women
PND	Public Nutrition Department
PPHD	Provincial Public Health Directorate
PPS	Probability Proportional to Size
RC	Reserve Cluster
SAM	Severe Acute Malnutrition
SD	Standard Deviation
SDO	Sanayee Development Organization
SMART	Standardized Monitoring and Assessment of Relief and Transition
U5DR	Under Five Death Rate
UNICEF	United Nation Children's Fund
WASH	Water, Sanitation, and Hygiene
WFP	World Food Program
WHO	World Health Organization
WHZ	Weight for Height Z score

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1. EXECUTIVE SUMMARY

Kabul Province is one of the 34 provinces of Afghanistan, located in the eastern part of the country bordering Wardak in the west, Parwan in the north and Laghman Province in the east, with Logar province located in south of the province. Kabul City is the capital of Kabul province and of the country.

A nutrition and mortality survey was conducted in Kabul Province from the 17th January to the 27th January 2019 during the winter 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 15-49 years old, women, infant and young child feeding (IYCF) practices, measle's immunization coverage, water, sanitation, and hygiene (WASH) and retrospective mortality. The summary of the key findings are presented in Table 1 below.

Table 1: Summary of Findings

Child Nutritional Status by WHO cut-offs	
Indicator	**Prevalence**
GAM prevalence among children 6-59 months per WHZ <-2SD*	9.4 % (7.3-12.0 95% C.I.)
SAM prevalence among children 6-59 months per WHZ <-3SD	2.2 % (1.3- 3.7 95% C.I.)
GAM prevalence among children 0-59 months per WHZ <-2SD	11.0 % (8.6-14.0 95% C.I.)
SAM prevalence among children 0-59 months per WHZ <-3SD	2.7 % (1.7- 4.1 95% C.I.)
GAM prevalence among children 6-59 months per MUAC <125 mm	6.6% (4.7- 9.3 95% C.I.)
SAM prevalence among children 6-59 months per MUAC <115 mm	1.6 % (0.9- 2.8 95% C.I.)
Combined GAM prevalence among children 6-59 months per WHZ <-2SD or MUAC <125mm	12.0 % (9.5-15.1 95% C.I.)
Combined SAM prevalence among children 6-59 months per WHZ <-3SD or MUAC <115 mm	3.0% (2.0- 4.5 95% C.I.)
Stunting among children 6-59 months per HAZ <-2SD	39.0% (35.4-42.795% CI)

Severe Stunting among children 6-59 months per HAZ <-3SD	11.6 % (9.2-14.7 95% CI)
Underweight among children 6-59 months per WAZ <-2SD	19.9 % (16.4-24.1 95% CI)
Severe Underweight among children 6-59 months per WAZ <-3SD	4.3 % (2.9- 6.4 95% CI)

**GAM and SAM prevalence by any indicator include cases of nutritional oedema*

Nutritional Status of Women	
Indicator	**Result**
Low MUAC among all women 15-49 years per MUAC <230mm	6.1 % (4.2-8.1 95% CI)
Low MUAC among pregnant women per MUAC <230 mm	8.9 % (3.0-14.8 95% CI)
Low MUAC among lactating women per MUAC <230 mm	7.0 % (3.8-10.2 95% CI)
Low MUAC among all pregnant and lactating women per MUAC <230mm	7.2% (4.5-9.9 95% CI)

Infant and Young Children Feeding Practices	
Indicator	**Result**
Initiation of breastfeeding within 1 hour of birth among children 0-23 months	69.1 %
Exclusive breastfeeding among infants 0-5 months	77.8 %
Continued breastfeeding at 1 year among children 12-15 months	82.9 %
Continued breastfeeding at 2 year among children 20-23 months	69.0 %

Child Immunization	
Indicator	**Result**
Second dose measles vaccination among children 18-59 months confirmed by vaccination card	15.9 %
Second dose measles vaccination among children 18-59 months confirmed by caregiver recall	68.6 %
Second dose measles vaccination among children 18-59 months confirmed by vaccination card or caregiver recall	84.5 %

Crude and Under Five Death Rate (Death/10,000/Day)	
Indicator	**Result**
Crude Death Rate (CDR)	0.24 (0.11-0.50 95% CI)
Under five Death Rate (U5DR)	0.11 (0.01-0.80 95% CI)

WASH Practice		
Main Drinking Water Source N= 509	**Frequency**	**%**
Improved Water Source	378	74.3%
Unimproved Water Source	131	25.7%

Hand washing practices by caregivers N= 588	**Frequency**	**%**
Uses soap or ash with water	374	63.6%
Uses only water	214	36.4%
Uses nothing	0	0.0 %

2. INTRODUCTION

Kabul is the central zone and capital of Afghanistan. It is one of the thirty-four provinces of the country. The population of Kabul Province is nearly 5 million people as of 2018[1], of which almost 15 percent live in the rural areas.

Kabul is located between Latitude 34-31' North and Longitude 69-12' East at an altitude of 1800 m (6000 feet) above sea level, which makes it one of the world's highest capital cities. Kabul is strategically located in a valley surrounded by high mountains at crossroads of north-south and east-west trade routes. It is surrounded by Koh-e Paghman Mountain from the east, Koh-e Qrough Mountain from the south-west and Koh-e Shirdarwaza Mountain from the north-east. Kabul has only one river, which is called Kabul River. Kabul River rises at the Paghman Mountain toward South Pass about 70 km (43 mi) west of Kabul. It flows in an easterly direction, past Kabul, and through Jalalabad city, and then on to Dakka where it enters Pakistani territory and finally runs into the Indus at Attack.

The coldest month of the year is January and the hottest month is July. The maximum temperature was recorded as + 42.7 °C in July and the minimum as -26.3 °C in January. Survey data collection was conducted from 17 January to 27 January 2019, therefore during the winter season [The Months of Jadi 1397 in Solar Calendar], when higher morbidity is reported and access to livelihoods is difficult. This is the lean season for Kabul province, with higher hunger peak.

Description of the survey area:

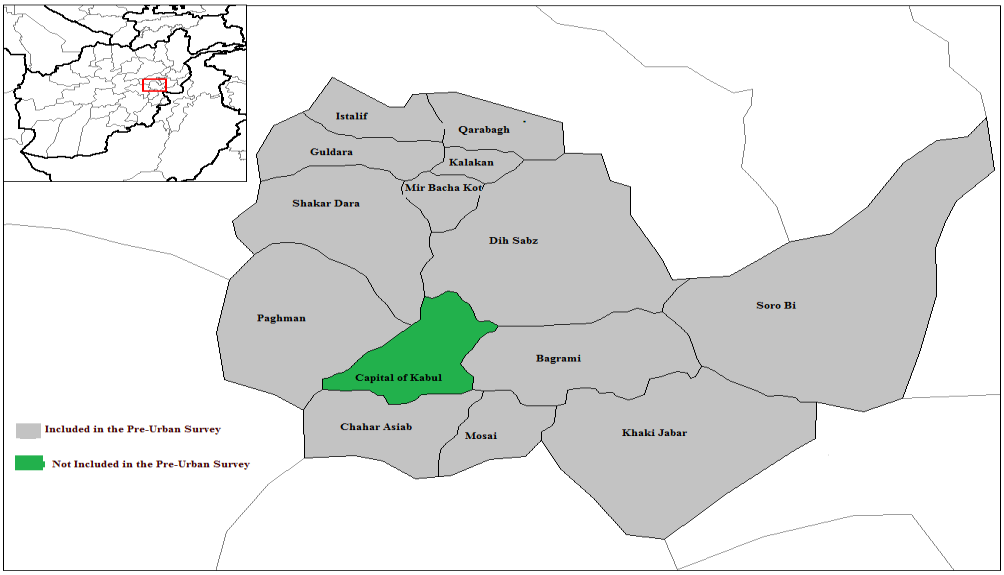
The SMART survey was conducted in all 14 districts of Kabul province (as presented in figure 1): Bagrami, Chahar Asyab, Deh Sabz, Farza, Guldara, Istalif, Kalakan, Khaki Jabbar, Sarai Khuaja, Mussahi, Paghman, Qarabagh, Shakadara and Surobi. Alll the 14 districts are categorized as rural areas. Kabul city was excluded from this survey sampling frame, and was covered by a parallel survey done in January 2019 for several reasons:

- Food security and livelihood situation are different between urban and rural area population as well as living conditions.
- Culture and beliefs of urban population are different between urban and rural population.
- Health access is different geographically between urban and rural population.

[1] CSO updated population 1397 (2018-2019)

. Based on above reasons, there was a need to have two separate SMART surveys in the province: one in Kabul province rural areas and a pararal survey in the urban area of the province. This report only concerns the rural areas, while results related to Kabul urban areas are presented in a separate report.

Figure 1: Map of districts, rural area, Kabul province (Source: Wikipedia)



2.1 Demography and Economy

The total population living in the rural area of Kabul province is 719,715[2], corresponding to thepopulation living in villages and small towns, and excluding people living in towns/cities (such as Kabul city).

The rural areas are multi-ethnic, most of the population being Tajik, Pashtun and Kochi nomad. The population is mostly sunny Muslims.

Based on IPC report 2018, 68% of the population do not have access to improved sanitation and 38% of the population do not have access to safe drinking water at Kabul province level.

At the early stage of the new government after Taliban, many national and international industries were interested in the new Kabul and many new companies have since then opened their branches in Kabul, with significant impact on people lifes and socioeconomic status. There are now more changes happening due to insecurity and internal population displacement. The security situation is still highly tense in the country, with multiple on going conflicts involving various parties. The situation is hard to handle with for the general

[2] CSO updated population 1397 (2018-2019)

population, living so often in precarious conditions, with limited access to livelihoods and basic services. The UN agencies support Afghan population in need by providing various humanitarian assistance. Many international aid organizations are contributing to the Afghan economy and provide humanitarian aid to the crisis-affected population. For instance, national and international humanitarian organizations are providing health services in the province. The agency MOVE was BPHS implementer in the districts of Kabul province, providing health and nutrition services. The agency Sanayee Development Organization (SDO) is recently assigned to as new BPHS implementer and will support the BPHS programs in the districts by the end of January 2019. The proposed survey was conducted by the BPHS implementer MOVE with technical support of AAH and under close coordination with MoPH (PND) and the local authorities.

2.2. Agriculture and Food Practices

Most of the population in the rural area are busy in the agricultures (wheat, cotton, potatoes, tomatoes, onions and garlic). The famous fruits are pomegranate, apples and grapes, which are often exported abroad.

Cereals, particularly wheat, and potatoes are the two main staple crops in Kabul Province. While wheat is only domestically consumed, the yield is not high enough to satisfy local demands. The wheat yield could be improved by agricultural inputs like improved seeds, technology, and fertilizers, but the annual deficit in wheat yield is also a result of the increasing conversion of arable land into orchards and vegetable growing areas – mainly because these crops fetch higher prizes on local and export markets. Fresh and dried fruits from Dahsabz District also supply Kabul and Pakistani markets. The Shimali Plains located in north of Kabul extend into Parwan and Kapisa Provinces and used to mark the former line of control between the Taleban and the Northern Alliances. The plains were once famous for its vineyards and agricultural products, mainly raisins. During the war, the vineyards were destroyed – left to dry out or overgrew with weed – depriving the region of a major economic opportunity that is now slowly being recovered. In most cases, landowners (farmers) work on their own land. There are no fruit processing factories yet, and mainly home-based employment opportunities for rural women exist as traditional methods in fruit drying prevail.

Looking at food security situation and the First Level FS Outcomes[3] in Kabul province: Though the FCS under the crisis and emergency category is very high as per the EFSA data, after thorough review of the

[3] IPC report 2018

other direct indicators and contributing factors, it has been agreed among the IPC TWG members that the FCS range could be 18-20% having poor and borderline FCS.

- 14.1% of the population are using 0-4 food groups, which defines crisis and emergency in terms of HDDS.
- 15% of the population either have moderate or severe hunger, which is emergency and crisis.

LCS prevalence rate as per the EFSA 2018 data is very high, after review and convergence of other direct indicators and contributing factors, it has been agreed that the LCS rate could be in the range of 25-27% applying either crisis and or emergency coping strategies.

3. SURVEY OBJECTIVES

3.1 Primary Objective

- To investigate the nutritional status of children under five years of age, and women 15-49 years old (including pregnant and lactating women) living in the 14 districts of rural area of Kabul province, Bagrami, Chahar Asyab, Deh Sabz, Farza, Guldara, Istalif, Kalakan, Khaki Jabbar, Sarai Khuaja, Mussahi, Paghman, Qarabagh, Shakadara and Surobi.

3.2 Specific Objectives

- To estimate prevalence of under nutrition (stunting, wasting, and underweight) among children aged 6-59 months.
- To estimate prevalence of Wasting, among children aged 0-59 months.
- To estimate 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 living in the rural area of Kabul province.
- To determine the nutritional status of women 15-49 years old and pregnant and lactating women based on MUAC assessment.
- To assess Water, Sanitation and Hygiene (WASH) proxy indicators: households level main drinking water sources and caregiver hand washing practices.

3.3 Survey Justification

The survey area was selected by the nutrition cluster and the Assessment Information Management Working Group (AIM-WG) to know the nutrition situation in the districts due to the following main reasons:

- Based on the nutrition assessments prioritization matrix, Kabul, Paktia, Khost, Faryab, Sar-e-pol, Nuristan and Wordak are the high priority provinces. The National Nutrition Survey (NNS) done in 2013 included Kabul entire province and has revealed a GAM rate of 6.5% (4.32 - 9.78; 95% CI) and a SAM rate of 2.0% (1.01 - 3.96; 95% CI). Due to lack of recent data, the AIM-WG and the Nutrition Cluster have prioritized Kabul province to conduct a SMART survey.
- According to IPC report, 2018, the loss of employment is closely linked to security situation. People lost their properties, their family members or breadwinner, they suffer from decrease in the investment sector etc.. "The main livelihoods of the people are informal jobs, off farm labor and agriculture labor. Recently, the loss of formal jobs, decrease in development activities and drought have negatively affected the living conditions and vulnerability of the Afghan population. Due to low precipitation, there is an increase of water borne diseases, limited access to safe drinking water and limited access to improved sanitation"[4]
- The survey was also a good opportunity to build the capacity of the partner.

4. METHODOLOGY

4.1 Sample Size

The household sample size to survey was determined by using ENA for SMART software version 2011 (updated 9th July 2015). A two-stage cluster methodology was apply. Villages were the Primary Sampling Unit (PSU) while household was Basic Sampling Unit (BSU).

In the first stage, the villages (clusters) were systematically randomly selected from a complete list of villages using the probability proportion to size (PPS) method. This was conducted in the province after a village-level security assessment done prior the data collection. The village was the primary sampling unit for the survey.

The second stage of the methodology involved the random selection of households from a complete and updated list of households. This was conducted at field level. The household was the basic sampling unit for the proposed survey.

Tables 2 and 3 highlight the sample size calculation for anthropometric and mortality surveys.

[4] EFSA 2018 report

Table 2: Sample size calculation of anthropometry

Parameters for Anthropometry	Value	Assumption and Source
Estimated prevalence of GAM (%)	**9.8%**	According to the MoPH National Nutrition Survey-2013, GAM estimated at 6.5 % (4.32-9.78 95% CI) in the entire province. The upper confidence interval of 9.8% was selected as a more conservative estimate for the planning stage, particularly given the effect of food security and security situation changing in the province.
Desired precision	**±3**	Based on SMART recommendation.
Design effect (DEFF)	**1.5**	The population living in the targeted rural districts was considered to have probably similar living conditions and food security situation. Nevertheless, access to health facilities was assumed to be not simillar over the targeted population ; people in the remote and hard-to-access areas have poor accessability due to geographical difficulties and far distance. Other inequalities may exist, such as access to school, livelihoods or job. Hence, the design effect was estimated at 1.5.
Children to be included	**616**	Minimum sample size-children aged 6-59 months.
Average household (HH) size	**8.0**	Based on AfDHs 2015, average HH size is estimated at 8.0 members per HH at national level. There is no available average for provincial level.
% Children 6–59 months	**17.3%**	Based on CSO updated population 1397 (2018)
% Non-response rate	**6%**	The percentage of non-respondent households estimated at 6%. Absenteeism was expected as HH members may go to Kabul city for job and business. Children may also be in kinder garden or school.

Households to be included	**526**	**Minimum sample size-Households to surveyed. Generated by ENA software**

**However all children 0-59 months in each household was measured for additional analyses and indicators*

Table 3: Sample size calculation of mortality

Parameters for Mortality	Value	Assumption and Source
Estimated death rate/10,000/day	0.5/10,000/day	There is no updated mortality data available; therefore, the 0.5 CDR baseline was used as per the SMART methodology recommendation.
Desired precision/10,000/day	±0.3	Based on SMART recommendation to estimate death rate.
Design effect	1.5	The standard design effect of 1.5 was used.
Recall period in days	**120**	Starting point of recall period is 20th Sep 2018 (29th Sunbula 1397) (Ashura) to the mid-point of data collection estimated was 19th January 2019 (19th Jadi 1397).
Population to be included	**2,904**	**Generated by ENA**
Average HH size	**8.0**	Based on [5]AFDHS survey 2015, the average HH size is estimated at 8.0 members per HH at national level.. There is no available average for provincial level.
% Non-response rate	**6%**	The percentage of non-respondent households estimated at 6%, using the last experience of the SMART surveys in the deferent provinces.
Households to be included	**386**	Households to be included- Generated by ENA

Based on the SMART methodology, between the calculated anthropometry and mortality sample sizes, the largest sample size was used for this survey. In this case, the larger sample size was 526 households. All additional indicators (women and PLW nutritional status, IYCF, immunization coverage and WASH) were collected based on this sample size.

[5]National Nutrition Survey-2013

[6] AFDHS survey 2015

4.2 Sampling Methodology

A two-stage cluster sampling methodology was implemented.

Stage 1: Selection of clusters/villages were conducted using probability proportion to size (PPS) using ENA for SMART software version 2011 of (updated 9th July, 2015). A list of all updated villages were uploaded into the ENA for SMART software where PPS was applied. The list of villages/cluster were gathered from Basic Package of Health Services (BPHS) providers in consultation with PPHD and local government to finalize the sampling frame. For the clusters which are mixed of semi urban and rural area, the list of clusters were gathered based on the zone/street/Guzar (Village name in Dari language) from semi urban place while a list of villages were gathered from rural site of the district based on the latest EPI micro-plan. All insecure or inaccessible villages (if any) were identified and systematically excluded from the final sampling frame. The villages with large population have a higher chance of being select than villages with small population and vice versa. 5 Reserve Clusters (RCs) were also selected by ENA software version 2011 (updated 9th July 2015). Reserve clusters could be used if 10% or more clusters were not reached during the survey. Based on the estimated time to travel to the survey area, select and survey the households, it was estimated that each team could effectively survey 11 HHs per day (526/11=47.8 clusters, rounded up to 48 Clusters) (for more details see bellow table).

Table 4: Household selection per day _Working time table

Total working time	8:00 AM to 3:30 PM (7,5 Hours (450 minutes)
Time for transportation (round trip)	1.5 hour (90 minutes
Coordination with Village elder and preparation of HH list	40 minutes
Time for break and pray	1 hour (60 minutes)
Time for interview: how long will last your interview?	20 minutes
Distance form one HH to another HH	10 minutes

Unfortunately, only 47 clusters were surveyed out of the 48 selected ; 1 cluster was not surveyed, representing 2.1% so less than 10% of sample size) due to refusal from village elder. RCs were not used

because the number of inaccessible cluster was less than 10%, as per the SMART methodology. The selected clusters are highlighted in Annex 2**.**

In each selected village, one or more community member(s) were asked to help the survey teams to conduct the survey by providing information about the village (eg: geographical organization, number of households). In cases of large villages or semi-rural zones/small city in a cluster, the village/zones were divided into smaller segments and a segment was selected randomly (if similar in size) or using PPS to represent the cluster. This division was done based on existing administrative units e.g. neighborhoods, zone, Guzar, streets, or natural landmarks like river, road, or public places like market, schools, and mosques.

Stage 2: The household is defined as "all people eating from the same pot and living together" (World Food Programme (WFP) definition). The household is the BSU. In Afghanistan, the term household is often used synonymously with a compound, which potentially represents more than one household. Hence, the household definition was explained to key informants before updating the household list to identify compounds composed of multiple households in advance. Under this survey, 528 (48 *11) households was assessed, with 6 teams covering 11 households in a day. The data collection was conducted over 9 days. In this assessment, households were chosen within each cluster using systematic random sampling. All households was listed and numbered by the survey team. The 11 households were identified from this enumerated household list using systematic random sampling. The teams were trained on both methods of sampling (simple random sampling and systematic random sampling). For the semi-urban areas in the province, the teams were take into account multi-storeyed buildings as multiple HHs according to the HH definition. In the case of a multi-storeyed building and polygamous households containing multiple households counted as one HH during the initial listing process, the enumerators conducted another round of randomization to select one HH.

Every household was asked to consent before any data is collected. All children 0 to 59 months living in the selected house were included for anthropometric measurements, including twins and orphans or unrelated children living with the household. Children aged <24 months were included for IYCF assessment. If a child of a surveyed household was absent due to enrolment in an IPD treatment centre at the time the household was surveyed, teams visited the treatment centre to measure the child if possible. Households without children were still assessed for household level questions (women and PLW nutritional status, WASH, mortality).

Any absent households, or households with missing or absent women or children were revisited at the end of the day before leaving the cluster. Missing or absent child that not found after multiple visits were not

included in the survey. A cluster control form was used to record all household visits and note any missed and absent households. Abandoned HHs were ideally excluded from the total HHs list before surveying began.

4.3 Training, Team composition, and Supervision

Six teams of four members each conducted data collection in the field. Each team was composed of one supervisor/team leader, two measurers, and one interviewer. Each team had at least two female surveyors to ensure acceptance of the team amongst the surveyed households, particularly for IYCF questions. Each female member of the survey team was accompanied by a mahram[6] to facilitate the work of the female surveyors at the community level. The teams were supervised by AAH, MOVE and PPHD team.

Figure 2: SMART Survey team is measuring a 13 months chiled lenght in Paghman Districts

The entire survey team received a 7-day training in both local languages of Pashto/Dari on the SMART survey methodology and all its practical aspects. one AAH technical staff facilitated the training. A standardisation test was conducted over the course of one day, measuring 10 children in order to evaluate the accuracy and the precision of the surveyors in taking the anthropometric measurements and at the end of the day all 10 children measured complete. The training included a one-day field test in order to evaluate the surveyors in real field conditions.

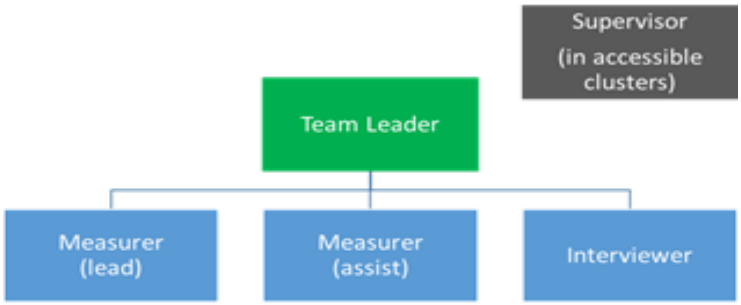


Figure 3: AAH/ACF Afghanistan SMART Team Structure

Each team member was provided with key documents and tools to carry into the field: a guidance document on field operations with instructions for conducting data collection, a household selection document, a local events calendar, and the questionnaire. All documents were translated into Pashto/Dari for better comprehension by the teams and to avoid direct translation during data collection. The questionnaire was translated and back-translated using a different translator in advance of the survey.

[6] In most areas of Afghanistan women are always accompanied outside of the home by a male relative called a 'Mahram'.

The questionnaire was then pre-tested during the field test. Modifications based on feedback from the field test were made as necessary.

4.4 Data Analysis

Data analysis was conducted using ENA software for SMART for anthropometric and mortality data. The ENA Plausibility Check was used both to monitor data quality during data collection and to assess data quality upon completion. Additional indicators were analysed using Microsoft Excel version 2016. Contextual information gained in the field was used to complement survey results and strengthen interpretation. Interpretation of each result was based on existing global and national thresholds for different indicators.

5. INDICATORS: DEFINITION, CALCULATION AND INTERPRETATION

5.1. Overview of Indicators

The indicators assessed and corresponding target population are 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
Acute Malnutrition by MUAC	Children 6-59 months
Acute Malnutrition by Combined (WHZ and/or MUAC)	
Chronic Malnutrition by HAZ	
Underweight by WAZ	
Mortality	
Crude Mortality Rate (CDR)	Entire population
Under Five Mortality Rate (U5MR)	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
Proportion of caregivers washing their hands during critical times	
Women of Reproductive Age & PLW	
MUAC	Women 15-49 years and PLW

5.2 Anthropometric Indicators

Acute Malnutrition

Acute malnutrition in children 6-59 months can be expressed by using three indicators. Weight for Height (W/H) and Mid Upper Arm Circumference (MUAC) are described below. Nutritional edema is the third indicator of severe acute malnutrition. Additionally, the prevalence of GAM amongst 0-59 was reported.

Weight-for-height index (W/H)

A child's nutritional status is estimated by comparing it to the weight-for-height distribution curves of the 2006 WHO growth standards reference population. The expression of the weight-for-height index as a Z-score (WHZ) compares the observed weight (OW) of the surveyed child to the mean weight (MW) of the reference population, for a child of the same height. The Z-score represents the number of standard deviations (SD) separating the observed weight from the mean weight of the reference population: WHZ = (OW - MW) / SD.

During data collection, the weight-for-height index in Z-score was calculated in the field for each child in order to refer malnourished cases to appropriate center if needed. Moreover, the results was presented in Z-score using WHO reference in the final report. The classification of acute malnutrition based on WHZ is well illustrated in Table 6.

Mid Upper Arm Circumference (MUAC)

The mid upper arm circumference does not need to be related to any other anthropometric measurement. It is a reliable indicator of the muscular status of the child and is mainly used to identify children with a risk of mortality. The MUAC is an indicator of malnutrition only for children greater or equal to 6 months. Table 6 provides the cut-off criteria for categorizing acute malnutrition cases.

Table 6: MUAC cut-offs points for children aged 6-59 months

Target Group	MUAC (mm)	Nutritional Status
Children 6-59 months	> or = 125	**No malnutrition**
	< 125 and >= 115	**Moderate Acute Malnutrition (MAM)**
	< 115	**Severe Acute Malnutrition (SAM)**

Nutritional bilateral "pitting" oedema

Nutritional bilateral pitting oedema is a sign of Kwashiorkor, one of the major clinical forms of severe acute malnutrition. When associated with Marasmus (severe wasting), it is called Marasmic-Kwashiorkor. Children with bilateral oedema are automatically categorized as being severely malnourished, regardless of their weight-for-height index.

Combined GAM

In Afghanistan, it has been demonstrated that there is a large discrepancy between the prevalence of GAM by WHZ and GAM by MUAC. Therefore, AAH routinely reports the prevalence of GAM by WHZ or MUAC as "combined GAM" among children 6-59 months. Combined GAM considers the cut-offs of both WHZ and MUAC.

Chronic Malnutrition

The height-for-age index (H/A)

The height-for-age measure indicates if a child of a given age is stunted also known as chronically malnourished. This index reflects the nutritional history of a child rather than his/her current nutritional status. This is mainly used to identify chronic malnutrition. The same principle is used as for weight-for-height; except that a child's chronic nutritional status is estimated by comparing its height with WHO standards height-for-age curves, as opposed to weight-for-height curves. The height-for-age index of a child from the studied population is expressed in Z-score (HAZ).

Underweight

Underweight is the physical manifestation of both acute malnutrition and chronic malnutrition. In children 6-59 months, underweight is estimated using Weight-for-Age z-score. WAZ is calculated using ENA Software for SMART by comparing the observed weight of a selected child to the mean weight of children from the reference population for a given age. When using WAZ, the distribution of the sample is compared against the 2006 WHO reference population. Global underweight is the sum of moderate and severe underweight. WAZ cut-offs are presented in Table 7 below.

Table 7: Definition of Acute Malnutrition, Chronic Malnutrition, and Underweight according to 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

The prevalence of malnutrition as identified by WHZ, HAZ and WAZ have also been classified by the WHO in terms of public health significance. These are presented in table 8 below.

Table 8: Classification for Severity of Malnutrition by Prevalence among Children under Five .

LABELS	PREVALENCE THRESHOLDS (%)			
	WASTING	OVERWEIGHT	STUNTING	UNDERWEIGHT[7]
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

5.3 Mortality

The mortality indicators included all households, regardless of the presence of children. All members of the household was counted, using the household definition.

a. Crude death rate (CDR)

The number of persons in the total population that dies over specified period of time refers to the Table 3

[7] WHO threshold

above for Sample size calculation for mortality surveys

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

b. Under-5 death rate (U5DR)

The number of children aged (0-5) years that die over specified period of time Table 2 above for Sample size calculation for mortality surveys. Calculated as:

$$\text{U5DR} = \frac{\text{Nb of deaths of U5s x 10000 U5s}}{\text{population of U5s at mid} - \text{interval x time interval in days}}$$

5.4 Infant and Young Child Feeding

The IYCF indicators used in the measurement of infant and young child feeding practices asked to the caregivers of children aged <24 months are described as follows.

Timely initiation of breastfeeding

Proportion of children born in the last 23 months who were put to the breast within one hour of birth. The indicator is calculated by dividing the number of children born in the last 24 months who were put to the breast within one hour of birth by children born in the last 24 months. The denominator and numerator include living children and deceased children who were born within the past 24 months. This indicator is based on historical recall.

Exclusive breastfeeding

Proportion of infants 0-5 months of age who are fed exclusively with breast milk. It is calculated by dividing the number of all infants aged 0–5 months who receive **only** breast milk during the previous day by total infants aged 0-5 months.

Continued breastfeeding at 1 year

Proportion of children 12 – 15 months of age who are fed with breast milk. It's calculated by dividing the total number of children aged 12–15 months who received breast milk during the previous day by total children aged 12–15 months

Continued breastfeeding at 2 years

Proportion of children 20–23 months of age who are fed breast milk. It is calculated by dividing the number of children aged 20–23 months who received breast milk during the previous day by total children aged 20–

23 months.

5.5 Immunization

Measles Immunization Coverage

Caregivers of all children 18-59 months was 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.

5.6. Maternal Nutrition

Women in childbearing age was 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.

5.7. Water, Sanitation and Hygiene

Water Quality

Household heads was asked, what their current main source of drinking water is. To assess if households are relying on improved or unimproved water sources.

Hand washing practices

Caregivers was asked to demonstrate how they wash their hands to assess the use of soap or ash and water when washing hands.

Caregivers was asked on what occasions they wash their hands to assess hand washing practices at 5 critical moments.

6. LIMITATIONS

- This survey was launched in the middle of a harsh winter, there were many problems that hampered the work and performance of our teams in the areas. For example, the problems of traveling to remote and mountainous areas due to the high snow, and meanwhile some families were not welling to remove extra children's clothes when weighing.Only 21% of the surveyed children had documentation to evidence their exact date of birth ; so 79% of the children were without exact birth date documentations. Due to the lack of reliable and available documentation of birth, the teams relied on a local events calendar to estimate age, with possible bias in age determination (and therefore stunting and underweight prevalence).
- Cultural barrier was another limitation. In some cases, the teams were allowed to start interviewing females in HH, but had to stop when men were coming back to the house, so before completing the

interview. Moreover, one team going to a cluster was rejected by village elders and was not able to survey that cluster.

- Many HH members were out of households and female members did not allow to measure their children by male and most of the workload were by female enumerators.
-
- Enumeration areas were not fully specified and for some of the cluster, borders were not specified in available cluster's maps. In rural areas, ordinal numbers were not assigned for houses, making very hard to differentiate houses of one cluster to a neighbooring one in highly populated rural areas. The teams faced problems for finding the selected cluster on time.

7. SURVEY FINDINGS

7.1. Survey Sample

Overall, the survey assessed 47 clusters, 509 households, 3,855 individuals, 1,906 women 15-49 years, 1,949 children under five, and 738 children 6-59 months. Among the 509 households the teams attempted to survey, 8 were absent or refused, resulting in a non-response rate of 1.5%. This rate is lower than the estimate done at planning stage ; less households have refused to participate to the survey in comparison to the 6% expected non-response rate. Overall, 98.5% of the planned households were assessed and 119.8% of the anticipated sample size for children 6-59 months was achieved.

Table 9: Proportion of Household and Child Sample Achieved

Number of households planned	Number of households surveyed	% surveyed of planned	Number of children 6-59 months planned	Number of children 6-59 months surveyed	% surveyed of planned
517	509	98.5%	616	738	119.8%

The mortality questionnaire is further designed to gather demographic data and capture in- and out-migration. Household demographics and movement are presented in Table 12 below. The survey findings indicate that the average household size was 7.5 (average lower than the one used at planning stage with 8 members per household), 50.6% of the population was female, 49.4% of the population was male, and 21.1% was under five (proportion lower than the average from CSO updated population 1397 (2018) of 17.3%) . The observed rate of IN/OUT-MIGRATION 0.17 and 0.07 during the recall period may have been influenced by 120 recall period days.

Table 10: Demographic Summary

Indicator	Values
Total number of clusters	47
Total number of HHs	509
Total number of HHs with children under five	459
Average household size	7.5
Female % of the population	50.6%
Male % of the population	49.4%
Children under five % of the population	21.1%
Birth Rate	1.16/10,000/day
In-migration Rate (Joined)	0.17/10,000/day
Out-migration Rate (Left)	0.07/10,000/day

Households were also assessed for residential status. Among the 509 surveyed households, 93.7% were residents of the area, 5.5% were internally displaced, and 1.0% were refugees.

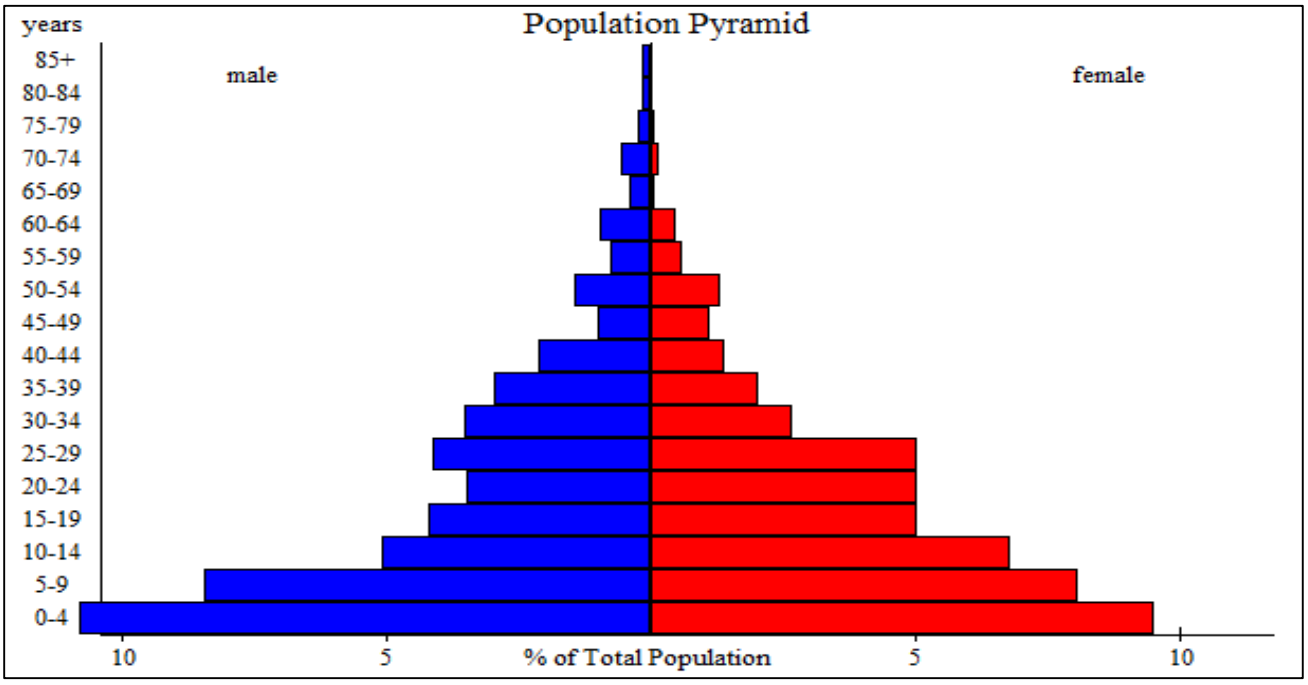
Table 11: Household Residential Status by Proportion

Residential Status of Households N= 509	Resident	476	93.5%
	IDP	28	5.5%
	Refugee	5	1.0%
	Nomad	0	0.0%

As the age and sex of all household members were assessed, it was also possible to disaggregate the population by sex and five year age interval, as presented in Figure 4 below. The pyramid is wide at the base and narrows towards the apex, indicating a generally youthful population characterized by a high birth rate and a low mortality rate The Afghanistan's national level Crude Birth Rate "CBR" was 37,9 per 1000 population in 2017 and in accordance with the latest UNICEF[8] report U5MR is 67.9 per 1000 live births in Afghanistan.

[8] https://data.unicef.org/country/afg/

Figure 4 : Kabul rural area Province Population Pyramid



The surveyed sample of children 6-59 months was 738. The distribution as disaggregated by age and sex is presented in Table 12 below. 54-59 months aged girls are lower than boy's maybe because of culture barriers existing in the community and because some families did not allow our teams to measure girls. The overall sex ratio was 1.1, indicating a sampleequally represented. Only 21% of the surveyed children had documentation to evidence their exact date of birth, this may have reduced the quality of age determination, and therefore the estimation of the stunting and underweight prevalence.

Table 12: Distribution of Age and Sex of among Children 6-59 months

	Boys		Girls		Total		Ratio
AGE (months)	no.	%	no.	%	no.	%	Boy:Girl
6-17	87	53.0	77	47.0	164	22.2	1.1
18-29	90	50.8	87	49.2	177	24.0	1.0
30-41	97	54.2	82	45.8	179	24.3	1.2
42-53	70	50.4	69	49.6	139	18.8	1.0
54-59	47	59.5	32	40.5	79	10.7	1.5
Total	391	53.0	347	47.0	738	100.0	1.1

7.2. Data Quality

Four children were excluded from WHZ analysis per SMART flags[9], resulting in an overall percentage of flagged data of 0.4% and judged as excellent by the ENA Plausibility Check. The overall WHZ analysis utilized the data from 738 children.The standard deviation, design effect, missing values, and flagged values are listed for WHZ, HAZ, and WAZ in Table 13 below. The SD of WHZ was 1.07, the SD of HAZ was 1.04, and the SD of WAZ was 0.84, all WHZ, HAZ and WAZ met the normal range (0.8 and 1.2) indicating an adequate distribution of data around the mean and data of excellent quality.

Table 13: 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*	734	-0.54±1.07	1.16	1	3
Weight-for-Age*	737	-1.35±0.84	1.69	1	0
Height-for-Age	731	-1.75±1.04	1.00	0	7

* contains for WHZ and WAZ the children with edema.

Additional statistical tests administered to study the distribution of the sample included:

- The Skewness coefficient for WHZ was considered of Excellent quality by the ENA Plausibility Check, suggesting the distribution curve was symmetrical. .
- The Kurtosis coefficient for WHZ was considered of Excellent quality by the ENA Plausibility Check, suggesting there was no kurtosis.
- The Poisson distribution for WHZ was not statistically significant (p=0.104) and considered of Excellent quality by the ENA Plausibility Check, suggesting there was no observed aggregation of acute malnutrition cases in specific clusters.
- The sex ratio between boys and girls 6-59 months was satisfactory at 1.1 boys/girls (expected value between 0.8 and 1.3) (p=0.105) suggesting that boys and girls were equally represented. The overall sex ratio was considered of Excellent quality by the ENA Plausibility Check.

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

- Among children 6-59 months. The age ratio between children 6-29 months and 30-59 months was 0.86 (expected value near 0.85) and the difference was as expected (p=0.887). The overall age ratio was considered of Excellent quality by the ENA Plausibility Check.
- Digit preferences scores for weight 0 (5), height 0 (6), and MUAC 2 (12) weight and height are digits preference score considered of Excellent and MUAC is good in digists number by the ENA Plausibility Check. The overall ENA Plausibility Check score was 2%, which is considered a survey of Excellent quality. The complete Kabul ENA Plausibility Check report is presented in Annex 3.

7.3. Prevalence of Acute Malnutrition

Acute Malnutrition by WHZ

The prevalence of GAM per WHZ among children 6-59 months in Kabul was 9.4% (7.3 - 12.0 95% CI) and was catagorized as medium level of severity as per the WHO cut off. This prevalence seems slightly higher in girls than boys, but this difference is not statistically significant (p-value = 0.691).

The prevalence of SAM per WHZ among children 6-59 months was 2.2 % (1.3 - 3.7 95% CI). According to WHO thresholds, this SAM prevalence was categorized as acceptable in Aghanistan.

Table 14: Prevalence of Acute Malnutrition by WHZ (and/or oedema) by Severity and Sex among Children 6-59 months, WHO 2006 Reference

Indicators	All n = 734	Boys n = 389	Girls n = 345
Prevalence of global acute* malnutrition (<-2 z-score and/or oedema)	(69) 9.4 % (7.3 - 12.0 95% C.I.)	(35) 9.0 % (6.2 - 12.9 95% C.I.)	(34) 9.9 % (7.3 - 13.1 95% C.I.)
Prevalence of moderate acute malnutrition (<-2 to ≥-3 z-score)	(53) 7.2 % (5.4 - 9.6 95% C.I.)	(29) 7.5 % (5.0 - 10.9 95% C.I.)	(24) 7.0 % (4.8 - 9.9 95% C.I.)
Prevalence of severe acute malnutrition (<-3 z-score and/or oedema)	(16) 2.2 % (1.3 - 3.7 95% C.I.)	(6) 1.5 % (0.6 - 3.8 95% C.I.)	(10) 2.9 % (1.5 - 5.4 95% C.I.)

**There were no oedema cases in the sample*

The prevalence of acute malnutrition by WHZ was also assessed among children 0-59 months. The GAM per WHZ was 11.0 % (8.6-14.0 95% CI), as presented in Table 15 below. This prevalence seems slightly higher

in girls than boys, but this difference is not statistically significant (p-value = 0.863). The prevalence of SAM per WHZ among children 0-59 months was 2.7% (1.7- 4.1 95% CI).

Table 15: Prevalence of Acute Malnutrition by WHZ (and/or oedema) by Severity and Sex among Children 0-59 months, WHO 2006 Reference

Indicators	All N = 786	Boys n = 416	Girls n = 366
Prevalence of global acute* malnutrition (<-2 z-score and/or oedema)	(86) 11.0 % (8.6 - 14.0 95% C.I.)	(45) 10.8 % (7.7 - 14.9 95% C.I.)	(41) 11.2 % (8.3 - 15.0 95% C.I.)
Prevalence of moderate acute malnutrition (<-2 to ≥-3 z-score)	(65) 8.3 % (6.2 - 11.0 95% C.I.)	(35) 8.4 % (5.9 - 12.0 95% C.I.)	(30) 8.2 % (5.8 - 11.6 95% C.I.)
Prevalence of severe acute malnutrition (<-3 z-score and/or oedema)	(21) 2.7 % (1.7 - 4.1 95% C.I.)	(10) 2.4 % (1.3 - 4.5 95% C.I.)	(11) 3.0 % (1.7 - 5.4 95% C.I.)

**There were no 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 16 below. The age group with the lowest MAM was 42-53 months and there was no SAM case in the age of 54-59 months. Results of this disaggregation suggests that the younger age groups (6-29) were more vulnerable to acute malnutrition than older groups (30-59), with significant difference (p-value <0.05).

Table 16: Prevalence of Acute Malnutrition per WHZ and/or Oedema by Severity and Age Group Children 0-59 months,

Age (months)	N	Severe wasting* (WHZ <-3)		Moderate wasting (WHZ ≥-3 to <-2)		Normal (WHZ ≥-2)		Oedema	
		n	%	N	%	N	%	n	%
6-17	162	10	6.2	30	18.5	122	75.3	0	0.0
18-29	176	4	2.3	8	4.5	164	93.2	0	0.0
30-41	179	1	0.6	7	3.9	171	95.5	0	0.0

42-53	138	1	0.7	4	2.9	133	96.4	0	0.0
54-59	79	0	0.0	4	5.1	75	94.9	0	0.0
Total	734	16	2.2	53	7.2	665	90.6	0	0.0

**There were no oedema cases in the sample*

The WHZ distribution curve (in red) as compared to the WHO 2006 reference WHZ distribution curve (in green) as presented in Figure 6 below demonstrates a shift to the left, suggesting an undernourished population in comparison to normal population. Figure 5 illustrates mean WHZ for age categories.

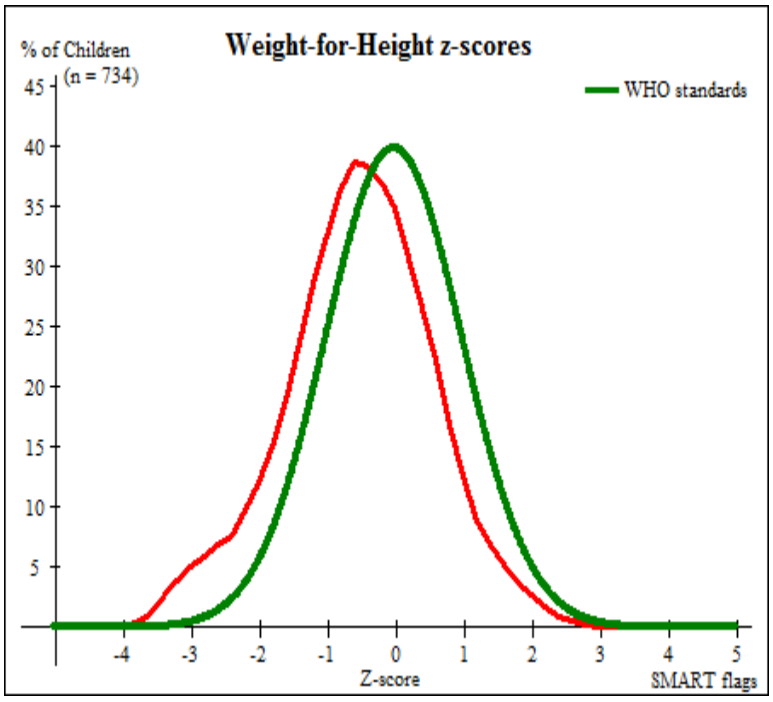


Figure 6: Distribution of WHZ Sample Compared to the WHO 2006 WHZ Reference Curve

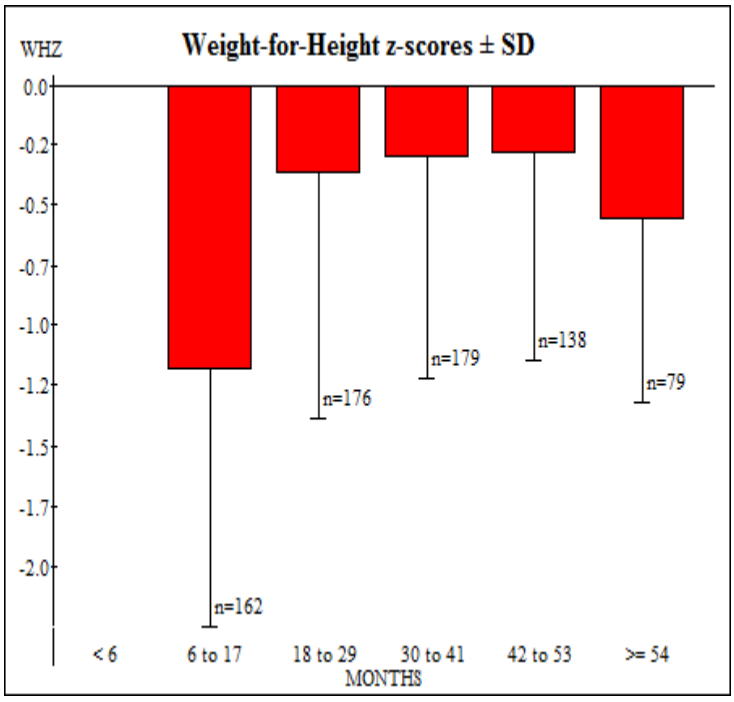


Figure 5: Means WHZ by age groups

Acute Malnutrition by MUAC

The prevalence of GAM per MUAC among children 6-59 months in Kabul was 6.6 % (4.7 - 9.3 95% CI), as presented in Table 17 below. This prevalence was higher in girls than boys (p-value < 0.05). The prevalence of SAM per MUAC among children 6-59 months was 1.6 % (0.9 - 2.8 95% CI).

Table 17: Prevalence of Acute Malnutrition by MUAC (and/or oedema) by Severity and Sex among children 6-59 months.

Indicators	All n = 738	Boys n = 391	Girls n = 347
Prevalence of global malnutrition* (<125 mm and/or Oedema)	(49) 6.6 % (4.7 - 9.3 95% C.I.)	(16) 4.1 % (2.5 - 6.6 95% C.I.)	(33) 9.5 % (6.5 - 13.6 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm to ≥115 mm, no Oedema)	(37) 5.0 % (3.4 - 7.2 95% C.I.)	(13) 3.3 % (1.8 - 5.9 95% C.I.)	(24) 6.9 % (4.5 - 10.6 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or Oedema)	(12) 1.6 % (0.9 - 2.8 95% C.I.)	(3) 0.8 % (0.2 - 2.4 95% C.I.)	(9) 2.6 % (1.4 - 4.7 95% C.I.)

**There were no 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 18 below. SAM cases were only found among children from 6 to 29 months, while there was no MAM cases among children above or equal 54 months.. Results of this disaggregation suggests that the younger age groups (6-29) were more vulnerable to acute malnutrition than older groups (30-59) according to MUAC criterion (p-value < 0.05).

Table 18: 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	164	10	6.1	24	14.6	130	79.3	0	0.0
18-29	177	2	1.1	10	5.6	165	93.2	0	0.0

30-41	179	0	0.0	2	1.1	177	98.9	0	0.0
42-53	139	0	0.0	1	0.7	138	99.3	0	0.0
54-59	79	0	0.0	0	0.0	79	100.0	0	0.0
Total	738	12	1.6	37	5.0	689	93.4	0	0.0

*There were no oedema cases in the sample

Acute Malnutrition by Oedema

Among all children 0-59 Months, there was no case of bilateral pitting oedema presented in Table 19 below.

Table 19: 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. 19 (2.6 %)	Not severely malnourished No. 718 (97.4 %)

*There was no oedema cases in the sample

Combined Acute Malnutrition rate

The prevalence of Combined GAM among children 6-59 months in Kabul was 12.0 % (9.5 - 15.1 95% CI) as presented in Table 20 below. This prevalence seems higher in girls than boys, but this difference is not statistically siginifcant (p-value = 0.130). The prevalence of Combined SAM among children 6-59 months was 3.0% (2.0- 4.5 95% CI). Although there is no globally established threshold for Combined GAM, the combined GAM and SAM prevalence were higher than the ones referring to WHZ or MUAC only. Combined GAM indicator seems to capture more acutely malnourished children.

Table 20: Prevalence of Acute Malnutrition by WHZ and/or MUAC and/or oedema by Severity and Sex among Children 6-59 months.

Indicators	All N = 734	Boys n = 389	Girls n = 345

Prevalence of Global Acute Malnutrition (MUAC<125 mm+ WHZ<-2SD)	(88) 12.0 % (9.5 - 15.1 95% C.I.)	(40) 10.3 % (7.3 - 14.3 95% C.I.)	(48) 13.9 % (10.5 - 18.2 95% C.I.)
Prevalence of Sever Acute Malnutrition (MUAC<115 mm+ WHZ<-3SD)	(22) 3.0 % (2.0 - 4.5 95% C.I.)	(8) 2.1 % (1.0 - 4.3 95% C.I.)	(14) 4.1 % (2.5 - 6.6 95% C.I.)

*There was no oedema cases in the sample

Proportion of Acutely Malnourished Children Enrolled in and Referred to OPD-MAM, IPD/OPD-SAM Program

Only teams identified malnourished children by MUAC in the field as acutely malnourished and their corresponding treatment enrolment status are presented in Table 21 below. Overall, out of children identified as acutely malnourished by the teams in the field, 24.1% were enrolled in a program at the time of survey. Out of the children who were identified as acutely malnourished but not currently enrolled in a treatment program, 22 children were referred for treatment.

Table 21: Proportion of Acutely Malnourished Children 6-59 Months Enrolled in a Treatment Programme

Sample	Enrolled in an OPD SAM	Enrolled in an OPD MAM	Enrolled in an IPD SAM	Not Enrolled
Acutely malnourished children 6-59 months by, MUAC, or oedema (N=29)	(3) 10.3 %	(4) 13.8 %	(0) 0.0 %	(22) 75.9 %

7.4. Prevalence of Chronic Malnutrition

The prevalence of stunting per HAZ among children 6-59 months in Kabul rural area was 39.0 % (35.4 - 42.7 95%CI), as presented in Table 22 below. This prevalence seems slightly higher in boys than girls, but this difference is not statistically significant (p-value = 0.196). The prevalence of severe stunting per HAZ among

children 6-59 months was 11.6 % (9.2 - 14.7 95% CI). According to WHO thresholds, this stunting prevalence is categorized as very high.

Table 22: Prevalence of Chronic Malnutrition by HAZ by Severity and Sex among Children 6-59 months, WHO 2006 Reference.

Indicators	All N = 731	Boys n = 386	Girls n = 345
Prevalence of chronic malnutrition (HAZ <-2 SD)	(285) 39.0 % (35.4 - 42.7 95% C.I.)	(159) 41.2 % (36.2 - 46.3 95% C.I.)	(126) 36.5 % (32.3 - 40.9 95% C.I.)
Prevalence of moderate chronic malnutrition (HAZ <-2 to ≥-3 SD)	(200) 27.4 % (24.6 - 30.3 95% C.I.)	(111) 28.8 % (24.6 - 33.3 95% C.I.)	(89) 25.8 % (21.9 - 30.1 95% C.I.)
Prevalence of severe chronic malnutrition (HAZ <-3 SD)	(85) 11.6 % (9.2 - 14.7 95% C.I.)	(48) 12.4 % (9.2 - 16.6 95% C.I.)	(37) 10.7 % (7.6 - 15.0 95% C.I.)

When disaggregated by age group, the age group 18-29 months has the highest moderatate chronic malnutrition and the highest sever chronic malnutrition as well, as presented in Table 23 below. Results of this disaggregation suggests that the older age groups (42-59) were more vulnerable to chronic malnutrition than younger groups (6-41), with statistically significant difference (p-value < 0.05).

Table 23: Prevalence of Chronic Malnutrition per HAZ by Severity and Age Group.

Age (months)	N	Severe stunting (HAZ <-3)		Moderate stunting (HAZ >= -3 to <-2)		Normal (HAZ>= -2)	
		n	%	N	%	n	%
6-17	161	13	8.1	32	19.9	116	72.0
18-29	175	30	17.1	60	34.3	85	48.6
30-41	177	23	13.0	57	32.2	97	54.8
42-53	139	14	10.1	33	23.7	92	66.2
54-59	79	5	6.3	18	22.8	56	70.9

Total	731	85	11.6	200	27.4	446	61.0

The HAZ distribution curve (in red) as compared to the WHO 2006 reference HAZ distribution curve (in green) as presented in Figure 7 below demonstrates a large shift to the left, suggesting a very stunted population in comparison to normal population. Further analysis suggests that linear severe growth retardation is at its highest in the group of children aged 30-41 months (n=177).

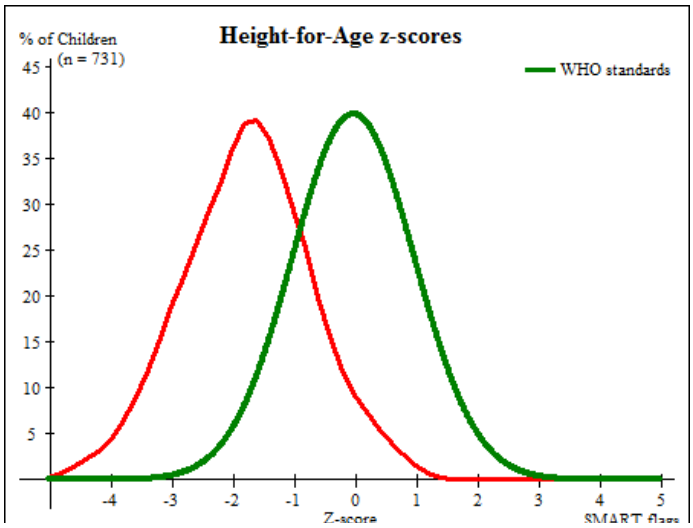


Figure 7: Distribution of HAZ Sample Compared to the WHO 2006 HAZ Reference Curve

Figure 8: Mean HAZ by Age Group

7.5. Prevalence of Underweight

The prevalence of underweight per WAZ among children 6-59 months in Kabul rural area was 19.9 % (16.4 - 24.1 95% CI), as presented in Table 24 below. This prevalence seems slightly higher in boys than girls, but without statistical difference (p-value = 0.138).

The prevalence of severe underweight per WAZ among children 6-59 months was 4.3 % (2.9 - 6.4 95% CI). According to WHO thresholds, this underweight prevalence was categorized at medium level of severity.

Table 24: Prevalence of Underweight by WAZ by Severity and Sex among Children 6-59 months, WHO 2006 Reference.

Indicators	All N = 737	Boys n = 391	Girls n = 346
Prevalence of underweight (WAZ <-2 SD)	(147) 19.9 % (16.4 - 24.1 95% C.I.)	(86) 22.0 % (17.5 - 27.2 95% C.I.)	(61) 17.6 % (13.5 - 22.8 95% C.I.)
Prevalence of moderate underweight (WAZ <-2 and >=-3 SD)	(115) 15.6 % (12.6 - 19.2 95% C.I.)	(70) 17.9 % (13.9 - 22.8 95% C.I.)	(45) 13.0 % (9.5 - 17.6 95% C.I.)
Prevalence of severe underweight (WAZ <-3SD)	(32) 4.3 % (2.9 - 6.4 95% C.I.)	(16) 4.1 % (2.6 - 6.5 95% C.I.)	(16) 4.6 % (2.6 - 8.2 95% C.I.)

When disaggregated by age group, 6-17 months children has the highest moderate underweight and also has the highest severe underweight, as presented in Table 25 below. The age group with the lowest moderate underweight was 42-53. Results of this disaggregation suggests that the younger age groups (6-29) were more vulnerable to underweight than older groups (30-59) (p-value < 0.05).

Table 25: 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	164	15	9.1	35	21.3	114	69.5
18-29	177	14	7.9	22	12.4	141	79.7

30-41	179	2	1.1	29	16.2	148	82.7
42-53	138	1	0.7	16	11.6	121	87.7
54-59	79	0	0.0	13	16.5	66	83.5
Total	737	32	4.3	115	15.6	590	80.1

7.6. Low MUAC among Women

All women of child-bearing age (15-49 years) were included in the survey. A total of 588 women were assessed for nutrition status by MUAC. The analysis looked at all women 15-49 years, further disaggregating the sample by physiological status (pregnant, lactating, etc.). The highest proportion of Low MUAC (<230 mm) was among the pregnant women, with 8.9% of them malnourished. Surprisingly, there was no malnourished women among women pregnant and simultaneously lactating. There is no statistically significant difference between the nutritional status of all PLW compared to non lactating-non breastfeeding women (p-value = 0.189).

Table 26: :Prevalence of Acute Malnutrition among Women per MUAC.

Sample	N	MUAC <230 mm	
		N	%
All women 15-49 years	588	36	6.1%
Pregnant women	90	8	8.9%
Lactating women	244	17	7.0%
Pregnant and lactating women*	13	0	0.0%
Non-pregnant and non-lactating women	241	11	4.6%
All PLWs	347	25	7.2%

**Women that were simultaneously pregnant and lactating*

7.7. Retrospective Mortality

Table 27: Death Rate by Age and Sex with Reported Design Effect.

Population	Death Rate (/10,000/Day)	Design Effect
Overall	0.24 (0.11-0.50)	1.00
By Sex		
Male	0.26 (0.11-0.64)	1.13

Female	0.22 (0.09-0.52)	1.00
By Age Group		
0-4	0.11 (0.01-0.80)	1.01
5-11	0.00 (0.00-0.00)	1.00
12-17	0.00 (0.00-0.00)	1.00
18-49	0.17 (0.05-0.53)	1.00
50-64	1.57 (0.47-5.08)	1.43
65-120	3.47 (1.14-9.98)	1

7.8. Infant and Young Child Feeding

Indicators for IYCF practices were asked of all caregivers with children less than 24 months. A total of 324 children under two years were included in the sample, with the core IYCF indicators assessed presented in Table 28 below. The proportion of infants breastfed within one hour of birth was 69.1 % suggesting some infants were breastfed within an appropriate amount of time after birth, likely receiving gcolostrum, but still highlighting that more than 1 child out of 3 do not get colostrum. The proportion of infants 0-5 months exclusively breastfed was low suggesting frequent replacement of breastmilk by other liquids or foods at a stage when an infant should be receiving the protective benefits of exclusive breastfeeding. The proportion of children with continued breastfeeding at one year was 82.9 % and at two years was 69.0 %, indicating that many children are receiving breastmilk until their first year but Fewer are receiving breastmilk until their second year.

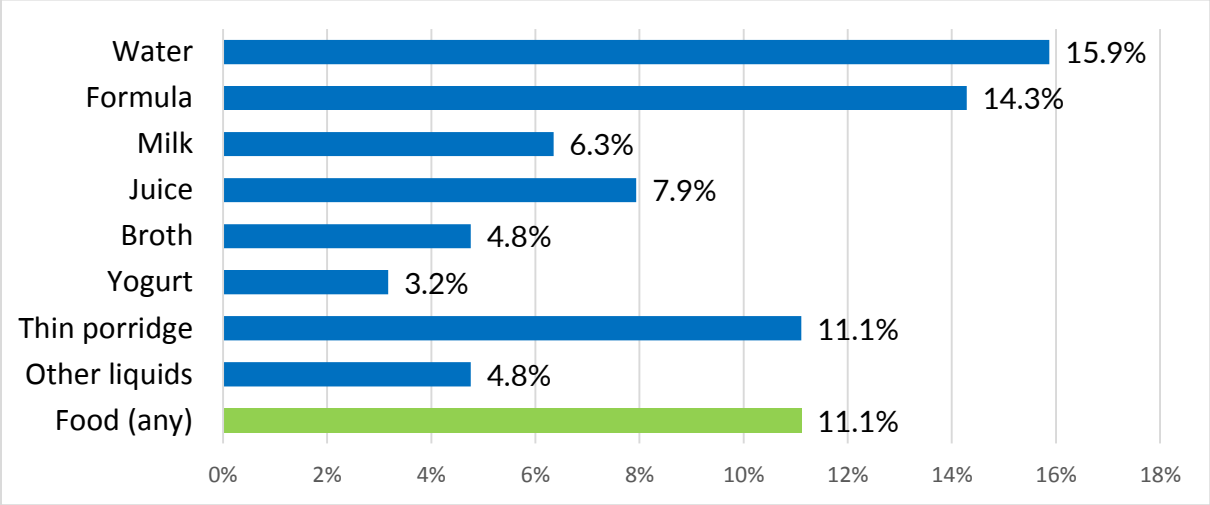
Table 28: Infant and Young Child Feeding Practices.

IYCF Indicator	Sample	N	n	Results
Timely initiation of breastfeeding	Children 0-23 months	324	224	69.1 %
Exclusive breastfeeding	Infants 0-5 months	63	49	77.8 %
Continued breastfeeding at one year	Children 12–15 months	70	58	82.9 %
Continued breastfeeding at two years	Children 20-23 months	58	40	69.0 %

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 6 below presents the

liquids most frequently displacing breastmilk in this population. 10 at 15.9% was the most frequently fed water, followed by 9 at 14.3% by formula milk.

Figure 9: Liquids or Food Consumed by Infants 0-5 Months



7.9. Child Immunization Status

In Kabul the results indicated that 84.5% of children 18-59 months had received the second dose measles immunization, as confirmed by either vaccination card or caregiver recall.

Table 29: Second Dose Measles Immunization Coverages among Children 18-59 Months.

Indicator		Frequency	%
Second Dose Measles Immunization (N=803)	Yes by card	91	15.9 %
	Yes by recall	394	68.6 %
	Yes by card *or* recall	485	84.5 %
	No	71	12.4%
	Don't know	18	3.1%

7.10. Water, Sanitation, and Hygiene

Improved and Unimproved Drinking Water Sources

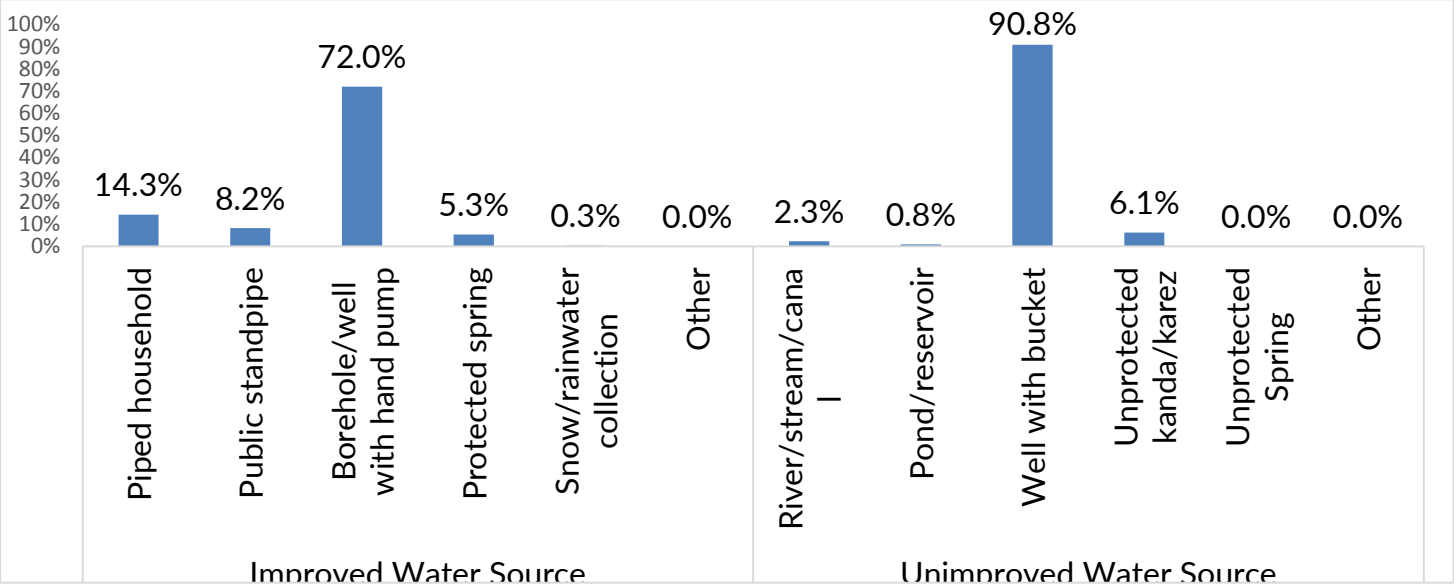
Households were asked to identify their main source of drinking water, which was then categorized as improved or unimproved during analysis. Among all households surveyed, 378 (74.3%) relied mainly on an improved water source, most commonly was borehole/ well with hand pump and piped houshold.

Meanwhile, the remaining 131 (25.7%) relied mainly on an unimproved water source, most commonly well with bucket.

Table 30: Household Main Drinking Water Source.

Main Drinking Water Source N= 509	Frequency	%
Improved Water Source	378	74.3%
Unimproved Water Source	131	25.7%

Figure 10: Household Use of Improved and Unimproved Drinking Water Sources



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

Caregivers demonstrated how they washed their hands for the interviewer. Overall, only 63.6 % of caregivers demonstrated washing their hands with soap/ash and water. For more details refer to table 31 below.

Table 31: Hand Washing Practices (Use of Soap or Ash) among Caregivers.

Hand washing practices by caregivers N= 588	Frequency	%
Uses soap or ash with water	374	63.6%

Uses only water	214	36.4%
Uses nothing	0	0.0 %

Hand Washing During Critical Moments among Caregivers

Caregiver responses about when they routinely wash their hands were assessed as five critical moments, and further grouped into two categories: Hand washing after coming into contact with feces, and hand washing before coming into contact with food. Overall, 24.5 % of caregivers reported washing their hands during five critical moments that fell into these two categories, suggesting low understanding of the importance of hand washing at these moments.

Table 32: Hand Washing Practices by Caregivers at Critical Moments.

Hand washing during Five Critical Moments	N	n	Results	Critical Moments in Two Categories[10]	N	n	Results
After defecation	588	564	95.9%	Washes hands after coming into contact with faeces	588	467	79.4%
After cleaning baby's bottom	588	347	59.0%				
Before food preparation	588	379	64.5%	Washes hands before coming in contact with food	588	466	79.3%
Before eating	588	546	92.9%				
Before feeding or breastfeeding children	588	229	38.9%				
Reported washing hands during all five critical moments	588	144	24.5%	**Reported washing hands during critical moments in both categories.**	588	461	78.4%

8. DISCUSSION

8.1. Nutritional Status of the Province

The results of the survey showed a prevalence of GAM of 9.4% (7.3 – 12.0 95% C.I.) and a SAM prevalence of 2.2% (1.3 – 3.7 95% C.I) per WHZ in the rural area of Kabul province. This level of severity was classified as medium in Kabul rural area according to UNICEF-WHO clasifiation 2018. SAM WHZ threshold (3.0%),

[10] The Sphere Handbook 2018

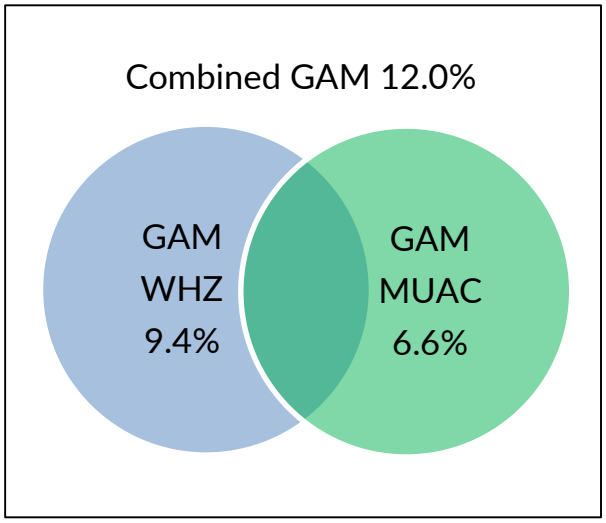
established by MoPH, Nutrition Cluster and AIM-WG as the cut-off after which a response should be prioritized in the Afghanistan context, was not exceeded. According to the last National Nutrition Survey (NNS) conducted in the spring season of 2013, the prevalence of GAM was 6.5 % (4.32-9.78 95% CI) and the prevalence of SAM was 2.0% (1.01 - 3.96 95% CI) in Kabul province including rural and urban.

The GAM prevalence per MUAC was 6.6% (4.7 – 9.3 95% CI) and the SAM prevalence was 1.6% (0.9 – 2.8 95% CI).

The discrepancy between the prevalence of GAM by WHZ and GAM by MUAC continues to be a topic of interest in Afghanistan. Considering both indicators, the Combined GAM prevalence was 12.0% (9.5-15.1 95% CI) and the Combined SAM prevalence was 3.0% (2.0-4.5 95% CI) 95% CI), so reaching the national cut-off for SAM. The combined GAM indicates a higher proportion of children under five affected by acute malnutrition in the province than by referring to either GAM by WHZ or GAM by MUAC only.

Combined GAM captures a greater proportion of acutely malnourished children 6-59 months, and may inform better the estimations of SAM and MAM caseloads in the province; ultimately strengthening planning and programming. All the children in the sample detected as acutely malnourished by either by WHZ, MUAC, or oedema are reflected in this prevalence according to combined criteria.

Figure 11: Children Captured by GAM by WHZ, MUAC, and Combined



Across indicators, children under two years of age had a higher prevalence of GAM [per WHZ 18.8 % (14.3-24.3 95% CI) and per MUAC 17.2 % (12.2-23.7 95% CI)] compared to children over two years of age [per WHZ 4.2 % (2.6- 6.7 95% CI) and per MUAC 0.8 % (0.2- 2.8 95% CI). the result is significant difference with P-Values is less than 0.05 (chi-square statistic is 41.6798). , if we look at to 0-59 months age GAM was 11.0% (8.6-14.0 95% CI)

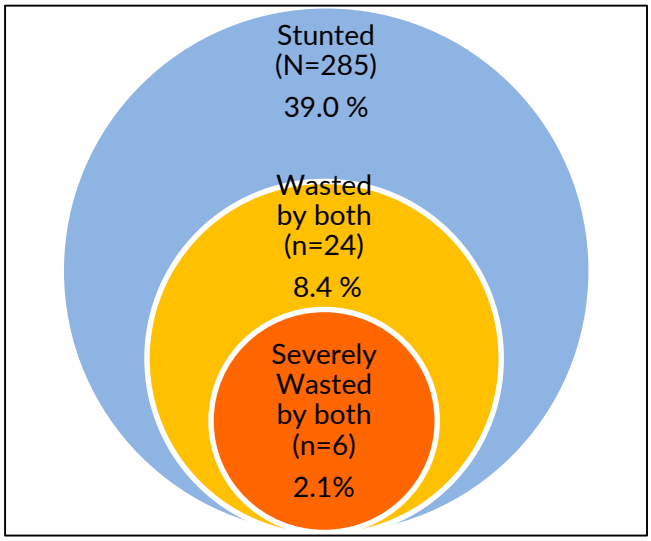
In Brief, with an U5R of 21.1% there were 151,860 children in this age category today. Where 9.4% of them, 142,75 children were acutely malnourished in the current time, meawhile, this survey finds a stunting rate of 39% in the Kabul Rural Areas, so we can imply that there might be 54,206 stunted children today.

Table 33: Prevalence of GAM by WHZ Comparing the 0-59 Month to the 6-59 Month Sample.

Sample	GAM by WHZ		SAM by WHZ	
	%	95% CI	%	95% CI
Children 0-59 Months	11.0 %	(8.6-14.0 95% CI)	2.7%	(1.7- 4.1 95% CI)
Children 6-59 Months	9.4%	(7.3-12.0 95% CI)	2.2%	(1.3- 3.7 95% CI)

Chronic malnutrition in the province is also of concern. The prevalence of chronic malnutrition in province among children 6-59 months was 39.0% (35.4 - 42.7 95% CI), which was classified as very high according to the UNICEF-WHO thresholds 2018. In other words, more than 1 in 3 children in the rural area of Kabul province is not reaching his/her optimal growth and development. This prevalence is of further concern, when the simultaneous presence of acute malnutrition is demonstrated. Recent research has concluded that children both stunted and wasted are at a heightened risk of mortality[11], further suggesting that this should be a priority group for treatment interventions. In Kabul rural area, it was found that among the 285 that were stunted, 24 of them (8.4%) were also wasted by both criteria (WHZ<-2SD + MUAC<125 mm) and 6 of them (2.1%) were severely wasted.

Figure 12: Among Stunted Children 6-59 Months, those Simultaneous Wasted (WHZ)



Low MUAC among women in Kabul rural area was also of concern. Although there is no globally defined cut-off for acute malnutrition among women, the results demonstrated that a higher proportion of pregnant/lactating/preg&lact women had a low MUAC (7.2%). This may be linked to the high energy requirements for breastfeeding/fetal development, further suggesting that this group may be at a heightened risk of acute malnutrition.with difference statistically significant (P-values <0.05).

[11] Myatt, M. et al (2018) Children who are both wasted and stunted are also underweight and have a high risk of death: a descriptive epidemiology of multiple anthropometric deficits using data from 51 countries

8.2. Additional Indicators

Concerns for the strength of IYCF practices in the Province were rised, particularly when the prevalence of exclusive breastfeeding was found to be 77.8%. Efforts to promote the early initation of breastfeeding are also required.

Immunization is an important public health intervention that protects children from illness and disability. As part of the Expanded Program on Immunization (EPI), 84.5% of the children aged between 9 to 18 months have received the 2nd dose of measles vaccination; This highlights a satisfactory coverage, although not reaching the expected 90%.

The CDR and U5DR were below the WHO emergency threshold[12]. Kabul rural area has been found to have a low CDR (0.24 death/10,000/Day) and U5DR (0.11 death/10,000/Day); therefore the situation is acceptable according to WHO thresholds for mortality.

Based on household level assessment of water source, 378 out of 509 households were accessing an improved water source as their main source of drinking water.

[12] emergency threshold

9. RECOMMENDATIONS

SMART Finding	#	Recommendation	Actor	Required Resources	Timeline
1. GAM = 9.4 % (7.3 - 12.0 95% C.I.) Based on WHZ. 3. Combine GAM = 12.0 % (9.5 - 15.1 95% C.I.)	1	Initiating growth monitoring for all U2 children and screening of all U5 children attend HF sought care for their health to identify malnourished cases for the treatment And the frequency of supportive supervision should Increase and strength by service provider and all HFs should provide case finding and referral services	Sehatmandi implementer	Fund/hiring the technical person	Continuously
	2	Nutrition counsellor should hire for all HFs	Sehatmandi implementer	Fund/hiring the consular	ASAP
	3	The OPD-SAM services should be expand to those HFs that still have not provided Supportive supervision will strength to all health facilities, Support and strength the health education session specialty in nutrition program the community trust needs to be build, as well capacity building of related staff	Sehatmandi implementer/PND/UNICEF	RUTF/measuring equipment	Till end June, 2022
	4	The OPD-MAM services should be started	Sehatmandi implementer/WFP	Fund/RUSF/WSB	July, 2019
	5	The CBNP program should be started	Sehatmandi implementer/PND/IHSAN	Fund/HR	ASAP

	6	The nutrition related topics should be increased in the HF's health education time table	Sehatmandi implementer	Fund/hiring the consular	Continuously
1. Stunting) = 39.0 % (35.4 - 42.7 95% C.I.) 2. Underweight = 19.9 %(16.4 - 24.1 95%C.I.)	1	Community based activities should be strengthen and all HFs and HPs and Strengthening growth monitoring of all under two children and apply proper IYCF counseling for mothers of children in each visit	Kabul PPHD national and international stockholder and BPHS implementer NGO	Fund/hiring the consular	Till end of 2020
	2	The underlying causes of malnutrition should be identified and addressed	Kabul PPHD national and international stockholder and BPHS implementer NGO	Fund/hiring the consular	Till end of 2019
	3	Early case finding and referral and treatment services should be improved	Kabul PPHD national and international stockholder and BPHS	Fund/hiring the consular	ASAP

			implementer NGO		
	4	To strengthen Growth monitoring and IYCF counseling for all U2 children to improve nutrition of first 1000 days of life to prevent stunting.	Kabul PPHD national and international stockholder and BPHS implementer NGO	Fund/hiring the consular	Till end 2019
	5	Strictly follow up of Growth Monitoring &IYCF counseling.	Kabul PPHD national and international stockholder and BPHS implementer NGO	Fund/hiring the consular	ASAP
	6	The CBNP program should be started	Sehatmandi implementer/PND/IHSAN	Fund/HR	ASAP
1. 2nd dose Measles immunization coverage=84.8%	1	Strengthen supportive supervision outreach planning in the health facilities.	Sehatmandi implementer	Budged for Vehicle, recruitment	Continuously

(Lower than National standard 90%)	2	Strengthen on the job training about EPI Micro planning.	Sehatmandi implementer	Budged for Vehicle, recruitment	Continuously
	3	strengthen health education in HFs level and increase benefits of the importance of the vaccination in the community	Sehatmandi implementer	Budged for Vehicle, recruitment	Continuously
ICFY 1. Early initiation breastfeeding<24 months = 69.1% 2. Exclusive breastfeeding<6 months = 77.8% 3. Introduction of solid and semisolid food 6-8 months= 44.4%	1	This could be addressed by implementing effective CBNP in the area	Sehatmandi implementer/IHSAN/PND	Budged for Vehicle, recruitment	ASAP
	2	Increasing of health education in the community level.	Sehatmandi implementer/IHSAN/PND	Budged for Vehicle, recruitment	Continuously
1. Pregnant and lactating women (PLWs) nutrition status based on MUAC <230 mm = 7.7%	1	The OPD-MAM services should be started	Sehatmandi implementer/WFP	Fund/RUSF/WSB	July, 2019
WASH 1. Caregiver hand washing practice at all five critical moment= 24.5%	1	This could be addressed by implementing effective CBNP in the area	Sehatmandi implementer/IHSAN/PND	FUND/HR	ASAP

10. ANNEXES

Annex 1: Standard Integrated SMART Survey Questionnaire (Dari)

سوالنامه سروی ادغام یافته سمارت برای ولایت (کابل) سال ۲۰۱۹

تاریخ (روز/ماه/سال)			اسم قریه		
شماره قریه		شماره تیم		شماره خانه	

سوالنامه خانواده

تاریخ آغاز/ مقطع زمانی مشخص: از ماه عاشورا گذشته تا به حالی							
1	2	3	4	5	6	7	8
No.	اسم	جنسیت (مذکر/مونث)	سن (سال)	پیوستن در جریان و یا بعد از مقطع زمانی مشخص	ترک خانواده در دوره و یا بعد از مقطع زمانی مشخص	تولد در دوره و یا بعد از مقطع زمانی مشخص	وفات در دوره و یا بعد از مقطع زمانی مشخص
*اسم های تمام اعضا موجود خانواده را لست نمایید							
1	سرپرست خانواده						
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
نامهای اعضا خانواده را که از آغاز "مقطع زمانی مشخص" تا حال خانه را ترک کرده اند را لست نمایید							
1					بلی		
2					بلی		
3					بلی		
4					بلی		
5					بلی		

نامهای تمام اعضا خانواده را که از آغاز "مقطع زمانی مشخص" تا حال وفات نموده اند را لست نمایید							
1							بلی
2							بلی
3							بلی
4							بلی
5							بلی

*خانواده مجوعه از کسانی را گفته میشود که از یک دیگ/ ظرف نان میخورند و باهم زندگی میکنند (تعریف شده توسط سازمان غذای جهانی (WFP))

سوالنامه خانواده

سوال 1: حالت اقامت اعضا خانواده چگونه است؟ 1= باشنده این ساحه 2= بیجاشده داخلی 3= مهاجر 4= کوچی	
سوال 2. منبع اصلی آب آشامیدنی که توسط اعضا فامیل استفاده میگردد کدام است؟ یکی از گزینه ها (منبع اصلی) را طبق پاسخ جواب دهنده انتخاب نمایید. 1= شبکه آبرسانی در خانه 2= نل آب عامه 3= بمبه آب 4= چشمه آب محافظت شده 5= آب جمع آوری شده برف و باران 6= آب دریا/ نهر/کانال 7= آب دریاچه/ مخذن 8= چاه با دولچه 9= کاریز غیر محفوظ 10= چشمه غیر محفوظ 98= دیگر موارد (مشخص سازید)	

سولنامه طفل 0-59 ماهه

1	2	3	4	5	6	7	8	9	10
ای دی طفل	جنسیت (مذکر/ مونث)	تاریخ تولد (روز/ ماه/ سال)	سن (ماه ها)	وزن (00.0 کیلو گرام)	قد یا طول (00.0 سانتی متر)	*اندازه گیری (طول و قد)	پندیده گی (edema) دوجانبه	اندازه محیط وسط بازو چپ (*MUAC*) ملی متر) 000)	همراه با لباس (بلی/نخیر)
1									
2									
3									

4									
5									
6									
7									
8									

* صرف اگر طول برای طفل بزرگتر از 2 ساله اندازه گیری شده باشد و یا به سبب شرایط اجتناب ناپذیر قد برای طفل کوچکتر از 2 ساله اندازه گیری شده باشد یادداشت را انجام دهید.

شماره شناسایی (**ID**) طفل (6 -59 ماهه)					
برای هر طفل که با سوء تغذی حاد شناسایی گردد: (وزن، قد، *Z* (*WHZ*)، اندازه گیری محیط وسطی بازو (*MUAC*) و یا پندیده گی (*edema*)) **سوال 5. آیا طفل در حال حاضر خدمات تداوی سوء تغذی را دریافت میکند؟** در مورد کارت شمولت از آنها بپرسید و غذا درمانی (موادغذایی درمانی آماده برای مصرف (*RUTF*)/ غذای مکمل آماده برای مصرف (*RUSF*) را برای شناسایی نوعیت خدمات تداوی ارزیابی نمایید 1= بخش غیر بستری سوء تغذی حاد شدید OPD-SAM 2= بخش غیر بستری سوء تغذی حاد متوسط OPD-MAM 3= بخش بستری سوء تغذی حاد شدید IPD-SAM 4= تداوی صورت نگرفته 98= نمی دانم					
اگر طفل در برنامه تداوی شامل نشده باشد، به نزدیکترین مرکز مناسب تداوی راجع گردد **سوال 6. آیا طفل را راجع ساختید؟** 1= بلی 0= نخیر					

سوالنامه طفل

شماره شناسایی (**ID**) طفل (18-59 ماهه)					
سوال 7. آیا طفل دو دوره واکسین سرخکان را دریافت کرده است؟ (در محیط وسطی بازو راست) در مورد کارت واکسین بپرسید تا از موجودیت آن اطمینان حاصل گردد. 1= طبق کارت تصدیق میگردد که دو دوره واکسین را دریافت کرده است 2= طبق گفته مواظبت کننده دو دوره واکسین را دریافت کرده است 3= دو دوره واکسین را دریافت نکرده است 98= نمی دانم					

شماره شناسایی (**ID** نمبر) طفل (کوچکتر از 24 ماهه)					

سوال 8. چه زمانی بعد از ولادت برای اولین بار طفل از شیر مادر مستفید شد؟ 1= در جریان یک ساعت اول 2= در جریان یک روز اول یا در طول 24 ساعت اول 3= بعد از روز اول (بعد از 24 ساعت اول) 98= نمی دانم					
سوال 9. آیا دیروز برای طفل از طرف روز و یا شب شیر مادر داده شد؟ این پرسش شامل دریافت شیر پستان از طریق پیاله، بوتل و یا زن دیگری نیز میشود (اگر شیر به طریقه های فوق الذکر داده شده باشد جواب "بلی" انتخاب گردد) 1= بلی 0= نخیر 98= نمی دانم					
سوال 10. آیا طفل بغیر از شیر مادر مایع نوشیدنی دیگری را دیروز در جریان روز و یا شب حاصل نموده است؟ گزینه ها را نخوانید، با پرسیدن سوالات باز تحقیق نموده و جوابات قابل تطبیق را نشانی نمایید. قطره ویتامین، او-ار-اس، و یا ادویه جات که بشکل قطره داده میشود استثنا به حساب میاید. 1= بلی 0= نخیر					
A. **آب صاف**					
B. **شیر خشک برای نوزادان (شیر خشک مختص شده برای اطفال)**					
C. **شیر حیوانی تازه و یا خشک**					
D. **جوس و یا نوشابه**					
E. **شوربا**					
F. **ماست**					
G. **فرنی رقیق**					
H. **مایعات دیگر (چای، قهوه و غیره)**					
سوال 11. . آیا طفل ماده جامد، نیمه جامد و یا غذا های نرم را دیروز در جریان روز و یا شب گرفته است؟ 1= بلی 0= نخیر 98= نمی دانم					

سوالنامه مواظبت کننده

شماره شناسایی (**ID** نمبر) عضو مواظبت کننده خانواده					
سوال 12. آیا میتوانید نشان دهید که چگونه دستان تانرا میشوید؟ مواظبت کننده را هنگام شستن دستان شان مشاهده نمایید. از وی سوال نپرسید و جوابات را نخوانید. مناسب ترین جواب را نشانی نمایید. 1= بلی 0= نخیر					
A. **از صابون و یا خاکستر همراه با آب استفاده میکند**					
B. **فقد از آب استفاده میکند**					
C. **از هیچ چیز استفاده نمی کند**					
D. **موارد دیگر (مشخص سازید)**					

شماره شناسایی (**ID** نمبر) عضو مواظبت کننده خانواده					
سوال 13. چه زمانی معمولاً دستان تانرا میشوید؟ پرس و پال نکنید و جواب ها را نیز نخوانید. تمام جوابات مناسب را نشانی نمایید. 1= بلی 0= نخیر					
A. بعد از رفع حاجت					
B. بعد از پاک کردن طفل					
C. قبل از آماده نمودن غذا					
D. قبل از غذا خوردن					
E. قبل از غذا و یا شیر دادن به اطفال					

شماره شناسایی (**ID** نمبر) زنان (15-49 ساله) خانواده					
سوال 14. حالت زن 1= حامله 2= شیرده 3= حامله و شیرده 4= هیچ کدام					
اندازه گیری محیط وسطی بازو (MUAC) (ملی متر)					

نظریات کلی (اختیاری)

Annex 2: Selected Clusters in Kabul Province Rural area

District Name	Geographical unit	Population size	Cluster
Kabul	ساحات بین ده یحیی و پاچا صاحب حسین خیل و اسد اباد بالای سرک از خانه خواجه خان آغاالی خانه نذیر احمد پهلوی مسجد حاجی شاکر	1350	1
Kabul	قریه تره خیل مسجد کلان از خانه سناتور الی خانه خانه عمر گل	1350	2
Kabul	ده یحیی مدرسه قاری محیط مسجد حاجی آصف و میر عالم شهید و مسجد حاجی گلبازاز خانه عبدالمجید الی خانه ناصر	1170	3
Kabul	قریه بختیاران از پهلوی مسجد عسلیمان از خانه شمس الله الی خانه خانه حاجی بازار بختیاران	1150	4
Kabul	قریه سنگ آب،نو آباد شروع از خانه بید الله الی خانه سید عالم	1125	5
Kabul	شهرک محمدیه لب جر غرب پارک از خانه اکرم الی خانه ویس	1710	6
Kabul	ده سبز خاص از خانه مولوی محبوب الی خانه صمد	750	7

8	1665	ده سیز قلعه رستم خانه محمد عارف الی خانه عدالجان	Kabul
9	400	Qariea pirmohamad khanقریه پیر محمد خان	Kabul
10	420	qala nayazeقلعه نیازی	Kabul
11	500	قلعه الله نور	Kabul
12	1365	DehYaqobده یعقوب	Kabul
13	700	لب سرک قلعه وزیر	Kabul
14	700	نواباد برجک	Kabul
15	635	دره زرگر	Kabul
16	1100	شاه توت	Kabul
17	720	قلعه لاله قلعه کهنه اوریا خیل	Kabul
18	420	کوچی های دشت	Kabul
19	550	جنره خیل	Kabul
20	800	مسجید جامع چهار سو	Kabul
21	800	سرک اول خیر آباد الی مسجید جامع	Kabul
22	750	قلعه لقمان	Kabul
23	550	بگرامی قریه کاریز پائین از خانه گلبدین الی خانه شاه ولی	Kabul
24	1400	بگرامی شهرک نو آباد قله بغلک	Kabul
25	1600	مسجد حضرت یوسف	Kabul
26	1690	قله احمد خان تا چمندیا ی خانه وحید	Kabul
27	1250	مسجد ابراهیم خلیل	Kabul
28	1360	از کوچه مسجد عمر الی فارم مرغ داری	Kabul
29	900	بکرامی کمری مسجد سید احمد غازی رضا خان ازخانه الی خانه عبرالجلیل	Kabul
30	900	کوچه شمشاد مسجد محمد مصطفی از خانه شمس الرحمن شروع الی خانه غلام خان	Kabul
31	950	بکرامی داک منجی مسجد جامعه داک از خانه الی خانه	Kabul
32	900	بکر امی بتخاک مسجد حضرت صاحب از خانه شمس الی خانه احمد شاه	Kabul
33	975	تانگ تیل قله احمد خان	Kabul
34	1800	نوآباد قلعه سلام مقابل لیسه شیوه کی	Kabul
35	1150	بگرامی گلبته شهرک وحدت برج برق	Kabul
36	1280	میر کلان, دشت درگی	Kabul
37	480	یکه درخت	Kabul
38	1265	کوچی بازار	Kabul
39	450	قلعه دیوانه	Kabul
40	335	مسجد جامع مشوانی	Kabul
41	490	اطراف ده سکندر	Kabul
42	700	قلع بالا	Kabul
43	700	مشوانی	Kabul
44	510	باغ های ده نو	Kabul
45	150	کوچی های جلاب صالو خیل	Kabul
46	750	انځری خواجه بهران بابا	Kabul
47	765	قلعه کلان آکه خیل	Kabul
48	700	قلعه مرزا	Kabul

Annex 3: Standardization Test Results: Evaluation of Enumerators For Kabul Rural area

Enumerator	Weight	Height	MUAC
Enumerator 1	TEM good	TEM good	TEM good
Enumerator 2	TEM acceptable	TEM good	TEM poor
Enumerator 3	TEM good	TEM good	TEM acceptable
Enumerator 4	TEM acceptable	TEM good	TEM poor
Enumerator 5	TEM acceptable	TEM good	TEM acceptable
Enumerator 6	TEM good	TEM good	TEM good
Enumerator 7	TEM acceptable	TEM good	TEM acceptable
Enumerator 8	TEM acceptable	TEM good	TEM good
Enumerator 9	TEM good	TEM good	TEM good
Enumerator 10	TEM acceptable	TEM good	TEM good
Enumerator 11	TEM poor	TEM good	TEM good
Enumerator 12	TEM acceptable	TEM good	TEM good
Enumerator 13	TEM acceptable	TEM good	TEM good
Enumerator 14	TEM poor	TEM good	TEM good
Enumerator 15	TEM acceptable	TEM good	TEM good
Enumerator 16	TEM poor	TEM good	TEM good
Enumerator 17	TEM good	TEM good	TEM good
Enumerator 18	TEM acceptable	TEM good	TEM good
Enumerator 19	TEM acceptable	TEM good	TEM good
Enumerator 20	TEM good	TEM good	TEM good

Annex 4: Plausibility check for: Kabul_Rural_SMART_Survey_January_2019_Afghanistan.as

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

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Flagged data (% of out of range subjects)	Incl	%	0-2.5 0	>2.5-5.0 5	>5.0-7.5 10	>7.5 20	**0** (0.4 %)
Overall Sex ratio (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	**0** (p=0.105)
Age ratio(6-29 vs 30-59)	Incl	p	>0.1	>0.05	>0.001	<=0.001	

(Significant chi square)			0	2	4	10	**0** (p=0.887)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (5)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (6)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (12)
Standard Dev WHZ	Excl	SD	<1.1 and	<1.15 and	<1.20 and	>=1.20 or	
.							
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	**0** (1.07)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (-0.19)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (0.06)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**0** (p=0.104)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**2** %

The overall score of this survey is 2 %, this is excellent.

There were no duplicate entries detected.

Percentage of children with no exact birthday: 79 %

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 wereflagged 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=82/ID=2: HAZ (1.372), Age may be incorrect
Line=159/ID=1: HAZ (1.631), Age may be incorrect
Line=311/ID=3: HAZ (1.492), Height may be incorrect
Line=481/ID=3: HAZ (1.345), Height may be incorrect
Line=561/ID=1: **WHZ (-4.689)**, Weight may be incorrect
Line=595/ID=2: HAZ (-5.476), Height may be incorrect
Line=667/ID=1: **WHZ (-4.094)**, Weight may be incorrect
Line=677/ID=1: HAZ (-5.768), Age may be incorrect
Line=789/ID=3: **WHZ (-4.527)**, HAZ (3.967), Height may be incorrect

Percentage of values flagged with SMART flags:WHZ: 0.4 %, HAZ: 0.9 %, WAZ: 0.0 %

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: 0.86 (The value should be around 0.85).:
p-value = 0.887 (as expected)

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

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	87/90.7 (1.0)	77/80.5 (1.0)	164/171.2 (1.0)	1.13
18 to 29	12	90/88.5 (1.0)	87/78.5 (1.1)	177/166.9 (1.1)	1.03
30 to 41	12	97/85.7 (1.1)	82/76.1 (1.1)	179/161.8 (1.1)	1.18
42 to 53	12	70/84.4 (0.8)	69/74.9 (0.9)	139/159.2 (0.9)	1.01
54 to 59	6	47/41.7 (1.1)	32/37.0 (0.9)	79/78.8 (1.0)	1.47
6 to 59	54	391/369.0 (1.1)	347/369.0 (0.9)		1.13

The data are expressed as observed number/expected number (ratio of obs/expect)

Overall sex ratio: p-value = 0.105 (boys and girls equally represented)
Overall age distribution: p-value = 0.257 (as expected)
Overall age distribution for boys: p-value = 0.311 (as expected)
Overall age distribution for girls: p-value = 0.613 (as expected)
Overall sex/age distribution: p-value = 0.037 (significant difference)

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: **5** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.142

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: **6** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.008 (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: **12** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.000 (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:	1.10	1.10	1.07
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	9.8%	9.8%	9.4%
calculated with current SD:	9.4%	9.4%	8.6%
calculated with a SD of 1:	7.4%	7.4%	7.2%
HAZ			
Standard Deviation SD:	1.10	1.10	1.04
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	38.9%	38.9%	39.0%
calculated with current SD:	40.6%	40.6%	40.6%
calculated with a SD of 1:	39.7%	39.7%	40.2%
WAZ			
Standard Deviation SD:	0.84	0.84	0.84
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:			
calculated with current SD:			
calculated with a SD of 1:			
Results for Shapiro-Wilk test for normally (Gaussian) distributed data:			
WHZ	p= 0.000	p= 0.000	p= 0.004

```
HAZ                                    p= 0.002         p= 0.002         p= 0.470
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                                      -0.32            -0.32            -0.19
HAZ                                       0.13             0.13            -0.04
WAZ                                      -0.32            -0.32            -0.32
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                                       0.42             0.42             0.06
HAZ                                       1.09             1.09            -0.10
WAZ                                       0.31             0.31             0.31
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 with 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=1.27 (p=0.104)
WHZ < -3: ID=1.06 (p=0.368)
GAM:      ID=1.27 (p=0.104)
SAM:      ID=1.06 (p=0.368)
HAZ < -2: ID=1.42 (p=0.033)
HAZ < -3: ID=1.48 (p=0.019)
WAZ < -2: ID=1.54 (p=0.011)
WAZ < -3: ID=1.28 (p=0.094)
```

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 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 wererelated 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: 1.02 (n=47, f=0)  #########
02: 0.91 (n=44, f=0)  #####
03: 0.96 (n=47, f=0)  #######
```

```
04: 1.11 (n=45, f=0)  #############
05: 1.15 (n=44, f=0)  ###############
06: 1.08 (n=44, f=0)  ############
07: 1.41 (n=43, f=2)  ##########################
08: 1.06 (n=45, f=0)  ###########
09: 0.83 (n=46, f=0)  #
10: 0.96 (n=45, f=0)  #######
11: 1.14 (n=42, f=0)  ##############
12: 1.05 (n=41, f=0)  ##########
13: 1.00 (n=36, f=0)  ########
14: 1.02 (n=32, f=0)  #########
15: 0.98 (n=26, f=0)  #######
16: 1.53 (n=22, f=1)  ##############################
17: 0.66 (n=21, f=0)
18: 1.06 (n=15, f=0)  OOOOOOOOOO
19: 0.78 (n=12, f=0)
20: 1.36 (n=10, f=0)  ~~~~~~~~~~~~~~~~~~~~~~
21: 1.25 (n=08, f=0)  ~~~~~~~~~~~~~~~~~~~
22: 1.51 (n=08, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
23: 1.47 (n=05, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~
24: 1.21 (n=03, f=0)  ~~~~~~~~~~~~~~~~~
25: 1.48 (n=03, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
26: 1.52 (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)

Analysis by Team

Team	**1**	**2**	**3**	**4**	**5**	**6**
n =	113	120	114	105	130	156
Percentage of values flagged with SMART flags:						
WHZ:	0.0	0.0	0.9	0.0	0.8	1.3
HAZ:	0.0	0.0	2.6	1.0	1.5	0.6
WAZ:	0.0	0.0	0.9	0.0	0.0	0.0
Age ratio of 6-29 months to 30-59 months:						
	0.85	0.90	0.93	0.94	0.88	0.71
Sex ratio (male/female):						
	1.17	1.07	0.90	1.44	1.41	0.95
Digit preference Weight (%):						
.0 :	11	7	12	12	12	5
.1 :	8	16	12	7	6	13
.2 :	9	16	5	10	8	14
.3 :	8	3	11	11	5	10
.4 :	8	13	11	5	7	10
.5 :	6	12	6	8	12	7
.6 :	18	8	13	10	10	7
.7 :	12	6	9	10	12	6
.8 :	11	12	12	18	10	13
.9 :	11	10	8	10	16	14
DPS:	10	14	9	11	11	11

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

Digit preference Height (%):						
.0 :	6	13	10	9	6	4
.1 :	6	13	7	14	9	15
.2 :	17	11	11	10	9	10

.3 :	12	12	11	8	15	13
.4 :	8	14	10	12	15	8
.5 :	7	6	13	10	9	8
.6 :	19	8	10	9	12	15
.7 :	15	10	10	7	15	10
.8 :	6	8	9	10	5	10
.9 :	4	6	11	12	5	8
DPS:	17	9	5	8	13	11

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

Digit preference MUAC (%):

.0 :	4	4	6	5	17	2
.1 :	12	11	12	8	14	13
.2 :	23	20	19	16	15	17
.3 :	7	10	15	15	10	8
.4 :	11	13	11	13	11	14
.5 :	4	6	4	7	3	8
.6 :	13	12	9	13	5	10
.7 :	10	3	4	5	8	4
.8 :	8	18	8	6	5	10
.9 :	8	5	12	12	12	13
DPS:	17	18	15	14	15	15

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

Standard deviation of WHZ:

SD	1.12	1.14	0.84	1.01	1.14	1.22

Prevalence (< -2) observed:

%	9.7	10.0	8.6	10.8	12.2

Prevalence (< -2) calculated with current SD:

%	8.5	10.4	6.8	8.6	12.3

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

%	6.2	7.7	6.6	6.0	8.0

Standard deviation of HAZ:

SD	0.99	1.04	1.16	0.98	1.26	1.08

observed:

%	47.5	29.8	40.0	39.7	

calculated with current SD:

%	50.5	32.2	41.4	40.9	

calculated with a SD of 1:

%	50.5	29.6	39.2	40.2	

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	13/14.2 (0.9)	11/12.1 (0.9)	24/26.2 (0.9)	1.18
18 to 29	12	11/13.8 (0.8)	17/11.8 (1.4)	28/25.6 (1.1)	0.65
30 to 41	12	19/13.4 (1.4)	13/11.4 (1.1)	32/24.8 (1.3)	1.46
42 to 53	12	10/13.2 (0.8)	6/11.2 (0.5)	16/24.4 (0.7)	1.67
54 to 59	6	8/6.5 (1.2)	5/5.5 (0.9)	13/12.1 (1.1)	1.60

6 to 59	54	61/56.5 (1.1)	52/56.5 (0.9)	1.17

The data are expressed as observed number/expected number (ratio of obs/expect)

Overall sex ratio: p-value = 0.397 (boys and girls equally represented)
Overall age distribution: p-value = 0.241 (as expected)
Overall age distribution for boys: p-value = 0.389 (as expected)
Overall age distribution for girls: p-value = 0.274 (as expected)
Overall sex/age distribution: p-value = 0.042 (significant difference)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	18/14.4 (1.3)	9/13.5 (0.7)	27/27.8 (1.0)	2.00
18 to 29	12	15/14.0 (1.1)	15/13.1 (1.1)	30/27.1 (1.1)	1.00
30 to 41	12	19/13.6 (1.4)	18/12.7 (1.4)	37/26.3 (1.4)	1.06
42 to 53	12	6/13.4 (0.4)	12/12.5 (1.0)	18/25.9 (0.7)	0.50
54 to 59	6	4/6.6 (0.6)	4/6.2 (0.6)	8/12.8 (0.6)	1.00
6 to 59	54	62/60.0 (1.0)	58/60.0 (1.0)		1.07

The data are expressed as observed number/expected number (ratio of obs/expect)

Overall sex ratio: p-value = 0.715 (boys and girls equally represented)
Overall age distribution: p-value = 0.064 (as expected)
Overall age distribution for boys: p-value = 0.084 (as expected)
Overall age distribution for girls: p-value = 0.315 (as expected)
Overall sex/age distribution: p-value = 0.010 (significant difference)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	12/12.5 (1.0)	13/13.9 (0.9)	25/26.5 (0.9)	0.92
18 to 29	12	11/12.2 (0.9)	19/13.6 (1.4)	30/25.8 (1.2)	0.58
30 to 41	12	12/11.8 (1.0)	10/13.2 (0.8)	22/25.0 (0.9)	1.20
42 to 53	12	12/11.7 (1.0)	13/12.9 (1.0)	25/24.6 (1.0)	0.92
54 to 59	6	7/5.8 (1.2)	5/6.4 (0.8)	12/12.2 (1.0)	1.40
6 to 59	54	54/57.0 (0.9)	60/57.0 (1.1)		0.90

The data are expressed as observed number/expected number (ratio of obs/expect)

Overall sex ratio: p-value = 0.574 (boys and girls equally represented)
Overall age distribution: p-value = 0.889 (as expected)
Overall age distribution for boys: p-value = 0.981 (as expected)
Overall age distribution for girls: p-value = 0.510 (as expected)
Overall sex/age distribution: p-value = 0.382 (as expected)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	12/14.4 (0.8)	15/10.0 (1.5)	27/24.4 (1.1)	0.80
18 to 29	12	18/14.0 (1.3)	6/9.7 (0.6)	24/23.8 (1.0)	3.00

30 to 41	12	14/13.6 (1.0)	11/9.4 (1.2)	25/23.0 (1.1)	1.27
42 to 53	12	10/13.4 (0.7)	11/9.3 (1.2)	21/22.7 (0.9)	0.91
54 to 59	6	8/6.6 (1.2)	0/4.6 (0.0)	8/11.2 (0.7)	
6 to 59	54	62/52.5 (1.2)	43/52.5 (0.8)		1.44

The data are expressed as observed number/expected number (ratio of obs/expect)

Overall sex ratio: p-value = 0.064 (boys and girls equally represented)
Overall age distribution: p-value = 0.827 (as expected)
Overall age distribution for boys: p-value = 0.613 (as expected)
Overall age distribution for girls: p-value = 0.058 (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	19/17.6 (1.1)	10/12.5 (0.8)	29/30.2 (1.0)	1.90
18 to 29	12	17/17.2 (1.0)	15/12.2 (1.2)	32/29.4 (1.1)	1.13
30 to 41	12	21/16.7 (1.3)	11/11.8 (0.9)	32/28.5 (1.1)	1.91
42 to 53	12	14/16.4 (0.9)	13/11.7 (1.1)	27/28.1 (1.0)	1.08
54 to 59	6	5/8.1 (0.6)	5/5.8 (0.9)	10/13.9 (0.7)	1.00
6 to 59	54	76/65.0 (1.2)	54/65.0 (0.8)		1.41

The data are expressed as observed number/expected number (ratio of obs/expect)

Overall sex ratio: p-value = 0.054 (boys and girls equally represented)
Overall age distribution: p-value = 0.768 (as expected)
Overall age distribution for boys: p-value = 0.595 (as expected)
Overall age distribution for girls: p-value = 0.833 (as expected)
Overall sex/age distribution: p-value = 0.085 (as expected)

Team 6:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	13/17.6 (0.7)	19/18.6 (1.0)	32/36.2 (0.9)	0.68
18 to 29	12	18/17.2 (1.0)	15/18.1 (0.8)	33/35.3 (0.9)	1.20
30 to 41	12	12/16.7 (0.7)	19/17.5 (1.1)	31/34.2 (0.9)	0.63
42 to 53	12	18/16.4 (1.1)	14/17.3 (0.8)	32/33.7 (1.0)	1.29
54 to 59	6	15/8.1 (1.8)	13/8.5 (1.5)	28/16.6 (1.7)	1.15
6 to 59	54	76/78.0 (1.0)	80/78.0 (1.0)		0.95

The data are expressed as observed number/expected number (ratio of obs/expect)

Overall sex ratio: p-value = 0.749 (boys and girls equally represented)
Overall age distribution: p-value = 0.068 (as expected)
Overall age distribution for boys: p-value = 0.073 (as expected)
Overall age distribution for girls: p-value = 0.461 (as expected)
Overall sex/age distribution: p-value = 0.016 (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 then this wererelated 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: 0.93 (n=08, f=0)  ######
02: 1.15 (n=08, f=0)  ###############
03: 1.36 (n=08, f=0)  ########################
04: 1.31 (n=08, f=0)  ####################
05: 0.87 (n=07, f=0)  ###
06: 1.01 (n=08, f=0)  #########
07: 1.37 (n=08, f=0)  ########################
08: 0.87 (n=08, f=0)  ###
09: 0.68 (n=08, f=0)
10: 1.26 (n=08, f=0)  ##################
11: 1.16 (n=07, f=0)  ###############
12: 1.35 (n=06, f=0)  ######################
13: 0.33 (n=04, f=0)
14: 1.32 (n=05, f=0)  ####################
15: 0.40 (n=02, f=0)
16: 1.49 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOO
17: 0.19 (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: 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: 1.36 (n=07, f=0)  ########################
02: 1.11 (n=07, f=0)  ############
03: 1.06 (n=07, f=0)  ###########
04: 1.00 (n=07, f=0)  #########
05: 0.98 (n=06, f=0)  ########
06: 0.61 (n=07, f=0)
07: 1.48 (n=07, f=0)  ##############################
08: 1.01 (n=06, f=0)  #########
09: 0.85 (n=06, f=0)  ##
10: 0.94 (n=07, f=0)  ######
11: 1.61 (n=07, f=0)  ###################################
12: 1.02 (n=07, f=0)  #########
13: 1.22 (n=07, f=0)  #################
14: 0.64 (n=07, f=0)
15: 0.99 (n=05, f=0)  ########
16: 1.37 (n=04, f=0)  ########################
17: 1.05 (n=04, f=0)  ##########
18: 0.84 (n=02, f=0)  OO
19: 0.56 (n=02, f=0)
20: 0.60 (n=02, f=0)
22: 0.86 (n=02, f=0)  OO
```

(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: 0.98 (n=08, f=0)  #######
02: 0.48 (n=06, f=0)
03: 0.85 (n=08, f=0)  ##
04: 1.18 (n=06, f=0)  ################
05: 0.50 (n=08, f=0)
06: 0.70 (n=08, f=0)
07: 0.56 (n=08, f=0)
08: 1.13 (n=08, f=0)  ##############
09: 0.49 (n=08, f=0)
10: 0.48 (n=07, f=0)
11: 0.83 (n=07, f=0)  #
12: 0.47 (n=08, f=0)
```

```
13: 1.01 (n=06, f=0)  #########
14: 1.14 (n=04, f=0)  OOOOOOOOOOOOOO
15: 1.29 (n=04, f=0)  OOOOOOOOOOOOOOOOOOOOO
16: 0.21 (n=03, f=0)
17: 0.16 (n=02, f=0)
18: 0.75 (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: 1.25 (n=08, f=0)  ###################
02: 0.55 (n=08, f=0)
03: 0.57 (n=08, f=0)
04: 0.27 (n=08, f=0)
05: 1.18 (n=07, f=0)  #################
06: 1.59 (n=07, f=0)  ################################
07: 1.27 (n=06, f=0)  ####################
08: 1.03 (n=08, f=0)  ##########
09: 0.70 (n=08, f=0)
10: 0.93 (n=08, f=0)  #####
11: 1.00 (n=06, f=0)  ########
12: 0.81 (n=06, f=0)
13: 1.29 (n=04, f=0)  OOOOOOOOOOOOOOOOOOOO
14: 1.55 (n=04, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
15: 0.63 (n=03, f=0)
16: 1.59 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
17: 1.10 (n=02, f=0)  ~~~~~~~~~~~~
18: 0.87 (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: 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: 0.72 (n=08, f=0)
02: 1.26 (n=07, f=0)  ###################
03: 0.78 (n=08, f=0)
04: 1.22 (n=08, f=0)  ##################
05: 1.61 (n=08, f=0)  ################################
06: 1.33 (n=06, f=0)  ######################
07: 1.22 (n=06, f=0)  ##################
08: 1.31 (n=08, f=0)  ####################
09: 1.51 (n=08, f=0)  ##############################
10: 1.03 (n=07, f=0)  ##########
11: 0.36 (n=07, f=0)
12: 0.89 (n=07, f=0)  ####
13: 0.49 (n=07, f=0)
14: 0.85 (n=05, f=0)  ##
15: 0.50 (n=05, f=0)
16: 1.53 (n=04, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
17: 0.73 (n=05, f=0)
18: 1.29 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOO
19: 0.67 (n=04, f=0)
20: 1.53 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
21: 0.55 (n=03, f=0)
22: 0.28 (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: 1.06 (n=08, f=0)  ############
```

```
02: 0.65 (n=08, f=0)
03: 0.91 (n=08, f=0)  #####
04: 1.07 (n=08, f=0)  ###########
05: 1.60 (n=08, f=0)  ################################
06: 0.79 (n=08, f=0)
07: 2.08 (n=08, f=2)  ##################################################
08: 0.85 (n=07, f=0)  ##
09: 0.50 (n=08, f=0)
10: 0.71 (n=08, f=0)
11: 1.22 (n=08, f=0)  ##################
12: 1.38 (n=07, f=0)  ########################
13: 1.05 (n=08, f=0)  ##########
14: 0.52 (n=07, f=0)
15: 1.20 (n=07, f=0)  ##################
16: 1.50 (n=07, f=0)  ##############################
17: 0.60 (n=06, f=0)
18: 1.15 (n=05, f=0)  ###############
19: 0.87 (n=04, f=0)  OOO
20: 2.11 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
21: 2.08 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
22: 2.38 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
23: 0.42 (n=02, f=0)
24: 1.71 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
25: 2.03 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
26: 1.52 (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)

11. REFERENCES

- ENA software 2011 updated 9th July 2015
- National nutrition Survey 2013
- WHO Child Growth Standard 2006
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