Nutrition Survey
Western Sahara Refugee Camps, Tindouf, Algeria

Report on Nutrition Survey and
Anaemia Intervention Impact Analysis

Survey Conducted: November 2012
Report Finalised: May 2013

ACKNOWLEDGEMENTS

The authors would like to acknowledge the involvement and support from the Western Sahara Refugee Health Authorities. Special thanks go to the Responsible of Health, Muhammad Lamine Ould Dadi, and to the Director of Cooperation for Health, Alien Abdulah Chej.

We are also grateful for the involvement and support from the Western Sahara Red Crescent. Special thanks go to the President of the Western Sahara Red Crescent Buhobeini Yahia.

We are grateful for all the logistical support we received from all the team at UNCHR Algiers and SO Tindouf, especially Zainab Sheik-Ali, Marious Buga and Eissa Elzaki for all their encouragement and support to facilitate the implementation of the survey. We also thank all the team at WFP SO Tindouf, especially Mariko Ousmane (WFP) and Hala Suliman (WFP) for their support in the implementation of the survey. We also thank all the team at WFP Algiers, especially Francesca Caponera and Ussama Osman for their support we received during the Inter-Agency Nutrition Expert Meeting, held in Tindouf and Algiers.

In addition, the authors acknowledge the collaboration of UN agencies and NGOs for providing data for the context analysis.

Without the dedication of the surveyor's team members, data entry clerks, logistical support teams and drivers, the implementation of the survey would not have been possible (*see next page for the full list of the survey staff*); we fully thank them.

We would like to especially acknowledge the technical support of Andrew Seal (UCL), Melody Tondeur (UNHCR), and Caroline Wilkinson (UNHCR), for their valuable comments during the development of this survey. We also thank Carmel Dolan and Thom Banks, both from ENN, for logistical support.

Finally, the authors are extremely grateful to all the Western Sahara refugee families who took part in this Nutrition Survey.

Ghalia Salama, who worked tirelessly with us collecting data, passed away before the report was finalised. This work is dedicated to her memory.

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LIST OF ACRONYMS

AECID	Spanish Agency for International Development Cooperation
ARC	Algerian Red Crescent
CI	Confidence Interval
CSB	Corn Soya Blend
ECHO	European Commission's Humanitarian Aid & Civil Protection Office
ENA	Emergency Nutrition Assessment
ENN	Emergency Nutrition Network
FCS	Food Consumption Score
FSS	Food Security Stock
GAM	Global Acute Malnutrition
HH	Household
IYCF	Infant and Young Child Feeding Practices
JAM	Joint Assessment
LNS	Lipid-based Nutrient Supplement
MAM	Moderate Acute Malnutrition
MdM	Médicos del Mundo
MNP	Micro-Nutrient Powder
MUAC	Mid-Upper Arm Circumference
N/A	Not available
NCHS	National Centre for Health Statistics
NGO	Non-Governmental Organisation
PISIS	Western Sahara Child Health Integrated Programme
PLW	Pregnant and Lactating Women
SAM	Severe Acute Malnutrition
UN	United Nations
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
WFP	World Food Programme
WHO	World Health Organisation
WSRC	Western Sahara Red Crescent

EXECUTIVE SUMMARY

INTRODUCTION

Four nutritional surveys were conducted, one in each of the Western Sahara refugee camps (Laayoune, Awserd, Smara and Dakhla), located near Tindouf, Algeria, in November 2012. The aim of these surveys was to establish a detailed mapping of the current nutritional profile of the population, which has always been considered precarious. These four surveys also aimed at providing detailed follow-up information and analysis for evaluating the impact of a Anaemia and Stunting Reduction Programme. This programme provided Micro-Nutrient Powder (MNP) to pregnant and lactating women (PLW) and children aged 36-59 months, and a Lipid-based Nutrient Supplement (LNS) to children aged 6-35 months, with the aim of reducing the very high anaemia prevalence in children aged 6-59 months and PLW, as well as to reduce the high levels of stunting in children.

METHODS

Two population groups were included in the survey; children aged 0-59 months and women of reproductive age aged 15-49 years. For all children surveyed, standard anthropometric and infant and young child feeding indicators were collected. Peripheral blood was also obtained in children and women, to assess haemoglobin using a portable photometer (HemoCue® 301). In addition, food consumption scores were assessed in all households included in the survey. A two stage cluster sampling design for each survey was used, allocating the cluster at the quarter level.

RESULTS

A total of 2,049 households were visited (2208 children and 1121 women). Only 1% of households refused to participate. All key indicators obtained in these surveys are summarised in Table 1, below.

Nutritional status – Anthropometric indicators

The overall prevalence of global acute malnutrition (GAM) was 7.6% (95% CI 6.4 – 8.8) ranging from 6% in Awserd to almost 11% in Laayoune. The prevalence of global acute malnutrition in Laayoune is significantly higher from that of the combined weighted prevalence of the other three camps ($p<0.05$). The overall prevalence of underweight is 16.7% (95% CI 14.8 – 18.5) ranging from 14% to 18% at the camp level (did not differ significantly between camps). Stunting prevalence was 25.2% (95% CI 22.8 – 27.6), ranging from 23% in Dakhla to 28% in Smara. Since 2010, the overall prevalence of GAM remains similar.

Infant and young child feeding (IYCF) practices

The proportion of children aged <24 months ever breastfed was high (94.5%). However, the proportion of infants aged <6 months who are exclusively breastfed was low at 18.4%, while less than half of the infants <6 months were predominantly breastfed. Exclusive breastfeeding decreased sharply with age, 42.5% in the first two months of life to less than 8% by the age of 4-5 months. Continuation of breastfeeding at 12 and 24 months was 79% and 29%, respectively. The mean duration of breastfeeding was 18.7 months. Introduction of solid, semi-solid and soft foods between the ages of 6-8 months was 45%.

Overall, only 6% of all children aged 6-23 months had a minimum acceptable diet (an IYCF summary indicator). The proportion of children aged 6-23 months consuming iron-rich or iron-fortified foods was 42%. Consumption of iron-rich or iron-fortified food differed by camp, with Dakhla consuming now more iron-rich or iron-fortified foods (50% in Dakhla compared to the aggregated average of 42%).

Since 2010, there have been no overall changes in IYCF practices as indexed by the indicators. Nonetheless, at the camp level Dakhla showed a consistent and significant improvement of IYCF indicators such as age-appropriate breastfeeding for children aged <24 months, with greater food diversity and higher consumption of iron-rich foods for children aged 6 – 23 months.

Nutritional status – Anaemia

Overall, 28.4% (95% CI 25.7 – 31.0) of children aged 6-59 months suffer from anaemia. The most common type of anaemia being mild (16%) followed by moderate (12%) and severe (0.5%). There were no differences in anaemia prevalence between camps. For non-pregnant women of reproductive age anaemia prevalence was 36.4% (95% CI 33.2 – 39.6). Unlike children, there were significant differences in anaemia prevalence between camps with Dakhla and Laayoune presenting greater anaemia prevalences (44% and 42%, respectively) and Smara presenting the lowest (29%).

Impact analysis of a supplementary feeding programme for combating anaemia and stunting

Overall for children aged 6-59 months since 2010, there was a significant decrease of 24.5 percentage points (95% CI: 19.9 – 29.0) in anaemia prevalence; which accounts for 46% relative reduction. In addition, there was an observed significant decrease of 4.5 percentage points (95% CI 0.9 – 8.2) stunting prevalence; which account for a 15% relative reduction.

It is difficult to ascertain the potential impact of the programme for PLW, as no clear and reliable indicators are currently available for this target group. Nonetheless, we observed a decrease of 12.3 percentage points in anaemia prevalence among lactating women, which account for 18% relative reduction. No changes were observed in anaemia prevalence for pregnant women.

Household food consumption score (FCS)

Overall, the weighted proportion of households classified as having an acceptable food consumption score was 59.5% (95% CI 53.2 – 65.7)) ranging from 57% in Smara to 64% in Awserd. No significant differences were observed between camps.

RECOMMENDATIONS

Recommendations for action based on the findings of these surveys are provided in section VI of this report (see page 67).

Table 1. Summary of key indicators

Children aged 6-59 months[1]					
Key indicators (%)	**Awserd**	**Dakhla**	**Laayoune**	**Smara**	**Combined**
GAM	5.9	6.8	10.5	6.5	7.6 (6.4 – 8.8)
SAM	0.4	0.2	1.5	0.8	0.8 (0.3 – 1.3)
MUAC <125mm and/or oedema	3.0	4.0	4.2	5.0	4.2 (3.1 – 5.2)
MUAC <115 and/or oedema	0.6	0.2	0.8	0.4	0.5 (0.2 – 0.9)
Stunting	24.4	22.5	23.8	28.3	25.2 (22.8 – 27.6)
Severe Stunting	4.9	6.6	6.7	7.3	6.5 (5.3 – 7.7)
Total Anaemia	28.7	26.6	30.2	27.3	28.4 (25.7 – 31.0)
Moderate Anaemia	12.5	9.5	12.0	11.8	11.7 (9.9 – 13.4)
Severe Anaemia	0.2	0.2	0.8	0.4	0.5 (0.1 – 0.8)
Exclusive breastfeeding (<6 months)	--	--	--	--	18.4 (11.4 – 25.4)
Continued breastfeeding at 1 year	--	--	--	--	78.9 (71.4 – 86.4)
Continued breastfeeding at 2 years	--	--	--	--	28.7 (21.5 – 35.7)
Minimum dietary diversity	--	--	--	--	32.1 (26.5 – 37.6)
Minimum meal frequency	--	--	--	--	19.9 (15.4 – 24.4)
Minimum acceptable diet	--	--	--	--	6.4 (3.9 – 8.8)
Consumption of iron-rich or iron-fortified foods	--	--	--	--	41.9 (36.5 – 47.4)
Women of reproductive age (15 – 49 years)					
Key indicators (%)	**Awserd**	**Dakhla**	**Laayoune**	**Smara**	**Combined**
Total Anaemia	35.1	44.0	41.9	28.6	36.4 (33.2 – 39.6)
Moderate Anaemia	18.3	22.3	23.1	12.0	18.2 (15.7 – 20.8)
Severe Anaemia	2.5	6.6	3.9	2.6	3.6 (2.5 – 4.8)
Households food security indicators					
Key indicators (%)	**Awserd**	**Dakhla**	**Laayoune**	**Smara**	**Combined**
FCS acceptable[5]	63.7	58.2	59.2	57.3	59.5 (53.2 – 65.7)
FCS borderline[6]	25.7	38.2	36.0	35.0	33.7 (28.7 – 38.7)
FCS poor[7]	10.6	3.6	4.8	7.6	6.8 (4.5 – 9.1)

I. INTRODUCTION

1.1 GENERAL CONTEXT

In 1975, Western Sahara refugees fled their land for Algeria upon independence from Spain and the subsequent occupation of the Western Saharan land by Morocco, which led to an armed conflict lasting 16 years. A cease-fire agreement was negotiated in 1991 after UN intervention, pending the agreement of the parties on a referendum for self-determination to decide the political future of the disputed territory. The political solution for their return is at an impasse. The UN Security Council and the Secretary General are still making efforts to find a solution and agreement between the parties of this conflict. While repatriation has not been considered as an option, neither local integration, nor resettlement, seem to be options either.[1] Consequently, Western Sahara refugees have been hosted for over thirty seven years in the south west region of Tindouf, Algeria. Their situation is considered a protracted emergency.

After assistance was provided by the Algerian Government, through the Algerian Red Crescent (ARC); the United Nations World Food Programme (WFP) and the United Nations High Commissioner for the Refugees (UNHCR) stepped in to support the refugees upon request of the Algerian Government, in 1986. Currently, most refugee households are dependent on international assistance as they are located in a remote area with limited access to markets and opportunities for local integration. The camp sites close to the city of Tindouf are characterised by a harsh desert environment where sand storms are frequent, with extremely high temperature throughout the months of May to September (reaching above 50º C), and a cold winter season from November to March (0º C). Rainfall is scarce and irregular.

1.2. LOCAL ORGANISATION

The Western Sahara refugee camps possess a specific administrative and health organisation. The population is organised in four camps (Laayoune, Awserd, Smara, and Dakhla), and a small but growing settlement camp (Boujdour, previously named February 27th). Each camp is divided into districts; Laayoune and Awserd each have 6 districts while Smara and Dakhla have 7; Boujdour has only 1 district (a total of 27 districts). Each district in turn, is subdivided into quarters of approximately equal population (a total of 108 quarters).

Regarding health systems' structure; each camp has a hospital (4 in total), and each district has a primary health centre (27 in total). Finally, a Central Hospital is based at Rabouni. Access to medical services is free of charge, transportation costs being the only expense.

Accurate refugee population estimates are not available, owing to impossibility to conduct a proper registration exercise in the camps. The Western Sahara authorities/refugee leadership and the host Government estimate the number of refugees at 165,000. In the absence of registration, UNHCR and WFP assistance programme is targeting 90,000 most vulnerable persons among the refugee population. Since 2006, 35,000 additional supplementary rations are provided in an attempt to respond to the pressing nutritional needs.

1.3. NUTRITIONAL STATUS OF WOMEN AND CHILDREN

The nutrition situation of the Western Sahara refugees has remained precarious. The nutritional problems of greatest public health significance are anaemia in women, and anaemia and stunting in children (aged 6-59 months). The latest nutritional survey, undertaken in 2010, showed high levels of anaemia in women and children (58.9% and 52.8%, respectively), and high levels of stunting in children (29.7%). Previous nutrition surveys have shown a strong correlation between iron deficiency and anaemia prevalence in this population[2].

[1] UNHCR/WFP Joint Assessment Mission. Assistance to refugees from Western Sahara. Algeria, September 27th to October 9th 2009.
[2] Anthropometric and Micronutrient Nutrition Survey. Western Sahara Refugee Camps, Tindouf, Algeria. September 2002

1.4. DESCRIPTION OF HUMANITARIAN ASSISTANCE AND HEALTH PROGRAMMES

1.4.1. General Food Distribution

The main actors providing food assistance are WFP, the European Commission Humanitarian Aid & Civil Protection (ECHO), the Spanish Agency of International Development Cooperation (AECID), and UNHCR. WFP is responsible for the commodities of the basic food ration (cereals, edible oils and fat, pulses and other sources of protein, salt, sugar, and fortified blended foods). WFP is responsible of the timely transport of the commodities under its responsibility to agreed extended delivery points (EDPs) as well as the storage and management of the EDPs. This is mainly done through the ARC (and their partner, the Sahrawi Red Crescent Society.), WFP's implementing partner. UNHCR is responsible for mobilizing complementary items such as tea and yeast. UNHCR is responsible for the timely transport and storage of the food commodities under its responsibility. UNHCR is also responsible for the transportation of WFP food items from the EDPs to the final delivery points, for their final distribution to beneficiaries, and for reporting food diversions, misuse and losses.[3] This is done by UNHCR through their implementing partner the ARC.

ECHO and AECID are responsible for distributing additional fresh food (vegetables and fruits), while additional commodities like dates, camel meat, fresh vegetables, and fruits, distributed by UNHCR, AECID and ECHO cover the Ramadan period. Praktisk Solidarität distributes canned mackerel regularly since 2009. Additional food commodities are distributed throughout the year by bilateral assistance, but concentrate during Ramadan in so-called 'caravans'. These caravans are mostly civil society lead (mainly from Europe), and reliable data about these commodities is lacking.

A Food Security Stock (FSS) jointly managed by the ARC and the Spanish Red Cross was established in 2010 and became functional in January 2012. The FSS was established to prevent delays/shortfalls in WFP distributions.

1.4.2. Integrated Programme for Sahrawi Child Health (PISIS)

The creation of the Integrated Programme for Sahrawi Child Health (PISIS by its Spanish acronym), was the result of a joint effort to integrate on-going activities aimed at improving the health and development of Western Sahara refugee children. It was integrated in 2009 and has since being rolled-out in all health clinics in the camps[4]. Some key activities that are now under the PISIS remit, which are expected to positively impact the nutritional profile of children, are described below:

Growth monitoring and vaccination

Growth monitoring is implemented in all the health centres and a health card is given to mothers[5]. Children failing to thrive or children losing weight are then referred to targeted nutrition programme supported by WFP, UNHCR and/or NGOs. Likewise, a vaccination programme is implemented in all health centres. The vaccination programme is led by the health prevention sector of the refugee health authorities and is currently supported by UNICEF. Several trainings sessions for both activities are in place carried by different organisations[6].

Management of acute malnutrition

Management of Severe Acute Malnutrition (SAM)

Since 2008, MdM Spain provides support to the refugee health authorities in the management of severe acute malnutrition. Standardised admission protocols for SAM without complications are currently in place, and admitted children are managed at the health centre with a 'ready to use therapeutic food' called Plumpy'nut. UNHCR is currently supporting the procurement of plumpy'nut in sufficient quantities. Children suffering

[3] Memorandum of Understanding between UNHCR and WFP January 2011.
[4] Guía Programa Integral de Salud Infantil Saharaui. PISIS, December 2009.
[5] The previous programme in charge of these activities was called 'Programa Niño Sano, this programme is superseded by PISIS.
[6] MdM Spain and Baleares Friends of Sahrawi Population Association

from SAM with medical complications are referred to the Central Hospital in Rabouni. In addition, an MdM Spain-supported component of Community Mobilization through the 'Jefas de Barrio'[7], assist directly in screening of MAM and SAM cases measuring mid-upper arm circumference (MUAC). The current programme coverage is unknown, however, the last SAM coverage survey[8] (December 2008) offered no coverage results as no sufficient SAM cases were found[9].

Management of Moderate Acute malnutrition (MAM)

Since 2004, WFP and UNHCR are jointly implementing a targeted supplementary feeding programme (now also integrated under the PISIS) through their implementing partner the ARC. Approximately 10,000 dry rations (6,000 for children and 4,000 for pregnant and lactating women (PLW)) are being distributed every month. The dry ration provides 1,037 kcal and includes 200g of CSB+, 20g of vegetable oil and 15g of sugar; corresponding to 13.0% of proteins and 27.8% of lipids. Since April 2010, the conventional CSB was replaced by CSB+ [10] to better meet the micronutrient needs children and PLW. Children discharged from SAM programme care are automatically admitted into MAM programme care for follow-up during two months.

Anaemia and Stunting Reduction Programme

Following the recommendations from the joint 2009 UNHCR/WFP nutrition mission[11], the 2009 UNHCR/WFP Joint Assessment Mission (JAM)[12], as well as the Western Sahara Nutrition Strategy, since December 2010 a Anaemia and Stunting Reduction Programme comprising a blanket supplementary feeding programme providing Micro-Nutrient Powder (MNP) to PLW and children aged 36-59 months, and a Lipid-based Nutrient Supplement (LNS) to children aged 6-35 months is being implemented in the camps. This programme was piloted for the first two years by UNHCR through its implementing partner, the ARC.

The 2010 Nutrition Survey served as the baseline assessment, and together with the results of the current Nutrition Survey the programme's impact will be evaluated.

1.4.3. Maternal and Child Health Programme

MdM Spain is providing technical support for a maternal health programme in all 27 health centres. The programme supports to refugee health authorities for the following-up of pregnancy and delivery. According to programme guidelines, all pregnant women have haemoglobin levels tested and will receive blood transfusion at the Central Hospital if they show haemoglobin values <7 mg/dL. Pregnant women are expected to receive iron supplementation. The recommended daily dose during pregnancy is 200mg iron sulphate + 5mg acid folic. However, it is reported that a number of women refuse to take the pills due to its side effects and concern for its positive impact on the foetal growth of their offspring[13].

[7] Quarters' community workers.
[8] Fiesch. L. Coverage CCT survey. Valid International, MDM SPAIN. December 2008
[9] Only one SAM case was found during the coverage survey
[10] The CSB Plus has the same maize and soya mix used for conventional CSB, but with an improved micronutrient profile. In the CSB Plus composition, the vitamin and mineral premix has been enhanced with additional or elevated levels of micronutrients, in particular, of vitamins B6, D, E and K, iron, iodine, calcium, potassium and phosphorus. Due to high levels of iodine in the drinking water of the camps, and the important number of celiac disease cases among the population, the revised CSB Plus does not contain iodine in its fortification and is produced with gluten free guarantee (as agreed with the health authorities and the implementing partners)
[11] Joint UNHCR-WFP Nutrition Mission to the Western Sahara Camps in Algeria, March 2009
[12] UNHCR/WFP Joint Assessment Mission. Assistance to refugees from Western Sahara. Algeria, September 27th to October 9th 2009.
[13] Salse Ubach N, Wilkinson C. Nutributter 3® and MNP Acceptability Test. Western Sahara Camps – Algeria. Final Report. October 2009.

II. SURVEY DESIGN AND METHODS

2.1. AIM

To establish the current nutrition status profile of the population, and to evaluate the potential impact of the Anaemia and Stunting Reduction Programme, distributing MNP and LNS, on the nutritional status of women and children in the Western Sahara refugee camps; by implementing a stratified nutrition survey, one stratum per camp. The impact evaluation will be done by comparing the results against those obtained from the 2010 Nutrition Survey. The findings will be used to produce recommendations on actions to improve the nutritional status and health of the Western Sahara refugees. The original Nutrition Survey Terms of Reference are included in *Annex 1*

2.2. TARGET POPULATION

- Children aged 0 – 59 months`
- Women of reproductive age (15 – 49 years)

2.3. OBJECTIVES

- Determine the malnutrition prevalence in children aged 6-59 months.
- Determine the anaemia prevalence in children aged 6-59 months.
- Assess infant and young children feeding (IYCF) practice indicators.
- Determine the anaemia prevalence in pregnant and non-pregnant women of reproductive age (15-49 years).
- Determine the Food Consumption Score of households.
- Strengthen the health system capacity to design and implement nutritional surveys.

2.4. SAMPLE SIZE, NUMBER OF HOUSEHOLDS, AND NUMBER OF CLUSTER INCLUDED IN THE SURVEY

Based on sample size calculations, it was estimated that about 505 households were needed to be surveyed, per camp, to ensure the required sample size of 340 children aged 6-59 months and 195 women of reproductive age could be met. See *Annex 1* for a detailed sample size and household number calculation.

Following training of the survey field team and piloting of field data collection, the cluster size was set at 17 households, with a total of 30 clusters per stratum. As detailed in *Annex 1*, all children aged <5 years were surveyed in the 17 households comprising each cluster. However, women of reproductive age were surveyed in only the first 6 households of each cluster.

2.5. SAMPLING PROCEDURE: SELECTING CLUSTERS, HOUSEHOLDS, CHILDREN AND WOMEN

A two-stage cluster sampling was followed for each survey. In the first stage, using agreed population figures (for every camp) each district was divided in 4 quarters of approximate equal size. Cluster allocation was then carried at the quarter level using proportionality to population size method (PPS, see *Annex 3* for cluster allocation). Past surveys have allocated clusters at the district level; by using the quarter as the allocating unit we aimed at ensuring maximal dispersal of the clusters and greater representation of individual quarters.

In the second stage, households were chosen randomly from within each selected quarter, following the EPI method for proximity selection. The survey team went to the centre of the quarter and tossed a pen to find a random direction. All households on each side of an imaginary line from the centre to the end of the quarter were counted. One household was then randomly selected as the first household, using a table of random

numbers. Every subsequent household located nearest to the right was then selected and visited up to a total of 17 households.

If the team reached the boundary of the quarter before completing 17 households, they returned to the quarter's centre and repeated again the whole procedure. If the quarter was exhausted without obtaining the required number of households, then the nearest quarter was selected and the procedure repeated until the remaining number of households was obtained.

A household was defined as a group of people living together (sharing the same meals and/or sleeping under the same roof) in accordance with most previous surveys. If any of the household members of our target population were not present at the time of the visit, community members were asked to bring them to the house. If all the members of the household were absent, the household was visited again before leaving the quarter at the end of the day. If the members of the household had departed permanently or were not expected to return before the survey team had to leave the quarter, the household was marked as empty and was then replaced.

2.6. NUTRITIONAL STATUS: DATA COLLECTION, AND INDICATORS

2.6.1. Biological Data Obtained

Annex 1 (TORs), provides a definition of all the indicators and procedures by population group. To obtain these indicators, the following data was obtained:

- *Age* in children was estimated from the date of birth obtained from the health card or another official document. If an official document was not available, the caregiver was asked to recall the age. All women were asked to recall their age.
- *Weight* was obtained using an electronic digital scale Seca 876 with mother/child function. Measurements were taken to the nearest 0.1kg. Each scale was regularly checked with a standard 2kg weight before the start of the survey and regularly during the survey. Children that could not stand alone were weighed carried by their caregiver using the mother/child function. All children were weighted without clothes. No weight data was obtained from women.
- *Height* and length were taken using a Shorr Child Stadiometer following standard recommendations. The measurement was recorded to the nearest 0.1 cm. Children aged less than 24 months were measured in a supine position. Children older than 24 months were measured standing. Children older than 24 months and measuring less than 87 cm were also measured in a supine position. No height data was obtained from women.
- *The presence of oedema* in children was determined by pressing both feet for three seconds. If a shallow imprint remained in both feet oedema was recorded as present. No oedema was assessed in women.
- *MUAC* was measured using a TALC MUAC tape on the left arm of children aged 6-59 months. MUAC measurement was recorded to the nearest 0.1 mm. MUAC measurements were also taken for women.
- *Haemoglobin* was measured to all children aged 6-59 months and in women of reproductive age in the first 6 households of the cluster. Haemoglobin was measured using a portable photometer (HemoCue® 301). Peripheral blood was collected from a finger prick using a safety lancet. The first drop was allowed to form and wiped away using a tissue paper. The second drop was transferred into a HemoCue microcuvette for haemoglobin measurement. The result was expressed to the nearest 0.1gr/dL.

2.6.2. Nutritional Status Indicators

Table 6 shows the definition of the nutritional status indicators for the analyses.

Table 2.1. Nutritional status indicators

Type of prevalence	Indicator	Children (6-59 months)	Women (15-49 years)		
			Non-pregnant	Lactating	Pregnant
Malnutrition (weight + height)	Global acute malnutrition	WHZ<-2 and/or oedema	--	--	--
	Moderate acute malnutrition	WHZ<-2 and ≥-3	--	--	--
	Severe acute malnutrition	WHZ<-3 and/or oedema	--	--	--
	Stunting	HAZ<-2	--	--	--
	Moderate stunting	HAZ<-2 and ≥-3	--	--	--
	Severe stunting	HAZ<-3	--	--	--
	Underweight	WAZ<-2	--	--	--
	Moderate underweight	WAZ<-2 and ≥-3	--	--	--
	Severe underweight	WAZ<-3	--	--	--
Anaemia	Total anaemia	Hb <11.0g/dL	Hb <12.0g/dL		Hb <11.0g/dL
	Mild anaemia	Hb 10.9 – 10.0g/dL	Hb 11.9 – 11.0g/dL		Hb 10.9 – 10.0g/dL
	Moderate anaemia	Hb 9.9 – 7.0g/dL	Hb 10.9 – 8.0g/dL		Hb 9.9 – 7.0g/dL
	Severe anaemia	Hb <7.0g/dL	Hb <8.0g/dL		Hb <7.0g/dL
Malnutrition	Low MUAC	MUAC< 125mm	--	--	--
		MUAC<125 and 115mm	--	--	--
		MUAC <115mm	--	--	--

WHZ: Weight-for-height z-score, HAZ: Height-for-age z-score, WAZ: Weight-for-age z-score, BMI: Body mass index, WC: Waist circumference, Hb: Haemoglobin

2.6.3. Infant and Young Child Feeding (IYCF) Indicators

Indicators of IYCF practices were obtained and assessed following standard recommendations[14]. The list of IYCF indicators collected in the nutrition survey is given below.

IYCF Core indicators

IYCF-2. Exclusive breastfeeding under 6 months

Proportion of infants 0–5 months of age who are fed exclusively with breast milk[15]

IYCF-3. Continued breastfeeding at 1 year

Proportion of children 12–15 months of age who are fed breast milk

IYCF-4. Introduction of solid, semi-solid or soft foods

Proportion of infants 6–8 months of age who receive solid, semi-solid or soft foods

IYCF-5. Minimum dietary diversity

Proportion of children 6–23 months of age who receive foods from 4 or more food groups

IYCF-6. Minimum meal frequency

Proportion of breastfed and non-breastfed children 6–23 months of age, who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more. For breastfed children, the minimum number of times varies with age (2 times if 6–8 months and 3 times if 9–23 months). For non-breastfed children the minimum number of times does not vary by age (4 times for all children 6–23 months).

IYCF-7. Minimum acceptable diet

Proportion of children 6–23 months of age who receive a minimum acceptable diet (apart from breast milk). This indicator combines minimum meal frequency and minimum dietary diversity indicators.

IYCF-8. Consumption of iron-rich or iron-fortified foods

Proportion of children 6–23 months of age who receive CSB, Plumpy'nut[16], or high energy biscuits

IYCF Optional indicators

IYCF-9. Children ever breastfed

Proportion of children born in the last 24 months who were ever breastfed

IYCF-10. Continued breastfeeding at 2 years

Proportion of children 20–23 months of age who are fed breast milk

IYCF-11. Age-appropriate breastfeeding

Proportion of children 0–23 months of age who are appropriately breastfed

IYCF-12. Predominant breastfeeding under 6 months

Proportion of infants 0–5 months of age who are predominantly breastfed

IYCF-13. Duration of breastfeeding

Median duration of breastfeeding among children less than 36 months of age

IYCF-15. Milk feeding frequency for non-breastfed children

Proportion of non-breastfed children 6–23 months of age who receive at least 2 milk feedings

2.6.4. Food Consumption Score (FCS)

The FCS is a frequency-weighted diet diversity score that is calculated using the frequency of consumption of different food groups by a household during a seven days period prior to the survey[17]. To examine food consumption patterns, sampled households were asked the number of days that specific food items, grouped in 8 food groups, had been consumed over the 7 day period prior to the interview.

[14] Indicators for assessing infant and young child feeding practices – part I: definition. WHO-UNICEF, 2010
[15] Only breast milk (including milk expressed or from a wet nurse), ORS, drops or syrups (vitamins, breastfeeding minerals, medicines)
[16] LNS was not considered during the survey as there has been a shortage of LNS of at least four distributions
[17] Food Consumption Analysis. Calculation and use of food consumption score in food security analysis. VAM, 2008

For each food group, the frequency of days any item of the food group was consumed is tabulated from 0 (never eaten) to 7 (eaten every day). A weight was assigned to each food group, representing the nutritional importance of the food group. The frequency obtained for each food group was multiplied by the weight factor. The food consumption score is the sum of the weighted food groups. The food groups and the weights used for the calculation are presented in Table 7.

Table 2.2: Key food groups and weights

Food group	Weight factor	Maximum value
Cereals and tubers	2	14
Pulses	3	21
Vegetables	1	7
Fruit	1	7
Meat and fish	4	28
Milk products	4	28
Sugar	0.5	3.5
Oil	0.5	3.5

Two standard thresholds were used to distinguish different food consumption levels, in a population where oil and sugar are eaten on a daily basis, as recommended. A household with a score value between 0-28 was classified as having 'poor' FCS, 28.5-42 as 'borderline', and a score >42 as 'acceptable'[18].

2.7. SURVEY TOOLS

Four questionnaires were created (*see Annex 4 to see the forms*):

- Informed consent questionnaire
- Children questionnaire, divided in the following sections: details of the child, IYCF, Anaemia and Stunting Reduction Programme, nutritional status.
- Women questionnaire, divided in the following sections: details of the woman, pregnancy/lactating status of the woman, anaemia reduction targeted supplementary feeding programme, nutrition status of the woman.
- Household Food consumption questionnaire where FCS data was collected.

The questionnaires were designed as short and simple. They were in Spanish. The teams took an average of 20 minutes per each household.

2.8. TRAINING OF SURVEY TEAMS

The training was carried out in Spanish and translated simultaneously into Hassaniya. Training lasted three weeks. Topics covered were anthropometric and haemoglobin measures, interview techniques, sampling procedures and how to complete the questionnaires. The sessions were theoretical and practical.

Following training, we carried a standardization test in pre-schools for assessing the inter- and intra-observer variability when taking anthropometric measurements among surveyors. At the same time, the surveyors trained to assess haemoglobin practiced and improved their technique with children. Following the standardisation test, piloting of data collection was performed in Awserd camp. The objectives of the pilot data collection were to:

- Determine the average time per household to estimate how many households could be measured per

[18] A score of 28 was set as the minimum food consumption with an expected daily consumption of staples (frequency*weight, 7*2=14) and vegetables (7*1=7)

day to be able to calculate the required number of clusters according to the calculated sample.
- Identify potential problems/difficulties with survey's methods or questionnaires

2.9. SURVEY AND DATA ENTRY TEAMS AND SUPERVISION

2.9.1. Survey Teams

The background of the staff composing the teams was: Western Sahara Red Crescent (WSRC)' field monitors and nurses, laboratory technicians and veterinary technicians from the refugee health authorities. A total of eight teams, of about 4 persons each and divided as two larger groups of four teams, were finally enrolled following training. One of these four persons was selected to be the team's supervisor. Each large group of four teams were in charge of carrying out two survey strata (one survey per camp). Each group of four teams were supervised by a survey manager, and two persons of the refugee health authorities.

Each field team of four persons was composed of:
- One person responsible to fill in the questionnaire
- Two persons responsible of obtaining anthropometric measurements
- One person responsible of measuring haemoglobin

During the survey's data collection, at the end of each day, questionnaires were checked by the survey managers for accuracy and completeness, collated, and transferred to the data entry teams.

2.9.2. Field Supervision

Two survey managers (one staff from UNHCR and another UNHCR consultant) were in charge of the training, the overall management of field data collection, data analyses and report writing. Each manager was responsible for one large survey group (4 teams) which surveyed two strata. Another UNHCR and WFP field coordinators were supporting the overall survey: training, logistics and field supervision. In addition, four coordinators from the refugee health authorities were enrolled for teams' supervision (two for each large survey group). Supervision was carried out daily at field level. UNHCR, WFP and the refugee health authorities assured the overall survey.

2.10. DATA ENTRY TEAMS AND DATA ENTRY SUPERVISION

A WFP data entry manager was in charge of training and supervision of the data entry team. Data was double-entered, and later cross-checked for data entry errors. Any error found was subsequently corrected.

2.11. ETHICS AND INFORMED CONSENT

The aims and objectives of the survey were discussed and agreed with members of the refugee health authorities. Community dissemination of information about the survey was carried by the refugee health authorities.

During the survey, members of the household visited received detailed information about the nutrition survey aims using the informed consent sheet. Households wishing to participate signed the informed consent questionnaire, indicating the voluntary nature of the nutrition survey. For questionnaire administration, individual anthropometric measurements and haemoglobin measurement verbal consent was sought, in accordance with the refugee health authorities' recommendations. In the case of children, verbal consent was sought from the caregiver. Individuals were able to consent or declined the type of measurements or procedures that were performed at any point if they so wished.

All information collected during the survey was treated as confidential and no identity data was either recorded or stored.

2.12. SURVEY SCHEDULE

The field work took place from mid-October to the first week of December 2012, which included logistics and preparation, training, anthropometric standardization, piloting of survey in the field, data collection, feed-back and de-briefing meetings in Rabouni, Tindouf and Algiers. Each survey carried in each camp lasted between 8 to 9 days. Initially two surveys (Awserd – Laayoune) were conducted concomitantly followed by the final two surveys (Smara – Dakhla). The survey schedule is shown in Table 8:

Table 2. Survey Timeline

Activity	Timeline
Field logistics preparation	13 – 17 October 2012
Teams training	18 – 23 October 2012
Anthropometric standardization	29 – 31 October 2012
Pilot testing in field (Awserd)	3 – 5 November 2012
Data collection Awserd & Laayoune	10 November – 18 November 2012
Data collection Smara + February 27th	19 – 28 November 2012
Data collection Dakhla	20 – 28 November 2012

2.13. INTER-AGENCY NUTRITION EXPERT TECHNICAL MEETING

Following the dissemination of the preliminary nutrition survey results, and to coincide with a Donor's meeting in Algiers, an inter-Agency Nutrition Expert Technical Meeting was organised in March 6th – 17th, 2013. Agencies attending the meeting included UNHCR, WFP and UNICEF.

The aim of the meeting was to discuss the preliminary nutrition survey results and its potential implications for programming. In addition, various targeted sessions were organised to disseminate the preliminary results to different groups of stakeholders, such as the refugee authorities (health and food distribution sectors), health care workers, and national and international NGO's and IP's. During these targeted sessions discussions were held aimed at obtaining more information to better inform the nutrition survey recommendations.

The final output of the meeting was the Nutrition Survey Recommendations outlined in section VI (page 67).

III. PRIMARY FIELD DATA RESULTS

3.1. CHARACTERISTICS OF THE SURVEYED HOUSEHOLDS

Table 3.1 summarises the number of households included in each survey (strata) undertaken. Of the total of households surveyed, 99% consented to participate. Table 3.1 also summarises the total number of individuals surveyed, per target group.

Table 3.1. Sampled and participating households

	Households				Target groups surveyed	
	Planned sample[1]	Surveyed sample	Agreed to participate	Refused to participate	Women (15-49 years)	Children <5 years
Awserd	510	513	511	2	249	591
Dakhla	510	510	508	2	341	576
Laayoune	510	510	497	13	265	489
Smara[2]	510	516	513	3	266	552
Combined	2,040	2,049	2,029	20	1,121	2,208

1. The planned number of households was calculated as 17 households per cluster (30 in total) per survey; based on the sample size calculation (see *Annex 1*). Data from Smara also includes data from February 27th.

Tables 3.2 and 3.3 summarise the age distribution and status of the target groups sampled in the participating households. It was reported that, on average, there were 1.2 children per household, aged 0-59 months. Of the 2,355 children reported as normally residing in the surveyed households, 147 (6.2%) were not present at the time of the survey. Of the 2,208 surveyed children, infants aged <6 months represented about 8% of the total. The age and sex distribution of children aged 6-59 months is summarised in Table 3.4. The sex ratio (boy:girl) ranged between 0.9 to 1.1.

Table 3.2. Age groups of surveyed children (0-59 months).

	Total	<6 months	6-59 months	Unknown	Children/HH
Awserd	591	52	539	0	1.3
Dakhla	576	72	504	0	1.2
Laayoune	489	15	474	0	1.1
Smara[1]	552	47	505	0	1.1
Combined	2,208	186	2022	0	1.2

HH: Household. [1] Data from Smara also includes data from February 27th.

Table 3.3. Reproductive status of women (aged 15-49 years) surveyed.

	Total	Non-pregnant	Lactating	Pregnant	Unknown	Women/HH
Awserd	249	157	51	34	7	1.7
Dakhla	341	251	67	20	3	2.0
Laayoune	265	179	51	30	5	1.7
Smara1	266	187	48	27	4	1.5
Combined	1121	774	217	111	19	1.7

HH: Household. [1] Data from Smara also includes data from February 27th.

Of the 1,121 women participating in the survey approximately (see Table 3.3) 19% were lactating and 10% were pregnant. A total of 1.2% of the women's surveyed reported that they did not know whether they were pregnant or not, or this data was not properly recorded. Those with missing pregnancy or lactating status were excluded from the analysis. A total of 45 women reported to be concomitantly pregnant and lactating; they were classified as pregnant for the survey analysis.

Table 3.4. Age and sex distribution of the children aged 6-59 months

Age	Boys		Girls		Total		Ratio
(months)	no.	%	no.	%	no.	%	Boy:Girl
6-17	239	47.2	267	52.8	506	25.0	0.9
18-29	237	50.3	234	49.7	471	23.3	1.0
30-41	217	48.2	233	51.8	450	22.3	0.9
42-53	185	52.9	165	47.1	350	17.3	1.1
54-59	128	52.2	117	47.8	245	12.1	1.1
Total	1006	49.8	1016	50.2	2022	100.0	1.0

3.2. NUTRITIONAL STATUS - ANTHROPOMETRIC INDICATORS

The anthropometric evaluation of the nutritional status in children aged 6-59 months summarised in this section is based on the 2006 WHO Growth Standards. Please see *Annex 7* for more detailed tables. In addition; tables for similar analysis based on the 1977 NCHS Growth References can be found in *Annex 8*.

3.2.1. Global Acute Malnutrition (GAM) in Children Aged 6-59 Months

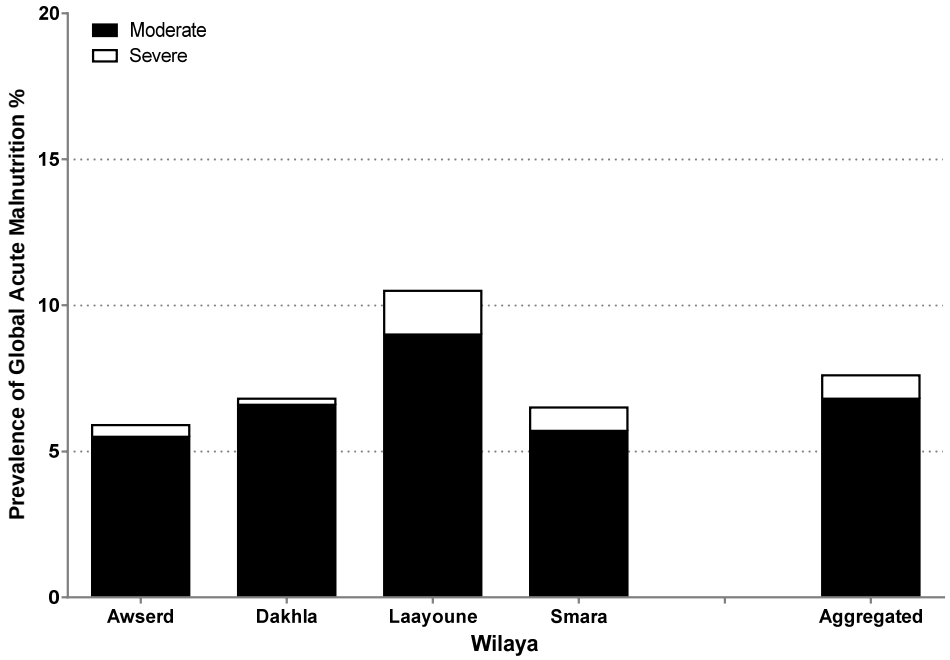

Figure 3.1. Global acute malnutrition (GAM) prevalence in children aged 6-59 months.
GAM prevalence was calculated using the 2006 WHO Growth Standards. Combined results are the weighted prevalence.

The overall prevalence of global acute malnutrition (GAM) is less than 8% ranging from 6% in Awserd to almost 11% in Laayoune (see Figure 3.1). The prevalence of global acute malnutrition in Laayoune is significantly higher from that of the combined weighted prevalence of the other three camps ($p<0.05$).

Of the total GAM prevalence, MAM accounted for 89% of the total, ranging from 86% in Laayoune to 97% in Dakhla. The difference observed in Laayoune in the overall prevalence of GAM when compared to the weighted prevalence of the other three camps is mostly accounted for the greater rate of moderate malnutrition, although the prevalence of SAM is also greater (neither difference was statistically significant).

GAM prevalence was generally greater among boys than girls in most camps, and in the aggregated results (see Figure 3.2). For both sexes, MAM was the predominant form of acute malnutrition. It is worth noting the high GAM levels observed for boys in Laayoune.

Estimates of acute malnutrition were also assessed using the proxy measure of low MUAC values. Overall, the weighted prevalence of low MUAC was 4% ranging from 3% in Awserd to 5% in Smara. No significant differences were found between camps in the prevalence of low MUAC. For more detailed data on low MUAC see Annex 7.

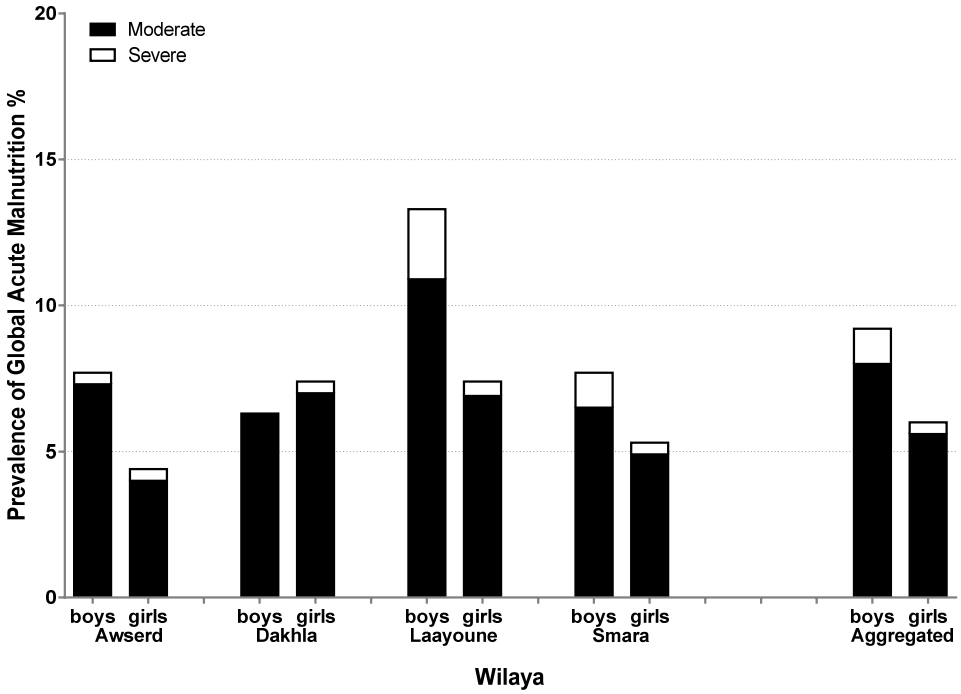

Figure 3.2. Global acute malnutrition (GAM) prevalence in children aged 6-59 months, by sex.
GAM prevalence was obtained using the 2006 WHO Growth Standards. Combined results are the weighted prevalence.

3.2.2. Underweight in Children Aged 6-59 Months

The overall prevalence of underweight is 17% ranging from 14% to 18% at the camp level (see Figure 3.3). No statistically significant differences between camps were found on the prevalence of underweight.

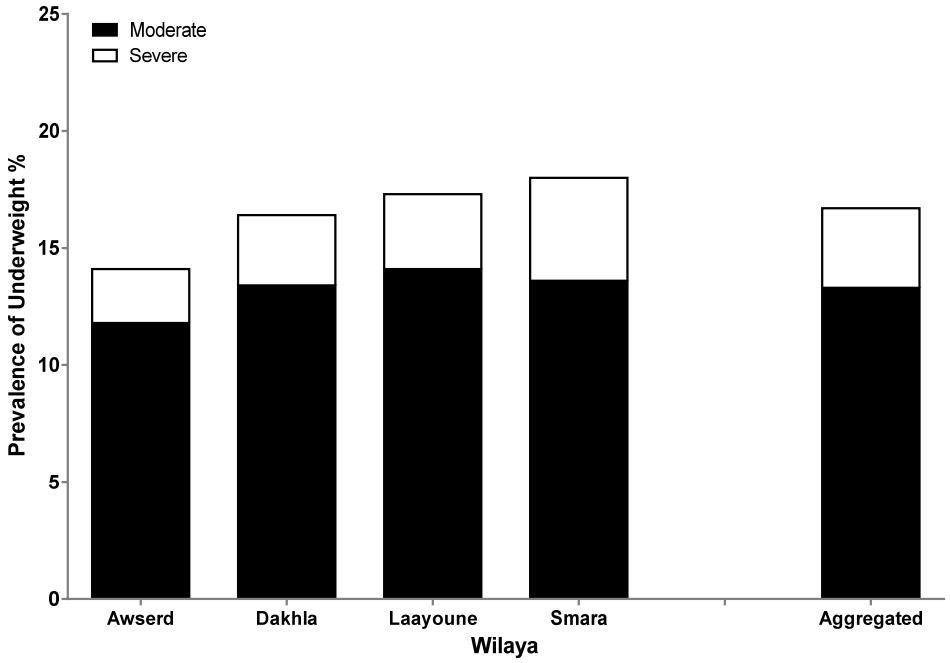

Figure 3.3. Underweight prevalence in children aged 6-59 months.
Underweight prevalence was obtained using the 2006 WHO Growth Standards. Combined results are the weighted prevalence.

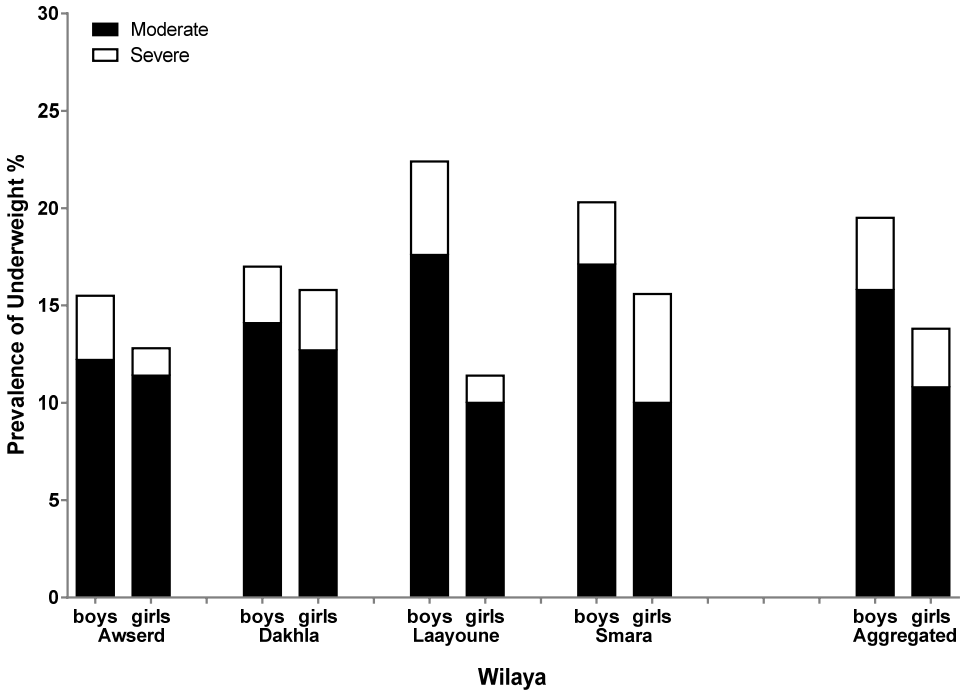

Figure 3.4. Underweight prevalence in children aged 6-59 months, by sex.
Underweight prevalence was obtained using the 2006 WHO Growth Standards. Combined results are the weighted prevalence.

Overall, the prevalence of underweight was consistently greater among boys than girls (see Figure 3.4). Boys presented greater underweight prevalence than girls in Laayoune.

3.2.3. Stunting in Children Aged 6-59 months

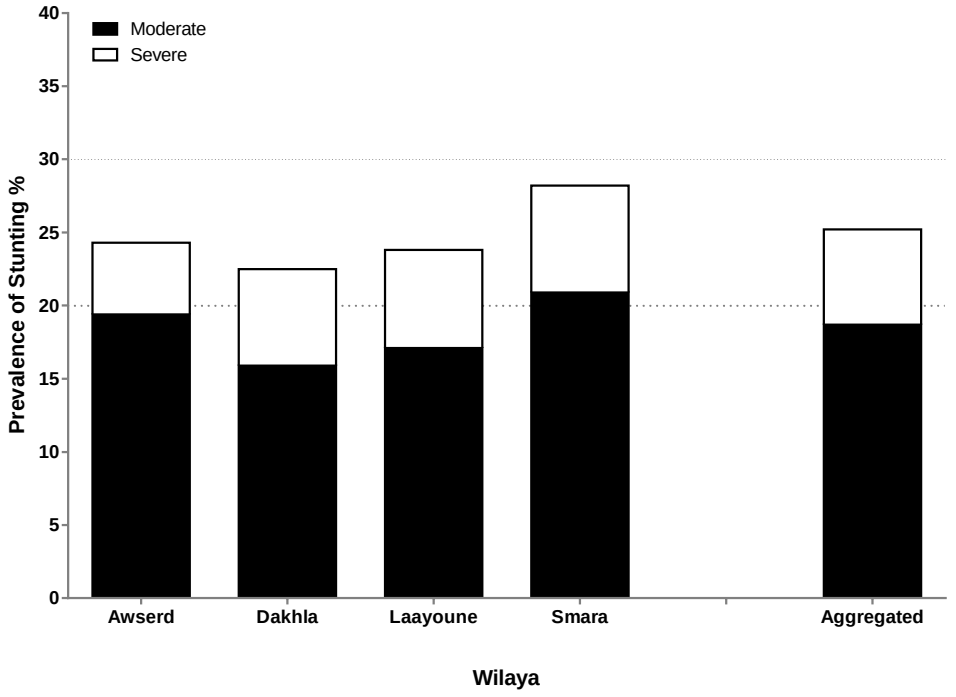

Figure 3.5. Stunting prevalence in children aged 6-59 months.
Stunting prevalence was obtained using the 2006 WHO Growth Standards. Combined results are the weighted prevalence.

Overall, the stunting prevalence is 25%, ranging from 23% in Laayoune to 29% in Smara. Laayoune and Dakhla presented slightly lower stunting prevalence than Smara and Awserd (see Figure 3.5). No statistically significant differences between camps were found on the prevalence of stunting.

Overall the prevalence of stunting was greater in boy than in girls. The prevalence difference between sexes was greater in Laayoune and Dakhla (see Figure 3.6). Severe stunting prevalence in Laayoune was also noticeably greater for boys than for girls.

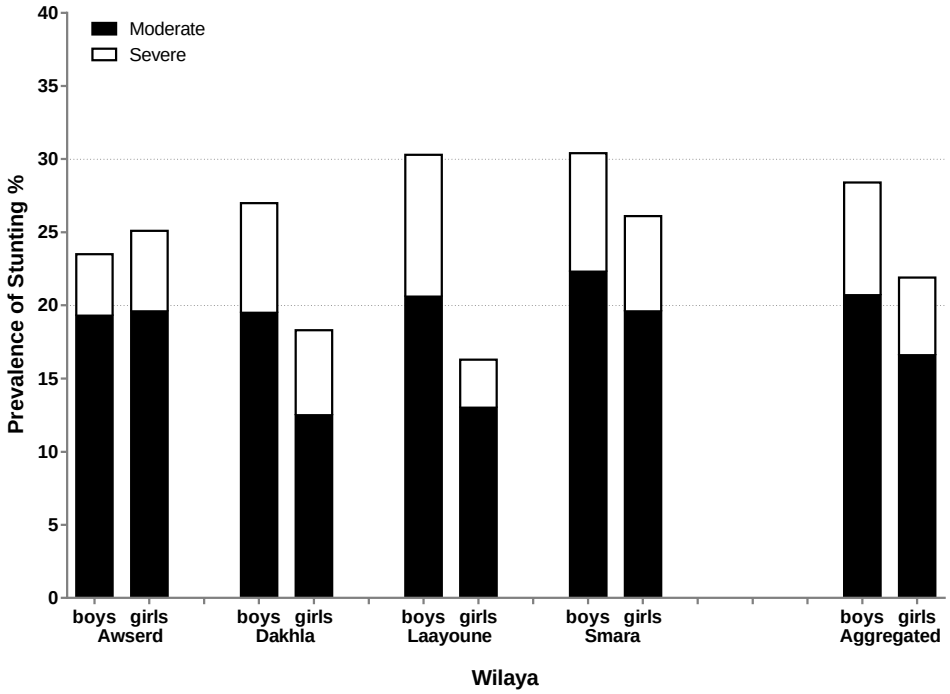

Figure 3.6. Stunting prevalence in children aged 6-59 months, by sex.
Stunting prevalence was obtained using the 2006 WHO Growth Standards. Combined results are the weighted prevalence

3.2.4. Malnutrition Trends in Children Aged 6-59 Months

Age-related trends for all three indicators are shown in Figure 3.7. Wasting prevalence is at its highest between the ages of 6-17 months. Afterwards, this prevalence decreases and remains mostly stable until 59 months of age. Conversely, stunting prevalence is already high between the ages of 6-17 months (affecting about one in four children); but this prevalence increases to its highest prevalence between the ages of 18-29 months (affecting then about one in three children). An observable decrease in the stunting prevalence follows after this age, especially for severe stunting.

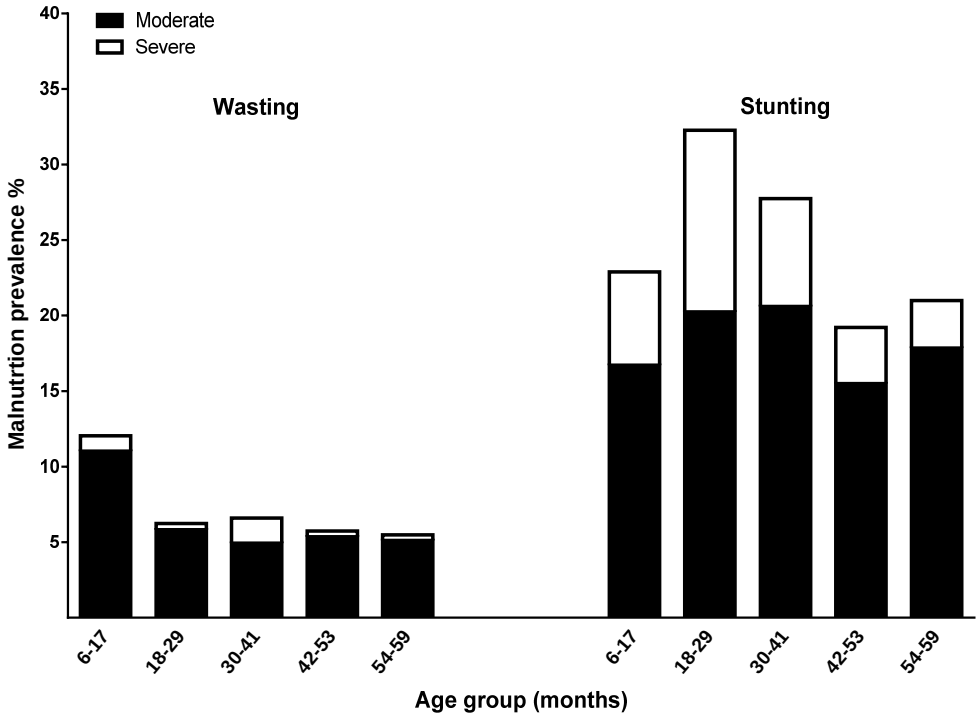

Figure 3.7. Malnutrition trends in children aged 0-59 months.
Results are the weighted prevalence obtained using the 2006 WHO Growth Standards.

3.3. INFANT AND YOUNG CHILDREN FEEDING (IYCF) PRACTICES

3.3.1 Current IYCF Indicators

Table 3.5 summarises the weighted results of IYCF indicators, which are useful indicators for measuring feeding practices at a population level.

The proportion of children aged <24 months ever breastfed was high. However the proportion of infants aged <6 months who are exclusively breastfed was low, at about 18%. About 44% of infants <6 months are predominantly breastfed. Exclusive breastfeeding was 43% in the first two months of life and the proportion decreases sharply with age to less than 8% by the age of 4-5 months (Figure 3.8).

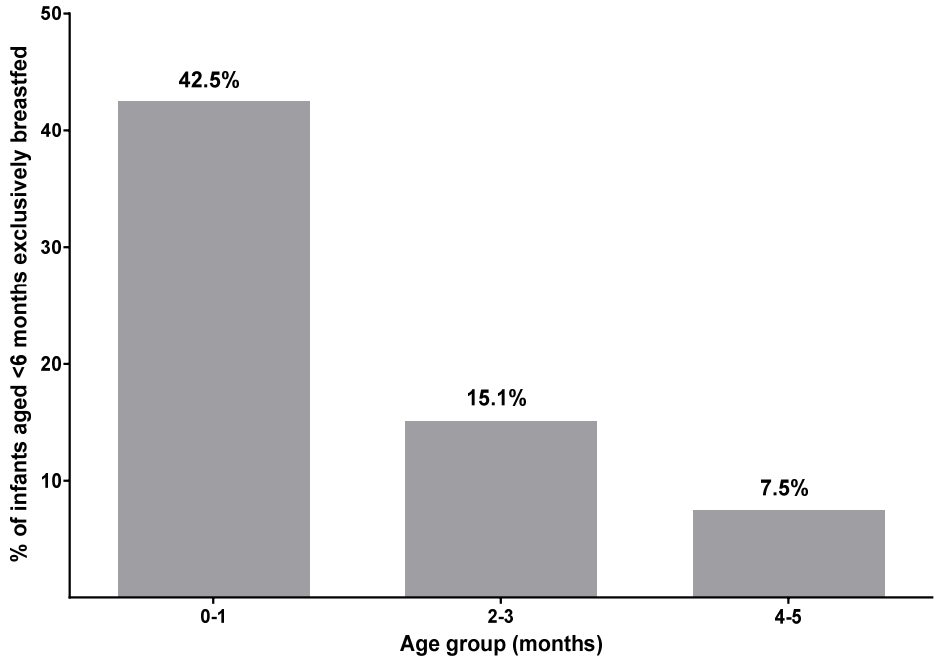

Figure 3.8. Proportion of infants aged <6 months exclusively breastfed by age.

Continuation of breastfeeding at 12 and 24 months was 79% and 29%, respectively; indicating that by 12 months about 21% of women have stopped breastfeeding before the current WHO recommendation of at least two years. By 24 months about 71% of women have stopped breastfeeding. Figure 3.9 describes the overall reported duration of breastfeeding. The mean duration of breastfeeding was 18.7 months, that is, after children reach this age, only half of them would continue to breastfeed. As evidenced in Figure 3.9 a small proportion of women continue to breastfed beyond 24 months. For all children aged <24 months, only 38% are appropriately breastfed.

Of the surveyed children, aged 6-23 months of age, who are not breastfed, only 33% received at least 2 milk feedings the previous day. Prevalence of bottle feeding was not assessed in the survey.

Introduction of solid, semi-solid and soft foods between the ages of 6-8 months was 45%. This simple and useful indicator for evaluating the adequate introduction of complementary foods suggest that slightly less than half of the children aged 6-8 months have received solid or semi-solid foods, as recommended by WHO. Figure 3.9 shows the pattern of introduction to solid, semi-solid or soft food by age in the sample of children surveyed.

Table 3.5. Prevalence of Infant and Young Child Feeding Practices indicators

Indicator	Age range	Eligible sample	Included sample*	Prevalence (n) %	95% CI (%)
Children ever breastfed	< 24 months	945	943	(896) 94.5	(92.4 – 96.6)
Exclusive breastfeeding under 6 months	< 6 months	188	177	(35) 18.4	(11.4 – 25.4)
Predominant breastfeeding under 6 months	< 6 months	186	177	(81) 44.2	(34.9 – 53.5)
Continued breastfeeding at 1 year	12-15 months	148	147	(116) 78.9	(71.4 – 86.4)
Continued breastfeeding at 2 years	20-23 months	181	178	(52) 28.7	(21.5 – 35.7)
Age-appropriate breastfeeding	< 24 months	945	869	(342) 38.0	(33.6 – 42.5)
Median duration of breastfeeding	0-36 months	1390	1378	18.7 months	
Milk feeding frequency for non-breastfed children	6-23 months	255	198	(62) 32.7	(24.5 – 40.9)
Introduction of solid, semi-solid or soft foods	6-8 months	61	61	(28) 44.7	(31.3 – 58.0)
Minimum dietary diversity	6-23 months	759	724	(243) 32.1	(26.5 – 37.6)
Minimum meal frequency	6-23 months	759	568	(111) 19.9	(15.4 – 24.4)
Minimum acceptable diet	6-23 months	759	568	(38) 6.4	(3.9 – 8.8)
Consumption of iron-rich or iron-fortified foods	6-23 months	759	748	(317) 41.9	(36.5 – 47.4)

* The sample included for the analysis of each indicator where all eligible children, according to their age, with all the needed data to calculate the given indicator.

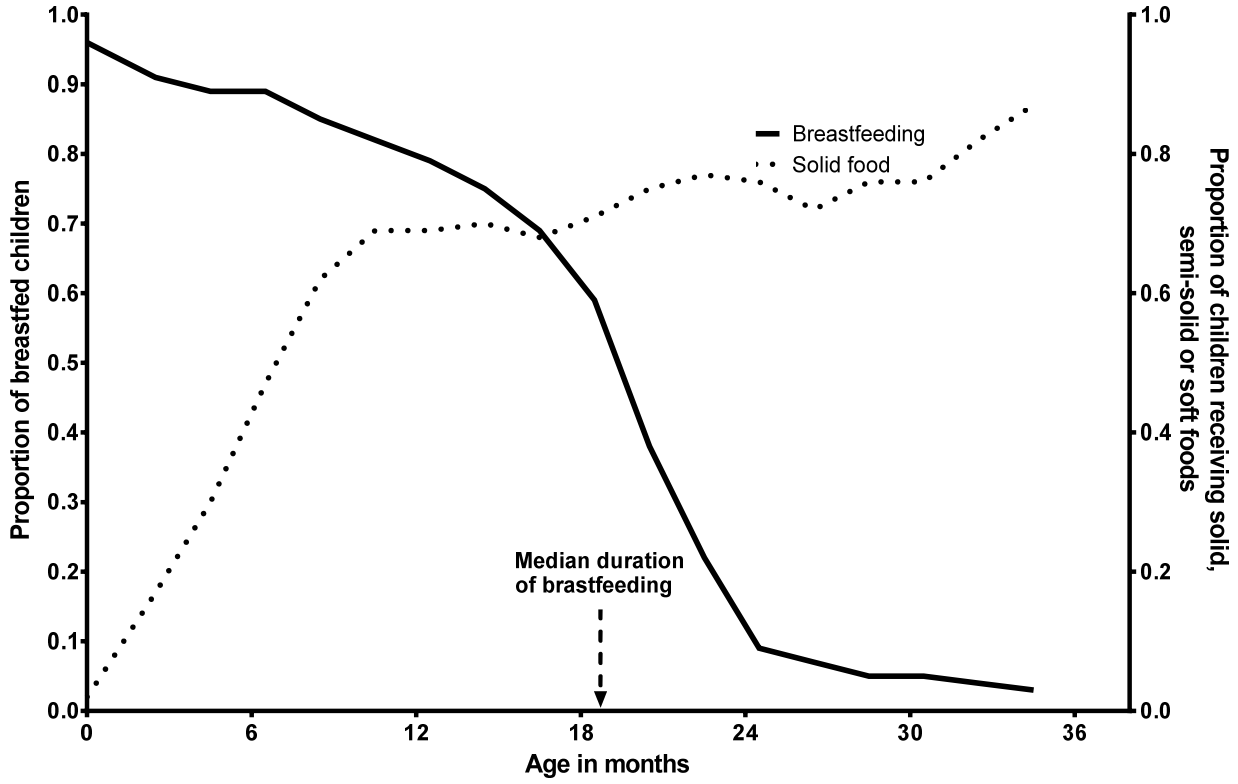

Figure 3.9. Age trends of breastfeeding duration and introduction to solid, semi-solid and soft foods in children aged 0-35 months.

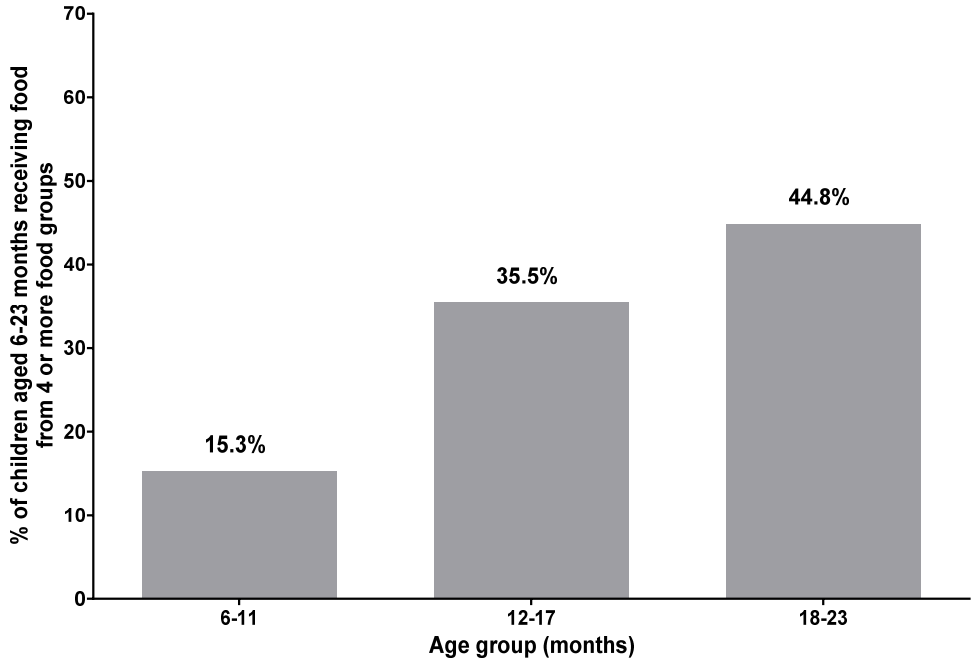

Figure 3.10. Minimum dietary diversity in children aged 6-23 months by age group.

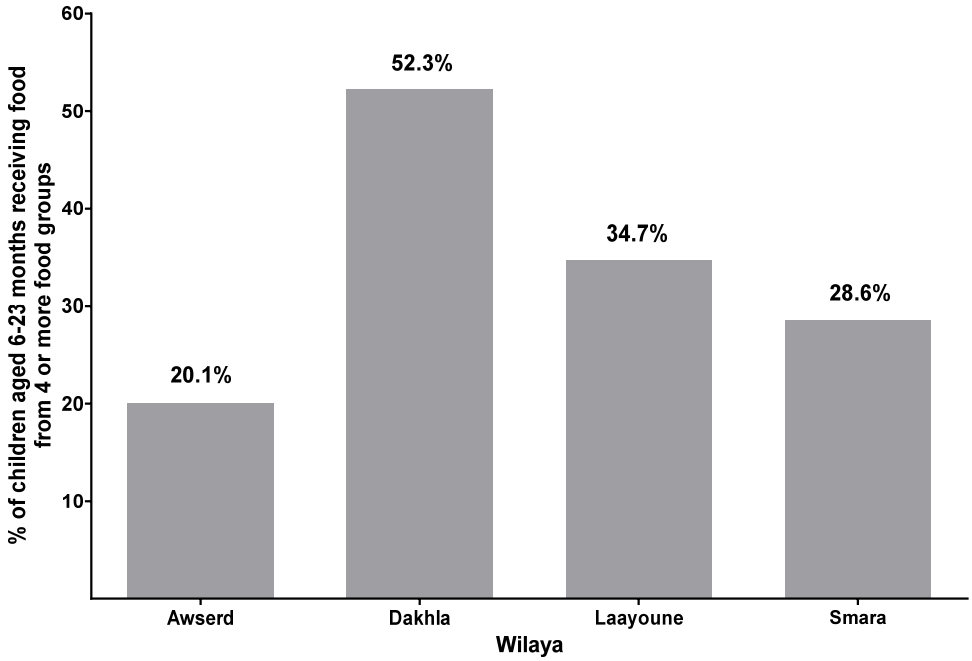

Figure 3.11. Minimum dietary diversity in children aged 6-23 months by camp.

With regards to the overall feeding pattern of children aged 6-23 months, only 32 % of the sampled children received foods from 4 or more food groups, that is, had the minimum dietary diversity in their diets. Dietary diversity increased with age as observed in Figure 3.10; from 15% at 6-11 months to 49% at 18-23 months of age. There were significant differences between camps in the proportion of children aged 6-23 months with minimum dietary diversity (see Figure 3.11). Dakhla presented the greatest proportion while Awserd presented the lowest proportion.

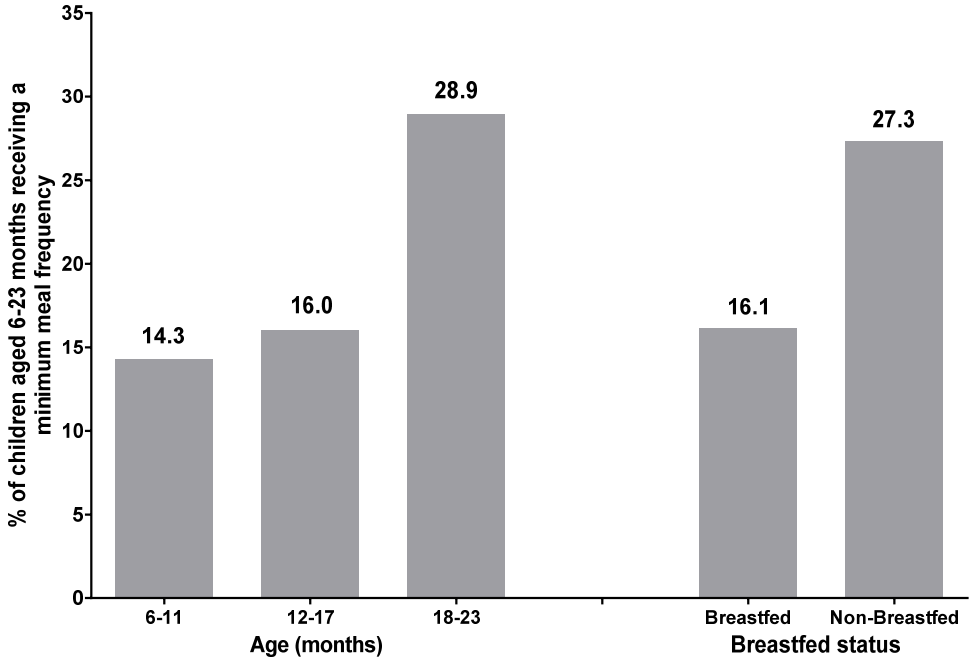

Figure 3.12. Minimum meal frequency in children aged 6-23 months by age and breastfed status.

The proportion of breastfed and non-breastfed children aged 6-23 months, who received solid, semi-solid, or soft foods (but including also milk feeds for non-breastfed children) the minimum number of times was 20%; hence a very low proportion of children 6-23 months received an adequate number of feeds according to current recommendations. The proportion of children receiving a minimum meal frequency increases at later ages (see Figure 3.12), with percentage values remaining similar at 6-11 months and 12-17 months (14% and 16%, respectively) increasing at 18-23 months (29%). The proportion of children aged 6-23 months with the minimum meal frequency is greater in non-breastfed children than in breastfed children (Figure 3.12). There were also differences between the camps (see Figure 3.13), but none of the differences reached statistical significance.

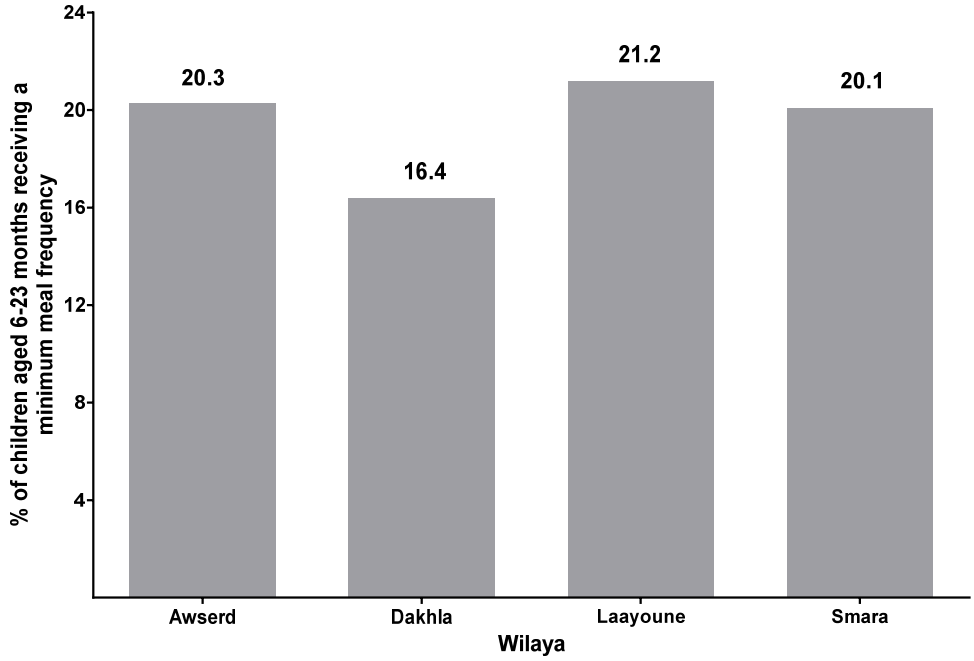

Figure 3.13. Minimum meal frequency in children aged 6-23 months by camp.

A summary IYCF indicator is the minimum acceptable diet, which is a composite of the indicators described above for children aged 6-23 months. Overall, only 6% of all children aged 6-23 months have a minimum acceptable diet. In line with previous indicators, there is an age-dependant increase in the proportion of children with a minimum acceptable diet (Figure 3.14). There were noticeable differences between camps, in the proportion of children receiving a minimum acceptable diet (Figure 3.15).

The proportion of children aged 6-23 months consuming iron-rich or iron-fortified foods was 42%. Consumption of iron-rich or iron-fortified food increased with age as shown in Figure 3.16. Twenty-two % of children aged 6-11 months consume iron-rich foods compared to 58% of children aged 18-23 months. The pattern of consumption differs also by camp (Figure 3.17), with Awserd and Smara consuming less iron-rich or iron-fortified foods, 35% and 38%, respectively, compared to 47% and 50% in Laayoune and Dakhla, respectively. It is worth nothing that this indicator did not take into account consumption of Ghazala in this age group, as the product has not been distributed for at least 4 months at the time of data collection.

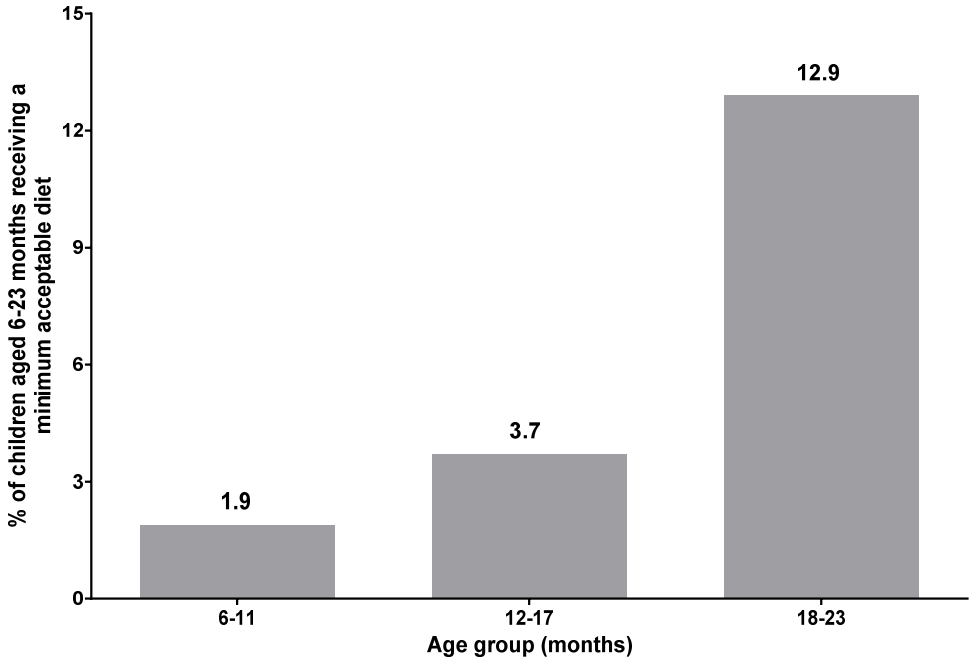

Figure 3.14. Minimum acceptable diet in children aged 6-23 months by age.

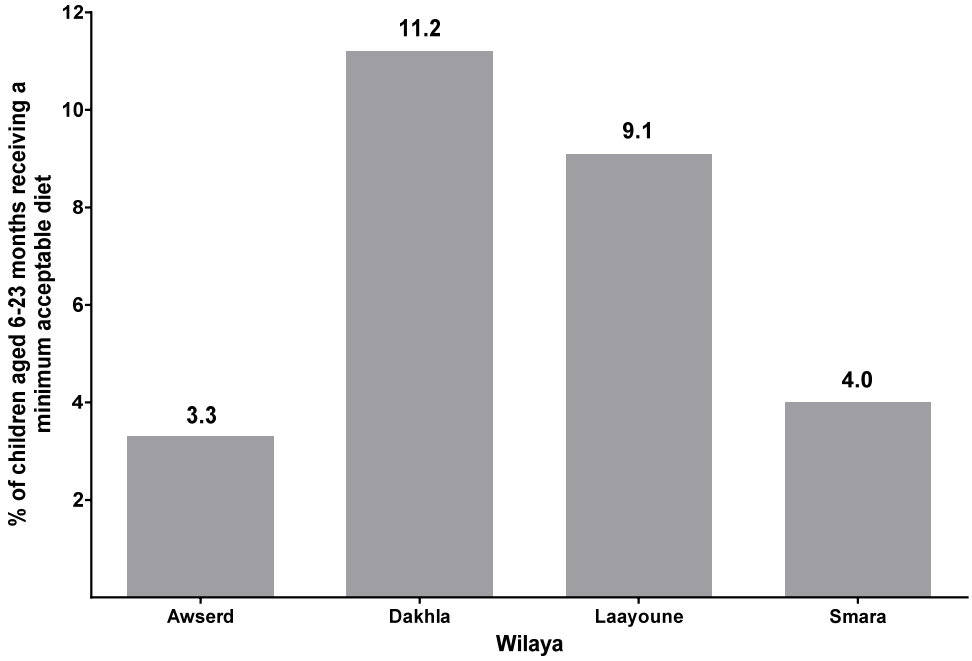

Figure 3.15. Minimum acceptable diet in children aged 6-23 months by camp.

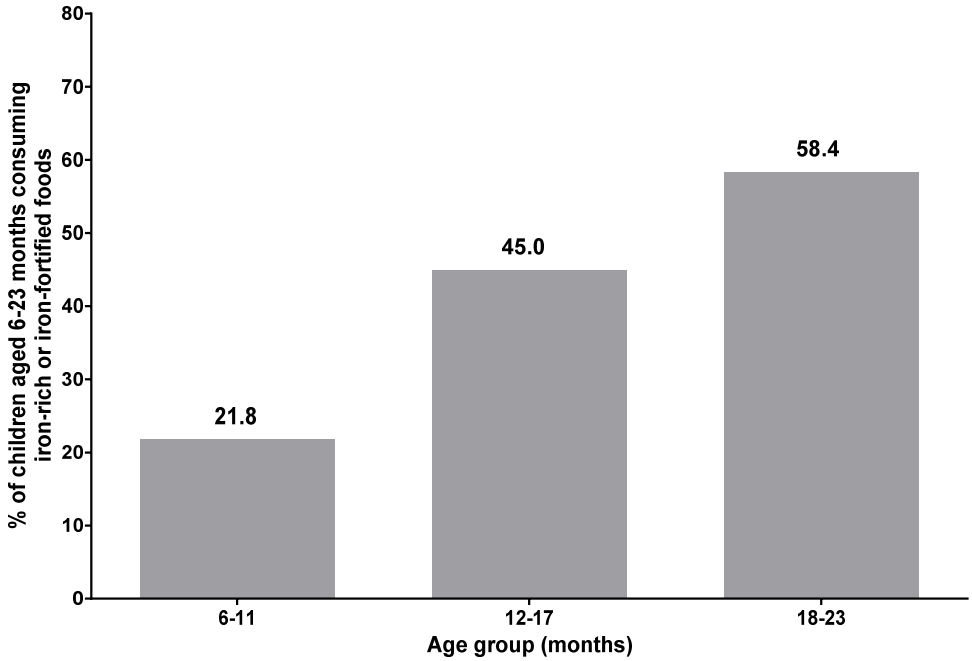

Figure 3.16. Consumption of iron-rich or iron-fortified food in children aged 6-23 months by age.

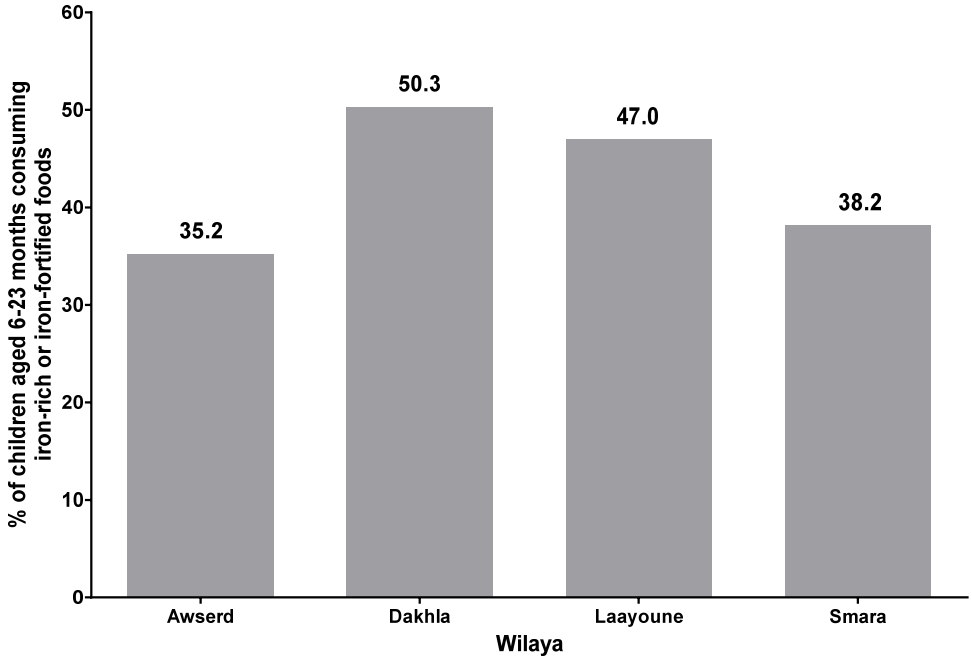

Figure 3.17. Consumption of iron-rich or iron-fortified food in children aged 6-23 months by camp.

3.3.2. Two-Year Prevalence Change of IYCF Indicators

Overall, there were no significant changes in any of the aggregated IYCF indicators between 2010 and 2012, as observed by comparing IYCF indicators in Tables 3.6 and A7.1 (Annex 7). Nonetheless, some consistent changes on breastfeeding and complementary feeding indicators were observed at the camp level.

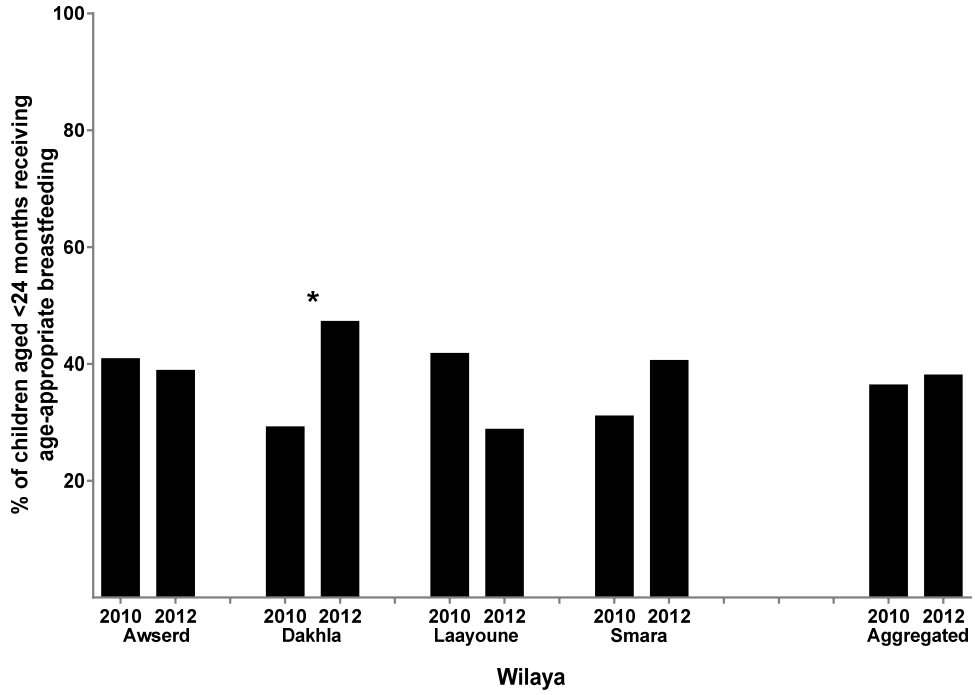

Figure 3.18. Two-year prevalence change of children aged <24 months receiving age-appropriate breastfeeding. * The differences observed reached statistical significance

For breastfeeding indicators differences were observed for the proportion of children aged <24 months receiving an age-appropriate breastfeeding as shown in Figure 3.18. In the last two years we observed an increase in this proportion among children living in Dakhla and Smara camps, but deterioration among those living in Laayoune; the difference being statistically significant only in Dakhla camp.

For complementary feeding indicators, the main changes observed were for an increase in diet diversity and consumption of iron-rich foods for children aged 6-23 months. We observed in Dakhla a significant improvement in the proportion of children aged 6-23 months receiving food from four or more food groups (see Figure 3.19). At the same time, we observed a reduction of this proportion in Awserd and Smara, none reaching statistical significance.

Similarly, in Dakhla camps we observed a significant increase in the proportion of children receiving iron-rich or iron-fortified foods (see Figure 3.20). Concomitantly, we observed a reduction of this proportion in Awserd and Smara, none of which reached statistical significance.

Of all the camps, Dakhla showed a consistent and significant improvement of IYCF practices.

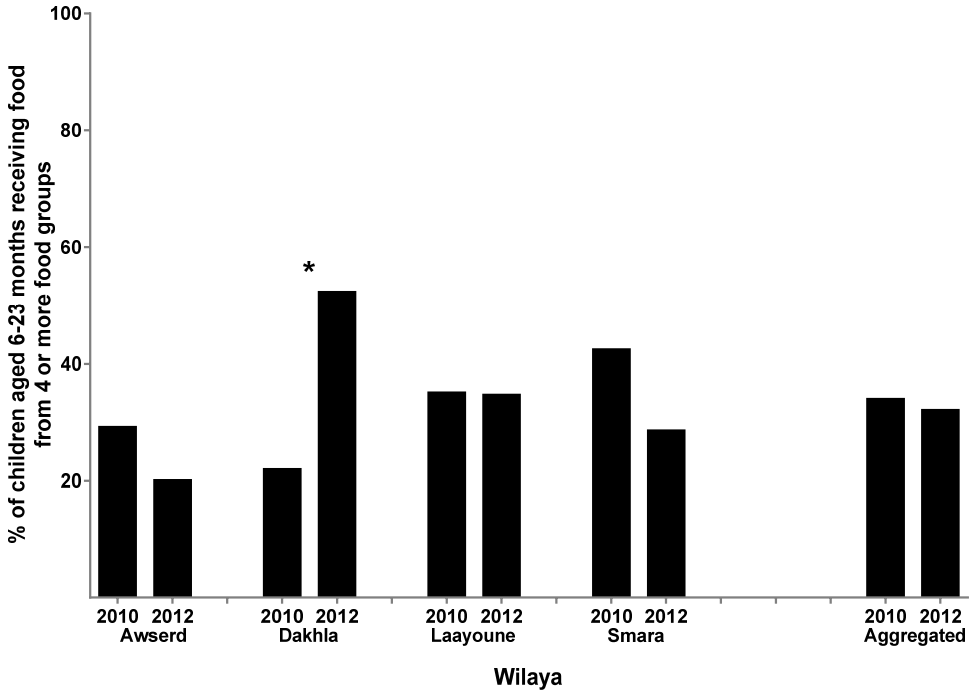

Figure 3.19. Two-year prevalence change of children aged 6-23 months receiving greater food diversity.
*** The differences observed reached statistical significance.**

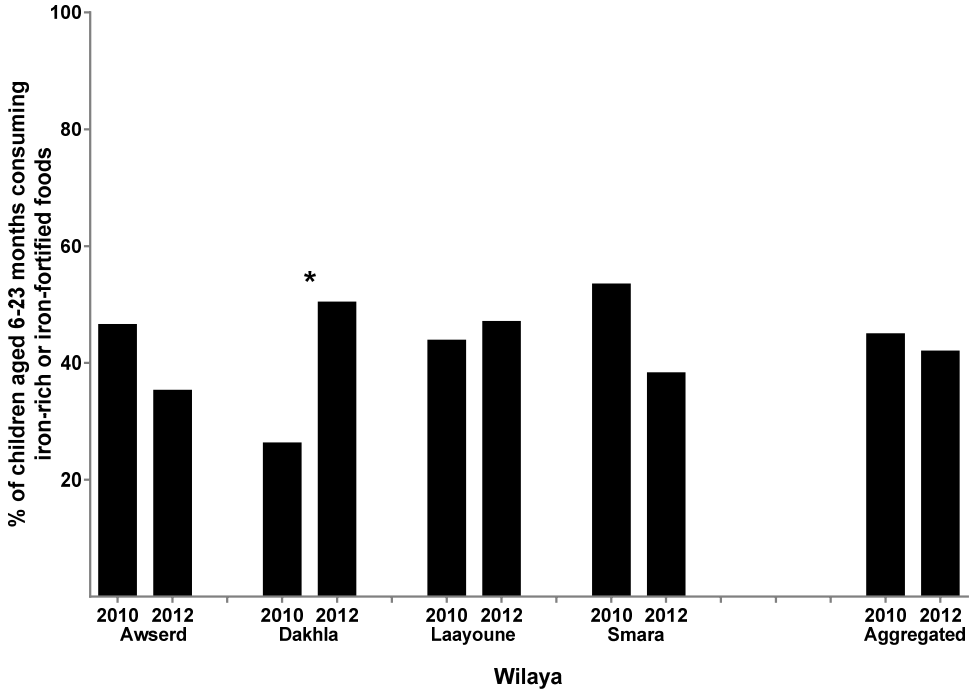

Figure 3.20. Two-year prevalence change of children aged 6-23 months consuming iron-rich foods.
*** The differences observed reached statistical significance.**

3.4. NUTRITIONAL STATUS - ANAEMIA

3.4.1. Anaemia in Children Aged 6-59 Months

A total of 2009 children were assessed for haemoglobin concentrations. About 28% of children aged 6-59 months suffer from some form of anaemia (see Figure 3.21). The most common type of anaemia being mild (16%) followed by moderate (12%) and severe (<1%). There are small differences in the anaemia prevalence among camps, but none were found statistically significant.

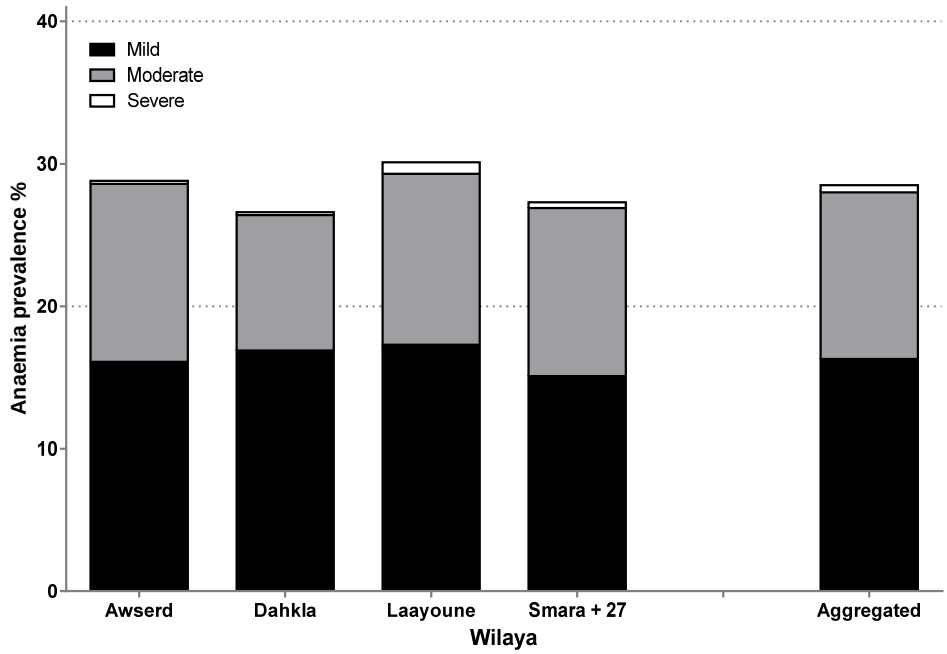

Figure 3.21. Anaemia prevalence in children aged 6-59 months.
Combined results are the weighted prevalence.

Overall anaemia prevalence was observable greater in boys than in girls (see Figure 3.22), although the difference did not reach statistical significance. Of notice is the greater proportion of moderate anaemia observed in boys from Laayoune than that of girls from the same camp. All forms of anaemia seem to be more prevalent at the earlier ages of 6-23, decreasing noticeably by the age of 24-59 months period (see Figure 3.23).

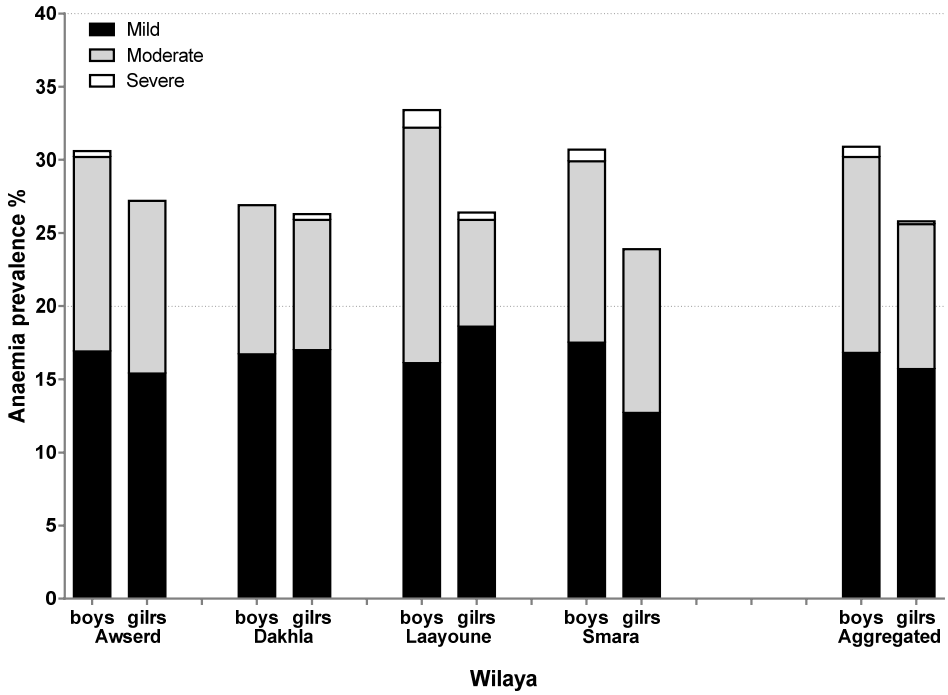

Figure 3.22. Anaemia prevalence in children aged 6-59 months, by sex.
Combined results are the weighted prevalence.

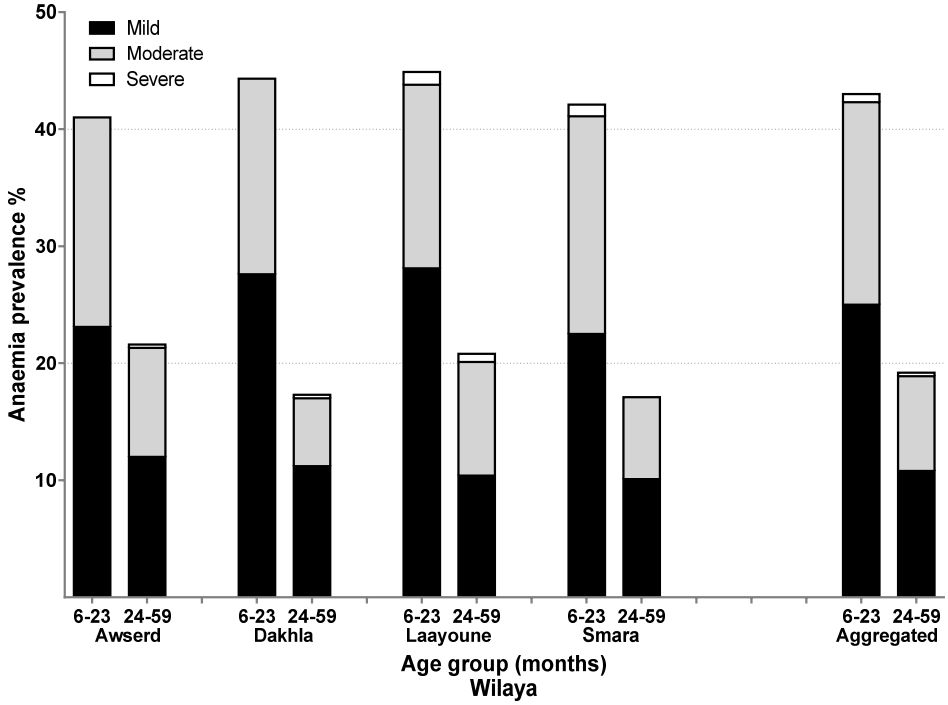

Figure 3.23. Anaemia prevalence in children aged 6-59 months, by age group.
Combined results are the weighted prevalence.

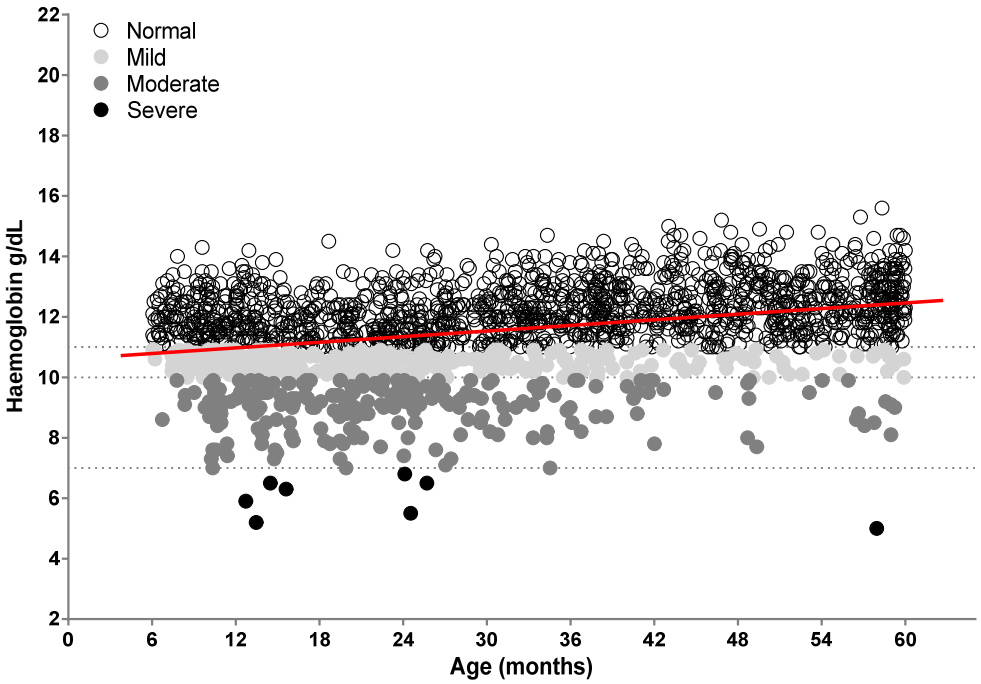

Figure 3.24. Haemoglobin concentration in children aged 6-59 months.

The overall pattern of haemoglobin changes during the age of 6-59 months is more clearly illustrated in Figure 3.24 that plots observed haemoglobin concentrations against age in months. An upward trend in haemoglobin concentration with age is evident with an increase of 0.031 g/dL (95% C.I 0.027 – 0.035) of haemoglobin concentration for every one month increase in age. The slope value is significantly different than zero ($p<0.05$). As observed in Figure 3.24, the majority of children with severe anaemia cluster at ages below 30 months. A similar pattern was observed for moderate anaemia.

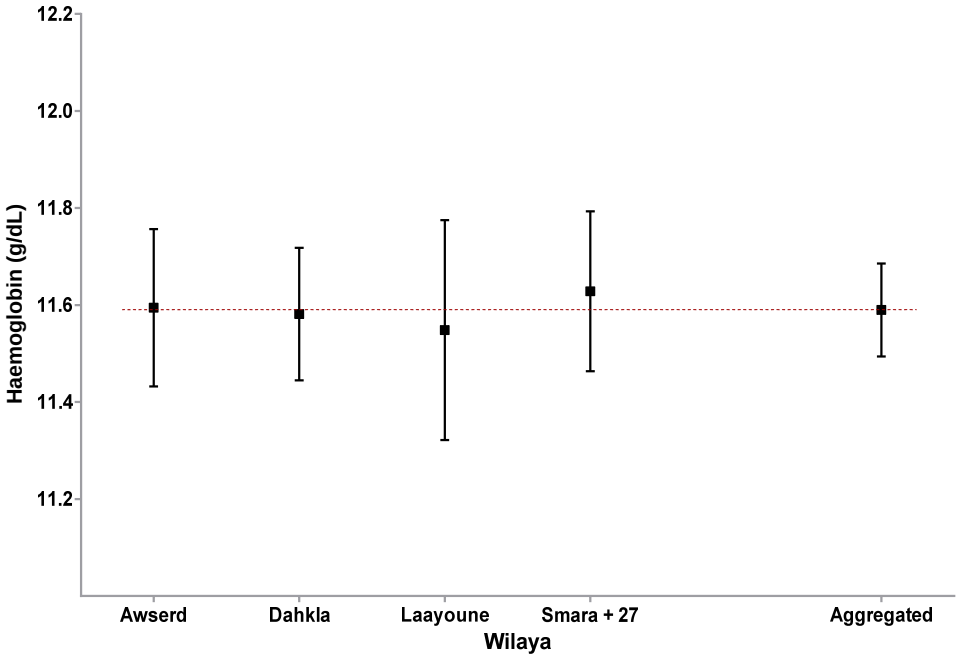

Figure 3.25. Mean haemoglobin values (and 95% CI) of children aged 6-59 months.

Mean values of haemoglobin by camp are shown in Figure 3.25. In accordance with the anaemia prevalence data above described, the mean haemoglobin values were comparable between Awserd, Dakhla, and Smara, while Laayoune presented slightly lower values. There were no significant differences.

3.4.2. Anaemia in Women of Reproductive Age (15-49 years)

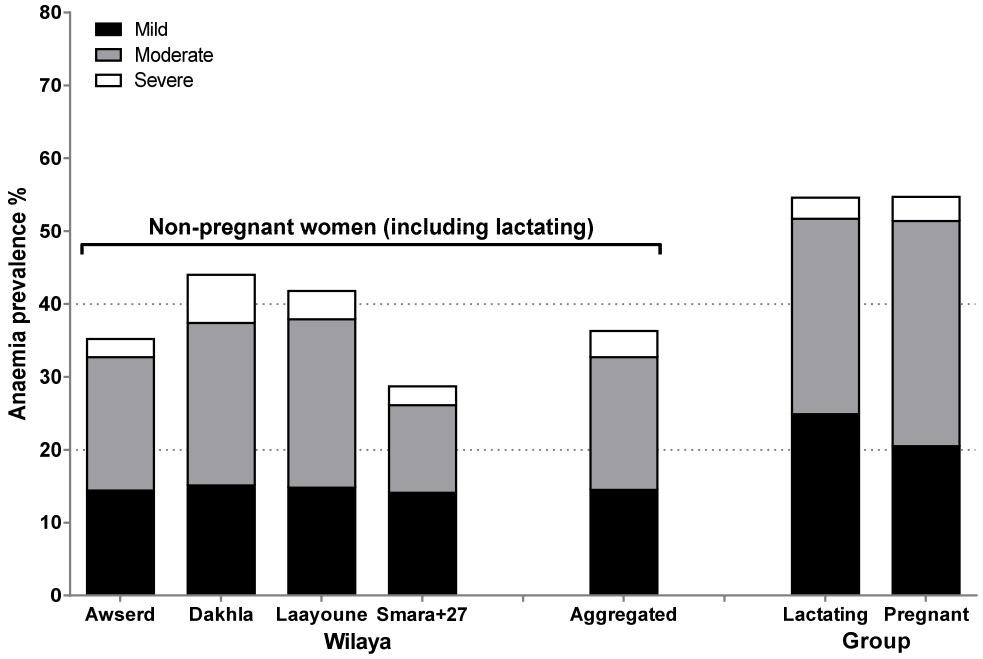

Figure 3.26. Anaemia prevalence in women of reproductive age (15-49 years).

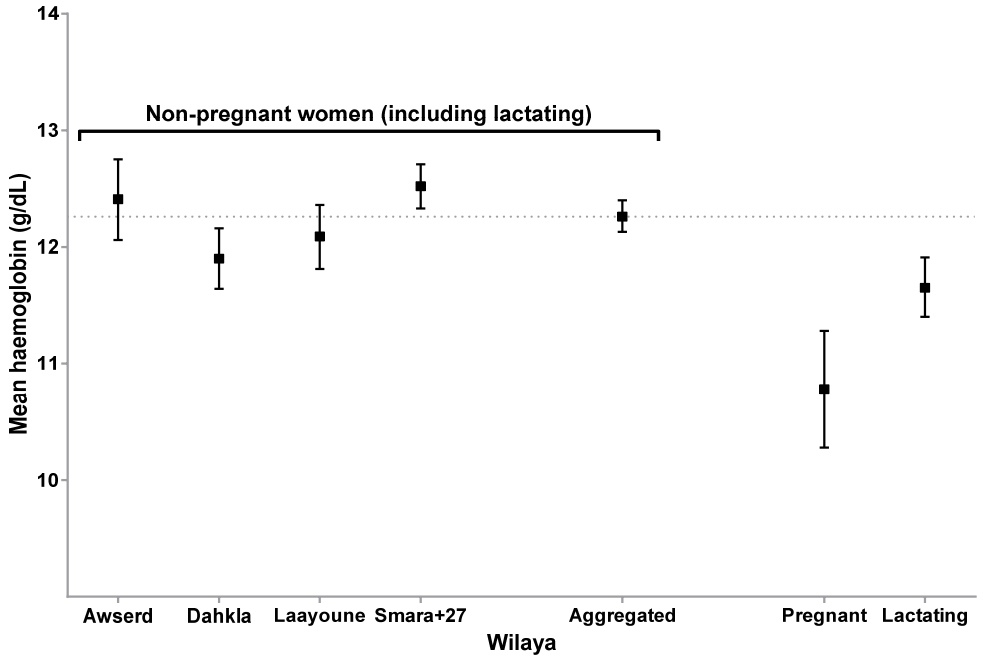

Figure 3.27. Mean haemoglobin values (and 95% CI) in women of reproductive age (15-49 years).

Haemoglobin concentration was measured in a total of 1,110 women of reproductive age. Of these women, 111 reported to be pregnant and 216 reported to be lactating. For the assessment of anaemia prevalence in non-pregnant women, lactating women were considered among the non-pregnant.

Overall the weighted prevalence of anaemia in non-pregnant women of reproductive age is 36%. There were differences between camps with Dakhla and Laayoune having the higher anaemia prevalence and Smara having the lower. These differences were statistically significant ($p<0.05$). Pregnant and lactating women presented similar anaemia prevalence, but these were greater than the weighted anaemia prevalence observed in non-pregnant women (see Figure 3.26).

Mean values of haemoglobin concentration, by camp, are shown in Figure 3.27. The values observed for Dakhla and Laayoune are lower than those observed for Awserd and Smara; however, the differences were not statistically significant. The mean haemoglobin values for pregnant and lactating women were significantly lower when compared with the overall mean haemoglobin value of non-pregnant women. Mean haemoglobin concentration for pregnant women were also significantly lower than those for lactating women.

3.5. ANAEMIA AND STUNTING REDUCTION PROGRAMME - IMPACT ANALYSIS

As outlined in the UNHCR guidance on the use of special nutritional products[19], impact analysis was done by comparing changes, since the 2010 Nutrition Survey, in anaemia and malnutrition prevalence of children aged 6-59 months. In addition, we have included a comparison in anaemia prevalence of PLW.

3.5.1. Coverage and Acceptability Indicators – Children Aged 6-59 Months

Simple proxy indicators of coverage, uptake, and acceptability of the Anaemia and Stunting Reduction Programme with a blanket distribution of LNS and MNP were collected during the survey (see Annex 4 for the questionnaires) and are summarised in Table 3.6. Coverage and uptake of LNS in the period of 30 days prior to the survey were not assessed given that the last four LNS distributions (comprising about 4 months) were not carried due to international shortages of the product.

Table 3.6. Coverage and acceptability indicators for the Anaemia and Stunting Reduction Programme – Children aged 6-59 months.

		Awserd	Dakhla	Laayoune	Smara + 27th	Aggregated
6–35 months		*Q1. Ever received LNS?*				
total	*n*	331	272	292	309	1204
yes	*(n) %*	(227) 68.6	(193) 71.0	(209) 71.6	(218) 70.6	(847) 70.3
no	*(n) %*	(103) 31.l	(78) 28.7	(82) 28.1	(89) 28.8	(352) 29.2
missing	*n*	1	1	1	2	5
		Q2. If yes to Q1, would like to receive LNS again?				
total	*n*	227	193	209	218	847
yes	*(n) %*	(221) 97.4	(190) 98.4	(207) 99.0	(209) 95.9	(827) 97.6
no	*(n) %*	(6) 2.6	(3) 1.6	(2) 1.0	(8) 3.7	(19) 2.2
missing	*n*	0	0	0	1	1
36–59 months		*Q3. Received MNP in the last 30 days?*				
total	*n*	208	232	182	196	818
yes	*(n) %*	(7) 3.4	(63) 27.2	(36) 19.8	(8) 4.1	(114) 13.9
no	*(n) %*	(200) 96.2	(167) 72.0	(142) 78.0	(188) 95.9	(697) 85.2
missing	*n*	1	2	4	0	7
		Q4. If yes to Q4, took MNP in the last 7 days?				
total	*n*	7	63	36	8	114
yes	*(n) %*	(2) 28.6	(27) 42.9	(19) 52.8	(3) 37.5	(51) 44.7
no	*(n) %*	(5) 71.4	(36) 57.1	(17) 47.2	(2) 25.0	(60) 52.6
missing	*n*	0	0	0	3	3
		Q5. Ever received MNP?				
total	*n*	208	232	182	196	818
yes	*(n) %*	(61) 29.3	(110) 47.4	(97) 53.3	(94) 48.0	(362) 44.3
no	*(n) %*	(146) 70.2	(104) 44.8	(49) 26.9	(101) 51.5	(400) 48.9
missing	*n*	1	18	36	1	56
		Q6, If yes to Q5, would like to receive MNP again?				
total	*n*	61	110	97	94	362
yes	*(n) %*	(48) 78.7	(105) 95.5	(65) 67.0	(59) 62.8	(277) 76.5
no	*(n) %*	(10) 16.4	(5) 4.5	(25) 25.8	(31) 33.0	(71) 19.6
missing	*n*	3	0	7	4	14

[19] UNHCR Operational Guidance on the Use of Special Nutritional Products to Reduce Micronutrient Deficiencies and Malnutrition in Refugee Populations. UNHCR, 2011

For LNS, in all camps, 70% of all eligible children aged 6-35 months surveyed reported to have ever received it (historical coverage). This proportion was very similar between the camps. Acceptability of LNS among the eligible population, as measured by the desire to receive the product again, was very high at 98%, being this acceptability also similar between the camps.

For MNP, a reported coverage of 14% among eligible children (aged 36-59 months) was observed for the last distribution. There were clear differences in coverage of the last distribution between the camps with Dakhla and Laayoune having the highest coverage (27% and 20%, respectively), compared to Awserd and Smara (less than 5% in both). Overall MNP uptake in the last distribution was also low at 45%, with Awserd showing the lowest uptake and Laayoune the greatest (29% and 53%, respectively).

Overall among eligible children, 44% reported to have ever received MNP. Consistent with the last distribution data, Awserd presented lower values (29%) of having ever received MNP. It is worth noting that for Dakhla and Laayoune there were a significant amount of missing values for this question making it more difficult to confidently compare historical coverage between camps. Overall, 77% reported desire to receive MNP again, with Dakhla presenting the greatest proportion (96%). Interestingly in Awserd, among those who have ever received MNP, 78% reported desire to receive again the product. This finding is inconsistent with the overall pattern observed in Awserd showing the lowest coverage (for last distribution and historical), and lowest uptake. Dakhla on the other hand showed a consistent and more positive pattern, with better coverage, uptake and acceptability.

3.5.2. Impact Indicators – Change in Anaemia Prevalence in Children Aged 6-59 Months

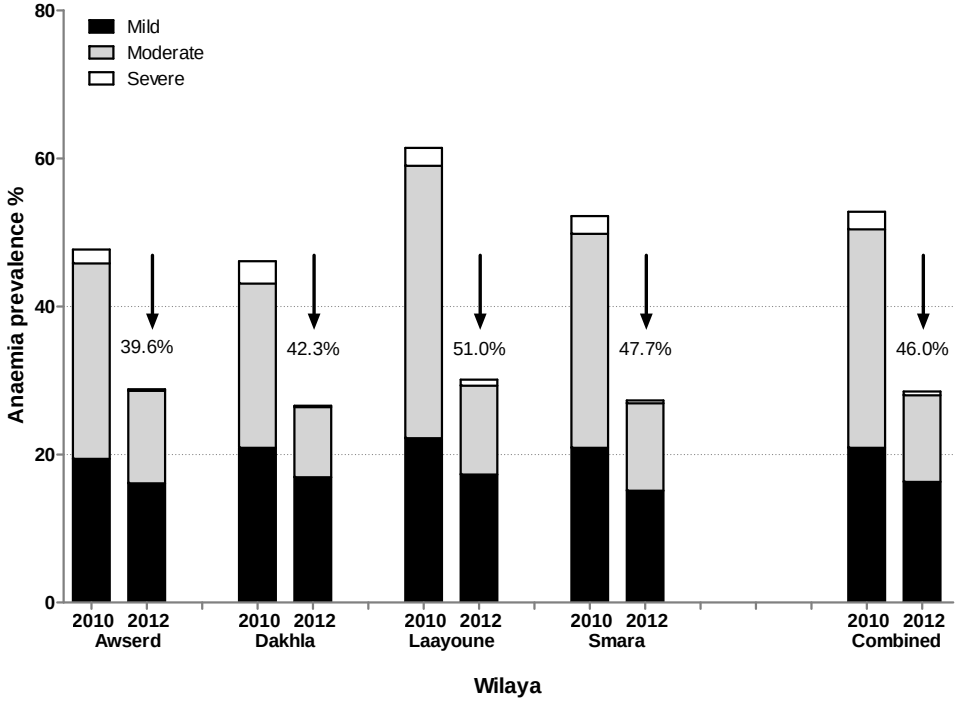

Figure 3.28. Two-year anaemia prevalence change in children aged 6-59 months.
Combined results are the aggregated weighted prevalence. Arrows indicate the relative change in proportions.

Overall, there was a high and significant reduction of anaemia in the camps from 52.8% (95% CI: 49.1 – 56.6) in 2010 to 28.4% (95% CI: 25.7 – 31.0) in 2012 (a 24.5% difference, 95% CI: 19.9 – 29.0). The overall relative reduction of anaemia between 2010 and 2012 was 46% as observed in Figure 3.28. All camps

showed a significant reduction with the greatest relative reduction observed in Laayoune (51%) and the lowest in Awserd (40%). The reduction observed shifted the public health significance of anaemia prevalence in children from a high to a medium level.

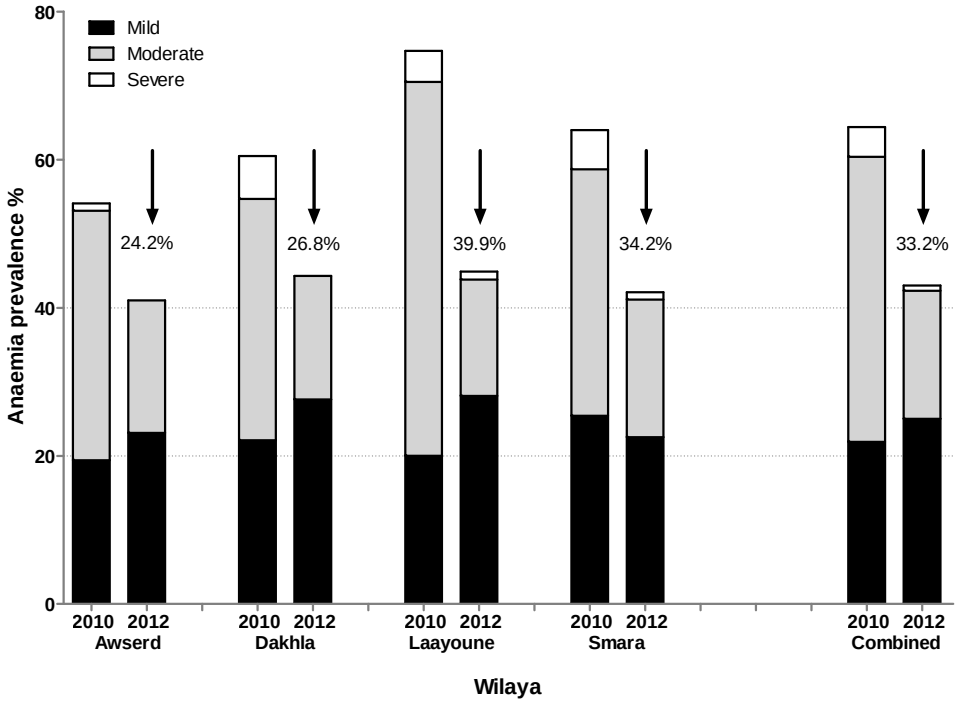

Figure 3.29. Two-year anaemia prevalence change in children aged 6-23 months.
Combined results are the aggregated weighted prevalence. Arrows indicate the relative change in proportions.

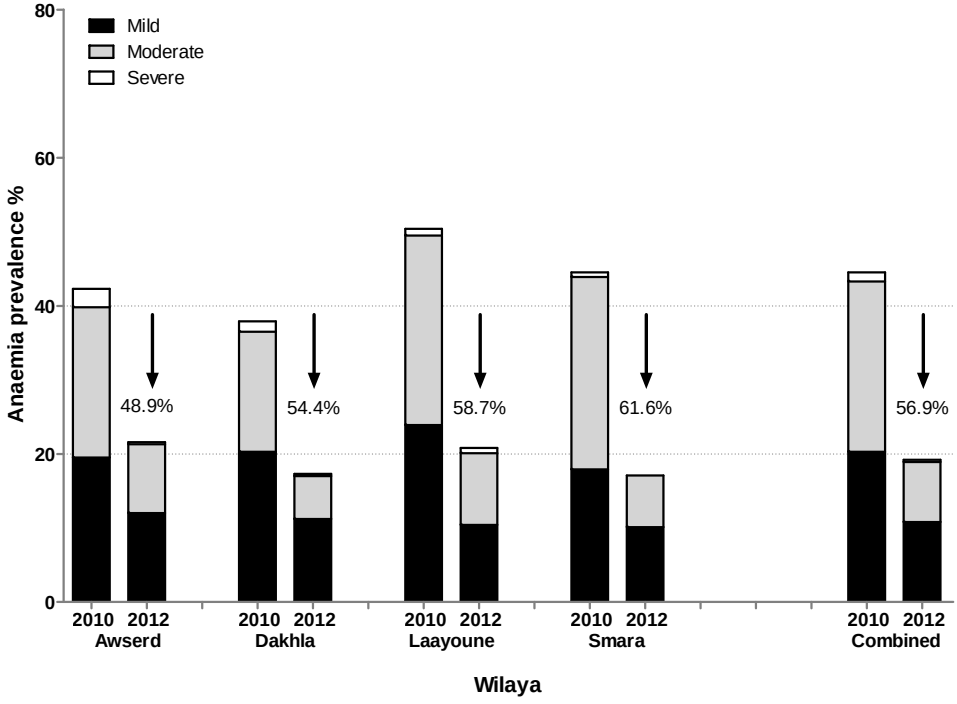

Figure 3.30. Two-year anaemia prevalence change in children aged 24-59 months.
Combined results are the aggregated weighted prevalence. Arrows indicate the change in relative proportions.

The reduction in anaemia prevalence in children aged 6-59 months was also observed after separating the

children into a younger and an older age categories, as shown in Figures 3.29 and 3.30. Again, and consistently in both age groups, the lowest relative reduction in anaemia prevalence was observed in Awserd.

Figure 3.31 aims at combining the data obtained of programme coverage and anaemia trends between the ages of 6 to 59 months in children (focusing only on moderate and severe anaemia). In the figure we observed that there is a minimal amount of children below the ages of 6 months (a non-eligible population) that reported to have ever received LNS. After 6 months the proportion of those reporting to having ever received LNS increases, and from the age of 14 months up to 57 months this proportion remains above 70%. This contrasts with MNP coverage. For instance, an observable proportion of children aged <36 months reported to have, both, ever received MNP and received it in the last distribution. In addition, only amongst those aged >50 months the historical coverage of MNP is reported to be above 50%, whereas for those aged >42 months, the last distribution coverage is reported to be about 20%.

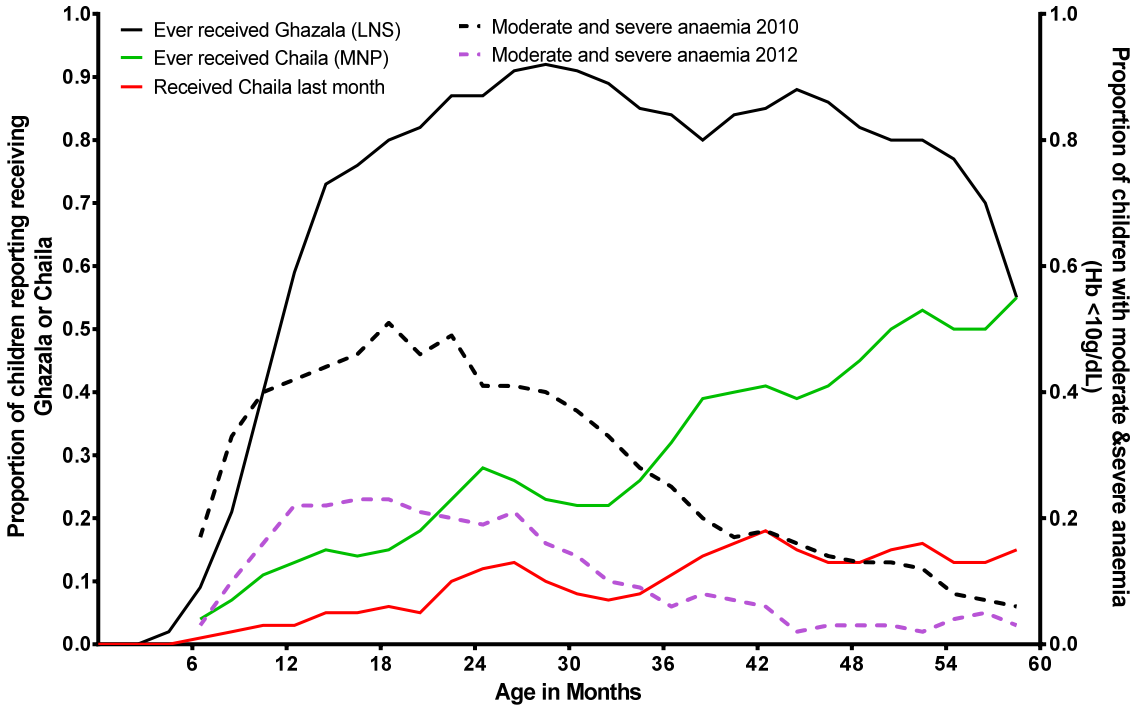

Figure 3.31. Comparison between combined moderate and severe anaemia trends and reported coverage of the Anaemia and Stunting Reduction Programme.

In the same figure we can observe that a difference, in the combined moderate and severe anaemia prevalence trend (between 2010 and 2012), is already present at 6 months of age. For both anaemia prevalence trends, anaemia prevalence increases with age reaching its maximum prevalence at about 24 months. Yet, the above mentioned difference observed at 6 months of age increases with age, up to the age of 24 months. Afterwards this observed difference reduces with age, especially after 36 months of age, when the moderate and severe anaemia prevalence in 2012 is small.

3.5.3. Impact Indicators – Change in Stunting Prevalence in Children Aged 6-59 Months

Overall, there was a small but significant reduction in stunting prevalence between 2010 and 2012, from 29.7% (95% CI: 26.9 – 32.5) to 25.2% (95% CI: 22.8 – 27.6), respectively (a 4.5% difference, 95% CI: 0.9 – 8.2). This amounts, overall, to a relative reduction of 15% as shown in Figure 3.32. Interestingly, this significant reduction of stunting prevalence was not present in all camps, as it was only observed in Dakhla and Laayoune, with a difference of 9.2% (95% CI: 2.6 – 15.7) and 10.5% (95% CI: 2.7 – 18.3), respectively.

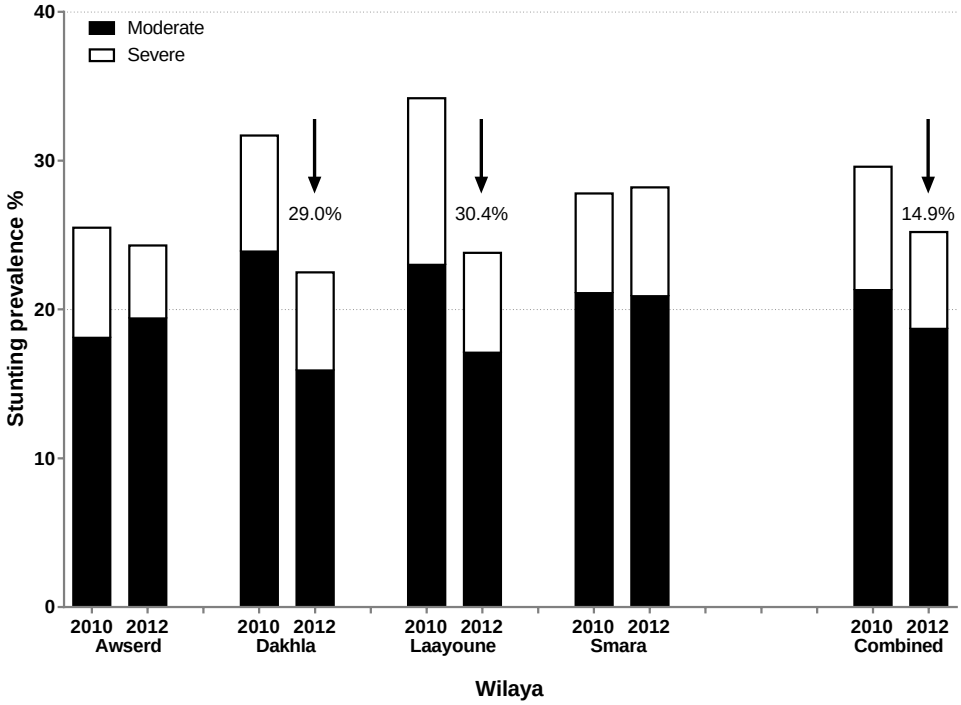

Figure 3.32 Two-year stunting prevalence change in children aged 6-59 months.
Combined results are the aggregated weighted prevalence. Arrows indicate the relative change in proportions.

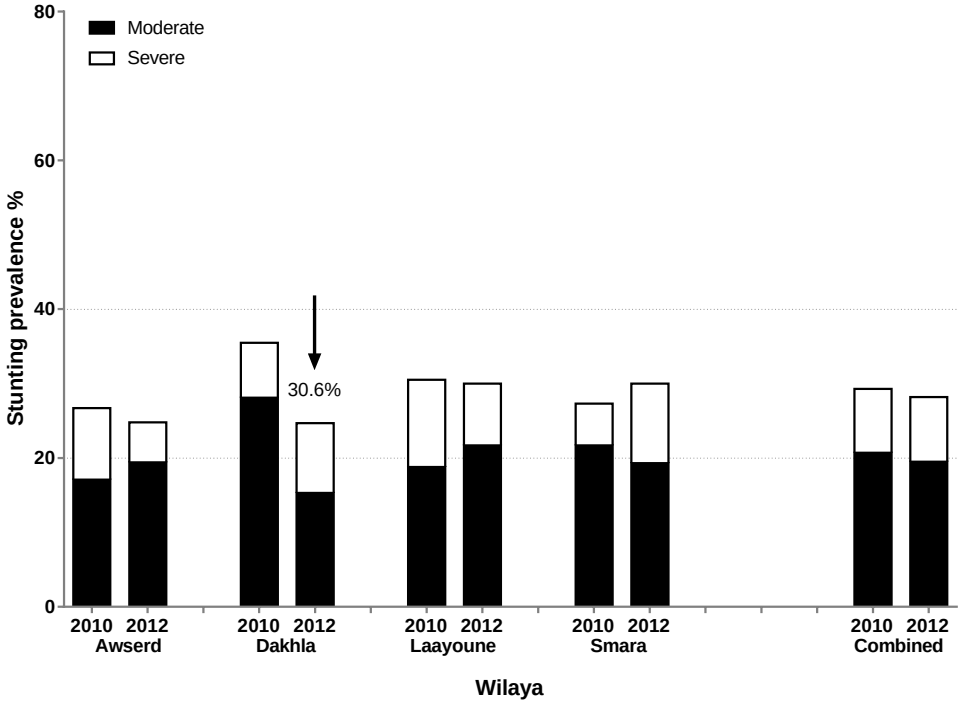

Figure 3.33. Two-year stunting prevalence change in children aged 6-23 months.
Combined results are the aggregated weighted prevalence. Arrows indicate the relative change in proportions.

The overall reduction of stunting prevalence in children aged 6-59 months, and that observed in Dakhla and Laayoune was not equally observed after separating the children into a younger and an older age categories,

as shown in figures 3.32 and 3.33.

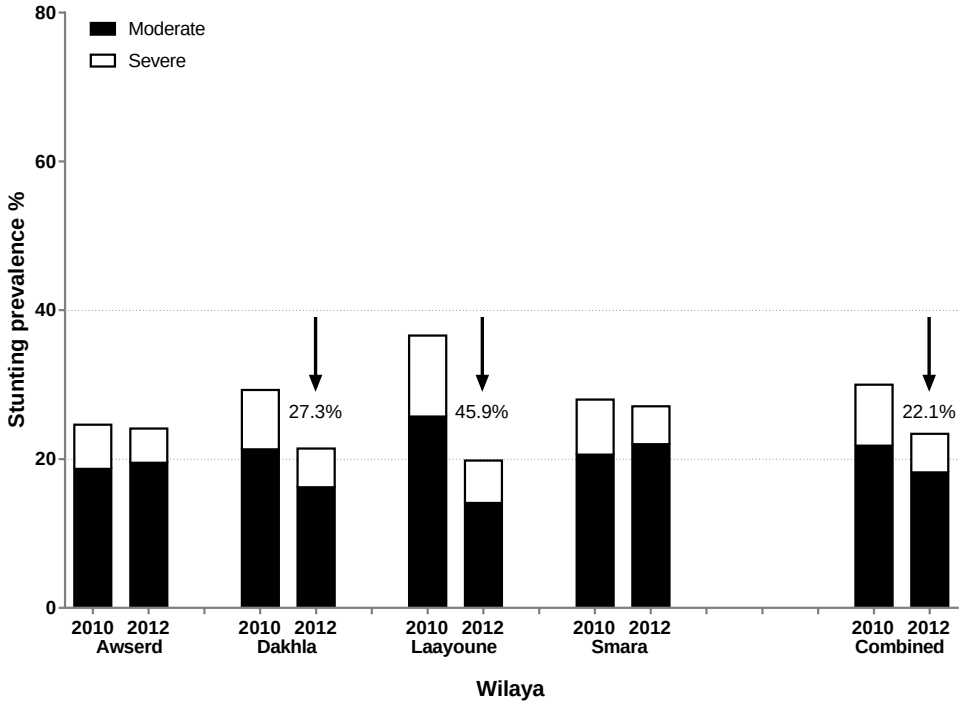

Figure 3.34. Two-year stunting prevalence change in children aged 24-59 months.
Combined results are the weighted prevalence. Arrows indicate the change in relative proportions.

Only among children aged 6-24 months living in Dakhla, a relative reduction of 31% was observed, but no reduction was observed after the data from all camps was aggregated and weighted (Figure 3.33). On the other hand, a relative reduction of stunting prevalence was observed among children aged 24-59months from Dakhla and Laayoune (Figure 3.34) and this reduction remained after the data was aggregated and weighted.

3.5.4. Impact Indicators – Change in GAM Prevalence in Children Aged 6-59 Months

Overall, there was no change in the GAM prevalence in the camps (Figure 3.35). Yet, at the camp level, changes were observed where Dakhla and Smara camps experienced a significant reduction of GAM prevalence, while Laayoune saw a significant increase. Given the lack of consistency in the changes observed in GAM prevalence, it seems unlikely for them to be associated to programme distributing LNS or MNP.

3.5.5. Coverage and Acceptability Indicators – Pregnant and Lactating Women Aged 15-49 Years

The reported coverage and usage among PLW for the distribution of iron and MNP is shown in Table 3.7. Overall the coverage of MNP is slightly greater than that of iron for both, pregnant and lactating women; however, both programmes have very low levels of reported coverage.

Reported usage of both iron supplementation and MNP was greater among lactating women than among pregnant. In addition, despite MNP having slightly greater coverage in both target groups, the reported usage is lower among pregnant women compared to iron supplementation. A similar pattern of lactating women reporting higher coverage for MNP was observed for reported historical coverage (ever received). For both groups acceptability of MNP, as measured by the reported desire to receive again the commodity, was high.

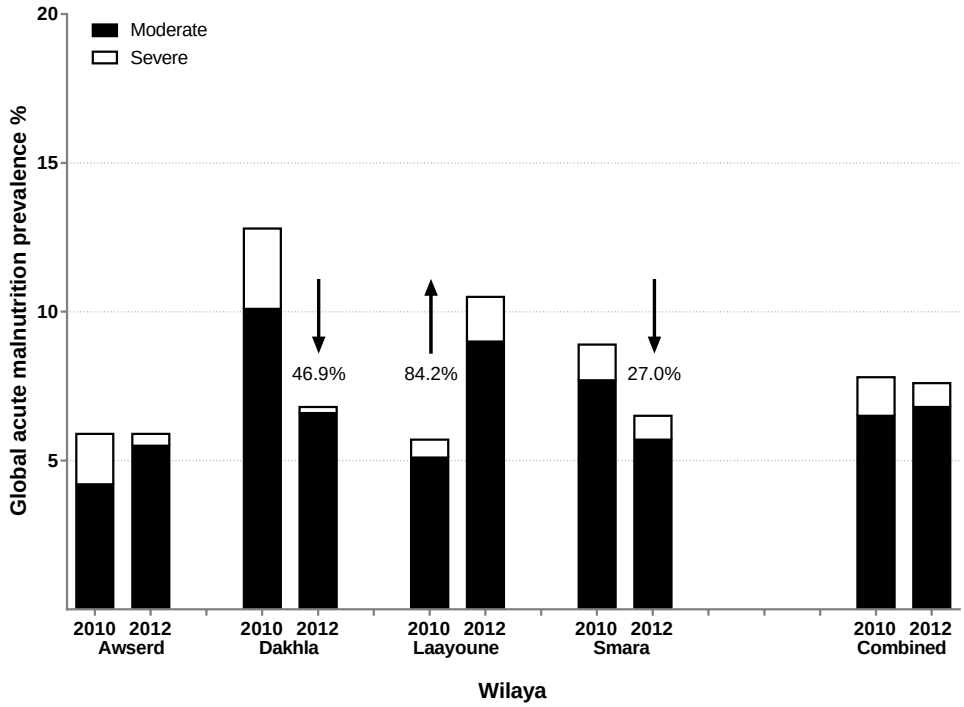

Figure 3.35. Two-year global acute malnutrition prevalence change in children aged 6-59 months. Combined results are the weighted prevalence. Arrows indicate the relative change in proportions.

Table 3.7. Coverage and acceptability indicators for the Anaemia and Stunting Reduction programme – Pregnant and lactating women aged 15-49 years.

	Pregnant				Lactating			
	yes (n) %	*no (n) %*	*missing n*	*total n*	*yes (n) %*	*no (n) %*	*missing n*	*total n*
Q1. Currently receiving oral iron?								
	(16) 14.4	(92) 82.9	3	111	(35) 16.1	(177) 81.6	5	217
Q2. If yes to Q1, took oral iron yesterday?								
	(9) 56.3	(4) 25.0	3	16	(24) 68.6	(11) 31.4	0	35
Q3, Received MNP in the last 30 days?								
	(24) 21.6	(80) 72.1	7	111	(50) 23.0	(155) 71.4	12	217
Q4. If yes to Q3, took MNP in the last 7 days?								
	(8) 33.3	(15) 62.5	1	24	(32) 64.0	(18) 36.0	0	50
Q5. Ever received MNP?								
	(63) 56.8	(33) 29.7	15	111	(163) 75.1	(42) 19.4	12	217
Q6. If yes to Q5, would like to receive MNP again?								
	(58) 92.1	(4) 6.3	1	63	(144) 88.3	(18) 11.0	1	163

3.5.6. Change in Anaemia Prevalence in Pregnant and Lactating Women Aged 15-49 Years

Comparisons between 2010 and 2012 of anaemia prevalence in PLW are shown in Figure 3.36. Overall, anaemia prevalence among pregnant women was similar between the two surveys. For lactating women, however, there was a significant difference in the anaemia prevalence; a 12.3% difference (95% CI: 3.5 – 21.2), equivalent to an 18% relative reduction.

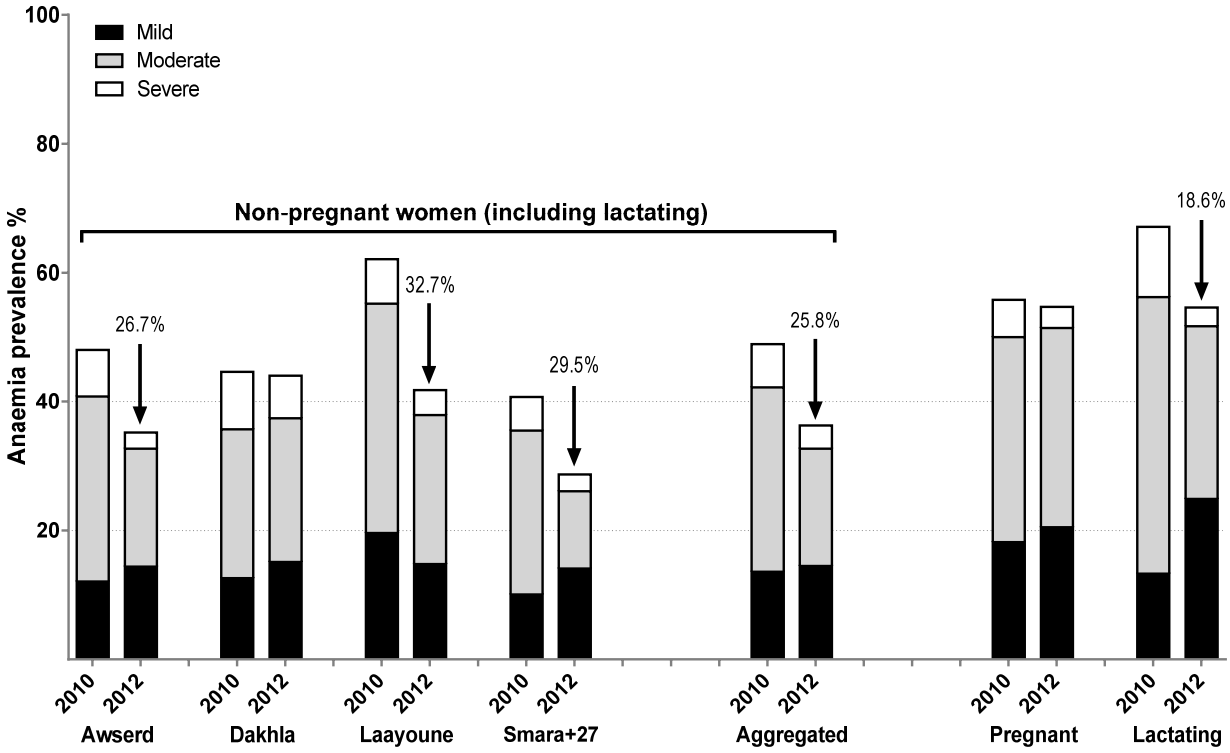

Figure 3.36. Two-year prevalence change of anaemia in women of childbearing age (15-49 years) Arrows indicate the relative change in proportions.

It is important to acknowledge the limitations of comparing the value of anaemia prevalence for PLW between 2010 and 2012. First for pregnant women no data was collected regarding gestational age of the developing offspring. The lack of gestational age data does not allow for a more meaningful comparison as haemoglobin values do changes as pregnancy unfolds. Likewise, no data was collected on the time gap since delivery among the lactating women, which would likely also impact on anaemia prevalence. Nonetheless, both surveys utilised a two stage random selection approach, so both factors (gestational age and time since delivery) could potentially remain equally distributed within the survey samples.

Additionally, it is important to analyse these changes in anaemia prevalence among PLW, when compared with changes in anaemia prevalence among women of childbearing age (also shown in Figure 3.36). With the exception of Dakhla camp, there was a significant reduction in anaemia prevalence for non-pregnant women of childbearing age in all camps, ranging from 27% to 33%, to an overall 26% significant reduction.

3.6. HOUSEHOLD FOOD CONSUMPTION SCORE

FCS data was available for a total of 2,024 households of which 54 had incomplete data to calculate the FCS. A total of 1,970 households were included in this analysis.

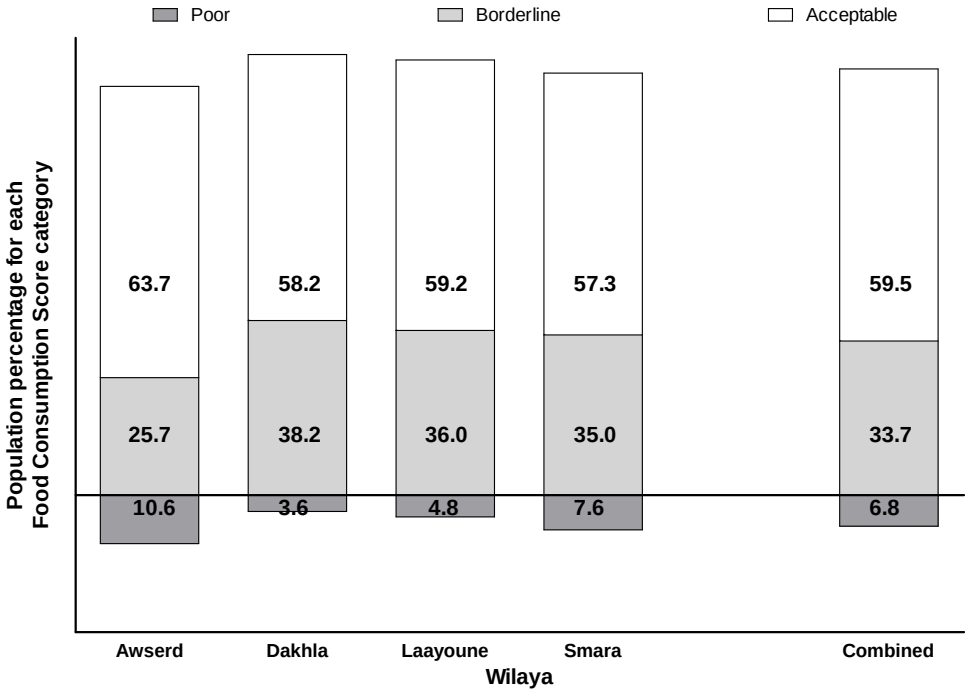

Figure 3.37. Household food consumption score by camp

Overall the weighted proportion of households classified as having an acceptable food consumption score is 59% ranging from 57% in Smara to 64% in Awserd. The data is described graphically in Figure 3.37.

A breakup of all the data included in this analysis of food groups consumed by the households is shown in Figure 3.38. The general pattern of consumption reported is one of daily consumption of cereals, sugary products, and oils and fat; where the majority of households consume tubers less than 4 days a week, but eat beans, peas or nuts more than 4 days a week; where the majority of households consume neither fruits nor vegetables throughout the week; but where the majority of households reported to consume animal products less than three days a week. It is important to note that the survey data was collected during the immediate period following Ramadan, which could potentially explain the higher than expected consumption of animal products; as during Ramadan donations of animal products occur.

Comparisons with the 2010 FCS values are shown in Figure 3.39. Overall, there was a minimal improvement of food security in the camps as proxy by this indicator. Nonetheless, small differences were observed at the camp level, with observable improvements in Dakhla and Smara camps. Yet, none of these differences reached statistical significance.

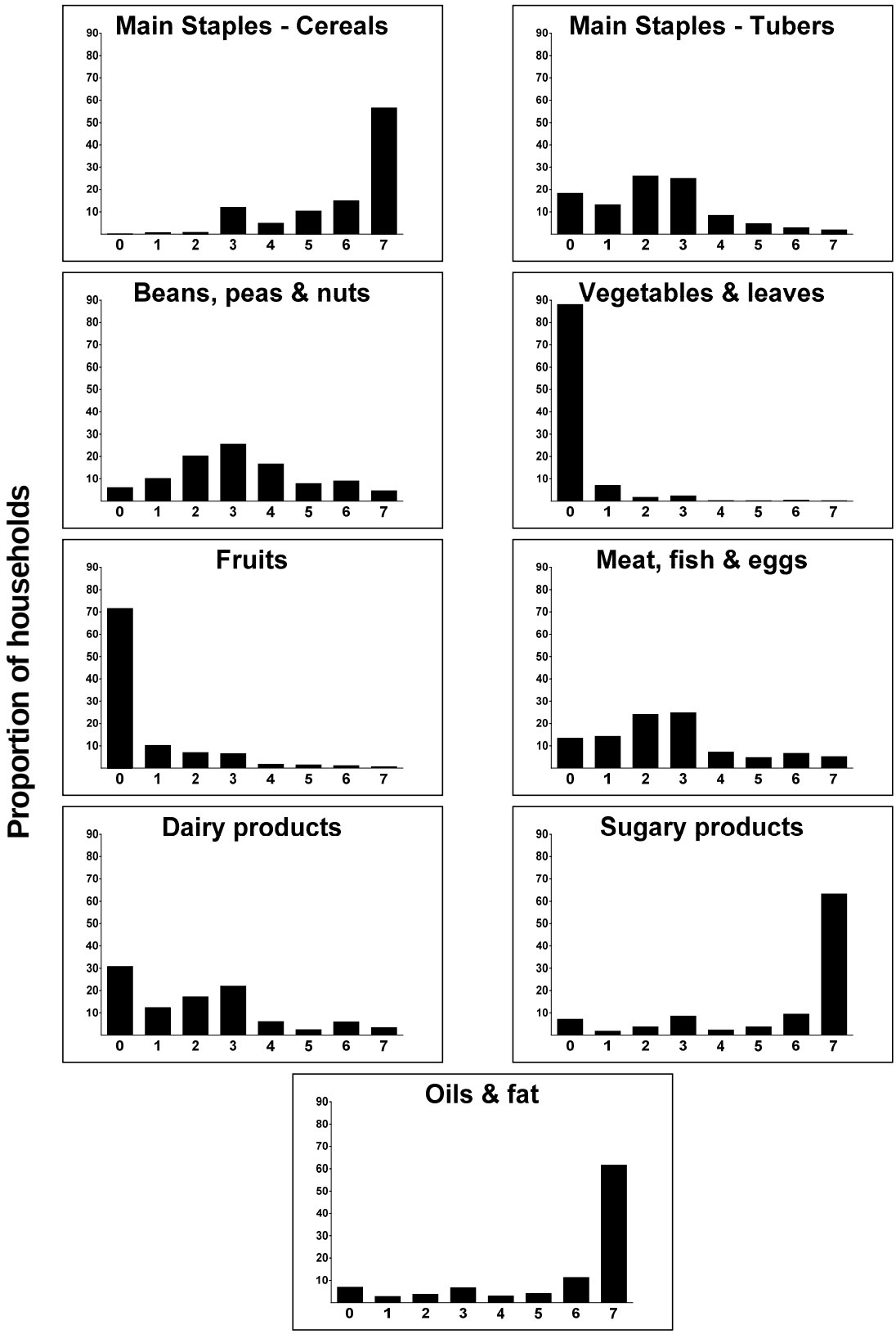

Figure 3.38. Reported weekly consumption (in days) of different food groups

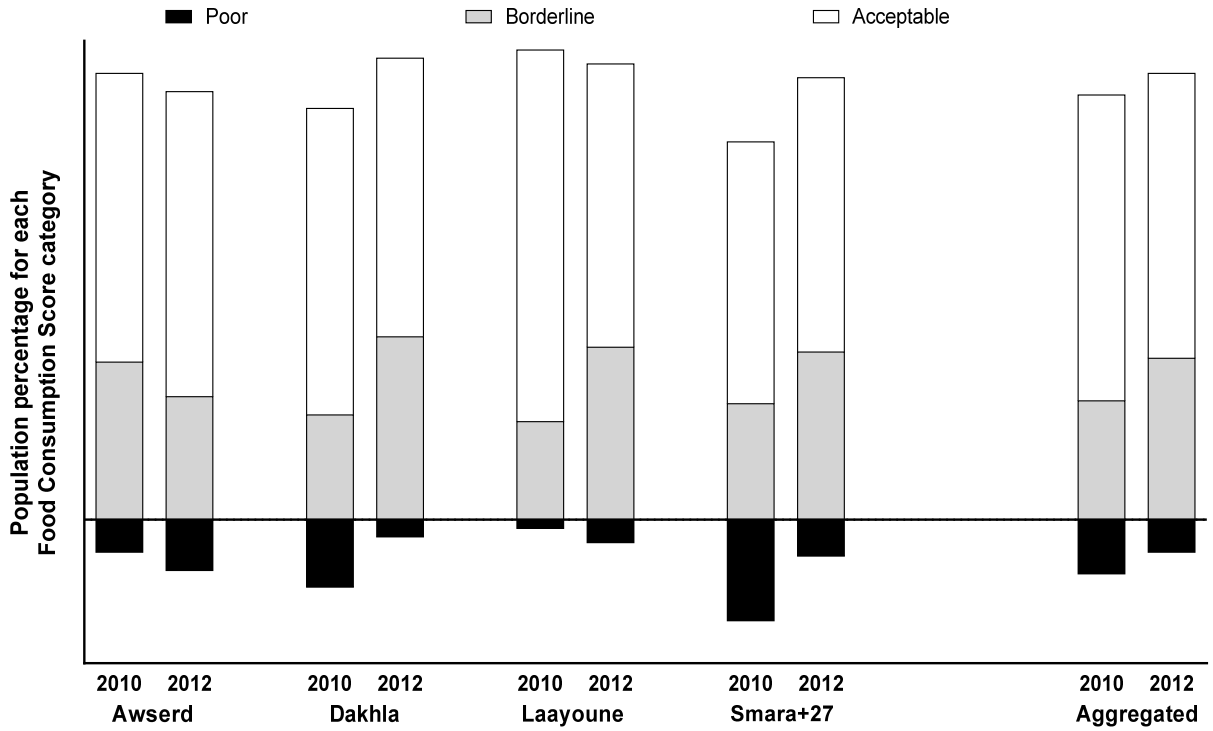

Figure 3.39. Two-year change of food consumption scores by camp.

IV. SECONDARY DATA RESULTS

4.1. UNDERLYING CAUSES OF MALNUTRITION

Additional secondary data was available for two known underlying causes of malnutrition, namely unhealthy environment and household food insecurity.

4.1.1. Unhealthy Environment - Water, Sanitation and Hygiene (WASH)

WASH is considered an important aspect with direct impact on the nutritional status, mostly through increasing the load of infectious disease. WASH has been in the past highlighted as one of the main public health concerns in this refugee operation[20].

Household level – As described in the latest WASH mission report[21], at present, there are bad practices in water storage at the household level. It is reported that 37% of the metallic water containers (79% of household water containers are metallic) are inadequate for drinking use, and that 62% of the population is currently drinking water at risk of contamination. This situation is reported to be worse in the camps of Laayoune and Awserd. Likewise it is reported that currently there is an insufficient quantity of water available at most households.

Hygiene practices – At the time of writing there was no data available regarding hygiene practices, such as hand washing, among the refugees. Likewise, there is scarce understanding about traditional practices, such as food handling, that could potentially have a negative impact on hygiene and health. For example, anecdotal data suggest the traditional use of freshly warm camel's milk as laxatives.

Public infrastructure – Also reported in the latest WASH mission report, current sanitation ratio in schools is poor with one toilet for every 100 students. A similar situation is likely to be present in health centres.

4.1.2. Household Food Insecurity

General Food Distribution Ration and the Food Security Stock

On average, the average actual energy provided by the basic food ration has increased since 2007 and has remained stable above 2000 kcal since 2009 (1800 kcal in 2007 and 1747 kcal in 2008, to 2112 kcal in 2009, 2056 kcal in 2010, 2115 kcal in 2011, and 2020[22] kcal in 2012). Figure 4.1 illustrates the total energy of the food ration (basic + additional commodities) supplied in the last four years (2009 – 2012, data updated until November 2012), comprising WFP and other donors' commodities.

Regarding total energy provision, as observed in Figure 4.1 and taken as a cut-off value of 2100±10% kcal, a total of nine and three distributions has provided energy above and below that threshold, respectively. Of those distributions providing above the +10% threshold, four occurred during 2009, two during 2010 and also 2011, and only one in 2012. Conversely, the three distribution providing below the -10% threshold have occurred in the last two years. This pattern is suggestive of an increasing uncertainty affecting the food distribution pipeline to secure the 2100 kcal minimum requirement.

In is worth noting the role that commodities supplied from other donors (additional to the basic food basket commodities) has in ensuring that the 2100 kcal minimum requirement is met. As observed in Figure 4.1 only in three of the six distributions (five of these distributions occurred in the last two years), where the energy provided by basic food basket commodities alone is below the -10% threshold, the total energy provided by all commodities remained below the -10% threshold of the 2100 kcal minimum requirement. Conversely, of the nine distributions abovementioned, providing energy above the 2100 +10% kcal

[20] MdM, WFP, NCA, AUC. Nutritional and Food Security Survey among the Saharawi Refugees in Camps in Tindouf, Algeria. October 2008
[21] Algeria, Saharaui camps in Tindouf area, WASH support mission – October, 2012. Mission report
[22] Average up to November 2012.

threshold, only three seemed to be attributable to the energy provided by the basic food basket commodities.

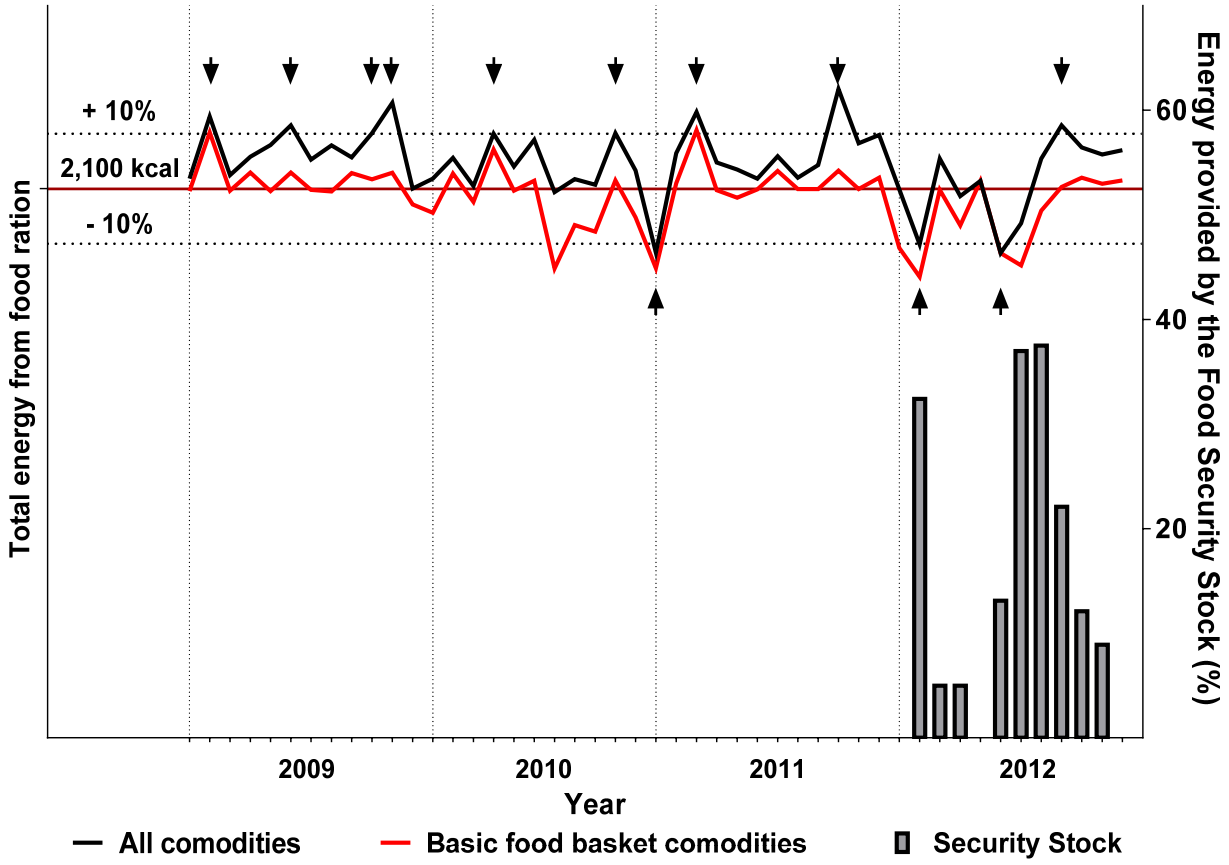

Figure 4.1. Food ration's energy provision (basic and all commodities) for the period 2009-2012.
The arrows represent when the total energy content of the distributions exceeded ±10% the 2100 kcal minimum requirement. The bars represent the proportion of the total energy content of the distributions provided by Food Security Stock commodities.

Since becoming functional in January 2012, the food security stock has played an important role in ensuring that the 2100 kcal minimum requirement is met. In only two out of eleven distributions, since January 2012, the food security stock has not contributed energy to the food distribution, while in four out of eleven distributions it has contributed more than 20% of the total energy provided by the food ration. The observed food security stock energy contributions, towards meeting the minimum energy requirements, reinforces the view of an increasing uncertainty to meet these requirements, faced by WFP and other donors, while also demonstrating the importance of putting in place strategies to counteract, or at least minimise, the effects of this uncertainty on the food distribution pipeline.

Food Diversity

The diversity of cereals and pulses, two of the main commodities in the GFD, is shown in Table 4.1. Overall, diversity of cereals increased in 2012 compared to 2011 with an average of 4.2 and 3.3 commodities per month, respectively. On the other hand the diversity of pulses has decreased from 1.9 items per month to 1.5 items in 2011 and 2012, respectively.

Table 4.1. Number items of cereals and pulses distributed during the period of 2011-2012 *(empty spaces are 0).*

	2011													2012											
Cereals	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Mean**	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	**Mean**
Wheat	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
Barley															x	x		x	x	x	x	x	x	x	
Rice	x	x	x	x	x	x	x	x	x	x	x	x		x			x	x	x	x			x	x	
CSB+	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x	
Gofio									x	x	x	x		x	x	x		x	x	x	x	x	x	x	
Total items	3	3	3	3	3	3	3	3	4	4	4	4	**3.3**	3	3	4	3	5	5	5	4	4	5	5	**4.2**
Pulses																									
Lentils	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x		
Beans	x	x	x	x	x	x	x	x	x	x	x										x	x	x		
Chickpeas																						x	x	x	
Total items	2	2	2	2	2	2	2	2	2	2	2	1	**1.9**	1	1	1	1	1	1	1	2	3	3	1	**1.5**

Table 4.2. Fresh food distribution in kg/ration/month during the period of 2011-2012 *(empty spaces are 0)*.

Fresh	2011													2012											
products	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Mean**	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	**Mean**
Potatoes, kg	1.1	1.2	1.1	1.1	1.1	1.0	1.0	2.0	1.0	1.0	1.0	1.5	**1.2**	1.0	1.0	1.5	1.0	2.0	1.0	2.9	1.0	1.5	1.0	1.0	**1.0**
Carrots, kg	1.1	0.6	1.1	1.2			0.5	0.5			1.0	1.0	**0.6**	1.0	1.0	1.0								0.5	**0.3**
Onions, kg	1.1	1.2	1.1	1.1	1.1	1.0	1.0	2.0	1.0	1.0	1.0	1.0	**1.1**	1.0	1.0	1.2	1.0	2.0	1.0	2.9	1.0	1.0	1.0	1.0	**1.0**
Tomatoes, kg						1.0							**0.1**						0.5			0.5			**0.0**
Dates, kg								0.5	1.5				**0.2**						0.5	1.8	0.7			0.5	**0.3**
Oranges, kg	0.6	1.4	0.6	0.6								1.9	**0.4**	0.5											**0.0**
Apples, kg						0.5		0.5	1.0	1.0			**0.2**				0.5	0.5	0.5		0.5			0.5	**0.1**
Bananas, kg													**0.0**		0.5										**0.0**
Pears, kg													**0.0**									1.0	0.5		**0.0**
Meat, kg								0.8					**0.0**							0.3			0.5		**0.1**
Total, kg	**3.9**	**4.4**	**3.9**	**4.0**	**2.1**	**3.5**	**2.4**	**5.4**	**4.5**	**2.9**	**3.0**	**5.4**	**3.81**	**3.4**	**3.4**	**3.7**	**2.5**	**4.4**	**3.6**	**7.9**	**3.1**	**4.0**	**3.0**	**3.5**	**3.86**
Number of fresh products	**4**	**4**	**4**	**4**	**2**	**4**	**3**	**5**	**4**	**3**	**3**	**4**	**3.7**	**4**	**4**	**3**	**3**	**3**	**4**	**4**	**4**	**4**	**4**	**5**	**3.8**

Fresh food

Compared to cereals and pulses, fresh food distributions have remained stable in the last two years (see Table 4.2), even compared with the period of 2008-2010[23]. Overall, there is an average of 3.8kg of fresh food distributed per month, with potatoes and onions accounting for the majority of these fresh foods. These values contrast with the recommendation of at least 10kg/month[24]

Macro and micro-nutrient assessment of the General Food Distribution

All the reported GFD commodities, distributed during 2011 and 2012, were analysed from macro- and micro-nutrient content using NutVal version 3.0. Overall, the GFD covers above 20% of the protein dietary requirements (see Figure 4.2). Yet, it is important to note that these requirements are met by protein of vegetable origin, hence of lower biological value. In addition, at most times the fat dietary requirements are covered.

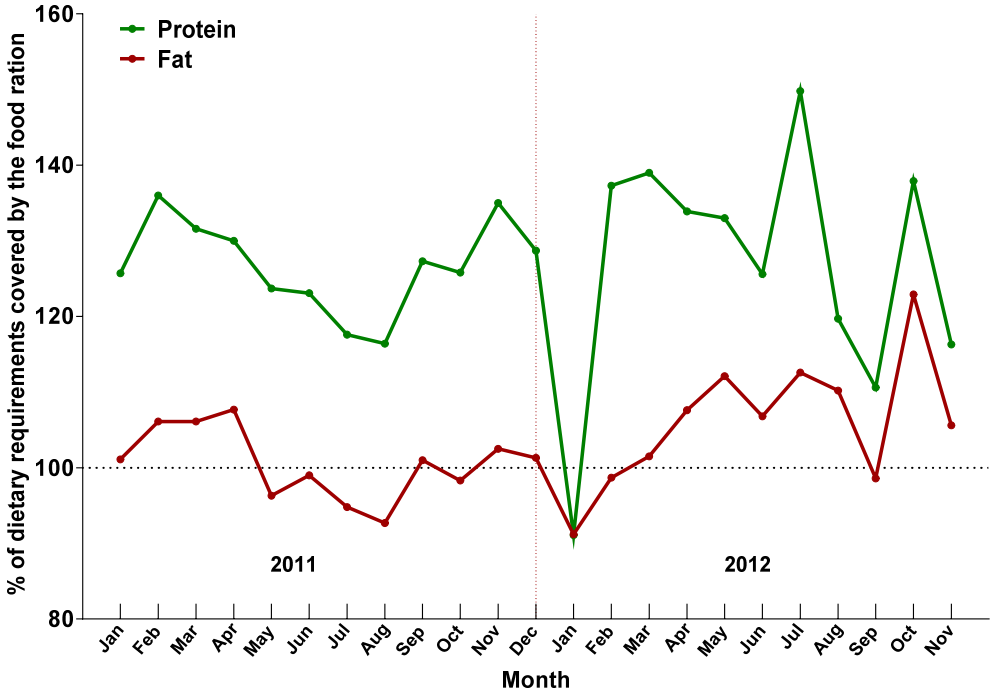

Figure 4.2. Macronutrient content of the General Food Distribution in 2011-2012

The micronutrient provision of the diet is less stable in its adequacy for covering dietary requirements as shown in Figures 4.3 and 4.4 below. Regarding minerals and trace elements, specifically calcium and iron, the GFD met the dietary requirements only during three brief periods. These three periods coincide with the distribution of fortified wheat flour and vegetable oil; both fortified using WFP and USAID specifications. Yet, at most times the dietary requirements of calcium and iron are not met by the GFD. On the other hand, the iodine content of the GFD has been kept at all times low (<15% of the dietary requirements), given the high concentration of this trace element.

[23] An average of 3.4 and 3.6 items distributed monthly for 2009 and 2010, respectively.
[24] WSRC / CISP. Food Aid Western Sahara Red Crescent "Mesa" presentation 14-15 November 2010. Adapted Food basket Steering Group.

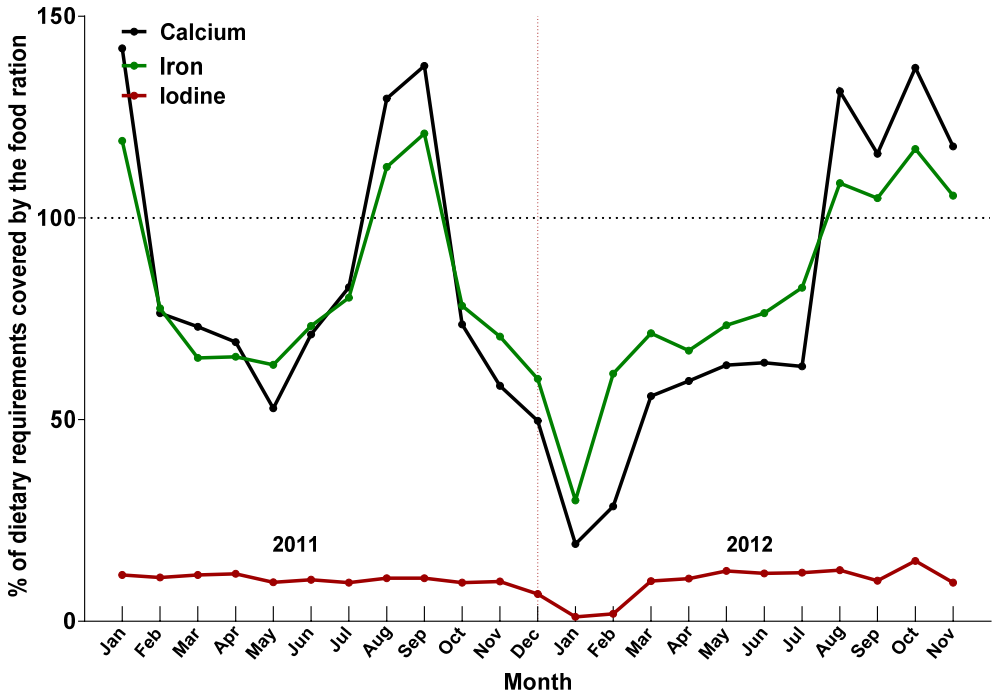

Figure 4.3. Mineral and trace elements content of the General Food Distribution in 2011-2012

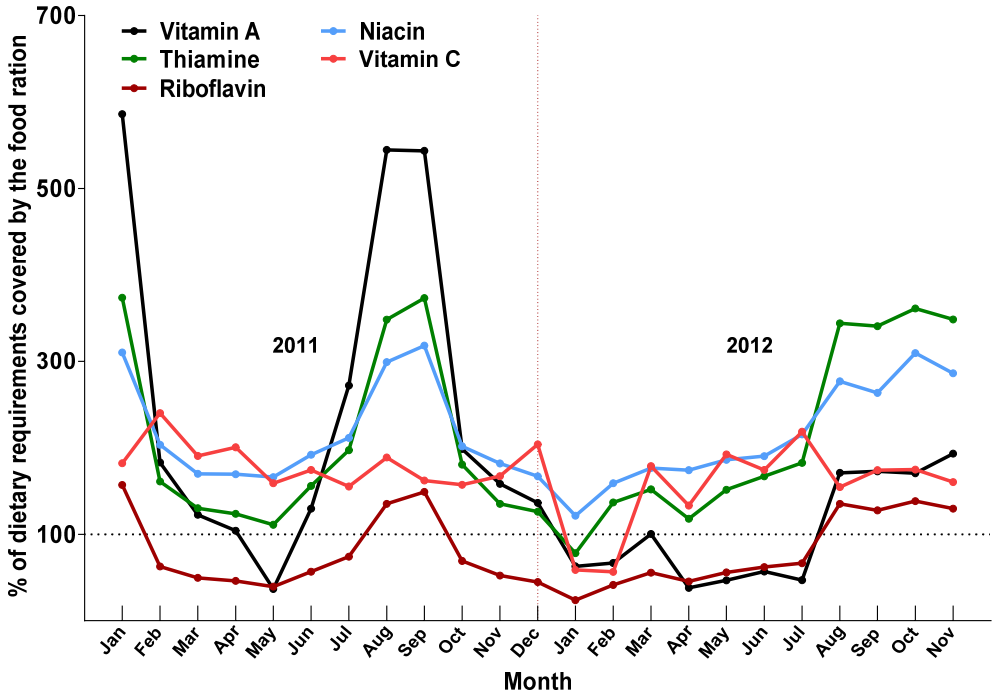

Figure 4.4. Vitamin content of the General Food Distribution in 2011-2012

Like minerals and trace elements, most of the vitamin content of the GFD lacks stability in its adequacy to meet dietary requirements. This lack of stability can be observed in Figure 4.4. Overall and at most times, the dietary requirements for niacin, thiamine, and vitamin C are met by the GFD, This contrast the riboflavin content that at most times does not met the dietary requirements. Vitamin A is the vitamin that shows the greatest instability to meet dietary requirements, where during two brief periods in 2011, it reached the upper

tolerable levels of intake (just below of 3,000 xxx); to later in the first half of 2012 failed to meet the dietary requirements. It is worth nothing that the three peaks observed of greater percentage values of micronutrient content coincides with the inclusion of fortified commodities into the GFD.

4.2. MANAGEMENT OF ACUTE MALNUTRITION

In 2012, it was reported that a monthly average of 7,859 (ranging from 7,506 to 8,362) children, aged 6-59 months and suffering MAM, were benefiting from the targeted supplementary feeding programme. Yet, it is difficult to evaluate the performance and impact of this activity as the reporting of the programme performace indicators is considered unreliable (despite an in-depth technical revision of protocols performed in 2009) and contradict other more reliable results.

For instance, for the year 2012 the average reported cured rate was 86%, very similar to that reported in 2010 at 84%[25]. Yet, the 2012 average reported transfer rate from MAM to SAM programme (an indicator of a continued worsening nutritional status) was 14%, noticibly higher than that reported in 2010 of 7%[26]. These reported 2012 transfer rates were generally greater than those in 2010 throughout the year (see Figure 4.5). In addition, the reported re-admission rates during 2012 were in all months above 30%[27]. Taken together and assuming that these performance indicators are reliable, they strongly suggest a potential overall worsening of the nutritional status of the population with a significant proportion of vulnerable children in the community relapsing into MAM throughout the year, and a greater porportion of children, compared with 2010, whose nutritional status continues to worsen after being admitted to MAM programme care. Consequently, it could be expected to also observed greater prevalence values of SAM. Yet, and despite this potential worsening nutrition situation, the MAM care programme continues to achive similar high performance indicators of cured rates above 75%.

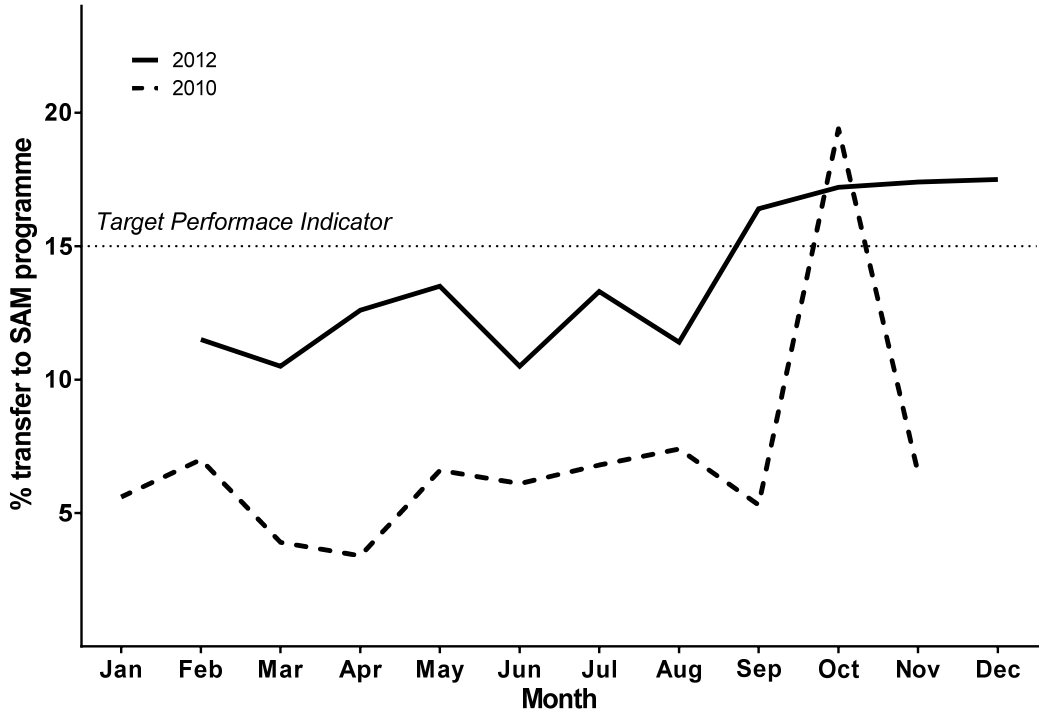

Figure 4.5. Monthly transfers from MAM to SAM treatment programmes, 2010 & 2012. Both years suggest an increased proportion of transfers during the autumn period

[25] Both above the target performance indicator of cured rates above 75%
[26] Both below the target performance indicator of transfer rates below 15%
[27] Significantly higher than the target performance indicator of re-admission rates below 5%

Again, taken together, these performace indicators are generally incompatible with the absence of change of the GAM prevalence observed between 2010 and 2012 surveys, as well as the overall reduction in the anaemia and stunting prevalence since 2010. Likewise, they are incompatible with the 12-year relationship pattern observed between the total aggregated energy provided by the GFD and its relative stability, and the changing prevalence of the different types of acute manutrition during this period (see Figure 4.6)[28].

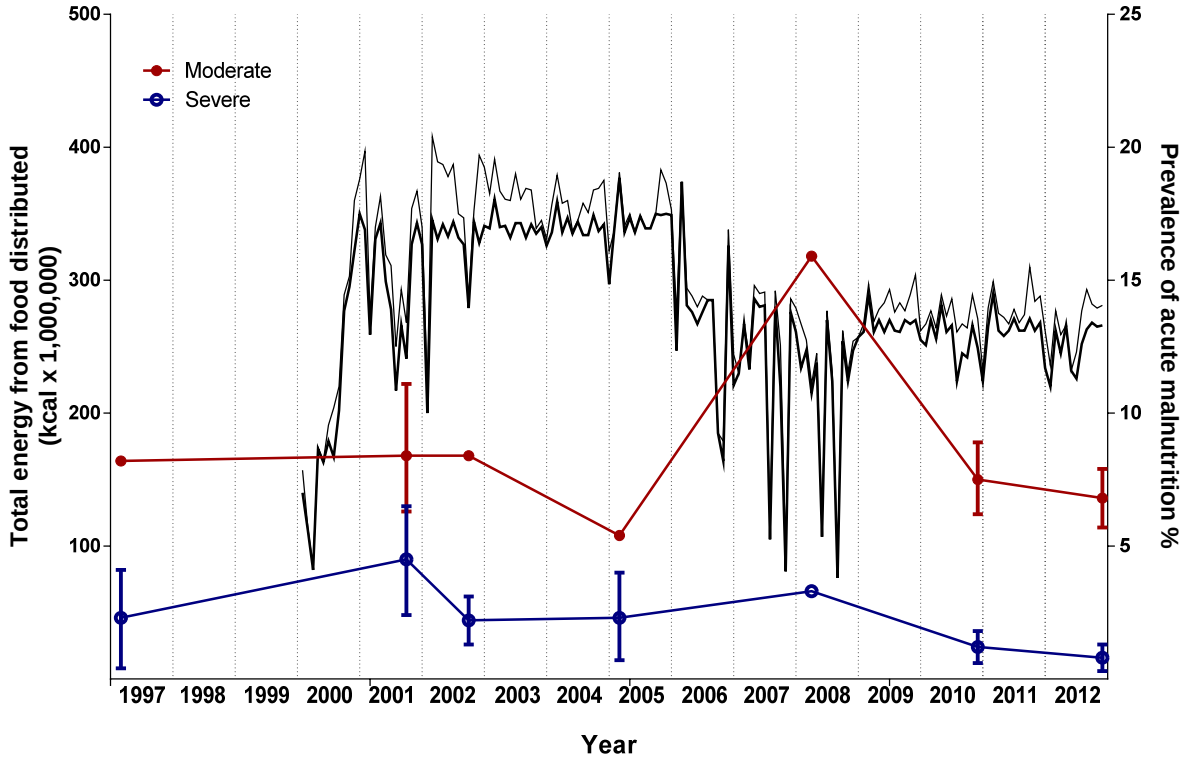

Figure 4.6. Total energy distributed from the GFD and prevalence of MAM and SAM in children aged 6-59 months. 1997-2010

Unfortunately, at the time of writing, performance indicators for the care of SAM were not available, making it also difficult to evaluate its performance. Furthermore, absence of these performance indicators make it hard to interpret the reliability of the high transfers rates reported from MAM care. At present, scarce linkages between the management of MAM and the management of SAM exist. It is considered imperative that effective mechanisms of coordination between the MAM and SAM care components are developed for and adequate monitoring of process and for a reliable impact evaluation.

4.3. EMERGING NUTRITION-RELATED PROBLEMS

4.3.1. Obesity among Women of Childbearing Age

As reported in the 2010 Nutrition survey[29], there is an alarming high prevalence of overweight and obesity (a body mass index greater than 25 and 30, respectively – kg/m^2) reported in the camps among women of childbearing age (15-49 years). As observed in Figure 4.7, the prevalence of overweight and obesity have almost consistently risen from the already high values reported in 1997. Overweight and obesity are among the main risk factors for metabolic diseases in the population such as diabetes, hypertension, cardiovascular

[28] For a detail explanation triangulatin data between the GFD energy content, the stability of the distribution and the acute malnutrition trends, please see the ENN, UNHCR, WFP Nutrition Survey Report, 2010
[29] Op cit.

diseases and cancer.

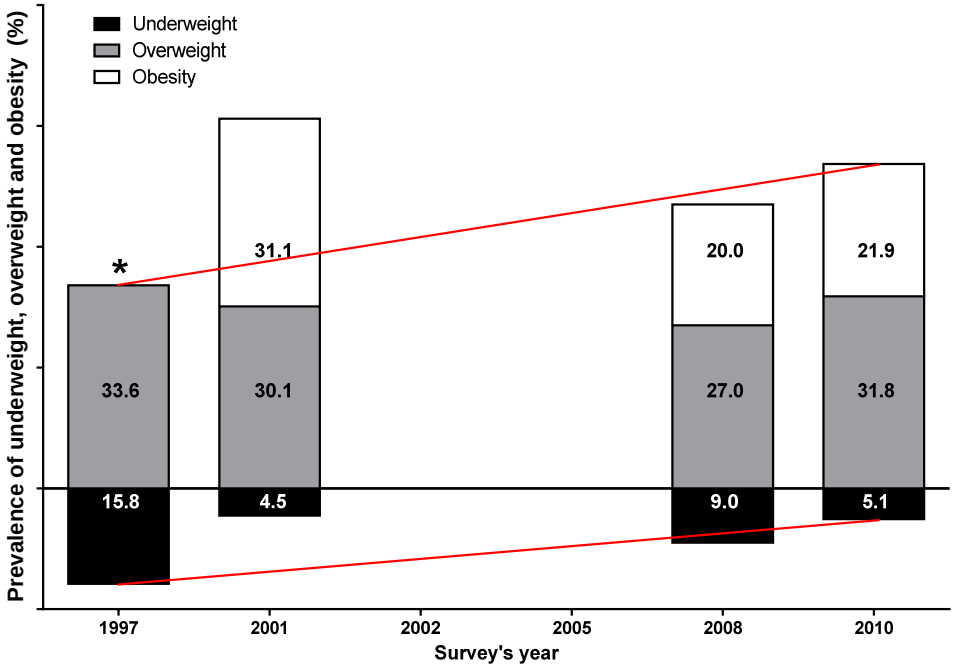

Figure 4.7. Underweight, overweight and obesity in women aged 15-49 years (1997-2010)
*** No data was available to differentiate between overweight and obesity**

4.3.2. Households Suffering the Double Burden of Malnutrition

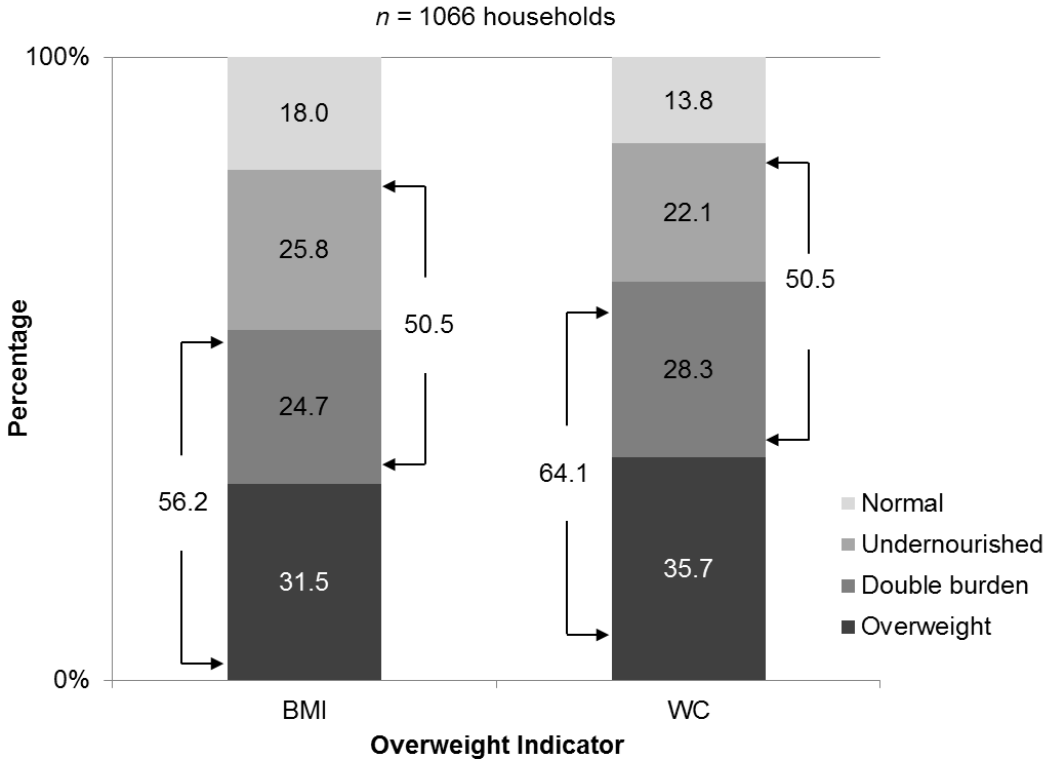

Figure 4.8. Double burden of malnutrition in refugee households
Proportion of households classified as normal, double burden, overweight, and undernourished. Overweight and the double burden in each stacked bar is based on two different indicators used to classify either obesity as

indexed by body mass index (BMI), or central obesity as indexed by waist circumference (WC).

A recent secondary analysis of the 2010 nutrition survey results[30], using data on malnutrition and also obesity indicators such as body mass index and waist circumference, showed that in less than one in five households it members present neither undernutrion nor overweight or obesity; but that in over one in two households its members present either undernutrition or overweight or obesity, and that in about one on four households, have at least one member suffering undernutrion while another suffers from overweight or obesity. The data is graphically presented in Figure 4.8.

[30] Grijalva-Eternod CS et al. (2012) The Double Burden of Obesity and Malnutrition in a Protracted Emergency Setting: A Cross-Sectional Study of Western Sahara Refugees. PLoS Med 9(10): e1001320. doi:10.1371/journal.pmed.1001320

V. TRENDS IN NUTRITION INDICATORS 1997-2010

Several surveys have been undertaken in the camps since 1997, therefore it is useful to compare current indicators in the light of historical data. It is important to emphasise that most data compared in this section were obtained using different survey methods. A detail description of similarities and differences between the nutrition surveys can be seen in Table A10.1 (Annex 10). Likewise, Annex 11 contains more detailed tables with all the values used in the graphic comparisons of trends.

5.1. ACUTE MALNUTRITION PREVALENCE TRENDS IN CHILDREN AGED 6-59 MONTHS

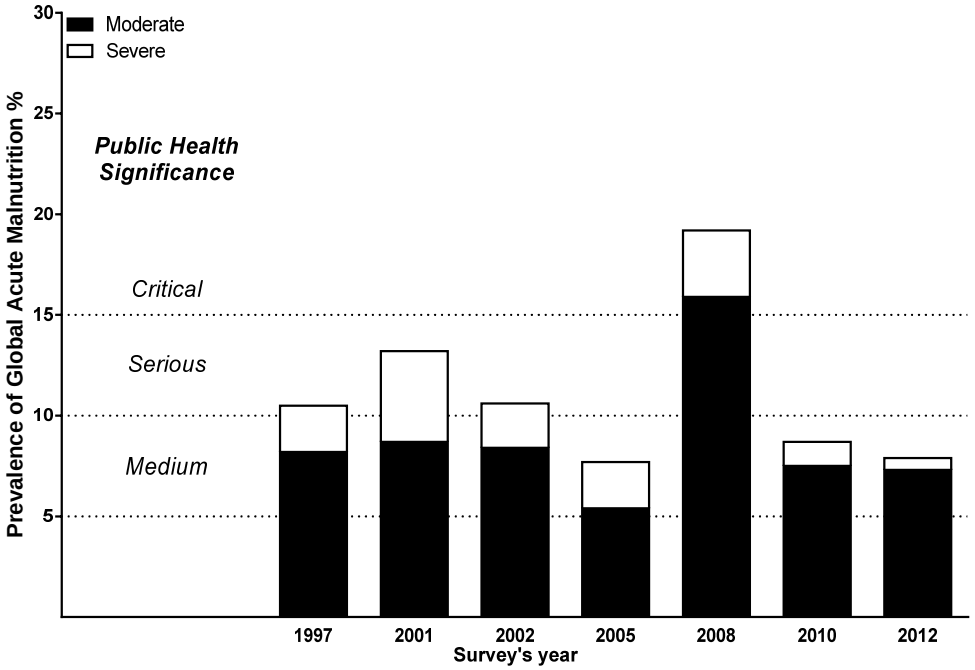

Figure 5.1. Global acute malnutrition prevalence trend in children aged 6-59 months. 1997-2012. For analysis of trends, values obtained using the NCHS were used

Between 1997 and 2012 GAM prevalence has fluctuated around 10%, the notable exception being in 2008 where the GAM prevalence reached critical public health significance levels (see Figure 5.1). Since 2010 GAM levels have remained stable at a medium level of significance. Since 2008 the prevalence of SAM shows a consistent reduction.

5.2. STUNTING PREVALENCE TREND IN CHILDREN AGED 6-59 MONTHS

The prevalence of stunting, on the other hand, presents a 15-year steady decline from well above the threshold of high public health significance, to currently being in closer to the threshold between medium and low public health significance (see Figure 5.2). The most significant observation is the observable decline of severe stunting, where the severe to moderate stunting ratio was 1:1 in 1997, while in 2012 it was almost 1:4.

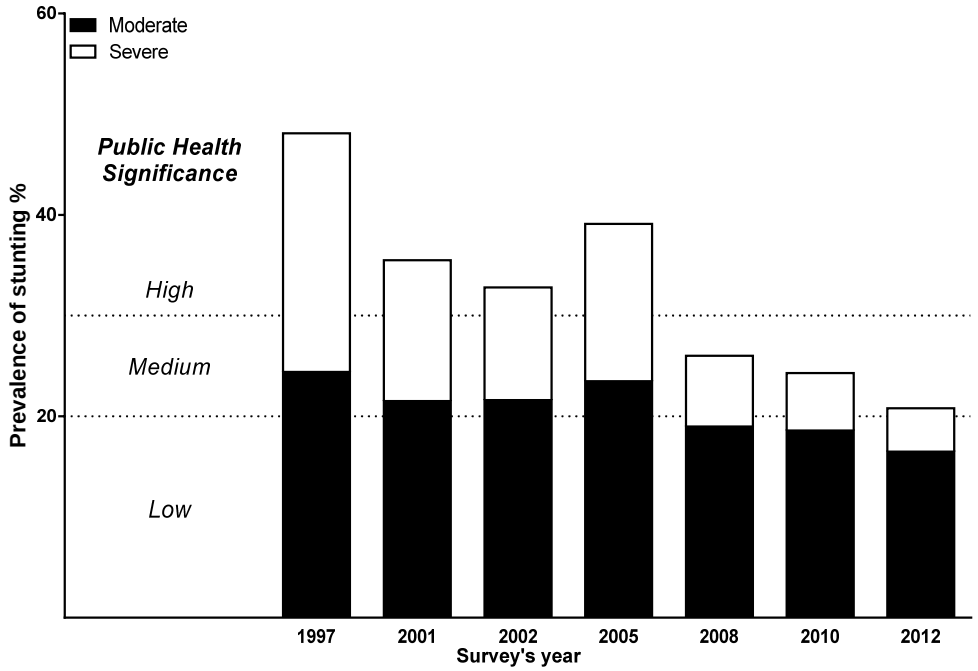

Figure 5.2. Stunting prevalence trend in children aged 6-59 months. 1997-2012.

5.3. ANAEMIA PREVALENCE TREND IN CHILDREN AGED 6-59 MONTHS

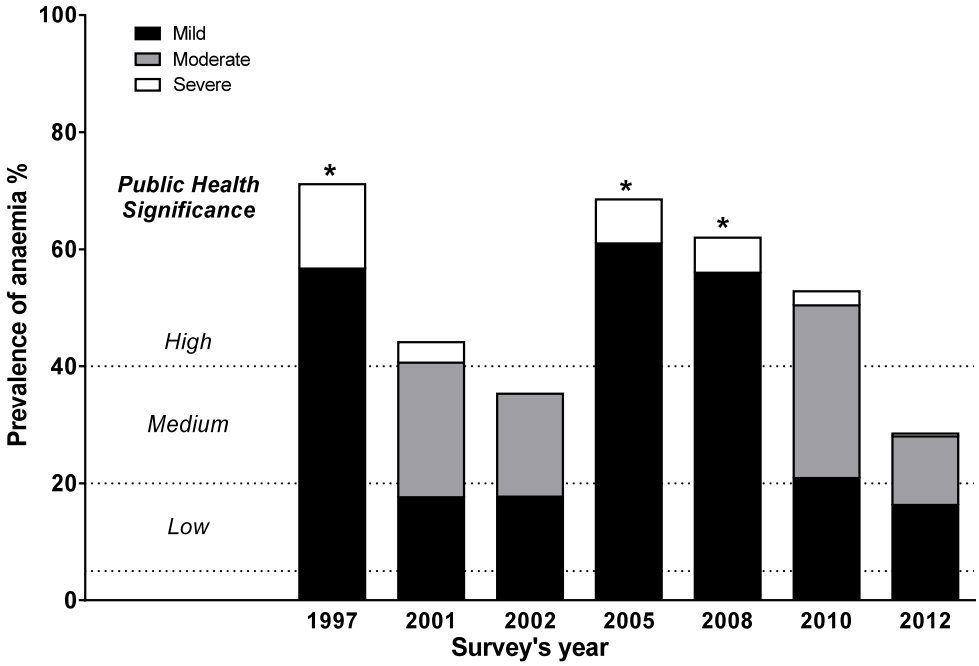

Figure 5.3. Anaemia prevalence trend in children aged 6-59 months. 1997-2012.
*** Data to differentiate mild or moderate anaemia was not available. Data was grouped as mild/moderate anaemia**

Anaemia prevalence in children aged 6-59 months showed an important and consistent trend. Twice in this refugee context (early 2000's and since 2010), there has been experiences using LNS to reduce the high levels of anaemia and stunting prevalence in this population; and twice we have observed a marked reduction of anaemia prevalence (2002 and 2012) with an almost complete elimination of severe anaemia. In addition,

for this target group, since 2005, the public health significance of anaemia has been now downgraded from high to medium level.

5.4. ANAEMIA PREVALENCE TREND IN WOMEN OF REPRODUCTIVE AGE (15-49 YEARS)

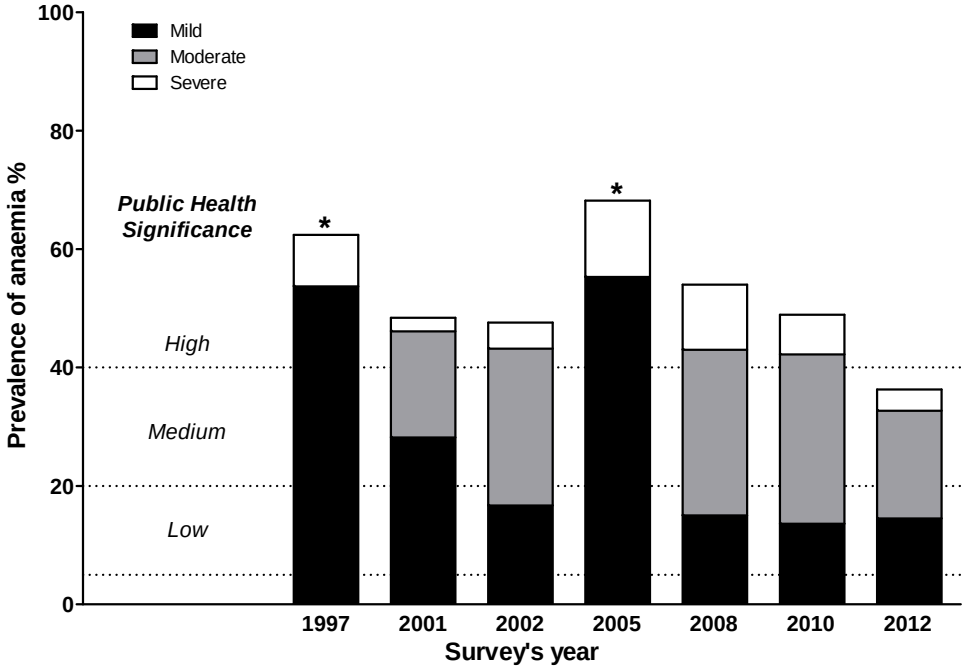

Figure 5.4. Anaemia trend in non-pregnant women of reproductive age (15-49 years). 1997-2012.
*** Data to differentiate mild or moderate anaemia was not available. Data is grouped as mild/moderate anaemia**

A very similar trend in anaemia prevalence to than observed in children was also observed for women of reproductive age (see Figure 5.4), although some differences exist. For instance, from the high prevalence values observed in 1997, there was a prevalence reduction by 2001. Yet, unlike for children, no further prevalence reduction was observed for 2002. Anaemia prevalence increased again by 2005 and has since steadily decreasing, as has also among children. In 2012, for the first time in 15 years, the public health significance of anaemia in this target group moved from a high to a medium level.

It is interesting to note when comparing anaemia prevalence trends between women and children – specifically the reduction in anaemia prevalence observed in children between 2001 and 2002, which was not observed among women, and the prevalence reduction observed between 2010 and 2012 in both target groups- that no supplementary feeding programme for any target group among women of reproductive age was operating between 2001 and 2002, compared to a blanket supplementary feeding programme using MNP for PLW operating between 2010 and 2012. This could be suggestive of a potential spill-over effect.

Again, similarities between women of reproductive age and children aged 6-59 months were observed for haemoglobin concentrations (see Figure 5.5). This tight similarity is suggestive of the shared risk factors for anaemia operating either independently in each target group (i.e. a GFD with insufficient iron content), and/or affecting women during reproduction, in turn affecting the nutritional status of children, who develop within the maternal niche.

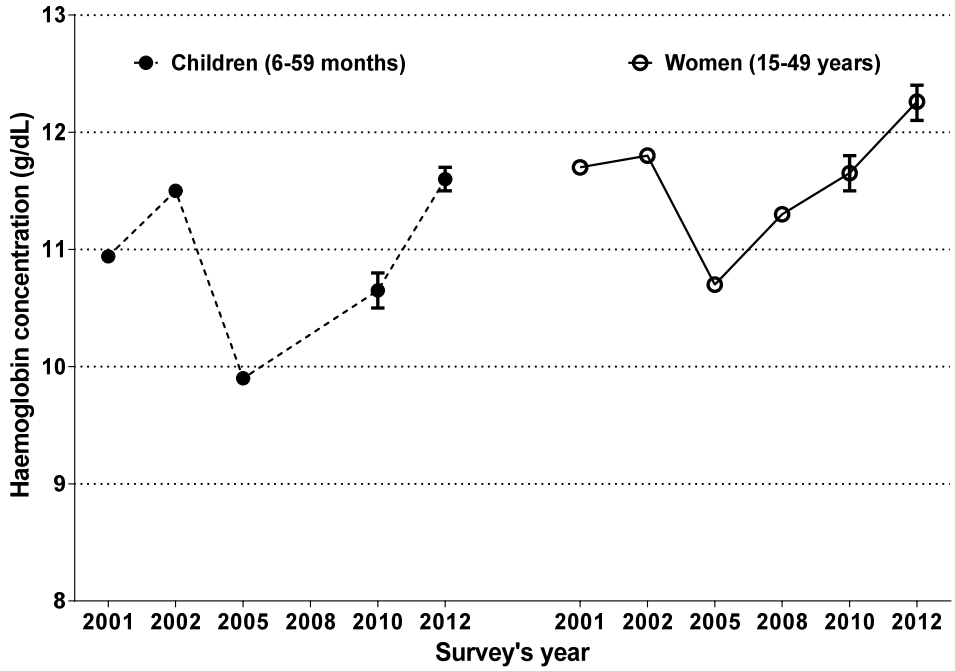

Figure 5.5. Haemoglobin concentration trends for children aged 6-59 months and women of reproductive age (15-49 years). 2001-2010.
Values are shown as mean values (95% CI).

5.5. ANAEMIA PREVALENCE TREND IN PREGNANT WOMEN OF REPRODUCTIVE AGE (15-49 YEARS)

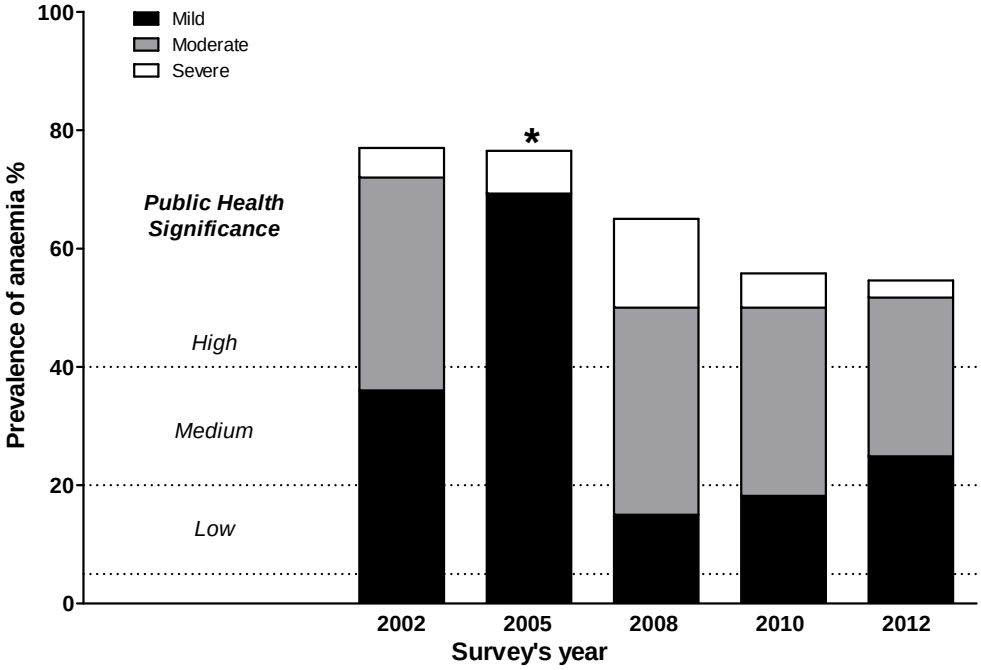

Figure 5.6. Anaemia trend in pregnant women of reproductive age (15-49 years). 1997-2012.
*** Data to differentiate mild or moderate anaemia was not available. Data is grouped as mild/moderate anaemia**

Data for anaemia prevalence among pregnant women has been collected since 2002 and it is graphically displayed in Figure 5.6. Since 2002, anaemia prevalence for this target group is of high public health

significance. Nonetheless, the pattern of anaemia prevalence has changed in this group with the suggestion of an overall improvement in the last 10 years. For instance, anaemia prevalence in 2012 is lower than that observed in 2005, while concomitantly; the proportion of mild to moderate/severe anaemia seems to be slowly improving since 2008.

5.6. INFANT AND YOUNG CHILD FEEDING PRACTICES PREVALENCE TRENDS

Table 3.1: Prevalence trends in Infant and Young Child Feeding indicators 2001-2012

Year	Exclusively breastfed < 6 months	Predominantly breastfed <6 months	Continue to breastfed at 1 year	Continue to breastfed at 2 years	Children ever breastfed <24 months
1997	53.3 (27.2 – 77.9)	63.3 (57.6 – 83.6)	N/A	N/A	N/A
2001	3.7 (3.9 – 11.6)	37.0 (15.5 – 61.4)	N/A	N/A	N/A
2002	2.3 (0.0 – 6.8)	N/A	84.1 (75.3 – 93.0)	47.5 (32.1 – 62.8)	97.3 (95.3 – 99.4)
2005	26.6 (16.4 – 36.7)	12.7 (4.1 – 21.2)	89.5 (81.8 – 97.1)	45.3 (31.9 – 58.7)	N/A
2008	2.0 (N/A)	N/A	N/A	N/A	N/A
2010	10.8 (5.5 – 16.0)	46.7 (37.4 – 55.9)	66.3 (56.6 – 76.1)	34.0 (25.6 – 42.4)	96.3 (94.6 – 98.0)
2012	18.4 (11.4 – 25.4)	44.2 (34.9 – 53.5)	78.9 (71.4 – 86.4)	28.7 (21.5 – 35.7)	94.5 (92.4 – 96.6)

Most of the parameters used for obtaining IYCF indicators in 2010 and 2012 nutrition surveys are different than in previous years, as they were based in the new WHO recommendations, and consequently, are difficult to compare retrospectively. However, some breastfeeding indicators do allow for comparisons and are summarised in Table 2.1.

Overall, prevalence trends suggest four patterns. First for exclusive breastfeeding, excluding the values observed in 1997 and 2005, it suggest an overall improvement since 2002 of exclusive breastfeeding for children aged less than 6 months of age, although the current prevalence is still low. Second, despite an initial reduction in the proportion of children predominantly breastfed from 1997 to 2005, there was an improvement observed in 2010 with similar prevalence values observed also in 2012. Third, since 2002 there seems to be a consistent reduction in the number of children who continue to be breastfed at two years of age as recommended by the WHO. Lastly, in the last 10 years, the proportion of children aged less than 24 months ever breastfed remains high. The interpretation of the patterns observed above should be taken with caution given the high heterogeneity of the summary data.

VI. RECOMMENDATIONS

Based on the survey's findings, and following discussions during the Inter-Agency Nutrition Expert Meeting, the following recommendations are made for improving the nutrition and health situation of the Western Sahara refugees.

Strategies to improve coordination of actors working on nutrition-related activities

1. Technically assess the effectiveness of the current mechanisms of coordination of each sector (i.e. Nutrition, WASH, Health and Food).
2. Technically assess the effectiveness of the current mechanisms of inter-sectorial coordination.
3. Strengthen the current nutrition sector coordination to expand its effectiveness and capacities (e.g. partnerships, information sharing, guidelines development, strategy harmonisation, etc.).

Strategies to assess and improve the monitoring of the nutrition-related issues

1. Technically review the current monitoring systems as stipulated in each of the strategies sections mentioned below.
2. Implement nutrition surveys systematically every two years.
    - Nutrition surveys should follow UNHCR SENS guidelines.
    - Nutrition surveys should include infants aged <6 months as a target group.
    - Nutrition surveys should be performed separately for each camp, when feasible.
    - If the monitoring systems become functional, a significant worsening of health and/or nutrition indicators should trigger the implementation of a nutrition survey.
3. Implement a survey to establish the nutrition status of school age children in order to have baseline data for future activities.
4. Implement a survey to establish the nutrition status of special needs groups (e.g. elderly, people with disabilities)

Strategies to improve the Health Information System (HIS)

1. Collect and report basic standard UNHCR health indicators (e.g. low birth weight prevalence, infectious diseases), at the Wilaya level.
2. Strengthen the capacity with regards to reporting and monitoring of the HIS.

Strategies to improve Water, Sanitation and Hygiene (WASH) in the refugee camps.

1. Implement the recently developed WASH strategy.
2. Integrate WASH components in the nutritional response implementation (e.g. hygiene promotion).
3. Implement a WASH survey following UNHCR SENS guidelines.
4. It is recommended that monitoring and evaluation indicators are collected and reported at the Wilaya level.

Strategies to improve infant and child feeding (IYCF) practices

1. Develop an integrated component for improving IYCF practices within the nutrition strategy including:
    - Revise and/or develop activities that emphasize peer- and community participation in supporting exclusive breastfeeding up to six months
    - Develop activities to improve the provision of age-appropriate complementary feeding from six months to two years of life, and beyond.
    - Improvement of the current behaviour change communication activities towards infant and young child feeding practices (e.g. women's meetings, TV and radio campaigns, etc.). Targeting BCC during calendar festivities is strongly recommended.

- Revise the current IYCF promotion and support protocols of the PISIS programme.
- Provide further training of health personnel regarding adequate infant and young child feeding practices. In addition, training on strategies to support breastfeeding from the health system should be performed and strengthened at the dispensary level.
- Develop an M&E system for monitoring IYCF practices.
  - Develop a M&E strategy for IYCF indicators
  - Develop a M&E strategy of BCC activities
  - The M&E strategy should be implemented and reported at the Wilaya level.

2. Develop a minimum package for mothers and care takers to enhance their caring capacity, with the aim of improving IYCF.
3. Study the cultural and local factors affecting IYCF.

Strategies to improve food security and nutrition sufficiency to vulnerable refugees

1. Further improve the stability of the General Food Distribution (GFD).
   - Evaluate resources and needs utilised for food distribution.
   - Develop appropriate indicators to better monitor the frequency of distributions of the GFD (basic and fresh foods).
   - Revise the agreement of the Food Security Stock (FSS) as to make more flexible the borrowing of commodities.
2. Improve the stability of the distribution of complementary foods
   - Complementary foods includes fresh and canned foods
3. Continue the provision of micronutrient-rich foods within the general food ration.
   - Review and define the needed strategy regarding the provision of fortified foods, with potential focus on flour and oil, with the aim of stabilising and adequate micronutrient provision of the GFD
4. Continue to provide diverse commodities
   - Explore new commodity options
   - Explore additional delivery channels to help increase food diversity (e.g. use of vouchers).
   - Support local livelihoods activities to expand local production (Wilaya, school and home gardens)
   - Review the composition of the FSS as to make it a tool for ensuring the stability of diversification of the GFD
5. Continue the monitoring and evaluation of the food distribution system.
   - Revise the current joint monitoring system, with special focus on improving the reporting of food security indicators (Food Consumption Score and Household Dietary Diversity Score).
   - The M&E should be performed at camp level, given the nutritional differences observed in the nutrition survey.
6. Improve the correct utilisation of the GFD
   - Raising nutrition awareness (e.g. culinary contest, TV cuisine programme, women's groups)

Strategies to combat acute malnutrition in children

1. Prevention
   - WASH (water, sanitation & hygiene), as described above.
   - Diarrheal and infection diseases monitoring, as described below.
   - Improve IYCF practices, as described above.
   - Maintain the inclusion of pregnant and lactating women in the supplementary feeding programme. Strengthening the admission and the duration of the supplementation of pregnant women.
   -
2. Treatment

- Continue the implementation of acute malnutrition treatment. Acute malnutrition care programmes should continue to be integrated within the PISIS, following international standards.
- Revise and integrate the current CMAM protocols in order to render it fully operational.
- In 2013 Fortified Blended Foods or Ready-to Use Supplementary Foods will be roll-out to replace the ration of CSB+, plus sugar, plus oil for the care of moderate acute malnutrition (MAM). It is recommended that an assessment of needs for transitioning to these new products is implemented. Current protocols for MAM care will need to be revised.
- Develop SOP for SAM with complications. In addition, a SOP for SAM treatment in the absence of Plumpy'nut needs to be developed.

3. Screening and follow-up of acute malnutrition at the community level
    - Active case finding and referral in the community by the 'Jefas de barrio', using MUAC, should be reinforced.
    - Strengthening the follow-up of identified cases of acute malnutrition
4. Strengthening the current programmes
    - Further trainings in current protocols should be performed at the dispensary level, in order to improve the programmes' coverage & impact, and to produce reliable registers. Annual evaluation of training programmes should be developed and/or strengthened.
    - To reinforce the current capacity of the current implementing partners in charge of overseeing acute malnutrition management. Explore the need to identify an additional implementing partner for expanding the treatment of acute malnutrition.
5. Monitoring & Evaluation
    - Monitoring and evaluation components of on-going strategies to combat acute malnutrition should be developed and/or strengthened. Given the differences observed between camps, monitoring indicators should be obtained and reported at camp level.

Strategies to continue to reduce anaemia and to combat stunting in women of childbearing age and children.

1. Continuation of the Anaemia and Stunting Reduction Programme is recommended.
2. It is recommended that the detailed recommendations of the impact evaluation report[31] are implemented.
3. Specific BCC activities targeting PLW, mothers and care takers regarding anaemia prevention/treatment should be implemented. Explore additional channels for the better outreach and impact. These activities should be integrated within the primary care services (PISIS, "Materno-Infantil" programme, etc.).
4. Implement the deworming programme.
5. M&E should be strengthened, and reports should continue to be produced monthly according to the UNHCR Operational Guidelines. An additional compiled M&E report should be produced twice a year, to be shared with the refugee health authorities and others stakeholders.
6. Integrate programmes targeting pregnant and lactating women.
    - Review the current implementation protocols of the A&SR-SFP and the SFP to better integrate the programmes targeting PLW to increase its outreach.
7. Explore delivering a minimum package for women of childbearing age addressing optimal wellbeing including maternal care, psychosocial support, and additional nutrient needs, among others.

[31] An additional document will be produced for more detailed recommendations aimed specifically to improve the implementation of the Anaemia and Stunting Reduction Programme.

Strategies to address the emerging threat of the double burden of obesity and under-nutrition.

7. Implement the recommendations for dealing with under-nutrition in women & children as stipulated above.
8. Assess the prevalence of non-communicable diseases.
    - Given the very high prevalence of obesity measured in the past survey, it is recommended that a separate survey with a special focus on metabolic disorders and cardiovascular disease be implemented (women and men)
9. Implement operational research to better understand the cultural, social and biological aspects regarding overweight and non-communicable diseases.
10. Expand the current BCC activities to increase awareness about obesity and associated risks.

Encourage further operational research issues

11. Implement operational research[32] such as KAP surveys to better understand IYCF, food habits, utilization and acceptability of GDF commodities, and utilization and acceptability of supplementary products. In addition to the abovementioned aspects regarding overweight and non-communicable diseases.

[32] Operational research should strengthen an evidence-based approach.

VII. ANNEXES

Annex 1: Terms of Reference and sample size calculation
Annex 2: Map of the nutrition survey area
Annex 3: Cluster allocation
Annex 4: Questionnaires
Annex 5: Tables – Prevalence of malnutrition in children aged 6-59 months based on the 2006 WHO Growth Standards
Annex 6: Tables – Prevalence of malnutrition in children aged 6-59 months based on the 1977 NCHS Growth References
Annex 7: Tables – 2010 prevalence of IYCF indicators
Annex 8: Tables – Prevalence of anaemia in children aged 6-59 months and women of childbearing age (15-49 years)
Annex 9: Tables – Food security analysis – Food consumption scores
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Annex 1: Terms of Reference and sample size calculation

Anaemia and Stunting Reduction Programme
Impact Evaluation
Western Sahara Refugee Camps, Tindouf, Algeria
October 2012

Terms of Reference

Background

Western Sahara refugees started arriving in 1975 to the South West region of Tindouf, Algeria, which is characterised by a harsh desert environment. In 1986, after receiving support for 11 years from the Algerian Government, which is the host country; The United Nations World Food Programme (WFP) and the United Nations High Commissioner for Refugees (UNHCR) started providing basic assistance[33] to the most vulnerable of these refugees. The situation is now considered a protracted emergency situation.

A number of nutrition surveys have been undertaken over the years. **Table 1** summarises key findings for women and children for the period 1997 – 2010. The nutritional problems of greatest public health significance are anaemia in women, and anaemia and stunting in children (aged 6-59 months).

Table 1. Nutrition survey results during the period 1997 – 2010. All values are % (95% CI). Acute malnutrition and stunting were calculated based on the NCHS 1977 growth references.

	Women [a]		Children				
	Anaemia		Anaemia		Acute Malnutrition		Stunting
Period	Severe	Total	Severe	Total	SAM	GAM	
1997	8.7 (4.6 – 12.8)	62.4 (N/A)	14.4 (8.0 – 20.1)	71.1 (N/A)	2.3 (0.4 – 4.1)	10.5 (6.1 – 14.9)	49.1 (44.2 – 54.1)
2001	2.3 (0.8 – 3.8)	48.4 (N/A)	3.5 (2.2 – 4.8)	44.1 (N/A)	4.5 (2.4 – 6.5)	13.2 (9.9 – 16.4)	35.5 (30.0 – 41.1)
2002	4.4 (1.2 – 7.6)	47.6 (38.6 – 56.5)	0.0 (N/A)	35.3 (26.7 – 43.9)	2.2 (1.3 – 3.1)	10.6 (7.7 – 13.5)	32.8 (29.7 – 36.1)
2005	12.9 (10.1 – 15.7)	66.4 (60.5 – 72.3)	7.5 (5.4 – 9.7)	68.5 (64.4 – 72.5)	2.3 (0.7 – 4.0)	7.7 (4.1 – 11.2)	39.1 (34.4 – 43.8)
2008	11.0 (N/A)	54.0 (N/A)	6.0 (N/A)	62.0 (N/A)	3.3 (N/A)	19.2 (N/A)	26.0 (N/A)
2010	6.7 (5.3 – 8.0)	48.9 (45.3 – 52.5)	2.4 (1.1 – 3.6)	52.8 (49.1 – 56.6)	1.2 (0.6 – 1.8)	8.8 (7.3 – 10.3)	24.2 (21.6 – 26.9)

95% CI: 95% Confidence Intervals; GAM: Global Acute Malnutrition. Prevalence of children, aged 6-59 months, presenting a weight for height z-score <-2 z-scores and/or bilateral pitting oedema. SAM: Severe Acute Malnutrition. Prevalence of children, aged 6-59 months, presenting a weight for height z-score <-3 z-scores and/or bilateral pitting oedema. Stunting: Prevalence of children, aged 6-59 months, presenting a height for age z-score <-2 z-scores. Severe Anaemia: Prevalence of children, aged 6-59 months, presenting haemoglobin values <7 g/dL or the prevalence of non-pregnant women of reproductive age (15-49 years) presenting haemoglobin values <8 g/dL. Total Anaemia: Prevalence of children, aged 6-59 months, presenting haemoglobin values <11 g/dL or the prevalence of non-pregnant women of reproductive age (15-49 years) presenting haemoglobin values <12 g/dL.
[a] Non-pregnant women of reproductive age (15 – 49 years).

Current context

The latest nutrition survey undertaken in the camps in 2010[34] reported a prevalence of anaemia in non-pregnant women of reproductive age (15-49 years) and children aged 6-59 months above the threshold of high public health significance (see **Table 1**). In addition, exceedingly high levels of anaemia were reported among pregnant and lactating women (PLW) of reproductive age (55.8 (95%

[33] Following a request by the Algerian Government.
[34] Nutrition Survey. Western Sahara Refugee Camps, Tindouf, Algeria. Oct-Nov 2010

CI 47.4-64.2) and 67.1 (95% CI 61.5-72.6), respectively). Moreover, the overall burden of anaemia was found to be different between the camps.

Similarly, stunting in children aged 6-59 months is between the thresholds of high and medium public health significance with a prevalence of 29.7 (95% CI 26.9-32.5), based on the WHO 2006 growth standards[35].

The joint 2009 UNHCR/WFP nutrition mission[36], the UNHCR/WFP 2009 Joint Assessment Mission (JAM)[37], as well as the Saharawi Nutrition Strategy[38], recommended a programme aimed at reducing the very high anaemia prevalence in children aged 6-59 months and PLW, as well as to reduce the high levels of stunting in children. The programme, designed and integrated as part of the Saharawi Child Health Integrated Programme (PISIS by its Spanish acronym), and in line with the current UNHCR operational guidelines to reduce micronutrient deficiencies[39], is a blanket supplementary feeding programme which provides the special nutritional products: Micro-Nutrient Powder (MNP) to PLW and children aged 36-59 months; and a Lipid-based Nutrient Supplement (LNS) to children aged 6-35 months[40].

Supporting evidence for this type of interventions in the Western Sahara refugee camps comes from previous surveys that have demonstrated a strong correlation between iron deficiency and anaemia prevalence in this population[41]. In addition, previous experiences in the camps, using different types of LNS, have shown noticeable effects in reducing the prevalence of stunting and total anaemia in children as well as eradicating severe anaemia in children[42].

During September and October 2009 an acceptability test for this programme was carried in the Western Sahara refugee camps[43]. The acceptability test showed generally good acceptance of the products in the camps by all target groups, as well as a correct utilization, good adherence, and minimal side effects.

The supplementary feeding programme was rolled-out and started distribution in December 2010. It is being currently implemented by the Algerian Red Crescent (ARC). The programme is to be piloted for at least 12 months under the leadership of UNHCR, hence providing the initial procurement of products, supervision and required technical support. If after this initial phase, and following an impact evaluation, its continuation is recommended, the procurement of products for this programme will then be undertaken by WFP.

The latest nutrition survey recommended, in line with the above mentioned UNHCR Operational Guidance to reduce micronutrient deficiencies, that impact evaluation of this programme is undertaken by comparing anaemia and malnutrition prevalence between two nutrition surveys undertaken in similar conditions and ideally within a time gap no longer than one year. Consequently a nutrition survey was initially scheduled to be implemented in October-November 2011, but due to security changes in the region, the survey was postponed to October 2012.

UNHCR, through its implementing partner, the Emergency Nutrition Network, undertook in 2011 an initial review of the specific objectives of the impact evaluation, methods, target groups and mode of implementation. These were decided following discussions with key informants and a variety of partners and stakeholders (WFP, WHO, Red Crescent Societies, and relevant Saharawi authorities).

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[35] WHO Multicentre Growth Reference Study Group: WHO Child Growth Standards: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: Methods and development. Geneva, World Health Organization, 2006. Available at: http://www.who.int/childgrowth/standards/technical_report/en/index.html

[36] Joint UNHCR-WFP Nutrition Mission to the Saharawi Camps in Algeria, March 2009.

[37] UNHCR/WFP Joint Assessment Mission. Assistance to refugees from Western Sahara. Algeria, 27 September to 9 October 2009.

[38] Saharawi Nutrition Strategy. May 2009.

[39] UNHCR Operational Guidance on the Use of Special Nutritional Products to Reduce Micronutrient Deficiencies and Malnutrition in Refugee Populations. 2011

[40] The products are known in the Western Sahara refugee camps as Ghazala (LNS) and Chaila (MNP).

[41] Anthropometric and Micronutrient Nutrition Survey. Saharawi Refugee Camps, Tindouf, Algeria. September 2002.

[42] Lopriore C, Guidoum Y, Briend A, Branca F. Spread fortified with vitamins and minerals induces catch-up growth and eradicates severe anaemia in stunted refugee children aged 3-6 y. *Am J Clin Nutr*. 2004;80:973-81.

[43] Salse Ubach N, Wilkinson C. Nutributter 3® and MNP Acceptability Test. Saharawi Camps – Algeria. Final Report. October 2009.

Methods

Aim

- To evaluate the potential impact of the blanket supplementary feeding programme, distributing MNP and LNS, on the nutritional status of women and children in the Western Sahara refugee camps. The impact evaluation will be done by implementing a stratified nutrition survey, one stratum per camp, to establish in detail the current nutritional profile of the population. The data will then be compared with the results obtained from the 2010 Nutrition Surveys. In addition, a detail context analysis of the programme looking at reported coverage, distribution and acceptability will be included to aid interpretation. The final results will be used to produce recommendations on actions to improve the nutritional status and health of the Western Sahara refugees.

Target population

- Children aged 0 – 59 months
- Women of reproductive age (15 – 49 years)

Objectives

- Determine the malnutrition prevalence in children aged 6-59 months to evaluate the impact of nutritional interventions to reduce malnutrition.
- Determine the anaemia prevalence in children aged 6-59 months to evaluate the impact of nutritional interventions to reduce anaemia.
- Assess infant and young children feeding[44] (IYCF) practice indicators.
- Determine the anaemia prevalence in pregnant and non-pregnant women of reproductive age (15-49 years) to evaluate the impact of nutritional interventions to reduce anaemia.
- Determine the Food Consumption Score of households.
- Strengthen the health system capacity to design and implement nutritional surveys.

Measurements and Indicators

Table A1 in annex 1 describes the indicators and measurements to be collected in each camp survey.

Survey Schedule

The survey is programmed to take place from October 17th to November 22nd, 2012. This period also includes feed-back and de-briefing meetings in Rabouni, Tindouf and Algiers.

Documents

* Terms of reference (TORs): The survey TORs will be produced in English and Spanish for discussion.
* Nutrition survey questionnaires: Survey questionnaires will be produced first in English to facilitate discussion of what information will be included. The final version will be then translated into Spanish for final approval by the Western Sahara health authorities.
* Nutrition survey report: The final version of the full report will be produced first in English to allow for discussion. The final version will then be translated into Spanish to be presented to the Western Sahara health authorities. Only after the translation of the survey report is finalised, will dissemination of the survey results be carried out.
* Anaemia and stunting reduction programme impact evaluation report: The final version of the impact evaluation report will be produced in English and only the executive summary and recommendations will be translated into Spanish to be presented to the Western Sahara authorities. Only after the translation of the executive summary and recommendations are finalised, will dissemination of the impact evaluation results be carried out.

[44] WHO 2008. Indicators for assessing infant and young child feeding practices: Conclusions and consensus meeting held 6-8 November 2007. Part 1: Definitions & Part 2: Measurement.

TORS Annex 1
Indicators

Table A1. Indicators and procedures by population group

Population group	Indicators	Procedure/ measurement	Materials/ methods
Children (0-5 months)	***IYCF indicators*** • Exclusive breastfeeding under 6 months • Early initiation of breastfeeding • Bottle feeding • Diarrhoea prevalence • Continued or increased feeding during diarrhoea	Questionnaire	Questionnaire
Children (6-59 months)	***Nutritional status indicators*** • Weight for age z-score *Underweight: <-2 z-scores* • Height for age z-score *Stunting: <-2 z-scores* • Weight for height z-score *GAM: <-2 z-scores and/or oedema* *MAM: <-2 and ≥-3 z-scores* *SAM: <-3 z-scores and/or oedema*	Weight Length/height	Weight scale Stadiometer
	• MUAC *GAM: <125mm and/or oedema* *MAM: <125mm and ≥115mm* *SAM: <115mm and/or oedema*	MUAC	MUAC tape
	• Oedema	Clinical evaluation	
	• Anaemia *Total: Hb<11.0 g/dL* *Mild: Hb 10.0-10.9 g/dL* *Moderate: Hb 7.0-9.9 g/dL* *Severe: Hb <7.0 g/dL*	Haemoglobin (Hb)	HemoCue
	IYCF indicators • Child ever breastfed • Continued breastfeeding at 1 year • Continued breastfeeding at 2 years • Introduction of solid, semi-solid or soft foods • Consumption of iron-rich or iron-fortified foods	Questionnaire	Questionnaire
Women (15 – 49 years)	***Nutritional status indicators*** • Anaemia *Pregnant women* *Total: Hb<11.0 g/dL* *Mild: Hb 10.0-10.9 g/dL* *Moderate: Hb 7.0-9.9 g/dL* *Severe: Hb <7.0 g/dL* *Non-pregnant women* *Total: Hb<12.0 g/dL* *Mild: Hb 11.0-11.9 g/dL* *Moderate: Hb 8.0-10.9 g/dL* *Severe: Hb <8.0 g/dL*	Haemoglobin (Hb)	HemoCue
Household	***Food Consumption Score***	Questionnaire	Questionnaire

GAM: Global acute malnutrition; MAM: Moderate acute malnutrition; SAM: Severe acute malnutrition; MUAC: Mid-upper arm circumference; Hb: Haemoglobin.

TORS Annex 2
Sample size calculation

A2.1. Sample size required for a single cross-sectional survey

Sample size calculations were carried out using ENA for SMART software (version July 31st 2012)[45], following UNHCR recommendations for standardised nutrition surveys[46]. Calculations were based on prevalence data for Global Acute Malnutrition (GAM), stunting and anaemia reported in the previous survey (see **Table A2.1**).

As one survey per strata (camp) is planned (4 strata in total) it was assumed that there would be less heterogeneity within the population of each camp. In the last nutrition survey the values observed of the design effect for anthropometric indicators ranged between 1.06 and 1.37; while those for anaemia ranged between 0.7 and 1.7; and between 0.96 and 2.91 for children and non-pregnant women, respectively. We used a design effect value of 1.3 for calculations of sample size on anthropometric indicators and 1.5 for anaemia indicators in children, while a value of 2.0 was used for anaemia indicators in women.

Table A2.1. Calculation of the sample size required for a single cross-sectional survey, based on data from the previous survey[a,b]. Acute malnutrition and stunting prevalence was calculated using the WHO 2006 Growth Standards.

	Children (6-59 months)				
	Reported prevalence % (95% CI)	Prevalence used %	Precision %	Design Effect	Calculated sample size
GAM (Laayoune)	5.7 (3.6 – 8.7)	9	3.5	1.3	340*
GAM (Dakhla)	12.8 (9.0 – 17.8)	18	5.0	1.3	321
Stunting (Awserd)	25.5 (20.9 – 30.8)	26	8.0	1.3	163*
Stunting (Laayoune)	34.2 (28.3 – 40.7)	35	10.0	1.3	124
Anaemia (Dakhla)	46.2 (39.3 – 53.0)	46	10.0	1.5	156*
Anaemia (Laayoune)	61.3 (54.1 – 68.6)	61	10.0	1.5	149
	Non-pregnant women of reproductive age (15 – 49 years)				
	Reported prevalence % (95% CI)	Prevalence used %	Precision %	Design effect	Calculated sample size
Anaemia (Smara)	36.0 (29.0 – 43.1)	36	10.0	2.0	193
Anaemia (Laayoune)	62.5 (55.7 – 69.3)	63	10.0	2.0	195*

95% CI: 95% Confidence Interval. GAM, Global Acute Malnutrition: Prevalence in children, aged 6-59 months (weight for height z-score <-2 z-scores and/or bilateral pitting oedema). Stunting: Prevalence in children, aged 6-59 months (height for age z-score <-2 z-scores). Anaemia: Prevalence in children, aged 6-59 months (haemoglobin values <11 g/dL) or the prevalence in non-pregnant women of reproductive age (15-49 years, haemoglobin values <12 g/dL).
[a] Sample size calculations were carried using ENA for SMART software (version July 31st 2012)
[b] Nutrition survey carried out in Oct-Nov 2010. Only the highest and lowest prevalence values for each indicator were used for calculating sample size.
* Highest sample size value estimated per indicator.

Based on the calculations, a sample of **340 children** aged 6-59 months and a sample of **195 non-pregnant women** of reproductive age (15-49 years), per camp, are needed to be included in each camp survey (see **Table A2.1**).

A2.2. Sample size required for detecting a difference between two cross-sectional surveys

The data collected from the present survey will also be used as the follow-up data, to evaluate the impact of the nutritional supplementation programme in reducing the prevalence of growth retardation and anaemia in children aged 6-59 months and PLW. Therefore it is crucial that the calculated sample size is sufficient to allow comparisons of prevalence changes over time.
Based on previously published data[47,48], after about one year of the nutritional programme being implemented, it is expected to observe an increase in the mean values of height for age z-score of about 0.26

[45] Available at http://www.nutrisurvey.de/ena2011/
[46] UNHCR Guidelines for Standardised Nutrition Surveys. 2011.
[47] Adu-Afarwuah S, Lartey A, Brown KH, Zlotkin S, Briend A, Dewey KG. Randomized comparison of 3 types of micronutrient supplements for home fortification of complementary foods in Ghana: effects on growth and motor development. *Am J Clin Nutr* 2007;86:412-20.

z-scores for children aged 6-35 months. In addition, and in accordance with current UNHCR operation guidance[49], the programme is expected to achieve a relative reduction in the prevalence of anaemia of at least 20% of the baseline prevalence in children aged 6-59 months. At present there is no clear guide as to how to assess the impact of the programme for PLW.

Based on the above reported changes in anaemia and stunting prevalence overall in the camps and by each of the target groups, a sample size calculation was performed. The sample size calculation was done using Save the Children's Excel spread-sheet (ComparePrevalences.xls) for comparison of two prevalence rates from surveys with complex sampling[50]

Table A2.2. Comparison of two prevalence rates from surveys with complex sampling

Target group	Initial prevalence	Initial sample size	s.e.	Final prevalence	Design effect	Required sample size
Children						
Anaemia (6-59 months)						
Dakhla	45.5%	220	3.5%	36.4%	1.3	324*
Laayoune	59.2%	201	3.9%	47.4%	1.3	155
Stunting (6-59 months)						
Awserd	25.5%	349	2.4%	17.9%	1.3	206*
Laayoune	34.2%	330	3.0%	25.2%	1.3	203

s.e.: Standard error; * Highest sample size value estimated per indicator and target group

Based on the higher values obtained in the sample size calculations in **Table A2.2**, the sample size required to detect the expected reduction in the prevalence of stunting and anaemia in children aged 6-59 months is **324 and 206**, respectively

A2.3. Final sample size to be included in the impact evaluation

Based on the previous calculations (sections A2.1 and A2.2), it is estimated that a sample size, per nutrition survey per camp, of **340 children** aged 6-59 months and **195 women** of reproductive age (15 – 49 years) will need to be included in each nutrition survey. This total sample size will suffice to evaluate the malnutrition prevalence in the Western Sahara refugee camps and will allow for comparisons between camps. The total sample size will also suffice to evaluate, per camp, the impact of the nutritional supplementation programme at reducing anaemia in children aged 6-59 months as a whole.

The final sample size will not suffice to evaluate, per camp, neither the change in anaemia prevalence per intervention target group, in children aged 6-59 months, nor stunting prevalence in children aged 6-35 months. However, the combined sample from the 4 camps will suffice to allow for some of these evaluations.

A2.4. Number of households required for sampling

Household characteristics were obtained from the 2010 nutrition survey data (see **Table A2.3**) to allow calculating the required number of households.

[48] Chaparro CM, Dewey KG. Use of lipid-based nutrient supplements (LNS) to improve the nutrient adequacy of general food distribution rations for vulnerable sub-groups in emergency settings. *Matern Child Nutr.* 2010;6:1-69

[49] Anaemia Prevention, Control and Reduction Project. Overview of UNHCR Interim Operational Guidance on Planning, Implementing and Monitoring the Use of Food Supplementation Products at Camp Level. Draft version September 2010.

[50] Save the Children. Emergency Nutrition Assessment Tools CD-ROM. Included in: Save the Children. Emergency Nutrition Assessment Guidelines for field workers. 2004. The formula used in the spreadsheet for calculating sample size is taken from page 96 of Allan Donner and Neil Klar, Design and Analysis of Cluster Randomization Trials in Health Research. Arnold Publishing, London, 2000.

Table A2.3. Household characteristics observed in the 2010 nutrition survey. All values are household numbers (rounded to two decimal points) unless otherwise specified.

Category	Awserd	Dakhla	Laayoune	Smara	Combined
Children aged 6-59 months	0.72	0.86	0.69	0.94	0.80
Women aged 15-49 years	1.25	1.47	1.24	1.52	1.37
Non-response (%)	0.79	4.29	1.19	1.58	1.50

Based on the data obtained from the 2010 nutrition survey it was assumed, for this survey, an average household would have 0.7 children aged 6-59 months and 1.2 women of reproductive age (15-49 years). It was also assumed that non-response would occur in 4% of the households.

	Sample required		Households	+ non-response ≈4%	Households per cluster needed: 30 clusters	Households per cluster needed: 32 clusters
Children 6-59 months	340	÷ 0.7 =	486	505	17	16
Women 15-49 years	195	÷ 1.2 =	163	169	6	6

Based on the calculations above, about **505 households will need to be sampled** per camp, to ensure the required sample sizes for all target groups are surveyed. In every household surveyed, all children aged 6-59 months will be included in the survey; whereas only for the first six households of each cluster women of reproductive age will be included in the survey.

After the training of survey's staff and depending on the amount of time needed to collect all necessary data during the pilot exercise, the total number of households will be divided in 30 or 32 clusters with a range of 17 to 16 households per cluster.

Annex 2: Map of the nutrition survey area

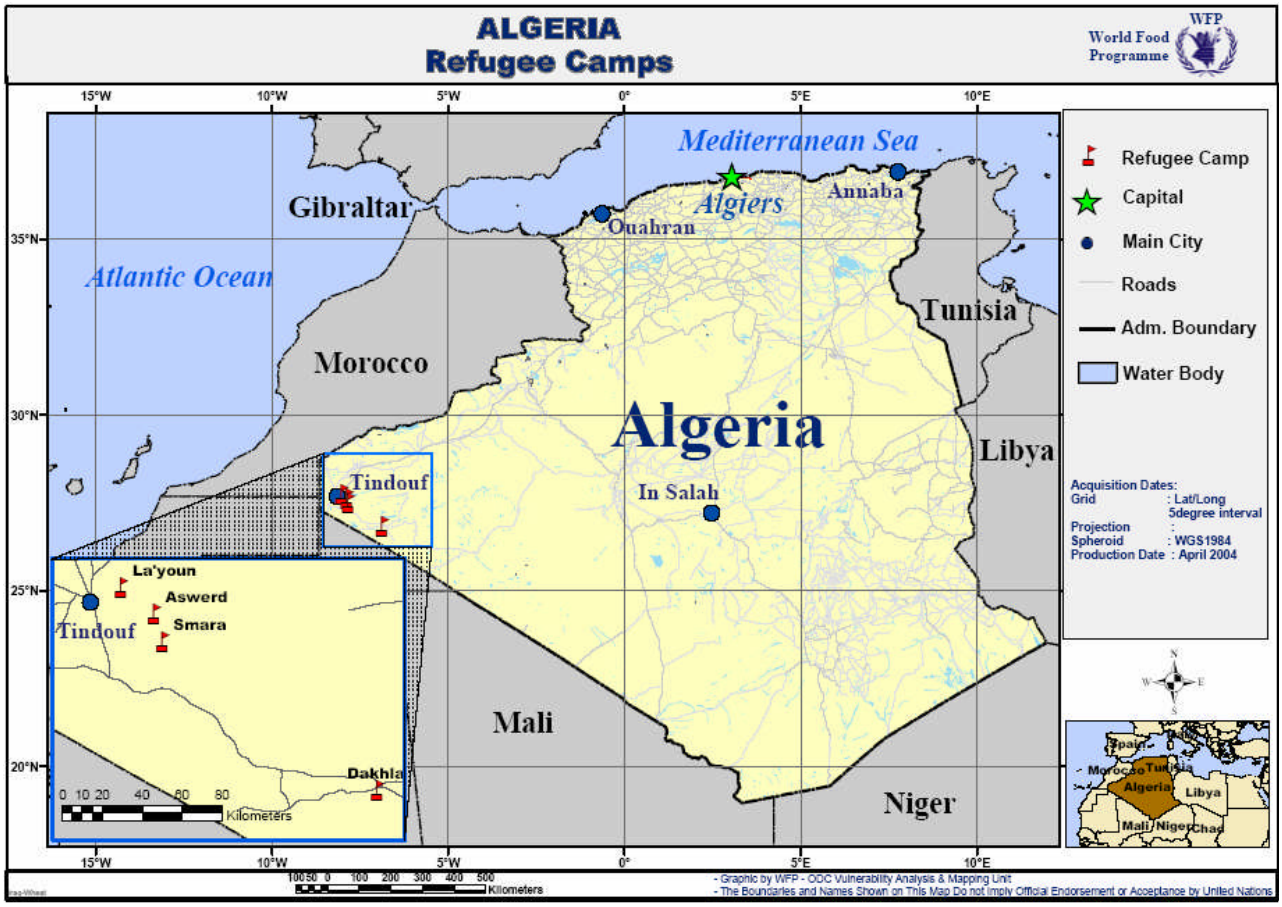


Figure A2.1. Map of the area

* Graphic by WFP – ODC Vulnerability Analysis & Mapping Unit
* The boundaries and names shown in this map do not imply official endorsement or acceptance by United Nations

Annex 3: Cluster allocation

Table A3.1. Cluster allocation Dakhla

District	Quarter	Population	Cluster
J-raifia	Quarter 1	739	1
	Quarter 2	738	2
	Quarter 3	739	3
	Quarter 4	738	4
El- Argub	Quarter 1	638	5
	Quarter 2	638	6
	Quarter 3	637	7
	Quarter 4	638	8
Um-edraiga	Quarter 1	859	9
	Quarter 2	860	10
	Quarter 3	859	11,12
	Quarter 4	859	13
Bujdur	Quarter 1	716	14
	Quarter 2	715	15
	Quarter 3	715	16
	Quarter 4	715	17
Glaibat el F	Quarter 1	762	18
	Quarter 2	762	19,20
	Quarter 3	762	21
	Quarter 4	762	22
Ain-el Beida	Quarter 1	581	23
	Quarter 2	582	24
	Quarter 3	581	25
	Quarter 4	581	26
Bir-Enzaran	Quarter 1	688	27
	Quarter 2	688	28
	Quarter 3	688	29
	Quarter 4	688	30
Total	**28**	**19,928**	**30**

Table A3.2. Cluster allocation Laayoune

District	Quarter	Population	Cluster
Amgala	Quarter 1	1,457	1
	Quarter 2	1,457	2
	Quarter 3	1,457	3
	Quarter 4	1,456	4,5
Dchera	Quarter 1	1,328	6
	Quarter 2	1,328	7
	Quarter 3	1,328	8
	Quarter 4	1,327	9
Daoura	Quarter 1	1,489	10
	Quarter 2	1,490	11,12
	Quarter 3	1,490	13
	Quarter 4	1,490	14
Hagouina	Quarter 1	1,386	15,16
	Quarter 2	1,386	17
	Quarter 3	1,386	18
	Quarter 4	1,385	19
Bucraa	Quarter 1	1,516	20,21
	Quarter 2	1,516	22
	Quarter 3	1,516	23
	Quarter 4	1,517	24
Guelta	Quarter 1	1,462	25,26
	Quarter 2	1,462	27
	Quarter 3	1,462	28
	Quarter 4	1,461	29,30
Total	**24**	**34,552**	**30**

Table A3.3. Cluster allocation Awserd

District	Quarter	Population	Cluster
Aguenit	Quarter 1	1,040	1
	Quarter 2	1,040	2
	Quarter 3	1,040	3
	Quarter 4	1,040	4
Tichla	Quarter 1	1,130	5
	Quarter 2	1,130	6,7
	Quarter 3	1,130	8
	Quarter 4	1,129	9
La Gouera	Quarter 1	1,350	10,11
	Quarter 2	1,350	12
	Quarter 3	1,350	13
	Quarter 4	1,349	14,15
Biz-ganduz	Quarter 1	1,164	16
	Quarter 2	1,163	17
	Quarter 3	1,164	18,19
	Quarter 4	1,163	20
Miyek	Quarter 1	1,227	21
	Quarter 2	1,228	22
	Quarter 3	1,228	23,24
	Quarter 4	1,228	25
Zug	Quarter 1	1,105	26
	Quarter 2	1,104	27
	Quarter 3	1,105	28,29
	Quarter 4	1,104	30
Total	**24**	**28,061**	**30**

Table A3.4. Cluster allocation Smara and 27 February

Camp	District	Quarter	Population	Cluster
Smara	Mahbes	Quarter 1	1,222	1
		Quarter 2	1,221	2
		Quarter 3	1,222	
		Quarter 4	1,222	3
	Farsia	Quarter 1	1,385	4
		Quarter 2	1,385	5
		Quarter 3	1,385	6
		Quarter 4	1,385	7
	Ejdeira	Quarter 1	1,396	8,9
		Quarter 2	1,396	10
		Quarter 3	1,396	11
		Quarter 4	1,396	12
	Hauza	Quarter 1	1,326	13
		Quarter 2	1,325	14
		Quarter 3	1,326	15
		Quarter 4	1,326	16
	B-Lehlu	Quarter 1	1,087	
		Quarter 2	1,086	17
		Quarter 3	1,086	18
		Quarter 4	1,086	19
	Tifariti	Quarter 1	1,226	20
		Quarter 2	1,226	21
		Quarter 3	1,227	
		Quarter 4	1,226	22
	Mheiriz	Quarter 1	1,152	23
		Quarter 2	1,153	24
		Quarter 3	1,152	25
		Quarter 4	1,152	26
February 27th	February 27th	Quarter 1	1,075	27
		Quarter 2	1,075	
		Quarter 3	1,075	28
		Quarter 4	1,075	29
		Quarter 5	1,075	30
	Total	**33**	**40,548**	**30**

Annex 4: Questionnaires

Informed Consent

Today's date : |__|__| / Nov /2012 **Day**	**Wilaya: |_____|**	**Daira: |_____|**
Barrio: |_____|	**Cluster number: |____|**	**Team number: |____|**
Household number: |____|		

Information about the survey

We are a team of people working for the Ministry of Health. Along with the United Nations High Commissioner for Refugees (UNHCR) and World Food Programme (WFP), we are conducting a survey on health in the camps. The people in the household that are included in the survey are children under 5 years and women aged 15 to 49. For the children we are going to measure the weight, the height, the arm circumference and a finger prick to draw a few drops of blood. Concerning the women were going to measure the weight, the height, the waist circumference and prick a finger to get a few drops of blood. We would also like to ask some questions about the vaccines of children and the feeding habits of the family members.

All the information you give will be kept strictly confidential and will not contain your names. The survey is voluntary and you may choose not to answer any questions we will make. We hope you participate because your participation in the survey is very important. Are there any questions? Are you willing participate?

Yes |_____| No |_____|

Number of children and women in the household

Q1.	¿How many children under 5 years are living in the household?	|___|___|	**Q2.**	How many children under 5 years have been filled in the questionnaire?	|___|___|
Q3.	¿How many women aged 15- 49 years are living in the household?	|___|___|	**Q4.**	How many women aged 15 to 49 years have been filled in the questionnaire?	|___|___|

Notes

Questionnaire for children under 5 years

Today's date: |__|__| / Nov /2012 (Day)	**Wilaya: |_____|**	**Daira: |_____|**
Barrio: |_____|	**Cluster number: |____|**	**Team number: |____|**
Household number: |____|	**Child number: |____|**	**Consent taken? Yes No**

Details of the Child

Q1.	Sex of Child	1 Male 2 Female
Q2.	Child's date of birth	|__|__| / |__|__| / 20|__|__| Day / Month / Year
Q3.	Child's date of birth source of information	1 Vaccination card 2 Memory recall
Q4.	Age of child in months (see table)	|__|__| months

Infant and Young Child Feeding Practices

Q5.	Has the child ever been breastfed?	1 Yes 2 No 8 Don't know
Q6.	Was the child breastfed yesterday during the day or at night?	1 Yes 2 No

Q7. Did the child have any of the following items yesterday during the day or at night?		Yes	No	Don't Know	**Q8.** How many times yesterday during the day or at night did the child consume these? (See items in **Q7**).
a.	Plain water?	1	2	8	
b.	Infant formula such as guigus?	1	2	8	b. Times |__|__|
c.	Milk such as tinned, powdered or fresh?	1	2	8	c. Times |__|__|
d.	Juice or juice drinks?	1	2	8	
e.	Clear broth?	1	2	8	
f.	Yoghurt?	1	2	8	f. Times |__|__|
g.	Thin porridge?	1	2	8	
h.	Tea, soft drinks?	1	2	8	
i.	Any other liquids? e.g. arka (made of sugar or dates, zrig (gofio shake)	1	2	8	

Q9. Yesterday, during the day or at night did the child eat any of the following items?		Yes	No	Don't know
a.	Bread, rice, pasta, soya blend, gofio, couscous, incha, or other food made from grains	1	2	8
b.	Carrots, courgettes, squash, or sweet potatoes that are yellow or orange inside	1	2	8
c.	White potatoes, turnips, or any other food made from roots	1	2	8
d.	Any dark green leafy vegetables	1	2	8
e.	Melon, watermelon, tomato, peach, apricot	1	2	8
f.	Any other fruits or vegetables	1	2	8
g.	Liver, kidney, heart, or other organ meats	1	2	8
h.	Any meat such as camel, chicken, goat, or lamb	1	2	8
i.	Eggs	1	2	8
j.	Canned fish, brined mackerel, or canned tuna	1	2	8
k.	Any food made from beans, peas, or lentils	1	2	8
l.	Cheese, yoghurt, or other milk products including young children cereal formulas	1	2	8
m.	Any oil, fats, butter, ludik (camel), edhen (goat) or foods made with any of these	1	2	8
n.	Any sugary foods such as chocolates, sweets, candies, pastries, cakes or biscuits	1	2	8
o.	Soya blend, Plumpy'nut, high energy biscuits	1	2	8

Q10.	Did the child eat any food (solid, semi-solid, or soft foods) yesterday during the day or at night? ***If the answer is '1', check that you have filled correctly Q9***	1 2 8	Yes No Don't know
Q11.	How many times did the child eat food (solid, semi-solid, or soft foods) other than liquids yesterday during the day or at night?		Times |__|__|
Q12.	Did you celebrate any event with food yesterday?	1 2	Yes No

Anaemia and stunting reduction programme for children aged 6-59 months

Q13.	Has the child ever received *Ghazala* from the dispensary?	1 2	Si No
Q14.	If "**yes**" to **Q13** would you like to continue to receive *Ghazala* for the child?	1 2	Si No
Q15.	In the past 30 days, has the child received *Chaila* from the dispensary?	1 2	Si No
Q16.	If "**yes**" to **Q15**, in the past 7 days, has the child taken *Chaila*?	1 2	Si No
Q17.	If "**no**" to **Q15**, has the child ever received *Chaila* from the dispensary?	1 2	Si No
Q18.	If "**yes**" to **Q15** or **Q17**, would you like to continue to receive *Chaila* for the child?	1 2	Si No

Nutritional Status of children aged 6-59 months

Q19.	Child's weight in kilograms	|__|__| **.** |__| kg
Q20.	Child's length/height in cm ***Measure length if the child is < 24 months or < 87 cm***	|__|__|__| **.** |__| cm
Q21.	Does the child present oedema?	1 Yes 2 No
Q22.	Child's MUAC in mm	|__|__|__| mm.
Q23.	Child's haemoglobin (in g/dl, measured by HemoCue) ***Do not measure haemoglobin if the child is < 6 months***	|__|__|__| g/L

Q24.	Is the child currently being treated for?	Yes	No	Don't know
	Anaemia (taking iron drops)	1	2	8
	Moderate acute malnutrition: (taking soya blend + sugar + oil)	1	2	8
	Severe acute malnutrition: (taking plumpy'nut)	1	2	8

Q25.	*For the Enumerator:* Was the child referred?	Yes	No
	Anaemia (haemoglobin < 110 g/L)	1	2
	Moderate acute malnutrition (by MOYO chart)	1	2
	Severe acute malnutrition (by MOYO chart)	1	2

Questionnaire for women aged 15-49 years

Today's date: |__|__| / Nov /2012 Day	**Wilaya: |_____|**	**Daira: |_____|**
Barrio: |_____|	**Cluster number: |____|**	**Team number: |____|**
Household number: |____|	**Woman number: |____|**	**Consent taken? Yes No**

Details of the Woman

Q1.	Age of woman in years	|__|__| years

Status of the woman

Q2.	Are you currently breastfeeding?	1 2	Yes No
Q3.	Are you currently pregnant?	1 2 8	Yes No Don't know

Para mujeres embarazadas y lactantes

Q4.	Are you receiving oral iron (tablets, drops, or syrup)?	1 2	Si No
Q5.	If "**yes**" to **Q4**, did you take these yesterday during the day or at night?	1 2	Si No
Q6.	¿In the past 30 days, have you received Chaila from the dispensary?	1 2	Si No
Q7.	If "**yes**" to **Q6**, in the past 7 days, have you taken Chaila?	1 2	Si No
Q8.	If "**no**" to **Q6**, Have you ever received Chaila from the dispensary?	1 2	Si No
Q9.	If "yes" to **Q6** or **Q8**, would you be interested to received Chaila again?	1 2	Si No

Nutritional Status

Q10.	Woman's arm circumference (MUAC) in mm	|__|__|__| mm
Q11.	Woman's Haemoglobin (in g/L, as measured by HemoCue)	|__|__|__| g/L

Q12.	*For the Enumerator:* Was the woman referred?	Yes	No
	Anaemia (non-pregnant women <120 g/L) (pregnant women <110 g/L)	1	2

Household Food Consumption Score

Today's date: |__|__| / Nov /2012 **Wilaya: |_____|** **Daira: |_____|**
Day

Barrio: |_____| **Cluster number: |____|** **Team number: |____|**

Household number: |____|

Food consumption score

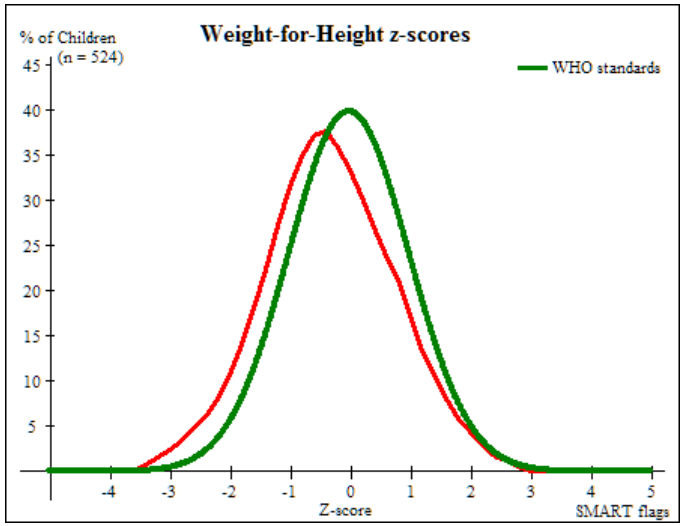
Q1.	During the last 7 days, did any member of the family eat any food of the following food groups?	Yes	No	**Q2.**	For how many days?	
Group	Products	Yes	No		Number of days (1 – 7)	
a.	Bread, rice, pasta, soya blend, gofio, couscous, insha, oats, barley, or any other food made from grains	1	2	a.	|___|	
b.	Potatoes, beetroot, turnip, or any other food made from roots	1	2	b.	|___|	
c.	Any food made from beans, peas, or lentils	1	2	c.	|___|	
d.	Any vegetables or green leaves	1	2	d.	|___|	
e.	Any fruit	1	2	e.	|___|	
f.	Any camel meat, chicken, goat, lamb, brined mackerel, canned tuna, or eggs	1	2	f.	|___|	
g.	Any milk (fresh or powdered), cheese, yoghurt, laish, or any other milk products	1	2	g.	|___|	
h.	Any sugar or sugary foods such as chocolates, sweets, candies, cakes, biscuits, soft drinks	1	2	h.	|___|	
i.	Any oil, fats, butter, ludik (camel), edhen (goat), or foods made with any of these	1	2	i.	|___|	

Annex 5: Tables - Prevalence of malnutrition in children aged 6-59 months based on the 2006 WHO Growth Standards.

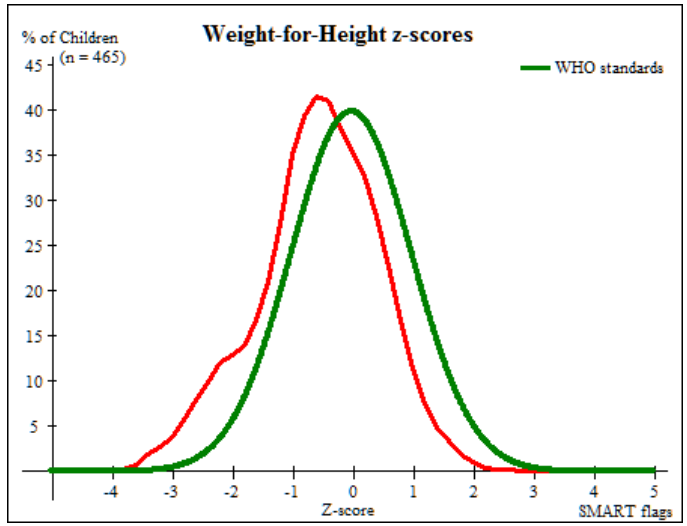
Table A5.1. Prevalence of acute malnutrition in children aged 6-59 months, based on weight-for-height z-scores and/or oedema (WHO 2006 growth standards). Results are shown by camp and sex

		Awserd	Dakhla	Laayoune	Smara[1]	Combined[2]
All	n	523	497	465	495	1980
Prevalence of global acute malnutrition	(n) %	(31) 5.9	(34) 6.8	(49) 10.5*	(32) 6.5	(146) 7.6
(<-2 z-scores and/or oedema)	(95% C.I)	(4.2 – 7.6)	(4.6 – 9.0)	(7.8 – 13.2)	(4.1 – 8.8)	(6.4 – 8.8)
Prevalence of moderate acute malnutrition	(n) %	(29) 5.5	(33) 6.6	(42) 9.0	(28) 5.7	(132) 6.8
(<-2 and ≥-3 z-scores, no oedema)	(95% C.I)	(3.8 – 7.3)	(4.4 – 8.9)	(6.8 – 11.3)	(3.4 – 7.9)	(5.7 - 7.9)
Prevalence of severe acute malnutrition	(n) %	(2) 0.4	(1) 0.2	(7) 1.5	(4) 0.8	(14) 0.8
(<-3 z-score and/or oedema	(95% C.I)	(0.0 – 0.9)	(0.0 – 0.6)	(0.0 – 3.0)	(0.0 - 1.6)	(0.3 – 1.3)
Oedema prevalence	(n) %	(0) 0.0	(0) 0.0	(0) 0.0	(0) 0.0	(0) 0.0
Boys	n	246	239	248	248	981
Prevalence of global acute malnutrition	(n) %	(19) 7.7	(15) 6.3	(33) 13.3	(19) 7.7	(86) 9.2
(<-2 z-scores and/or oedema)	(95% C.I)	(4.6 – 10.9)	(2.7 – 9.9)	(8.5 – 18.1)	(4.7 – 10.6)	(7.3 - 11.2)
Prevalence of moderate acute malnutrition	(n) %	(18) 7.3	(15) 6.3	(27) 10.9	(16) 6.5	(76) 8.0
(<-2 and ≥-3 z-scores, no oedema)	(95% C.I)	(4.3 – 10.3)	(2.7 – 9.9)	(6.4 – 15.4)	(3.4 – 9.5)	(6.1 – 9.9)
Prevalence of severe acute malnutrition	(n) %	(1) 0.4	(0) 0.0	(6) 2.4	(3) 1.2	(10) 1.2
(<-3 z-score and/or oedema	(95% C.I)	(0.0 – 1.2)	(N/A)	(0.3 – 4.6)	(0.0 – 2.6)	(0.4 – 2.1)
Girls	n	277	258	217	247	999
Prevalence of global acute malnutrition	(n) %	(12) 4.3	(19) 7.4	(16) 7.4	(13) 5.3	(60) 6.0
(<-2 z-scores and/or oedema)	(95% C.I)	(2.1 – 6.5)	(4.3 – 10.5)	(4.3 – 10.5)	(2.4 – 8.1)	(4.5 – 7.4)
Prevalence of moderate acute malnutrition	(n) %	(11) 4.0	(18) 7.0	(15) 6.9	(12) 4.9	(56) 5.6
(<-2 and ≥-3 z-scores, no oedema)	(95% C.I)	(1.8 – 6.2)	(3.8 – 10.1)	(4.1 – 9.7)	(2.2 – 7.5)	(4.2 – 6.9)
Prevalence of severe acute malnutrition	(n) %	(1) 0.4	(1) 0.4	(1) 0.5	(1) 0.4	(4) 0.4
(<-3 z-score and/or oedema	(95% C.I)	(0.0 – 1.1)	(0.0 – 1.1)	(0.0 – 1.4)	(0.0 – 1.2)	(0.0 – 0.8)

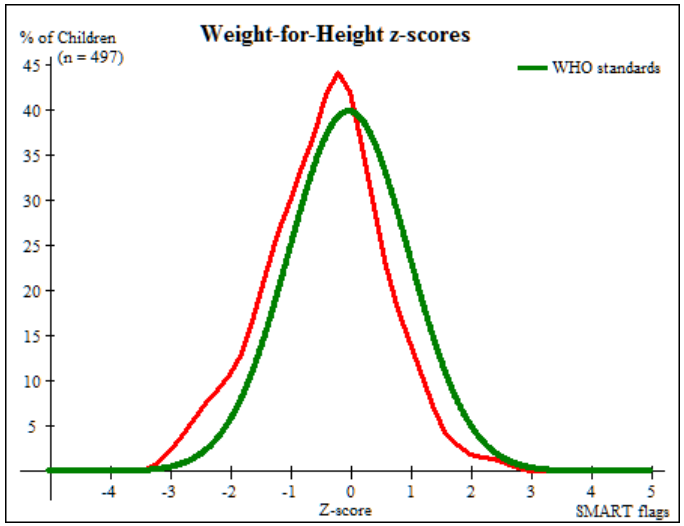
1. Data from Smara also includes data from February 27th. 2. Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.
***** Camp prevalence of global acute malnutrition significantly different from the weighted prevalence of the remaining three camps.



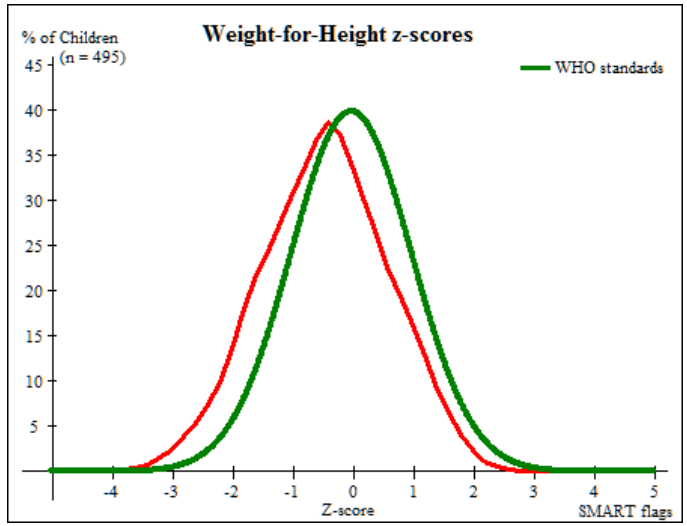
Awserd



Laayoune



Dakhla



Smara + February 27th

Figure A5.1. Weight-for-height distribution in children aged 6-59 months by Wilaya. Smara data includes data from February 27th.

Table A5.2. Prevalence of acute malnutrition by age in children aged 6-59 months, based on weight-for-height z-scores and/or oedema (WHO 2006 growth standards). Weighted results (4 camps).

Age	Total	Severe wasting (<-3 z-scores)		Moderate wasting (≥-3 and <-2 z-scores)		Normal (≥-2 z-scores)		Oedema	
months	No.	No.	%	No.	%	No.	%	No.	%
6 - 17	494	4	1.0	55	11.0	435	88.0	0	0.0
18 - 29	464	2	0.4	28	5.8	434	93.8	0	0.0
30 - 41	438	6	1.7	20	4.9	412	93.4	0	0.0
42 - 53	345	1	0.4	17	5.4	327	94.2	0	0.0
54 - 59	239	1	0.4	12	5.1	226	94.5	0	0.0
Total	1980	14	0.8	132	6.8	1834	92.4	0	0.0

Table A5.3. Prevalence of low MUAC in children aged 6-59 months. Results are shown by camp

		Awserd	Dakhla	Laayoune	Smara[1]	Combined[2]
All	n	363	416	345	467	1591
Prevalence of MUAC <125mm and/or oedema	(n) %	(16) 3.0	(20) 4.0	(20) 4.2	(25) 5.0	(81) 4.2
	(95% C.I)	(1.5 – 4.5)	(2.1 – 5.9)	(2.4 – 6.0)	(2.7 – 7.3)	(3.1 – 5.2)
Prevalence of MUAC<125mm and ≥115mm, no oedema	(n) %	(13) 2.4	(19) 3.8	(16) 3.4	(23) 4.6	(71) 3.6
	(95% C.I)	(1.0 – 3.9)	(1.9 – 5.6)	(1.9 – 4.9)	(2.6 – 6.6)	(2.7 – 4.5)
Prevalence of MUAC <115mm and or oedema	(n) %	(3) 0.6	(1) 0.2	(4) 0.8	(2) 0.4	(10) 0.5
	(95% C.I)	(0.0 – 1.2)	(0.0 – 0.6)	(0.1 – 1.6)	(0.0 – 1.2)	(0.2 – 0.9)

1. Data from Smara also includes data from February 27th. 2. Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.
***** Camp prevalence of global acute malnutrition significantly different from the weighted prevalence of the remaining three camps.

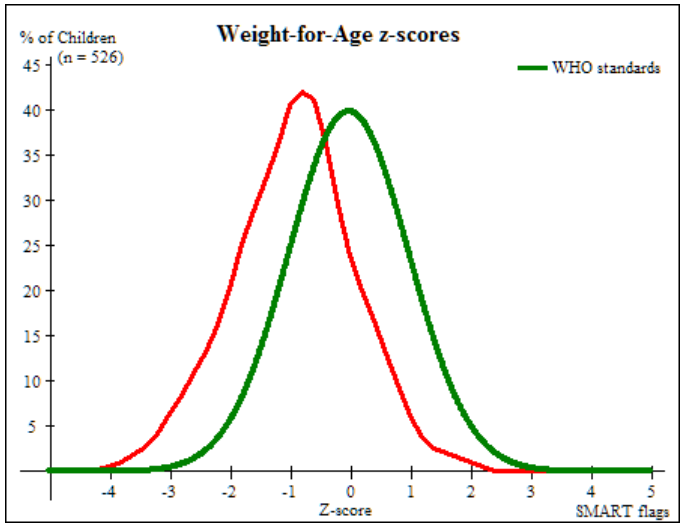
Table A5.4. Prevalence of low MUAC in children aged 6-59 months, by age based on MUAC. Weighted results (4 camps)

Age	Total	<115mm		<125mm and ≥115mm		<125mm		≥125mm	
months	No.	No.	%	No.	%	No.	%	No.	%
6 - 17	506	8	1.6	64	12.6	72	14.2	434	85.8
18 - 29	469	0	0.0	6	1.3	6	1.3	463	98.7
30 - 41	448	1	0.2	1	0.2	2	0.4	446	99.6
42 - 53	348	1	0.3	0	0.0	1	0.3	347	99.7
54 - 59	243	0	0.0	0	0.0	0	0.0	243	100.0
Total	2014	10	0.5	71	3.5	81	4.0	1933	96.0

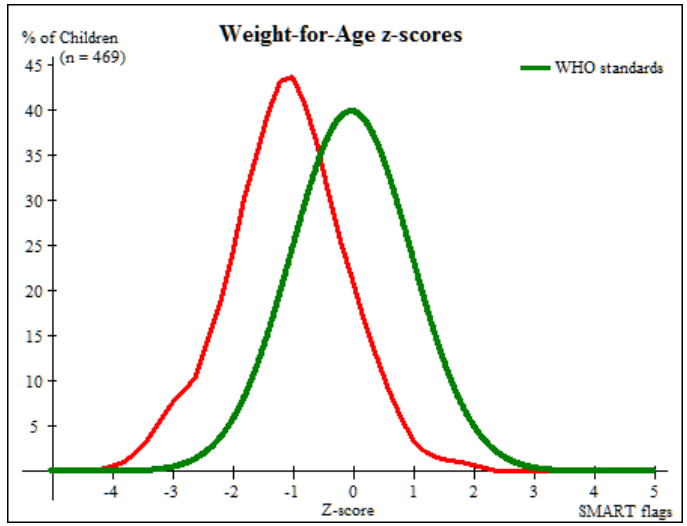
Table A5.5. Prevalence of underweight in children aged 6-59 months, based on weight-for-age z-scores and by sex (WHO 2006 growth standards). Results are shown by camp.

		Awserd	Dakhla	Laayoune	Smara[1]	Combined[2]
All	n	525	500	469	501	1995
Prevalence of underweight	(n) %	(74) 14.1	(82) 16.4	(81) 17.3	(90) 18.0	(327) 16.7
(<-2 z-scores)	(95% C.I)	(10.8 – 17.4)	(13.5 – 19.3)	(13.4 – 21.1)	(14.3 – 21.7)	(14.8 – 18.5)
Prevalence of moderate underweight	(n) %	(62) 11.8	(67) 13.4	(66) 14.1	(68) 13.6	(263) 13.3
(<-2 and ≥-3 z-scores)	(95% C.I)	(9.1 – 14.5)	(11.0 – 15.8)	(11.1 – 17.0)	(10.7 – 16.5)	(11.8 – 14.8)
Prevalence of severe underweight	(n) %	(12) 2.3	(15) 3.0	(15) 3.2	(22) 4.4	(64) 3.4
(<-3 z-score)	(95% C.I)	(1.0 – 3.6)	(1.1 – 4.9)	(1.3 – 5.1)	(2.3 – 6.5)	(2.4 – 4.3)
Boys	n	245	241	250	251	987
Prevalence of underweight	(n) %	(38) 15.5	(41) 17.0	(56) 22.4	(51) 20.3	(186) 19.5
(<-2 z-scores)	(95% C.I)	(11.5 – 19.5)	(12.4 – 21.6)	(16.8 – 28.0)	(15.4 – 25.3)	(16.8 – 22.2)
Prevalence of moderate underweight	(n) %	(30) 12.2	(34) 14.1	(44) 17.6	(43) 17.1	(151) 15.8
(<-2 and ≥-3 z-scores)	(95% C.I)	(8.7 – 15.8)	(10.1 – 18.1)	(13.6 – 21.6)	(12.6 – 21.7)	(13.6 – 18.0)
Prevalence of severe underweight	(n) %	(8) 3.3	(7) 2.9	(12) 4.8	(8) 3.2	(35) 3.7
(<-3 z-score)	(95% C.I)	(1.1 – 5.4)	(0.6 – 5.2)	(1.6 – 8.0)	(1.3 – 5.1)	(2.3 – 5.0)
Girls	n	280	259	219	250	1008
Prevalence of underweight	(n) %	(36) 12.9	(41) 15.8	(25) 11.4	(39) 15.6	(141) 13.8
(<-2 z-scores)	(95% C.I)	(8.6 – 17.1)	(11.7 – 20.0)	(7.5 – 15.3)	(9.8 – 21.4)	(11.3 – 16.3)
Prevalence of moderate underweight	(n) %	(32) 11.4	(33) 12.7	(22) 10.0	(25) 10.0	(112) 10.8
(<-2 and ≥-3 z-scores)	(95% C.I)	(7.6 – 15.2)	(9.1 – 16.3)	(6.1 – 14.0)	(6.5 – 13.5)	(8.9 – 12.7)
Prevalence of severe underweight	(n) %	(4) 1.4	(8) 3.1	(3) 1.4	(14) 5.6	(29) 3.0
(<-3 z-score)	(95% C.I)	(0.1 – 2.8)	(1.0 – 5.1)	(0.0 – 2.9)	(1.5 – 9.7)	(1.6 – 4.5)

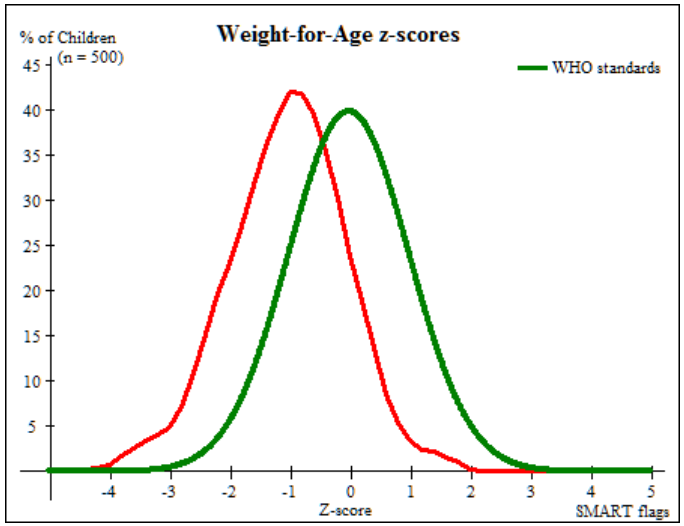
1. Data from Smara also includes data from February 27th. 2. Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.



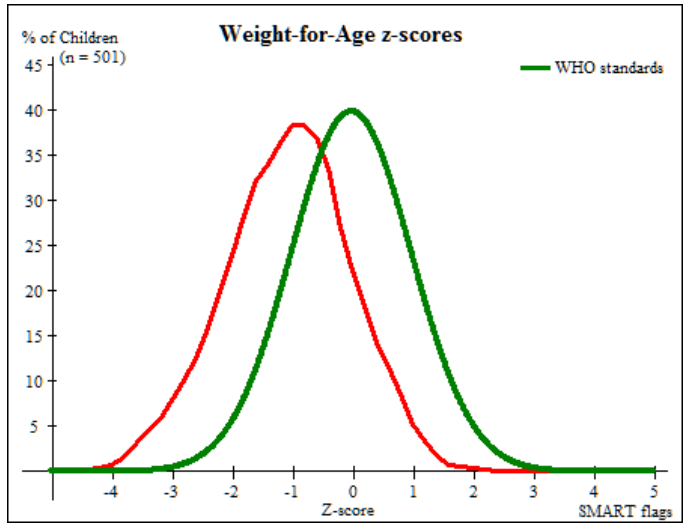
Awserd



Laayoune



Dakhla



Smara + February 27th

Figure A5.2. Weight-for-age distribution in children aged 6-59 months for each survey. Smara data includes data from February 27th.

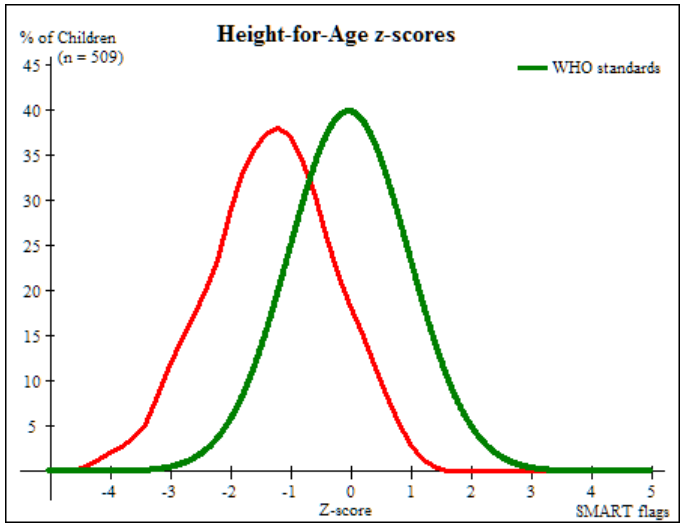
Table A5.6. Prevalence of underweight in children aged 6-59 months, by age, based on weight-for-age z-scores (WHO references). Weighted results (4 camps).

Age	Total	Severe underweight (<-3 z-scores)		Moderate underweight (≥-3 and <-2 z-scores)		Normal (≥-2 z-scores)	
months	No.	No.	%	No.	%	No.	%
6 - 17	496	26	5.7	76	15.2	394	79.1
18 - 29	465	16	3.4	59	12.5	390	84.9
30 - 41	444	11	2.6	61	14.3	372	83.1
42 - 53	347	6	1.5	37	11.5	304	87.0
54 - 59	243	5	2.4	30	11.6	208	83.3
Total	1995	64	3.4	263	13.3	1668	82.1

Table A5.7. Prevalence of stunting in children aged 6-59 months, based on height-for-age z-scores and by sex (WHO 2006 growth standards). Results are shown by camp.

		Awserd	Dakhla	Laayoune	Smara[1]	Combined[2]
All		509	498	463	492	1962
Prevalence of stunting	(n) %	(124) 24.4	(112) 22.5	(110) 23.8	(139) 28.3	(485) 25.2
(<-2 z-scores)	(95% C.I)	(19.7 – 29.0)	(19.3 – 25.7)	(18.6 – 28.9)	(23.8 – 32.8)	(22.8 – 27.6)
Prevalence of moderate stunting	(n) %	(99) 19.4	(79) 15.9	(79) 17.1	(103) 20.9	(360) 18.7
(<-2 and ≥-3 z-scores)	(95% C.I)	(15.0 – 23.9)	(12.5 – 19.3)	(13.5 – 20.6)	(17.0 – 24.8)	(16.7 – 20.7)
Prevalence of severe stunting	(n) %	(25) 4.9	(33) 6.6	(31) 6.7	(36) 7.3	(125) 6.5
(<-3 z-score	(95% C.I)	(2.9 – 7.0)	(4.3 – 9.0)	(4.1 – 9.3)	(5.2 – 9.4)	(5.3 – 7.7)
Boys		238	241	248	247	974
Prevalence of stunting	(n) %	(56) 23.5	(65) 27.0	(75) 30.2	(75) 30.4	(271) 28.4
(<-2 z-scores)	(95% C.I)	(17.7 – 29.3)	(21.4 – 32.6)	(22.5 – 38.0)	(24.7 – 36.0)	(25.0 – 31.8)
Prevalence of moderate stunting	(n) %	(46) 19.3	(47) 19.5	(51) 20.6	(55) 22.3	(199) 20.7
(<-2 and ≥-3 z-scores)	(95% C.I)	(13.7 – 25.0)	(13.8 – 25.2)	(14.9 – 26.2)	(17.3 – 27.3)	(17.9 – 23.5)
Prevalence of severe stunting	(n) %	(10) 4.2	(18) 7.5	(24) 9.7	(20) 8.1	(72) 7.7
(<-3 z-score	(95% C.I)	(1.5 – 6.9)	(3.8 – 11.1)	(6.0 – 13.4)	(5.3 – 10.9)	(6.0 – 9.4)
Girls		271	257	215	245	988
Prevalence of stunting	(n) %	(68) 25.1	(47) 18.3	(35) 16.3	(64) 26.1	(214) 21.9
(<-2 z-scores)	(95% C.I)	(18.4 – 31.7)	(13.9 – 22.7)	(11.6 – 20.9)	(20.4 – 31.8)	(19.0 – 24.7)
Prevalence of moderate stunting	(n) %	(53) 19.6	(32) 12.5	(28) 13.0	(48) 19.6	(161) 16.6
(<-2 and≥[3]-3 z-scores)	(95% C.I)	(13.5 – 25.6)	(9.0 – 15.9)	(9.0 – 17.1)	(14.4 – 24.7)	(14.1 – 19.2)
Prevalence of severe stunting	(n) %	(15) 5.5	(15) 5.8	(7) 3.3	(16) 6.5	(53) 5.3
(<-3 z-score	(95% C.I)	(2.6 – 8.4)	(2.8 – 8.8)	(0.7 – 5.8)	(2.8 – 10.3)	(3.6 – 6.9)

1. Data from Smara also includes data from February 27th. 2. Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.



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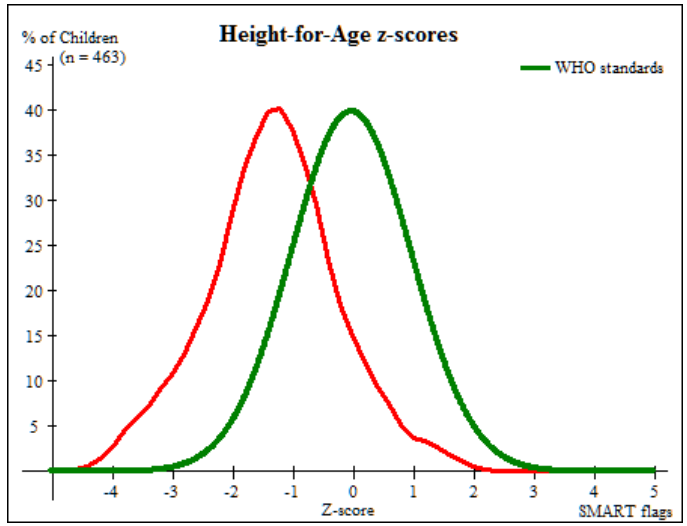
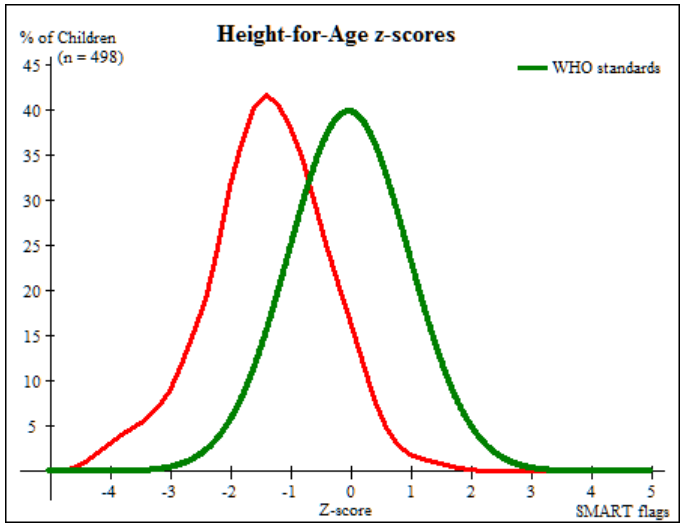


Laayoune



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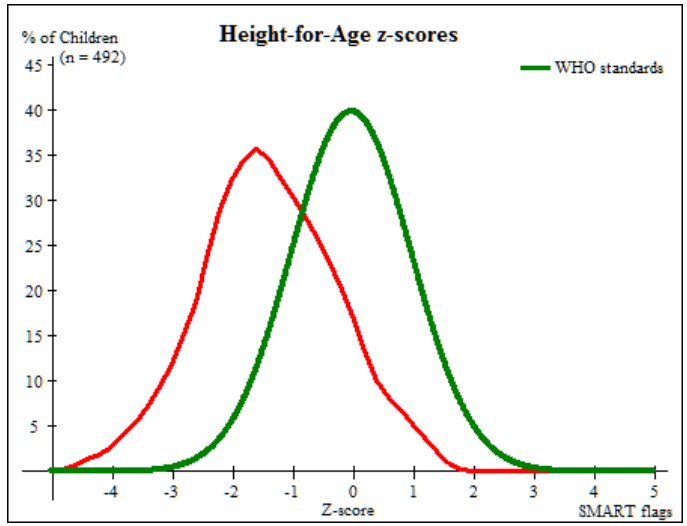

Smara + February 27th

Figure A5.3. Height-for-age distribution in children aged 6-59 months, for each survey. Smara data includes data from the February 27th.

Table A5.8. Prevalence of stunting in children aged 6-59 months, by age, based on height-for-age z-scores (WHO 2006 growth standards). Weighted results (4 camps)

Age	Total	Severe stunting (<-3 z-scores)		Moderate stunting (≥-3 and <-2 z-scores)		Normal (≥-2 z-scores)	
months	No.	No.	%	No.	%	No.	%
6 - 17	490	30	6.2	83	17.2	377	76.6
18 - 29	451	47	10.9	92	21.1	312	68.0
30 - 41	437	28	6.8	89	20.6	320	72.6
42 - 53	342	12	3.3	53	15.8	277	80.9
54 - 59	242	8	2.6	43	17.6	191	79.8
Total	1962	125	6.5	360	18.7	1477	74.8

Table A5.9. Prevalence of stunting in children aged 6-59 months, based on height-for-age z-scores and by sex (WHO 2006 growth standards). Results are shown by camp.

		Awserd	Dakhla	Laayoune	Smara[1]	Combined[2]
Children aged 6-23 months	n	186	170	180	197	733
Prevalence of stunting	(n) %	(46) 24.7	(42) 24.7	(54) 30.0	(59) 29.9	(201) 28.1
(<-2 z-scores)	(95% C.I)	(18.6 – 30.9)	(17.3 – 32.2)	(23.6 – 36.4)	(23.0 – 36.9)	(24.6 – 31.6)
Prevalence of moderate stunting	(n) %	(36) 19.4	(26) 15.3	(29) 21.7	(38) 19.3	(139) 19.5
(<-2 and ≥-3 z-scores)	(95% C.I)	(13.1 – 25.6)	(9.5 – 21.1)	(15.4 – 27.9)	(13.4 – 25.2)	(16.3 – 22.7)
Prevalence of severe stunting	(n) %	(10) 5.4	(16) 9.4	(15) 8.3	(21) 10.7	(62) 8.7
(<-3 z-score	(95% C.I)	(2.1 – 8.6)	(4.5 – 14.3)	(4.2 – 12.5)	(6.6 – 14.7)	(6.6 – 10.8)
Children aged 24-59 months	n	323	328	283	295	1229
Prevalence of stunting	(n) %	(78) 24.1	(70) 21.3	(56) 19.8	(80) 27.1	(284) 23.3
(<-2 z-scores)	(95% C.I)	(19.2 – 29.1)	(16.7 – 26.0)	(13.2 – 26.3)	(22.0 – 32.3)	(20.5 – 26.2)
Prevalence of moderate stunting	(n) %	(63) 19.5	(53) 16.2	(40) 14.1	(65) 22.0	(221) 18.2
(<-2 and ≥-3 z-scores)	(95% C.I)	(14.8 – 24.2)	(11.1 – 21.2)	(9.3 – 19.0)	(16.8 – 27.3)	(15.6 – 20.8)
Prevalence of severe stunting	(n) %	(15) 4.6	(17) 5.2	(16) 5.7	(15) 5.1	(63) 5.2
(<-3 z-score	(95% C.I)	(2.1 – 7.2)	(2.6 – 7.8)	(2.4 – 8.9)	(2.7 – 7.4)	(3.8 – 6.6)

1. Data from Smara also includes data from February 27th. 2. Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A5.10. Prevalence in 2010 of stunting in children aged 6-59 months, based on height-for-age z-scores and by sex (WHO 2006 growth standards). Results are shown by camp.

		Awserd	Dakhla	Laayoune	Smara[1]	Combined[2]
6 – 59 months	n	349	360	330	418	1457
Prevalence of stunting	(n) %	(89) 25.5	(114) 31.7	(113) 34.2	(116) 27.8	(432) 29.7
(<-2 z-scores)	(95% C.I)	(20.9 - 30.8)	(26.0 - 37.9)	(28.3 - 40.7)	(22.9 - 33.2)	(26.9 - 32.5)
Prevalence of moderate stunting	(n) %	(63) 18.1	(86) 23.9	(76) 23.0	(88) 21.1	(313) 21.3
(<-2 and ≥-3 z-scores)	(95% C.I)	(13.9 - 23.1)	(19.2 - 29.3)	(18.2 - 28.7)	(17.2 - 25.5)	(19.0 – 23.7)
Prevalence of severe stunting	(n) %	(26) 7.4	(28) 7.8	(37) 11.2	(28) 6.7	(150) 8.3
(<-3 z-score	(95% C.I)	(5.2 - 10.6)	(5.3 - 11.2)	(8.7 - 14.3)	(4.1 - 10.7)	(6.9 – 9.8)
6 – 23 months	n	146	135	128	161	570
Prevalence of stunting	(n) %	(39) 26.7	(48) 35.6	(39) 30.5	(44) 27.3	(170) 29.3
(<-2 z-scores)	(95% C.I)	(20.9 – 32.5)	(25.7 – 45.4)	(22.0 – 39.0)	(20.7 – 34.0)	(25.5 – 33.1)
Prevalence of moderate stunting	(n) %	(25) 17.1	(38) 28.1	(24) 18.8	(35) 21.7	(122) 20.7
(<-2 and ≥-3 z-scores)	(95% C.I)	(11.1 – 23.1)	(19.2 – 37.1)	(11.0 – 26.5)	(16.2 – 27.3)	(17.3 – 24.1)
Prevalence of severe stunting	(n) %	(14) 9.6	(10) 7.4	(15) 11.7	(9) 5.6	(48) 8.6
(<-3 z-score	(95% C.I)	(5.3 – 13.9)	(3.4 – 11.4)	(7.0 – 16.4)	(2.0 – 9.2)	(6.4 – 10.8)
24 – 59 months	n	203	225	202	257	887
Prevalence of stunting	(n) %	(50) 24.6	(66) 29.3	(74) 36.6	(72) 28.0	(262) 29.9
(<-2 z-scores)	(95% C.I)	(17.6 – 31.6)	(22.9 – 35.8)	(28.8 – 44.4)	(21.3 – 34.7)	(26.3 – 33.6)
Prevalence of moderate stunting	(n) %	(38) 18.7	(48) 21.3	(52) 25.7	(53) 20.6	(191) 21.8
(<-2 and≥[3]-3 z-scores)	(95% C.I)	(11.9 – 25.5)	(16.5 – 26.2)	(18.4 – 33.1)	(14.8 – 26.4)	(18.5 – 25.1)
Prevalence of severe stunting	(n) %	(12) 5.9	(18) 8.0	(22) 10.9	(19) 7.4	(71) 8.2
(<-3 z-score	(95% C.I)	(2.3 – 9.6)	(4.7 – 11.3)	(6.9 – 14.9)	(3.6 – 11.1)	(6.2 – 10.1)

1. Data from Smara also includes data from February 27th. 2. Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A5.11. Mean z-score values (WHO 2006 growth standards) in children aged 6-59 months, design effects and included and excluded subjects

Indicator	Camp	Total	Mean z-scores ± S.D.	Design Effect (z-score < -2)	Included	z-scores not available	z-scores out of range
Weight-for-Height	Awserd	539	-0.34±1.06	1.00	523	9	7
	Dakhla	504	-0.41±0.98	1.00	497	0	7
	Laayoune	474	-0.58±1.00	1.00	465	0	9
	Smara[1]	505	-0.46±1.03	1.15	495	3	7
	Combined	2022	-0.46±1.02	1.07	1980	12	30
Weight-for-Age	Awserd	539	-0.93±1.01	1.16	525	7	7
	Dakhla	504	-1.04±0.96	1.00	500	0	4
	Laayoune	474	-1.09±0.96	1.23	469	0	5
	Smara[1]	505	-1.08±1.02	1.18	501	2	2
	Combined	2022	-1.04±0.98	1.29	1995	9	18
Height-for-Age	Awserd	539	-1.31±1.02	1.53	509	9	21
	Dakhla	504	-1.37±1.00	1.00	498	0	6
	Laayoune	474	-1.32±1.08	1.71	463	0	11
	Smara[1]	505	-1.38±1.11	1.25	492	2	11
	Combined	2022	-1.35±1.06	1.56	1962	11	49

1. Data from Smara also includes data from February 27th.

Annex 6: Tables - Prevalence of malnutrition in children aged 6-59 months based on the 1977 NCHS Growth References

Table A6.1. Prevalence of acute malnutrition in children aged 6-59 months, based on weight-for-height z-scores and/or oedema (1977 NCHS Growth References). Results are shown by camp and sex

		Awserd	Dakhla	Laayoune	Smara[1]	Combined[2]
All	n	526	500	467	499	1992
Prevalence of global acute malnutrition	(n) %	(37) 7.0	(41) 8.2	(46) 9.9	(32) 6.4	(156) 7.9
(<-2 z-scores and/or oedema)	(95% C.I)	(5.5 - 8.9)	(6.0 - 11.2)	(7.6 - 12.7)	(4.5 - 9.0)	(6.7 – 9.0)
Prevalence of moderate acute malnutrition	(n) %	(36) 6.8	(39) 7.8	(44) 9.4	(26) 5.2	(145) 7.3
(<-2 and ≥-3 z-scores, no oedema)	(95% C.I)	(5.4 - 8.7)	(5.7 - 10.6)	(7.1 - 12.4)	(3.5 - 7.6)	(6.2 – 8.4)
Prevalence of severe acute malnutrition	(n) %	(1) 0.2	(2) 0.4	(2) 0.4	(6) 1.2	(11) 0.6
(<-3 z-score and/or oedema	(95% C.I)	(0.0 - 1.5)	(0.1 - 1.7)	(0.1 - 1.7)	(0.6 - 2.5)	(0.3 – 1.0)
Boys	n	248	241	250	251	990
Prevalence of global acute malnutrition	(n) %	(22) 8.9	(21) 8.2	(32) 12.8	(18) 7.2	(113) 9.6
(<-2 z-scores and/or oedema)	(95% C.I)	(6.5 - 12.0)	(6.0 - 11.2)	(8.7 - 18.4)	(4.9 - 10.3)	(7.8 – 11.4)
Prevalence of moderate acute malnutrition	(n) %	(21) 8.5	(20) 7.8	(31) 12.4	(15) 6.0	(106) 8.9
(<-2 and ≥-3 z-scores, no oedema)	(95% C.I)	(6.1 - 11.7)	(5.7 - 10.6)	(8.3 - 18.1)	(3.9 - 9.0)	(7.1 – 10.8)
Prevalence of severe acute malnutrition	(n) %	(1) 0.4	(1) 0.4	(1) 0.4	(3) 1.2	(7) 0.7
(<-3 z-score and/or oedema	(95% C.I)	(0.1 - 3.1)	(0.1 - 1.7)	(0.1 - 3.0)	(0.4 - 3.7)	(0.1 – 1.2)
Girls	n	278	259	217	248	1002
Prevalence of global acute malnutrition	(n) %	(15) 5.4	(20) 7.7	(14) 6.5	(14) 5.6	(63) 6.1
(<-2 z-scores and/or oedema)	(95% C.I)	(3.3 - 8.7)	(5.0 - 11.7)	(3.8 - 10.7)	(3.3 - 9.4)	(4.6 – 7.7)
Prevalence of moderate acute malnutrition	(n) %	(15) 5.4	(19) 7.3	(13) 6.0	(11) 4.4	(58) 5.6
(<-2 and ≥-3 z-scores, no oedema)	(95% C.I)	(3.3 - 8.7)	(4.7 - 11.2)	(3.6 - 9.8)	(2.4 - 7.9)	(4.2 – 7.0)
Prevalence of severe acute malnutrition	(n) %	(0) 0.0	(1) 0.4	(1) 0.5	(3) 1.2	(5) 0.6
(<-3 z-score and/or oedema	(95% C.I)	(0.0 - 0.0)	(0.1 - 2.8)	(0.1 - 3.5)	(0.4 - 3.7)	(0.1 – 1.1)

1. Data from Smara also includes data from the February 27th. 2. Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.
***** Camp prevalence of global acute malnutrition significantly different from the weighted prevalence of the remaining three camps.

Table A6.2. Prevalence of acute malnutrition in children aged 6-59 months, based on weight-for-height percentage of the median and/or oedema (NCHS 1977 growth references) Results are shown by camp

		Awserd	Dakhla	Laayoune	Smara[1]	Combined[2]
All	n	526	500	467	499	1992
Prevalence of global acute malnutrition	(n) %	(15) 2.9	(22) 4.4	(22) 4.7	(23) 4.6	(82) 4.3
(<80% and/or oedema)	(95% C.I)	(1.8 - 4.4)	(2.6 - 7.4)	(3.1 - 7.2)	(3.3 - 6.5)	(3.4 – 5.2)
Prevalence of moderate acute malnutrition	(n) %	(15) 2.9	(22) 4.4	(21) 4.5	(23) 4.6	(81) 4.2
(<80% & ≥70%, no oedema)	(95% C.I)	(1.8 - 4.4)	(2.6 - 7.4)	(2.8 - 7.0)	(3.3 - 6.5)	(3.3 – 5.1)
Prevalence of severe acute malnutrition	(n) %	(0) 0.0	(0) 0.0	(1) 0.2	(0) 0.0	(1) 0.01
(<70% and/or oedema)	(95% C.I)	(0.0 - 0.0)	(0.0 - 0.0)	(0.0 - 1.6)	(0.0 - 0.0)	(0.0 – 0.2)

1. Data from Smara also includes data from February 27th. 2. Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.
***** Camp prevalence of global acute malnutrition significantly different from the weighted prevalence of the remaining three camps.

Table A6.3. Prevalence of underweight in children aged 6-59 months, based on weight-for-age z-scores (NCHS 1977 growth references). Results are shown by camp

		Awserd	Dakhla	Laayoune	Smara[1]	Combined[2]
All	n	527	501	470	501	1999
Prevalence of underweight	(n) %	(106) 20.1	(107) 20.1	(110) 23.4	(129) 25.7	(452) 23.1
(<-2 z-scores)	(95% C.I)	(16.6 - 24.2)	(16.6 - 24.2)	(18.9 - 28.6)	(21.8 - 30.1)	(21.0 – 25.3)
Prevalence of moderate underweight	(n) %	(91) 17.3	(91) 17.3	(92) 19.6	(108) 21.6	(382) 19.5
(<-2 and ≥-3 z-scores)	(95% C.I)	(14.2 - 20.8)	(14.2 - 20.8)	(16.2 - 23.4)	(18.3 - 25.2)	(17.7 – 21.2)
Prevalence of severe underweight	(n) %	(15) 2.8	(16) 2.8	(18) 3.8	(21) 4.2	(70) 3.6
(<-3 z-score)	(95% C.I)	(1.5 - 5.2)	(1.5 - 5.2)	(2.2 - 6.6)	(2.3 - 7.6)	(2.5 – 4.7)
Boys	n	248	242	251	252	993
Prevalence of underweight	(n) %	(47) 19.0	(53) 21.9	(77) 30.7	(65) 25.8	(242) 25.3
(<-2 z-scores)	(95% C.I)	(14.6 - 24.2)	(17.0 - 27.7)	(24.1 - 38.2)	(21.1 - 31.2)	(22.3 – 28.3)
Prevalence of moderate underweight	(n) %	(36) 14.5	(45) 18.6	(65) 25.9	(58) 23.0	(204) 21.5
(<-2 and ≥-3 z-scores)	(95% C.I)	(10.5 - 19.8)	(14.3 - 23.9)	(21.1 - 31.4)	(18.5 - 28.3)	(18.9 – 24.0)
Prevalence of severe underweight	(n) %	(11) 4.4	(8) 3.3	(12) 4.8	(7) 2.8	(38) 3.8
(<-3 z-score)	(95% C.I)	(2.2 - 8.8)	(1.6 - 6.9)	(2.4 - 9.2)	(1.4 - 5.5)	(2.5 – 5.2)
Girls	n	279	259	219	249	1006
Prevalence of underweight	(n) %	(59) 21.1	(54) 20.8	(33) 15.1	(64) 25.7	(210) 20.9
(<-2 z-scores)	(95% C.I)	(16.4 - 26.8)	(16.3 - 26.2)	(10.8 - 20.7)	(19.5 - 33.0)	(18.0 – 23.8)
Prevalence of moderate underweight	(n) %	(55) 19.7	(46) 17.8	(27) 12.3	(50) 20.1	(178) 17.5
(<-2 and ≥-3 z-scores)	(95% C.I)	(15.5 - 24.8)	(13.5 - 23.0)	(8.5 - 17.6)	(15.9 - 25.0)	(15.2 – 198)
Prevalence of severe underweight	(n) %	(4) 1.4	(8) 3.1	(6) 2.7	(14) 5.6	(32) 3.4
(<-3 z-score)	(95% C.I)	(0.4 - 4.8)	(1.4 - 6.7)	(1.3 - 5.9)	(2.6 - 11.6)	(1.9 – 5.0)

1. Data from Smara also includes data from the February 27th. 2. Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A6.4. Prevalence of stunting in children aged 6-59 months, based on height-for-age z-scores (NCHS 1977 growth references). Results are shown by camp.

		Awserd	Dakhla	Laayoune	Smara[1]	Combined[2]
All		511	497	465	495	1968
Prevalence of stunting	(n) %	(100) 19.6	(95) 19.1	(93) 20.0	(114) 23.0	(402) 20.8
(<-2 z-scores)	(95% C.I)	(15.6 - 24.2)	(15.9 - 22.8)	(15.9 - 24.8)	(19.5 - 27.0)	(18.7 – 22.8)
Prevalence of moderate stunting	(n) %	(83) 16.2	(70) 14.1	(74) 15.9	(91) 18.4	(328) 16.5
(<-2 and ≥-3 z-scores)	(95% C.I)	(12.5 - 20.8)	(10.9 - 18.0)	(12.1 - 20.6)	(15.2 - 22.1)	(14.6 – 18.4)
Prevalence of severe stunting	(n) %	(17) 3.3	(25) 5.0	(19) 4.1	(23) 4.6	(84) 4.3
(<-3 z-score	(95% C.I)	(1.9 - 5.6)	(3.6 - 7.1)	(2.4 - 6.9)	(2.9 - 7.3)	(3.2 – 5.3)
Boys		240	240	250	249	979
Prevalence of stunting	(n) %	(42) 17.5	(53) 22.1	(63) 25.2	(59) 23.7	(217) 22.7
(<-2 z-scores)	(95% C.I)	(13.0 - 23.1)	(17.0 - 28.1)	(19.2 - 32.4)	(19.5 - 28.4)	(19.8 – 25.5)
Prevalence of moderate stunting	(n) %	(37) 15.4	(41) 17.1	(50) 20.0	(49) 19.7	(177) 18.5
(<-2 and ≥-3 z-scores)	(95% C.I)	(10.9 - 21.3)	(12.6 - 22.8)	(14.4 - 27.2)	(15.6 - 24.5)	(15.8 – 21.2)
Prevalence of severe stunting	(n) %	(5) 2.1	(12) 5.0	(13) 5.2	(10) 4.0	(40) 4.1
(<-3 z-score	(95% C.I)	(0.9 - 4.7)	(2.9 - 8.6)	(2.7 - 9.8)	(2.3 - 7.0)	(2.8 – 5.5)
Girls		271	257	215	246	989
Prevalence of stunting	(n) %	(58) 21.4	(42) 16.3	(30) 14.0	(55) 22.4	(185) 18.8
(<-2 z-scores)	(95% C.I)	(16.0 - 28.0)	(12.4 - 21.2)	(10.4 - 18.5)	(17.2 - 28.5)	(16.2 – 21.5)
Prevalence of moderate stunting	(n) %	(46) 17.0	(29) 11.3	(24) 11.2	(42) 17.1	(151) 14.5
(<-2 and ≥-3 z-scores)	(95% C.I)	(12.2 - 23.1)	(8.2 - 15.4)	(7.9 - 15.5)	(12.5 - 22.9)	(12.1 – 16.9)
Prevalence of severe stunting	(n) %	(12) 4.4	(13) 5.1	(6) 2.8	(13) 5.3	(44) 4.4
(<-3 z-score	(95% C.I)	(2.4 - 8.1)	(2.8 - 8.9)	(1.1 - 6.7)	(2.8 - 9.6)	(2.9 – 5.8)

1. Data from Smara also includes data from the February 27th. 2. Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A6.5. Mean z-score values (NCHS 1977 growth references) in children aged 6-59 months, design effects and included and excluded subjects

Indicator	Camp	Total	Mean z-scores ± S.D.	Design Effect (z-score < -2)	Included	z-scores not available	z-scores out of range
Weight-for-Height	Awserd	539	-0.58±0.95	1.00	526	9	4
	Dakhla	504	-0.65±0.90	1.05	500	0	4
	Laayoune	474	-0.79±0.88	1.00	467	0	7
	Smara[1]	505	-0.71±0.93	1.00	499	2	4
	Aggregated	2022	-0.69±0.92	1.00	1992	11	19
Weight-for-Age	Awserd	539	-1.18±0.99	1.13	527	7	5
	Dakhla	504	-1.26±0.94	1.00	501	0	3
	Laayoune	474	-1.35±0.93	1.49	470	0	4
	Smara[1]	505	-1.32±0.98	1.08	501	2	2
	Aggregated	2022	-1.29±0.96	1.35	1999	9	14
Height-for-Age	Awserd	539	-1.14±1.00	1.43	511	9	19
	Dakhla	504	-1.21±0.96	1.00	497	0	7
	Laayoune	474	-1.12±1.04	1.37	465	0	9
	Smara[1]	505	-1.23±1.08	1.00	495	2	8
	Aggregated	2022	-1.18±1.03	1.29	1968	11	42

1. Data from Smara also includes data from the February 27th.

Annex 7: Tables – 2010 prevalence of IYCF indicators

Table A7.1. 2010 Prevalence of Infant and Young Child Feeding Practices indicators

Indicator	Age range	Eligible sample	Included sample*	Prevalence (n) %	95% CI (%)
Children ever breastfed	< 24 months	798	791	(762) 96.3	(94.6 – 98.0)
Exclusive breastfeeding under 6 months	< 6 months	146	138	(15) 10.8	(5.5 - 16.0)
Predominant breastfeeding under 6 months	< 6 months	146	140	(65) 46.7	(37.4 – 55.9)
Continued breastfeeding at 1 year	12-15 months	128	124	(84) 66.3	(56.6 - 76.1)
Continued breastfeeding at 2 years	20-23 months	143	136	(47) 34.0	(25.6 - 42.4)
Age-appropriate breastfeeding	< 24 months	798	717	(255) 36.3	(31.5 – 41.1)
Median duration of breastfeeding	0-36 months	1154	1119	18.5 months	
Milk feeding frequency for non-breastfed children	6-23 months	232	220	(75) 34.6	(27.1 – 42.1)
Introduction of solid, semi-solid or soft foods	6-8 months	68	66	(24) 38.7	(24.7 - 52.8)
Minimum dietary diversity	6-23 months	652	625	(221) 34.0	(27.9 - 40.0)
Minimum meal frequency	6-23 months	652	595	(94) 16.2	(12.4 – 19.9)
Minimum acceptable diet	6-23 months	652	595	(36) 6.5	(4.1 – 8.9)
Consumption of iron-rich or iron-fortified foods	6-23 months	652	645	(277) 44.9	(38.5 - 51.2)

* The sample of children included for the analysis of each indicator where all children eligible, according to the age required, with all the necessary data to calculate the given indicator.

Annex 8: Tables - Prevalence of anaemia in children aged 6-59 months and women of childbearing age (15-49 years)

Table A8.1. Prevalence of anaemia in children aged 6-59 months. Results are shown by camp and by age groups.

		Awserd	Dakhla	Laayoune	Smara[1]	Combined[2]
6-59 months	n	529	504	474	502	2009
Total Anaemia	(n) %	(152) 28.7	(134) 26.6	(143) 30.2	(137) 27.3	(566) 28.4
(Hb < 11.0 g/dL)	95% CI	(24.1 – 33.3)	(21.8 – 31.4)	(24.7 – 35.6)	(22.3 – 32.3)	(25.7 – 31.0)
Mild Anaemia	(n) %	(85) 16.1	(85) 16.9	(82) 17.3	(76) 15.1	(328) 16.3
(Hb 10.0-10.9 g/dL)	95% CI	(12.9 – 19.3)	(13.0 – 20.7)	(13.8 – 20.8)	(11.7 – 18.6)	(14.5 – 18.0)
Moderate Anaemia	(n) %	(66) 12.5	(48) 9.5	(57) 12.0	(59) 11.8	(230) 11.7
(Hb 7.0-9.9 g/dL)	95% CI	(9.7 – 15.2)	(6.9 – 12.2)	(8.5 – 15.6)	(8.3 – 15.2)	(9.9 – 13.4)
Severe Anaemia	(n) %	(1) 0.2	(1) 0.2	(4) 0.8	(2) 0.4	(8) 0.5
(Hb <7.0 g/dL)	95% CI	(0.0 – 0.6)	(0.0 – 0.6)	(0.1 – 1.6)	(0.0 – 0.9)	(0.1 – 0.8)
6-23 months	n	195	174	185	204	758
Total Anaemia	(n) %	(80) 41.0	(77) 44.3	(83) 44.9	(86) 42.2	(326) 43.0
(Hb < 11.0 g/dL)	95% CI	(34.4 – 47.6)	(35.6 – 52.9)	(38.0 – 51.8)	(36.1 – 48.2)	(39.5 – 46.5)
Mild Anaemia	(n) %	(45) 23.1	(48) 27.6	(52) 28.1	(46) 22.5	(191) 25.0
(Hb 10.0-10.9 g/dL)	95% CI	(17.2 – 28.9)	(20.9 – 34.2)	(22.3 – 33.9)	(17.5 – 27.6)	(22.2 – 27.9)
Moderate Anaemia	(n) %	(35) 17.9	(29) 16.7	(29) 15.7	(38) 18.6	(131) 17.3
(Hb 7.0-9.9 g/dL)	95% CI	(12.4 – 23.5)	(11.0 – 22.3)	(10.1 – 21.2)	(13.6 – 23.6)	(14.5 – 20.1)
Severe Anaemia	(n) %	(0) 0.0	(0) 0.0	(2) 1.1	(2) 1.0	(4) 0.7
(Hb <7.0 g/dL)	95% CI	N/A	N/A	(0.0 – 2.6)	(0.0 – 2.3)	(0.0 – 1.3)
24-59 months	n	334	330	289	298	1251
Total Anaemia	(n) %	(72) 21.6	(57) 17.3	(60) 20.8	(51) 17.1	(240) 19.2
(Hb < 11.0 g/dL)	95% CI	(16.6 – 26.5)	(12.5 – 22.1)	(14.5 – 27.0)	(12.4 – 21.9)	(16.5 – 22.0)
Mild Anaemia	(n) %	(40) 12.0	(37) 11.2	(30) 10.4	(30) 10.1	(137)10.8
(Hb 10.0-10.9 g/dL)	95% CI	(8.1 – 15.8)	(7.0 – 15.5)	(6.7 – 14.0)	(6.3 – 13.8)	(8.8 – 12.7)
Moderate Anaemia	(n) %	(31) 9.3	(19) 5.8	(28) 9.7	(21) 7.0	(99) 8.1
(Hb 7.0-9.9 g/dL)	95% CI	(6.0 – 12.5)	(3.2 – 8.4)	(5.5 – 13.9)	(3.4 – 10.7)	(6.2 – 10.0)
Severe Anaemia	(n) %	(1) 0.3	(1) 0.3	(2) 0.7	(0) 0.0	(4) 0.3
(Hb <7.0 g/dL)	95% CI	(0.0 – 0.9)	(0.0 – 0.9)	(0.0 – 1.6)	N/A	(0.0 – 0.6)

1. Data from Smara also includes data from February 27th. 2. Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A8.2. Mean values of haemoglobin in children aged 6-59 months

Camp	n	Mean values	95% CI	Design Effect (Hb < 11g/dL)
Awserd	529	11.6	(11.4 – 11.8)	1.19
Dakhla	504	11.6	(11.4 – 11.7)	0.93
Laayoune	474	11.5	(11.3 – 11.8)	2.15
Smara[1]	502	11.6	(11.5 – 11.8)	2.14
Combined[2]	2009	11.6	(11.5 – 11.7)	1.75

[1] Data from Smara also includes data from February 27th.
[2] Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A9.3. Prevalence of anaemia in non-pregnant women of reproductive age (15-49 years) by camp.

		Awserd	Dakhla	Laayoune	Smara[1]	Combined[2]
Sample size		202	318	229	234	983
Total Anaemia	(n) %	(71) 35.1	(140) 44.0*	(96) 41.9*	(67) 28.6*	(374) 36.4
(Hb < 12.0 g/dL)	95% CI	(26.7 – 42.7)	(37.9 – 50.2)	(35.5 – 48.3)	(23.2 – 34.1)	(33.2 – 39.6)
Mild Anaemia	(n) %	(29) 14.4	(48) 15.1	(34) 14.8	(33) 14.1	(144) 14.5
(Hb 11.0-11.9 g/dL)	95% CI	(8.7 – 20.0)	(11.2 – 19.0)	(10.5 – 19.1)	(10.2 – 18.0)	(12.3 – 16.8)
Moderate Anaemia	(n) %	(37) 18.3	(71) 22.3	(53) 23.1	(28) 12.0	(189) 18.2
(Hb 8.0-10.9 g/dL)	95% CI	(13.2 – 23.4)	(17.1 – 27.5)	(17.5 – 28.8)	(7.6 – 16.3)	(15.7 – 20.8)
Severe Anaemia	(n) %	(5) 2.5	(21) 6.6	(9) 3.9	(6) 2.6	(41) 3.6
(Hb <8.0 g/dL)	95% CI	(0.4 – 4.5)	(4.1 – 9.1)	(1.4 – 6.5)	(0.6 – 4.5)	(2.5 – 4.8)

[1]Data from Smara also includes data from February 27th. 2. Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.
***** Camp prevalence of global acute malnutrition significantly different from the weighted prevalence of the remaining three camps.

Table 4x. Prevalence of anaemia in pregnant & lactating women (15-49 years)

		Pregnant*	Lactating
	n	111	216
Total Anaemia	(n) %	(63) 54.7	(123) 54.6
(Hb < 11.0 g/dL)	95% CI	(44.2 – 65.2)	(47.7 – 61.6)
Mild Anaemia	(n) %	(25) 20.5	(54) 24.9
(Hb 10.0-10.9 g/dL)	95% CI	(12.1 – 28.8)	(19.0 – 30.9)
Moderate Anaemia	(n) %	(34) 30.9	(62) 26.8
(Hb 7.0-9.9 g/dL)	95% CI	(21.7 – 40.0)	(21.2 – 32.4)
Severe Anaemia	(n) %	(4) 3.3	(7) 2.9
(Hb <7.0 g/dL)	95% CI	(0.0 – 6.8)	(0.7 – 5.1)

* Women were classified as pregnant or lactating if they reported to be pregnant or lactating. 45 women were reported to be concomitantly lactating and pregnant; they were classified as pregnant for the survey analysis. See Annex 4 for the survey questionnaires.

Table 5x. Mean values of haemoglobin in women of childbearing age (15-49 years)

Camp	Sample size	Mean values	95% CI	Design Effect (Hb < 11g/dL)
Awserd	202	12.4	(12.1 – 12.8)	1.32
Dakhla	318	11.9	(11.6 – 12.2)	0.66
Laayoune	229	12.1	(11.8 – 12.4)	1.16
Smara	234	12.5	(12.3 – 12.7)	1.19
All combined	983	12.3	(12.1 – 12.4)	1.10
Lactating	216	11.7	(11.4 – 11.9)	1.07
Pregnant	111	10.8	(10.3 – 11.3)	1.34

Annex 9: Tables - Food security analysis – Food consumption scores

Table 6x. Household food consumption score prevalence. Results are shown by camp.

		Awserd	Dakhla	Laayoune	Smara[1]	Combined[2]
	n	491	498	484	497	1970
Acceptable	(n) %	(313) 63.7	(290) 58.2	(286) 59.2	(285) 57.3	(1174) 59.5
FCS >42	95% CI	(50.7 – 76.8)	(47.4 – 69.0)	(47.3 – 71.2)	(45.2 – 69.5)	(53.2 – 65.7)
Borderline	(n) %	(126) 25.7	(190) 38.2	(175) 36.0	(174) 35.0	(665) 33.7
FCS 28.5 - 42	95% CI	(17.4 – 34.0)	(28.6 – 47.8)	(25.3 – 46.8)	(25.3 – 44.7)	(28.7 – 38.7)
Poor	(n) %	(52) 10.6	(18) 3.6	(23) 4.8	(38) 7.6	(131) 6.8
FCS 0-28	95% CI	(3.9 – 17.2)	(1.4 – 5.8)	(1.5 – 8.1)	(3.3 – 11.9)	(4.5 – 9.1)

1. Data from Smara also includes data from February 27th. 2. Combined prevalence results are weighted based on the estimated total population used for the estimation of the sample size.
***** Camp prevalence of global acute malnutrition significantly different from the weighted prevalence of the remaining three camps.

Annex 10: Summary of survey methods 1997-2012

Table A10.1. Methods used in different surveys carried in the Western Sahara refugee camps, 1997 – 2010.

Year	Number of children aged 6-59 months	Number of women of reproductive age	Sampling	Number of households	Number of Clusters	Households per cluster	Selection of the households	Cleaning criteria
1997	N/A	487	Cluster Sampling. PPS method	310	31	10	EPI method	N/A
2001	580	753	Cluster Sampling PPS method	N/A	40	N/A	EPI method	Plotting and outlier selection
2002	881 (anthropometry) 204 (anaemia)	223	Cluster Sampling. PPS method	900	30	30	EPI method	Epi-Info criteria
2005	785 (anthropometry) 758 (anaemia)	772	Cluster Sampling. PPS method	660	30	22	Systematic random (list of food distribution)	± 4 z-scores
2008	889	689	Cluster Sampling. PPS method	215	48	5	Modified EPI	± 5 z-scores
2010	1609 (anthropometry) 949 (anaemia)	1689 (anthropometry) 1556 (anaemia)	Cluster Sampling. PPS method	2040	120	17	EPI method	SMART criteria (± 3 z-scores)
2012	2022 (anthropometry) 2009 (anaemia)	0 (anthropometry) 983 (anaemia)	Cluster Sampling. PPS method	2049	120	17	EPI method	SMART criteria (± 3 z-scores)

Annex 11: Tables - Analysis of trends 1997-2012

Table 7. Acute malnutrition trends in children aged 6-59 months based on NCHS 1977 growth references

Year	Global	Moderate	Severe	Mean WHZ	SAM:MAM
1997	10.5 (6.1 – 14.9)	8.2 (N/A)	2.3 (0.4 – 4.1)	(N/A)	1 : 3.6
2001	13.2 (9.9 – 16.4)	8.7 (6.3 – 11.1)	4.5 (2.4 – 6.5)	-0.83 ± 1.15	1 : 1.9
2002	10.6 (7.7 – 13.5)	8.4 (N/A)	2.2 (1.3 – 3.1)	-0.81 (-0.89 – 0.72)	1 : 3.8
2005	7.7 (4.1 – 11.2)	5.4 (N/A)	2.3 (0.7 – 4.0)	(N/A)	1 : 2.3
2008	19.2 (N/A)	15.9 (N/A)	3.3 (N/A)	(N/A)	1 : 4.8
2010	8.8 (7.3 – 10.3)	7.5 (6.2 – 8.9)	1.2 (0.6 – 1.8)	-0.61 ± 1.03	1 : 6.3
2012	7.9 (6.7 – 9.0)	7.3 (6.2 – 8.4)	0.6 (0.3 – 1.0)	-0.69 ± 0.92	1 : 12.2

CI: 95% Confidence Intervals; GAM: Global Acute Malnutrition. Prevalence of children, aged 6-59 months, presenting a weight for height z-score <-2 z-scores (NCHS, 1977) and/or bilateral pitting oedema. MAM: Moderate Acute Malnutrition. Prevalence of children aged 6-59 months presenting a weight for height z-score < -2 z-scores and >= -3 z-scores (NCHS, 1977). SAM: Severe Acute Malnutrition. Prevalence of children, aged 6-59 months, presenting a weight for height z-score <-3 z-scores (NCHS, 1977) and/or bilateral pitting oedema.

Table 8. Stunting trends in children aged 6-59 months based on NCHS 1977 growth references

Year	Global	Moderate	Severe	Mean WHZ	Severe : Moderate
1997	49.1 (44.2 – 54.1)	24.4 (N/A)	23.7 (19.2 – 28.2)	(N/A)	1 : 1.0
2001	35.5 (30.0 – 41.1)	21.5 (17.0 – 26.0)	14.0 (9.4 – 18.6)	-1.45 ± 1.48	1 : 1.5
2002	32.8 (29.7 – 36.1)	21.6 (N/A)	11.2 (9.2 – 13.5)	-1.48 (-1.57 – -1.38)	1 : 1.9
2005	39.1 (34.4 – 43.8)	23.5 (N/A)	15.6 (12.2 – 19.6).	-1.62 ± 1.51.	1 : 1.5
2008	26.0 (N/A)	19 (N/A)	7 (N/A)	(N/A)	1 : 2.7
2010	24.2 (21.6 – 26.9)	18.6 (16.2 – 20.9)	5.7 (4.4 – 6.9)	-1.19 ± 1.12	1 : 3.3
2012	20.8 (18.7 – 22.8)	16.5 (14.6 – 18.4)	4.3 (3.2 – 5.3)	-1.18 ± 1.03	1 : 3.8

CI: 95% Confidence Intervals; Global stunting: Prevalence of children, aged 6-59 months, presenting a height for age z-score <-2 z-scores (NCHS, 1977). Moderate stunting: Prevalence of children, aged 6-59 months, presenting a height for age z-score <-2 z-scores and >= -3 Z-scores (NCHS, 1977). Severe stunting: Prevalence of children, aged 6-59 months, presenting a height for age z-score <-3 z-scores (NCHS, 1977).

Table 9. Trends in anaemia in children aged 6-59 months 1997-2010

Year	Total	Mild	Moderate	Severe	Mean
1997	71.1 (N/A)	56.7 (47.5 – 65.9)		14.4 (8.0 – 20.1)	(N/A)
2001	44.1 (N/A)	17.6 (14.8 – 20.5)	23.0 (19.3 – 26.6)	3.5 (2.2 – 4.8)	10.9 ± 1.9
2002	35.3 (26.7 – 43.9)	17.7 (11.9 – 23.4)	17.6 (11.9 – 23.4)	0.0 (N/A)	11.5 ± 1.6
2005	68.5 (64.4 – 72.5)	6.1 (N/A)		7.5 (5.4 – 9.7)	9.9 ± 1.9
2008	62.0 (N/A)	56.0 (N/A)		6.0 (N/A)	(N/A)
2010	52.8 (49.1 – 56.6)	20.9 (18.3 – 23.6)	29.5 (26.2 – 32.8)	2.4 (1.1 – 3.6)	10.7 ± 1.7
2012	28.4 (25.7 – 31.0)	16.3 (14.5 – 18.0)	11.7 (9.9 – 13.4)	0.5 (0.1 – 0.8)	11.6 ± 1.4

CI: 95% Confidence Intervals; Moderate Anaemia: Hb 7.0-9.9 g/dL. Severe Anaemia: Hb <7 g/dL. Total Anaemia: Hb <11 g/dL

Table 10x. Trends in anaemia in non-pregnant women of reproductive age (15-49 years) 1997-2010

Year	Total	Mild	Moderate	Severe	Mean
1997	62.4 (N/A)	53.7 (47.0 – 60.3)		8.7 (4.6 – 12.8)	(N/A)
2001	48.4 (N/A)	28.2 (24.4 – 31.9)	17.9 (15.1-20.7)	2.3 (0.8 – 3.8)	11.7 ± 2.1
2002	47.6 (38.6 – 56.5)	16.6 (11.6 – 21.7)	26.5 (19.5 - 33.5)	4.4 (1.2 – 7.6)	11.8 ± 2.0
2005	66.4 (60.5 – 72.3)	53.5 (N/A)		12.9 (10.1 – 15.7)	10.7 ± 2.3
2008	54.0 (N/A)	15 (N/A)	28 (N/A)	11.0 (N/A)	11.3
2010	48.9 (45.3 – 52.5)	13.6 (12.0 – 15.2)	28.6 (25.3 – 31.9)	6.7 (5.3 – 8.0)	11.6 ± 2.2
2012	36.4 (33.2 – 39.6)	14.5 (12.3 – 16.8)	18.2 (15.7 – 20.8)	3.6 (2.5 – 4.8)	12.3 ± 2.0

CI: 95% Moderate Anaemia: Hb 8.0-10.9g/dL. Severe Anaemia: Hb <8 g/dL. Total Anaemia: Hb <12 g/dL.

Table 11x. Trends in anaemia in pregnant women of reproductive age (15-49 years) 1997-2010

Year	N	Total	Mild	Moderate	Severe	Mean
2002	19	78.0 (60.0 – 98.0)	36.0 (11.0 – 59.0)	36.0 (15.2 – 58.5)	5.0 (0.0 – 15.2)	9.9 ± 2.1
2005	202	76.5 (71.3 – 81.7)	69.3 (N/A)		7.2 (3.9 – 10.5)	N/A
2008	59	66.0 (N/A)	15.0 (N/A)	36.0 (N/A)	15.0 (N/A)	9.7
2010	176	55.8 (47.4 – 64.2)	18.2 (12.5 – 23.9)	31.8 (24.2 – 39.4)	5.8 (2.3 – 9.3)	10.5 ± 2.1
2012	111	54.6 (47.7 – 61.6)	24.9 (19.0 – 30.9)	26.8 (21.2 – 32.4)	2.9 (0.7 – 5.1)	10.8 ± 2.2

CI: 95% Confidence Intervals; Moderate Anaemia: Hb 7.0-9.9 g/dL. Severe Anaemia: Hb <7 g/dL. Total Anaemia: Hb <11 g/dL

Table 12. Trends in Food Consumption Score 2010-2012

Year	Acceptable	Borderline	Poor
2010	63.9 (58.3 – 69.5)	24.8 (21.2 – 28.3)	11.3 (7.0 – 15.5)
2012	59.5 (53.2 – 65.7)	33.7 (28.7 – 38.7)	6.8 (4.5 – 9.1)

CI: 95% Confidence Intervals. Acceptable: FCS >42. Borderline: FCS 28.5-42. Poor: FCS 0-28.

Annex 12: Plausibility check reports

Plausibility check for: Awserd

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	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (1.3 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.182)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**4** (p=0.003)
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**4** (11)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**4** (15)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (1.06)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.03)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (-0.12)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=0.811)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**12** %

At the moment the overall score of this survey is 12 %, this is acceptable.

There were no duplicate entries detected.

Missing data:

WEIGHT: Line=1/ID=558, Line=3/ID=562, Line=4/ID=970, Line=5/ID=312, Line=6/ID=477, Line=8/ID=869, Line=9/ID=89
HEIGHT: Line=1/ID=558, Line=2/ID=198, Line=3/ID=562, Line=4/ID=970, Line=5/ID=312, Line=6/ID=477, Line=8/ID=869, Line=9/ID=89

Percentage of children with no exact birthday: 0 %

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=10/ID=975:	**WHZ (-4.423)**	WAZ (-4.705)	Weight may be incorrect
Line=11/ID=575:	**WHZ (-3.337)**		Height may be incorrect
Line=13/ID=554:	HAZ (-4.708)	WAZ (-4.472)	Age may be incorrect
Line=41/ID=100:	HAZ (2.212)		Height may be incorrect
Line=63/ID=553:	HAZ (-5.664)	WAZ (-4.173)	Age may be incorrect
Line=68/ID=835:	HAZ (-5.091)		Age may be incorrect
Line=107/ID=17:	HAZ (-4.424)		Age may be incorrect
Line=108/ID=91:	HAZ (1.766)		Age may be incorrect
Line=116/ID=264:	HAZ (5.499)	WAZ (2.107)	Age may be incorrect
Line=136/ID=585:	HAZ (2.918)		Age may be incorrect
Line=237/ID=36:	HAZ (3.411)		Age may be incorrect
Line=275/ID=949:	HAZ (-5.478)		Age may be incorrect
Line=375/ID=1040:	HAZ (3.791)		Age may be incorrect
Line=398/ID=699:	HAZ (-8.813)	WAZ (-5.384)	Age may be incorrect
Line=431/ID=786:	HAZ (5.380)	WAZ (2.684)	Age may be incorrect
Line=444/ID=399:	HAZ (2.690)		Age may be incorrect
Line=479/ID=518:	HAZ (2.308)		Age may be incorrect
Line=495/ID=90:	HAZ (2.084)		Age may be incorrect

Line=522/ID=279: HAZ (2.315) WAZ (2.320) Age may be incorrect
Line=535/ID=816: **WHZ (2.981)** Height may be incorrect
Line=536/ID=330: **WHZ (3.156)** HAZ (-4.374) Height may be incorrect
Line=537/ID=1025: **WHZ (3.911)** HAZ (-6.331) Height may be incorrect
Line=538/ID=352: **WHZ (4.437)** HAZ (-6.712) Height may be incorrect
Line=539/ID=660: **WHZ (4.517)** HAZ (-7.002) Height may be incorrect

Percentage of values flagged with SMART flags:WHZ: 1.3 %, HAZ: 4.0 %, WAZ: 1.3 %

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: 0.85 (The value should be around 1.0).

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

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	59/58.9 (1.0)	64/66.1 (1.0)	123/125.1 (1.0)	0.92
18 to 29	12	58/57.5 (1.0)	67/64.5 (1.0)	125/121.9 (1.0)	0.87

```
30 to 41     12      56/55.7 (1.0)      76/62.5 (1.2)    132/118.2 (1.1)    0.74
42 to 53     12      45/54.8 (0.8)      39/61.5 (0.6)     84/116.3 (0.7)    1.15
54 to 59      6      36/27.1 (1.3)      39/30.4 (1.3)      75/57.5 (1.3)    0.92
-------------------------------------------------------------------------------------
6  to 59     54    254/269.5 (0.9)    285/269.5 (1.1)                       0.89

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

Overall sex ratio: p-value = 0.182 (boys and girls equally represented)
Overall age distribution: p-value = 0.003 (significant difference)
Overall age distribution for boys: p-value = 0.322 (as expected)
Overall age distribution for girls: p-value = 0.008 (significant difference)
Overall sex/age distribution: p-value = 0.000 (significant difference)
```

Digit preference Weight:

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

Digit Preference Score: 11 (0-5 excellent, 6-10 good, 11-20 acceptable and > 20 problematic)
p-value for chi2: 0.000 (significant difference)
```

Digit preference Height:

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

Digit Preference Score: 15 (0-5 excellent, 6-10 good, 11-20 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: 11 (0-5 excellent, 6-10 good, 11-20 acceptable and > 20 problematic)
p-value for chi2: 0.000 (significant difference)
```

Evaluation of Standard deviation, Normal distribution, Skewness and Kurtosis using the 3 exclusion (Flag) procedures

.	no exclusion	exclusion from reference mean (WHO flags)	exclusion from observed mean (SMART flags)
WHZ			
Standard Deviation SD:	1.15	1.15	1.06
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			

observed:	6.2%	6.2%	5.9%
calculated with current SD:	7.1%	7.1%	5.8%
calculated with a SD of 1:	4.5%	4.5%	4.8%

HAZ

Standard Deviation SD:	1.36	1.26	1.02
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	25.3%	24.7%	24.4%
calculated with current SD:	30.4%	27.8%	24.7%
calculated with a SD of 1:	24.2%	22.8%	24.4%

WAZ

Standard Deviation SD:	1.08	1.08	1.00
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	14.7%	14.7%	14.1%
calculated with current SD:	16.2%	16.2%	14.2%
calculated with a SD of 1:	14.4%	14.4%	14.2%

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

WHZ	p= 0.000	p= 0.000	p= 0.656
HAZ	p= 0.000	p= 0.000	p= 0.106
WAZ	p= 0.003	p= 0.003	p= 0.476

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

Skewness

WHZ	0.31	0.31	0.03
HAZ	-0.08	0.64	-0.16
WAZ	-0.19	-0.19	-0.06

If the value is:
-below minus 2 there is a relative excess of wasted/stunted/underweight subjects in the sample
-between minus 2 and minus 1, there may be a relative excess of wasted/stunted/underweight subjects in the sample.
-between minus 1 and plus 1, the distribution can be considered as symmetrical.
-between 1 and 2, there may be an excess of obese/tall/overweight subjects in the sample.
-above 2, there is an excess of obese/tall/overweight subjects in the sample

Kurtosis

WHZ	1.22	1.22	-0.12
HAZ	5.31	3.89	-0.28
WAZ	0.98	0.98	0.03

(Kurtosis characterizes the relative peakedness or flatness compared with the normal distribution, positive kurtosis indicates a relatively peaked distribution, negative kurtosis indicates a relatively flat distribution)
If the value is:
-above 2 it indicates a problem. There might have been a problem with data collection or sampling.
-between 1 and 2, the data may be affected with a problem.
-less than an absolute value of 1 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=0.77 (p=0.811)
WHZ < -3: ID=0.97 (p=0.518)
GAM: ID=0.77 (p=0.811)
SAM: ID=0.97 (p=0.518)
HAZ < -2: ID=1.51 (p=0.037)
HAZ < -3: ID=1.25 (p=0.168)
WAZ < -2: ID=1.00 (p=0.466)
WAZ < -3: ID=0.97 (p=0.518)

Subjects with SMART flags are excluded from this analysis.

The Index of Dispersion (ID) indicates the degree to which the cases are aggregated into certain clusters (the degree to which there are "pockets"). If the ID is less than 1 and p > 0.95 it indicates that the cases are UNIFORMLY distributed among the clusters. If the p value is between 0.05 and 0.95 the cases appear to be randomly distributed among the clusters, if ID is higher than 1 and p is less than 0.05 the cases are aggregated into certain cluster (there appear to be pockets of cases). If this is the case for Oedema but not for WHZ then aggregation of GAM and SAM cases is likely due to inclusion of oedematous cases in GAM and SAM estimates.

Are the data of the same quality at the beginning and the end of the clusters?
Evaluation of the SD for WHZ depending upon the order the cases are measured within each cluster (if one cluster per day is measured then this will be related to the time of the day the measurement is made).

```
Time                                          SD for WHZ
point                0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.12 (n=30, f=0)  #############
02: 0.80 (n=29, f=0)
03: 1.31 (n=30, f=1)  ####################
04: 1.02 (n=30, f=0)  #########
05: 1.53 (n=30, f=1)  ##############################
06: 1.22 (n=30, f=1)  ##################
07: 1.03 (n=29, f=0)  ##########
08: 1.28 (n=29, f=1)  ###################
09: 1.12 (n=29, f=0)  #############
10: 1.17 (n=29, f=0)  ################
11: 1.10 (n=30, f=0)  #############
12: 1.37 (n=30, f=2)  ########################
13: 1.42 (n=28, f=1)  ##########################
14: 0.77 (n=26, f=0)
15: 1.23 (n=25, f=0)  ##################
16: 0.76 (n=23, f=0)
17: 0.95 (n=16, f=0)  ######
18: 0.96 (n=14, f=0)  OOOOOOO
19: 0.91 (n=10, f=0)  OOOOO
20: 0.92 (n=09, f=0)  OOOOO
21: 0.99 (n=07, f=0)  ~~~~~~~~
22: 1.41 (n=04, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~
23: 0.89 (n=04, f=0)  ~~~~
24: 0.76 (n=04, f=0)
25: 0.86 (n=02, f=0)  ~~
```

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

Analysis by Team

Team	**5**	**6**	**7**	**8**	
n =	153	126	130	130	
Percentage of values flagged with SMART flags:					
WHZ:	1.3	4.0	2.3	4.8	
HAZ:	5.9	3.2	7.8	5.6	
WAZ:	2.0	1.6	2.3	4.8	
Age ratio of 6-29 months to 30-59 months:					
	0.78	0.83	1.10	0.76	
Sex ratio (male/female):					
	0.96	1.10	0.88	0.67	
Digit preference Weight (%):					
.0 :	16	20	28	11	
.1 :	10	8	5	6	
.2 :	12	10	9	13	
.3 :	8	10	5	17	
.4 :	10	9	12	9	
.5 :	3	9	12	7	
.6 :	10	12	4	14	
.7 :	7	10	6	8	
.8 :	10	9	10	7	
.9 :	13	6	8	8	
DPS:	12	12	22	11	Digit preference score (0-5 excellent, 5-10 good, 10-20 acceptable and > 20 problematic)
Digit preference Height (%):					
.0 :	13	26	13	27	
.1 :	14	6	8	5	
.2 :	19	10	14	10	
.3 :	9	10	18	13	
.4 :	8	5	13	10	
.5 :	5	14	11	11	
.6 :	14	11	11	10	
.7 :	8	10	5	6	
.8 :	7	2	2	5	
.9 :	3	6	5	1	
DPS:	15	21	15	23	Digit preference score (0-5 excellent, 5-10 good, 10-20

acceptable and > 20 problematic)
Digit preference MUAC (%):
.0 : 15 29 10 14
.1 : 11 8 11 6
.2 : 13 7 19 12
.3 : 12 11 9 7
.4 : 12 2 9 8
.5 : 6 19 18 14
.6 : 8 6 3 11
.7 : 5 6 3 7
.8 : 10 6 12 8
.9 : 7 6 5 12
DPS: 10 25 17 9 Digit preference score (0-5 excellent, 5-10 good, 10-20 acceptable and > 20 problematic)
Standard deviation of WHZ:
SD 1.21 1.20 1.04 1.11
Prevalence (< -2) observed:
% 6.5 6.4 5.5 6.5
Prevalence (< -2) calculated with current SD:
% 6.0 7.2 7.3 7.6
Prevalence (< -2) calculated with a SD of 1:
% 3.0 4.0 6.5 5.7
Standard deviation of HAZ:
SD 1.45 1.25 1.53 1.16
observed:
% 30.1 19.2 21.9 29.0
calculated with current SD:
% 34.4 29.1 28.5 27.8
calculated with a SD of 1:
% 28.0 24.6 19.2 24.8

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

Team 1:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	13/17.4 (0.7)	16/18.1 (0.9)	29/35.5 (0.8)	0.81
18 to 29	12	15/17.0 (0.9)	23/17.6 (1.3)	38/34.6 (1.1)	0.65
30 to 41	12	14/16.4 (0.9)	18/17.1 (1.1)	32/33.5 (1.0)	0.78
42 to 53	12	13/16.2 (0.8)	9/16.8 (0.5)	22/33.0 (0.7)	1.44
54 to 59	6	20/8.0 (2.5)	12/8.3 (1.4)	32/16.3 (2.0)	1.67
6 to 59	54	75/76.5 (1.0)	78/76.5 (1.0)		0.96

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

Overall sex ratio: p-value = 0.808 (boys and girls equally represented)
Overall age distribution: p-value = 0.000 (significant difference)
Overall age distribution for boys: p-value = 0.000 (significant difference)
Overall age distribution for girls: p-value = 0.127 (as expected)
Overall sex/age distribution: p-value = 0.000 (significant difference)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	9/15.3 (0.6)	14/13.9 (1.0)	23/29.2 (0.8)	0.64
18 to 29	12	18/14.9 (1.2)	16/13.6 (1.2)	34/28.5 (1.2)	1.13
30 to 41	12	16/14.5 (1.1)	17/13.2 (1.3)	33/27.6 (1.2)	0.94
42 to 53	12	13/14.2 (0.9)	7/12.9 (0.5)	20/27.2 (0.7)	1.86
54 to 59	6	10/7.0 (1.4)	6/6.4 (0.9)	16/13.4 (1.2)	1.67
6 to 59	54	66/63.0 (1.0)	60/63.0 (1.0)		1.10

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

Overall sex ratio: p-value = 0.593 (boys and girls equally represented)
Overall age distribution: p-value = 0.213 (as expected)
Overall age distribution for boys: p-value = 0.315 (as expected)
Overall age distribution for girls: p-value = 0.365 (as expected)
Overall sex/age distribution: p-value = 0.053 (as expected)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	15/14.2 (1.1)	13/16.0 (0.8)	28/30.2 (0.9)	1.15
18 to 29	12	22/13.8 (1.6)	18/15.6 (1.2)	40/29.4 (1.4)	1.22
30 to 41	12	13/13.4 (1.0)	23/15.1 (1.5)	36/28.5 (1.3)	0.57
42 to 53	12	8/13.2 (0.6)	7/14.9 (0.5)	15/28.1 (0.5)	1.14
54 to 59	6	3/6.5 (0.5)	8/7.4 (1.1)	11/13.9 (0.8)	0.38
6 to 59	54	61/65.0 (0.9)	69/65.0 (1.1)		0.88

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

Overall sex ratio: p-value = 0.483 (boys and girls equally represented)
Overall age distribution: p-value = 0.013 (significant difference)
Overall age distribution for boys: p-value = 0.065 (as expected)
Overall age distribution for girls: p-value = 0.055 (as expected)
Overall sex/age distribution: p-value = 0.001 (significant difference)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	22/12.1 (1.8)	21/18.1 (1.2)	43/30.2 (1.4)	1.05
18 to 29	12	3/11.8 (0.3)	10/17.6 (0.6)	13/29.4 (0.4)	0.30
30 to 41	12	13/11.4 (1.1)	18/17.1 (1.1)	31/28.5 (1.1)	0.72
42 to 53	12	11/11.2 (1.0)	16/16.8 (1.0)	27/28.1 (1.0)	0.69
54 to 59	6	3/5.5 (0.5)	13/8.3 (1.6)	16/13.9 (1.2)	0.23
6 to 59	54	52/65.0 (0.8)	78/65.0 (1.2)		0.67

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

Overall sex ratio: p-value = 0.023 (significant excess of girls)
Overall age distribution: p-value = 0.004 (significant difference)
Overall age distribution for boys: p-value = 0.003 (significant difference)
Overall age distribution for girls: p-value = 0.165 (as expected)
Overall sex/age distribution: p-value = 0.000 (significant difference)

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

Team: 1

```
Time                                        SD for WHZ
point               0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.14 (n=10, f=0)  ##############
02: 0.66 (n=08, f=0)
03: 1.93 (n=08, f=1)  ################################################
04: 0.98 (n=08, f=0)  ########
05: 1.77 (n=08, f=0)  ##########################################
06: 0.95 (n=08, f=0)  ######
07: 1.26 (n=08, f=0)  ###################
08: 1.27 (n=08, f=0)  ###################
09: 0.77 (n=08, f=0)
10: 1.06 (n=08, f=0)  ###########
11: 1.13 (n=08, f=0)  ##############
12: 0.83 (n=07, f=0)  #
13: 2.07 (n=06, f=1)  ##########################################################
14: 0.69 (n=06, f=0)
15: 1.37 (n=06, f=0)  ########################
16: 0.67 (n=06, f=0)
17: 0.90 (n=05, f=0)  ####
18: 1.45 (n=05, f=0)  ############################
19: 1.33 (n=05, f=0)  ######################
20: 1.25 (n=05, f=0)  ##################
21: 1.27 (n=03, f=0)  00000000000000000000
22: 1.07 (n=02, f=0)  ~~~~~~~~~~
23: 0.63 (n=02, f=0)
24: 0.51 (n=02, f=0)
```

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

Team: 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: 0.59 (n=09, f=0)
02: 0.59 (n=08, f=0)
03: 0.73 (n=08, f=0)
04: 0.79 (n=08, f=0)
05: 2.00 (n=08, f=1)  ##################################################
06: 1.93 (n=08, f=1)  ################################################
07: 1.03 (n=08, f=0)  #########
08: 1.91 (n=08, f=1)  ################################################
09: 1.05 (n=07, f=0)  ##########
10: 1.14 (n=06, f=0)  ##############
11: 1.48 (n=07, f=1)  ############################
12: 1.27 (n=07, f=0)  ####################
13: 0.97 (n=07, f=0)  #######
14: 0.98 (n=06, f=0)  #######
15: 1.17 (n=06, f=0)  ################
16: 0.33 (n=04, f=0)
17: 1.02 (n=04, f=0)  OOOOOOOOO
18: 0.45 (n=03, f=0)
```

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

Team: 3

```
Time                                          SD for WHZ
point                0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.13 (n=11, f=0)  ##############
02: 0.65 (n=09, f=0)
03: 1.16 (n=09, f=0)  ################
04: 1.01 (n=09, f=0)  #########
05: 0.74 (n=09, f=0)
06: 0.75 (n=09, f=0)
07: 0.44 (n=08, f=0)
08: 0.93 (n=07, f=0)  #####
09: 1.34 (n=06, f=0)  ######################
10: 1.39 (n=07, f=0)  ########################
11: 0.89 (n=07, f=0)  ####
12: 1.88 (n=07, f=1)  ##############################################
13: 1.64 (n=06, f=0)  ###################################
14: 0.97 (n=06, f=0)  #######
15: 0.99 (n=07, f=0)  ########
16: 0.50 (n=06, f=0)
17: 0.61 (n=02, f=0)
```

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

Team: 4

```
Time                                          SD for WHZ
point                0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.60 (n=08, f=0)  ###################################
02: 1.23 (n=07, f=0)  ##################
03: 1.53 (n=08, f=0)  ################################
04: 1.37 (n=08, f=0)  ########################
05: 0.95 (n=08, f=0)  ######
06: 0.73 (n=08, f=0)
07: 0.60 (n=07, f=0)
08: 1.04 (n=06, f=0)  ##########
09: 0.83 (n=07, f=0)  #
10: 1.17 (n=07, f=0)  ################
11: 1.32 (n=07, f=0)  ######################
12: 0.98 (n=07, f=0)  #######
13: 0.80 (n=06, f=0)
14: 0.88 (n=05, f=0)  ####
15: 1.40 (n=04, f=0)  ########################
16: 0.98 (n=04, f=0)  #######
17: 0.68 (n=02, f=0)
18: 0.34 (n=03, f=0)
20: 0.21 (n=02, f=0)
```

```
21: 0.66 (n=02, f=0)
22: 1.84 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
23: 1.23 (n=02, f=0)  OOOOOOOOOOOOOOOO
24: 1.18 (n=02, f=0)  OOOOOOOOOOOOOOO

(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)
```

Plausibility check for: Dakhla

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	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (1.4 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.533)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.210)
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**2** (10)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**2** (7)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (0.98)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (-0.09)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (0.11)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=0.625)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**4** %

At the moment the overall score of this survey is 4 %, this is excellent.

There were no duplicate entries detected.

Percentage of children with no exact birthday: 0 %

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=20/ID=1291:	**WHZ (-3.922)**	WAZ (-4.529)	Weight may be incorrect
Line=21/ID=1292:	HAZ (-4.464)		Age may be incorrect
Line=40/ID=1237:	**WHZ (-3.977)**		Weight may be incorrect
Line=57/ID=1274:	HAZ (2.075)		Age may be incorrect
Line=61/ID=1278:	**WHZ (-3.471)**		Weight may be incorrect
Line=224/ID=1734:	**WHZ (-3.950)**		Height may be incorrect
Line=226/ID=1733:	HAZ (5.643)		Age may be incorrect
Line=242/ID=1722:	HAZ (2.354)		Age may be incorrect
Line=289/ID=1816:	**WHZ (4.261)**		Weight may be incorrect
Line=325/ID=1930:	**WHZ (2.912)**		Weight may be incorrect
Line=335/ID=1934:	HAZ (-6.613)	WAZ (-4.500)	Age may be incorrect
Line=433/ID=2052:	HAZ (2.726)		Age may be incorrect
Line=436/ID=2059:	WAZ (2.048)		Weight may be incorrect
Line=498/ID=2175:	**WHZ (2.785)**	WAZ (2.123)	Weight may be incorrect

Percentage of values flagged with SMART flags:WHZ: 1.4 %, HAZ: 1.2 %, WAZ: 0.8 %

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 1.0).
```

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

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	62/56.8 (1.1)	64/60.1 (1.1)	126/116.9 (1.1)	0.97
18 to 29	12	50/55.4 (0.9)	51/58.6 (0.9)	101/114.0 (0.9)	0.98
30 to 41	12	52/53.7 (1.0)	60/56.8 (1.1)	112/110.5 (1.0)	0.87
42 to 53	12	45/52.9 (0.9)	54/55.9 (1.0)	99/108.8 (0.9)	0.83
54 to 59	6	36/26.1 (1.4)	30/27.6 (1.1)	66/53.8 (1.2)	1.20
6 to 59	54	245/252.0 (1.0)	259/252.0 (1.0)		0.95

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

Overall sex ratio: p-value = 0.533 (boys and girls equally represented)
Overall age distribution: p-value = 0.210 (as expected)
Overall age distribution for boys: p-value = 0.204 (as expected)
Overall age distribution for girls: p-value = 0.794 (as expected)
Overall sex/age distribution: p-value = 0.096 (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: **10** (0-5 excellent, 6-10 good, 11-20 acceptable and > 20 problematic)
p-value for chi2: 0.000 (significant difference)

Digit preference Height:

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

Digit Preference Score: **7** (0-5 excellent, 6-10 good, 11-20 acceptable and > 20 problematic)
p-value for chi2: 0.006 (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: **4** (0-5 excellent, 6-10 good, 11-20 acceptable and > 20 problematic)
p-value for chi2: 0.609

Evaluation of Standard deviation, Normal distribution, Skewness and Kurtosis using the 3 exclusion (Flag) procedures

.	no exclusion	exclusion from reference mean (WHO flags)	exclusion from observed mean (SMART flags)
WHZ			
Standard Deviation SD:	1.06	1.06	0.98
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	7.5%	7.5%	
calculated with current SD:	6.8%	6.8%	
calculated with a SD of 1:	5.7%	5.7%	
HAZ			
Standard Deviation SD:	1.11	1.09	1.00
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	22.6%	22.5%	
calculated with current SD:	28.0%	27.3%	
calculated with a SD of 1:	25.9%	25.5%	
WAZ			
Standard Deviation SD:	1.00	1.00	0.96
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:			
calculated with current SD:			
calculated with a SD of 1:			

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

WHZ	p= 0.000	p= 0.000	p= 0.083
HAZ	p= 0.000	p= 0.000	p= 0.027
WAZ	p= 0.021	p= 0.021	p= 0.175

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

Skewness

WHZ	-0.04	-0.04	-0.09
HAZ	0.27	0.48	-0.23
WAZ	-0.19	-0.19	-0.17

If the value is:
-below minus 2 there is a relative excess of wasted/stunted/underweight subjects in the sample
-between minus 2 and minus 1, there may be a relative excess of wasted/stunted/underweight subjects in the sample.
-between minus 1 and plus 1, the distribution can be considered as symmetrical.
-between 1 and 2, there may be an excess of obese/tall/overweight subjects in the sample.
-above 2, there is an excess of obese/tall/overweight subjects in the sample

Kurtosis

WHZ	1.21	1.21	0.11
HAZ	4.14	3.69	0.26
WAZ	0.64	0.64	0.17

(Kurtosis characterizes the relative peakedness or flatness compared with the normal distribution, positive kurtosis indicates a relatively peaked distribution, negative kurtosis indicates a relatively flat distribution)
If the value is:
-above 2 it indicates a problem. There might have been a problem with data collection or sampling.
-between 1 and 2, the data may be affected with a problem.
-less than an absolute value of 1 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=0.90 (p=0.625)
WHZ < -3: ID=1.00 (p=0.465)
GAM: ID=0.90 (p=0.625)
SAM: ID=1.00 (p=0.465)
HAZ < -2: ID=0.77 (p=0.800)
HAZ < -3: ID=1.15 (p=0.263)
WAZ < -2: ID=0.78 (p=0.793)
WAZ < -3: ID=1.48 (p=0.046)

Subjects with SMART flags are excluded from this analysis.

The Index of Dispersion (ID) indicates the degree to which the cases are aggregated into certain clusters (the degree to which there are "pockets"). If the ID is less than 1 and p > 0.95 it indicates that the cases are UNIFORMLY distributed among the clusters. If the p value is between 0.05 and 0.95 the cases appear to be randomly distributed among the clusters, if ID is higher than 1 and p is less than 0.05 the cases are aggregated into certain cluster (there appear to be pockets of cases). If this is the case for Oedema but not for WHZ then aggregation of GAM and SAM cases is likely due to inclusion of oedematous cases in GAM and SAM estimates.

Are the data of the same quality at the beginning and the end of the clusters?
Evaluation of the SD for WHZ depending upon the order the cases are measured within each cluster (if one cluster per day is measured then this will be related to the time of the day the measurement is made).

Time point	SD for WHZ 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.97 (n=30, f=0)	#######
02: 0.94 (n=30, f=0)	######
03: 1.02 (n=30, f=0)	#########
04: 0.85 (n=30, f=0)	##
05: 1.04 (n=30, f=1)	##########
06: 1.01 (n=30, f=1)	#########
07: 1.25 (n=30, f=1)	###################
08: 1.35 (n=30, f=0)	#######################
09: 1.07 (n=30, f=1)	##########
10: 0.93 (n=29, f=0)	######
11: 0.93 (n=28, f=0)	#####
12: 1.53 (n=27, f=1)	################################
13: 1.12 (n=27, f=0)	##############
14: 0.90 (n=23, f=0)	####

```
15: 1.01 (n=21, f=1)  #########
16: 0.83 (n=18, f=0)  #
17: 0.96 (n=16, f=0)  #######
18: 0.70 (n=14, f=0)
19: 0.51 (n=08, f=0)
20: 1.29 (n=05, f=0)  ~~~~~~~~~~~~~~~~~~~
21: 0.62 (n=04, f=0)
22: 0.77 (n=03, f=0)
23: 0.17 (n=02, f=0)
24: 0.25 (n=02, f=0)
25: 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)
```

Analysis by Team

Team	**1**	**2**	**3**	**4**	
n =	130	135	107	132	
Percentage of values flagged with SMART flags:					
WHZ:	0.8	2.2	1.9	0.8	
HAZ:	0.8	1.5	1.9	0.8	
WAZ:	0.0	1.5	1.9	0.0	
Age ratio of 6-29 months to 30-59 months:					
	0.73	0.71	0.95	0.94	
Sex ratio (male/female):					
	0.83	1.25	0.98	0.78	
Digit preference Weight (%):					
.0 :	15	13	32	13	
.1 :	15	6	4	9	
.2 :	13	11	9	14	
.3 :	7	7	9	12	
.4 :	5	10	7	11	
.5 :	8	12	6	6	
.6 :	7	15	11	9	
.7 :	9	11	10	5	
.8 :	12	10	10	13	
.9 :	8	6	2	8	
DPS:	11	10	26	10	Digit preference score (0-5 excellent, 5-10 good, 10-20 acceptable and > 20 problematic)
Digit preference Height (%):					
.0 :	10	10	2	6	
.1 :	15	10	8	8	
.2 :	11	10	16	4	
.3 :	22	11	15	11	
.4 :	10	16	16	7	
.5 :	8	9	7	5	
.6 :	6	11	13	16	
.7 :	5	4	12	11	
.8 :	10	11	1	17	
.9 :	4	7	9	14	
DPS:	16	9	17	15	Digit preference score (0-5 excellent, 5-10 good, 10-20 acceptable and > 20 problematic)
Digit preference MUAC (%):					
.0 :	8	9	6	19	
.1 :	11	7	16	13	
.2 :	13	12	11	8	
.3 :	10	11	9	12	
.4 :	5	16	14	8	
.5 :	9	8	7	10	
.6 :	11	8	18	9	
.7 :	13	9	9	4	
.8 :	12	12	3	11	
.9 :	9	8	7	6	
DPS:	8	9	15	13	Digit preference score (0-5 excellent, 5-10 good, 10-20 acceptable and > 20 problematic)
Standard deviation of WHZ:					
SD	1.06	1.11	1.08	0.99	
Prevalence (< -2) observed:					
%	6.2	5.9	7.5		
Prevalence (< -2) calculated with current SD:					
%	4.9	8.1	7.1		
Prevalence (< -2) calculated with a SD of 1:					

%	4.0	5.9	5.6	
Standard deviation of HAZ:				
SD	1.08	1.27	1.04	1.04
observed:				
%	23.8	26.7	16.8	22.0
calculated with current SD:				
%	27.2	30.3	28.0	26.1
calculated with a SD of 1:				
%	25.6	25.7	27.1	25.2

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

Team 1:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	16/13.7 (1.2)	18/16.5 (1.1)	34/30.2 (1.1)	0.89
18 to 29	12	7/13.3 (0.5)	14/16.1 (0.9)	21/29.4 (0.7)	0.50
30 to 41	12	12/12.9 (0.9)	16/15.6 (1.0)	28/28.5 (1.0)	0.75
42 to 53	12	8/12.7 (0.6)	19/15.3 (1.2)	27/28.1 (1.0)	0.42
54 to 59	6	16/6.3 (2.5)	4/7.6 (0.5)	20/13.9 (1.4)	4.00
6 to 59	54	59/65.0 (0.9)	71/65.0 (1.1)		0.83

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

Overall sex ratio: p-value = 0.293 (boys and girls equally represented)
Overall age distribution: p-value = 0.227 (as expected)
Overall age distribution for boys: p-value = 0.000 (significant difference)
Overall age distribution for girls: p-value = 0.559 (as expected)
Overall sex/age distribution: p-value = 0.000 (significant difference)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	17/17.4 (1.0)	14/13.9 (1.0)	31/31.3 (1.0)	1.21
18 to 29	12	14/17.0 (0.8)	11/13.6 (0.8)	25/30.5 (0.8)	1.27
30 to 41	12	22/16.4 (1.3)	14/13.2 (1.1)	36/29.6 (1.2)	1.57
42 to 53	12	14/16.2 (0.9)	10/12.9 (0.8)	24/29.1 (0.8)	1.40
54 to 59	6	8/8.0 (1.0)	11/6.4 (1.7)	19/14.4 (1.3)	0.73
6 to 59	54	75/67.5 (1.1)	60/67.5 (0.9)		1.25

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

Overall sex ratio: p-value = 0.197 (boys and girls equally represented)
Overall age distribution: p-value = 0.313 (as expected)
Overall age distribution for boys: p-value = 0.609 (as expected)
Overall age distribution for girls: p-value = 0.341 (as expected)
Overall sex/age distribution: p-value = 0.070 (as expected)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	12/12.3 (1.0)	15/12.5 (1.2)	27/24.8 (1.1)	0.80
18 to 29	12	11/12.0 (0.9)	14/12.2 (1.1)	25/24.2 (1.0)	0.79
30 to 41	12	12/11.6 (1.0)	13/11.8 (1.1)	25/23.5 (1.1)	0.92
42 to 53	12	12/11.4 (1.0)	5/11.7 (0.4)	17/23.1 (0.7)	2.40
54 to 59	6	6/5.7 (1.1)	7/5.8 (1.2)	13/11.4 (1.1)	0.86
6 to 59	54	53/53.5 (1.0)	54/53.5 (1.0)		0.98

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

Overall sex ratio: p-value = 0.923 (boys and girls equally represented)
Overall age distribution: p-value = 0.710 (as expected)
Overall age distribution for boys: p-value = 0.997 (as expected)
Overall age distribution for girls: p-value = 0.295 (as expected)
Overall sex/age distribution: p-value = 0.274 (as expected)

Team 4:

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

6 to 17	12	17/13.5 (1.3)	17/17.2 (1.0)	34/30.6 (1.1)	1.00
18 to 29	12	18/13.1 (1.4)	12/16.7 (0.7)	30/29.9 (1.0)	1.50
30 to 41	12	6/12.7 (0.5)	17/16.2 (1.0)	23/28.9 (0.8)	0.35
42 to 53	12	11/12.5 (0.9)	20/16.0 (1.3)	31/28.5 (1.1)	0.55
54 to 59	6	6/6.2 (1.0)	8/7.9 (1.0)	14/14.1 (1.0)	0.75
6 to 59	54	58/66.0 (0.9)	74/66.0 (1.1)		0.78

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

Overall sex ratio: p-value = 0.164 (boys and girls equally represented)
Overall age distribution: p-value = 0.770 (as expected)
Overall age distribution for boys: p-value = 0.166 (as expected)
Overall age distribution for girls: p-value = 0.663 (as expected)
Overall sex/age distribution: p-value = 0.035 (significant difference)

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

Team: 1

```
Time                                          SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.85 (n=11, f=0)  ##
02: 0.93 (n=11, f=0)  #####
03: 1.15 (n=11, f=0)  ###############
04: 0.65 (n=11, f=0)
05: 0.77 (n=11, f=0)
06: 1.56 (n=11, f=1)  ################################
07: 1.07 (n=10, f=0)  ############
08: 1.47 (n=10, f=0)  ############################
09: 1.08 (n=08, f=0)  ############
10: 0.36 (n=06, f=0)
11: 0.94 (n=05, f=0)  ######
12: 0.52 (n=03, f=0)
13: 1.06 (n=04, f=0)  OOOOOOOOOO
14: 0.38 (n=04, f=0)
15: 0.63 (n=03, f=0)
16: 1.13 (n=02, f=0)  ~~~~~~~~~~~~~~
17: 1.15 (n=02, f=0)  ~~~~~~~~~~~~~~~
18: 0.96 (n=02, f=0)  ~~~~~~~
19: 0.19 (n=02, f=0)
```

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

Team: 2

```
Time                                          SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.19 (n=10, f=0)  ################
02: 0.93 (n=10, f=0)  #####
03: 0.68 (n=10, f=0)
04: 0.86 (n=10, f=0)  ##
05: 0.70 (n=10, f=0)
06: 1.15 (n=09, f=0)  ###############
07: 1.71 (n=08, f=1)  ######################################
08: 1.10 (n=06, f=0)  #############
09: 0.73 (n=06, f=0)
10: 0.63 (n=05, f=0)
11: 0.73 (n=05, f=0)
12: 1.65 (n=05, f=0)  ###################################
13: 1.04 (n=05, f=0)  ##########
14: 1.02 (n=04, f=0)  #########
15: 1.74 (n=04, f=1)  ########################################
16: 0.44 (n=03, f=0)
17: 1.08 (n=03, f=0)  OOOOOOOOOOO
18: 0.17 (n=03, f=0)
19: 0.07 (n=02, f=0)
20: 0.39 (n=02, f=0)
21: 0.19 (n=02, f=0)
22: 0.28 (n=02, f=0)
```

```
23: 0.17 (n=02, f=0)
24: 0.25 (n=02, f=0)
25: 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: 1.12 (n=11, f=0)  #############
02: 0.77 (n=11, f=0)
03: 1.53 (n=10, f=1)  ##############################
04: 0.85 (n=10, f=0)  ##
05: 1.65 (n=09, f=1)  ####################################
06: 0.72 (n=09, f=0)
07: 1.07 (n=08, f=0)  ###########
08: 1.34 (n=07, f=0)  ########################
09: 0.65 (n=07, f=0)
10: 0.78 (n=05, f=0)
11: 1.12 (n=03, f=0)  OOOOOOOOOOOOO
12: 1.95 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
13: 0.37 (n=03, f=0)
14: 1.18 (n=03, f=0)  OOOOOOOOOOOOOOOO
15: 0.60 (n=02, f=0)
16: 0.85 (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: 0.99 (n=10, f=0)  ########
02: 1.22 (n=10, f=0)  ##################
03: 1.01 (n=10, f=0)  #########
04: 0.73 (n=10, f=0)
05: 0.68 (n=10, f=0)
06: 0.64 (n=10, f=0)
07: 1.36 (n=09, f=0)  ########################
08: 1.09 (n=09, f=0)  ############
09: 0.94 (n=07, f=0)  ######
10: 1.43 (n=06, f=0)  ##########################
11: 0.89 (n=06, f=0)  ####
12: 1.35 (n=06, f=0)  ########################
13: 1.28 (n=05, f=0)  OOOOOOOOOOOOOOOOOO
14: 0.43 (n=04, f=0)
15: 0.90 (n=04, f=0)  OOOO
16: 0.61 (n=04, f=0)
17: 1.10 (n=04, f=0)  OOOOOOOOOOOO
18: 0.79 (n=04, f=0)
19: 0.64 (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)

Plausibility check for: Laayoune

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	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (1.9 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.118)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.143)
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**2** (9)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**4** (13)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (1.00)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (-0.32)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (-0.01)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=0.793)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**6** %

At the moment the overall score of this survey is 6 %, this is good.

There were no duplicate entries detected.

Percentage of children with no exact birthday: 0 %

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=21/ID=49:	WAZ (-4.158)		Weight may be incorrect
Line=30/ID=5:	HAZ (2.059)		Age may be incorrect
Line=34/ID=123:	**WHZ (-4.521)**		Weight may be incorrect
Line=67/ID=129:	**WHZ (3.374)**	HAZ (-6.091)	Height may be incorrect
Line=69/ID=182:	**WHZ (-5.591)**	WAZ (-4.567)	Weight may be incorrect
Line=84/ID=220:	HAZ (1.729)		Height may be incorrect
Line=102/ID=240:	HAZ (1.955)		Age may be incorrect
Line=114/ID=228:	HAZ (1.730)		Age may be incorrect
Line=117/ID=171:	**WHZ (-5.567)**	WAZ (-4.886)	Weight may be incorrect
Line=210/ID=508:	HAZ (3.402)		Height may be incorrect
Line=219/ID=529:	HAZ (1.703)		Age may be incorrect
Line=232/ID=497:	HAZ (-4.374)		Age may be incorrect
Line=252/ID=454:	**WHZ (2.554)**		Height may be incorrect
Line=264/ID=677:	**WHZ (-3.796)**	WAZ (-5.070)	Weight may be incorrect
Line=278/ID=691:	**WHZ (-5.349)**		Height may be incorrect
Line=306/ID=612:	**WHZ (2.499)**		Weight may be incorrect
Line=322/ID=674:	HAZ (2.245)		Height may be incorrect
Line=332/ID=840:	HAZ (-4.493)		Age may be incorrect
Line=336/ID=813:	HAZ (-4.890)	WAZ (-4.604)	Age may be incorrect
Line=390/ID=998:	**WHZ (2.921)**		Weight may be incorrect

Percentage of values flagged with SMART flags:WHZ: 1.9 %, HAZ: 2.3 %, WAZ: 1.1 %

Age distribution:

Month 6 : ##
Month 7 : ########
Month 8 : ######

```
Month 9  : ##############
Month 10 : ###################
Month 11 : #########
Month 12 : ###########
Month 13 : ############
Month 14 : ##################
Month 15 : #########
Month 16 : #######
Month 17 : ##########
Month 18 : ####
Month 19 : ########
Month 20 : #######
Month 21 : #########
Month 22 : ################
Month 23 : ##########
Month 24 : #########
Month 25 : ###########
Month 26 : ############
Month 27 : ##########
Month 28 : #########
Month 29 : ####
Month 30 : #############
Month 31 : #########
Month 32 : #######
Month 33 : ###########
Month 34 : #############
Month 35 : ####
Month 36 : ########
Month 37 : #########
Month 38 : ###############
Month 39 : #########
Month 40 : #####
Month 41 : #######
Month 42 : ##
Month 43 : ########
Month 44 : #########
Month 45 : ######
Month 46 : ###########
Month 47 : #######
Month 48 : ############
Month 49 : ########
Month 50 : ####
Month 51 : #############
Month 52 : ####
Month 53 : ####
Month 54 : #####
Month 55 : ########
Month 56 : ###
Month 57 : ######
Month 58 : ############
Month 59 : ########

Age ratio of 6-29 months to 30-59 months: 1.04 (The value should be around 1.0).
```

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

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	62/58.9 (1.1)	64/51.0 (1.3)	126/110.0 (1.1)	0.97
18 to 29	12	59/57.5 (1.0)	57/49.8 (1.1)	116/107.2 (1.1)	1.04
30 to 41	12	60/55.7 (1.1)	43/48.2 (0.9)	103/103.9 (1.0)	1.40
42 to 53	12	53/54.8 (1.0)	35/47.5 (0.7)	88/102.3 (0.9)	1.51
54 to 59	6	20/27.1 (0.7)	21/23.5 (0.9)	41/50.6 (0.8)	0.95
6 to 59	54	254/237.0 (1.1)	220/237.0 (0.9)		1.15

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

Overall sex ratio: p-value = 0.118 (boys and girls equally represented)
Overall age distribution: p-value = 0.143 (as expected)
Overall age distribution for boys: p-value = 0.652 (as expected)
Overall age distribution for girls: p-value = 0.077 (as expected)
Overall sex/age distribution: p-value = 0.012 (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: 9 (0-5 excellent, 6-10 good, 11-20 acceptable and > 20 problematic)
p-value for chi2: 0.000 (significant difference)
```

Digit preference Height:

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

Digit Preference Score: 13 (0-5 excellent, 6-10 good, 11-20 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 (0-5 excellent, 6-10 good, 11-20 acceptable and > 20 problematic)
p-value for chi2: 0.011 (significant difference)
```

Evaluation of Standard deviation, Normal distribution, Skewness and Kurtosis using the 3 exclusion (Flag) procedures

.	no exclusion	exclusion from reference mean (WHO flags)	exclusion from observed mean (SMART flags)
WHZ			
Standard Deviation SD:	1.13	1.07	1.00
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	11.4%	10.8%	
calculated with current SD:	10.7%	8.9%	
calculated with a SD of 1:	8.0%	7.5%	
HAZ			
Standard Deviation SD:	1.19	1.18	1.08
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	24.1%	23.9%	23.8%
calculated with current SD:	28.0%	27.4%	26.5%
calculated with a SD of 1:	24.3%	24.0%	24.9%
WAZ			
Standard Deviation SD:	1.02	1.02	0.96
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			

observed:	18.1%	18.1%	
calculated with current SD:	19.6%	19.6%	
calculated with a SD of 1:	19.1%	19.1%	

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

WHZ	p= 0.000	p= 0.001	p= 0.002
HAZ	p= 0.001	p= 0.002	p= 0.114
WAZ	p= 0.000	p= 0.000	p= 0.578

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

Skewness

WHZ	-0.59	-0.18	-0.32
HAZ	0.09	0.21	0.03
WAZ	-0.37	-0.37	-0.02

If the value is:
-below minus 2 there is a relative excess of wasted/stunted/underweight subjects in the sample
-between minus 2 and minus 1, there may be a relative excess of wasted/stunted/underweight subjects in the sample.
-between minus 1 and plus 1, the distribution can be considered as symmetrical.
-between 1 and 2, there may be an excess of obese/tall/overweight subjects in the sample.
-above 2, there is an excess of obese/tall/overweight subjects in the sample

Kurtosis

WHZ	2.21	0.80	-0.01
HAZ	1.15	0.84	0.15
WAZ	1.06	1.06	0.21

(Kurtosis characterizes the relative peakedness or flatness compared with the normal distribution, positive kurtosis indicates a relatively peaked distribution, negative kurtosis indicates a relatively flat distribution)
If the value is:
-above 2 it indicates a problem. There might have been a problem with data collection or sampling.
-between 1 and 2, the data may be affected with a problem.
-less than an absolute value of 1 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=0.78 (p=0.793)
WHZ < -3: ID=1.68 (p=0.012)
GAM: ID=0.78 (p=0.793)
SAM: ID=1.68 (p=0.012)
HAZ < -2: ID=1.38 (p=0.084)
HAZ < -3: ID=1.23 (p=0.180)
WAZ < -2: ID=1.08 (p=0.355)
WAZ < -3: ID=1.34 (p=0.102)

Subjects with SMART flags are excluded from this analysis.

The Index of Dispersion (ID) indicates the degree to which the cases are aggregated into certain clusters (the degree to which there are "pockets"). If the ID is less than 1 and p > 0.95 it indicates that the cases are UNIFORMLY distributed among the clusters. If the p value is between 0.05 and 0.95 the cases appear to be randomly distributed among the clusters, if ID is higher than 1 and p is less than 0.05 the cases are aggregated into certain cluster (there appear to be pockets of cases). If this is the case for Oedema but not for WHZ then aggregation of GAM and SAM cases is likely due to inclusion of oedematous cases in GAM and SAM estimates.

Are the data of the same quality at the beginning and the end of the clusters?
Evaluation of the SD for WHZ depending upon the order the cases are measured within each cluster (if one cluster per day is measured then this will be related to the time of the day the measurement is made).

Time point	SD for WHZ 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.09 (n=30, f=1)	############
02: 1.24 (n=30, f=2)	##################
03: 1.04 (n=30, f=0)	##########
04: 0.55 (n=30, f=0)	
05: 1.03 (n=30, f=0)	##########
06: 0.95 (n=30, f=0)	######
07: 0.76 (n=30, f=0)	
08: 0.96 (n=30, f=0)	#######
09: 0.89 (n=30, f=0)	####

```
10: 1.44 (n=30, f=1)  ##########################
11: 1.40 (n=30, f=1)  ##########################
12: 1.25 (n=28, f=1)  ###################
13: 1.28 (n=28, f=1)  ###################
14: 0.87 (n=24, f=0)  ###
15: 1.30 (n=21, f=1)  ####################
16: 1.13 (n=16, f=0)  0000000000000
17: 1.25 (n=12, f=0)  00000000000000000000
18: 0.96 (n=09, f=0)  ~~~~~~~
19: 2.42 (n=04, f=1)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

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

Analysis by Team

Team	**1**	**2**	**3**	**4**	
n =	116	114	116	128	
Percentage of values flagged with SMART flags:					
WHZ:	2.6	1.8	0.9	2.3	
HAZ:	4.3	1.8	3.4	0.0	
WAZ:	1.7	1.8	0.0	0.8	
Age ratio of 6-29 months to 30-59 months:					
	0.93	0.97	1.04	1.25	
Sex ratio (male/female):					
	1.23	0.90	1.19	1.33	
Digit preference Weight (%):					
.0 :	27	12	16	10	
.1 :	7	12	5	4	
.2 :	9	17	4	7	
.3 :	8	12	15	11	
.4 :	10	6	9	11	
.5 :	13	8	10	8	
.6 :	5	11	11	15	
.7 :	4	4	9	9	
.8 :	10	12	9	13	
.9 :	6	5	10	13	
DPS:	20	12	12	10	Digit preference score (0-5 excellent, 5-10 good, 10-20 acceptable and > 20 problematic)
Digit preference Height (%):					
.0 :	21	13	11	27	
.1 :	9	8	11	9	
.2 :	16	6	12	12	
.3 :	12	9	15	10	
.4 :	3	11	10	9	
.5 :	9	18	11	12	
.6 :	12	14	11	9	
.7 :	7	12	8	5	
.8 :	9	6	6	5	
.9 :	3	3	4	3	
DPS:	17	15	10	21	Digit preference score (0-5 excellent, 5-10 good, 10-20 acceptable and > 20 problematic)
Digit preference MUAC (%):					
.0 :	4	13	11	16	
.1 :	3	12	11	9	
.2 :	6	17	7	9	
.3 :	11	7	9	6	
.4 :	17	8	16	11	
.5 :	10	16	12	13	
.6 :	16	7	13	11	
.7 :	14	12	8	9	
.8 :	9	7	3	9	
.9 :	9	1	9	9	
DPS:	15	15	11	9	Digit preference score (0-5 excellent, 5-10 good, 10-20 acceptable and > 20 problematic)
Standard deviation of WHZ:					
SD	1.18	1.15	1.05	1.13	
Prevalence (< -2) observed:					
%	12.9	16.7	9.5	7.0	
Prevalence (< -2) calculated with current SD:					
%	12.1	15.0	7.1	9.3	
Prevalence (< -2) calculated with a SD of 1:					
%	8.3	11.7	6.2	6.6	

Standard deviation of HAZ:

SD	1.31	1.22	1.13	1.13
observed:				
%	28.4	22.8	18.1	26.6
calculated with current SD:				
%	32.0	25.1	24.8	29.6
calculated with a SD of 1:				
%	27.0	20.7	22.2	27.2

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

Team 1:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	16/14.8 (1.1)	16/12.1 (1.3)	32/26.9 (1.2)	1.00
18 to 29	12	13/14.5 (0.9)	11/11.8 (0.9)	24/26.2 (0.9)	1.18
30 to 41	12	14/14.0 (1.0)	15/11.4 (1.3)	29/25.4 (1.1)	0.93
42 to 53	12	15/13.8 (1.1)	8/11.2 (0.7)	23/25.0 (0.9)	1.88
54 to 59	6	6/6.8 (0.9)	2/5.5 (0.4)	8/12.4 (0.6)	3.00
6 to 59	54	64/58.0 (1.1)	52/58.0 (0.9)		1.23

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

Overall sex ratio: p-value = 0.265 (boys and girls equally represented)
Overall age distribution: p-value = 0.498 (as expected)
Overall age distribution for boys: p-value = 0.979 (as expected)
Overall age distribution for girls: p-value = 0.226 (as expected)
Overall sex/age distribution: p-value = 0.146 (as expected)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	10/12.5 (0.8)	20/13.9 (1.4)	30/26.5 (1.1)	0.50
18 to 29	12	9/12.2 (0.7)	17/13.6 (1.3)	26/25.8 (1.0)	0.53
30 to 41	12	18/11.8 (1.5)	8/13.2 (0.6)	26/25.0 (1.0)	2.25
42 to 53	12	11/11.7 (0.9)	10/12.9 (0.8)	21/24.6 (0.9)	1.10
54 to 59	6	6/5.8 (1.0)	5/6.4 (0.8)	11/12.2 (0.9)	1.20
6 to 59	54	54/57.0 (0.9)	60/57.0 (1.1)		0.90

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

Overall sex ratio: p-value = 0.574 (boys and girls equally represented)
Overall age distribution: p-value = 0.885 (as expected)
Overall age distribution for boys: p-value = 0.330 (as expected)
Overall age distribution for girls: p-value = 0.164 (as expected)
Overall sex/age distribution: p-value = 0.021 (significant difference)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	10/14.6 (0.7)	15/12.3 (1.2)	25/26.9 (0.9)	0.67
18 to 29	12	19/14.3 (1.3)	15/12.0 (1.3)	34/26.2 (1.3)	1.27
30 to 41	12	11/13.8 (0.8)	10/11.6 (0.9)	21/25.4 (0.8)	1.10
42 to 53	12	18/13.6 (1.3)	7/11.4 (0.6)	25/25.0 (1.0)	2.57
54 to 59	6	5/6.7 (0.7)	6/5.7 (1.1)	11/12.4 (0.9)	0.83
6 to 59	54	63/58.0 (1.1)	53/58.0 (0.9)		1.19

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

Overall sex ratio: p-value = 0.353 (boys and girls equally represented)
Overall age distribution: p-value = 0.500 (as expected)
Overall age distribution for boys: p-value = 0.241 (as expected)
Overall age distribution for girls: p-value = 0.506 (as expected)
Overall sex/age distribution: p-value = 0.043 (significant difference)

Team 4:

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

```
6  to 17     12      26/16.9 (1.5)      13/12.8 (1.0)      39/29.7 (1.3)    2.00
18 to 29     12      18/16.5 (1.1)      14/12.4 (1.1)      32/29.0 (1.1)    1.29
30 to 41     12      17/16.0 (1.1)      10/12.1 (0.8)      27/28.1 (1.0)    1.70
42 to 53     12       9/15.8 (0.6)      10/11.9 (0.8)      19/27.6 (0.7)    0.90
54 to 59      6       3/7.8 (0.4)        8/5.9 (1.4)      11/13.7 (0.8)    0.38
-------------------------------------------------------------------------------
6  to 59     54      73/64.0 (1.1)      55/64.0 (0.9)                       1.33

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

Overall sex ratio: p-value = 0.112 (boys and girls equally represented)
Overall age distribution: p-value = 0.166 (as expected)
Overall age distribution for boys: p-value = 0.028 (significant difference)
Overall age distribution for girls: p-value = 0.806 (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

```
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: 0.87 (n=08, f=0)  ###
02: 1.61 (n=07, f=1)  ##################################
03: 1.41 (n=07, f=0)  ##########################
04: 0.70 (n=08, f=0)
05: 0.82 (n=07, f=0)  #
06: 0.76 (n=08, f=0)
07: 0.70 (n=08, f=0)
08: 0.73 (n=07, f=0)
09: 0.71 (n=07, f=0)
10: 1.72 (n=07, f=1)  ########################################
11: 2.23 (n=07, f=1)  ##################################################################
12: 1.04 (n=07, f=0)  ##########
13: 1.58 (n=07, f=0)  ##################################
14: 0.54 (n=05, f=0)
15: 1.32 (n=05, f=0)  ######################
16: 1.09 (n=03, f=0)  OOOOOOOOOOO
17: 0.64 (n=03, f=0)
18: 1.53 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOO
19: 2.00 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

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

Team: 2

```
Time                                          SD for WHZ
point               0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.48 (n=08, f=0)  ##############################
02: 0.64 (n=08, f=0)
03: 0.91 (n=08, f=0)  #####
04: 0.36 (n=07, f=0)
05: 1.55 (n=08, f=0)  ################################
06: 1.23 (n=08, f=0)  ##################
07: 0.59 (n=07, f=0)
08: 1.15 (n=08, f=0)  ###############
09: 0.54 (n=07, f=0)
10: 1.42 (n=07, f=0)  ##########################
11: 0.79 (n=08, f=0)
12: 0.79 (n=07, f=0)
13: 1.18 (n=07, f=0)  ################
14: 1.17 (n=05, f=0)  OOOOOOOOOOOOOOO
15: 2.02 (n=04, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
16: 0.44 (n=03, f=0)
17: 1.41 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOO
```

(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: 0.97 (n=08, f=0)  #######
02: 1.01 (n=07, f=0)  #########
03: 0.98 (n=07, f=0)  ########
04: 0.62 (n=08, f=0)
05: 0.71 (n=07, f=0)
06: 0.70 (n=08, f=0)
07: 0.68 (n=07, f=0)
08: 1.00 (n=07, f=0)  ########
09: 0.58 (n=08, f=0)
10: 1.59 (n=08, f=0)  ##################################
11: 1.08 (n=07, f=0)  ############
12: 1.44 (n=06, f=0)  ############################
13: 1.74 (n=06, f=1)  ########################################
14: 0.57 (n=06, f=0)
15: 0.75 (n=06, f=0)
16: 1.53 (n=04, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOO
17: 2.29 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
18: 0.38 (n=03, f=0)
```

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

Team: 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: 0.75 (n=08, f=0)
02: 1.37 (n=08, f=0)  ########################
03: 0.77 (n=07, f=0)
04: 0.55 (n=08, f=0)
05: 0.80 (n=07, f=0)
06: 0.75 (n=08, f=0)
07: 1.27 (n=08, f=0)  ####################
08: 0.95 (n=07, f=0)  ######
09: 1.15 (n=07, f=0)  ###############
10: 1.01 (n=08, f=0)  #########
11: 0.84 (n=08, f=0)  ##
12: 1.20 (n=08, f=1)  #################
13: 0.83 (n=08, f=0)  #
14: 0.63 (n=07, f=0)
15: 0.76 (n=07, f=0)
16: 1.15 (n=06, f=0)  ###############
17: 0.57 (n=03, f=0)
18: 0.40 (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)

Plausibility check for: Smara + February 27th.

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	>5.0-10	>10	
(% of in-range subjects)			0	5	10	20	**0** (1.4 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**0** (p=0.964)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000	
(Significant chi square)			0	2	4	10	**4** (p=0.008)
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**0** (5)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20	
			0	2	4	10	**2** (10)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20	
			0	2	6	20	**0** (1.03)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (-0.08)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0	
			0	1	3	5	**0** (-0.29)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000	
			0	1	3	5	**0** (p=0.331)
Timing	Excl	Not determined yet					
			0	1	3	5	
OVERALL SCORE WHZ =			0-5	5-10	10-15	>15	**6** %

At the moment the overall score of this survey is 6 %, this is good.

There were no duplicate entries detected.

Missing data:

WEIGHT: Line=129/ID=1194, Line=443/ID=2009
HEIGHT: Line=129/ID=1194, Line=443/ID=2009

Percentage of children with no exact birthday: 0 %

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=24/ID=1152:	**WHZ (6.113)**	HAZ (-7.457)	Height may be incorrect
Line=28/ID=1140:	HAZ (-4.420)		Age may be incorrect
Line=61/ID=1129:	HAZ (1.823)		Age may be incorrect
Line=72/ID=1225:	HAZ (2.058)		Age may be incorrect
Line=100/ID=1167:	HAZ (-4.481)		Age may be incorrect
Line=150/ID=1317:	HAZ (-7.506)		Height may be incorrect
Line=154/ID=1315:	**WHZ (-3.919)**		Weight may be incorrect
Line=157/ID=1311:	HAZ (2.068)		Age may be incorrect
Line=210/ID=1403:	**WHZ (7.133)**	HAZ (-7.747)	Height may be incorrect
Line=212/ID=1401:	HAZ (4.017)		Height may be incorrect
Line=219/ID=1374:	**WHZ (-3.875)**		Weight may be incorrect
Line=369/ID=1832:	**WHZ (-3.835)**		Weight may be incorrect
Line=373/ID=1837:	WAZ (-4.554)		Age may be incorrect
Line=384/ID=1921:	**WHZ (-3.989)**		Weight may be incorrect
Line=409/ID=1877:	**WHZ (3.733)**	WAZ (2.965)	Weight may be incorrect
Line=448/ID=2004:	HAZ (-4.460)		Age may be incorrect
Line=490/ID=2091:	HAZ (-4.419)		Age may be incorrect

Percentage of values flagged with SMART flags:WHZ: 1.4 %, HAZ: 2.2 %, WAZ: 0.4 %

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: 1.06 (The value should be around 1.0).
```

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

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	56/58.7 (1.0)	75/58.5 (1.3)	131/117.2 (1.1)	0.75
18 to 29	12	70/57.2 (1.2)	59/57.0 (1.0)	129/114.2 (1.1)	1.19
30 to 41	12	49/55.5 (0.9)	54/55.3 (1.0)	103/110.7 (0.9)	0.91
42 to 53	12	42/54.6 (0.8)	37/54.4 (0.7)	79/109.0 (0.7)	1.14
54 to 59	6	36/27.0 (1.3)	27/26.9 (1.0)	63/53.9 (1.2)	1.33
6 to 59	54	253/252.5 (1.0)	252/252.5 (1.0)		1.00

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

Overall sex ratio: p-value = 0.964 (boys and girls equally represented)
Overall age distribution: p-value = 0.008 (significant difference)
Overall age distribution for boys: p-value = 0.047 (significant difference)
Overall age distribution for girls: p-value = 0.035 (significant difference)
```

Overall sex/age distribution: p-value = 0.001 (significant difference)

Digit preference Weight:

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

Digit Preference Score: **5** (0-5 excellent, 6-10 good, 11-20 acceptable and > 20 problematic)
p-value for chi2: 0.280

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** (0-5 excellent, 6-10 good, 11-20 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: **5** (0-5 excellent, 6-10 good, 11-20 acceptable and > 20 problematic)
p-value for chi2: 0.172

Evaluation of Standard deviation, Normal distribution, Skewness and Kurtosis using the 3 exclusion (Flag) procedures

.	no exclusion	exclusion from reference mean (WHO flags)	exclusion from observed mean (SMART flags)
WHZ			
Standard Deviation SD:	1.18	1.09	1.03
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	7.2%	7.2%	6.5%
calculated with current SD:	9.4%	8.1%	6.8%
calculated with a SD of 1:	6.0%	6.4%	6.2%
HAZ			
Standard Deviation SD:	1.27	1.18	1.11
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	29.0%	28.6%	28.3%
calculated with current SD:	32.3%	30.0%	28.9%
calculated with a SD of 1:	27.9%	26.7%	26.9%

WAZ

Standard Deviation SD:	1.04	1.04	1.02
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	18.1%	18.1%	18.0%
calculated with current SD:	18.7%	18.7%	18.1%
calculated with a SD of 1:	17.7%	17.7%	17.8%

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

WHZ	p= 0.000	p= 0.078	p= 0.452
HAZ	p= 0.000	p= 0.024	p= 0.272
WAZ	p= 0.370	p= 0.370	p= 0.398

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

Skewness

WHZ	0.70	-0.16	-0.08
HAZ	-0.46	0.18	0.01
WAZ	-0.09	-0.09	-0.14

If the value is:
-below minus 2 there is a relative excess of wasted/stunted/underweight subjects in the sample
-between minus 2 and minus 1, there may be a relative excess of wasted/stunted/underweight subjects in the sample.
-between minus 1 and plus 1, the distribution can be considered as symmetrical.
-between 1 and 2, there may be an excess of obese/tall/overweight subjects in the sample.
-above 2, there is an excess of obese/tall/overweight subjects in the sample

Kurtosis

WHZ	4.97	0.41	-0.29
HAZ	3.07	0.70	-0.22
WAZ	0.28	0.28	-0.15

(Kurtosis characterizes the relative peakedness or flatness compared with the normal distribution, positive kurtosis indicates a relatively peaked distribution, negative kurtosis indicates a relatively flat distribution)
If the value is:
-above 2 it indicates a problem. There might have been a problem with data collection or sampling.
-between 1 and 2, the data may be affected with a problem.
-less than an absolute value of 1 the distribution can be considered as normal.

Test if cases are randomly distributed or aggregated over the clusters by calculation of the Index of Dispersion (ID) and comparison with the Poisson distribution for:

WHZ < -2: ID=1.09 (p=0.331)
WHZ < -3: ID=0.90 (p=0.625)
GAM: ID=1.09 (p=0.331)
SAM: ID=0.90 (p=0.625)
HAZ < -2: ID=1.27 (p=0.149)
HAZ < -3: ID=0.83 (p=0.729)
WAZ < -2: ID=1.26 (p=0.155)
WAZ < -3: ID=1.31 (p=0.122)

Subjects with SMART flags are excluded from this analysis.

The Index of Dispersion (ID) indicates the degree to which the cases are aggregated into certain clusters (the degree to which there are "pockets"). If the ID is less than 1 and p > 0.95 it indicates that the cases are UNIFORMLY distributed among the clusters. If the p value is between 0.05 and 0.95 the cases appear to be randomly distributed among the clusters, if ID is higher than 1 and p is less than 0.05 the cases are aggregated into certain cluster (there appear to be pockets of cases). If this is the case for Oedema but not for WHZ then aggregation of GAM and SAM cases is likely due to inclusion of oedematous cases in GAM and SAM estimates.

Are the data of the same quality at the beginning and the end of the clusters?
Evaluation of the SD for WHZ depending upon the order the cases are measured within each cluster (if one cluster per day is measured then this will be related to the time of the day the measurement is made).

```
Time                                          SD for WHZ
point               0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.20 (n=30, f=1)  #################
02: 1.36 (n=30, f=1)  ########################
03: 1.00 (n=30, f=0)  ########
04: 0.91 (n=30, f=0)  #####
05: 1.28 (n=30, f=1)  ###################
```

```
06: 1.12 (n=30, f=0)  ##############
07: 0.89 (n=29, f=0)  ####
08: 0.95 (n=30, f=0)  ######
09: 1.03 (n=30, f=0)  ##########
10: 0.88 (n=29, f=0)  ###
11: 1.84 (n=27, f=1)  ###########################################
12: 0.86 (n=28, f=0)  ##
13: 1.41 (n=26, f=2)  ########################
14: 1.11 (n=23, f=0)  ##############
15: 0.91 (n=18, f=0)  #####
16: 1.28 (n=18, f=0)  ###################
17: 1.03 (n=16, f=0)  0000000000
18: 0.83 (n=13, f=0)  0
19: 1.05 (n=13, f=0)  00000000000
20: 2.27 (n=11, f=1)  00000000000000000000000000000000000000000000000000000000000000000000
21: 1.00 (n=07, f=0)  ~~~~~~~~
22: 1.85 (n=03, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

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

Analysis by Team

Team	**5**	**6**	**7**	**8**	
n =	116	149	114	126	
Percentage of values flagged with SMART flags:					
WHZ:	1.7	2.7	0.9	2.4	
HAZ:	2.6	3.4	0.9	3.2	
WAZ:	0.0	0.0	0.9	2.4	
Age ratio of 6-29 months to 30-59 months:					
	0.87	1.29	0.93	1.14	
Sex ratio (male/female):					
	0.84	1.13	1.00	1.03	
Digit preference Weight (%):					
.0 :	9	11	10	10	
.1 :	5	9	9	9	
.2 :	15	12	15	10	
.3 :	11	9	5	18	
.4 :	8	7	5	10	
.5 :	9	10	11	10	
.6 :	12	13	17	5	
.7 :	9	15	5	8	
.8 :	9	5	19	9	
.9 :	12	9	4	12	
DPS:	8	10	17	10	Digit preference score (0-5 excellent, 5-10 good, 10-20 acceptable and > 20 problematic)
Digit preference Height (%):					
.0 :	6	18	20	15	
.1 :	8	12	11	9	
.2 :	16	11	11	13	
.3 :	12	7	11	13	
.4 :	10	9	5	16	
.5 :	6	20	10	11	
.6 :	15	6	14	10	
.7 :	12	4	10	8	
.8 :	9	7	4	2	
.9 :	7	5	4	2	
DPS:	11	17	16	16	Digit preference score (0-5 excellent, 5-10 good, 10-20 acceptable and > 20 problematic)
Digit preference MUAC (%):					
.0 :	9	17	5	11	
.1 :	6	16	11	8	
.2 :	20	13	11	8	
.3 :	11	5	13	9	
.4 :	9	7	11	16	
.5 :	10	9	9	6	
.6 :	10	7	11	15	
.7 :	8	4	16	8	
.8 :	7	7	6	7	
.9 :	9	14	6	11	
DPS:	12	15	11	10	Digit preference score (0-5 excellent, 5-10 good, 10-20 acceptable and > 20 problematic)
Standard deviation of WHZ:					

SD 1.34 1.14 1.04 1.09
Prevalence (< -2) observed:
% 7.8 5.4 12.3 4.0
Prevalence (< -2) calculated with current SD:
% 9.8 8.8 13.1 5.5
Prevalence (< -2) calculated with a SD of 1:
% 4.1 6.1 12.2 4.1
Standard deviation of HAZ:
SD 1.41 1.29 1.21 1.15
observed:
% 18.1 29.5 31.6 36.3
calculated with current SD:
% 26.4 34.6 34.3 33.7
calculated with a SD of 1:
% 18.8 30.5 31.3 31.4

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	9/12.3 (0.7)	17/14.6 (1.2)	26/26.9 (1.0)	0.53
18 to 29	12	17/12.0 (1.4)	11/14.3 (0.8)	28/26.2 (1.1)	1.55
30 to 41	12	9/11.6 (0.8)	21/13.8 (1.5)	30/25.4 (1.2)	0.43
42 to 53	12	11/11.4 (1.0)	5/13.6 (0.4)	16/25.0 (0.6)	2.20
54 to 59	6	7/5.7 (1.2)	9/6.7 (1.3)	16/12.4 (1.3)	0.78
6 to 59	54	53/58.0 (0.9)	63/58.0 (1.1)		0.84

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

Overall sex ratio: p-value = 0.353 (boys and girls equally represented)
Overall age distribution: p-value = 0.259 (as expected)
Overall age distribution for boys: p-value = 0.419 (as expected)
Overall age distribution for girls: p-value = 0.026 (significant difference)
Overall sex/age distribution: p-value = 0.002 (significant difference)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	20/18.3 (1.1)	24/16.2 (1.5)	44/34.6 (1.3)	0.83
18 to 29	12	24/17.9 (1.3)	16/15.8 (1.0)	40/33.7 (1.2)	1.50
30 to 41	12	17/17.3 (1.0)	10/15.3 (0.7)	27/32.7 (0.8)	1.70
42 to 53	12	8/17.0 (0.5)	14/15.1 (0.9)	22/32.2 (0.7)	0.57
54 to 59	6	10/8.4 (1.2)	6/7.5 (0.8)	16/15.9 (1.0)	1.67
6 to 59	54	79/74.5 (1.1)	70/74.5 (0.9)		1.13

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

Overall sex ratio: p-value = 0.461 (boys and girls equally represented)
Overall age distribution: p-value = 0.094 (as expected)
Overall age distribution for boys: p-value = 0.118 (as expected)
Overall age distribution for girls: p-value = 0.204 (as expected)
Overall sex/age distribution: p-value = 0.008 (significant difference)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	14/13.2 (1.1)	18/13.2 (1.4)	32/26.5 (1.2)	0.78
18 to 29	12	10/12.9 (0.8)	13/12.9 (1.0)	23/25.8 (0.9)	0.77
30 to 41	12	7/12.5 (0.6)	9/12.5 (0.7)	16/25.0 (0.6)	0.78
42 to 53	12	17/12.3 (1.4)	11/12.3 (0.9)	28/24.6 (1.1)	1.55
54 to 59	6	9/6.1 (1.5)	6/6.1 (1.0)	15/12.2 (1.2)	1.50
6 to 59	54	57/57.0 (1.0)	57/57.0 (1.0)		1.00

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

Overall sex ratio: p-value = 1.000 (boys and girls equally represented)
Overall age distribution: p-value = 0.212 (as expected)
Overall age distribution for boys: p-value = 0.177 (as expected)

Overall age distribution for girls: p-value = 0.585 (as expected)
Overall sex/age distribution: p-value = 0.057 (as expected)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	13/14.8 (0.9)	16/14.4 (1.1)	29/29.2 (1.0)	0.81
18 to 29	12	19/14.5 (1.3)	19/14.0 (1.4)	38/28.5 (1.3)	1.00
30 to 41	12	16/14.0 (1.1)	14/13.6 (1.0)	30/27.6 (1.1)	1.14
42 to 53	12	6/13.8 (0.4)	7/13.4 (0.5)	13/27.2 (0.5)	0.86
54 to 59	6	10/6.8 (1.5)	6/6.6 (0.9)	16/13.4 (1.2)	1.67
6 to 59	54	64/63.0 (1.0)	62/63.0 (1.0)		1.03

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

Overall sex ratio: p-value = 0.859 (boys and girls equally represented)
Overall age distribution: p-value = 0.024 (significant difference)
Overall age distribution for boys: p-value = 0.099 (as expected)
Overall age distribution for girls: p-value = 0.282 (as expected)
Overall sex/age distribution: p-value = 0.012 (significant difference)

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

Team: 1

```
Time                                        SD for WHZ
point               0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.50 (n=11, f=0)  ############################
02: 1.32 (n=09, f=0)  ######################
03: 1.14 (n=09, f=0)  ##############
04: 1.50 (n=09, f=1)  ##############################
05: 0.85 (n=09, f=0)  ##
06: 1.10 (n=08, f=0)  #############
07: 0.84 (n=08, f=0)  ##
08: 0.89 (n=08, f=0)  ####
09: 1.27 (n=08, f=0)  ###################
10: 0.55 (n=07, f=0)
11: 2.78 (n=07, f=1)  ########################################################################
12: 1.03 (n=05, f=0)  ##########
13: 1.17 (n=05, f=0)  ################
14: 1.18 (n=04, f=0)  OOOOOOOOOOOOOOO
15: 0.54 (n=02, f=0)
16: 0.00 (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: 0.75 (n=09, f=0)
02: 0.79 (n=09, f=0)
03: 0.97 (n=09, f=0)  #######
04: 0.78 (n=09, f=0)
05: 1.10 (n=09, f=1)  #############
06: 1.09 (n=09, f=0)  ############
07: 0.52 (n=09, f=0)
08: 1.00 (n=09, f=0)  ########
09: 0.39 (n=09, f=0)
10: 1.33 (n=06, f=0)  ######################
11: 0.77 (n=06, f=0)
12: 0.99 (n=06, f=0)  ########
13: 1.82 (n=06, f=1)  ##########################################
14: 1.00 (n=06, f=0)  #########
15: 0.94 (n=05, f=0)  OOOOOO
16: 1.02 (n=05, f=0)  OOOOOOOOO
17: 0.65 (n=05, f=0)
18: 0.50 (n=05, f=0)
19: 1.26 (n=05, f=0)  OOOOOOOOOOOOOOOOOO
```

```
20: 3.16 (n=05, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
21: 1.02 (n=04, f=0)  OOOOOOOOO
22: 1.47 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

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

Team: 3

```
Time                                          SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.27 (n=09, f=0)  ####################
02: 1.09 (n=09, f=0)  ############
03: 0.66 (n=09, f=0)
04: 1.12 (n=09, f=0)  ##############
05: 0.98 (n=09, f=0)  ########
06: 1.19 (n=09, f=0)  ################
07: 1.16 (n=08, f=0)  ###############
08: 0.70 (n=07, f=0)
09: 1.20 (n=07, f=0)  #################
10: 1.09 (n=06, f=0)  ############
11: 0.74 (n=05, f=0)
12: 0.99 (n=05, f=0)  ########
13: 0.23 (n=04, f=0)
14: 1.59 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
15: 1.01 (n=02, f=0)  ~~~~~~~~~
16: 2.30 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
17: 1.03 (n=03, f=0)  OOOOOOOOOO
18: 0.10 (n=02, f=0)
19: 0.76 (n=02, f=0)
20: 0.76 (n=02, f=0)
21: 0.13 (n=02, f=0)
```

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

Team: 4

```
Time                                          SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.01 (n=09, f=0)  #########
02: 1.91 (n=09, f=1)  ################################################
03: 0.89 (n=09, f=0)  ####
04: 0.81 (n=09, f=0)  #
05: 1.11 (n=09, f=0)  #############
06: 1.16 (n=09, f=0)  ###############
07: 1.09 (n=08, f=0)  ############
08: 1.08 (n=08, f=0)  ############
09: 0.68 (n=08, f=0)
10: 0.76 (n=07, f=0)
11: 1.40 (n=05, f=0)  ##########################
12: 0.67 (n=06, f=0)
13: 0.45 (n=05, f=0)
14: 1.40 (n=05, f=0)  ##########################
15: 0.55 (n=05, f=0)
16: 2.00 (n=04, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
17: 0.47 (n=04, f=0)
18: 1.54 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
19: 0.67 (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)