AFGHANISTAN

Nutrition & Mortality SMART Survey
Final Report

Bamyan Province, Afghanistan

10th to 26th August 2017

Survey Manager: Dr. Baidar Bakht Habib

Report compiled by: Dr. Mohammad Khalid Zakir and Shafiullah Samim

Funded by: OCHA

Bu Ali Rehabilitation and Aid Network (BARAN) and MOVE Welfare Organization with technical support of Action Against Hunger

Action Against Hunger /Action Contre la Faim

Is a non-governmental, non-political and non-religious organization

1. Acknowledgment

Action Against Hunger / Action Contra la Faim (ACF) Afghanistan would like to thank the following stakeholders for their support in the smooth running and successful implementation of the nutrition and mortality SMART survey in Bamyan province.

- Public Nutrition Department (PND), Nutrition Cluster and Afghanistan Information Management Working Group (AIM-WG) for their support in methodological review and guidance.
- Bamyan Provincial Public Health Directorate (PPHD) and currently Bamyan Provincial Nutrition officer (PNO) for the support provided in authorization of the survey.
- Office for the Coordination of Humanitarian Affairs (OCHA) for their financial support in the survey.
- All the community members for welcoming and supporting the survey teams during the data collection process.
- Bu Ali Rehabilitation and Aid Network (BARAN) and MOVE welfare organization teams at Kabul and Bamyan level especially thanks from Dr. Temorshah Yarghal, Dr. Husain Ali Khalili, Dr. Ezatulllah Akbari, Mr. Najibullah Yaqobi and Mr. Abdul Hameed Wasiq, for their valued support and extremely good partnership during the assessment. Moreover, from the whole BARAN/MOVE teams based in Bamyan their support provided during the implementation of the Assessment making the whole process smooth.
- ACF teams at Kabul and Paris for technical, logistics and administrative support.
- Survey teams composed of enumerators, team leaders and supervisors for making the whole process smooth.

Statement on Copyright

© Action Against Hunger

Action Against Hunger is a non-governmental, non-political and non-religious organization.

Unless otherwise indicated, reproduction is authorized on condition that the source is credited. If reproduction or use of texts and visual materials (sound, images, software, etc.) is subject to prior authorization, such authorization will render null and void the above-mentioned general authorization and will clearly indicate any restrictions on use.

The content of this document is the responsibility of the authors and does not necessarily reflect the views of Action Against Hunger or OCHA.

2. Abbreviations

ACF	**Action Contra la Faim/Action Against Hunger**
AIM -WG	**Assessment Information Working Group**
BARAN	**Bu Ali Rehabilitation and Aid Network**
BCG	**Bacillus Calmette Guerin**
CDR	**Crude Death Rate**
CHW	**Community Health Worker**
CSO	**Central Statistics Organization**
DoPH	**Directorate of Public Health**
ENA	**Emergency Nutrition Assessment**
GAM	**Global Acute Malnutrition**
HH	**Household**
HQ	**Head Quarter**
IYCF	**Infant and Young Child Feeding**
MOPH	**Minister of Public Health**
MOVE	**MOVE welfare Organization**
MUAC	**mid Upper Arm Circumference**
MW	**Mean Weight**
NNS	**National Nutrition Survey**
OCHA	**Office for the Coordination of Humanitarian Affairs**
OW	**observed Weight**
PND	**Public Health Nutrition Department**
PNO	**Public Nutrition Officer**
PPHD	**Provincial Public Health Directorate**
PPS	**Proportional Population Size**
RC	**Reserve Cluster**

SAM	**Severe Acute Malnutrition**
SD	**Standard Deviation**
SMART	**Standardized Monitoring and Assessment of Relief and Transition**
U5	**Under five**
U5DR	**Under five Death Rates**
UNICEF	**United Nation Children's Fund**
WASH	**Water Sanitation and Hygiene**
WHO	**World Health Organization**
WHZ	**Weight for Height Z score**

3. Table of content

1. Acknowledgment 2
2. Abbreviations 3
3. Table of content 5
4. Executive summery 9
5. Introduction 10
6. Context and Justification 10
   1. Survey objective 11
7. Methodology 11
   7.1. . Sampling Methodology 11
   7.2. Sample Size 13
   7.3. Training, team composition and supervision: 15
   7.4. Data Entry and analysis 16
8. Indicators: definition, calculation and interpretation 16
   8.1. Anthropometric Indicators: Definition of nutritional status of children 0-59 months 16
   8.2. Mortality Indicator Calculation 18
      8.2.1. Crude death rate (CDR) 18
      8.2.2. Under-5 death rate (U5DR) 19
   8.3. Health 19
      8.3.1. Immunization status, deworming and vitamin A supplementation 19
      8.3.2. Morbidity 19
      8.3.3. Mothers nutritional status and Iron/Folate supplementation for pregnant 19
      8.3.4. WASH 19
      8.3.5. Infant and Young Child Feeding Practices Indicators (IYCF) 19
      8.3.6. Maternal Health and Nutrition 21
9. Survey Findings 21
   9.1. Anthropometric results (based on WHO standard) 21
   9.2. Quality of anthropometric data 22
   9.3. Prevalence of Acute malnutrition based on Weight for Height Z – score (WHZ): 23
   9.4. Prevalence of acute malnutrition based on MUAC cut off classification and/ Or oedema among children 6-59 months: 24
   9.5. Prevalence of underweight (WHO 2006) 25
   9.6. Prevalence of stunting based on height for age Z score (HAZ) 26

9.7. Maternal nutrition status among women of childbearing age (CBA) 27
9.8. Child health and immunization 28
9.9. Vitamin-A Supplementation and Deworming 30
9.10. IYCF Indicators 30
9.11. Crude and under five Children mortality rates 30
9.12. WASH Indicators 31
9.13. Food Security and livelihood 33
a. Food Consumption Scores and Food Based Coping Strategies 33
b. Reduced Coping Strategy Index 34
c. Food Consumption Score: 35
d. Food stock: 36
e. Food Main Sources 36
9.14. Demography 37
9.15. Returnees 37
10. Discussions 38
10.1. Nutrition status 38
10.2. Maternal nutritional status 39
10.3. IYCF practice 39
10.4. Death rates 40
10.5. Risk factors 40
11. Conclusion 41
12. Recommendation 41
12.1. Under nutrition 41
12.2. Child health and immunization 42
12.3. Maternal nutrition status 42
13. Annexes 43
14. References: 56

List of tables

Table 1: Details of proposed and actual sample size achieved, Bamyan SAMRT, August 2017 13
Table 2: Parameters for sample size calculation of anthropometric indicators, Bamyan SAMRT, August 2017 13

Table 3: Sample size calculation for mortality surveys, Bamyan SMART, August 2017.....14
Table 4: MUAC cut-offs points for children aged 6-59 months 17
Table 5: Definition of acute malnutrition according to weight-for-height index (W/H), expressed as a Z-score based on WHO standards 17
Table 6: Cut offs points of the Height for Age index (HAZ) expressed in Z-score, WHO standards.....18
Table 7: Distribution of age and sex of sample, Bamyan SMART, August 2017.....21
Table 8: Mean z-scores, Design Effects and excluded subjects in children among children 6-59 months, Bamyan SMART, August 2017.....22
Table 9: Mean z-scores, Design Effects and excluded subjects among children 0-59 months, Bamyan SMART, August 2017. 23
Table 10: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or edema) and by sex among children 6-59 months, Bamyan SMART, August 2017. 23
Table 11: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema in children age 6-59 months, Bamyan SMART, August 2017 23
Table 12: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex among children 0-59 months, Bamyan SMART, August 2017.....24
Table 13: Distribution of acute malnutrition and oedema based on weight-for-height z-scores, among children 6-59 months, Bamyan SMART, August 2017.....24
Table 14: Prevalence of acute malnutrition based on MUAC cut affs (and/or oedema) and by sex age, among children 6-59 months, Bamyan SMART, August 2017.....24
Table 15: Prevalence of acute malnutrition by age, based on MUAC cut offs and/or oedema, Bamyan SMART, August 2017.....25
Table 16: Prevalence of underweight based on weight-for-age z-scores by sex, among children 6-59 months, Bamyan SMART, August 2017.....25
Table 17: Prevalence of underweight by age, based on weight-for-age z-scores Bamyan SMART, August 2017 26
Table 18: Prevalence of stunting based on height-for-age z-scores and by sex, among children , 6-59 months, Bamyan SMART, August 2017.....26
Table 19: Prevalence of stunting by age based on height-for-age z-scores, Bamyan SMART, August 2017 26
Table 20: ANC visits in the last pregnancy, (N=741), Bamyan SMART, August 2017 28
Table 21: Skill birth Attendance (SBA), (N=741), Bamyan SMART, August 2017.....28
Table 22: Major illnesses reported among children 0-59 months, Bamyan SMART, August 2017.....29
Table 233: Immunization coverages for BCG, measles and Polio, Bamyan SMART, August 2017.....29
Table 24: Vitamin A supplementation and Deworming for under five children, Bamyan SMART, August 2017 30
Table 25: Infant and Young Child Feeding Practice, Bamyan SMART, August 2017 30
Table 26: Mortality rate by age category with design effect, Bamyan SMART, July 2017 .31
Table 27: Percentage of households with access to water treatment (n=708), Bamyan SMART, August 2017 32
Table 28: Hand washing practice, Bamyan SMART, August 2017 32
Table 29: Hand washing practice at 5 critical moments, (n=741), Bamyan SMART, August 2017.....33
Table 30: food stock in households level, (n=708), Bamyan SMART survey, August 2017 .36
Table 31: Food main sources, Bamyan SMART, August 2017 37
Table 32: Short Summery of demography, Bamyan SMART, August 2017.....37
Table 33: percentage of Returnees and IDPs, (N=708), Bamyan SMART, August 2017 38

List of Annexes

Figure 1: Distribution curves Population Pyramid, Bamyan SMART, August 2017 22
Figure 2 : Gaussian distributed curve, HAZ, Figure 3: Trend of stunting over the age distribution 27
Figure 4: Maternal nutrition prevalence of PLWs Bamyan SMART, August 2017.....27
Figure 5: Physiological status of women of reproductive age (15 – 49 years), (n=741), Bamyan SMART, August 2017 28
Figure 6: Iron folate for pregnant women based on available answers, (n=81), Bamyan SMART, August 2017 28
Figure 7: Percentage of household's level daily quantity Figure 8: Percentage of access to water daily used in 31
Figure 9: Household level daily-improved water sources Figure 10: Households level daily-unimproved water source (n=361), Bamyan August 2017 (n =347), Bamyan SMART, August 2017 32
Figure 11: Reduced coping strategy index, Bamyan SMART, August 2017. 35
Figure 12: Food Consumption scores per HH, Bamyan SMART, August 2017 35
Figure 13: Households consuming each food group, Bamyan SMART, August 2017. 36
Figure 14 : Overlapping WHZ<-2 and MUAC<125, Bamyan SMART, July 2017 38

4. Executive summery

The Nutrition SMART assessment took place between 8th to 26th August 2017 and has covered the entire Province of Bamyan. The assessment has been technically supported by ACF in partnership with BARAN/MOVE and in close coordination with Bamyan public health directorate. This assessment has been conducted in order to assess the current nutrition status of U5 children and Pregnant and lactating women, household Food security, WASH and hygiene proxy indicators, immunization status of children, iron and folate supplementation among PLWs, vitamin A supplementation and optimal IYCF practices. The preliminary report provided summary of the methodology used, analysis and interpretation of the survey findings with preliminary recommendation. 708 households were assessed during the assessment, using two-stage cluster sampling methodology.

Summary findings:

- 5,231 individuals living in 708 households were assessed. Out of them, 976 were children aged 0-59 months, 902 were children aged 6-59 months and 741 were women of childbearing age in the selected households.
- The combined GAM and SAM prevalence based on MUAC and WHZ both criteria were 15.8% (13.4-18.2 95% CI) and SAM is 2.8% (1.7-3.9 95% CI) respectively.
- Prevalence of Global Acute Malnutrition (GAM) and Severe Acute Malnutrition (SAM) in children aged 6-59 months based on Weight for Height Z-score (WHZ) was at 8.6% (6.6-11.1 95% C.I.) and 1.0 % (0.5-1.8 95% CI.) respectively.
- Prevalence of Global Acute Malnutrition (GAM) and severe acute malnutrition (SAM) in children aged 0-59 months based on Weight for Height Z-score (WHZ) was at 10.4% (8.3-13.0 95% CI) and 1.4% (0.8- 2.5 95% CI) respectively.
- Prevalence of global acute malnutrition in children aged 6-59 months based on MUAC was at 10.4% (8.2-13.2 95% CI) and SAM was 2.2% (1.3- 3.7 95% CI).
- Prevalence of underweight based on Weight for Age Z-score (WAZ) in children age 6-59 months was at 24.3% (20.7-28.4 95% CI) and severe underweight was 5.0% (3.8- 6.6 95% CI).
- Prevalence of stunting or chronic malnutrition based on Height for Age Z-score (HAZ) in children aged 6-59 months was at 42.2% (38.1-46.4 95% CI) while severe stunting was at 14.0% (11.3-17.2 95% CI).
- Maternal Malnutrition prevalence among pregnant and lactating women (PLW) based on MUAC <230mm was at 25.8% (21.9-29.7 95% CI).

- Immunization coverage such as Measles (9-59 months) both by card and recall was at 83.9 %, BCG (0-59 months) confirmed by scar was at 94.2% and Polio (0-59 months) both by card and recall was at 87.0% and PENTA 3 (3.5-59 months) was at 81.5%.

5. Introduction

Bamyan is one of the thirty-four provinces of Afghanistan, located in the central highlands of the country. Its terrain is mountainous or semi-mountainous. The province has divided into six districts such as Shebar, Saighan, Kahmard, yakawlang, Panjab, Waras, yakawlang No 2 and Bamyan the capital of the province. The province has a population of about 462,144[1] it is the largest province in the Hazarajat region of Afghanistan and is the cultural capital of the Hazaa ethnic group that predominates in the area.

The province has several famous historical sites, including the now-destroyed Budhas of Bamyan, around which are more than 3,000 caves, the Bande Amir National park, Dara-I-Ajhdar, Gholghola and Zakhak ancient towns, the Feroz Bahar, Astopa, Klegan, Gaohargin, Kaferan and Cheldukhtaran.

The nutrition SMART survey has been conducted in summer (August 2017) which covered the entire province. ACF technically supported BARAN and Move Welfare organization to implement this survey to investigate in the entire districts Bamyan province of the integrated nutrition and mortality assessment.

6. Context and Justification

The justification of the proposed assessment was to estimate the current prevalence of under nutrition among vulnerable populations in the province. The survey was also investigating the current mortality rates, child health status (morbidity, immunization, and supplementation) and nutritional status of women of reproductive age (15-49 years) with a special focus on pregnant and lactating women, IYCF and WASH practices. The last assessment that provided information on nutritional status of under-fives has conducted through the National Nutrition Survey in 2013 and GAM rates 5.0 % (3.44-7.16 95% CI) was poor levels of WHO severity classification. There is need to investigate the current prevalence of under-nutrition in the province. The Survey findings will used to inform future programming in the province. It was also serve as a good opportunity of building the capacity of BARAN, Move Welfare, and other stakeholders.

[1] CSO updated population for Afghanistan 1396

1. Survey objective

Broad objective:

- To determine the nutritional status of vulnerable population mainly under five, pregnant and lactating women living in Bamyan province.

Specific objective:

1. To estimate Crude Death Rate(CDR) and Under five Death Rate(U5DR)
2. To determine prevalence of under nutrition among children aged 0-59 months and 6-59 months.
3. To determine core Infant and Young Child Feeding(IYCF) practices among children aged <24months
4. To determine prevalence of nutritional status of pregnant and lactating women based on MUAC assessment.
5. To assess institutional birth attendance in the province.
6. To assess Water, Sanitation and Hygiene (WASH) proxy indicators: household water storage, water use and caregiver hand washing practices.
7. To assess morbidity among children under five based on a two weeks recall period.
8. To assess food access and consumption on seven days recall period: households levels.
9. To assess education of the school ages population in the province.

7. Methodology

7.1. . Sampling Methodology

The cluster sampling methodology has implemented in two stages:

Stage 1: Random selection of clusters/villages was chosen by using probability proportional to size (PPS) used ENA for SMART software version 2011 of (9th July 2015). A list of all updated villages amounted into the ENA for SMART software where PPS was applying. The villages with a large population had a higher chance of being selected than villages with a small population and vice versa. Reserve Clusters (RCs) have also selected by ENA software version 2011(updated 9th July 2015). Reserve clusters were used if 10% or more clusters will be impossible to reach during the survey as highlighted in Annex 1. A total of 51 clusters have been covered and each survey team completed anthropometric measurements in 14 households in a day (710/14=50.7

clusters its round-up is equal to 51 Clusters). In each selected village, one or more community member(s) was asked to help the survey teams to conduct their work by providing information about the village with regard to the geographical organization or the number of households. In cases where there were large villages in a cluster, the village was dividing into smaller segments and a segment was selecting randomly to represent the cluster. This division has done based on existing administrative units e.g. neighbourhoods, or streets or natural landmarks like river, road, or public places like market, schools, and mosques.

Stage 2: Random selection of households from updated and complete list of households within a given village. In this case, the actual survey data collection incorporated 708 households randomly selected based on survey parameters calculation for anthropometric Based on total sample size each team can cover effectively 14 households in a day. In this assessment, 6 teams were engaged during the assessments, while data collection was conducted for 11 days. All households were enumerated and given numbers by the survey team in the beginning before starting random selection of HHs. The 14 households were chosen randomly from these enumerated households in each cluster and systematic random sampling method was used to identify the households to be surveyed. The teams have been trained on both methods of sampling (simple and systematic random sampling) and they have offered with materials to assist in determining the households during the data collection exercise.

All the children living in the selected houses aged 0 to 59 months old were included for anthropometric measurements. Children aged <24 months were included for IYCF measurements. If more than one eligible child was found in a household, both were included, even if there are twins. Eligible orphans living in the selected Households were surveyed. All of the selected HH included in the mortality survey as well as will respond to questions concerning the HH as a whole (ex. water storage).

Any empty households or households with missing or absent children were revisited at the end of the sampling day in each cluster; any missing or absent children that were not subsequently found was not included in the survey. A cluster control form was used to record all these missed and absent households, however the abandoned HH excluded from the total HHs list at the beginning in the field. This information has provided to the teams by an elder of the villages.

The household was our basic sampling unit. The term household was defined as all people eating from the same pot and living together (WFP definition). In Afghanistan, the term household has often defined and/or used synonymously with a compound – which potentially represents more than one household as defined here. In this case, a two-step process is ensured with the village

leaders/community elders and then identifying compound together with the use of the list of households within the community, asking if there are multiple cooking areas to determine what members of the household/compound should be included in the study.

Table 1: Details of proposed and actual sample size achieved, Bamyan SAMRT, August 2017

Number of households planned	Number of households surveyed	% surveyed /planned	Number of children 6-59 months planned	Number of children 6-59 months surveyed	% surveyed /planned
714	708	99.2%	745	902	121.1%

7.2. Sample Size

The sample size of households for the survey has determined by ENA for SMART software version 2011 (updated 9th July 2015). Two stages of cluster methodology was applying. In first stage, it involves random selection of clusters/villages (51 clusters) from total list of villages using probability proportion to size (PPS) method. This has done before starting the data collection at the office or training hall. Each of Village was the primary sampling unit for the proposed survey. In the second stage of methodology, it has involved random selection of household (14 households) from an updated list of households. This has conducted at the field level. Households were the basic sampling unit for the proposed survey. The table 2 and 3 highlights sample size calculation for anthropometric and mortality surveys.

Table 2: Parameters for sample size calculation of anthropometric indicators, Bamyan SMART, August 2017

Parameters for Anthropometry	Value	Assumptions based on context
Estimated prevalence of GAM (%)	5.0%	The survey team was referred to the NNS 2013 assessment for the planning stage of this survey (GAM was 5.0% (3.44-7.16 95% CI) with (1.1) SD in the recommended limit (0.85-1.2 SD) due to lack of any updated data.
± Desired precision	2%	It was based on survey objectives in line to estimated prevalence and SMART methodology recommendations.
Design Effect (if applicable)	1.5	The population living in the targeted districts is considered as having similar living conditions and the same access to food and social conditions. Nevertheless, access to health facilities cannot be estimated as similar within the targeted population as some remote areas are

		not well served by health facilities. Hence the design effect was estimated at 1.5.
Children to be included	**745**	**Minimum sample size for children aged 6-59 months. (However to avoid possible bias of selection for younger age group, all children from 0 to 59 months old found in the selected households will be surveyed.)**
Average HH Size	8	Based on AfDH2 survey, the most frequent number for the average HH size was 8.
% Children 6 – 59 Months	15.5%	Based on CSO updated population Afghanistan 1396 (2017-2018)
% Non-response Households	6%	The percentage of non-respondent households was estimated at 6%. Using the last experience of the SMART surveys in the deferent provinces.
Households to be included	**710**	**Minimum sample size-Households to be surveyed. Households will be the basic sampling unit for the SMART survey**

Table 3: Sample size calculation for mortality surveys, Bamyan SMART, August 2017

Parameters for Mortality	Value	Assumptions based on context
Estimated Death Rate /10,000/day	0.05/10000 /day	AfDH survey 2015 for the country, we were using this for planning stage in the province.
± Desired precision /10,000/day	0.1	Based on survey objectives and inline to estimated death rate.
Design Effect (if applicable)	1.5	This will caters for heterogeneity in the population being sampled.
Recall Period in days	120	Starting point of recall period has done (from the beginning of Now Rose).1st Hamal 1396 the date of recall is equivalent to 21st March 2017 as per Gregorian calendar.
Population to be included	**2,614**	**Population**
Average HH Size	8	Based on AfDH survey the mostly frequent of the HH was 8.
% Non-response Households	6%	The percentage of non-respondent households was estimated at 6%. Using the last experience of the SMART surveys in the deferent provinces.
Households to be included	348	Households

[2] Afghanistan Demographic and Health survey 2015

7.3. Training, team composition and supervision:

Six teams and each team with four members have conducted the field data collection. Each team was composed of one supervisor, one team leader, and two data collectors. Each team had at least one female data collectors to ensure acceptance of the team amongst the surveyed households; particularly for IYCF questionnaires. Each female member of the survey team was accompanied with a mahram to facilitate the work of the female data collectors at the community level. ACF, Partner, and PNO of the province supervised the teams.

The entire team received a 6-days training on the survey methodology and all its practical aspects; the training has facilitated by two ACF technical staffs. A standardization test has been conducted over the course of 1 day, measuring 5 children, in order to evaluate the accuracy and the precision of the team members in taking the anthropometric measurements. The teams conducted a one-day field test in order to evaluate their work in real field conditions. Feedbacks have provided to the team in regard to the results of the field test; particularly in relation to digit preferences and data collection.

Survey enumerators are practicing weight measurements during the training

Refresher training on the anthropometric measurement and on the filling of the questionnaires and the household's selection have organized on the last day of the training by ACF to ensure overall comprehension before going to the field.

One-field guidelines document with instructions and household definition and selection document have provided to each team member. All documents, such as local event calendar, questionnaires or consent forms were translated in Dari, local language, for better understanding and to avoiding direct translation during the data field collection. The questionnaires was back translated using a different translator and will be pre-tested during the field test. Alterations made as necessary.

Daily data entry and analysis have done using ENA for anthropometric data, plausibility check, and feedbacks provided to the data collection teams. Anthropometric data will all be directly entered into ENA while IYCF and other data were completed through an excel spreadsheet.

7.4. Data Entry and analysis

Anthropometric and mortality data were studied using ENA for SMART software 2011 version (updated 9th July 2015). The software automatically generated assessment result report for acute malnutrition (WHZ and MUAC), stunting (HAZ) and underweight (WAZ), anthropometric and mortality results are presented in (%) with 95% Confidential interval and additional indicators (IYCF, Morbidity and immunization) were studied using excel 2010.

8. Indicators: definition, calculation and interpretation

8.1. Anthropometric Indicators: Definition of nutritional status of children 0-59 months

Acute Malnutrition

Acute malnutrition in children 6-59 months can be expressed by using 2 indicators; Weight for Height (W/H) or Mid Upper Arm Circumference (MUAC) as described below.

Weight-for-height index (W/H)

Child's nutritional status is estimated by comparing it to the weight-for-height curves of a reference population (WHO standards data). These curves have a normal shape and are characterized by the median weight (value separating the population into two groups of the same size) and its standard deviation (SD). 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.

Survey enumerators are practicing weight and height measurements during standardization test

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

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 4 provides the cut-off criteria for categorizing acute malnutrition cases.

Survey enumerators are taking MUAC measurements during the standardization test

Table 4: 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 to ≥ 115	Moderate Acute Malnutrition (MAM)
	< 115	Severe Acute Malnutrition (SAM)

Nutritional bilateral "pitting" oedema

Nutritional bilateral pitting edema 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 edema are automatically categorized as being severely malnourished, regardless of their weight-for-height index. The table below defines the acute malnutrition according to W/H index, MUAC criterion, and edema.

Table 5: Definition of acute malnutrition according to weight-for-height index (W/H), expressed as a Z-score based on WHO standards

Severe Acute Malnutrition (SAM)
W/H <-3 Z-score and /or bilateral oedema
Moderate Acute Malnutrition
W/H <-2 z-score and >= -3 z-score and absence of bilateral oedema

Global Acute Malnutrition (GAM)
W/H <-2 z-score and /or bilateral oedema

Chronic Malnutrition

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

The height-for-age measure indicates if a child of a given age is stunted and so if he is 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). The HAZ cut-off points are presented in the table below.

Survey enumerators are practicing height measurements during the standardization test

Table 6: Cut offs points of the Height for Age index (HAZ) expressed in Z-score, WHO standards

Not stunted	≥ -2 z-score
Moderate stunting	-3 z-score ≤ H/A < -2 z-score
Severe stunting	< -3 z-score

8.2. Mortality Indicator Calculation

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

8.2.1. Crude death rate (CDR)

The number of persons in the total population that dies over specified period of time.

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

8.2.2. 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:

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

8.3. Health

8.3.1. Immunization status, deworming and vitamin A supplementation

Mothers/caretakers of all children were asked if children received all the necessary 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. The deworming and the Vitamin A supplementation of children was also recorded using samples.

8.3.2. Morbidity

Mothers/caretakers of children were asked if children had experienced an illness in the past 2 weeks. Acute respiratory infection, fever, and diarrhea were recorded when symptoms according to the case definition are described by the caretaker.

8.3.3. Mothers nutritional status and Iron/Folate supplementation for pregnant

Women in childbearing age were assessed for their nutritional status based on MUAC using the cut-off of 230 mm.

8.3.4. WASH

- Water storage and Usage

Household heads were asked what type of container they use for storing drinking water and how much water they used in the HH in the last 24 hours to assess the water use per person per day.

- Hand washing practices

The mothers was asked on what occasions they wash their hands and also what they use to wash their hands to determine the hand washing practices in the surveyed area.

8.3.5. Infant and Young Child Feeding Practices Indicators (IYCF)

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

- Child ever breastfed

Proportion of children who have ever received breast milk. The indicator refers to proportion of children who have ever received breast milk. It's calculated by dividing the number of children born in the last 24 months who were ever breastfed by all Children born in the last 24 months. The indicator is based on historical recall, and a caregiver(s) is supposed to provide information of all children living or dead who were born in the last 24 months. This indicator was looking at the number of mothers who ever breast fed their children. This indicator was based on historic recall.

- Timely initiation of breastfeeding

The proportion of children born in the last 24 months, who were timely breastfeed (breastfeed at first hours of birth). The indicator is calculating by dividing the number of children aged 24 months who were timely breastfeed by children age less than 24 months. The denominator and numerator include living children and deceased children who were born within the past 24 months. This indicator was based on historical recall.

- Provision of colostrum in the first 3 days of life

Proportion of children who received colostrum (yellowish liquid milk) within the first 3 days after birth.This indicator was look at the number of mothers with children 0-23 months who fed their children with Colostrum within the first 3 days after birth.

- Exclusive breastfeeding under 6 months

Proportion of infants 0-5 months of age who are fed exclusively with breast milk. It's 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

- Introduction of solid, semi-solid or soft foods:

Proportion of infants 6-8 months of age who receive solid, semi-solid or soft foods. It's calculated by diving the number of all Infants aged 6-8 months who received solid, semi-solid or soft foods during the previous day by total number of infants 6–8 months of age

- Continued breastfeeding at 2 years

Proportion of children leas then <24 months of age who are fed breast milk. It's calculated by dividing the number of children aged leas then < 24 months who received breast milk during the previous day by total children aged leas the < 24 months.

8.3.6. Maternal Health and Nutrition

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

The indicator for iron-folate supplementation was derived from dividing the total number of pregnant mothers supplemented with Iron-folate in the last 90 days by a total number of pregnant mothers.

9. Survey Findings

9.1. Anthropometric results (based on WHO standard)

The results are presented with exclusion of z- score from observed mean SMART flags: WHZ-3 to +3, HAZ -3 to +3 and WAZ -3 to +3. The sex ratio (boys and girls) were equally represented at (p-value = 0.387). For complete plausibility check report, please refer to Annex 1 (automatically generated from ENA software).

Table 7: Distribution of age and sex of sample, Bamyan SMART, August 2017

	Boys	%	Girls	%	Total	%	Ratio, boys : girls
AGE (mo)	no.	%	no.	%	no.	%	Boy: girl
6-17	109	47.8	119	52.2	228	25.3	0.9
18-29	105	51.5	99	48.5	204	22.6	1.1
30-41	103	54.5	86	45.5	189	21.0	1.2
42-53	103	52.6	93	47.4	196	21.7	1.1
54-59	44	51.8	41	48.2	85	9.4	1.1
Total	464	51.4	438	48.6	902	100.0	1.1

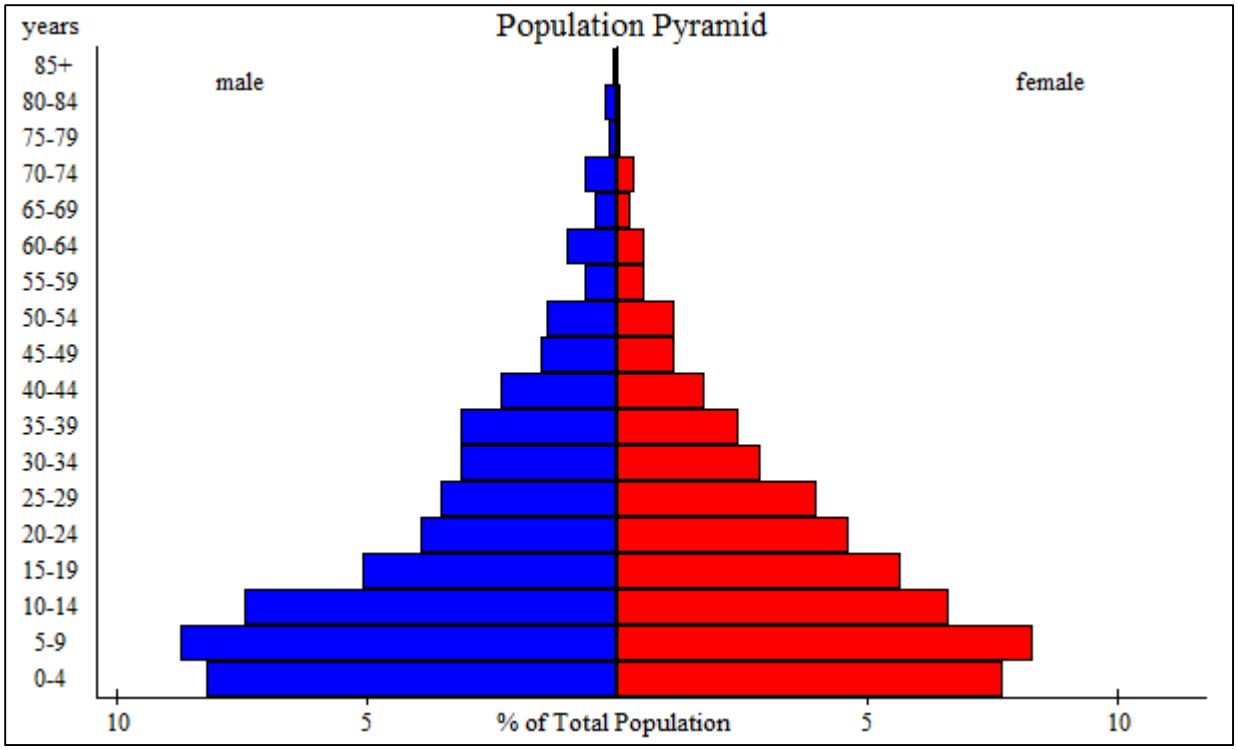


Figure 1: Distribution curves Population Pyramid, Bamyan SMART, August 2017

9.2. Quality of anthropometric data

The anthropometric data was analyzed using ENA for SMART software (version 2011, 9, July 2015 updated). The plausibility check report is available in Annex 1.

The summery of mean z score with Standard deviations (SD), the design effects and number of the out of range data per index is indicating in table below.

Table 8: Mean z-scores, Design Effects and excluded subjects in children among children 6-59 months, Bamyan SMART, August 2017.

Indicator	N	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	894	-0.57±0.99	1.37	0	8
Weight-for-Age	896	-1.45±0.84	1.81	0	6
Height-for-Age	887	-1.88±0.99	1.55	0	15

* contains for WHZ and WAZ the children with oedema.

Table 9: Mean z-scores, Design Effects and excluded subjects among children 0-59 months, Bamyan SMART, August 2017.

Indicator	N	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	968	-0.63±1.03	1.37	0	8
Weight-for-Age	969	-1.44±0.84	1.72	0	7
Height-for-Age	956	-1.79±1.03	1.46	0	20

* contains for WHZ and WAZ the children with oedema.

9.3. Prevalence of Acute malnutrition based on Weight for Height Z - score (WHZ):

The sex and age disaggregated results are presented in table 10 and 11 respectively. The Prevalence of wasting is higher among boys as compared to girls. The younger Children (6-59months) seem to be more affected than older (30-59 months). There was no edematous case.

Table 10: Prevalence of acute malnutrition based on weight-for-height z-scores (WHZ and/or edema) and disaggregated by sex among children 6-59 months, Bamyan SMART, August 2017.

	All n = 894	Boys n = 459	Girls n = 435
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(77) 8.6 % (6.6 - 11.1 95% C.I.)	(49) 10.7 % (7.8 - 14.4 95% C.I.)	(28) 6.4 % (4.3 - 9.4 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(68) 7.6 % (5.8 - 9.9 95% C.I.)	(41) 8.9 % (6.3 - 12.4 95% C.I.)	(27) 6.2 % (4.1 - 9.3 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(9) 1.0 % (0.5 - 1.8 95% C.I.)	(8) 1.7 % (0.9 - 3.3 95% C.I.)	(1) 0.2 % (0.0 - 1.7 95% C.I.)

The prevalence of oedema is 0.0 %

Table 11: Prevalence of acute malnutrition by age, based on weight-for-height z-scores (WHZ) and/or oedema in children age 6-59 months, Bamyan SMART, August 2017

		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	Total no.	No.	%	No.	%	No.	%	No.	%
6-17	224	7	3.1	36	16.1	181	80.8	0	0.0
18-29	200	2	1.0	18	9.0	180	90.0	0	0.0
30-41	189	0	0.0	4	2.1	185	97.9	0	0.0
42-53	196	0	0.0	6	3.1	190	96.9	0	0.0

54-59	85	0	0.0	4	4.7	81	95.3	0	0.0
Total	894	9	1.0	68	7.6	817	91.4	0	0.0

Table 12: Prevalence of acute malnutrition based on weight-for-height z-scores (WHZ and/or oedema) and disaggregated by sex among children 0-59 months, Bamyan SMART, August 2017.

	All n = 968	Boys n = 492	Girls n = 476
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(101) 10.4 % (8.3 - 13.0 95% C.I.)	(62) 12.6 % (9.4 - 16.7 95% C.I.)	(39) 8.2 % (5.9 - 11.2 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(87) 9.0 % (7.1 - 11.3 95% C.I.)	(52) 10.6 % (7.7 - 14.4 95% C.I.)	(35) 7.4 % (5.2 - 10.2 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(14) 1.4 % (0.8 - 2.5 95% C.I.)	(10) 2.0 % (1.1 - 3.9 95% C.I.)	(4) 0.8 % (0.3 - 2.2 95% C.I.)

The prevalence of oedema is 0.0 %

Table 13: Distribution of acute malnutrition and oedema based on weight-for-height z-scores (WHZ), among children 6-59 months, Bamyan SMART, August 2017.

	<-3 z-score	>=-3 z-score
Oedema present	Marasmic kwashiorkor No. 0 (0.0 %)	Kwashiorkor No. 0 (0.0 %)
Oedema absent	Marasmic No. 13 (1.4 %)	Not severely malnourished No. 889 (98.6 %)

9.4. Prevalence of acute malnutrition based on MUAC cut off classification and/ Or oedema among children 6-59 months:

The prevalence of acute malnutrition based on MUAC cut off is presented in table below.

Table 14: Prevalence of acute malnutrition based on MUAC cut offs (and/or oedema) and disaggregated by sex age, among children 6-59 months, Bamyan SMART, August 2017

	All n = 902	Boys n = 464	Girls n = 438
Prevalence of global malnutrition (< 125 mm and/or oedema)	(94) 10.4 % (8.2 - 13.2 95% C.I.)	(34) 7.3 % (5.1 - 10.4 95% C.I.)	(60) 13.7 % (10.4 - 17.9 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(74) 8.2 % (6.3 - 10.6 95% C.I.)	(26) 5.6 % (3.9 - 8.1 95% C.I.)	(48) 11.0 % (8.2 - 14.5 95% C.I.)

Prevalence of severe malnutrition (< 115 mm and/or oedema)	(20) 2.2 % (1.3 - 3.7 95% C.I.)	(8) 1.7 % (0.8 - 3.6 95% C.I.)	(12) 2.7 % (1.4 - 5.4 95% C.I.)

Table 15: Prevalence of acute malnutrition by age, based on MUAC cut offs and/or oedema, Bamyan SMART, August 2017

		Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
Age (mo)	Total no.	No.	%	No.	%	No.	%	No.	%
6-17	228	14	6.1	46	20.2	168	73.7	0	0.0
18-29	204	6	2.9	25	12.3	173	84.8	0	0.0
30-41	189	0	0.0	2	1.1	187	98.9	0	0.0
42-53	196	0	0.0	1	0.5	195	99.5	0	0.0
54-59	85	0	0.0	0	0.0	85	100.0	0	0.0
Total	902	20	2.2	74	8.2	808	89.6	0	0.0

9.5. Prevalence of underweight (WHO 2006)

The underweight is defined by weight for age Z score (WAZ), the sex and age disaggregated results are present in the tables below for children aged 6-59 months.

Table 16: Prevalence of underweight based on weight-for-age z-scores (WAZ) disaggregated by sex, among children 6-59 months, Bamyan SMART, August 2017.

	All n = 896	**Boys n = 460**	**Girls n = 436**
Prevalence of underweight (<-2 z-score)	(218) 24.3 % (20.7 - 28.4 95% C.I.)	(136) 29.6 % (24.8 - 34.9 95% C.I.)	(82) 18.8 % (14.6 - 23.9 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(173) 19.3 % (16.2 - 22.9 95% C.I.)	(107) 23.3 % (19.1 - 28.1 95% C.I.)	(66) 15.1 % (11.7 - 19.4 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(45) 5.0 % (3.8 - 6.6 95% C.I.)	(29) 6.3 % (4.6 - 8.6 95% C.I.)	(16) 3.7 % (2.1 - 6.4 95% C.I.)

Table 17: Prevalence of underweight by age, based on weight-for-age z-scores Bamyan SMART, August 2017

		Severe underweight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	Total no.	No.	%	No.	%	No.	%	No.	%
6-17	224	21	9.4	59	26.3	144	64.3	0	0.0
18-29	202	18	8.9	50	24.8	134	66.3	0	0.0
30-41	189	4	2.1	30	15.9	155	82.0	0	0.0
42-53	196	1	0.5	24	12.2	171	87.2	0	0.0
54-59	85	1	1.2	10	11.8	74	87.1	0	0.0
Total	896	45	5.0	173	19.3	678	75.7	0	0.0

9.6. Prevalence of stunting based on height for age Z score (HAZ)

The stunting or chronic malnutrition is defined by height for age Z score (HAZ), the sex and age disaggregated results are presented in tables below for age 6-59 months.

Table 18: Prevalence of stunting based on height-for-age z-scores (HAZ) and disaggregated by sex, among children, 6-59 months, Bamyan SMART, August 2017.

	All n = 887	Boys n = 454	Girls n = 433
Prevalence of stunting (<-2 z-score)	(374) 42.2 % (38.1 - 46.4 95% C.I.)	(208) 45.8 % (40.5 - 51.2 95% C.I.)	(166) 38.3 % (32.8 - 44.1 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(250) 28.2 % (24.9 - 31.7 95% C.I.)	(133) 29.3 % (25.1 - 33.8 95% C.I.)	(117) 27.0 % (22.6 - 32.0 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(124) 14.0 % (11.3 - 17.2 95% C.I.)	(75) 16.5 % (13.1 - 20.7 95% C.I.)	(49) 11.3 % (8.0 - 15.7 95% C.I.)

Table 19: Prevalence of stunting disaggregated by age based on height-for-age z-scores (HAZ), Bamyan SMART, August 2017

		Severe stunting (<-3 z-score)		Moderate stunting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
Age (mo)	Total no.	No.	%	No.	%	No.	%
6-17	221	28	12.7	66	29.9	127	57.5
18-29	201	58	28.9	72	35.8	71	35.3
30-41	184	27	14.7	66	35.9	91	49.5

42-53	196	9	4.6	36	18.4	151	77.0
54-59	85	2	2.4	10	11.8	73	85.9
Total	887	124	14.0	250	28.2	513	57.8

Figure 2 shows the distribution of HAZ of the observed population (SMART flags excluded) compared to WHO Reference curve. In Bamyan, it was shifted to the left, suggesting restricted linear growth of the observed population. Further analysis (Figure2): suggests that linear growth retardation is at its highest in the lower age group of children (18-29 months).

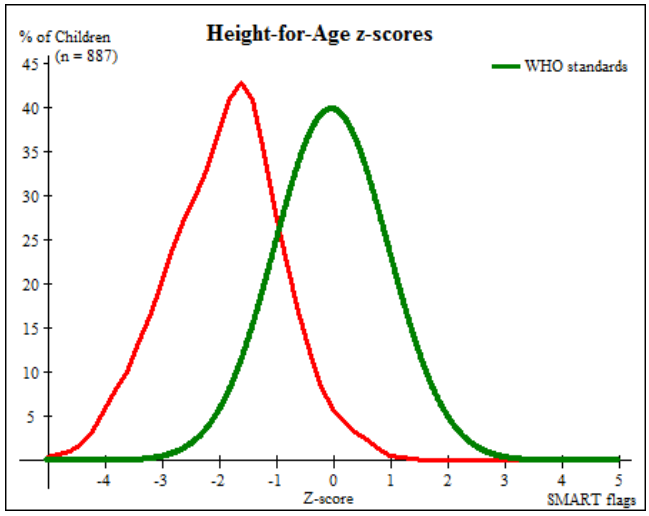


Figure 2 : Gaussian distributed curve, HAZ,

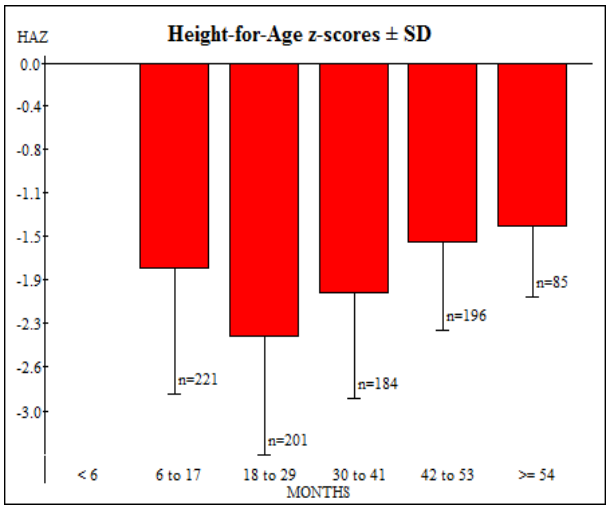


Figure 3: Trend of stunting over the age distribution

9.7. Maternal nutrition status among women of childbearing age (CBA)

741 mothers and caretakers in total were living in the selected households surveyed. The survey results are presented in table below as a proportion of the 484 total number of PLWs measured using MUAC cut off 230 mm and 210 mm. While to classify the early stage of nutrition status for referral OPD-MAM enrolment criteria the unique cut off 230 mm is used in Afghanistan.

Figure 4: Maternal malnutrition prevalence of PLWs Bamyan SMART, August 2017.

PLWs MUAC cut off (N=484)	Frequency	Results
Global acute malnutrition (MUAC< 230 mm)	125	25.8% (21.9-29.7 95% CI)
Moderate acute malnutrition (MUAC ≥210mm to <230 mm)	112	23.1% (19.4-26.9 95% CI)
Sever acute malnutrition (MUAC < 210)	13	2.7% (1.2-4.1 95% CI)

Figure 5: Physiological status of women of reproductive age (15 - 49 years), (n=741), Bamyan SMART, August 2017

Status	Frequency	%
Pregnant	81	**10.9%**
Lactating	403	**54.4%**
Non-pregnant & non-lactating	257	**34.7**

Figure 6: Iron folate for pregnant women based on available answers, (n=81), Bamyan SMART, August 2017

Iron-folate for PLW	Frequency	%
Yes	48	**59.3 %**
No	32	**39.5%**
Don't know	1	**1.2**

Table 20: ANC visits in the last pregnancy, (N=741), Bamyan SMART, August 2017

ANC Visits (N=741)	Frequency	%
Yes	594	80.2%
No	147	19.8
ANC visited by WHOM	**Frequency**	**%**
Health professional	581	78.4%
Traditional birth attendant	11	1.5%
Community health worker	2	0.3%
Relative/Friends	0	0.0%
No visited during pregnancy	147	19.8

Table 21: Skill birth Attendance (SBA), (N=741), Bamyan SMART, August 2017

		Frequency	%
Delivery at health facilities		**453**	**61.1%**
Delivery at Home	Professional staff (midwife, community midwife, Doctor and Nurse).	**16**	**2.2%**
	None professional staff (CHWs , TBA and relatives)	**271**	**36.6%**

9.8. Child health and immunization

Retrospective morbidity data were collected among children 0-59 months with two weeks recall period to assess the prevalence of the main disease. The survey finding shows that 51.6% of

children had at least one episode of illness in the 2 weeks period to the survey. The major illnesses reported such as fever diarrhea and ARI as a highlighted in the table below.

Table 22: Major illnesses reported among children 0-59 months, Bamyan SMART, August 2017

Parameter (N=976)	Frequency	Results
Acute Respiratory infection (ARI)	274	28.1%
Fever	380	38.9 %
Diarrhea	323	33.1 %

Table 23: Immunization coverages for BCG, measles and Polio, Bamyan SMART, August 2017

Indicators	Class	Frequency	Results (95% CI)
Measles (children form 9-59 months) (N= 840)	Yes by cards	507	60.4 %
	Yes by recall	198	23.6 %
	Both by cards and recall	705	83.9 %
	No	132	15.7 %
	Don't know	3	0.4 %
Polio (children from 0-59 months) (N= 976)	Yes by cards	600	61.5 %
	Yes by recall	249	25.5 %
	Both by cards and recall	849	87.0 %
	No	124	12.7 %
	DK	3	0.3 %
PENTA 3 (children from 3.5-59 months) (N=931)	Yes by cards	540	58.0 %
	Yes by recall	219	23.5 %
	Both by cards and recall	759	81.5 %
	No	169	18.2%
	Don't know	3	0.3 %
BCG scar (children 0-59 months (N=976)	By scar confirmation (Yes)	919	94.2 %
	No	57	5.8%
	Don't Know	0	0%

9.9. Vitamin-A Supplementation and Deworming

Vitamin A supplementation was quite good, deworming was significant good see table below.

Table 23: Vitamin A supplementation and Deworming for under five children, Bamyan SMART, August 2017

Indicators	Class	Frequency	Results
Vitamin A supplementation 6-59 months (N= 902)	**Yes**	825	91.5 %
	No	75	8.3 %
	Don't know	2	0.2 %
Deworming 24-59 months (N=583)	**Yes**	414	71.0 %
	No	167	28.6 %
	Don't know	2	0.3 %

9.10. IYCF Indicators

Indicators for infant and young child feeding (IYCF) practices included all children less than < 24 months. 393 children's were included in the sample. The results are presented as the percentage of the total answers available with (See Table below).

Table 24: Infant and Young Child Feeding Practice, Bamyan SMART, August 2017

CORE INDICATORS	DEFINITION	N	%
Child ever breastfed (N=393)	Proportion of children who have ever received breast milk	393	100 %
Timely initiation of breastfeeding (N=393)	Proportion of children born in the last 23 months who were put to the breast within one hour of birth	323	82.2%
Provision of colostrum within first 3 days (N=393	Proportion of children who received colostrum (yellowish liquid) within the first 3 days after birth	385	97.9%
Still breast feeding at 1 year (N=75)	Proportion of children 12-15 months of age who are fed breast milk.	74	98.7%
Exclusive breast feeding (N=74)	Proportion of infants 0-5 months of age who are fed exclusively with breast milk.	45	60.8%
Introduction of solid, semi-solid or soft foods (N=62)	Proportion of infants 6-8 months of age who receive solid, semi-solid or soft foods.	30	48.4 %

9.11. Crude and under five Children mortality rates

The table below shows mortality rates disaggregated by age and sex categorized. The crude and under five children mortality rates were below than the WHO emergency threshold.

Table 25: Mortality rate by age category with design effect, Bamyan SMART, July 2017

	Crude Death Rate (95% CI)	Design Effect
'Overall	0.18 (0.09-0.35)	1.36
'Sex		
'Male	0.15 (0.07-0.36)	1.00
'Female	0.20 (0.09-0.43)	1 .00
'Years		
'0-4	0.30 (0.10-0.93)	1.00
'5-11	0.07 (0.01-0.52)	1.00
'12-17	0.11 (0.01-0.81)	1.02
'18-49	0.04 (0.01-0.30)	1.00
'50-64	0.30 (0.04-2.25)	1.03
'65-120	1.95 (0.42-8.55)	1.74

9.12. WASH Indicators

708 responders, representing 708 households and 5,231 individuals, included either male or female. The information collected from household's regarding the total amount of water consumption in litter per household, excluded those water used by animals, and subsequently organized into a range of litters used. The results were then divided into the quantity of water in liters available to each household member per day; refer to figures 7 and 8 below.

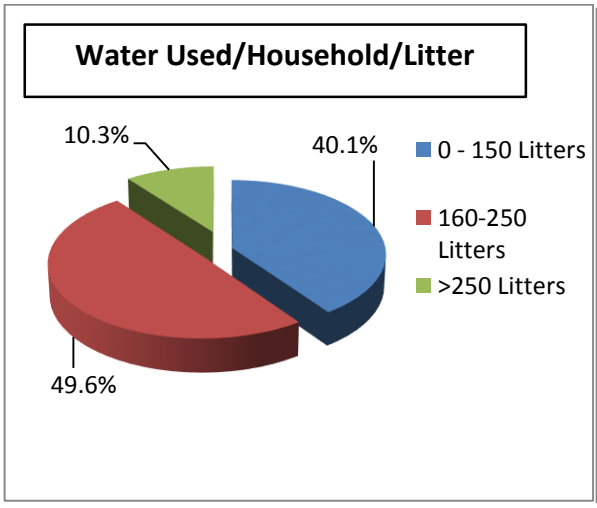


Figure 7: Percentage of household's level daily quantity +Used per HH, Bamyan SMART, August 2017

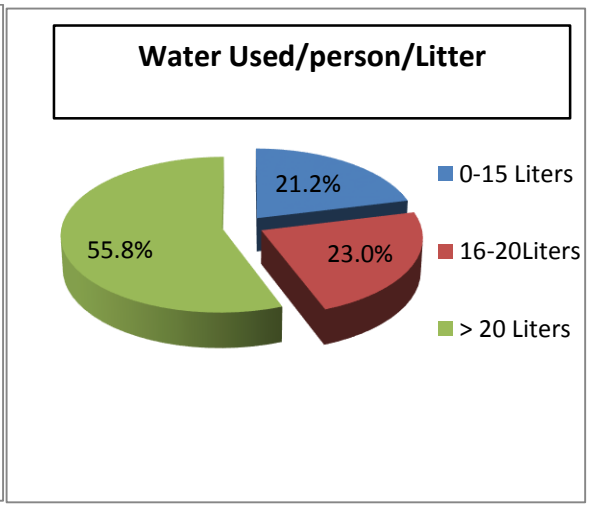


Figure 8: Percentage of access to water daily used in Liter/person/day

Table 26: Percentage of households with access to water treatment (n=708), Bamyan SMART, August 2017

Water treatment	Frequency	Results
Boil	143	20.2%
Chlorine	2	0.3%
Strain into the cloths	3	0.4%
Water filter	1	0.1%
Stand and settle	544	76.8%
Nothing used from the above	15	2.1%

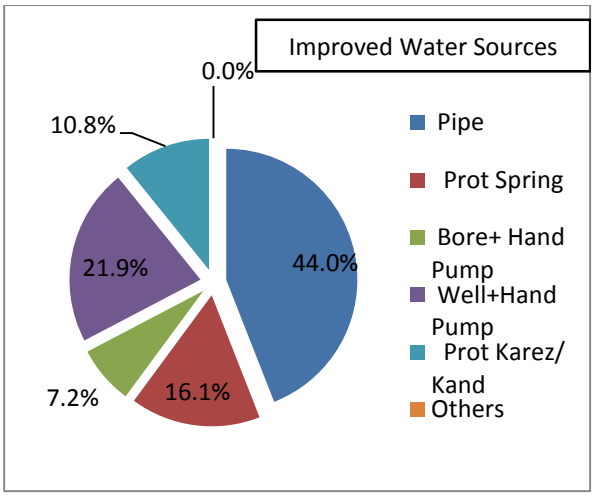


Figure 9: Household level daily-improved water sources (n=361), Bamyan August 2017

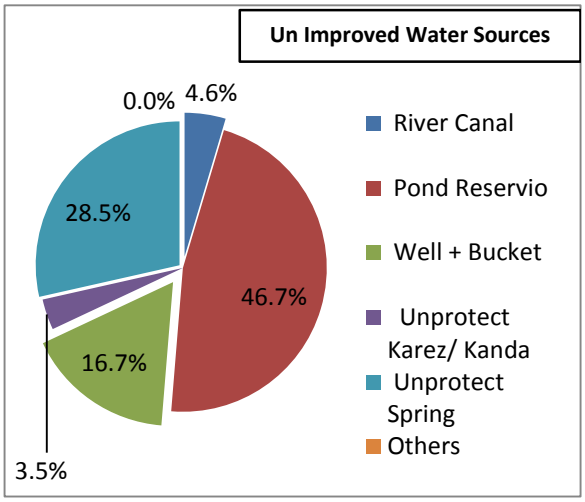


Figure 10: Households level daily-unimproved water source (n =347), Bamyan SMART, August 2017

Mothers/ caretakers Hand washing practices before and after events indicated in table below.

Table 27: Hand washing practice, Bamyan SMART, August 2017

Hand Washing care takers (n=741)	Frequency	%
Only water	**504**	**68.0%**
Soap/ASH with water	**237**	**32.0%**
Wash both hands	**711**	**96.0%**
Rubs hands together at least three times	**576**	**77.7%**
Dries hands hygienically by air-drying or using a clean cloth	**274**	**37.0%**

Table 28: Hand washing practice at 5 critical moments, (n=741), Bamyan SMART, August 2017

Response	Frequency	%
Wash hands at all 5 critical moments	**383**	**51.7%**
After Toilet/latrines	619	83.5%
After cleaning baby	641	86.5%
Before food preparation	641	86.5%
Before eat	713	96.2%
Before feed child	407	54.9%

: This was a multiple response question; percentages do not add up to 100.

NB: As this information was largely knowledge/recall based, there is no practical verification process to know if mothers/caretakers actually practiced hand washing at all 5 critical points or if they were largely recalling times to which they were previously informed.

9.13. Food Security and livelihood

a. Food Consumption Scores and Food Based Coping Strategies

Food Consumption Scores and Food Based Coping Strategies Food security exists when all people, at all times have physical, social and economic access to sufficient, safe and nutritious food for a healthy and active life. In this survey, food consumption based on the Food Consumption Score (FCS)3 as a description for the current short-term household food security situation is triangulated with the food-based or reduced Coping Strategy Index (rCSI)4 to provide an indication of the food security status of the household. The triangulation of these two food security proxy indicators, instead of only food consumption, allows for capturing the interaction between household food consumption and coping strategies adopted, and hence, more properly reflects the food security situation in Bamyan province.

As a result, households having poor food consumption with high or medium coping and those with borderline food consumption but with high coping are considered as severely food

[3] The Food Consumption Score (FCS) is an acceptable proxy indicator to measure caloric intake and diet quality at household level, giving an indication of food security status of the household if combined with other household access indicators. It is a composite score based on dietary diversity, food frequency, and relative nutritional importance of different food groups. The FCS is calculated based on the past 7-day food consumption recall for the household and classified into three categories: poor consumption (FCS = 1.0 to 28); borderline (FCS = 28.1 to 42); and acceptable consumption (FCS = >42.0). The FCS is a weighted sum of food groups. The score for each food group is calculated by multiplying the number of days the commodity was consumed and its relative weight.

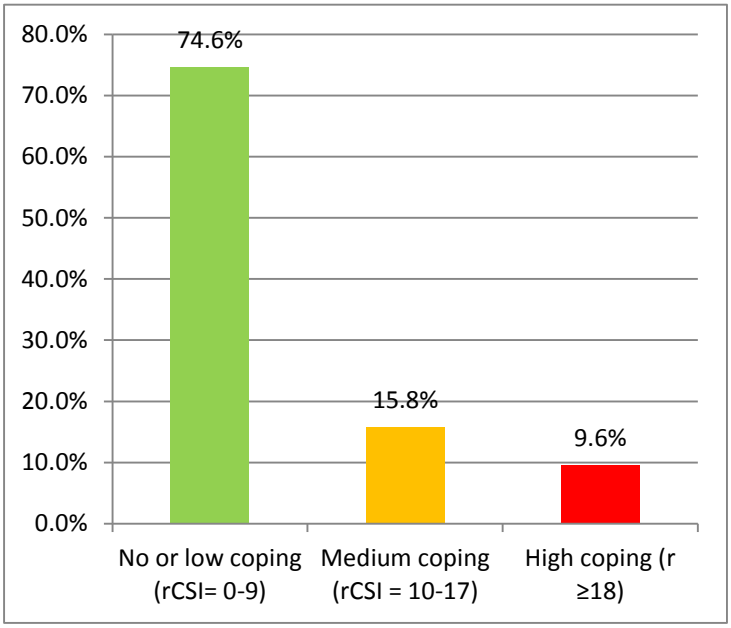
[4] The reduced Coping Strategy Index (rCSI) is often used as a proxy indicator of household food insecurity. Households were asked about how often they used a set of five short-term food based coping strategies in situations in which they did not have enough food, or money to buy food, during the one-week period prior to interview. The information is combined into the rCSI which is a score assigned to a household that represents the frequency and severity of coping strategies employed. First, each of the five strategies is assigned a standard weight based on its severity. These weights are: Relying on less preferred and less expensive foods (=1.0); Limiting portion size at meal times (=1.0); Reducing the number of meals eaten in a day (=1.0); Borrow food or rely on help from relatives or friends (=2.0); Restricting consumption by adults for small children to eat (=3.0). Household CSI scores are then determined by multiplying the number of days in the past week each strategy was employed by its corresponding severity weight, and then summing together the totals. The total rCSI score is the basis to determine and classify the level of coping: into three categories: No or low coping (rCSI= 0-9), medium coping (rCSI = 10-17), high coping (r ≥18).

insecure. Households having poor food consumption with low coping, households having borderline food consumption with medium coping and those having acceptable consumption but with high coping are considered as moderately food insecure. Households having borderline or acceptable food consumption with low or medium coping are considered as Food Security (Table).

Food consumption groups (based on FCS)	Coping group (based on CSI)		
	High coping	Medium coping	No or low coping
Poor	Severely food insecure	Severely food insecure	Moderately food insecure
Border line	Severely food insecure	Moderately food insecure	Food secure
Acceptable	Moderately food insecure	Food secure	Food secure

b. Reduced Coping Strategy Index

The Food Based Coping Strategy Index is based on measures of the frequency of use of food deprivation, such as the recourse to cheaper food, reductions of the quantity of meals, the act of.



Borrowing food, as well as alterations in food distribution within the household to favor children. Each strategy is weighted as per its severity with borrowing food and altering the distribution

Of food within the household regarded as the most severe strategies. Categories are then defined based upon these scores varying from low coping (0-9) to medium coping (10-17) and high coping (>18).

9.6% of HHs with a high level of coping (rCSI ≥18 score).

15.8% of HHs with a medium level of coping (rCSI= 10-17 score).

74.6% of HHs with No or Low-level coping (rCSI=0-9 score).

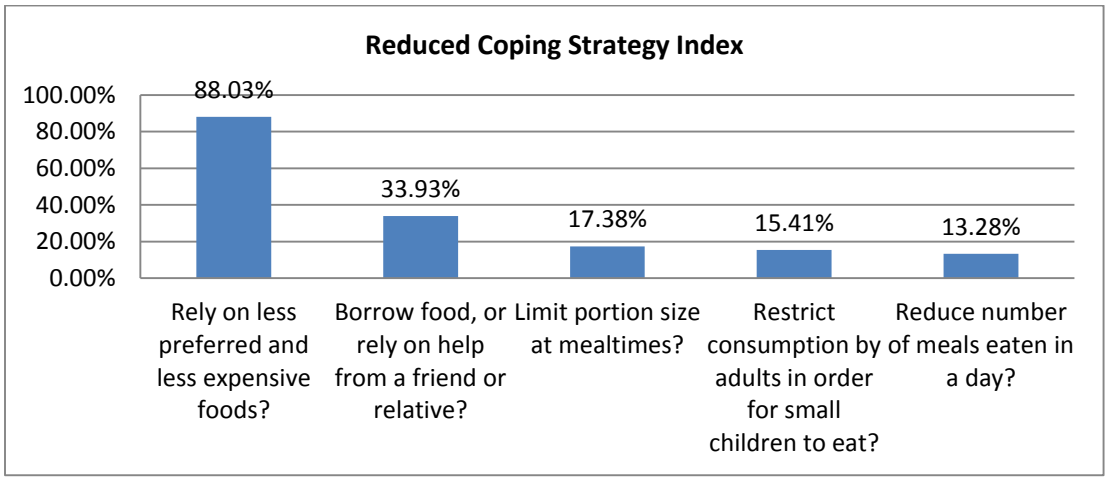


Figure 11: Reduced coping strategy index, Bamyan SMART, August 2017.

c. Food Consumption Score:

Food Consumption Scores are the sum of the frequency of consumption (in the 7 days prior to the interview) of each type of food item (cereal, pulses, vegetables, meat fish and eggs, dairies, oil and sugar) weighted by their nutritional value (proteins are weighted 4, cereals 2, pulses 3, and vegetables and fruits 1, while sugar is weighted 0.5). Households are then grouped into "Poor" food consumption (1.0-28), "Borderline" (28.01 – 42) and acceptable (above 42). Food consumption groups are a proxy for food consumption and reflect both the frequency and quality of food consumption.

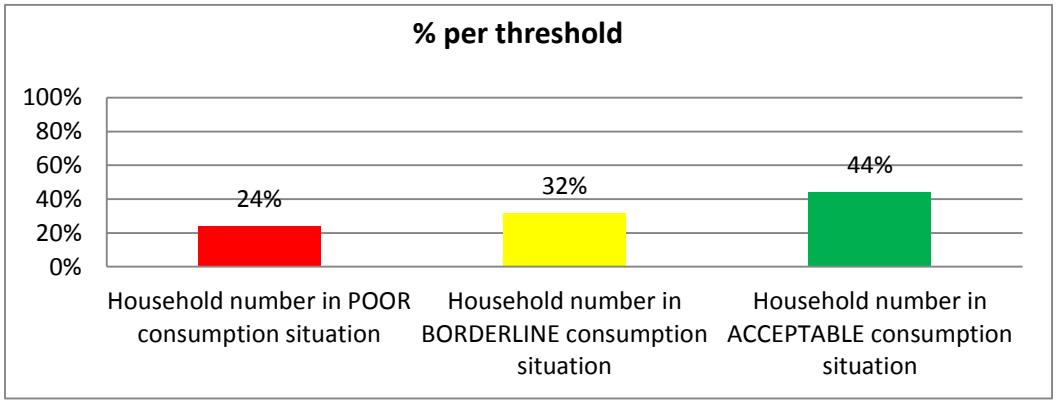


Figure 12: Food Consumption scores per HH, Bamyan SMART, August 2017

- 24 % households surveyed have Poor consumption scores (FCS = 1.0 to 28).
- 32 % households surveyed have Borderline consumption scores (FCS = 28.1 to 42).
- 44 % households surveyed have acceptable food consumption scores (FCS = >42.0).

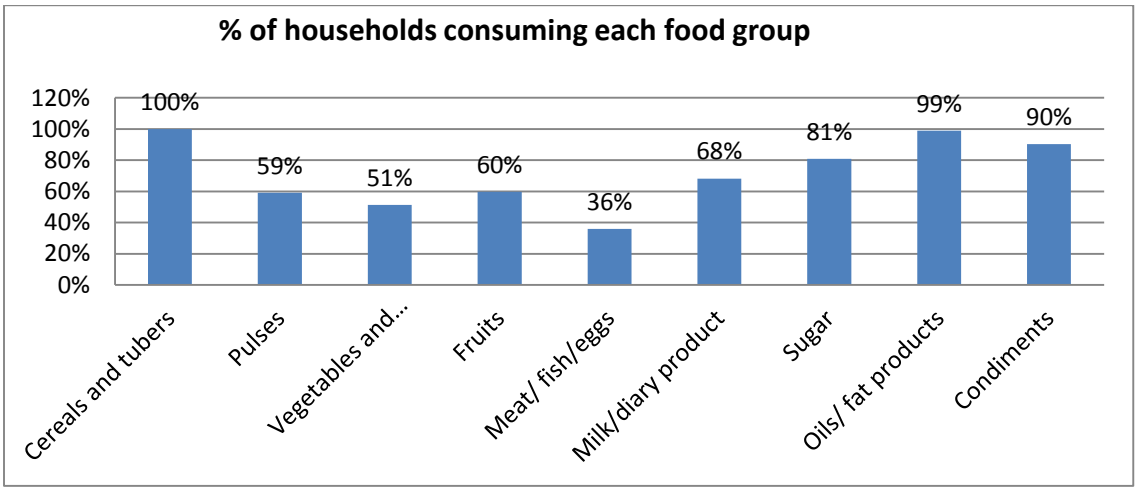


Figure 13: Households consuming each food group, Bamyan SMART, August 2017.

d. Food stock:

Total 708 households responded for the food stock, for more detail refers to the table below.

Table 29: food stock in households level, (n=708), Bamyan SMART survey, August 2017

	N	%
No food stock in the households	73	10.3%
Less than a week stock in the HH	134	18.9%
Food stock in HHs from 1 to 3 weeks	318	44.9%
Food stock in HHS up to 3 months	144	20.3%
Food stock in HHs more than 3 months	39	5.5%

e. Food Main Sources

The food that households used in the last 7 days prior to the survey mains sources of the food, survey finding shows most of the food was cash based, see table below for more details.

Table 30: Food main sources, Bamyan SMART, August 2017

	Own production	Cash	Credit	Battering	Gift/ charity	Wild food	Food Aid	Total
Cereals and tubers	251	297	112	0	5	0	1	**666**
Pulses/ Nuts	42	287	60	1	8	0	0	**398**
Vegetables and leaves	220	113	0	1	10	0	1	**345**
Fruits	211	156	2	1	27	0	0	**397**
Meat/ fish/eggs	32	203	5	0	1	0	0	**241**
Milk/diary product	379	50	3	1	18	0	1	**452**
Sugar / Honey	25	445	62	1	5	0	1	**539**
Oils/ fat products	13	504	132	0	7	0	1	**657**
Condiments	9	521	65	1	6	0	0	**602**

9.14. Demography

The mortality questionnaires in SMART are designed in a way that some additional useful demography data can be withdrawn. Summery is highlighted in tables below. A total of 5231 individuals and 1847 School-age children (6-18) years) were presented in the surveyed households.

Table 31: Short Summery of demography, Bamyan SMART, August 2017

Indicators	Value
Average households size	**7.4**
Children under five	**17.3 %**
People have Tazkera	**46.3%**

9.15. Returnees

The information collected from households regarding returnees and IDPs due to different reasons, in the survey no collected data for the reason of IDPs, see below table for more details.

Table 32: percentage of Returnees and IDPs, (N=708), Bamyan SMART, August 2017

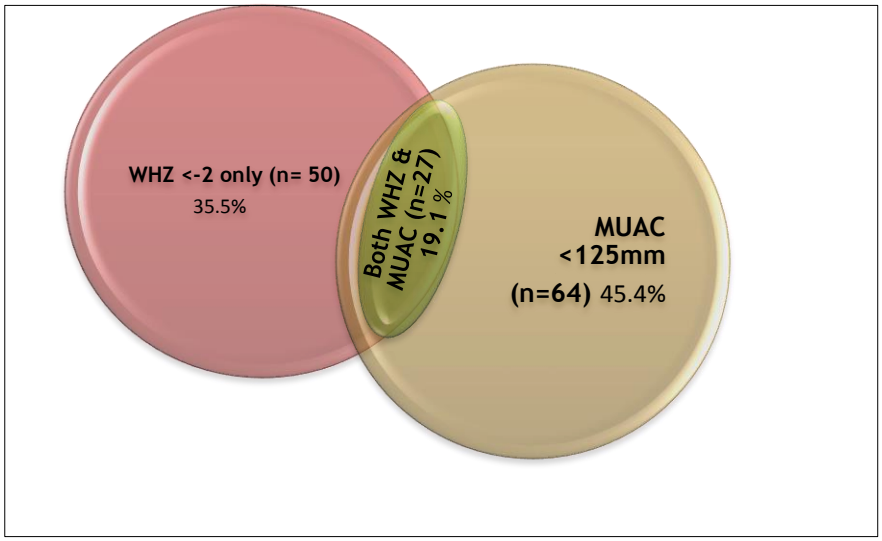
Residential status of Households	**Permanent residential**	**655**	**92.5%**
	Internal Displacement	52	**7.3%**
	Returnees	1	**0.1%**

10. Discussions

10.1. Nutrition status

The GAM rate, based on WHZ and Oedema was found 8.6% (6.6-11.1 95% CI) which classify the situation as poor (WHO Crisis Classification of GAM rates) while The SAM rate based on WHZ, was 1.0% (0.5- 1.8 95% CI). And in penetration analysis from 0-59 months GAM was 10.4% (8.3-13.0 95% CI) based on WHZ score that classified as serious situation in the province. The GAM rate based on MUAC<125 mm was 10.4% (8.2-13.2 95% CI) while the SAM rate was 2.2% (1.3-3.7 95% CI). In-depth analysis indicated that both criteria (WHZ and MUAC) prevalence are not based on the same Children and combine GAM rate for children 6-59 month was 15.8% (13.4-18.2 95% CI) while SAM rate by both criteria was 2.8 % (1.7-3.9 95 % CI). Figure-12 schematically proves this difference.

Figure 14 : Overlapping WHZ<-2 and MUAC<125, Bamyan SMART, July 2017



Only 19.1% children in the sample were detected as acutely malnourished according both criteria, children classified as wasted by WHZ only were 35.5% and those wasted by MUAC only were 45.4%. Therefore, it is likely that MUAC based community screenings are not enough to detect all acutely malnourished children eligible for treatment according to the criteria stipulated in the Afghanistan National IMAM Guidelines. In that regard, exploring innovation methods of community detection and screening is a must.

The use of only MUAC or only WHZ based rates might lead to under estimation of caseload when comes to programming. Data were analyzed to get the combined WHZ/MUAC GAM and SAM rates to inform better programming in Bamyan province. Thus, combined GAM was of 15.8% (13.4-18.2 95% CI) and SAM is 2.8% (1.7-3.9 95% CI). These rates directly classify the situation in Bamyan province as Critical need to strength IMAM program.

Chronic malnutrition trends in Bamyan province remain worrying. The results of the present survey clearly showed that stunting was of 42.2% (38.1-46.4 95% CI) among children from 6-59 months. More than 1 in each 2 children included in the survey were found to be stunted, while 1 in each 4 children was underweight. The high stunting rates are in line with high morbidity (51.6% reported of being ill in 2 weeks prior to survey), and poor infant feeding practices (exclusive breastfeeding was found to be 60.8 % and timely complementary feeding was of 48.4 %) have been known to expose children under nutrition and its potential consequences.

10.2. Maternal nutritional status

There are no commonly accepted international standards for maternal nutrition status. In line with the Afghanistan National Guideline, the MUAC cutoff for pregnant and lactating women of 230 mm is used to approximately identify their status. In this survey 25.8% (21.9-29.7 95% CI) of pregnant and lactating women were found to have a MUAC<230mm, which suggest that a considerable number of PLWs in Bamyan province are likely to have low nutritional status. The main concern was iron supplementation among pregnant women, which was found to be very low (59.3%). The Iron supplementation prevent anemia during pregnancy and eventual life-threatening complications during delivery. Therefore, it decreases maternal mortality, prenatal and perinatal infant loss and prematurity, which can be directly related to child stunting in the first 2 years of life. The Iron/Folate supplementation for pregnant women needs to increase significantly by reinforcing the usual channels for that in BPHS/CBHC. The BPHS Implementing partner needs to make immediately significant progress by reinforcing ANC and CHW home visits to PLW.

10.3. IYCF practice

Optimal infant and young child nutrition, especially exclusive breastfeeding are estimated to prevent potential deaths every year among children under five years old. Infant and young child feeding nutrition in this area still need to be improved.

Findings so far have indicated that timely initiation of breastfeeding, colostrum feeding and continued breastfeeding up to the first year of the life well practiced by the mothers. However, exclusive breastfeeding rate of 60.8% is of real concern as these potentially contribute to stunting in the first two years of life. The introduction of complementary feeding after 6 months of EBF period remain relatively poor (48.4%) and often mixed with tea (inhibits iron absorption). These two practices need to be significantly improved in a targeted manner.

10.4. Death rates

The survey showed that the Crude Mortality Rate (CMR) and under-five mortality rate (U5MR) were 0.18 % (0.09-0.35, 95% CI) and 0.30 % (0.10-0.93, CI 96%) respectively. Both CMR and U5MR rates were below the WHO's emergency thresholds of 2/10,000/day and 4/10,000/day respectively.

10.5. Risk factors

Morbidity, immunization, Supplementation and deworming

The UNICEF conceptual framework of malnutrition can be used to explain the probable causes of under-nutrition in this area. Diseases weaken an individual immune system causing them have other side effects such as reduced food intake and diarrhea. In the entire Bamyan province, more than half of the sampled children had suffered from 1 form of illness or another (51.6 %) such as diarrhea, fever, cough and skin infection.

The coverage of Vitamin A supplementation, 6 months prior to the survey, was very good. About 91.6% children received vitamin A supplementation. One of the core functions of Vitamin A is to boost an individuals' immunity hence important of supplement. Building awareness on Vitamin A is of importance as the current rates are high compared to the recommended WHO target of 80%, vitamin A coverage that probably happened due to the effectiveness of the integrated NIDs campaign.

11. Conclusion

The survey findings revealed that the Prevalence of Global Acute Malnutrition (GAM) and severe acute malnutrition (SAM) in children aged (6-59) months based on Weight for Height (WHZ) was at **8.6% (6.6-11.1 95% C.I.)** while SAM prevalence is **1.0% (0.5-1.8 95% CI.).** Prevalence of Global Acute Malnutrition (GAM) and severe acute malnutrition (SAM) in children age under five (0-59) months based on Weight for Height was at **10.4% (8.3-13.0 95% CI)** and SAM is **1.4% (0.8- 2.5 95% CI)**. This is indicating a "Serious public health problem" according to WHO classification of acute malnutrition situation. The prevalence of GAM based on MUAC cut-offs was **10.4% (8.2 - 13.2 95% C.I.)** and SAM was at **2.2% (1.3 - 3.7 95% C.I.)** respectively. The situation of the province need to strength the current IMAM program and need to focus on the SAM treatment and prevention of under five children.

The combined GAM and SAM prevalence based on MUAC and WHZ both criteria was **15.8% (13.4-18.2 95% CI) and 2.8% (1.7-3.9 95% CI)** respectively.

The prevalence of stunting for children aged(6-59) months was at 42.2% (38.1 - 46.4 95% C.I.). This is considered as Serious public health problem based on WHO classification.

Crude Death Rate and Under-five Death rates were at 0.18/10,000/day and 0.30/10,000/per day respectively. The rates are both below the SPHERE emergency thresholds.

The survey revealed that fever and Diarrhea were major illnesses reported among to under-five, with above 51.6% of children reported to have been high prior to the survey period. See below for summary recommendation.

12. Recommendation

Summary of some key recommendations are noted below:

12.1. Under nutrition

- Prioritize activities addressing chronic malnutrition (serious stunting rates) at the community level through integrated food security/agricultural, WASH, nutrition cooking demonstrations, IYCF, appropriate supplementation, growth monitoring, and improving maternal health and nutrition.
- Reinforcing of health education including home management of diarrhea and ARI, ensure hygiene at both facility and community levels.

- To strength the TSFP program and increase referral system through CHWs in the community level.
- The survey finding representing over burden of illness experienced by children. So, it is recommended to launch some infection prevention intervention and applying nutrition sensitive interventions such as provision of safe drinking water, Hygiene promotion practices, sanitation.

12.2. Child health and immunization

- Improve awareness and investigate more on barriers for improved health care seeking by families for management of children's infections
- Strength child health prevention (vaccination, deworming and supplementation) and referral.
- Concentrating efforts on encouraging IYCF that fails to be achieved: exclusive breastfeeding and timely introduction of quality complementary food.
- Increasing of Health education on community and Health Facility level.

12.3. Maternal nutrition status

- Continue SFP to address PLW having MUAC <230 mm and potentially prevent child under nutrition
- To strength awareness on iron folate supplementation.
- To strength referral system for Antenatal care and health seeking visits during pregnancy trough CHWs in the community level.

13. Annexes

Annex 1: Plausibility check for: Bamyan_SMART_assessment_August_2017_.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** (0.9 %)
Overall Sex ratio (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	**0** (p=0.387)
Age ratio(6-29 vs 30-59) (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	**0** (p=0.240)
Dig pref score - weight	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	**2** (8)
Dig pref score - height	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	**0** (7)
Dig pref score - MUAC	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	**0** (6)
Standard Dev WHZ . .	Excl and Excl	SD and SD	<1.1 <1.15 >0.9	<1.15 <1.20 >0.85	<1.20 or >0.80	>=1.20 <=0.80	
			0	5	10	20	**0** (0.99)
Skewness WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	**1** (-0.23)
Kurtosis WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	**0** (0.04)
Poisson dist WHZ-2	Excl	p	>0.05 0	>0.01 1	>0.001 3	<=0.001 5	**1** (p=0.036)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**4** %

The overall score of this survey is 4 %, this is excellent.

There were no duplicate entries detected.

Percentage of children with no exact birthday: 33 %

Anthropometric Indices likely to be in error (-3 to 3 for WHZ, -3 to 3 for HAZ, -3 to 3 for WAZ, from observed mean - chosen in Options panel - these values will be flagged and should be excluded from analysis for a nutrition survey in emergencies. For other surveys this might not be the best procedure e.g. when the percentage of overweight children has to be calculated):

Line=19/ID=1: HAZ (2.119), Age may be incorrect
Line=29/ID=1: **WHZ (7.507)**, WAZ (4.552), Weight may be incorrect
Line=68/ID=2: HAZ (1.128), Age may be incorrect

Line=73/ID=1: HAZ (9.630), WAZ (2.509), Age may be incorrect
Line=93/ID=1: HAZ (-4.923), Height may be incorrect
Line=95/ID=3: HAZ (-5.003), Age may be incorrect
Line=98/ID=1: HAZ (1.557), Age may be incorrect
Line=109/ID=1: HAZ (-5.504), Age may be incorrect
Line=328/ID=2: HAZ (-5.225), Height may be incorrect
Line=374/ID=1: HAZ (-4.911), Height may be incorrect
Line=469/ID=1: **WHZ (-3.933)**, Weight may be incorrect
Line=480/ID=1: HAZ (-4.938), Height may be incorrect
Line=488/ID=1: **WHZ (2.734)**, Height may be incorrect
Line=546/ID=1: **WHZ (-4.062)**, WAZ (-4.603), Weight may be incorrect
Line=659/ID=1: HAZ (2.473), WAZ (1.923), Age may be incorrect
Line=665/ID=1: HAZ (-5.104), Age may be incorrect
Line=666/ID=2: HAZ (-5.104), Height may be incorrect
Line=784/ID=3: **WHZ (2.536)**, Weight may be incorrect
Line=828/ID=2: **WHZ (-4.157)**, Weight may be incorrect
Line=890/ID=1: HAZ (1.703), Age may be incorrect
Line=892/ID=3: HAZ (-6.569), WAZ (-4.794), Age may be incorrect
Line=895/ID=1: **WHZ (8.425)**, WAZ (4.803), Weight may be incorrect
Line=929/ID=1: **WHZ (-4.071)**, Weight may be incorrect

Percentage of values flagged with SMART flags:WHZ: 0.9 %, HAZ: 1.7 %, WAZ: 0.7 %

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 : ######################
Month 60 : #

Age ratio of 6-29 months to 30-59 months: 0.92 (The value should be around 0.85).:
p-value = 0.240 (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	109/107.7 (1.0)	119/101.6 (1.2)	228/209.3 (1.1)	0.92
18 to 29	12	105/105.0 (1.0)	99/99.1 (1.0)	204/204.0 (1.0)	1.06
30 to 41	12	103/101.7 (1.0)	86/96.0 (0.9)	189/197.8 (1.0)	1.20
42 to 53	12	103/100.1 (1.0)	93/94.5 (1.0)	196/194.6 (1.0)	1.11
54 to 59	6	44/49.5 (0.9)	41/46.7 (0.9)	85/96.3 (0.9)	1.07
6 to 59	54	464/451.0 (1.0)	438/451.0 (1.0)		1.06

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

Overall sex ratio: p-value = 0.387 (boys and girls equally represented)
Overall age distribution: p-value = 0.494 (as expected)
Overall age distribution for boys: p-value = 0.947 (as expected)
Overall age distribution for girls: p-value = 0.314 (as expected)
Overall sex/age distribution: p-value = 0.191 (as expected)

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: **8** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.000 (significant difference)

Digit preference Height:

Digit .0 : ##
Digit .1 : ##
Digit .2 : ##

Digit .3 : ##
Digit .4 : ##
Digit .5 : ##
Digit .6 : ##
Digit .7 : ##
Digit .8 : ##################################
Digit .9 : ############################

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

Digit preference MUAC:

Digit .0 : ##################################
Digit .1 : ####################################
Digit .2 : ##
Digit .3 : ##
Digit .4 : ##
Digit .5 : ##
Digit .6 : ##
Digit .7 : ####################################
Digit .8 : ##
Digit .9 : ##

Digit preference score: **6** (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	1.03	0.99
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	9.0%	9.0%	
calculated with current SD:	9.6%	8.4%	
calculated with a SD of 1:	7.6%	7.8%	
HAZ			
Standard Deviation SD:	1.14	1.06	0.99
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	42.5%	42.4%	
calculated with current SD:	45.8%	45.8%	
calculated with a SD of 1:	45.2%	45.5%	
WAZ			
Standard Deviation SD:	0.92	0.92	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= 0.000	p= 0.000	p= 0.064
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	0.77	-0.29	-0.23
HAZ	0.99	-0.07	-0.11
WAZ	0.41	0.41	-0.33

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	7.79	0.43	0.04
HAZ	11.79	0.81	-0.03
WAZ	4.53	4.53	0.03

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=1.39 (p=0.036)
WHZ < -3: ID=0.84 (p=0.782)
GAM: ID=1.39 (p=0.036)
SAM: ID=0.84 (p=0.782)
HAZ < -2: ID=1.20 (p=0.153)
HAZ < -3: ID=1.34 (p=0.056)
WAZ < -2: ID=1.56 (p=0.007)
WAZ < -3: ID=0.98 (p=0.511)

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 will be related to the time of the day the measurement is made).

Time point — SD for WHZ

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: 0.95 (n=51, f=0) ######
02: 1.61 (n=48, f=1) ##################################
03: 1.00 (n=46, f=0) #########
04: 1.13 (n=47, f=1) ##############
05: 1.16 (n=49, f=1) ###############
06: 0.82 (n=45, f=0) #
07: 0.96 (n=47, f=0) #######
08: 0.98 (n=48, f=0) ########
09: 1.06 (n=46, f=0) ###########
10: 0.91 (n=46, f=0) #####

11: 1.19 (n=45, f=1) ################
12: 1.07 (n=46, f=0) ##########
13: 1.64 (n=44, f=1) ##################################
14: 1.18 (n=44, f=0) ################
15: 1.12 (n=42, f=1) #############
16: 1.07 (n=40, f=0) ##########
17: 0.88 (n=33, f=0) ###
18: 0.85 (n=32, f=0) ##
19: 0.80 (n=24, f=0)
20: 0.94 (n=20, f=0) OOOOOO
21: 1.05 (n=14, f=1) OOOOOOOOOO
22: 0.81 (n=14, f=0) O
23: 1.23 (n=14, f=1) OOOOOOOOOOOOOOOOOO
24: 1.04 (n=07, f=0) ~~~~~~~~~~
25: 0.57 (n=05, f=0)
26: 0.48 (n=03, f=0)

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

Analysis by Team

Team	**1**	**2**	**3**	**4**	**5**	**6**
n =	168	136	162	116	175	145
Percentage of values flagged with SMART flags:						
WHZ:	0.0	1.5	1.9	0.0	1.1	0.7
HAZ:	1.8	2.2	0.0	1.7	3.4	0.7
WAZ:	0.0	1.5	0.6	0.9	0.6	0.7
Age ratio of 6-29 months to 30-59 months:						
	1.15	0.79	0.95	0.93	0.67	1.13
Sex ratio (male/female):						
	1.10	0.92	0.93	1.11	1.46	0.88
Digit preference Weight (%):						
.0 :	5	9	14	13	13	6
.1 :	13	17	22	8	10	15
.2 :	8	10	11	9	17	19
.3 :	12	10	9	8	5	9
.4 :	10	6	6	16	6	8
.5 :	12	16	13	12	16	8
.6 :	11	13	6	8	5	5
.7 :	10	4	6	5	13	4
.8 :	10	10	7	12	7	12
.9 :	10	6	6	9	9	14
DPS:	7	14	16	10	15	16
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)						
Digit preference Height (%):						
.0 :	8	9	17	20	15	3
.1 :	11	7	14	9	11	11
.2 :	11	14	11	15	10	12
.3 :	7	10	12	6	10	10
.4 :	10	12	9	5	9	12
.5 :	11	17	10	16	15	12
.6 :	15	10	12	6	11	9
.7 :	14	10	6	9	9	9
.8 :	10	8	6	9	5	10
.9 :	3	4	5	5	5	12
DPS:	11	12	12	16	11	9
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)						
Digit preference MUAC (%):						
.0 :	20	7	6	15	2	1
.1 :	8	8	10	4	7	10
.2 :	8	9	15	16	11	12

.3 :	4	12	8	8	11	10
.4 :	13	15	7	8	11	17
.5 :	17	11	12	15	20	6
.6 :	11	8	15	3	18	9
.7 :	7	8	6	5	11	10
.8 :	8	10	9	21	6	11
.9 :	5	13	12	6	3	14
DPS:	16	8	11	19	19	14

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

Standard deviation of WHZ:

SD	0.94	1.26	1.13	0.94	1.01	1.29

Prevalence (< -2) observed:

%	8.1	10.5		9.1	13.8

Prevalence (< -2) calculated with current SD:

%	13.2	12.3		7.7	14.4

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

%	8.0	9.5		7.4	8.6

Standard deviation of HAZ:

SD	1.09	1.01	0.98	1.57	1.16	0.98

observed:

%	42.9	40.4	46.6	45.7

calculated with current SD:

%	46.4	44.9	46.2	51.8

calculated with a SD of 1:

%	46.1	44.8	44.0	52.1

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	23/20.4 (1.1)	25/18.6 (1.3)	48/39.0 (1.2)	0.92
18 to 29	12	22/19.9 (1.1)	20/18.1 (1.1)	42/38.0 (1.1)	1.10
30 to 41	12	15/19.3 (0.8)	12/17.5 (0.7)	27/36.8 (0.7)	1.25
42 to 53	12	22/19.0 (1.2)	16/17.3 (0.9)	38/36.3 (1.0)	1.38
54 to 59	6	6/9.4 (0.6)	7/8.5 (0.8)	13/17.9 (0.7)	0.86
6 to 59	54	88/84.0 (1.0)	80/84.0 (1.0)		1.10

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

Overall sex ratio: p-value = 0.537 (boys and girls equally represented)
Overall age distribution: p-value = 0.160 (as expected)
Overall age distribution for boys: p-value = 0.524 (as expected)
Overall age distribution for girls: p-value = 0.336 (as expected)
Overall sex/age distribution: p-value = 0.089 (as expected)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	18/15.1 (1.2)	12/16.5 (0.7)	30/31.6 (1.0)	1.50
18 to 29	12	11/14.7 (0.7)	19/16.1 (1.2)	30/30.8 (1.0)	0.58
30 to 41	12	12/14.3 (0.8)	13/15.6 (0.8)	25/29.8 (0.8)	0.92
42 to 53	12	15/14.0 (1.1)	14/15.3 (0.9)	29/29.3 (1.0)	1.07
54 to 59	6	9/6.9 (1.3)	13/7.6 (1.7)	22/14.5 (1.5)	0.69
6 to 59	54	65/68.0 (1.0)	71/68.0 (1.0)		0.92

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

Overall sex ratio: p-value = 0.607 (boys and girls equally represented)

Overall age distribution: p-value = 0.315 (as expected)
Overall age distribution for boys: p-value = 0.638 (as expected)
Overall age distribution for girls: p-value = 0.187 (as expected)
Overall sex/age distribution: p-value = 0.058 (as expected)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	16/18.1 (0.9)	31/19.5 (1.6)	47/37.6 (1.3)	0.52
18 to 29	12	16/17.6 (0.9)	16/19.0 (0.8)	32/36.6 (0.9)	1.00
30 to 41	12	19/17.1 (1.1)	16/18.4 (0.9)	35/35.5 (1.0)	1.19
42 to 53	12	14/16.8 (0.8)	14/18.1 (0.8)	28/35.0 (0.8)	1.00
54 to 59	6	13/8.3 (1.6)	7/9.0 (0.8)	20/17.3 (1.2)	1.86
6 to 59	54	78/81.0 (1.0)	84/81.0 (1.0)		0.93

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

Overall sex ratio: p-value = 0.637 (boys and girls equally represented)
Overall age distribution: p-value = 0.312 (as expected)
Overall age distribution for boys: p-value = 0.447 (as expected)
Overall age distribution for girls: p-value = 0.062 (as expected)
Overall sex/age distribution: p-value = 0.011 (significant difference)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	15/14.2 (1.1)	11/12.8 (0.9)	26/26.9 (1.0)	1.36
18 to 29	12	18/13.8 (1.3)	12/12.4 (1.0)	30/26.2 (1.1)	1.50
30 to 41	12	14/13.4 (1.0)	17/12.1 (1.4)	31/25.4 (1.2)	0.82
42 to 53	12	10/13.2 (0.8)	13/11.9 (1.1)	23/25.0 (0.9)	0.77
54 to 59	6	4/6.5 (0.6)	2/5.9 (0.3)	6/12.4 (0.5)	2.00
6 to 59	54	61/58.0 (1.1)	55/58.0 (0.9)		1.11

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

Overall sex ratio: p-value = 0.577 (boys and girls equally represented)
Overall age distribution: p-value = 0.263 (as expected)
Overall age distribution for boys: p-value = 0.543 (as expected)
Overall age distribution for girls: p-value = 0.293 (as expected)
Overall sex/age distribution: p-value = 0.083 (as expected)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	19/24.1 (0.8)	18/16.5 (1.1)	37/40.6 (0.9)	1.06
18 to 29	12	23/23.5 (1.0)	10/16.1 (0.6)	33/39.6 (0.8)	2.30
30 to 41	12	27/22.8 (1.2)	15/15.6 (1.0)	42/38.4 (1.1)	1.80
42 to 53	12	25/22.4 (1.1)	21/15.3 (1.4)	46/37.8 (1.2)	1.19
54 to 59	6	10/11.1 (0.9)	7/7.6 (0.9)	17/18.7 (0.9)	1.43
6 to 59	54	104/87.5 (1.2)	71/87.5 (0.8)		1.46

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

Overall sex ratio: p-value = 0.013 (significant excess of boys)
Overall age distribution: p-value = 0.447 (as expected)
Overall age distribution for boys: p-value = 0.685 (as expected)
Overall age distribution for girls: p-value = 0.331 (as expected)
Overall sex/age distribution: p-value = 0.013 (significant difference)

Team 6:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	18/15.8 (1.1)	22/17.9 (1.2)	40/33.6 (1.2)	0.82
18 to 29	12	15/15.4 (1.0)	22/17.4 (1.3)	37/32.8 (1.1)	0.68
30 to 41	12	16/14.9 (1.1)	13/16.9 (0.8)	29/31.8 (0.9)	1.23
42 to 53	12	17/14.7 (1.2)	15/16.6 (0.9)	32/31.3 (1.0)	1.13
54 to 59	6	2/7.3 (0.3)	5/8.2 (0.6)	7/15.5 (0.5)	0.40
6 to 59	54	68/72.5 (0.9)	77/72.5 (1.1)		0.88

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

Overall sex ratio: p-value = 0.455 (boys and girls equally represented)
Overall age distribution: p-value = 0.156 (as expected)
Overall age distribution for boys: p-value = 0.333 (as expected)
Overall age distribution for girls: p-value = 0.346 (as expected)
Overall sex/age distribution: p-value = 0.048 (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 will be related to the time of the day the measurement is made).

Team: 1

```
Time                                SD for WHZ
point            0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.79 (n=09, f=0)
02: 1.20 (n=09, f=0)  ################
03: 0.86 (n=09, f=0)  ###
04: 1.20 (n=09, f=0)  ################
05: 0.54 (n=09, f=0)
06: 0.74 (n=08, f=0)
07: 1.12 (n=09, f=0)  ############
08: 1.22 (n=09, f=0)  ##################
09: 0.86 (n=09, f=0)  ##
10: 1.12 (n=09, f=0)  ############
11: 1.18 (n=09, f=0)  ################
12: 0.81 (n=09, f=0)
13: 0.77 (n=09, f=0)
14: 1.21 (n=09, f=0)  ################
15: 1.21 (n=09, f=0)  ################
16: 0.82 (n=09, f=0)  #
17: 0.44 (n=09, f=0)
18: 0.71 (n=07, f=0)
19: 0.59 (n=05, f=0)
20: 0.78 (n=03, f=0)
```

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

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: 1.01 (n=08, f=0)  ########
02: 0.78 (n=08, f=0)
03: 1.34 (n=06, f=0)  ######################
04: 1.04 (n=07, f=0)  #########
05: 1.25 (n=07, f=0)  ##################
06: 0.51 (n=08, f=0)
07: 1.07 (n=07, f=0)  ##########
```

08: 0.96 (n=07, f=0) #######
09: 1.04 (n=07, f=0) ##########
10: 0.69 (n=07, f=0)
11: 0.46 (n=07, f=0)
12: 0.74 (n=07, f=0)
13: 3.37 (n=07, f=1) ##
14: 0.76 (n=06, f=0)
15: 1.28 (n=07, f=1) ####################
16: 1.26 (n=05, f=0) ####################
17: 0.98 (n=05, f=0) #######
18: 0.82 (n=03, f=0) O
19: 0.34 (n=02, f=0)
20: 1.10 (n=03, f=0) OOOOOOOOOOOOO
21: 0.20 (n=03, f=0)
22: 1.18 (n=03, f=0) OOOOOOOOOOOOOOOO
23: 0.79 (n=02, f=0)
25: 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: 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: 1.25 (n=09, f=0) ###################
02: 1.52 (n=09, f=0) ###############################
03: 0.56 (n=08, f=0)
04: 0.79 (n=08, f=0)
05: 1.40 (n=09, f=1) ########################
06: 0.93 (n=08, f=0) ######
07: 0.82 (n=08, f=0) #
08: 1.08 (n=09, f=0) ############
09: 1.41 (n=09, f=0) ########################
10: 0.76 (n=08, f=0)
11: 1.50 (n=09, f=1) ##############################
12: 1.08 (n=09, f=0) ############
13: 1.10 (n=08, f=0) #############
14: 1.26 (n=09, f=0) ###################
15: 1.03 (n=08, f=0) ##########
16: 0.98 (n=08, f=0) ########
17: 0.87 (n=06, f=0) ###
18: 0.58 (n=06, f=0)
19: 0.22 (n=03, f=0)
20: 0.54 (n=02, f=0)
21: 0.41 (n=02, f=0)
22: 0.90 (n=02, f=0) ~~~~
23: 1.71 (n=02, f=1) ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
24: 1.37 (n=02, f=0) ~~~~~~~~~~~~~~~~~~~~~~~

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

Team: 4

Time SD for WHZ
point 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.92 (n=08, f=0) #####
02: 0.64 (n=06, f=0)
03: 0.75 (n=08, f=0)
04: 0.84 (n=06, f=0) ##
05: 1.10 (n=07, f=0) #############
06: 0.59 (n=06, f=0)
07: 0.77 (n=07, f=0)

08: 0.58 (n=06, f=0)
09: 0.93 (n=07, f=0) ######
10: 0.67 (n=06, f=0)
11: 1.55 (n=06, f=0) ##############################
12: 0.70 (n=07, f=0)
13: 0.76 (n=05, f=0)
14: 1.63 (n=06, f=0) ###################################
15: 0.49 (n=04, f=0)
16: 0.50 (n=05, f=0)
17: 1.40 (n=03, f=0) OOOOOOOOOOOOOOOOOOOOOOOO
18: 0.46 (n=04, f=0)
19: 0.83 (n=03, f=0) O
20: 1.17 (n=03, f=0) OOOOOOOOOOOOOO

(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: 0.88 (n=09, f=0) ###
02: 1.04 (n=08, f=0) ##########
03: 0.70 (n=09, f=0)
04: 1.26 (n=09, f=1) ###################
05: 1.08 (n=09, f=0) ############
06: 0.83 (n=08, f=0) #
07: 0.75 (n=08, f=0)
08: 0.52 (n=09, f=0)
09: 0.94 (n=08, f=0) ######
10: 1.21 (n=09, f=0) ################
11: 1.23 (n=08, f=0) #################
12: 1.48 (n=08, f=0) ############################
13: 0.87 (n=08, f=0) ###
14: 1.18 (n=07, f=0) ################
15: 0.64 (n=08, f=0)
16: 1.31 (n=07, f=0) ####################
17: 1.06 (n=06, f=0) ###########
18: 0.97 (n=07, f=0) #######
19: 0.20 (n=06, f=0)
20: 0.99 (n=06, f=0) ########
21: 1.46 (n=05, f=1) OOOOOOOOOOOOOOOOOOOOOOOOOOO
22: 0.11 (n=04, f=0)
23: 0.96 (n=05, f=0) OOOOOOO
24: 1.16 (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

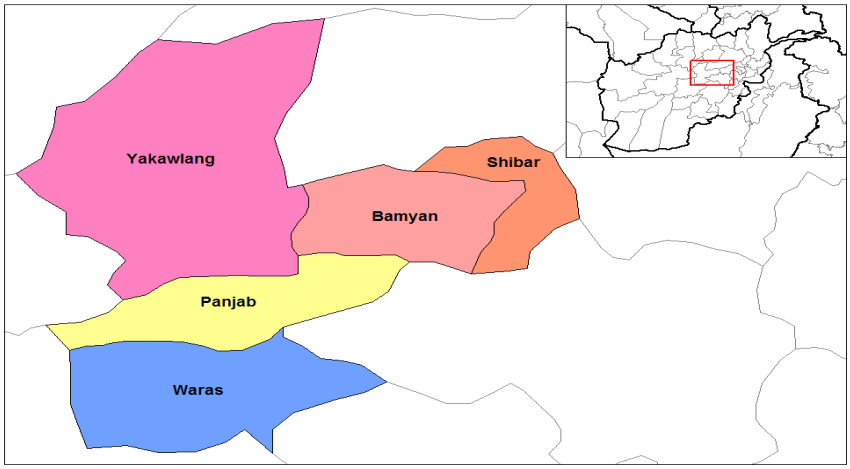
Time SD for WHZ
point 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.59 (n=08, f=0)
02: 3.06 (n=08, f=1) ##
03: 1.60 (n=06, f=0) ###################################
04: 1.07 (n=08, f=0) ###########
05: 1.13 (n=08, f=0) ##############
06: 1.20 (n=07, f=0) #################
07: 1.04 (n=08, f=0) ##########
08: 1.03 (n=08, f=0) ##########
09: 0.89 (n=06, f=0) ####
10: 0.95 (n=07, f=0) ######
11: 0.67 (n=06, f=0)

12: 1.37 (n=06, f=0) ########################
13: 1.14 (n=07, f=0) ##############
14: 1.15 (n=07, f=0) ###############
15: 1.34 (n=06, f=0) ########################
16: 1.45 (n=06, f=0) ############################
17: 0.26 (n=04, f=0)
18: 1.35 (n=05, f=0) ######################
19: 1.30 (n=05, f=0) ####################
20: 1.26 (n=03, f=0) OOOOOOOOOOOOOOOOOO
21: 0.22 (n=02, f=0)
22: 0.99 (n=04, f=0) OOOOOOOO
23: 0.75 (n=04, f=0)
24: 0.24 (n=02, f=0)

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

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

Annex 2: Bamyan physical maps.



Annex 3: Selected clusters in Bamyan province.

AIMS_Pname	AIMS_Dname	Vill_398_Name	Population size	Cluster
بامیان	مرکز بامیان ARCS	میانه قد.گیرو.تنگی میانه قد	1813	1
بامیان	مرکز بامیان ARCS	سنگ سوراخ	854	2
بامیان	مرکز بامیان حیدرآباد	حیدرآباد	2499	3
بامیان	مرکز بامیان شاه فولادی	سلطانو زیر مکتب	399	4
بامیان	مرکز بامیان شاه فولادی	پیتاب نوروزی .گیروی نوروزی	938	5
بامیان	مرکز بامیان سادات	دواب پایین.دواب زرد سنگ	546	6
بامیان	مرکز بامیان شهیدان	نواباد	518	7

RC	686	غار غلامک.لدوی پایین	مرکز بامیان شهیدان	بامیان
RC	260	پای کوتل ،دهن خوال ،دهن جوزار	مرکز بامیان FHH	بامیان
8	490	شهرنو سرخدر	مرکز بامیان PH	بامیان
9	868	قول کجک .قول جلال	مرکز بامیان PH	بامیان
10	3686	زرگران	مرکز بامیان کارته صلح	بامیان
RC	768	غریب اباد .فقیرا	مرکز بامیان کارته صلح	بامیان
11	609	پای کوتل بالا وپایین	مرکز بامیان قرغنه تو	بامیان
12	322	قلعه سرخار.سیل کشدهن سوماره	مرکز بامیان توبچی	بامیان
13	779	باجگاه	کهمرد دشت سفید	بامیان
14	1040	تنگی مویک	کهمرد دواب میخزرین	بامیان
15	1409	ده میانه	کهمرد دره اجر	بامیان
16	1032	دهقان قلعه	کهمرد دره اجر	بامیان
17	750	مرکز مدر	کهمرد درو دوشاخ	بامیان
18	876	غوراب چی	سیغان بیانی	بامیان
19	350	قلعه چه	سیغان خواجه گنج	بامیان
20	721	زیر باغ ، زیر ده	سیغان خواجه نمازگاه	بامیان
21	152	غوارب کیروی پائین	سیغان غوراب	بامیان
22	280	پای کوتل ، نورک ، سنگگ	شیبرکالو	بامیان
23	322	شکاری ، شش پول،	شیبرعراق	بامیان
RC	756	خواجه بیدک ، را نو	یکاولنگ سچک	بامیان
24	343	اور بورگود	یکاولنگ سرقول	بامیان
25	322	سربوم ، گیرو سبزدره	یکاولنگ دگا	بامیان
26	686	دهن دره چاشت َ،	یکاولنگ دره چتشت	بامیان
27	483	دم دشت سو ختگی	یکاولنگ دره چتشت	بامیان
28	1120	کفش اب ، امروتک، دواب شاه قدم	یکاولنگ ده سرخ	بامیان
29	420	سرسنک ،خک متگ ، غرغره	یکاولنگ ده سرخ	بامیان
30	2156	تو خانه ، قرغان	یکاولنگ DH	بامیان
31	630	گرد بید ، کمرک	یکاولنگ DH	بامیان
32	560	بغندک ، ذهرار	یکاولنگ DH	بامیان
33	441	حصارک ،	یکاولنگ سولیچ	بامیان
34	294	سیوک " دواب	ورس	بامیان
35	367	سفید اوبه علیا و سفلا	ورس	بامیان
36	1200	پش ده قوم مرزا	ورس	بامیان
RC	1100	دهن تخت	ورس	بامیان
37	370	دهن سفید پرمک " سومک " لیلی	ورس	بامیان
38	1200	پیازان	ورس	بامیان
RC	190	تو پ قابضان " بانوکه	ورس	بامیان
39	230	دهن خوک کشته " خوک کشته	ورس	بامیان
40	200	خاک شکه علیا و سفلا	ورس	بامیان
41	210	جو قولک علیا "رشک	ورس	بامیان

42	500	دره فقران	ورس	بامیان
43	600	واز درغان	ورس	بامیان
44	250	کجی ها	ورس	بامیان
45	200	سنک قول "اوته پور "پیره	پنجاب	بامیان
46	300	سرخ سنگ	پنجاب	بامیان
47	150	تو بک " وتار	پنجاب	بامیان
48	490	باریگی علیا و سفلا " میانه ده " غو جک	پنجاب	بامیان
49	700	خار قول " سربوم علیا	پنجاب	بامیان
50	1000	دشت غجور " باقر اباد " سید اباد	پنجاب	بامیان
51	119	سیبک " تق پوشی	پنجاب	بامیان

14. References:

A. **WHO 2000 thresholds (< 5 % acceptable, 5-9 % poor, 10-14 % serious, > 15 % critical).**
B. **WHO emergency threshold of 2/10,000/day and 4/10,000/day respectively.**
C. **WHO 2010, Indicators for Infant and Young child Feeding Practices**
D. **National Nutrition Survey of Afghanistan, UNICEF, 2013.**
E. **CSO: Estimated population 1396(2017-2018)**