Nutritional anthropometric assessment

(Based on SMART methodology)

Children aged 6 to 59 months living in IDP camps

Nam Hkam and May Ja Yang area,

Northern Shan and Kachin State – Republic of the Union of Myanmar

April 2014

Data collection period: 27th of March 2014 – 4th of April 2014

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LIST OF ACRONYMS

ARI	Acute Respiratory Infection
CI	Confidence Interval
DE	Design Effect
DoH	Department of Health
ENA	Emergency Nutrition Assessment (software)
GAM	Global Acute Malnutrition
GCA	Government Controlled Area
GFD	General Food Distribution
H/A	Height-for-Age
HAZ	Height-for Age in Z-score
HH	Household
ID	Index of Dispersion
IDP	Internal Displaced people
IYCF	Infant and Young Child Feeding
KIA	Kachin Independence Army
KMSS	Karuna Myanmar Social Service
MAM	Moderate Acute Malnutrition
MoH	Ministry of Health
MUAC	Mid-Upper Arm Circumference
NFI	Non-Food Item
NGCA	Non-Government Controlled Area
NGO	Non-Governmental Organization
OR	Odd Ratio
PLW	Pregnant and Lactating Women
RSB	Rice Soya Blend
SAM	Severe Acute Malnutrition
SCI	Save the Children International
SD	Standard Deviation
SMART	Standardized Monitoring and Assessment of Relief and Transitions
TFP	Therapeutic Feeding Programme
U2	Under two
U5	Under five
UN	United Nations
UNHCR	United Nation High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme
W/H	Weight-for-Height
WHZ	Weight-for-Height Z-score
WHO	World Health Organization

EXECUTIVE SUMMARY

Assessment area: Nam Kham Township IDP camps, May Ja Yang area IDP camps.
Date of the assessment: 27th of March 2014 – 4th of April 2014

OBJECTIVES:

- To estimate prevalence of global and severe acute malnutrition among children aged from 6 to 59 months;
- To obtain global and severe chronic malnutrition prevalence among children aged from 6 to 59 months;
- To determine under nutrition prevalence among children aged from 6 to 59 months;
- To determine the prevalence of overweight among children aged from 6 to 59 months;
- To estimate incidence of diarrhoea and acute respiratory infection (ARI) in the preceding two weeks;
- To determine measles vaccination coverage among 9-59 months and tuberculosis immunization coverage (BCG vaccine) among children aged 6-59 months living in IDP camps
- To assess vitamin A supplementation and deworming treatment coverage (6 months recall) among children 6-59 months old

METHODOLOGY:

- Multi-stage cluster sampling survey with 35 clusters x 21 households (HH) = 735 HH expected
- Population figures were provided by camp committees; the number of children below the age of 5 years was estimated to be 11%.

RESULTS:

- **Acute Malnutrition rates (in terms of Z-scores and / or prevalence of oedema) with 95 % confidence interval (CI)**

  Low rate of acute malnutrition but 6-29 months children more at risk of acute malnutrition (p<0.01)

  - GAM: 2.9% [95% CI: 1.7 – 5.0%],
  - SAM: 0.0% [95% CI: 0.0 – 0.0%], no case of kwashiorkor

- **Chronic Malnutrition rates (in terms of Z-scores) with 95 % CI**

  Alarming global stunting prevalence, above WHO emergency threshold (40%)

  - Global stunting: 47.6% [95% CI: 43.1 – 52.2%]
  - Severe stunting: 10.3% [95% CI: 7.5 – 14.0%]

- **Underweight (in terms of Z-scores) with 95 % CI**

  Acceptable prevalence of underweight remaining under WHO emergency threshold (30%)

  - Global underweight: 18.5% [95% CI: 14.6 – 23.2%]
  - Severe underweight: 2.9% [95% CI: 1.7 – 5.1%]

- **Morbidity (2-week cumulated prevalence, N = 381):**
  - Seeking treatment for serious child illness: 18.4% [95% CI: 13.0 – 25.3%]
  - Diarrhoea: 22.0% [95% CI: 16.9 – 28.3%]
  - ARI: 21.0% [95% CI: 14.7 – 29.1%]

- **Measles vaccination of 9-59 months (N = 362):**
  - Global: 84.0% [95% CI: 76.8 – 89.3%]
  - With card : 50.0% ; without card (recall) : 34.0%; 9 children 6-8 months vaccinated

- **BCG vaccination of 6-59 months (N = 381):**
  - Global: 73.2% [95% CI: 64.7 – 80.3%]
  - With card : 49.3% ; without card (recall) : 23.9%

- **Vitamin A supplementation and deworming (6 months recall) of 6-59 months (N = 381):**
  - Vitamin A: 38.1% [95% CI: 28.7 – 48.4%]
  - Deworming: 35.4% [95% CI: 27.7 – 44.0%]

INTRODUCTION

The conflict in Kachin State broke out again in June 2011 between the Kachin Independence Army (KIA) and the Myanmar Army, causing many civilian casualties and displacements on top of major infrastructural damages and still limits families' access to health services, proper water and sanitation facilities but also diversified food and livelihood, among others. This is particularly the case for those who lost their assets and fled fighting area to move into camps. There are many settlements spread over the wide area that constitute Kachin State; government controlled area (GCA) and non-government controlled area (NGCA), and Shan State (under government control). Figures from November 2013 estimated the number of internally displaced people (IDP) to be around 100,000 with above 55% in area beyond government controlled[1][2].

Security situation and bureaucratic constraints are preventing international organisations from having full access to new IDPs and delivering continuous humanitarian assistance. The presence of local Non-governmental Organizations (NGOs) and charities allows, since the beginning of renewed violence, the supply in basic commodities (general ration, complementary rations…) and non-food items (NFIs) as well as implementation of soft-programming. However, water sanitation and hygiene (WASH), health, nutrition, shelter, livelihood or education still remain a concern after 2 years and a half.

Save the Children International (SCI) has been working in the area since 1999 and is still providing essential humanitarian assistance to IDPs from the Kachin conflict in Northern Shan State (Nam Hkam) and in May Ja Yang area (NGCA) by supporting Wun Pawng Nightoi (WPN). Intervention covers a total of 11 camps, four in Nam Kham and seven in May Ja Yang, totalling 11,710 individuals among which 1265 are under 5 years of age (U5).

Families in these two areas are living in crowed settlement with often little privacy. Needs for shelter construction and rehabilitation is a constant issue. This includes also cooking facilities, sanitation, washing areas and water storage.

With the population pressure, poor infrastructures and inappropriate hygiene behaviour (hand washing, water storage, hygiene around food preparation...), WASH conditions are precarious. Infectious diseases such as diarrhoea, acute respiratory infection (ARI), or tuberculosis are not uncommon and even more likely to be transmitted in such context.

Despite efforts from local NGOs and the support of some international actors, population have only a limited access to health services, with facilities sometimes lacking of routine medicines or families unable to afford treatment outside of the camps. However access to hospitals and private clinics exists in both areas. Even with proper food intake, above mentioned pathology untreated, contracted repeatedly or becoming chronic have an impact on the general population health particularly the most vulnerable ones, among which U5 children. For these age category, going through an important development process, impact on nutritional status may be particularly severe in the short and long run.

In term of Food security and livelihood (FSL), given partial or total loss of income sources and assets, many families have to rely almost exclusively on food assistance. The Karuna Myanmar Social Services (KMSS) ensures monthly general food distribution (GFD) and blended food ration distribution from the World Food Programme (WFP) in Nam Hkam and May Ja Yang camps[3]. Irregular access to NGCA however sometimes disrupts distribution in Mai Ja Yang camps.

Various activities are also put in place to help families diversifying their diet:

- KMSS supports the distribution of 6000 MMK/household/month to each IDP family to buy firewood, curry and other items they may need

[1] Myanmar: International Displacement Snapshot – Kachin and Northern Shan States, November 2013
[2] Interagency assessment mission to Laiza and May Ja Yang areas in Kachin State, UNOCHA, September 2013
[3] Standard ration 13.5kg rice, 1.8kg pulse 0.5Kg vitamin A fortified cooking palm oil, 0.15Kg salt per person/month and covering 2100 Kcal/day. PLW also receive 1.9Kg fortified Rice Soy Blend (RSB) with sugar and oil per month each and 6-24 months children receive 1.9Kg Supercereal++ per month each.

- SCI supports WPN in the distribution of a top-up food ration in May Ja Yang camps, adapted according to the season and demand, and including items such as potato, garlic, dry fish, dry beef, chick pea (bean), chili and soy bean paste.
- Kitchen gardening activities are also supported by SCI in these camps with the aim of providing condiments, some vegetables and pulses but remain quite limited.
- Some small scale small scale income generating activities (IGA), of variable impact, are also present in some camps of Nam Hkam and May Ja Yang (Juice, Liquid soap, candy, traditional bag/hat, pig farming run by Oxfam and Shalom among others).

With regards to the nutrition, SCI and WPN are the only actors in nutrition with ongoing regular activities in the area. Since 2012, the main focus has been to target U2 children through Infant and Young Child Feeding (IYCF) programme in Nam Hkam and in May Ja Yang IDP camps, as a preventative measure form malnutrition and to increase population resilience to conflict-related stresses.

Only limited data are available for the area on malnutrition but acute malnutrition rates seem to be stably low according to SCI/WPN MUAC monitoring. Among the few cases of severe acute malnutrition (SAM) detected at field level, many seem to be associated with tuberculosis, recent episode of diarrhoea or ARI, others with congenital heart problem. No information is available on chronic malnutrition but a recent assessment in neighbouring Kachin townships tends to indicate that stunting is an important burden on these children[4] (acute malnutrition prevalence being also low).

As part of their monitoring activities and to complete/clarify the nutritional situation of children aged 6-59 months living in IDP camps, SCI and WPN conducted a nutrition anthropometric SMART survey in their intervention areas. Data were collected in Nam Hkam IDP camps and 6 camps from May Ja Yang area from the 27th of March until the 4th of April 2014. This period corresponded to the end of cold season where lowest rates of malnutrition can usually be observed.

[4] Nutrition Anthropometric assessment, children aged 6-59 months living in IDP camps of Plan intervention area, Bhamo, Chipwi, Hpakan, Mansi, Mogaung, Mohnyin, Momaunk, Myitkyina, Swegu, Waimaw Townships, Kachin State, Republic of the Union of Myanmar, Plan International

1. Objectives

1.1 Main Objective

To determine the nutritional status of children aged 6 to 59 months living in IDP camps in Nam Hkam Township Northern Shan State and May Ja Yang area, Kachin State, Myanmar that belong to SCI/WPN intervention area.

1.2 Specific Objectives

- To estimate prevalence of global and severe acute malnutrition among children aged from 6 to 59 months;
- To obtain global and severe chronic malnutrition prevalence among children aged from 6 to 59 months;
- To determine under nutrition prevalence among children aged from 6 to 59 months;
- To determine the prevalence of overweight among children aged from 6 to 59 months;
- To estimate incidence of diarrhoea and acute respiratory infection (ARI) in the preceding two weeks;
- To determine measles vaccination coverage among 9-59 months and tuberculosis immunization coverage (BCG vaccine) among children aged 6-59 months living in IDP camps
- To assess vitamin A supplementation and deworming treatment coverage (6 months recall) among children 6-59 months old

2. Sample size and selection

Data collection took place from 27th of March until 4th of April 2014 in Nam Hkam and May Ja Yang IDP camps (cluster sampling in annexe 1), the target population being children aged from 6 to 59 months and living in IDP camps.

Overall work was conducted following SMART[5] methodology, a fast, standardized and simplified method meant to ensure each household/individual in IDP camps had the same chance to be chosen.

According to a recent survey conducted by Plan International in other townships' IDP camps of Kachin State (cf. footnote in introduction for reference), chronic malnutrition seem to be the main nutritional problem among children 6-59 months old. However as this was the first SMART survey in this areas, sample calculation was run for chronic malnutrition and acute malnutrition, the biggest sample being finally chosen to ensure precise estimates for both indicators.

This survey was carried out using a two stages cluster sampling method:

- Cluster assignment was done through ENA2011[6] software (November, 16th 2013 update) according to population data per camp/site provided by the camp committees,
- Household selection (HH, the basic sampling unit) was performed at field level using simple or systematic random sampling method depending of the area set-up and size.

As it was not possible to visit the whole population, only a part of it was randomly selected in order to represent the whole population in each target area. Thus, **35 clusters including 21 households each** should provide a quite accurate estimation of acute malnutrition prevalence (as well as chronic malnutrition) in Nam Hkam and May Ja Yang IDP camps.

5 Standardized Monitoring and Assessment of Relief and Transitions
6 Emergency Nutrition Assessment

Table 1: Summary sample sizes requirement for nutritional component – Nam Hkam and May Ja Yang IDP camps, Northern Shan State and Kachin State, Myanmar.

Variable	Chronic malnutrition	Acute malnutrition	Comment
Total population	11710		Data from camps committees (March 2014)
Expected global prevalence	50	6	Taking into account July 2012 MUAC assessment results, previous SMART results and actual context.
precision	8	3	Default value, according to SMART recommendations
Design effect	1.5	1.5	Default value according to SMART recommendation and context data.
HH size	4,9		Data from camps committees
% children under 5	11		Data from camps committees
% Non-response	15		Based on previous evaluation and important population movements during this period (harvest)
minimum individuals	202	**294**	U5 <10,000 => correction for small population size
minimum HH	491	**712**	
Expected duration (days)		**6**	21HH/cluster/day, 35 clusters, 5 teams

3. Household and individual selection

3.1. Household selection

In statistical terms, all sampling methods are equivalent, as long as they result in a representative sample. The sampling scheme that should be chosen is determined mainly by the size of the population, the area's topography and households' organization.

List of household available

After introducing the team and explaining the purpose of the visit to the camp leaders, SMART team leader asked for an updated list of HH, not based on socio-economic indicator but on the following definition:

"People who slept in the house last night and ate from the same cooking pot".

If an updated list of HH could not obtained, the team sampled the camp/block using systematic or simple random sampling.

Simple random sampling

Simple random sampling is used where there is an up-to-date list of all individuals or HH in the population, with enough information to allow them to be located. It is generally only used for small populations and is the most straightforward method.

In some area assessed, HH were counted, given a number and listed. The team then chose randomly the required number of HH needed to complete one cluster using a random number table or papers...

Systematic sampling

This method is used in relatively small geographic areas where there is an orderly layout of the houses that make it possible to go systematically from one house to another, without omitting any of the houses. Usually the houses are mapped (not compulsory) and can be numbered.

After counting and assigning a number to each house the assessment team calculated the sampling interval following below definition:

$$\text{Sampling interval} = \frac{\text{Total number of HH in the camp/area}}{\text{Number of HH needed in the cluster}}$$

Example: If the camp contained 272 HH in total and the team need 20 HH for the cluster => 272/20=13.6.

They then selected randomly a number between 1 and the integer number of the sample interval (*between 1 and 13* in that example), this number being the 1st HH to be visited.

The number of the 2nd HH will be the number of the HH + the sample interval, the below the rule thumb:

First Decimal Point	Action	Example
0.0 – 0.2	Round Down	If SI was 3.2, take 3
0.3 – 0.7	Alternate	If SI was 3.5. alternate 3 and 4
0.8 – 0.9	Round Up	If SI was 3.8, take 4

The same procedure will be followed to determine the number of selected HH

A	B		C	D
Household n° in cluster	Previous HH total (from column D)	+	Sampling interval (S)	HH number in area
1	x		x	a =11
2	11	+	13	24
3	24	+	14	38
4	38	+	13	51
5	51	+	14	65
6	etc	+	etc	etc

3.2 Individual selection

All children from 6 to 59 months old in the selected HH were part of the sample for this assessment. Their mother or primary caretaker was also interviewed to collect other information (see data collection).

Special cases Children

- When a child as living in a house but was not present at the time of the visit, he/she was recorded on the data sheet. The team returned at mid-day and end of the day to take the child's measurements. When the child was still absent, he/she was not replaced, an identifying number was given to him/her.
- When a child was in a health structure, it was important to measure him. The team then reached the health structure if possible in a reasonable time. When not possible to visit the child in the structure, he/she was not replaced and an ID number was given to him/her. The team recorded that the child was in a health structure.
- In case of refusal from the parents to measure their child, he/she was not replaced and an identifying number was given to him/her.
- Orphan children taken in by a selected family were considered as part of the HH and therefore included in the sample. It was similar for children who were under care (living permanently) of their grandparents.
- Disabled children were eligible and thus included in this assessment. They were given an identifying number and all anthropometric data that were not affected by the disability were measured as well as other additional information. Other data were recorded as missing. In both case a note mentioned the child disability.

Special case household

- When a house was empty and neighbours confirmed that the family slept in the house the previous night and would come back (=house not abandoned), the team returned there at the end of the day. When it was not possible to return at the end of the day or when people where still absent at the second visit, it was then recorded as absent. Absent household were never substituted by another one.
- When a selected household refused or could not participate because of important reasons, an explanatory note was written on the questionnaire. The HH was not replaced by another one; the team proceeded to the next HH according to the rule.

3.3 Field constraints

One camp, Saint Thomas 2 in May Ja Yang, experienced significant movement of population just few days before data collection that reduced its households number from 30 to 20. All remaining households were included in the cluster therefore totalling 20 instead of 21 households. Other camps did not experience such population movement and were sampled according to the plan.

Due to the rather cold weather and cultural barriers, children were measured with small and light clothing. A sample of such light clothing was collected in each age class and their average weight determined. A correction factor of 210g on the weight was therefore applied with ENA software on children measured with clothes.

4. Data collection

Questionnaire is provided in annexe 3. For each child eligible and aged 6 to 59 months, following data were collected:

- Age: child's age was copied from its birth certificate whenever available. Majority of children had no certificate and birth date was unknown and a local events calendar (annexe 2) was used to approximate the child's age. In any case, birth date was cross checked with event calendar.
- Gender: The sex of each child was recorded as "M" for male/boys and "F" for female/girls.
- Weight: Children were weighed to the nearest 100 g with electronic SECA Scale. All scales' accuracy were checked daily by using a standard weight of 2 kg. Children were weighed undressed/with a minimum of clothes. When children could not stand up (too young, too agitated), double weighting technic was performed.
- Height/Length: Each child was measured to the nearest 1 mm with a measuring board. Children below 87 cm were measured lying down as those same or above 87 cm were measured in standing position.
- Oedema: presence oedema was diagnosed by applying moderate thumb pressure for at least three seconds to both feet (upper side). Oedema grade was not recorded. Only children with bilateral pitting oedema were recorded as having nutritional oedema (kwashiorkor).
- Mid-Upper Arm Circumference (MUAC): The MUAC were measured to the nearest 1 mm, at the midpoint of the left upper arm (between the tips of shoulder and elbow) using a coloured MUAC tape.
- Serious sickness: the team enquired about any serious disease the child may have had in the past 15 days. The "serious" aspect of it was determined by whether or not, in case of sickness, the family felt the need to seek treatment or advice. Coding was as follow: "0" for No, "1" for Yes, "4" when the respondent did not know.
- Diarrhoea: history of disease in the past 15 days was first assessed by the team. When sick, description of the symptoms was cross checked with diarrhoea case definition: *Emission of 3 or more liquid stools over 24 hours.* Coding was as follow: "0" for No, "1" for Yes, "4" when the respondent did not know.
- Acute respiratory infection (ARI): when enquiring about history of disease in the past 15 days, and when sick, also cross checked symptoms with ARI case definition: *Fever and at least one of the following: rhinitis, cough, redness or soreness of throat OR Fever and fast breath (> 50 breaths/min) and at least one of the following: cough, difficulty in breathing.* Coding was "0" for No, "1" for Yes and "4" when the respondent did not know.

- Measles' vaccination: immunization against measles was checked and vaccination card requested. Coding was as follow: "0" when child was not vaccinated, "1" when vaccination was confirmed by the card, "2" when only verbally confirmed, "4" when the respondent did not know.
- Tuberculosis immunization: vaccination with the *Bacillus Calmette–Guérin* (BCG) vaccines was checked and recorded according to the following classification: "0" for No, "1" for immunization confirmed by vaccination card, "2" for immunization confirmed by recall, "4" when the respondent did not know.
- Vitamin A supplementation: administration of vitamin A caps (sample showed to the family) within the last 6 months was considered. Record was as follow: "0" for No, "1" for Yes, "4" when the respondent did not know.
- Deworming: administration of Mebendazole tablets (sample showed to the family) within the last 6 months was considered. Record was as follow: "0" for No, "1" for Yes, "4" when the respondent did not know.

5. Training and supervision

5.1 Training

A total of 20 people were trained (95% women) and attended a total of 3 day theoretical training on assessment methodology, measurement, questionnaires and other assessment tools (event calendar, cluster control form). Theory was completed by various practical exercises. In addition, 3 standardization tests took place in order to evaluate and guarantee enumerators' accuracy and precision in taking measurements (summary results in annex 4). This also allowed supervisor to determine optimal team composition, also taking into account post-training test results.

Overall training was completed with a one day field test in a camp not selected in the survey to recreate real work conditions and enable each team to get familiar with all aspects of the work (introduction, individual selection, questionnaire filling, measurement, team organization). HH including in field test were not part of the analysis.

Finally, 15 enumerators were identified by the end of the training. One field guideline with the main instructions and a materiel kit was provided to each team member.

5.2 Supervision

During data collection period teams were supervised by SCI nutrition personnel and WPN nutrition coordinator. Each team was reviewed at least once a day. Remote technical support was also provided by the SMART international consultant on data quality check and methodology.

Data collected were entered every evening under ENA 2011 software, allowing daily quality checking. A meeting was then held the next morning between the team and the supervisor to comment results and make readjustment when necessary.

6. Data analysis (indicators and international/national thresholds used)

Children measurements' check and analysis were done using the latest version of ENA 2011 software (November, 16th 2013). The results are presented based on WHO standards[7]. Analysis was performed using ENA, Excel and Epi Info 7 to explore statistical linkage between parameters (when relevant).

6.1 Acute malnutrition rate

In this report, acute malnutrition (wasting) is estimated according to the weight for height (W/H) of each child and/or the presence of oedema. Weight for height (expressed in z-score) are calculated by comparing the measurements of the sample with 2006 WHO standard population.

Acute malnutrition is defined as follow[8]:

7 World Health Organization, 2006

8 WHO, use and interpretation of anthropometric indicators of nutritional status, Bulletin of the WHO,64 (6) : 929-941 (1995) WHO: World Health Organization, WHO growth curves for children, 2005

Table 2: Acute malnutrition classification according to W/H index and/or presence of bilateral pitting oedema

Classification	Criteria
Global acute malnutrition	*W/H below –2 z-score and/or Oedema*
Severe acute malnutrition	*W/H below –3 z-score and/or Oedema*

The weight for height index is used to quantify and qualify the prevalence of wasting in a population in emergency situations, where acute forms of malnutrition are the predominant pattern. However, the mid-upper arm circumference (MUAC) is a useful tool for rapid screening of children and detection of those who are at high risk of death.

Table 3: Acute malnutrition classification according to MUAC cut off in children population aged 6-59 months

MUAC in mm	Classification
115 – 124 mm	moderate acute malnutrition
< 115 mm	severe acute malnutrition

6.2 Chronic malnutrition - Stunting

The height-for-age (H/A) index provides indication on the nutritional history of a child rather than his/her current nutritional status. This indicator is used to identify chronic malnutrition or stunting.

The same principle is used as for weight-for-height, except that a child's chronic nutritional status is estimated by comparing its H/A with WHO standards height-for-age curves, as opposed to weight-for-height curves. As for the weight-for-height index, the height-for-age index as a Z-score was calculated according to WHO standard data and the following H/A cut-off points were applied:

Table 4: Chronic malnutrition classification among under five years old children

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

6.3 Immunization prevalence

WHO recommends that 90% of children aged from 9 to 59 months are being vaccinated against measles for an efficient protection.

In the Myanmar Expended Programme on Immunization (EPI) 2012-2016[9], the Ministry of Health (MoH) aims at 95% national coverage with at least 80% coverage in all township for all antigens by 2016.

Last mass measles campaign in Shan and Kachin State conducted by the MoH occurred in March 2012 (22nd-30th) and Vitamin A supplementation campaign in August 2013.

[9] Expended Programme on Immunization, Multi Year Plan 2012-2016, Central Expended Programme on Immunization, Department of Health, Ministry of Health, The Republic of the Union of Myanmar

As mentioned previously, data were entered under ENA at the end of each day for data quality analysis and EPI/WHO Flags identification. For each child flagged, the team came back to household to measure their weight, height and MUAC and estimate their age again. Possible data entry errors were also checked prior to second visit.

Feed-back on age distribution, digit preference and measurements' errors was given to the team after each analysis (by team or individual) Overall data quality was only available after completion of all clusters and full plausibility check report is available in annex 5.

1. Anthropometry

Overall survey score is 8% which is excellent, with a WHZ, HAZ and WAZ standard deviation (SD) within acceptable range (SD between 0.8 and 1.2). Sample presents a very low percentage of SMART flags and digit preference scores for weight, height and MUAC are either good or excellent. Summary is provided in table below.

Table 5: Mean Z-scores, Design effect and excluded subject for Weight-for-Height, Height-for-Age and Weight-for-Age index per strata.

	N	Mean z-score ± SD	Design effect (Z-score <-2)	z-score not available*	Out of range z-score	% SMART Flags
WHZ	379	-0,41±0,81	1,00	3	0	0
HAZ	378	-1,33±0,83	1,12	3	1	0.3
WAZ	378	-1,84±0,97	1,00	3	1	0.3

* contains for WHZ and WAZ the children with oedema.

In addition, Shapiro-Wilk test indicate a normal distribution of the data for all index (p>0.05).

2. Age distribution

Sample age distribution has been done for all eligible children with age data and gender data available (N=392, 2 children less than 6 months excluded). Overall, age distribution in samples is considered excellent with also no significant difference between age class (p>0.05, cf. gender/age distribution).

1. Sample characteristics

1.1 Non-response rate and proportion of under 5 children in population

Not all the selected families were found during data collection period but non response rate remains far under the 15% applied during sample calculation. Among the 36 HH not covered, 35 were absent and 1 was not accessible (one HH missing in St Thomas 2, cf. methodology).

Average number of children 6-59 months per household for this area is 0.5, which is slightly higher than initial expectations. The minimum required number of children for this survey was achieved with 381 individual measured.

Table 6: Sample non response rate

	Plan N	Covered n	% Non-Response	Not found/ inaccessible		Absent		Refusal	
				n	%	n	%	n	%
Household	735	699	4.9%	1	0.1%	35	4.8%	0	0.0%
Children 6-59 m	294	381	-29.6%	*1*	*0.2 %*	*41*	*9.7 %*	*1*	*0.3 %*

1.2 Gender distribution per age group

Overall sex ratios of 1.0 is within normal range[10]. Based on statistical tests, the small imbalances observed in table below for gender or within age classes are not significant (p>0.05).

Table 7 : Sample age and gender distribution (N=382)

	Boys		Girls		Total		Ratio
Age in month	**n**	**%**	**n**	**%**	**n**	**%**	**Boys/Girls**
6-17	38	51.4	36	48.6	74	19.4	1.06
18-29	40	46.0	47	54.0	87	22.8	0.85
30-41	48	53.9	41	46.1	89	23.3	1.17
42-53	46	46.9	52	53.1	98	25.7	0.88
54-59	18	52.9	16	47.1	34	8.9	1.13
Total	190	49.7	192	50.3	382	100.0	0.99

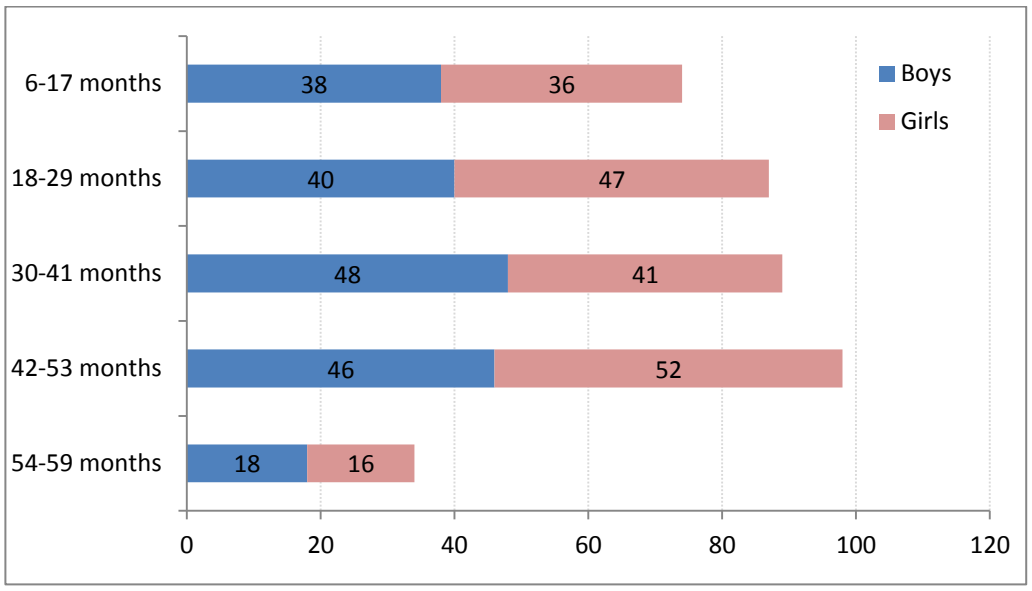

Figure 1: Age distribution (in months) among sampled children living in Nam Hkam and May Ja Yang IDP camps (N=382)

[10] Sex ratio normal range: [0.8-1.2]

2. Nutritional status of children aged 6-59 months in the area

2.1 Acute malnutrition prevalence

Weight-for-height analysis (W/H) has been done under 2006 WHO standards on children for whom gender, weight and height data were available (3 children with missing data). There was no SMART flag for WHZ in this survey (cf. data quality check section) and 379 children aged 6 to 59 months were therefore part of this analysis.

Results indicates an average W/H index of -0.41 z-score with a standard deviation (SD) of 0.81, in normal range[11]. Design effect (DE) of 1.00 show that the area is affected homogeneously by acute malnutrition with also an index of dispersion (ID) compared to Poisson distribution pointing to a random distribution of the malnutrition cases among clusters[12].

Prevalence of GAM among children is 2.9% (n=11) in IDP camps all of them being MAM cases. This result is very low and far under the 15% emergency threshold defined by WHO. Statistical test performed on survey sample revealed that children aged 6-29 months are 14.3 times at higher risk of GAM compared to the 30-59 months ($p<0.01$[13]). No association could be established between gender and GAM.

Table 8 : Acute malnutrition prevalence in children aged 6-59 (N = 379) and 6-29 (N = 161) months expressed as weight for height in z-sore and/or presence of oedema, WHO standards

	GAM	MAM	SAM
6-59 months	2.9%	2.9%	0.0%
	[95% CI:1.8 – 4.7]	[95% CI:1.8 – 4.7]	[95% CI:0.0 – 0.0]
6-29 months	6.2%	6.2%	0.0%
	[95% CI:3.6 – 10.5]	[95% CI:3.6 – 10.5]	[95% CI:0.0 – 0.0]

Figure below illustrates sample weight for height distribution curve in z-scores compared to the WHO standards. Sample curve is just a slightly shifted to the left, which indicate that the nutritional status of the assessed population is quite good compared to the WHO reference.

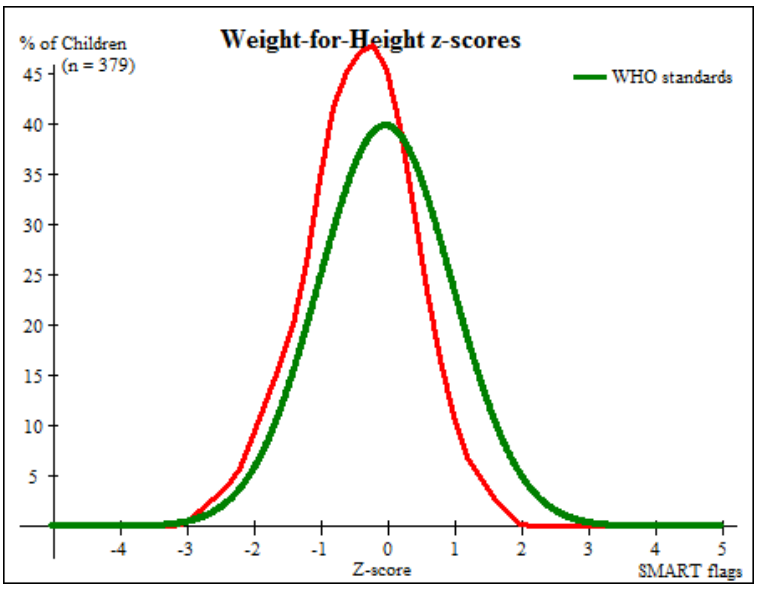

Figure 2: Weight-for-height distribution: sample versus 2006 WHO reference population, with SMART flags' exclusion (N=379)

2.2 MUAC analysis

Independently from their WHZ and looking only at MUAC criteria, 1.1 % of the target population appears to be suffering from MAM (n=4) and 0.5% from SAM (n=1), reaching a total of 1.6% of GAM according to MUAC.

[11] Normal range for SD [0.8-1.2]
[12] For ID : p value between 0.05 and 0.95
[13] OR=14.29 [2.00-626.46], p=0.0011

Table 9 : Acute malnutrition rates based on MUAC measurement among children aged 6-59 months (N=379) and 6-29 months (N=161)

	MUAC<115mm and/or oedema	115mm≤MUAC<125mm no oedema	MUAC<125mm and/or oedema
6-59 months	0.5%	1.1%	98.4%
	[95% CI:0.2– 1.7]	[95% CI:0.4 – 3.0]	[95% CI:96.2 – 99.4]
6-29 months	0.6%	2.5%	96.9%
	[95% CI:0.1 – 3.4]	[95% CI:0.9 – 6.8]	[95% CI:91.8 – 98.9]

2.3 Overweight prevalence

No case of overweight was found during the survey.

2.4 Chronic malnutrition prevalence

Chronic malnutrition or stunting prevalence estimations were done through Height-for-age (H/A) analysis under 2006 WHO standards. After exclusion of one SMART flag, 378 children aged 6 to 59 months were part of this analysis (3 children with missing data). Average H/A index in z-score is -1.84 ± 0.97 SD, which is still in the normal range[14]. Design effect equals 1.00, indicating population in the area is equally affected by chronic malnutrition. As for acute malnutrition, Shapiro-Wilk test indicate a normal sample distribution ($p<0.05$) and cases of stunting randomly distributed among clusters.

Prevalence of stunting among children in camps is 47.6% (n=180) with 37.3% (n=141) moderate and 10.3% (n=39) severe forms. Global stunting prevalence is therefore above the 40% emergency threshold fixed by WHO and indicates that almost one child out of two is suffering from long term nutrient deprivation and micronutrients deficiencies altering its development.

Table 10 : Chronic malnutrition prevalence in children aged 6-59 (N= 378) and 6-29 (N= 160) months, expressed as height-for-age in z-sore, WHO standards

	Global chronic malnutrition	Moderate chronic malnutrition	Severe chronic malnutrition
6-59 months	47.6%	37.3%	10.3%
	[95% CI:43.7 – 51.6]	[95% CI:33.6 – 41.2]	[95% CI:7.8– 13.5]
6-29 months	36.3%	27.5%	8.8%
	[95% CI:29.5 – 43.6]	[95% CI:21.9 – 33.9]	[95% CI:5.2 – 14.4]

Figure below illustrates the sample H/A distribution curve in z-scores compared to the WHO standards. Sample curve is shifted to the left, meaning that the assessed population has a poorer nutritional status in comparison to the WHO reference curve.

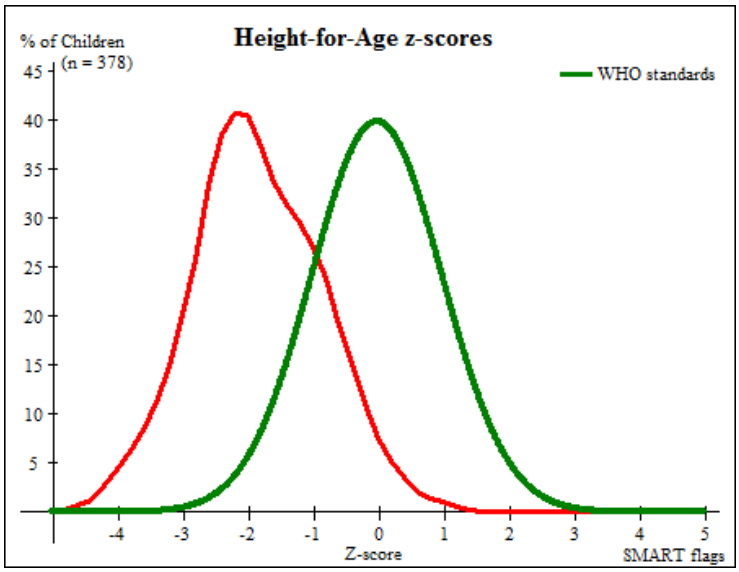

Figure 3: Height-for-age distribution: sample versus 2006 WHO reference population, with SMART flags' exclusion (N=378)

[14] Normal range for SD [0.8-1.2]

2.4 Underweight prevalence

Weight-for-age analysis has been done under 2006 WHO standards. With missing data on 3 children and after exclusion of one SMART flag, 378 children aged 6 to 59 months were part of this analysis.

Average W/A index in z-score equals -1.33 with SD of 0.83, which is also in the normal range[15]. Design effect of 1.12 indicates the population is rather equally affected by underweight, which is confirmed by ID compared to Poisson distribution that points to a random distribution of underweight cases. Shapiro-Wilk test result shows that sampled population is normally distributed (p>0.05).

Prevalence of underweight among children aged 6-59 months living in IDP camps was 18.5% (n=70) with 15.6% (n=59) moderate underweight and 2.9% (n=11) severe forms of underweight. The global underweight prevalence remains therefore under the 30% WHO emergency threshold.

Table 11 : Underweight prevalence in children aged 6-59 (N = 378) and 6-29 (N = 161) months, expressed as weight-for-age in z-sore, WHO standards

	Global underweight	Moderate underweight	Severe underweight
6-59 months	18.5%	15.6%	2.9%
	[95% CI:15.1– 22.5]	[95% CI:12.3 – 19.6]	[95% CI:1.8 – 4.7]
6-29 months	19.4%	16.3%	3.1%
	[95% CI:14.2 – 25.9]	[95% CI:11.7 – 22.1]	[95% CI:1.5 – 6.4]

As for W/H and H/A curves, figure below illustrate the sample W/A distribution curve in z-scores compared to the WHO standards. Sample curves are shifted to the left, which indicated that the nutritional status of the assessed population is poorer than the WHO reference population.

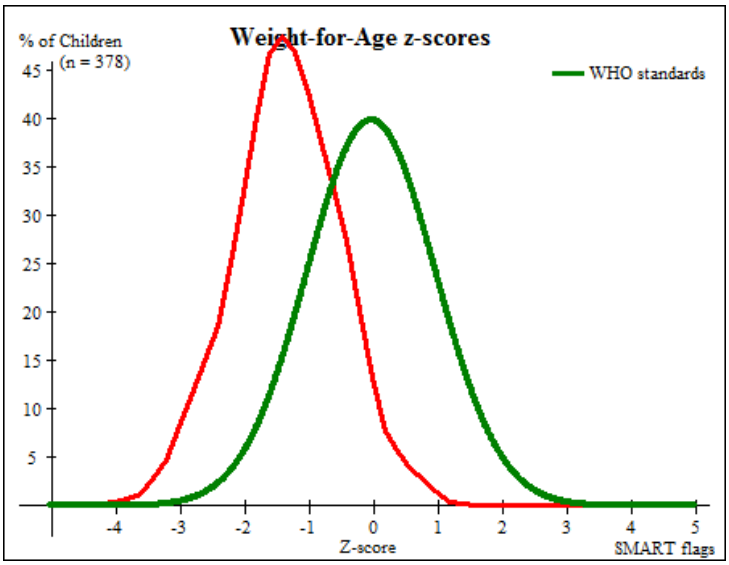

Figure 4: Weight-for-Age distribution: sample versus 2006 WHO reference population, with SMART flags' exclusion

2.5 Malnutrition caseload estimation

Figure 5 summarize malnutrition findings during this survey. Among sampled children aged 6-59 months living in IDP camps:

- GAM rates are very low in surveyed area with only 2.9% of children being affected, all of them being moderate forms of acute malnutrition.
- Concerning percentage of children are suffering from chronic malnutrition. They are indeed 47.6% to be stunted, with 37.3% of moderate form and 10.3% of severe form.
- Prevalence of underweight far below critical threshold are noticed in the area, most of them moderate forms (15.6% versus 2.9% of severe forms).

[15] Normal range for SD [0.8-1.2]

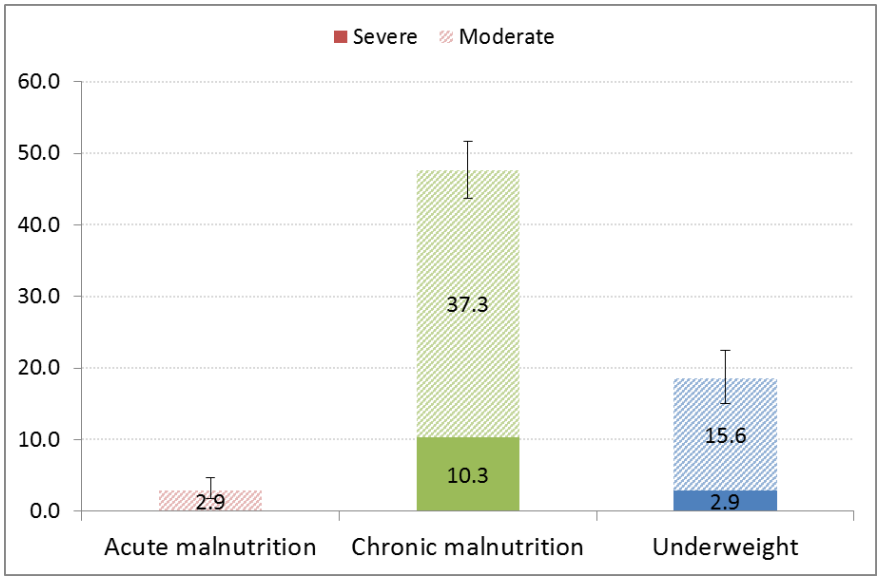

Figure 5 : Summary findings on malnutrition prevalence among children aged 6-59 months living in Nam Hkam and May Ja Yang IDP camps

Table below presents number of malnourished children present in target area at the time of the assessment. Estimates were calculated based on population data (cf. methodology) and W/H, H/A and W/A findings in z-score.

Table 12 : Estimated caseload of acute malnutrition, chronic malnutrition and underweight in Nam Hkam and May Ja Yang IDP camps

	Acute Malnutrition	Chronic Malnutrition	Underweight
*Population 6-59 months**		*1139*	
Total cases	**33**	**542**	**211**
Moderate form	33	425	178
Severe form	0	117	33

* Estimation with 6-59 months=90% of U5 population

3. Morbidity and Immunization

4.1 Morbidity incidence

According to respondents, 18.4% of the children experienced a serious illness in the past 15 days that required them to be brought to a health provider. Interestingly, this is less than the diarrhoea and/or acute respiratory infection (ARI) incidences, indicating that they are not always considered as serious pathologies. In the past 15 days, 11.5% of the 6-59 months children had suffered from diarrhoea, 10.5% from ARI and 10.5% from both diarrhoea and ARI, with a global diarrhoea incidence reaching 22% and ARI 21.0%.

Overall morbidity (one or several diseases) 15 days prior to the survey was 35.7%, which is very concerning given the short term and long term impact of sickness on their nutritional status. Indeed, issue on access to potable water, sanitation and hygiene as well as limited/variable access to primary health care service have an impact on length and virulence of the infection thus nutritional status. If no link could be established between diarrhoea or ARI and GAM for this survey (p>0.05), it is likely that such high morbidity incidence is involved in the alarming prevalence of stunting noticed in the area.

Table 13 : Morbidity incidence among children living in IDP camps (15 days recall)

	N	Does not know		No		Yes			
		n	%	n	%	n	%	95% CI	DE
Serious illness	381	1	0.3%	310	81.4%	70	18.4%	[13.0 %- 25.3 %]	2.29
Diarrhoea	381	3	0.8%	294	77.2%	84	22.0%	[16.9 % - 28.3 %]	1.76
ARI	381	3	0.8%	298	78.2%	80	21.0%	[14.7 % - 29.1 %]	2.89

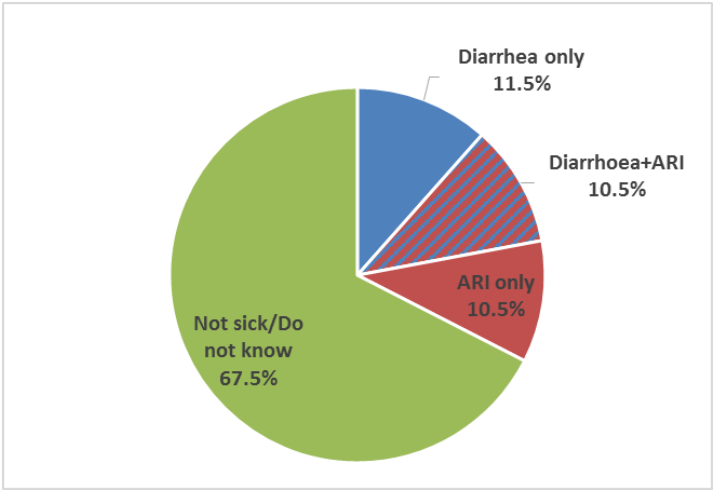

Figure 6 : Diarrhoea and ARI incidence among children living in IDP camps (15 days recall)

4.2 Immunization coverage

According to the EPI in Myanmar, children are vaccinated against measles through 2 shots, at 9 and 12 months. Regarding BCG vaccination (protection against tuberculosis) children should receive one injection at 6 weeks.

The MoH aim at a 95 % coverage for all antigens for 2016. For 2013, it is expected that coverage for 1 injection should reach at least 70%-90% in Kachin State versus 95% in Shan State for measles and 93% coverage for BCG. Objectives are expected to be achieved through combined routine immunization and mass campaigns. Last mass measles campaign in Shan and Kachin State occurred in March 2012 (22nd-30th) and Vitamin A supplementation campaign in August 2013.

Findings revealed a 84% coverage for measles immunization among children aged 9-59 months Among surveyed children, 9 of them were less than 9 months and vaccinated against measles (cards or recall). This prevalence is above the 80% minimum coverage recommended by WHO to prevent epidemics, but still far under 2016 target.

With regards to BCG vaccination, a 73.2% coverage was observed at the time of the survey among 6-59 months. This result is 20% under 2013 target value which is concerning, particularly since cases of tuberculosis are not uncommon in May Ja Yang area, some of them associated with SAM (reports from nutrition field team).

Half of sampled children had vaccination cards which indicate that they have been reached by routine immunization rather than a mass campaign.

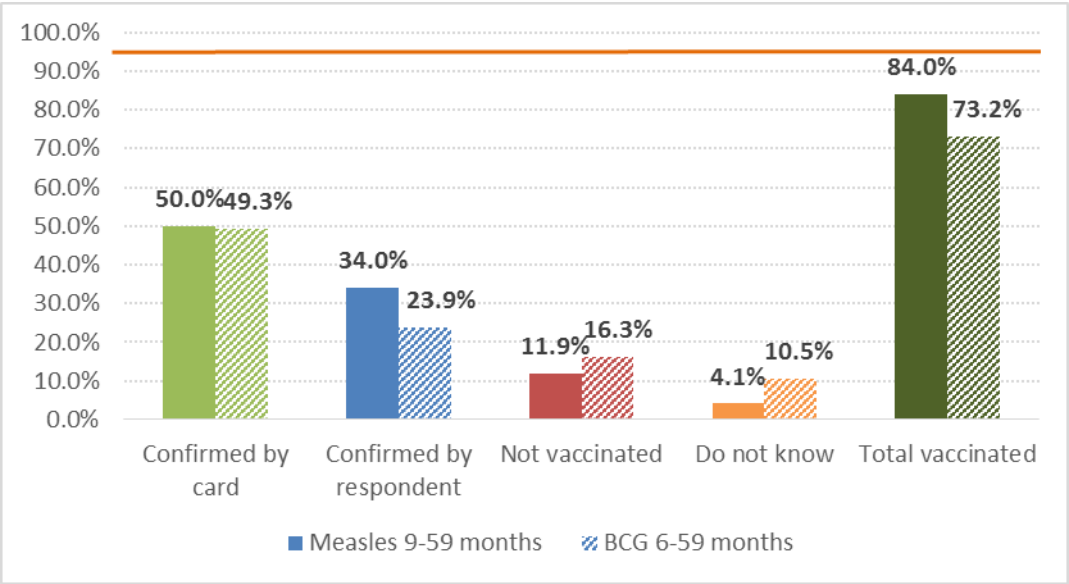

Figure 7 : Measles and tuberculosis vaccination status respectively among children aged 9 to 59 months and 6-59 months living in Nam Hkam and May Ja Yang IDP camps

4.3 Vitamin A supplementation and deworming

Both vitamin A supplementation coverage and deworming treatment among 6-59 months are very low in May Ja Yang and Nam Kham IDP camps with only 38.1% of the children provided with vitamin A capsules and 35.4% treated with Mebendazole in the last 6 months.

Table 14 : Vitamin A supplementation and deworming treatment coverage in the past 6 months among children aged 6-59 months living in IDP camps

	N	Do not know		No		Yes	
		n	%	n	%	n	%
Vitamin A	381	34	8.9%	202	53.0%	145	38.1%
Deworming	381	30	7.9%	216	56.7%	135	35.4%

DISCUSSION/CONCLUSION

This assessment was conducted during the cold season where lowest rates of acute malnutrition are classically observed.

Results showed very low rates of acute malnutrition, with 2.9% of the children suffering from acute malnutrition. WHZ based results confirm tendencies observed through SCI/WPN MUAC monitoring, indicating that current assistance and/or living conditions prevent children from falling into acute malnutrition in the area.

However, statistical tests showed a correlation between young age (6-29 months) and GAM. In addition, SAM and MAM cases are often associated with other pathology, among which diarrhoea, ARI, tuberculosis or heart problem even though no association could be established between ARI or diarrhoea and GAM. This two aspects should be monitored and preventative action should be implemented at field level particularly since SAM/MAM children do not have access to appropriate treatment (no facilities with trained staffs or supply).

Survey findings indicate that 6-59 months' main concern in the area is chronic malnutrition. They are indeed 47.6% to suffer from impaired growth, with 10.3% of severe forms. This result is above the 40% WHO emergency threshold defining a critical situation. There is therefore an urgent need to tackle stunting and continue efforts to preserve U5 feeding practices in order to improve their overall nutritional status and health. Yet interventions on chronic malnutrition should be carefully designed to deal with all determinants of the disease.

From a nutrition perspective, even if the use of the GFD ration may certainly be maximized, improvement of diet content may also play a significant role particularly in long term. Recent SCI assessment revealed inadequate IYCF practices (exclusive breastfeeding, continued breastfeeding up to 2 years, complementary feeding…). However, findings also highlighted that despite a good reception of nutrition education session, some families are unable to implement recommendations due to lack of cash and/or time available. Family members are indeed seeking job outside of the camps which have an impact on the level of care given to children U2 and feeding practices' quality. It appeared therefore crucial to coordinate nutrition programmes with other sector to avoid adverse effects of FLS programming on IYCF practices.

From a health perspective, morbidity is a concern with more than 30% of the children sick in the last 15 days, even though diarrhoea and ARI were no significant risk factors for acute malnutrition at that time of the year (may change during rainy season). Bearing in mind that repeated or untreated infections affect nutrients body absorption that leads to chronic malnutrition, morbidity should be closely monitored and rapid treatment provided to sick children.

Preventative action such as vaccination campaign, deworming and supplementation should be reinforced and regularly conducted. Coverage of measles and BCG vaccinations are indeed under national target for 2016, on top of deworming treatment and vitamin A supplementation coverage being very low (around 30%). This is a concern given the high population density and the poor WASH conditions that increase the risk of contamination and impact on the nutritional status. Deworming should not be neglected since parasitizes, sometimes asymptomatic, reduces vaccines efficiency and alter nutrients absorption (little impact of supplementation or improved feeding practices).

Given the alarming level of stunting despite the provision of fortified ration to children U2, morbidity is certainly reducing the efficiency of current programming. Therefore, increased efforts in nutrition, FSL and health should not be dissociated from a significant improvement of WASH conditions and hygiene sensitization.

In conclusion, current effort and services should be maintained since assistance deployed so far has been proved effective in preventing deterioration of U5 children nutritional status, maintaining low prevalence of acute malnutrition. Activities should however focus on the alarming level of chronic malnutrition rather than GAM. A comprehensive multi-sectorial approach should be designed to tackle stunting with the aim of improving camp hygiene and household capacity to diversify their diet including U2 complementary feeding while making sure positive IYCF practices are protected and encouraged.

RECOMMENDATIONS

- To continue nutrition activities and IYCF programming in the area through intervention covering breastfeeding support, complementary feeding and linked with health, WASH and FSL in camps focused though not restricted to mothers of U2 and pregnant women.
- To train key persons in camp and medical staffs on identification of SAM cases (full measurement) and local recipes for treatment while ensuring that a proper support in care practices and IYCF is provided to the family. Cases with associated chronic disease such as tuberculosis should be flagged and closely monitored (with provision of treatment when feasible). Considering the very low GAM/SAM rate, a Therapeutic Feeding Programme is not a viable option but efforts should be made to strengthen current system in place and increase access to appropriate treatment.
- To maintain the GFD in IDP communities including Rice Soya Blend (RSB) ration for all Pregnant and lactating women (PLW) and Supercereal++ for children under 2 and continue to prevent the deterioration of their nutritional status. Inclusion of children 24-59 months should be discussed given the prevalence of chronic malnutrition in the area and potential micronutrient deficiencies present in the area.
- To look at other more long term and sustainable strategy in micronutrient supplementation for the whole family, considering the critical rate of stunting, in order to prevent further deficiencies in U5 and elder children.
- To develop intervention such as cash based programming or income generating activities to empower families and increase household income while preserving and promoting positive IYCF practices and nutrition.
- To complete this intervention with a set of cooking demonstration to maximize the use of the GFD, RSB and Supercereal++ in order to increase micronutrient intake among children U5. Such activity should be held in small group and participatory. This should be implemented in coordination with other relevant actors.
- To increase monitoring around morbidity and accessibility to treatment in the area. Families should also be properly sensitize on seriousness and symptoms of most frequent and serious diseases, including malnutrition. They should also be encouraged to seek treatment to a health provider when needed.
- To conduct a mass immunization, deworming and high dose vitamin A supplementation campaign every 6 months to improve current coverage and prevent disease's outbreak such as measles but also tuberculosis. Health facilities' capacities to dispense vaccination and deworming treatment should be improved in order to complement action of mass campaign, elevate current low coverage observed during this survey and reduce morbidity impact on nutritional status.
- To increase access and safe storage (water filter) of potable water, sanitation and promote health and hygiene education in communities in order to contribute to the reduction of morbidity including disruption of diarrhoea infection cycle. Integration of WASH component in other sectors' programming should be enhanced as well.
- To monitor the nutritional situation in 6 months (rainy season and pick period of acute malnutrition) through another SMART assessment in IDP camps in order to establish the impact of seasonality on acute malnutrition. Morbidity should also be reassessed at that time and sample calculated according to chronic malnutrition.

ANNEXES

Annexe 1: Cluster selection

Area	Geographical unit	Population size	Cluster
May Ja Yang	Pa Ka Htawng	3279	1,2,3,4,5,RC,6,7,8,9,10
	Bum Tsip Pa (1)	723	11,12,13
	Bum Tsip Pa (2)	1066	14,15,16
	N Hkawng Pa	1621	RC,17,RC,18,19,20
	Lana Zup Ja	2950	21,22,23,24,25,26,27,28,29
	Hka Hkey	200	30
	Laga Yang	868	RC,31,32
Nam Hkam	Saint Thomas (1)	135	
	Saint Thomas (2)	128	33
	Jaw	373	34
	Nay Wun Ni	367	35

Annexe 2: Event calendar – English version

EVENTS CALENDAR - IDP camps in Kachin State, March 2014

Seasons	Religious celebration	Other event	Disaster/ Hazard	Local Event	Month/Year	Age (month)
Summer	MYNANAR BAPTIC CONVENTION (MBC) SUNDAY	Last month of Myanmar government fiscal year, Final exam for matriculation students, Peasant's Day		Kachin Peace talk in Yangon	March 2014	0
Spring	MBC YOUTH Sunday	Union Day, Chinese New Year Day, St. Valentine's Day, Preparation for plantation, Final exam for the student of Basic Education	Conflict unresolved	Kachin Revolution Day	February 2014	1
Winter	New Year Day (English Calendar)	New Year Day, Independance Day		Kachin State Day, Manaw festival	January 2014	2
Winter	200 years aniversary celebration for Judson (the whole Myanmar Baptist Convention MBC) 1st and 2nd week of December, Christmas day 25 December	Most of camp leaders under KBC shall be very busy for the Christmas for the whole month, Picking season of mustard bud, World AIDS Day	Conflict unresolved	Normally, state government organized Public walking event during December and January, Public sport movement	December 2013	3
Winter	Thanks Giving Day, Full Moon Day of Ta Zaung Mone, Cemetry Cleansing Ceremony (Roman Catholic)	Harvesting time	Conflict unresolved	Shan New Year, New crops celebration	November 2013	4
Winter	Fruit eating festival, Thadingyut festival, Depavili	Time for poppy cultivation,Corn harvesting time	Conflict unresolved	Shan New Year	October 2013	5
End of rainy season	The religious festival (Taking sabbath every week, monk did not travel outside the monestry),Starting Musilm fasting period		Conflict unresolved	Chinese Moon Cake Festival	September 2013	6
Rainy Season	The beginning of religious festival (Taking sabbath every week, monk did not travel outside the monestry)	Time for paddy cultivation	Conflict unresolved		August 2013	7
Rainy Season		Preapration for paddy cultivation, Martyrs' Day	Conflict unresolved	Paying Homage to Aged	July 2013	8
Rainy Season	Chinese medicine day, Chidren's day, Father's day (third week, Sunday)	June 26 (Int'l Day for ban on the Drugs Illicit ...)	Conflict unresolved	Civil war broke between KIA and Mililitary,Paddy cultivation	June 2013	9
Summer	Mother's day (second week , Sunday), Full moon day of Kason, Payer Day (Roman Catholic)	May Day (Worker's Day), Time for seasonal fruits like Chinese plum and mangosteen	Conflict unresolved	Paddy cultivation	May 2013	10
Summer	Kachin national wishing day (to wish for the refugees of conflict/ civil war), Bible Contest Day, Easter Sunday, Prayer Day (Roman Catholic)	Thingyan(water festival) , April Fool, To pluck tea leaf, Hta Ma Hne` festival	Conflict unresolved	Cemetry cleaning festival (paying homage to ancestors), Paddy cultivation	April 2013	11
Summer	Youth Summer camps, Holy childhood education, Buring firewood to keep warm (Chirsitian), Full Moon Day of Tabaung, Pagoda festival of reclining Buddha in Moe Kaung	Last month of Myanmar government fiscal year, Final exam for matriculation students, Peasant's Day	Conflict unresolved		March 2013	12

Spring		Union Day, Chinese New Year Day, St. Valentine's Day, Preparation for plantation, Final exam for the student of Basic Education	Conflict unresolved	Kachin Revolution Day	February 2013	13
Winter		New Year Day, Independance Day	Conflict unresolved	Kachin State Day, Manaw festival	January 2013	14
Winter	Christmas (25)	World AIDS day		December Mass Sport Activity	December 2012	15
Winter	Thank Giving Day, Full Moon Day of Ta Zaung Mone, Cemetry Cleansing Ceremony (Roman Catholic)	Harvesting time	Conflict unresolved	Shan New Year, New crops celebration	November 2012	16
Winter	Thank Giving Day, Full moon day of Ta Zaung Mone, Thadingyut festival	Time for poppy cultivation,Corn harvesting time	Conflict unresolved	Shan New Year, New crops celebration	October 2012	17
End of rainy season	The religious festival (Taking sabbath every week, monk did not travel outside the monestry), Starting Musilm fasting period		Conflict unresolved	Chinese Moon Cake Festival	September 2012	18
Rainy Season	The beginning of religious festival (Taking sabbath every week, monk did not travel outside the monestry)	Time for paddy cultivation	Conflict unresolved		August 2012	19
Rainy Season		Martyrs' Day, Preapration for paddy cultivation	Conflict unresolved	Paying Homage to Aged	July 2012	20
Rainy Season	Chinese medicine day, Chidren's Day, Father's Day (third week, Sunday)	June 26 (Int'l Day for ban on the Drugs Illicit ...)	Conflict unresolved	Paddy cultivation	June 2012	21
Summer	Mother's day (second week , Sunday), Full moon day of Kason, Payer Day (Roman Catholic)	May Day (Worker's Day), Time for seasonal fruits like Chinese plum and mangosteen	Conflict unresolved	Paddy cultivation	May 2012	22
Summer	Thin Gyan(water festival), Kachin national wishing day (to wish for the refugees of conflict/ civil war) Bible Contest Day, Easter Sunday, Prayer Day (Roman Catholic)	April Fool, To pluck tea leaf, Hta Ma Hne` festival	Conflict unresolved	Cemetry cleaning festival (paying homage to ancestors), Paddy cultivation	April 2012	23
Summer	Ta Baung Festival (buring firewood to keep warm (Chirsitian), (End of Musilm fasting period), Full Moon Day of Tabaung, Pagoda festival of reclining Buddha in Moe Kaung	Peasant's Day,To milk the poppy bud	Conflict unresolved	Buring farm/field to prepare for plantation	March 2012	24
Spring	Kachin Revolution Day, Making fireplace in front of God (to keep warm as it is coldest time of the year)	Union Day, Chinese New Year Day, St. Valentine's Day, Preparation for plantation, Final exam for the student of Basic Education	Conflict unresolved	Kachin Revolution Day, Shan National day	February 2012	25
Winter		Independance Day, New Year Day	Conflict unresolved	Ka Chin State Day, Ka Yin New Year	January 2012	26
Winter	Christmas (25)	World AIDS day			December 2011	27
Winter	Thank Giving Day, Full moon day of Ta Zaung Mon		Conflict unresolved	Shan New Year, New crops celebration	November 2011	28
Autumn	Fruit eating festival, Ta Din Gyut festival, Ta Zaung Taing Festival Depavili	Time for poppy cultivation,Corn harvesting time	Conflict unresolved	Shan New Year	October 2011	29
End of rainy season	The religious festival (Taking sabbath every week, monk did not travel outside the monestry),Starting Musilm fasting period		Conflict unresolved	Chinese Moon Cake Festival	September 2011	30
Rainy Season	The beginning of religious festival (Taking sabbath every week, monk did not travel outside the monestry)		Conflict unresolved		August 2011	31
Rainy Season		Martyrs' Day	Conflict unresolved	Paying Homage to Aged	July 2011	32

Rainy Season	Chinese medicine day, chidren's day, Father's day (third week, Sunday)		Conflict outbroken	Civil war broke between KIA and Milititary,Paddy plantation	June 2011	**33**
Summer	Mothers' day (second week , Sunday), Full moon day of Kason	May Day (worker)		Paddy plantation	May 2011	**34**
Summer	Thin Gyan(water festival), Kachin national wishing day (to wish for the refugees of conflict/ civil war)| Hta Ma Hne` festival	April Fool, Easter Sunday, To pluck tea leaf		Cemetry cleaning festival (paying homage to ancestors)| Paddy plantation	April 2011	**35**
Summer	Ta Baung Festival | buring firewood to keep warm (Chirsitian)(Full moon day of Ta Baung), (End of Musilm fasting period)	Peasant's Day,To milk the poppy bud		Buring farm/field to prepare for plantation	March 2011	**36**
Autumn	Ka Chin Revolution day,Making fireplace in front of God (to keep warm as it is coldest time of the year)	Union Day		Chinese New Year,Shan National day	February 2011	**37**
Winter	New Year Day (English Calendar)	Independant Day		Ka Chin State day(10), Ka Yin New Year	January 2011	**38**
Winter	Christmas (25)	World AIDS day			December 2010	**39**
Winter	Thank Giving Day, Full moon day of Ta Zaung Mon			Shan New Year, New crops celebration	November 2011	**40**
Autumn	Fruit eating festival, Ta Din Gyut festival, Ta Zaung Tainh Festival,Depavili	Time for poppy cultivation,Corn harvesting time		Shan New Year	October 2010	**41**
End of rainy season	Moon cake festival			Chinese Moon Cake Festival	September 2010	**42**
Rainy Season					August 2010	**43**
Rainy Season		Martyrs' Day		Paying Homage to Aged	July 2010	**44**
	Chinese medicine day, chidren's day, Father's day (third week, Sunday)			Paddy plantation	June 2010	**45**
Summer	Mothers' day (second week , Sunday), Full moon day of Kason	May Day (worker)		Paddy plantation	May 2010	**46**
Summer	Thin Gyan(water festival), Kachin national wishing day (to wish for the refugees of conflict/ civil war)| Hta Ma Hne` festival	April Fool, Easter Sunday| To pluck tea leaf		Opening Ceremony of Church in Kutkai,Cemetry cleaning festival (paying homage to ancestors)| Paddy plantation	April 2010	**47**
Summer	Ta Baung Festival | buring firewood to keep warm (Chirsitian)(Full moon day of Ta Baung), (End of Musilm fasting period)	Peasant's Day,To milk the poppy bud		Buring farm/field to prepare for plantation	March 2010	**48**
Autumn	Ka Chin Revolution day,Making fireplace in front of God (to keep warm as it is coldest time of the year)	Union Day		Chinese New Year,Shan National day	February 2010	**49**
Winter	New Year Day (English Calendar)	Independant Day		Ka Chin State day(10), Ka Yin New Year	January 2010	**50**

Winter	Christmas (25)	World AIDS day		December Mass Sport Activity, Kachin Ma Naw Fastival (8 to 11)	December 2009	**51**
Winter	Thank Giving Day, Full moon day of Ta Zaung Mon			Shan New Year, New crops celebration	November 2009	**52**
Autumn	Fruit eating festival, Ta Din Gyut festival, Ta Zaung Tainh Festival,Depavili	Time for poppy cultivation,Corn harvesting time		Shan New Year	October 2009	**53**
End of rainy season	The religious festival (Taking sabbath every week, monk did not travel outside the monestry),Starting Musilm fasting period			Chinese Moon Cake Festival	September 2009	**54**
Rainy Season	The beginning of religious festival (Taking sabbath every week, monk did not travel outside the monestry)	Start Puddy Growing Season			August 2009	**55**
Rainy Season		Martyrs' Day		Paying Homage to Aged	July 2009	**56**
	Chinese medicine day, chidren's day, Father's day (third week, Sunday)			Paddy plantation	June 2009	**57**
Summer	Mothers' day (second week , Sunday), Full moon day of Kason	May Day (worker)		Paddy plantation	May 2009	**58**
Summer	Thin Gyan(water festival), Kachin national wishing day (to wish for the refugees of conflict/ civil war)। Hta Ma Hne` festival	April Fool, Easter Sunday। To pluck tea leaf		Cemetry cleaning festival (paying homage to ancestors)। Paddy plantation	April 2009	**59**
Summer	Ta Baung Festival। buring firewood to keep warm (Chirsitian)(Full moon day of Ta Baung), (End of Musilm fasting period)	Peasant's Day,To milk the poppy bud		Palaung ethnic assembly, Buring farm/field to prepare for plantation	March 2009	**60**
Autumn	Ka Chin Revolution day,Making fireplace in front of God (to keep warm as it is coldest time of the year)	Union Day		Chinese New Year,Shan National day	February 2009	**61**

Annexe 3 : Questionnaire – English version

ANTHROPOMETRIC QUESTIONNAIRE - IDP population, Nam Hkam and May Ja Yang areas, March-April 2014

Date: **Camp/area name :** **Cluster N° :** **HH Absents:** **HH Refusing:** **Other:**

ID	HH	Gender	Date of Birth	Age	Weight ±100g	Height ±0.1cm	Œdema	MUAC ±1mm	Any serious illness in the past 15 days needing to seek treatment?	Diarrhoea the last 15 days?	Acute Respiratory Infection (ARI) the last 15 days?	Has the child been vaccinated for Measle?	Has the child been vaccinated for tuberculosis (BCG) ?	Received Vitamin A caps within the last 6 months? (show sample)	Received De-worming tablet in last 6 months? (show sample)
N°	N°	M/F	dd/mm/yyyy	Month	Kg (00.0)	cm (000.0)	N = No Y = Yes	mm (000)	0=No 1=Yes 4=Doesn't know	0=No 1=Yes 4=Doesn't know	0=No 1=Yes 4=Doesn't know	0=No 1 = Yes/card 2=Yes/no card 4=Doesn't know	0=No 1 = Yes/card 2= Yes/no card 4=Doesn't know	0=No 1=Yes 4=Doesn't Know	0=No 1=Yes 4=Doesn't Know
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															
16															
17															
18															

Diarrhea case definition: *3 or more liquid stools per day*

ARI case definition: *Fever and at least one of the following : rhinitis, cough, redness or soreness of throat*
OR Fever and fast breath (> 50 breaths/min) and at least one of the following : cough, difficulty in breathing

Annexe 4: Standardization test summary results

TEAM 1	Weight	Height	MUAC
Mwihpo Hkawn San		x	
Zing Htung Hla Tawm		x	
Lahpai Nang Ja	x	x	
TEAM 2			
Hpaw Yam Kaw Hpang	x	x	
Hla Htaw Seng Taung	x	x	x
Htu Mai	x	x	
TEAM 3			
M. Hkawn Ja	x	x	
Maran Sam Roi	x	x	
Too Raine		x	
TEAM 4			
Sum Lut Hkawn Shaung	x	x	
Daw Ywal Taung	x	x	
La Phaing Khaung Jan	x	x	
TEAM 5			
Daw Ral Gyi	x	x	
Inbaran Seng Pan	x	x	
Damau Lu Grawng	x	x	

Annexe 5: Plausibility check report

Plausibility check for: MYA_2014_KACHIN_SCI_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**
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of in-range subjects)			0	5	10	20	**0** (0,0 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0,918)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0,146)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (4)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (10)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (7)
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	2	6	20	**6** (0,81)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (-0,19)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (-0,05)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**0** (p=0,647)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**8** %

The overall score of this survey is 8 %, this is excellent.

There were no duplicate entries detected.

Missing data:
WEIGHT: Line=1/ID=1, Line=92/ID=92, Line=168/ID=168
HEIGHT: Line=1/ID=1, Line=92/ID=92, Line=168/ID=168

Percentage of children with no exact birthday: 4 %

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=39/ID=39: HAZ (-6,190), WAZ (-4,554), Age may be incorrect

Percentage of values flagged with SMART flags:WHZ: 0,0 %, HAZ: 0,3 %, WAZ: 0,3 %

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: 0,73 (The value should be around 0.85).

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

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	38/44,1 (0,9)	36/44,5 (0,8)	74/88,6 (0,8)	1,06
18 to 29	12	40/43,0 (0,9)	47/43,4 (1,1)	87/86,4 (1,0)	0,85
30 to 41	12	48/41,7 (1,2)	41/42,1 (1,0)	89/83,8 (1,1)	1,17
42 to 53	12	46/41,0 (1,1)	52/41,4 (1,3)	98/82,4 (1,2)	0,88
54 to 59	6	18/20,3 (0,9)	16/20,5 (0,8)	34/40,8 (0,8)	1,13
6 to 59	54	190/191,0 (1,0)	192/191,0 (1,0)		0,99

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

Overall sex ratio: p-value = 0,918 (boys and girls equally represented)
Overall age distribution: p-value = 0,146 (as expected)
Overall age distribution for boys: p-value = 0,578 (as expected)
Overall age distribution for girls: p-value = 0,227 (as expected)
Overall sex/age distribution: p-value = 0,074 (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: **4** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0,693

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: **10** (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: **7** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0,060

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:	0,81	0,81	0,81
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:			
calculated with current SD:			
calculated with a SD of 1:			
HAZ			
Standard Deviation SD:	1,00	0,97	0,97
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:			
calculated with current SD:			
calculated with a SD of 1:			
WAZ			
Standard Deviation SD:	0,84	0,84	0,83
(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= 0,227	p= 0,227	p= 0,227
HAZ	p= 0,118	p= 0,590	p= 0,590
WAZ	p= 0,414	p= 0,414	p= 0,913
(If p < 0.05 then the data are not normally distributed. If p > 0.05 you can consider the data normally distributed)			
Skewness			
WHZ	-0,19	-0,19	-0,19
HAZ	-0,07	0,13	0,13
WAZ	-0,18	-0,18	-0,06
If the absolute 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	-0,05	-0,05	-0,05
HAZ	0,56	-0,13	-0,13
WAZ	0,38	0,38	0,04
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=0,89 (p=0,647)
GAM: ID=0,89 (p=0,647)
HAZ < -2: ID=1,25 (p=0,152)
HAZ < -3: ID=1,20 (p=0,194)
WAZ < -2: ID=1,38 (p=0,068)
WAZ < -3: ID=0,89 (p=0,647)

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: 0,64 (n=34, f=0)
02: 0,74 (n=34, f=0)
03: 0,94 (n=34, f=0)  ######
04: 0,92 (n=34, f=0)  #####
05: 0,73 (n=33, f=0)
06: 0,80 (n=32, f=0)
07: 0,84 (n=32, f=0)  ##
08: 0,82 (n=29, f=0)  #
09: 0,97 (n=28, f=0)  #######
10: 0,92 (n=24, f=0)  #####
11: 0,61 (n=18, f=0)
12: 0,96 (n=14, f=0)  OOOOOOO
13: 0,82 (n=11, f=0)  O
14: 0,47 (n=06, f=0)
15: 0,57 (n=05, f=0)
16: 0,59 (n=05, f=0)
17: 0,85 (n=04, 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**
n =	89	78	68	77	70
Percentage of values flagged with SMART flags:					
WHZ:	1,1	0,0	0,0	2,7	0,0
HAZ:	2,3	0,0	0,0	2,7	0,0
WAZ:	2,3	0,0	0,0	2,7	0,0
Age ratio of 6-29 months to 30-59 months:					
	0,62	0,77	1,06	0,60	0,71
Sex ratio (male/female):					
	1,17	1,29	1,13	0,93	0,56

Digit preference Weight (%):

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

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

Digit preference Height (%):

.0 :	1	18	12	1	11
.1 :	16	9	7	15	10
.2 :	10	10	12	11	23
.3 :	15	15	16	15	11
.4 :	13	8	12	8	13
.5 :	3	24	3	7	9
.6 :	11	8	12	19	14
.7 :	11	4	10	9	4
.8 :	6	3	1	7	1
.9 :	14	1	15	9	3
DPS:	16	23	15	16	20

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

Digit preference MUAC (%):

.0 :	5	9	10	0	14
.1 :	8	14	15	9	6
.2 :	8	8	18	23	9
.3 :	17	9	3	13	20
.4 :	10	14	16	8	7
.5 :	5	13	6	0	13
.6 :	18	10	10	16	4
.7 :	11	5	6	13	4
.8 :	9	12	6	5	7
.9 :	9	6	10	12	16
DPS:	14	10	16	22	17

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

Standard deviation of WHZ:

SD	0,80	0,83	0,90	0,65	0,84

Prevalence (< -2) observed:

%

Prevalence (< -2) calculated with current SD:

%

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

%

Standard deviation of HAZ:

SD	1,00	0,89	1,06	1,01	0,98

observed:

%	56,8		47,1	50,7	

calculated with current SD:

%	55,0		46,3	42,4	

calculated with a SD of 1:

% 55,0 46,1 42,4

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	6/11,1 (0,5)	4/9,5 (0,4)	10/20,6 (0,5)	1,50
18 to 29	12	15/10,9 (1,4)	9/9,3 (1,0)	24/20,1 (1,2)	1,67
30 to 41	12	10/10,5 (1,0)	12/9,0 (1,3)	22/19,5 (1,1)	0,83
42 to 53	12	13/10,4 (1,3)	13/8,8 (1,5)	26/19,2 (1,4)	1,00
54 to 59	6	4/5,1 (0,8)	3/4,4 (0,7)	7/9,5 (0,7)	1,33
6 to 59	54	48/44,5 (1,1)	41/44,5 (0,9)		1,17

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

Overall sex ratio: p-value = 0,458 (boys and girls equally represented)
Overall age distribution: p-value = 0,047 (significant difference)
Overall age distribution for boys: p-value = 0,298 (as expected)
Overall age distribution for girls: p-value = 0,159 (as expected)
Overall sex/age distribution: p-value = 0,018 (significant difference)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	9/10,2 (0,9)	5/7,9 (0,6)	14/18,1 (0,8)	1,80
18 to 29	12	8/10,0 (0,8)	12/7,7 (1,6)	20/17,6 (1,1)	0,67
30 to 41	12	9/9,6 (0,9)	4/7,5 (0,5)	13/17,1 (0,8)	2,25
42 to 53	12	13/9,5 (1,4)	10/7,3 (1,4)	23/16,8 (1,4)	1,30
54 to 59	6	5/4,7 (1,1)	3/3,6 (0,8)	8/8,3 (1,0)	1,67
6 to 59	54	44/39,0 (1,1)	34/39,0 (0,9)		1,29

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

Overall sex ratio: p-value = 0,257 (boys and girls equally represented)
Overall age distribution: p-value = 0,343 (as expected)
Overall age distribution for boys: p-value = 0,757 (as expected)
Overall age distribution for girls: p-value = 0,188 (as expected)
Overall sex/age distribution: p-value = 0,067 (as expected)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	11/8,4 (1,3)	9/7,4 (1,2)	20/15,8 (1,3)	1,22
18 to 29	12	7/8,1 (0,9)	8/7,2 (1,1)	15/15,4 (1,0)	0,88
30 to 41	12	10/7,9 (1,3)	6/7,0 (0,9)	16/14,9 (1,1)	1,67
42 to 53	12	7/7,8 (0,9)	9/6,9 (1,3)	16/14,7 (1,1)	0,78
54 to 59	6	1/3,8 (0,3)	0/3,4 (0,0)	1/7,3 (0,1)	
6 to 59	54	36/34,0 (1,1)	32/34,0 (0,9)		1,13

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

Overall sex ratio: p-value = 0,628 (boys and girls equally represented)
Overall age distribution: p-value = 0,151 (as expected)
Overall age distribution for boys: p-value = 0,442 (as expected)
Overall age distribution for girls: p-value = 0,329 (as expected)
Overall sex/age distribution: p-value = 0,074 (as expected)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	6/8,6 (0,7)	7/9,3 (0,8)	13/17,9 (0,7)	0,86
18 to 29	12	6/8,4 (0,7)	10/9,0 (1,1)	16/17,4 (0,9)	0,60
30 to 41	12	11/8,1 (1,4)	9/8,8 (1,0)	20/16,9 (1,2)	1,22
42 to 53	12	8/8,0 (1,0)	8/8,6 (0,9)	16/16,6 (1,0)	1,00
54 to 59	6	6/3,9 (1,5)	6/4,3 (1,4)	12/8,2 (1,5)	1,00
6 to 59	54	37/38,5 (1,0)	40/38,5 (1,0)		0,93

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

Overall sex ratio: p-value = 0,732 (boys and girls equally represented)
Overall age distribution: p-value = 0,437 (as expected)
Overall age distribution for boys: p-value = 0,471 (as expected)
Overall age distribution for girls: p-value = 0,842 (as expected)
Overall sex/age distribution: p-value = 0,288 (as expected)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	6/5,8 (1,0)	11/10,4 (1,1)	17/16,2 (1,0)	0,55
18 to 29	12	4/5,7 (0,7)	8/10,2 (0,8)	12/15,8 (0,8)	0,50
30 to 41	12	8/5,5 (1,5)	10/9,9 (1,0)	18/15,3 (1,2)	0,80
42 to 53	12	5/5,4 (0,9)	12/9,7 (1,2)	17/15,1 (1,1)	0,42
54 to 59	6	2/2,7 (0,7)	4/4,8 (0,8)	6/7,5 (0,8)	0,50
6 to 59	54	25/35,0 (0,7)	45/35,0 (1,3)		0,56

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

Overall sex ratio: p-value = 0,017 (significant excess of girls)
Overall age distribution: p-value = 0,745 (as expected)
Overall age distribution for boys: p-value = 0,764 (as expected)
Overall age distribution for girls: p-value = 0,883 (as expected)
Overall sex/age distribution: p-value = 0,074 (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: 0,63 (n=07, f=0)
02: 0,69 (n=06, f=0)
03: 0,63 (n=07, f=0)
04: 1,25 (n=07, f=0)  ###################
05: 0,57 (n=07, f=0)
06: 0,95 (n=07, f=0)  ######
07: 0,58 (n=07, f=0)
08: 1,04 (n=06, f=0)  ##########
09: 1,10 (n=07, f=0)  #############
10: 0,81 (n=06, f=0)
11: 0,50 (n=05, f=0)
12: 0,95 (n=03, f=0)  OOOOOO
13: 0,79 (n=03, f=0)
14: 0,14 (n=02, f=0)
15: 0,47 (n=02, f=0)
16: 0,53 (n=02, f=0)
17: 0,20 (n=02, f=0)
```

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

Team: 2

```
Time                                        SD for WHZ
point               0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0,74 (n=07, f=0)
02: 0,95 (n=07, f=0)  ######
03: 0,89 (n=07, f=0)  ####
04: 0,63 (n=07, f=0)
05: 0,96 (n=07, f=0)  #######
06: 0,60 (n=06, f=0)
07: 1,15 (n=06, f=0)  ##############
08: 0,90 (n=05, f=0)  ####
09: 1,05 (n=04, f=0)  ###########
10: 0,77 (n=04, f=0)
11: 0,74 (n=04, f=0)
12: 1,12 (n=04, f=0)  ##############
13: 0,89 (n=03, f=0)  OOOO
14: 0,17 (n=02, f=0)
15: 0,94 (n=02, f=0)  OOOOOO
16: 0,44 (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: 0,71 (n=07, f=0)
02: 0,74 (n=07, f=0)
03: 1,08 (n=07, f=0)  ############
04: 0,68 (n=07, f=0)
05: 0,65 (n=07, f=0)
06: 0,40 (n=07, f=0)
07: 0,91 (n=06, f=0)  #####
08: 0,73 (n=05, f=0)
09: 1,37 (n=05, f=0)  ########################
10: 0,81 (n=04, f=0)
11: 0,94 (n=03, f=0)  OOOOOO
12: 1,91 (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: 0,57 (n=06, f=0)
02: 0,62 (n=07, f=0)
03: 0,75 (n=07, f=0)
04: 0,52 (n=07, f=0)
05: 0,61 (n=06, f=0)
06: 0,88 (n=06, f=0)  ###
07: 0,74 (n=07, f=0)
08: 0,35 (n=07, f=0)
09: 0,29 (n=06, f=0)
10: 0,95 (n=06, f=0)  #######
11: 0,41 (n=04, f=0)
12: 0,70 (n=03, f=0)
13: 1,08 (n=02, f=0)  ~~~~~~~~~~~~
```

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

Team: 5

```
Time                                        SD for WHZ
point               0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0,63 (n=07, f=0)
02: 0,73 (n=07, f=0)
03: 0,97 (n=06, f=0)  #######
04: 1,49 (n=06, f=0)  ############################
05: 0,71 (n=06, f=0)
06: 0,90 (n=06, f=0)  ####
07: 1,03 (n=06, f=0)  ##########
08: 0,77 (n=06, f=0)
09: 0,85 (n=06, f=0)  ##
10: 0,96 (n=04, f=0)  #######
```

```
11: 0,54 (n=02, f=0)
12: 0,20 (n=02, f=0)
13: 0,46 (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)