AFGHANISTAN

Nutrition & Mortality SMART Survey

Preliminary Report

Logar Province, Afghanistan

23rd, December 2017 to 7th, January, 2018

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Abbreviations

ACF	Action Contra la Faim/Action against Hunger
AfDHS	Afghanistan Demographic and health survey
AIM-WG	Afghanistan Information Management Working Group
BCG	Bacillus Calmette Guerin
CAF	Care of Afghan Families
CDR	Crude Death Rate
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
MUAC	Mid Upper Arm Circumference
MW	Mean Weight
NNS	National Nutrition Survey
OPD	Out Patient Department
PPS	Probability Proportional to Size
PPHD	Provincial Public Health Directorate
PND	Public Nutrition Department
PNO	Provincial Nutrition Officer
RC	Reserve Cluster
RUTF	Ready to use therapeutic feeding
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
UNOCHA-CHF	United Nations office for coordination and humanitarian affairs Common Humanitarian fund
W/H	Weight for Height
WASH	Water Sanitation and Hygiene
WFP	World Food Program
WHO	World Health Organization
WHZ	Weight for Height Z score

1. Executive summery

Nutrition and mortality SMART survey conducted in the entire province of Logar province from 23rd Dec 2017 to 7thJanuary 2018 in winter season. It was based on the Standardized Monitoring and Assessment of Relief and Transition (SMART) methodology and was a cross-sectional survey following a two-stage cluster sampling method, The final report will include a comprehensive analysis of all collected data after validation of ACF HQ Paris in the month of March 2018.

Summary findings

- 816 children aged 0-59 months and among them 776 children aged 6-59 months were assessed from 570 household in this survey.
- The combined GAM and SAM prevalence based on MUAC and WHZ both criteria were 9.6% (7.5-11.5 95% CI) and SAM is 1.2% 0.4-2.0 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 7.1% (5.2-9.6 95% C.I.) and 1.1 % (0.5-2.4 95% CI.) respectively.
- Prevalence of global acute malnutrition in children aged 6-59 months based on MUAC was at 4.0% (2.2-7.1 95% CI) and SAM is 1.5% (0.9-2.8 95% CI).
- Prevalence of underweight based on Weight for Age Z-score (WAZ) in children age 6-Prevalence of underweight (WAZ) was 12.4% (10.1-15.2 95% CI) and severe underweight was 2.9% (1.9-4.4 95% CI).
- Prevalence of stunting or chronic malnutrition based on Height for Age Z-score (HAZ) was 30.7% (26.4-35.2 95% CI) while severe stunting was at 9.3% (7.3-11.8 95% CI)
- Maternal Malnutrition prevalence of Global Acute Malnutrition among pregnant and lactating women (PLW) based on MUAC <230mm was at 8.4% (5.5-11.2 95% CI).
- Cured Mortality Rate (CMR) was 0.42% (0.24-073 95%) with 1.64 design effect and under five mortality Rate was 0.86 (0.38-1.91) with a design effect of 1.12.
- The coverage of Immunization such as Measles (9-59 months) both by card and recall was at 91.7%, BCG (0-59 months) confirmed by scar was at 89.7% and Polio (0-59 months) both by card and recall was at 92.8% and PENTA 3 (3.5-59 months) was at 88.8%.

2. Introduction

Logar is one of the 34 provinces of Afghanistan, Logar province is composed of seven districts, the province is located in central part of Afghanistan, bordering in the north, Kabul province in the east, Nangarhar province in the south Paktia province in the west Midan Wardak. A strip of Gazni Province touches Logar.

The population of Logar province is about 4,051,091, it is a multi-ethnic tribal society and homogeneous population, with about 60% belonging to the Pashtun group and the rest being Tajiks and Hazara.The languages spoken in the province are Dari, Pashto and Hazargi.

Logar can be generally described as a relatively flat river valley in the north and central regions, surrounded by rugged mountains to the east, south, and southwest. The district of Hazra, in the east, consists almost entirely of mountains.it is consists of seven districts that encompass 4,410,278 square kilometers of which 32,693.01[2] are used for agricultures purpose. The province is the best known for producing corn, Yogurts, and wool. Logar province has seven districts such as Azra, Baraki Barak, Charkh, Kharwar, Khoshi, Mohammad Agha and Puli Alam the capital of the city.

The nutrition SAMRT survey was conducted in winter season (Jan 2018) coved all completely secure and partially secure villages of the entire Logar province. Action Against hunger technically supported CAF for implementing this survey to investigate the nutrition status of under five children and pregnant and lactating women in the survey area.

3. Context and Justification

The justification of the proposed assessment was to estimate the current prevalence of under nutrition among vulnerable populations in Logar 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 6.8% (4.9-9.2 95% CI) was poor levels of WHO severity classification in the province. There is need to investigate the current prevalence of under-nutrition in the province. The Survey findings will used to inform future programming in Logar province. It was also served as a good opportunity for building the capacity of CAF, and other stakeholders.

[1] CSO: updated population 2017-2018 (1396)

[2] National Agricultures Information System (NAIS) 2008

3.1. Objective of the survey

3.1.1 Broad objective:

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

3.1.2. Specific objective:

- To estimate Crude Death Rate(CDR) and Under five Death Rate(U5DR)
- To broadly estimated Global Acute Malnutrition (GAM) rates among children from 6-59 months living in the province.
- To estimated measles, Polio, BCG and PENTA immunization coverages in the province
- To determine core Infant and Young Child Feeding(IYCF) practices among children aged <24 months
- To estimated prevalence of malnutrition among pregnant and lactating women (PLWs). assessment.
- To assess institutional birth attendance in the province.
- To assess Water, Sanitation and Hygiene (WASH) proxy indicators: household water storage, water use and caregiver hand washing practices.
- To assess morbidity among children under five based on a two weeks recall period.
- To assess food access and consumption on seven days recall period: households levels.

4. Methodology

4.1. Sampling Methodology

As the survey areas is large and the population is dispersed, the cluster sampling method was used. It was completed 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 to the ENA for SMART software where PPS was applying. The villages with a large population had a higher chance of being select 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 cluster is only using when 10% or more clusters were not possible to cover during data collection due to any reason, in the survey. Only 2 clusters were missed due to insecurity and the team could not cover and we did not have 10% missed clusters, see Annex 1. 45 clusters have been covered and each survey team completed anthropometric measurements in 13 households in a day (606/13=46.6 clusters its round up was equal to 47 Clusters) this HHS size is calculated from ENA in the planning stage, 606 being the number of households planned to be surveyd. In each selected village, one or more community member(s) were 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 selected randomly to represent the cluster. This division was done based on existing administrative units e.g. neighbourhoods, streets or natural landmarks like a 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 570 households randomly selected based on survey parameters calculation for anthropometric Based on total sample size each team could cover effectively 13 households in a day. In this assessment, 7 teams were engaged during the assessments, while data collection was expected maximum to 9 days. All households were enumerated and given numbers by the survey team. The 13 households were chosen randomly from these enumerated households, by systematic random sampling method to identify the households to be surveyed. The teams were trained in both methods of sampling (simple and systematic random sampling) and they were offered with materials to assist in determining the households during the data collection exercise.

All the children living in the selected house 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 founded in a household, both were included, even if there were 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, if the targeted children were present or no , for additional data were collected such as (WASH,FSL,HHs size, mortality, water storage and maternal health and nutrition status). .

Any empty households ,absent households with missing or absent children were revisited at the end of each 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 absent households, however the abandoned HH excluded from the total HHs list at the beginning in the field. This information was 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, Logar SAMRT, January 2018

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
606	570	94.1%	636	776	122.0%

4.2. Sample Size

The sample size of households for the survey was determined by ENA for SMART software version 2011 (updated 9th July 2015). Two stages of cluster methodology was applied. In the first stage,

it involves random selection of clusters/villages (47 clusters) from the total list of villages using probability proportional to size (PPS) method and there were assessed 45 clusters (two clusters were not covered) due to security problems. 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, the selection of HHs were done by systematic method in the field. 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, Logar SAMRT, January 2018

Parameters for Anthropometry	Value	Assumptions based on context
Estimated prevalence of GAM (%)	6.8%	The survey team was referred to the NNS 2013 assessment for the planning stage of this survey (GAM was 6.8 % (4.92-9.2 95% CI) with (1.9) SD in the recommended limit (0.85-1.2 SD) due to lack of any updated data.
± Desired precision	±2.5	Since the expected GAM prevalence is low, a precision of ±2.5 was chosen.
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, however, the population access to health services is not equally in the province.
Children to be included	**636**	**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 AfDH survey Sep 2015
% Children 6 – 59 Months	15.5%	Based on recently SMART AfDHs 2015 in Afghanistan was 15.5%.
% Non-response Households	6%	The percentage of non-respondent households was estimate at 6%. Using the last experience of the SMART surveys in the deferent provinces.
Households to be included	**606**	**Minimum sample size-Households was surveyed. Households was the basic sampling unit for the SMART survey**

Table 3: Sample size calculation for mortality surveys, Logar SMART, January 2018

Parameters for Mortality	Value	Assumptions based on context
Estimated Death Rate /10,000/day	0.5/10000/ day	No updated death rate at population level; Recommended in cases where there is no specific mortality data for the area is surveyed
± Desired precision /10,000/day	0.3	Based on survey objectives and inline to estimated death rate.
Design Effect (if applicable)	1.5	This will caters for heterogeneity between clusters in the population being sampled
Recall Period in days	101	Starting point of recall period was done (from the beginning of Eid Qurban). 22nd Sunbula1396 the date of recall is equivalent to 13 Sep 2017 as per Gregorian calendar.
Population to be included	**2,904**	**Population**
Average HH Size	8	AfDH survey Sep 2015
% Non-response Households	6%	Refer to Table 2 above
Households to be included	386	Households

4.3. Training, team composition and supervision:

Seven 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 collector to ensure acceptance of the team amongst the surveyed households, particularly for PLWs MUAC and 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 5-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 8 children, in order to evaluate the accuracy and the precision of the team members in taking the anthropometric measurements. A one-day field test was conducted by the teams in order to evaluate their work in real field conditions. Feedbacks were provided to the team in regard to the results of the field test; particularly in relation to digit preferences and data collection. 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 into Dari, the local language, for better understanding and to avoiding direct translation during the data field collection. The

questionnaires were 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.

4.4. Data Entry and analysis

Anthropometric and mortality data were analysed by using ENA for SMART software 2011 version (updated 9th July 2015). The software automatically generated assessment result report for mortality and undernutrition for children <5 years - acute malnutrition (WHZ and MUAC), stunting (HAZ) and underweight (WAZ).

Analysis of maternal nutrition was done through excel sheet 2010. Additional indicators (WASH,FSL, IYCF, Mortality, Morbidity and immunization) were studied using excel 2010.

5. Results

5.1. Anthropometric results (WHO standards 2006)

Anthropometric results presented with an exclusion of SMART flags: Z score values ranging outside-form the observed mean for all three indexes (WHZ, HAZ and WAZ). The percentage of values flagged with SMART flags was WHZ: 1.9 %, HAZ: 3.4 % and WAZ: 0.9 %

Survey finding showed the distribution of the boys and girls in the sample was **not equally represented** with p-value = 0.037, the number of boys is significantly higher than the number of girls.

Age ratio of 6-29 months to 30-59 months shows no difference with P-Value=0.057. There are however some significate difference in the age distribution (p-value = 0.000) that could be explain by the participation of older children to the almond harvests

Table 4: Distribution of aged and sex of sample, Logar SMART, January 2018

	Boys		Girls		Total		Ratio
AGE (mo)	**no.**	**%**	**no.**	**%**	**no.**	**%**	**Boy : girl**
6-17	99	52.9	88	47.1	187	24.1	1.1
18-29	105	53.6	91	46.4	196	25.3	1.2
30-41	111	55.2	90	44.8	201	25.9	1.2
42-53	80	53.7	69	46.3	149	19.2	1.2
54-59	22	51.2	21	48.8	43	5.5	1.0
Total	417	53.7	359	46.3	776	100.0	1.2

a. Data quality

Anthropometric data was analyzed by using ENA for SMART survey 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, the design effects and number of the out of range data per index is indicating in both tables below.

Table 5: Mean z-scores, Design Effects and excluded subjects in children among, Logar SMART, January 2018.

Indicator	N6-59 months	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	756	-0.12±1.10	1.41	5	15
Weight-for-Age	764	-0.85±1.03	1.09	5	7
Height-for-Age	750	-1.40±1.21	1.69	0	26

* contains for WHZ and WAZ the children with oedema.

The sex and age disaggregated results are presented in the table bellows:

Table 6: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or edema) and by sex among children 6-59 months, Logar SMART, January 2018.

	All n = 761	Boys n = 407	Girls n = 354
Prevalence of global acute malnutrition (<-2 z-score and/or oedema)	(54) 7.1 % (5.2 - 9.6 95% C.I.)	(29) 7.1 % (4.9 - 10.2 95% C.I.)	(25) 7.1 % (4.4 - 11.1 95% C.I.)
Prevalence of moderate acute malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(46) 6.0 % (4.3 - 8.5 95% C.I.)	(24) 5.9 % (3.9 - 8.9 95% C.I.)	(22) 6.2 % (3.7 - 10.3 95% C.I.)
Prevalence of severe acute malnutrition (<-3 z-score and/or oedema)	(8) 1.1 % (0.5 - 2.4 95% C.I.)	(5) 1.2 % (0.5 - 2.9 95% C.I.)	(3) 0.8 % (0.2 - 3.6 95% C.I.)

The prevalence of oedema is 0.7 % (= 5 cases)

Table 7: Distribution of acute malnutrition and oedema based on weight-for-height z-scores (WHZ) among children 6-59 months, Logar SMART, January 2018.

	<-3 z-score	>=-3 z-score
Oedema present	Marasmic kwashiorkor No. 1 (0.1 %)	Kwashiorkor No. 4 (0.5 %)
Oedema absent	Marasmic No. 11 (1.4 %)	Not severely malnourished No. 760 (97.9 %)

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

Table 8: Prevalence of acute malnutrition based on MUAC cut off's (and/or oedema) and by sex age, among children 6-59 months, Logar SMART, January 2018.

	All n = 776	Boys n = 417	Girls n = 359
Prevalence of global malnutrition (< 125 mm and/or oedema)	(31) 4.0 % (2.2 - 7.1 95% C.I.)	(13) 3.1 % (1.8 - 5.2 95% C.I.)	(18) 5.0 % (2.2 - 11.2 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(19) 2.4 % (1.2 - 4.9 95% C.I.)	(5) 1.2 % (0.4 - 3.3 95% C.I.)	(14) 3.9 % (1.6 - 9.4 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(12) 1.5 % (0.9 - 2.8 95% C.I.)	(8) 1.9 % (1.0 - 3.7 95% C.I.)	(4) 1.1 % (0.3 - 3.6 95% C.I.)

b. Prevalence of underweight (WHO 2006)

The underweight is define by weight for age Z score (WAZ), the sex and age disaggregated results are present in the tables below for age 6-59 and 0-59months.

Table 9: Prevalence of underweight based on weight-for-age z-scores (WAZ) by sex, among children 6-59 months, Logar SMART, January 2018

	All n = 764	Boys n = 408	Girls n = 356
Prevalence of underweight (<-2 z-score)	(95) 12.4 % (10.1 - 15.2 95% C.I.)	(55) 13.5 % (10.7 - 16.8 95% C.I.)	(40) 11.2 % (7.6 - 16.3 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(73) 9.6 % (7.6 - 12.0 95% C.I.)	(39) 9.6 % (7.1 - 12.7 95% C.I.)	(34) 9.6 % (6.5 - 13.8 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(22) 2.9 % (1.9 - 4.4 95% C.I.)	(16) 3.9 % (2.6 - 6.0 95% C.I.)	(6) 1.7 % (0.6 - 5.0 95% C.I.)

Table 10: Prevalence of underweight based on weight-for-age z-scores (WAZ) by sex, among children 0-59 months, Logar SMART, January 2018

	All n = 802	**Boys n = 429**	**Girls n = 373**
Prevalence of underweight (<-2 z-score)	**(104) 13.0 % (10.6 - 15.7 95% C.I.)**	**(60) 14.0 % (11.2 - 17.3 95% C.I.)**	**(44) 11.8 % (8.1 - 16.8 95% C.I.)**
Prevalence of moderate underweight	**(77) 9.6 %**	**(41) 9.6 %**	**(36) 9.7 %**

(<-2 z-score and >=-3 z-score)	**(7.7 - 11.9 95% C.I.)**	**(7.2 - 12.6 95% C.I.)**	**(6.7 - 13.7 95% C.I.)**
Prevalence of severe underweight (<-3 z-score)	**(27) 3.4 % (2.2 - 5.1 95% C.I.)**	**(19) 4.4 % (2.9 - 6.7 95% C.I.)**	**(8) 2.1 % (0.7 - 6.1 95% C.I.)**

c. 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 and 0-59 months.

Table 11: Prevalence of stunting based on height-for-age z-scores (WAZ) and by sex, among children, 6-59 months, Logar SMART, January 2018.

	All n = 750	Boys n = 405	Girls n = 345
Prevalence of stunting (<-2 z-score)	(230) 30.7 % (26.4 - 35.2 95% C.I.)	(135) 33.3 % (28.1 - 39.0 95% C.I.)	(95) 27.5 % (22.2 - 33.6 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(160) 21.3 % (18.2 - 24.8 95% C.I.)	(98) 24.2 % (20.0 - 29.0 95% C.I.)	(62) 18.0 % (14.5 - 22.1 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(70) 9.3 % (7.3 - 11.8 95% C.I.)	(37) 9.1 % (6.6 - 12.4 95% C.I.)	(33) 9.6 % (6.4 - 14.2 95% C.I.)

Table 11: Prevalence of stunting based on height-for-age z-scores (WAZ) and by sex, among children, 0-59 months, Logar SMART, January 2018.

	All n = 788	Boys n = 426	Girls n = 362
Prevalence of stunting (<-2 z-score)	**(238) 30.2 % (26.1 - 34.7 95% C.I.)**	**(139) 32.6 % (27.6 - 38.1 95% C.I.)**	**(99) 27.3 % (21.9 - 33.5 95% C.I.)**
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	**(167) 21.2 % (18.1 - 24.7 95% C.I.)**	**(101) 23.7 % (19.7 - 28.3 95% C.I.)**	**(66) 18.2 % (14.6 - 22.5 95% C.I.)**
Prevalence of severe stunting (<-3 z-score)	**(71) 9.0 % (7.1 - 11.4 95% C.I.)**	**(38) 8.9 % (6.4 - 12.3 95% C.I.)**	**(33) 9.1 % (6.0 - 13.6 95% C.I.)**

5.2. Maternal nutrition status among pregnant and lactating women (PLWs)

633 mothers and caretakers in total were living in the selected households surveyed. The survey results are presented in the table below as a proportion from the 371 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.

Table 11: Maternal nutrition prevalence of PLWs Logar SMART, January 2018

PLWs MUAC cut off (N=371)	Frequency	Results 95% CI
Global acute malnutrition MUAC< 230 mm	31	8.4% (5.5-11.2 95% CI)
Moderate acute malnutrition MUAC ≥210mm to< 230 mm	25	6.7% (4.2-9.3 95% CI)
Sever acute malnutrition MUAC < 210mm	6	1.6% (0.3-2.9 95% CI)

5.3. Crude and U5 mortality rate

The total of 2,904 population was planned to have accurate mortality rates in the 386 households, so in the actually data collection 570 households, 4,323 population for the mortality sample size in the surveyed area, all the additional variable data was used based on anthropometric sample size. The table below shows mortality rates disaggregated by age and sex with a recall period of 101 days. The crude and under five children mortality rates were below than WHO emergency threshold.

Table 12: Mortality rate by age category with design effect, Logar SMART, January 2018

	Crude Death Rate (95% CI)	Design Effect
'Overall	0.42(0.24-0.73 95% CI)	1.64
'Sex		
'Male	0.53 (0.30-0.95 95% CI)	1.27
'Female	0.30 (0.13-0.67 95% CI)	1.16
'Years		
'0-4	0.86 (0.38-1.91 95% CI)	1.12
'5-11	0.26 (0.08-0.79 95% CI)	1.00
'12-17	0.12 (0.02-0.88 95% CI)	1.00
'18-49	0.38 (0.18-0.79 95% CI)	1.07
'50-64	0.49 (0.06-3.65 95% CI)	1.03
'65-120	1.46 (0.18-10.66 95% CI)	1.02

5.4. Child health and immunization

Retrospective morbidity data was collected among children 0-59 months with two weeks recall period to the survey assessed prevalence of main disease. The survey finding shows that 51.8% of children had at least one episode of illness in the 2 weeks recall prior to the survey. The major illnesses reported such as fever diarrhea and ARI as a highlighted in the table below.

Table13: Morbidity status among under-fives, n=816, Logar SMART, January 2018.

Parameter	Frequency	Results (%)
Acute respiratory Infection (ARI)	326	40.0%
Fever	338	41.4 %
Diarrhea	116	14.2 %

Table14: Immunization coverages for BCG, measles and Polio Logar SMART, January 2018

Indicators	Class	Frequency	Results (95% CI)
Measles (children form 9-59 months) (N= 719)	Yes by cards	502	69.8 %
	Yes by recall	157	21.8 %
	Both by cards and recall	659	91.7 %
	No	60	8.3 %
	Don't know	0	0.0 %
Polio (children from 0-59 months) (N= 816)	Yes by cards	599	73.4 %
	Yes by recall	158	19.4 %
	Both by cards and recall	757	93.0 %
	No	59	7.2%
	DK	0	0.0 %
PENTA 3 (children from 3.5-59 months) (N=789)	Yes by cards	543	68.7%
	Yes by recall	158	20.1%
	Both by cards and recall	701	88.8%
	No	88	11.2%
	Don't know	0	0.0%
BCG scar (children 0-59 months (N=816)	By scar confirmation (Yes)	732	89.7 %
	No	84	10.3 %
	Don't Know	0	0.0%

Vitamin A supplementation was quite good while deworming was comparatively low. Please see the table below.

Table 15: Vitamin A supplementation and Deworming for under five children, Logar SMART, January 2018

Indicators	Class	Frequency	Results 95% CI
Vitamin A supplementation 6-59 months (N= 778)	**Yes**	649	83.4%
	No	129	16.6%
	Don't know	0	0.0%
Deworming 24-59 months (N=500)	**Yes**	412	82.4%
	No	88	17.6%
	Don't know	0	0.0%

6. limitations of the survey

- Security problems in the province especially Hazra district and we had two missed clusters and the team could not covered.
- Direct and daily monitoring was impossible from total teams due to insecurity
- Daily feedback could not be delivered on time at the teams were coming back to late from the field.
- Hard to reach geographical area and local transportation difficulties for the teams.
- Response rate was 6%

7. 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) were at 7.1% (5.2-9.6 95% C.I.) while SAM prevalence is 1.1% (0.5-2.4 95% CI.). This situation is "Poor" according to WHO classification of acute malnutrition. The prevalence of GAM based on MUAC cut-offs was 4.0% (2.2-7.1 95% C.I.) and SAM was at 1.5 % (0.9-2.8 95% C.I.) respectively. The combine GAM and SAM prevalence based on MUAC and WHZ both criteria was (n=73) 9.6% (7.5-11.7 95% CI) and (n=9)1.2 % (0.4-2.0 95% CI) respectively.

The prevalence of stunting for children age under 6-59 months was at 30.7 %(26.4-35.2 95% C.I.). This is considered serious public health problem based on WHO classification.

Crude Death Rate and Under-five Death rate was at 0.42/10,000/day and 0.30/10,000/per day. The rates are both below SPHERE emergency thresholds.

The survey revealed that fever, diarrhea and ARI were major illnesses reported among to under-five, with above 51.8% of children reported to have been sick prior to the survey period.

8. Recommendations

Summary of some key recommendations are noted below:

8.1. Under nutrition

- The situation of the province needed to strengthen the current IMAM program and need to focus on the SAM treatment and prevention of under-five children.
- Prioritize activities were addressing chronic malnutrition, at the community level, through food security/agricultural, WASH, nutrition cooking demonstrations, IYCF practices within the family, appropriate supplementation, growth monitoring, and improving maternal health and nutrition and access to health services.
- To strength the TSFP program and increase referral system through CHWs in the community level.
- To increase the supply of nutrition equipment (Measuring board, MUAC, Digital Scale) which are using for screening and assessing nutrition status of PLWs and children under five.
- To enhance the supply of Nutrients such Milk, RUTF etc. because it is supplying for a few HF, not for all.
- To strength the OPD SAM program because currently, they had only in three HFs OPD SAM Program need to extent the OPD SAM program in the province.
- To develop the capacity of Nutrition workers by conducting the training.

8.2. Child health and immunization

- Improve awareness and investigate more on barriers for improved health care seeking by families for management of children's infections
- Strengthening 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
- Launching infection prevention interventions and applying malnutrition sensitive interventions such as a provision of safe drinking water, Hygiene promotion practices, sanitation.
- Reinforcing of health education including home management of diarrhea and ARI, hygiene at both facility and community levels.

8.3. Maternal nutrition status

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

9. Annexes

Annex 1:

Plausibility check for: LOG_AFG_SMART_ENA_122017_FV.as

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

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	**0** (1.9 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**4** (p=0.037)
Age ratio(6-29 vs 30-59)	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**2** (p=0.057)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (7)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (8)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (8)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>=1.20	
.			and	and	and	or	
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	**5** (1.10)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**1** (-0.29)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (-0.18)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**0** (p=0.128)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**16** %

The overall score of this survey is 16 %, this is acceptable.

There were no duplicate entries detected.

Percentage of children with no exact birthday: 34 %

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=44/ID=3:	HAZ (1.717), Age may be incorrect
Line=266/ID=1:	HAZ (1.694), Age may be incorrect
Line=377/ID=2:	HAZ (1.892), Height may be incorrect
Line=387/ID=2:	HAZ (-4.539), Age may be incorrect
Line=395/ID=2:	HAZ (-4.674), Age may be incorrect
Line=427/ID=2:	HAZ (-4.652), Height may be incorrect
Line=467/ID=1:	**WHZ (-3.888)**, HAZ (-4.623), WAZ (-4.800)
Line=474/ID=2:	HAZ (2.780), Age may be incorrect
Line=492/ID=2:	**WHZ (2.999)**, Height may be incorrect
Line=500/ID=2:	HAZ (5.513), Age may be incorrect
Line=501/ID=1:	**WHZ (2.971)**, Weight may be incorrect
Line=512/ID=1:	**WHZ (3.285)**, Height may be incorrect
Line=514/ID=1:	**WHZ (3.189)**, Weight may be incorrect
Line=519/ID=1:	**WHZ (-4.814)**, WAZ (-4.257), Weight may be incorrect
Line=521/ID=3:	HAZ (-4.577), Age may be incorrect
Line=530/ID=3:	**WHZ (-3.407)**, Height may be incorrect
Line=536/ID=1:	WAZ (-4.028), Age may be incorrect
Line=537/ID=1:	**WHZ (-3.561)**, WAZ (-4.283), Weight may be incorrect
Line=540/ID=1:	**WHZ (-3.145)**, Weight may be incorrect
Line=543/ID=1:	HAZ (2.235), Age may be incorrect
Line=549/ID=1:	HAZ (-5.743), Age may be incorrect
Line=552/ID=1:	**WHZ (-3.536)**, Weight may be incorrect
Line=556/ID=2:	HAZ (-6.241), WAZ (-4.123), Age may be incorrect
Line=558/ID=2:	HAZ (-4.708), Age may be incorrect
Line=561/ID=3:	**WHZ (-5.288)**, HAZ (5.635), Height may be incorrect
Line=570/ID=1:	**WHZ (3.315)**, Height may be incorrect
Line=618/ID=1:	HAZ (-6.400), Age may be incorrect
Line=626/ID=1:	HAZ (-4.829), Height may be incorrect
Line=636/ID=1:	HAZ (-4.982), Age may be incorrect
Line=643/ID=2:	HAZ (2.668), Age may be incorrect
Line=644/ID=1:	**WHZ (4.481)**, Height may be incorrect
Line=648/ID=1:	HAZ (-6.084), WAZ (-3.922), Age may be incorrect
Line=655/ID=1:	HAZ (-4.582), Height may be incorrect
Line=685/ID=1:	**WHZ (2.991)**, Weight may be incorrect
Line=690/ID=2:	HAZ (-4.557), Height may be incorrect
Line=758/ID=2:	HAZ (1.864), Age may be incorrect
Line=767/ID=3:	HAZ (3.591), WAZ (2.482), Age may be incorrect
Line=768/ID=2:	HAZ (2.833), Age may be incorrect
Line=779/ID=2:	**WHZ (-3.346)**, HAZ (2.449), Height may be incorrect

Percentage of values flagged with SMART flags:WHZ: 1.9 %, HAZ: 3.4 %, WAZ: 0.9 %

Age distribution:

Month 6 : ################
Month 7 : #################
Month 8 : ####################
Month 9 : #################
Month 10 : #################
Month 11 : ##########
Month 12 : ####################
Month 13 : ##################
Month 14 : #########
Month 15 : ############
Month 16 : #######
Month 17 : ##########
Month 18 : ################################
Month 19 : ################
Month 20 : #########
Month 21 : #######
Month 22 : #########
Month 23 : ##############
Month 24 : ##
Month 25 : ##################
Month 26 : ####################
Month 27 : #########
Month 28 : ###########
Month 29 : ########
Month 30 : ######################
Month 31 : ##############
Month 32 : ##############
Month 33 : ###########
Month 34 : #########
Month 35 : #########
Month 36 : ##
Month 37 : ###################
Month 38 : #################
Month 39 : ###########
Month 40 : ##########
Month 41 : #######
Month 42 : ############################
Month 43 : ###########
Month 44 : ########
Month 45 : ######
Month 46 : #####

Month 47 : #######
Month 48 : ##
Month 49 : ################
Month 50 : ##########
Month 51 : #####
Month 52 : ####
Month 53 : ##########
Month 54 : #############
Month 55 : #######
Month 56 : #####
Month 57 : ######
Month 58 : #########
Month 59 : ######

Age ratio of 6-29 months to 30-59 months: 0.97 (The value should be around 0.85).:
p-value = 0.057 (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	99/96.8 (1.0)	88/83.3 (1.1)	187/180.0 (1.0)	1.13
18 to 29	12	105/94.3 (1.1)	91/81.2 (1.1)	196/175.5 (1.1)	1.15
30 to 41	12	111/91.4 (1.2)	90/78.7 (1.1)	201/170.1 (1.2)	1.23
42 to 53	12	80/90.0 (0.9)	69/77.5 (0.9)	149/167.4 (0.9)	1.16
54 to 59	6	22/44.5 (0.5)	21/38.3 (0.5)	43/82.8 (0.5)	1.05
6 to 59	54	417/388.0 (1.1)	359/388.0 (0.9)		1.16

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

Overall sex ratio: p-value = 0.037 (significant excess of boys)
Overall age distribution: p-value = 0.000 (significant difference)
Overall age distribution for boys: p-value = 0.001 (significant difference)
Overall age distribution for girls: p-value = 0.019 (significant difference)
Overall sex/age distribution: p-value = 0.000 (significant difference)

Digit preference Weight:

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

Digit .8 : ##############################
Digit .9 : ################################

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

Digit preference Height:

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

Digit preference score: **8** (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: **8** (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:	1.21	1.19	1.10
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	7.4%	7.3%	6.5%
calculated with current SD:	6.0%	5.8%	4.4%
calculated with a SD of 1:	3.1%	3.0%	3.0%

HAZ

Standard Deviation SD:	1.41	1.38	1.21
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	31.4%	31.2%	30.7%
calculated with current SD:	33.5%	32.7%	31.0%
calculated with a SD of 1:	27.5%	26.8%	27.5%

WAZ

Standard Deviation SD:	1.07	1.07	1.03
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	13.1%	13.1%	12.4%
calculated with current SD:	14.6%	14.6%	13.1%
calculated with a SD of 1:	12.9%	12.9%	12.5%

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

WHZ	p= 0.000	p= 0.000	p= 0.000
HAZ	p= 0.000	p= 0.000	p= 0.010
WAZ	p= 0.001	p= 0.001	p= 0.018

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

Skewness

WHZ	-0.32	-0.24	-0.29
HAZ	0.22	0.36	0.00
WAZ	-0.29	-0.29	-0.16

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

Kurtosis

WHZ	0.85	0.58	-0.18
HAZ	1.74	1.56	-0.44
WAZ	0.42	0.42	0.01

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=1.24 (p=0.128)

```
WHZ < -3: ID=1.64 (p=0.005)
Oedema:   ID=1.32 (p=0.077)
GAM:      ID=1.23 (p=0.137)
SAM:      ID=1.35 (p=0.059)
HAZ < -2: ID=1.63 (p=0.005)
HAZ < -3: ID=1.16 (p=0.222)
WAZ < -2: ID=1.10 (p=0.295)
WAZ < -3: ID=1.08 (p=0.330)
```

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                                          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: 1.29 (n=45, f=1)  ####################
02: 1.13 (n=43, f=0)  ##############
03: 1.22 (n=43, f=2)  ##################
04: 1.33 (n=45, f=2)  ######################
05: 1.08 (n=44, f=0)  ############
06: 1.00 (n=43, f=0)  ########
07: 1.05 (n=41, f=1)  ##########
08: 1.18 (n=42, f=0)  ################
09: 1.27 (n=44, f=1)  ####################
10: 1.40 (n=42, f=2)  ########################
11: 1.37 (n=42, f=1)  ########################
12: 1.18 (n=44, f=0)  ################
13: 1.29 (n=38, f=1)  ####################
14: 1.22 (n=36, f=1)  ##################
15: 1.04 (n=31, f=0)  ##########
16: 1.16 (n=27, f=0)  ###############
17: 0.87 (n=21, f=0)  OOO
18: 1.07 (n=21, f=1)  OOOOOOOOOO
19: 1.16 (n=19, f=0)  OOOOOOOOOOOOO
20: 1.06 (n=17, f=0)  OOOOOOOOOO
21: 1.03 (n=13, f=0)  OOOOOOOOO
22: 1.44 (n=10, f=1)  ~~~~~~~~~~~~~~~~~~~~~~~~~~
23: 0.75 (n=08, f=0)
24: 0.71 (n=04, f=0)
25: 1.14 (n=03, f=0)  ~~~~~~~~~~~~~~
26: 3.31 (n=02, f=1)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

(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**	**7**
n =	143	146	134	81	30	143	99
Percentage of values flagged with SMART flags:							
WHZ:	3.5	0.7	4.5	1.2	3.4	3.5	1.0
HAZ:	9.1	2.1	1.5	1.2	0.0	3.5	2.0
WAZ:	2.1	0.0	1.5	1.2	3.4	3.5	0.0
Age ratio of 6-29 months to 30-59 months:							
	1.01	0.92	0.94	1.31	1.14	1.20	0.57
Sex ratio (male/female):							
	1.04	1.39	0.94	1.31	1.73	1.04	1.30
Digit preference Weight (%):							
.0 :	5	5	7	15	17	13	5
.1 :	11	21	8	12	17	18	15
.2 :	20	14	17	9	3	8	11
.3 :	13	7	11	4	7	7	11
.4 :	6	9	10	15	10	8	10
.5 :	10	15	6	11	20	10	11
.6 :	3	5	13	9	3	8	9
.7 :	13	6	11	6	3	12	14
.8 :	7	7	8	11	10	8	7
.9 :	11	10	8	9	10	8	6
DPS:	16	17	10	11	19	11	10
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)							
Digit preference Height (%):							
.0 :	9	10	11	21	20	16	3
.1 :	16	14	13	9	3	21	10
.2 :	18	15	5	10	3	8	12
.3 :	13	13	10	15	20	10	13
.4 :	8	13	12	5	7	6	12
.5 :	12	7	11	17	17	12	10
.6 :	5	5	11	14	13	4	10
.7 :	5	7	10	4	10	12	15
.8 :	6	7	8	6	3	6	3
.9 :	7	10	8	0	3	6	11
DPS:	15	12	7	21	22	17	13
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)							
Digit preference MUAC (%):							
.0 :	6	3	19	15	17	12	3
.1 :	15	14	6	14	10	6	9
.2 :	13	11	10	15	0	19	9
.3 :	13	10	10	6	3	19	12

.4 :	6	5	5	7	20	10	10
.5 :	14	14	17	11	27	12	17
.6 :	10	14	7	6	3	2	12
.7 :	3	5	10	10	10	2	9
.8 :	10	12	4	6	7	4	6
.9 :	10	11	10	10	3	13	12
DPS:	13	12	16	11	27	20	12

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

Standard deviation of WHZ:

SD	1.28	0.93	1.19	1.11	1.04	1.30	1.24

Prevalence (< -2) observed:

%	5.6	6.1	14.8	3.4	12.7	8.1

Prevalence (< -2) calculated with current SD:

%	4.7	5.1	12.4	4.3	11.0	4.0

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

%	1.6	2.6	9.9	3.8	5.5	1.5

Standard deviation of HAZ:

SD	1.68	1.21	1.33	1.30	1.11	1.48	1.27

observed:

%	48.3	21.2	29.1	29.6	26.7	37.8	19.2

calculated with current SD:

%	46.3	26.1	30.6	30.1	31.5	36.7	21.9

calculated with a SD of 1:

%	43.8	22.0	25.0	24.9	29.7	30.8	16.4

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	18/16.9 (1.1)	20/16.2 (1.2)	38/33.2 (1.1)	0.90
18 to 29	12	19/16.5 (1.2)	15/15.8 (0.9)	34/32.3 (1.1)	1.27
30 to 41	12	23/16.0 (1.4)	18/15.3 (1.2)	41/31.4 (1.3)	1.28
42 to 53	12	11/15.8 (0.7)	16/15.1 (1.1)	27/30.9 (0.9)	0.69
54 to 59	6	2/7.8 (0.3)	1/7.5 (0.1)	3/15.3 (0.2)	2.00
6 to 59	54	73/71.5 (1.0)	70/71.5 (1.0)		1.04

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

Overall sex ratio: p-value = 0.802 (boys and girls equally represented)
Overall age distribution: p-value = 0.007 (significant difference)
Overall age distribution for boys: p-value = 0.055 (as expected)
Overall age distribution for girls: p-value = 0.134 (as expected)
Overall sex/age distribution: p-value = 0.003 (significant difference)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	26/19.7 (1.3)	14/14.2 (1.0)	40/33.9 (1.2)	1.86
18 to 29	12	14/19.2 (0.7)	16/13.8 (1.2)	30/33.0 (0.9)	0.88
30 to 41	12	14/18.6 (0.8)	18/13.4 (1.3)	32/32.0 (1.0)	0.78
42 to 53	12	23/18.3 (1.3)	9/13.2 (0.7)	32/31.5 (1.0)	2.56
54 to 59	6	8/9.1 (0.9)	4/6.5 (0.6)	12/15.6 (0.8)	2.00
6 to 59	54	85/73.0 (1.2)	61/73.0 (0.8)		1.39

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

Overall sex ratio: p-value = 0.047 (significant excess of boys)
Overall age distribution: p-value = 0.696 (as expected)
Overall age distribution for boys: p-value = 0.208 (as expected)
Overall age distribution for girls: p-value = 0.375 (as expected)
Overall sex/age distribution: p-value = 0.006 (significant difference)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	20/15.1 (1.3)	21/16.0 (1.3)	41/31.1 (1.3)	0.95
18 to 29	12	13/14.7 (0.9)	11/15.6 (0.7)	24/30.3 (0.8)	1.18
30 to 41	12	18/14.3 (1.3)	20/15.1 (1.3)	38/29.4 (1.3)	0.90
42 to 53	12	12/14.0 (0.9)	11/14.9 (0.7)	23/28.9 (0.8)	1.09
54 to 59	6	2/6.9 (0.3)	6/7.4 (0.8)	8/14.3 (0.6)	0.33
6 to 59	54	65/67.0 (1.0)	69/67.0 (1.0)		0.94

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

Overall sex ratio: p-value = 0.730 (boys and girls equally represented)
Overall age distribution: p-value = 0.027 (significant difference)
Overall age distribution for boys: p-value = 0.159 (as expected)
Overall age distribution for girls: p-value = 0.218 (as expected)
Overall sex/age distribution: p-value = 0.014 (significant difference)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	9/10.7 (0.8)	5/8.1 (0.6)	14/18.8 (0.7)	1.80
18 to 29	12	19/10.4 (1.8)	13/7.9 (1.6)	32/18.3 (1.7)	1.46
30 to 41	12	12/10.1 (1.2)	8/7.7 (1.0)	20/17.8 (1.1)	1.50
42 to 53	12	4/9.9 (0.4)	7/7.6 (0.9)	11/17.5 (0.6)	0.57
54 to 59	6	2/4.9 (0.4)	2/3.7 (0.5)	4/8.6 (0.5)	1.00
6 to 59	54	46/40.5 (1.1)	35/40.5 (0.9)		1.31

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

Overall sex ratio: p-value = 0.222 (boys and girls equally represented)
Overall age distribution: p-value = 0.002 (significant difference)
Overall age distribution for boys: p-value = 0.011 (significant difference)
Overall age distribution for girls: p-value = 0.256 (as expected)
Overall sex/age distribution: p-value = 0.000 (significant difference)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	2/4.4 (0.5)	4/2.6 (1.6)	6/7.0 (0.9)	0.50
18 to 29	12	5/4.3 (1.2)	5/2.5 (2.0)	10/6.8 (1.5)	1.00
30 to 41	12	5/4.2 (1.2)	1/2.4 (0.4)	6/6.6 (0.9)	5.00
42 to 53	12	6/4.1 (1.5)	1/2.4 (0.4)	7/6.5 (1.1)	6.00
54 to 59	6	1/2.0 (0.5)	0/1.2 (0.0)	1/3.2 (0.3)	
6 to 59	54	19/15.0 (1.3)	11/15.0 (0.7)		1.73

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

Overall sex ratio: p-value = 0.144 (boys and girls equally represented)
Overall age distribution: p-value = 0.515 (as expected)
Overall age distribution for boys: p-value = 0.558 (as expected)
Overall age distribution for girls: p-value = 0.188 (as expected)
Overall sex/age distribution: p-value = 0.034 (significant difference)

Team 6:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	17/16.9 (1.0)	18/16.2 (1.1)	35/33.2 (1.1)	0.94
18 to 29	12	22/16.5 (1.3)	21/15.8 (1.3)	43/32.3 (1.3)	1.05
30 to 41	12	22/16.0 (1.4)	13/15.3 (0.8)	35/31.4 (1.1)	1.69
42 to 53	12	11/15.8 (0.7)	14/15.1 (0.9)	25/30.9 (0.8)	0.79
54 to 59	6	1/7.8 (0.1)	4/7.5 (0.5)	5/15.3 (0.3)	0.25
6 to 59	54	73/71.5 (1.0)	70/71.5 (1.0)		1.04

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

Overall sex ratio: p-value = 0.802 (boys and girls equally represented)
Overall age distribution: p-value = 0.017 (significant difference)
Overall age distribution for boys: p-value = 0.022 (significant difference)
Overall age distribution for girls: p-value = 0.416 (as expected)
Overall sex/age distribution: p-value = 0.004 (significant difference)

Team 7:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	7/13.0 (0.5)	6/10.0 (0.6)	13/23.0 (0.6)	1.17

```
18 to 29     12      13/12.7 (1.0)       10/9.7 (1.0)      23/22.4 (1.0)    1.30
30 to 41     12      17/12.3 (1.4)       12/9.4 (1.3)      29/21.7 (1.3)    1.42
42 to 53     12      13/12.1 (1.1)       11/9.3 (1.2)      24/21.4 (1.1)    1.18
54 to 59      6        6/6.0 (1.0)        4/4.6 (0.9)      10/10.6 (0.9)    1.50
-------------------------------------------------------------------------------
6  to 59     54      56/49.5 (1.1)      43/49.5 (0.9)                       1.30
```

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

Overall sex ratio: p-value = 0.191 (boys and girls equally represented)
Overall age distribution: p-value = 0.128 (as expected)
Overall age distribution for boys: p-value = 0.324 (as expected)
Overall age distribution for girls: p-value = 0.611 (as expected)
Overall sex/age distribution: p-value = 0.054 (as expected)

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: 1.46 (n=07, f=0)  ############################
02: 1.41 (n=06, f=0)  ########################
03: 1.08 (n=07, f=0)  ############
04: 1.80 (n=07, f=1)  ########################################
05: 0.97 (n=07, f=0)  #######
06: 1.01 (n=07, f=0)  #########
07: 0.88 (n=07, f=0)  ###
08: 0.54 (n=06, f=0)
09: 1.24 (n=07, f=0)  ##################
10: 1.85 (n=06, f=1)  ##########################################
11: 1.37 (n=05, f=0)  ########################
12: 0.85 (n=07, f=0)  ##
13: 2.29 (n=05, f=1)  ################################################################
14: 0.69 (n=06, f=0)
15: 0.74 (n=06, f=0)
16: 1.07 (n=06, f=0)  ###########
17: 0.72 (n=06, f=0)
18: 1.26 (n=06, f=0)  ###################
19: 1.62 (n=06, f=0)  ###################################
20: 1.39 (n=05, f=0)  ########################
21: 1.03 (n=03, f=0)  OOOOOOOOO
22: 0.89 (n=03, f=0)  OOOO
23: 0.87 (n=03, f=0)  OOO
24: 0.76 (n=02, f=0)
25: 1.21 (n=02, f=0)  OOOOOOOOOOOOOOOO
```

(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: 0.97 (n=08, f=0)  #######
02: 0.56 (n=08, f=0)
03: 0.75 (n=08, f=0)
04: 0.72 (n=08, f=0)
05: 0.91 (n=08, f=0)  #####
06: 0.90 (n=08, f=0)  ####
07: 0.80 (n=07, f=0)
08: 1.45 (n=08, f=0)  ############################
09: 0.69 (n=07, f=0)
10: 0.68 (n=08, f=0)
11: 1.01 (n=07, f=0)  #########
12: 0.52 (n=07, f=0)
13: 1.17 (n=06, f=0)  ###############
14: 1.09 (n=07, f=0)  ############
15: 0.88 (n=08, f=0)  ###
16: 0.99 (n=07, f=0)  ########
17: 0.42 (n=04, f=0)
18: 1.65 (n=05, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
19: 1.41 (n=05, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOO
20: 0.86 (n=05, f=0)  OOO
21: 0.63 (n=05, 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: 1.36 (n=08, f=1)  ########################
02: 0.90 (n=08, f=0)  ####
03: 1.54 (n=08, f=1)  ################################
04: 1.33 (n=08, f=0)  ######################
05: 1.23 (n=08, f=0)  ##################
06: 1.19 (n=06, f=0)  ##################
07: 0.81 (n=07, f=0)
08: 1.50 (n=07, f=0)  ##############################
09: 1.43 (n=08, f=1)  ############################
10: 1.45 (n=07, f=0)  ############################
11: 1.22 (n=08, f=0)  ##################
12: 1.11 (n=08, f=0)  #############
13: 0.85 (n=08, f=0)  ##
14: 1.54 (n=08, f=1)  ################################
15: 0.92 (n=05, f=0)  #####
16: 0.37 (n=04, f=0)
17: 0.04 (n=02, f=0)
18: 0.89 (n=02, f=0)  ~~~~
19: 0.67 (n=02, f=0)
20: 1.30 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~
22: 0.00 (n=02, f=0)
23: 0.43 (n=02, f=0)
```

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

Team: 4

```
Time                                          SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
```

```
01: 1.35 (n=06, f=0)  ########################
02: 1.02 (n=06, f=0)  #########
03: 1.25 (n=06, f=0)  ###################
04: 1.09 (n=06, f=0)  ############
05: 1.23 (n=06, f=0)  ###################
06: 1.05 (n=06, f=0)  ###########
07: 0.72 (n=05, f=0)
08: 0.94 (n=06, f=0)  ######
09: 1.37 (n=06, f=0)  ########################
10: 1.76 (n=06, f=1)  ########################################
11: 1.03 (n=06, f=0)  ##########
12: 0.85 (n=06, f=0)  ##
13: 1.08 (n=04, f=0)  ############
14: 0.85 (n=02, f=0)  OO
```

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

Team: 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: 0.49 (n=02, f=0)
02: 0.01 (n=02, f=0)
04: 1.07 (n=02, f=0)  ###########
05: 0.36 (n=02, f=0)
06: 1.75 (n=02, f=0)  ########################################
07: 0.37 (n=02, f=0)
08: 0.07 (n=02, f=0)
09: 1.21 (n=02, f=0)  #################
10: 0.40 (n=02, f=0)
11: 1.51 (n=02, f=0)  ##############################
12: 0.39 (n=02, f=0)
13: 1.88 (n=02, f=0)  ##############################################
14: 0.66 (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: 0.84 (n=07, f=0)  ##
02: 1.58 (n=06, f=0)  ################################
03: 1.52 (n=06, f=1)  ##############################
04: 1.84 (n=07, f=0)  ############################################
05: 0.74 (n=07, f=0)
06: 0.57 (n=07, f=0)
07: 1.08 (n=06, f=0)  ############
08: 1.54 (n=07, f=0)  ################################
09: 1.34 (n=07, f=0)  ########################
10: 0.85 (n=07, f=0)  ##
11: 2.17 (n=07, f=1)  ############################################################
12: 1.44 (n=07, f=0)  ############################
13: 1.24 (n=07, f=1)  ##################
14: 1.42 (n=07, f=0)  ############################
15: 1.11 (n=07, f=0)  #############
16: 1.59 (n=06, f=0)  ################################
17: 0.86 (n=06, f=0)  ##
```

```
18: 0.61 (n=06, f=0)
19: 0.69 (n=06, f=0)
20: 0.82 (n=05, f=0)  #
21: 1.36 (n=04, f=0)  OOOOOOOOOOOOOOOOOOOOO
22: 1.99 (n=04, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
23: 0.51 (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)
```

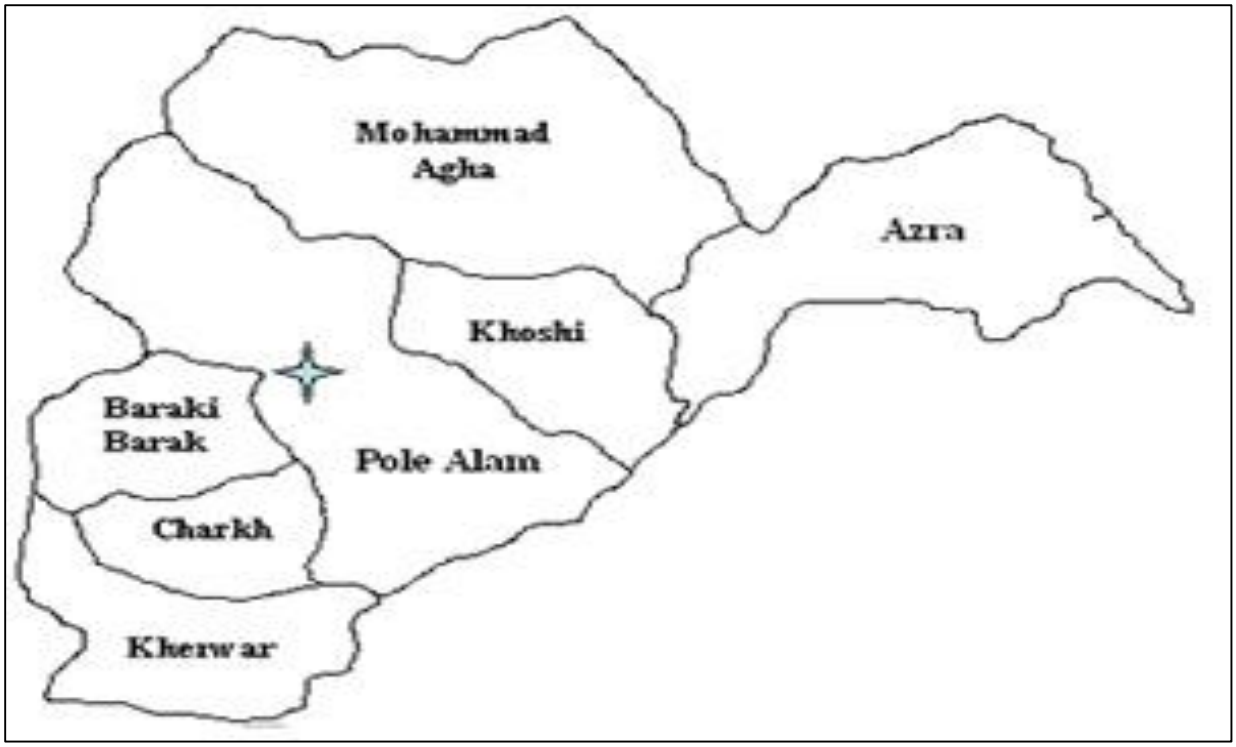
Team: 7

```
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: 1.37 (n=07, f=0)  ########################
02: 1.40 (n=07, f=0)  ########################
03: 0.72 (n=07, f=0)
04: 1.13 (n=07, f=0)  ##############
05: 1.10 (n=06, f=0)  ############
06: 0.87 (n=07, f=0)  ###
07: 1.39 (n=07, f=0)  ########################
08: 0.78 (n=06, f=0)
09: 1.69 (n=07, f=0)  ####################################
10: 0.77 (n=06, f=0)
11: 1.24 (n=07, f=0)  ##################
12: 1.71 (n=07, f=1)  ####################################
13: 1.25 (n=06, f=0)  ##################
14: 1.65 (n=04, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
15: 1.15 (n=03, f=0)  OOOOOOOOOOOOOOO
16: 0.40 (n=02, f=0)
17: 0.72 (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: Logar physical maps.



Annex 3: Selected clusters in Logar province.

No		Distract	Villages Name	Population	Cluster
1	Logar	Puli Alam	هونی سفلی	4758	1
2	Logar	Puli Alam	احمدگل - سبزک	560	2
3	Logar	Puli Alam	) ملاحسن-نوراحمد(	22388	RC,3,4
4	Logar	Puli Alam	تاجک	1549	5
5	Logar	Puli Alam	نوآباد مدرسه هوني سيدان	490	6
6	Logar	Puli Alam	قلعه نو حصارک - ده حصارک	1450	7
7	Logar	Puli Alam	قلعه احمد گل -علم خیل	820	8
8	Logar	Puli Alam	ده پورک - شمک	2420	9
9	Logar	Puli Alam	مها جرین	710	10
10	Logar	Muhammad Agha	صباکی خیل	1210	11
11	Logar	Muhammad Agha	قلعه ملا امان	3182	12

12	Logar	Muhammad Agha	غزنی خیل	1926	13
13	Logar	Muhammad Agha	کتب خیل - میر زا خیل	3182	14
14	Logar	Muhammad Agha	سپین چک	628	15
15	Logar	Muhammad Agha	مسجد عبد الرحمن	698	16
16	Logar	Muhammad Agha	ده محمد آغه	2936	17
17	Logar	Muhammad Agha	نیازیها . بهادر خیل	927	18
18	Logar	Muhammad Agha	قلعه عبدالواحد . وزیري ها	420	19
19	Logar	Muhammad Agha	قلعه افغانها . جامع زیارت	1050	20
20	Logar	Muhammad Agha	کافر کنج . رسول خیل	900	21
21	Logar	Muhammad Agha	علي خیل . نو آباد	1395	22
22	Logar	Muhammad Agha	ماله خیل بالا. پایین . فورمولي ها	888	23
23	Logar	Muhammad Agha	قلعه خلیفه	366	24
24	Logar	Muhammad Agha	سیا بینی - وزیری ها	580	25
25	Logar	Muhammad Agha	سیف الله	796	26
26	Logar	Muhammad Agha	لب جوی	820	27
27	Logar	Muhammad Agha	مسجد حاجی الو	927	28
28	Logar	Kharwar	عمرخان	2940	29
29	Logar	Kharwar	موچی خیل	2590	30
30	Logar	Baraki Barak	ده برکی برک	3789	31
31	Logar	Baraki Barak	قلعه وردک	367	32
32	Logar	Baraki Barak	بابوری ها	1541	33
33	Logar	Baraki Barak	نو برجه	932	34
34	Logar	Baraki Barak	شیخان	1547	35
35	Logar	Baraki Barak	هوسخیل	1793	36
36	Logar	Baraki Barak	قلعه امیر	308	37

37	Logar	Baraki Barak	نیازی - شمشیر خیل	490	38
38	Logar	Baraki Barak	ازبک خیل	480	39
39	Logar	Baraki Barak	قلعه سرایک	1364	40
40	Logar	Baraki Barak	اضافي اطراف (ده برکی راجان ۲) ملالطیف	8751	41,42
41	Logar	Azraa	الله خان خیل	493	43
42	Logar	Azraa	عثمان خیل	467	44
43	Logar	Khoshi	آبتک - باغ یارک	1315	45
44	Logar	Charkh	ارگان	880	46
45	Logar	Charkh	روزی گل	475	47