Report of Rapid SMART (MUAC) Survey in Zakho city of Dohuk Governorate, KRI during October 18th to October 21st 2014

26th October 2014

Conducted by Action Contre la Faim, KRI

Acknowledgements

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Executive Summary

Between 20th and 21st of October a total of 233 internally displaced people (IDPs) households in unfinished buildings, parks and schools in Zakho city of Dohuk governorate were assessed. This report contains analysis of nutrition anthropometric indicators (MUAC and oedema) among children 6-59 months, and presence of diarrhoea and acute respiratory infection among children were assessed.

Summary of key anthropometric findings:

- 323 children aged 6-59 months were assessed
- GAM was 3.2 % (1.4 – 7.0 95% C.I) and SAM was 0.6% (0.2- 2.7 95% CI) based on MUAC and the presence of bilateral oedema.
- 0 cases of oedema were identified
- Morbidity
  - 25% of children assessed were reported having diarrhoea in the past 2 weeks preceding the survey
  - 35% of children assessed were reported having acute respiratory infection in the past 2 weeks preceding the survey

1. Introduction

OCHA situation update in September 2014[1], estimated 1.8 million displaced people in Iraq since the start of the year, with over 860,000 Internally Displaced Persons (IDPs) reported to have arrived or passed through the Kurdistan Region of Iraq (KRI) since June with majority of IDPs concentrated in Dohuk governorate.

Zakho district is one of the seven districts in Dohuk Governorate, situated in the northern part of the country in the region of Iraqi Kurdistan. The district composed of 3 sub-districts and its capital is the city of Zakho. Zakho city, similar to other areas of KRI, is subjected to an extremely dry and hot summer (May to August) and mild and wet winter (October to March) with temperatures ranging between + 5 degree Celsius to -16 degree Celsius in some stances[2].

The estimated IDP population in Zakho district is 170,000, with majority (approximately 120,000) residing in Zakho city[3]. IDPs are sheltering in locations such as schools, unfinished buildings and in the open. Through several rapid needs assessments in multiple locations, ACF is targeting population in need in Zakho district of Dohuk Governorate.

1.1 Health and Nutrition Situation:

Limited information exists on health and particularly nutrition situation of the IDPs. Prior to the crisis, the main source of information for Iraqi nutrition status derives from the Multi-Indicators Cluster Survey (MICS) conducted in 2011. The average prevalence of wasting **(GAM) in Iraq is 6.9% (SAM is 3.4%)** while that of KRI region is **4.7% (2.4%).**

Between September to October 2014, UNICEF and Dohuk Department of Health (DoH) conducted a nutrition survey amongst IDPs in all the 7 districts in Dohuk Governorate, ***which found 3.7% Global acute malnutrition (GAM) and 0.2% severe acute malnutrition (SAM) based on weight-height z-score in children 0-59 months***, indicating an acceptable public health situation. Similarly, when ***Mid-upper-arm circumference (MUAC) was used as a proxy indicator in children 6-59 months, a 2.1% GAM and 0.6% SAM were found.***

1.2 Rational for rapid SMART MUAC survey

Given that the UNICEF-DoH led survey is of a larger scale, covering 7 districts in Dohuk governorate, and provided ACF's interest in having a better understanding of the nutrition situation in ACF's areas of implementation, a rapid SMART MUAC survey was carried out amongst ACF's targeted population in Zakho city from the 18 to 22 October 2014.

1.3 Survey Objectives

- To estimate the prevalence of acute malnutrition among children from 6 to 59 months of age using MUAC and bilateral pitting oedema
- To estimate the prevalence of acute diarrhoea among children from 6 to 59 months of age
- To estimate the prevalence of acute respiratory infections among children from 6 to 59 months of age.

The information will be used to guide ACF in making an informed decision as to the type of programming (or whether there is need) that could be implemented in nutrition/health sector.

[1] http://reliefweb.int/sites/reliefweb.int/files/resources/Iraq%20IDP%20Crisis%20Situation%20Report%20No%2011pdf
[2] file:///C:/Users/ACF/Downloads/Final_Iraq_Crisis_Situation_Report_No14_26_September_-_3_October_2014.pdf
[3] file:///C:/Users/ACF/Downloads/OCHA_Daily_Update_Tuesday_19_August_2014.pdf

2. Methodology

The assessment employs a rapid SMART methodology, which proposes a method to rapidly collect reliable nutrition data and to ensure optimum quality in a time-bound manner. Only limited indicators, MUAC and oedema and information on diarrhoea and ARI were collected.

2.1 Target population and geographical areas

The target population includes all IDP children aged 6 to 59 months living in ACF targeted informal settlements in Zakho city, Dohuk. Assessment was conducted through informal settlement such as schools, unfinished buildings and parks in Zakho city.

Although the estimated population of IDPs in Zakho district is 170,000, only those living in Zakho city and are listed in ACF's activities registration, were assessed (population size = 60, 457) (for more detailed please refer to annex 1).

2.2 Sample size:

Based on rapid SMART guideline, when using cluster random sampling method, a quoted sample size of minimum of **200 children** is considered sufficient to estimate GAM prevalence. The assumed design affect (DEFF) is of 1.5 as more than one settlement were assessed. Considering GAM prevalence of 2.6% based on MUAC assessment by UNICEF- DoH[4] it is expected that the GAM based on MUAC should be between 0 and 5%. In this case, a final result having a 95% Confidence Interval of +/- 3.9% would be enough for emergency programming.

Given the estimated percentage of children under 5 years of age in Iraq[5] is approximately 14%, it was found that the requested sample of 200 children will be found in minimum of 300 households.

2.3 Final Sampling Strategy

- A total of 25 **clusters each comprised of 12 households were targeted (25 * 12)** to reach a sample of 200 children 6-59 months.
- A cluster is defined as a school, unfinished buildings or a park where IDPs are residing. In the case of unfinished buildings, a cluster was determined based on ACF's grouping of closely knitted buildings. In some cases, where number of households is less than 50 and schools are located close to each other, and then a few schools are combined to form a cluster of at least 100 – 150 households.
- 3 Reserve Clusters were selected using the ENA software, but none were used
- Non-Response Rate (considered as children without age report) was about 6%, which is similar to the expected non-response rate.

Number of HH planned	Number of HH surveyed	% surveyed /planned	Number of children 6-59 months planned	Number of children 6-59 months surveyed	% Surveyed /planned
300	233	77.6%	200	323	161%

2.4 Survey Teams

- Survey teams

[4] UNICEF, and Department of Health (DoH) Dohuk - Rapid Nutrition Survey - 2014
[5] http://www.unicef.org/infobycountry/iraq_statistics.html

A total of 7 data collection teams with 2 members in each were used for the rapid SMART survey. The teams were composed of 1 team leader and 1 surveyor.

- Field Supervision

Due to logistical constraints of limited vehicles, one of the seven teams was directly supervised in the field during data collection on day 1. Other teams were provided with supervisions/direction over the phone for course-corrections and answering of any questions and concerns.

- Household selection techniques:

During the planning phase, list of head of households were provided to the team by ACF food distribution team. Assuming a complete list of households in each cluster, a simple random sampling method was planned for, and a random table was provided to each team to assist them in household selections.

However, upon arrival at the location, it was found that the due to high population mobility, a large number of IDPs have moved from the temporary shelters. In locations where the location manager has an updated list of households, the random sampling method was used. However, for most locations where an updated list does not exist, the systematic random sampling method for household selections was used instead. Through discussion with location focal point/manager, a rough estimated number of populations in each location was ascertained, and sampling interval was calculated to reach 12 households in each location. In locations where household number exceeded 250, segmentation method was used to divide location in segments containing from 150 to 250 households, and a segment is selected by using a random drawing.

All the children living in the selected household in the correct age range were included in the sample and measured. If two eligible children were found in a household, both were included, even if they were twins. It is important to note that only 76.6% of households were reached due to the fact that in some locations many families have left the locations.

The definition of household, as a family with 1 head of household with economic responsibility, were pre-determined with the team mainly because many IDPs are living in unfinished buildings, parks and schools where communal living were found. In cases where 1 grandfather is living with 4 sons with their own family, each of the sons was counted as a separate household.

Age of children between 6-59 months was determined by using official documents stating his/her date of birth (Birth certificate, etc.) or by an estimate using local events if the birthdate is not known.

3. Results

3.1. Anthropometric data

Data were analysed with ENA for SMART, using the version of ENA Delta software 2011 (updated in August 2014).

Global acute malnutrition (GAM) is defined as MUAC < 125 mm/and or oedema; Moderate Acute malnutrition (MAM) is defined as MUAC < 125 mm and > = 115 mm, no oedema); Severe acute malnutrition is defined as MUAC < 115 and/or oedema.

The results are presented based on MUAC and oedema assessments.

Table 3.1: Distribution of age and sex of sample

	Boys		Girls		Total		Ratio
AGE (mo)	no.	%	no.	%	no.	%	Boy: girl
6-17	46	64.8	25	35.2	71	22.8	1.8
18-29	37	52.9	33	47.1	70	22.4	1.1
30-41	40	50.0	40	50.0	80	25.6	1.0
42-53	30	49.2	31	50.8	61	19.6	1.0
54-59	18	60.0	12	40.0	30	9.6	1.5
Total	171	54.8	141	45.2	312	100.0	1.2

Table 3.2: Prevalence of acute malnutrition based on MUAC cut off (and/or oedema) and by sex

	All n = 312	Boys n = 171	Girls n = 141
Prevalence of global malnutrition (< 125 mm and/or oedema)	**(10) 3.2 % (1.4 - 7.0 95% C.I.)**	(2) 1.2 % (0.3 - 4.6 95% C.I.)	(8) 5.7 % (2.2 - 14.1 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	**(8) 2.6 % (1.1 - 5.7 95% C.I.)**	(2) 1.2 % (0.3 - 4.6 95% C.I.)	(6) 4.3 % (1.5 - 11.5 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	**(2) 0.6 % (0.2 - 2.7 95% C.I.)**	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(2) 1.4 % (0.4 - 5.5 95% C.I.)

Table 3.3: Prevalence of acute malnutrition by age, based on MUAC cut off and/or oedema

		Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
Age (mo)	Total no.	No.	%	No.	%	No.	%	No.	%
6-17	71	1	1.4	3	4.2	67	94.4	0	0.0
18-29	70	1	1.4	2	2.9	67	95.7	0	0.0
30-41	80	0	0.0	3	3.8	77	96.3	0	0.0
42-53	61	0	0.0	0	0.0	61	100.0	0	0.0
54-59	30	0	0.0	0	0.0	30	100.0	0	0.0
Total	312	2	0.6	8	2.6	302	96.8	0	0.0

3.2 Two-Week Recall of Diarrhoea and ARI:

To the question of if a child between the ages of 6-59 months had diarrhoea (more than 3 stools per day) or ARI (cough, wheezing and difficulty breathing) in the past 2 weeks preceding the survey - data is presented in the table below. About 2% responded as 'don't know' for both cases.

Table 3.4: Two-week recall of Diarrhoea and Acute Respiratory Infection

Indicator	n	Yes (%)	No (%)
Child had Diarrhoea in past two-weeks (>3 stools)	323	81 (25%)	234 (72%)
+ Child had Acute Respiratory Infection in past two weeks (cough and fever)	323	113 (35%)	204 (63%)

15% (n = 49) of children were found to have both diarrhoea and ARI in the past two weeks preceding the survey.

4. Data quality

The overall quality of data is acceptable with good quality of measurement and representativeness. The overall sex- ratio was 1.2 (p- score of 0.089) indicating an equal representation of boys and girls in the sample. Similarly overall age distribution p-score of 0.572 indicates that no significant difference exist in the age distribution.

Digit preference score for MUAC is good, indicating that there is low preference for any one of the digits during MUAC measurements. However some issues in measurements were found in team 3, 4 and 5 (Plausibility check is available in Annex 2).

5. Conclusion

The result is in-line with UNICEF- DoH's findings of 3.7% (2.8 – 4.8 95% C.I.) and 2.6% GAM rate using weight for height z-score (WFZ) and MUAC respectively; and 0.2 % (0.1 – 0.6 95% C.I.) and 0.6% SAM rate using WFZ and MUAC respectively.

The precision of the result is satisfactory: **3.2 %** with 95% C.I. (1.4 - 7.0) was according to the initial hypothesis of ±3,9%. This confirms the validity and the representativeness of the results and its usefulness for emergency programming.

Overall wasting rates are acceptable below 5% with GAM rate (MUAC < 125 mm) of 3.2% (1.4 – 7.0 95% C.I) and SAM rate of 0.6% (0.2 – 2.7 95 C.I.). More cases observed amongst girls (5.7 %) than boys (1.2%) and in younger age group (5.6% in aged group 6-17 months; 4.3% in 18-29 months; 3.8 in 30 -41 months; and 0 in 42 – 59 months). However, this difference was not significant.

Although GAM rates remain low, the following risks factors should be carefully observed monitor and reported to prevent deterioration of nutrition status:

- Lack of adequate and a coherent referral system for existing cases of acute malnutrition.
- Poor Infant and young child feeding practices (UNICEF's survey found only 59% of children 9-24 months being breastfed and 31.8% of children have never been breastfed)
- Poor living conditions of IDPs, particularly those in unfinished buildings and an arrival of wet and cold winter season could lead to an increased risks of diseases such as diarrhoea and ARI;
- Reduction in food ration due to funding constraint will likely impact food security situation of IDPs;
- The lack of nutritionally sensitive and micronutrient rich foods in the food basket over a long period could potentially increase incidence of micronutrient deficiency.

A total of **25%** (n=81) suffered from diarrhoea and 35% (n = 113) suffered from acute respiratory infection (ARI) 2 weeks preceding the survey. 15% (n = 49) suffered from both diarrhoea and ARI 2 weeks preceding the survey.

It was observed that as families are living in unprotected shelters without adequate heating system, sewage and drainage system, and adequate access to clean and running water, there is likely a higher risk for diarrhoea and ARI. The risks are further compounded by the arrival of rain and cold climatic condition, rendering it important to continue to monitor the trend in morbidity over the next few months.

5. Recommendations

As GAM rates remain below alarming rates of 5%, and considering the mentioned risks factors, the focus of response should be on prevention activities. However, availability of curative services has to be ensured. Specific activities could include:

- Support and participate in relevant nutrition related coordination mechanisms to ensure that efforts by nutrition actors are aligned.
- Support in capacity building of MoH/DoH to ensure that protocol and capacity to respond to any current cases or potentially new cases of acute malnutrition exist within the health sector.
- Strengthen Infant and young child feeding (IYCF) related activities, including both community level and health facility level response.
- Explore issues related to uptake of formula milk to ensure that harms (such as diarrhoea, inadequate intake and others) resulted from inappropriate feeding practices are minimized.
- Explore, with partners, on appropriate activities for micronutrient deficiency prevention and control.
- To Increase monitoring and surveillance of nutrition status through periodic rapid SMART survey, particularly after winter season.

Annex 1: Target population

Estimated population of IDPs in Zakho district = 170,000
Estimated population of IDPs in Zakho city = 120,000
Estimated population of IDPs in Zakho city and registered in ACF's list of activities = 60,457

- **The target population used in cluster assignment is based on population of IDPs based in Zakho city and are registered on ACF's list of activities. Therefore, this rapid MUAC assessment focuses only on approximately 50% of eligible population in Zakho city.**
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Annex 2: Plausibility check for: ZAK_21102014_ACF_clean.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** (%)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**2** (p=0.089)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.572)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (0)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (0)
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 and	<1.15 and	<1.20 and	>=1.20 or	
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	2	6	20	**0** ()
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** ()
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** ()
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**0** (p=)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**2** %

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

There were no duplicate entries detected.

Missing data:

WEIGHT: Line=1/ID=11, Line=2/ID=12, Line=3/ID=9, Line=4/ID=10, Line=5/ID=15, Line=6/ID=16, Line=7/ID=13, Line=8/ID=14, Line=9/ID=3, Line=10/ID=4, Line=11/ID=1, Line=12/ID=2, Line=13/ID=7, Line=14/ID=8, Line=15/ID=5, Line=16/ID=6, Line=17/ID=6, Line=18/ID=5, Line=19/ID=8, Line=20/ID=7, Line=21/ID=2, Line=22/ID=1, Line=23/ID=4, Line=24/ID=3, Line=25/ID=7, Line=26/ID=6, Line=27/ID=9, Line=28/ID=8, Line=29/ID=5, Line=30/ID=2, Line=31/ID=1, Line=32/ID=4, Line=33/ID=3, Line=34/ID=4, Line=35/ID=5, Line=36/ID=3, Line=37/ID=1, Line=38/ID=2, Line=39/ID=10, Line=40/ID=9, Line=41/ID=8, Line=42/ID=11, Line=43/ID=13, Line=44/ID=14, Line=45/ID=12, Line=46/ID=3, Line=47/ID=2, Line=48/ID=1, Line=49/ID=4, Line=50/ID=7, Line=51/ID=6, Line=52/ID=5, Line=53/ID=9, Line=54/ID=8, Line=55/ID=7, Line=56/ID=12, Line=57/ID=11, Line=58/ID=10, Line=59/ID=3, Line=60/ID=2, Line=61/ID=1, Line=62/ID=6, Line=63/ID=5, Line=64/ID=4, Line=65/ID=4, Line=66/ID=5, Line=67/ID=6, Line=68/ID=1, Line=69/ID=2, Line=70/ID=3, Line=71/ID=7, Line=72/ID=11, Line=73/ID=12, Line=74/ID=13, Line=75/ID=8, Line=76/ID=9, Line=77/ID=10, Line=78/ID=6, Line=79/ID=5, Line=80/ID=8, Line=81/ID=7, Line=82/ID=2, Line=83/ID=1, Line=84/ID=4, Line=85/ID=3, Line=86/ID=9, Line=87/ID=10, Line=89/ID=15, Line=90/ID=13, Line=91/ID=11, Line=92/ID=12, Line=93/ID=19, Line=94/ID=20, Line=95/ID=18, Line=96/ID=16, Line=97/ID=17, Line=98/ID=4, Line=99/ID=5, Line=100/ID=3, Line=101/ID=1, Line=102/ID=2, Line=103/ID=9, Line=104/ID=10, Line=105/ID=8, Line=106/ID=6, Line=107/ID=7, Line=108/ID=4, Line=109/ID=5, Line=110/ID=6, Line=111/ID=1, Line=112/ID=2, Line=113/ID=3, Line=114/ID=7, Line=115/ID=11, Line=116/ID=12, Line=117/ID=13, Line=118/ID=8, Line=119/ID=9, Line=120/ID=10, Line=121/ID=12, Line=123/ID=2, Line=124/ID=9, Line=125/ID=10, Line=127/ID=6, Line=128/ID=7, Line=129/ID=8, Line=130/ID=3, Line=131/ID=4, Line=132/ID=5, Line=133/ID=5, Line=134/ID=6, Line=135/ID=7, Line=136/ID=4, Line=137/ID=1, Line=138/ID=2, Line=139/ID=3, Line=140/ID=8, Line=141/ID=13, Line=142/ID=14, Line=143/ID=15, Line=144/ID=12, Line=145/ID=9, Line=146/ID=10, Line=147/ID=11, Line=148/ID=15, Line=149/ID=16, Line=150/ID=13, Line=151/ID=14, Line=152/ID=4, Line=153/ID=5, Line=154/ID=6, Line=155/ID=1, Line=156/ID=2, Line=157/ID=3, Line=159/ID=11, Line=160/ID=12, Line=161/ID=7, Line=162/ID=8, Line=163/ID=9, Line=164/ID=3, Line=165/ID=4, Line=166/ID=1, Line=167/ID=2, Line=168/ID=5, Line=169/ID=18, Line=170/ID=19, Line=171/ID=13, Line=172/ID=17, Line=173/ID=14, Line=174/ID=15, Line=175/ID=16, Line=176/ID=9, Line=177/ID=10, Line=178/ID=11, Line=179/ID=6, Line=180/ID=7, Line=181/ID=8, Line=182/ID=12, Line=183/ID=7, Line=184/ID=8, Line=185/ID=10, Line=186/ID=9, Line=187/ID=6, Line=188/ID=1, Line=189/ID=2, Line=190/ID=3, Line=191/ID=5, Line=192/ID=4, Line=193/ID=7, Line=195/ID=9, Line=196/ID=3, Line=197/ID=2, Line=199/ID=6, Line=202/ID=4, Line=203/ID=5, Line=204/ID=3, Line=205/ID=1, Line=206/ID=2, Line=207/ID=9, Line=208/ID=8, Line=209/ID=1, Line=210/ID=12, Line=211/ID=11, Line=212/ID=10, Line=213/ID=5, Line=214/ID=6, Line=215/ID=7, Line=216/ID=2, Line=217/ID=3, Line=218/ID=4, Line=219/ID=3, Line=220/ID=2, Line=221/ID=1, Line=222/ID=6, Line=223/ID=5, Line=224/ID=4, Line=225/ID=15, Line=226/ID=16, Line=227/ID=14, Line=228/ID=12, Line=229/ID=13, Line=230/ID=17, Line=231/ID=21, Line=232/ID=22, Line=233/ID=20, Line=234/ID=18, Line=235/ID=19, Line=236/ID=4, Line=237/ID=5, Line=238/ID=3, Line=239/ID=1, Line=240/ID=2, Line=241/ID=6, Line=242/ID=10, Line=243/ID=11, Line=244/ID=9, Line=245/ID=7, Line=246/ID=8, Line=247/ID=14, Line=248/ID=15, Line=249/ID=13, Line=250/ID=11, Line=251/ID=12, Line=252/ID=19, Line=253/ID=20, Line=254/ID=18, Line=255/ID=16, Line=256/ID=17, Line=257/ID=4, Line=258/ID=5, Line=259/ID=3, Line=260/ID=1, Line=261/ID=2, Line=262/ID=9, Line=263/ID=10, Line=264/ID=8, Line=265/ID=6, Line=266/ID=7, Line=267/ID=9, Line=268/ID=8, Line=270/ID=12, Line=271/ID=11, Line=273/ID=3, Line=274/ID=2, Line=275/ID=1, Line=276/ID=6, Line=277/ID=5, Line=278/ID=4, Line=279/ID=11, Line=280/ID=12, Line=281/ID=9, Line=282/ID=10, Line=283/ID=15, Line=284/ID=16, Line=285/ID=13, Line=286/ID=14, Line=287/ID=3, Line=288/ID=4, Line=289/ID=1, Line=290/ID=2, Line=291/ID=7, Line=292/ID=8, Line=293/ID=5, Line=294/ID=6, Line=295/ID=9, Line=296/ID=8, Line=297/ID=7, Line=298/ID=12, Line=299/ID=11, Line=300/ID=10, Line=301/ID=3, Line=302/ID=2, Line=303/ID=1, Line=304/ID=6, Line=306/ID=4, Line=307/ID=12, Line=308/ID=13, Line=309/ID=10, Line=310/ID=11, Line=311/ID=16, Line=312/ID=17, Line=313/ID=14, Line=314/ID=15, Line=315/ID=9, Line=316/ID=3, Line=317/ID=4, Line=318/ID=1, Line=319/ID=2, Line=320/ID=7, Line=321/ID=8, Line=322/ID=5, Line=323/ID=6
HEIGHT: Line=1/ID=11, Line=2/ID=12, Line=3/ID=9, Line=4/ID=10, Line=5/ID=15, Line=6/ID=16, Line=7/ID=13, Line=8/ID=14, Line=9/ID=3, Line=10/ID=4, Line=11/ID=1, Line=12/ID=2, Line=13/ID=7, Line=14/ID=8, Line=15/ID=5, Line=16/ID=6, Line=17/ID=6, Line=18/ID=5, Line=19/ID=8, Line=20/ID=7, Line=21/ID=2, Line=22/ID=1, Line=23/ID=4, Line=24/ID=3, Line=25/ID=7, Line=26/ID=6, Line=27/ID=9, Line=28/ID=8, Line=29/ID=5, Line=30/ID=2, Line=31/ID=1, Line=32/ID=4, Line=33/ID=3, Line=34/ID=4, Line=35/ID=5, Line=36/ID=3, Line=37/ID=1, Line=38/ID=2, Line=39/ID=10, Line=40/ID=9, Line=41/ID=8,

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Percentage of children with no exact birthday: 6 %

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):

Percentage of values flagged with SMART flags:

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: 0.82 (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	46/39.7 (1.2)	25/32.7 (0.8)	71/72.4 (1.0)	1.84

18 to 29	12	37/38.7 (1.0)	33/31.9 (1.0)	70/70.6 (1.0) 1.12
30 to 41	12	40/37.5 (1.1)	40/30.9 (1.3)	80/68.4 (1.2) 1.00
42 to 53	12	30/36.9 (0.8)	31/30.4 (1.0)	61/67.3 (0.9) 0.97
54 to 59	6	18/18.3 (1.0)	12/15.0 (0.8)	30/33.3 (0.9) 1.50
6 to 59	54	171/156.0 (1.1)	141/156.0 (0.9)	1.21

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

Overall sex ratio: p-value = 0.089 (boys and girls equally represented)
Overall age distribution: p-value = 0.572 (as expected)
Overall age distribution for boys: p-value = 0.637 (as expected)
Overall age distribution for girls: p-value = 0.272 (as expected)
Overall sex/age distribution: p-value = 0.035 (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: **0** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)

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: **0** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)

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: 0.077

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

Skewness
WHZ
HAZ
WAZ
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
HAZ
WAZ
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:

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).

Analysis by Team

Team	**1**	**2**	**3**	**4**	**5**	**6**	**7**
n =	38	34	41	41	53	46	59
Percentage of values flagged with SMART flags:							
WHZ:							
HAZ:							
WAZ:							
Age ratio of 6-29 months to 30-59 months:							
	0.81	0.55	0.64	1.28	1.21	0.64	0.79
Sex ratio (male/female):							
	1.24	0.89	1.73	1.05	1.30	0.84	1.57
Digit preference Weight (%):							
.0 :							
.1 :							
.2 :							
.3 :							
.4 :							
.5 :							
.6 :							
.7 :							
.8 :							
.9 :							
DPS:	0	0	0	0	0	0	0

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

Digit preference Height (%):							
.0 :							
.1 :							
.2 :							
.3 :							
.4 :							
.5 :							
.6 :							
.7 :							

.8 :
.9 :
DPS: 0 0 0 0 0 0 0
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)

Digit preference MUAC (%):

.0 : 0 9 27 34 9 13 0
.1 : 8 9 7 2 2 7 8
.2 : 18 3 5 7 17 7 12
.3 : 11 6 2 2 21 11 20
.4 : 8 6 15 0 0 15 12
.5 : 5 21 17 17 17 9 2
.6 : 8 12 5 2 2 9 15
.7 : 16 12 5 2 8 9 15
.8 : 16 9 12 22 15 13 8
.9 : 11 15 5 10 9 9 7
DPS: 17 16 24 35 23 9 20
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)

Standard deviation of WHZ:

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

Standard deviation of HAZ:

SD
observed:
%
calculated with current SD:
%
calculated with a SD of 1:
%

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

Team 1:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	8/4.9 (1.6)	3/3.9 (0.8)	11/8.8 (1.2)	2.67
18 to 29	12	3/4.8 (0.6)	3/3.8 (0.8)	6/8.6 (0.7)	1.00
30 to 41	12	3/4.6 (0.7)	3/3.7 (0.8)	6/8.3 (0.7)	1.00
42 to 53	12	5/4.5 (1.1)	3/3.7 (0.8)	8/8.2 (1.0)	1.67
54 to 59	6	2/2.2 (0.9)	5/1.8 (2.8)	7/4.1 (1.7)	0.40
6 to 59	54	21/19.0 (1.1)	17/19.0 (0.9)		1.24

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

Overall sex ratio: p-value = 0.516 (boys and girls equally represented)
Overall age distribution: p-value = 0.390 (as expected)
Overall age distribution for boys: p-value = 0.511 (as expected)
Overall age distribution for girls: p-value = 0.180 (as expected)
Overall sex/age distribution: p-value = 0.047 (significant difference)

Team 2:

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

6 to 17	12	4/3.7 (1.1)	1/4.2 (0.2)	5/7.9 (0.6)	4.00
18 to 29	12	2/3.6 (0.6)	5/4.1 (1.2)	7/7.7 (0.9)	0.40
30 to 41	12	5/3.5 (1.4)	4/3.9 (1.0)	9/7.5 (1.2)	1.25
42 to 53	12	4/3.5 (1.2)	7/3.9 (1.8)	11/7.3 (1.5)	0.57
54 to 59	6	1/1.7 (0.6)	1/1.9 (0.5)	2/3.6 (0.6)	1.00
6 to 59	54	16/17.0 (0.9)	18/17.0 (1.1)		0.89

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 = 0.406 (as expected)
Overall age distribution for boys: p-value = 0.780 (as expected)
Overall age distribution for girls: p-value = 0.234 (as expected)
Overall sex/age distribution: p-value = 0.104 (as expected)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	6/6.0 (1.0)	2/3.5 (0.6)	8/9.5 (0.8)	3.00
18 to 29	12	4/5.9 (0.7)	4/3.4 (1.2)	8/9.3 (0.9)	1.00
30 to 41	12	8/5.7 (1.4)	7/3.3 (2.1)	15/9.0 (1.7)	1.14
42 to 53	12	6/5.6 (1.1)	2/3.2 (0.6)	8/8.8 (0.9)	3.00
54 to 59	6	2/2.8 (0.7)	0/1.6 (0.0)	2/4.4 (0.5)	
6 to 59	54	26/20.5 (1.3)	15/20.5 (0.7)		1.73

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

Overall sex ratio: p-value = 0.086 (boys and girls equally represented)
Overall age distribution: p-value = 0.214 (as expected)
Overall age distribution for boys: p-value = 0.777 (as expected)
Overall age distribution for girls: p-value = 0.136 (as expected)
Overall sex/age distribution: p-value = 0.035 (significant difference)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	9/4.9 (1.8)	5/4.6 (1.1)	14/9.5 (1.5)	1.80
18 to 29	12	5/4.8 (1.1)	4/4.5 (0.9)	9/9.3 (1.0)	1.25
30 to 41	12	6/4.6 (1.3)	7/4.4 (1.6)	13/9.0 (1.4)	0.86
42 to 53	12	1/4.5 (0.2)	1/4.3 (0.2)	2/8.8 (0.2)	1.00
54 to 59	6	0/2.2 (0.0)	3/2.1 (1.4)	3/4.4 (0.7)	0.00
6 to 59	54	21/20.5 (1.0)	20/20.5 (1.0)		1.05

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

Overall sex ratio: p-value = 0.876 (boys and girls equally represented)
Overall age distribution: p-value = 0.047 (significant difference)
Overall age distribution for boys: p-value = 0.063 (as expected)
Overall age distribution for girls: p-value = 0.337 (as expected)
Overall sex/age distribution: p-value = 0.009 (significant difference)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	10/7.0 (1.4)	3/5.3 (0.6)	13/12.3 (1.1)	3.33

18 to 29	12	8/6.8 (1.2)	8/5.2 (1.5)	16/12.0 (1.3)	1.00
30 to 41	12	8/6.6 (1.2)	5/5.0 (1.0)	13/11.6 (1.1)	1.60
42 to 53	12	4/6.5 (0.6)	5/5.0 (1.0)	9/11.4 (0.8)	0.80
54 to 59	6	0/3.2 (0.0)	2/2.5 (0.8)	2/5.7 (0.4)	0.00
6 to 59	54	30/26.5 (1.1)	23/26.5 (0.9)		1.30

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

Overall sex ratio: p-value = 0.336 (boys and girls equally represented)
Overall age distribution: p-value = 0.351 (as expected)
Overall age distribution for boys: p-value = 0.199 (as expected)
Overall age distribution for girls: p-value = 0.625 (as expected)
Overall sex/age distribution: p-value = 0.041 (significant difference)

Team 6:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	2/4.9 (0.4)	4/5.8 (0.7)	6/10.7 (0.6)	0.50
18 to 29	12	7/4.8 (1.5)	5/5.7 (0.9)	12/10.4 (1.2)	1.40
30 to 41	12	3/4.6 (0.7)	8/5.5 (1.5)	11/10.1 (1.1)	0.38
42 to 53	12	5/4.5 (1.1)	7/5.4 (1.3)	12/9.9 (1.2)	0.71
54 to 59	6	4/2.2 (1.8)	1/2.7 (0.4)	5/4.9 (1.0)	4.00
6 to 59	54	21/23.0 (0.9)	25/23.0 (1.1)		0.84

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

Overall sex ratio: p-value = 0.555 (boys and girls equally represented)
Overall age distribution: p-value = 0.590 (as expected)
Overall age distribution for boys: p-value = 0.314 (as expected)
Overall age distribution for girls: p-value = 0.507 (as expected)
Overall sex/age distribution: p-value = 0.082 (as expected)

Team 7:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	7/8.4 (0.8)	7/5.3 (1.3)	14/13.7 (1.0)	1.00
18 to 29	12	8/8.1 (1.0)	4/5.2 (0.8)	12/13.3 (0.9)	2.00
30 to 41	12	7/7.9 (0.9)	6/5.0 (1.2)	13/12.9 (1.0)	1.17
42 to 53	12	5/7.8 (0.6)	6/5.0 (1.2)	11/12.7 (0.9)	0.83
54 to 59	6	9/3.8 (2.3)	0/2.5 (0.0)	9/6.3 (1.4)	
6 to 59	54	36/29.5 (1.2)	23/29.5 (0.8)		1.57

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

Overall sex ratio: p-value = 0.091 (boys and girls equally represented)
Overall age distribution: p-value = 0.820 (as expected)
Overall age distribution for boys: p-value = 0.083 (as expected)
Overall age distribution for girls: p-value = 0.455 (as expected)
Overall sex/age distribution: p-value = 0.003 (significant difference)

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

Team: 1

Team: 2

Team: 3

Team: 4

Team: 5

Team: 6

Team: 7

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