2019 Nutrition Survey
Sahrawi Refugee Camps, Tindouf, Algeria

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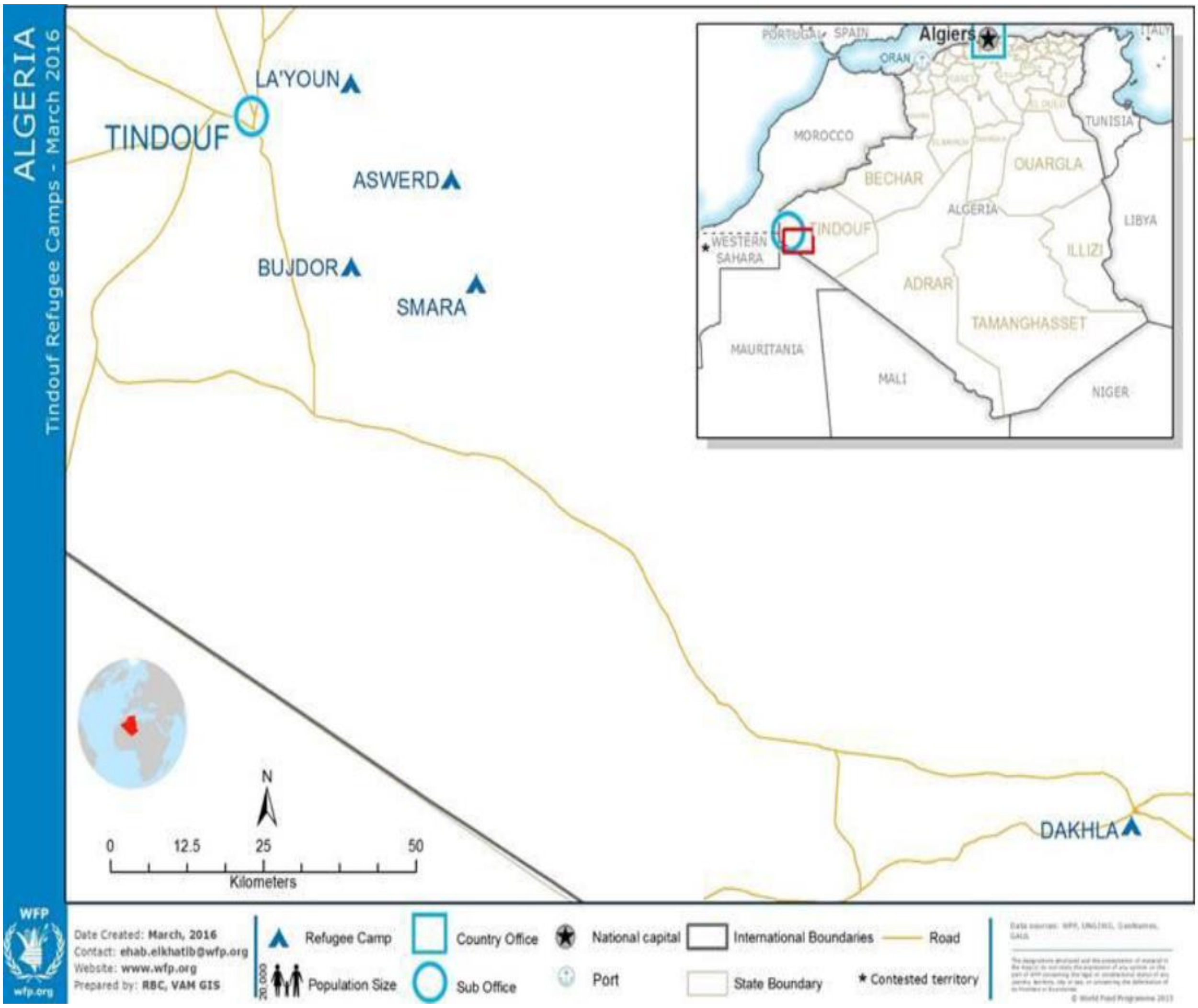
UNHCR ACNUR
La Agencia de la ONU para los Refugiados

CISP
COMITATO INTERNAZIONALE PER LO SVILUPPO DEI POPOLI

WFP
Programa Mundial de Alimentos



ALGERIA
Tindouf Refugee Camps - March 2016
LA'YOUN
TINDOUF
ASWERD
BUJDOR
SMARA
DAKHLA
PORTUGAL
SPAIN
Algiers
ORAN
ITALY
MOROCCO
TUNISIA
BECHAR
OUARGLA
ALGERIA
LIBYA
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12.5
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Kilometers
WFP
wfp.org
Date Created: March, 2016
Contact: ehab.elkhatib@wfp.org
Website: www.wfp.org
Prepared by: RBC, VAM GIS
Refugee Camp
20,000
Population Size
Country Office
Sub Office
National capital
Port
International Boundaries
State Boundary
Road
Contested territory

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Contents

ACRONYMS AND ABBREVIATIONS

ARC	Algerian Red Crescent
BMI	Body Mass Index
BSF	Blanket Supplementary Feeding
CI	Confidence Interval
CISP	Comittato Internazionalle per lo Sviluppo dei poppoli
ENA	Emergency Nutrition Assessment
FCS	Food Consumption Score
GAM	Global Acute Malnutrition
HAZ	Length/Height-for-Age Z-score
HDDS	Household Dietary Diversity Score
IYCF	Infant and Young Child Feeding Practices
LNS	Lipid-based Nutrient Supplement
MAM	Moderate Acute Malnutrition
MDD-W	Minimum Dietary Diversity for Women
MNP	Micronutrient Powder
MUAC	Mid-Upper Arm Circumference
N/A	Not available
NCD	Non-Communicable Diseases
NCHS	National Centre for Health Statistics
NGO	Non-Governmental Organisation
OTP	Outpatient Treatment Program
PISIS	Integrated Sahrawi Child Health Programme
PLW	Pregnant and Lactating Women
rCSI	Reduced Coping Strategy Index
SAM	Severe Acute Malnutrition
UN	United Nations
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation and Hygiene
WAZ	Weight-for-Age Z-score
WFP	World Food Programme
WHO	World Health Organisation
WHZ	Weight-for-Length/Height Z-score

EXECUTIVE SUMMARY

INTRODUCTION

A stratified, cluster nutrition survey was conducted in the Sahrawi refugee camps (Wilayas: Laayoune, Awserd, Smara, Dakhla and Boujdour) located near Tindouf, Algeria. The survey took place in March to May 2019, with the overall aim of establishing a detailed mapping of the current nutritional profile of the population. Findings of the survey were used to produce recommendations to improve the nutritional status and health of the Sahrawi refugees.

METHODS

The surveyed used a stratified two-stage cluster sampling design. A total of 42[1] clusters were randomly allocated to each stratum using probability proportional to size based on available estimates used for humanitarian programming and using the quarter (barrio) as the sampling unit in this first stage. In the second stage, nine households[2] were randomly selected from within each cluster, following the updated EPI method of proximity selection.

Two population groups were included in each survey; children aged 0-59 months and women of childbearing age (15-49 years). For all children surveyed, standard anthropometric, measles vaccination status, presence of diarrhoea in the previous two weeks and feeding practices, as well as health-seeking behaviours, during diarrhoea episodes were collected. Infant and young child feeding indicators were collected for children 0-35 months. For women, Body Mass Index (BMI) was obtained to assess the risk of chronic metabolic diseases. Peripheral blood was obtained in children and women, to assess haemoglobin using a portable photometer (HemoCue® 201+). At the household level the Food Consumption Score (FCS) and the Household Dietary Diversity Score (HDDS) -both food security indicators-, as well as coping mechanisms, were obtained in all surveyed households. In addition, we obtained reported Non-Communicable Diseases (NCDs) and household water and sanitation data.

RESULTS

A total of 1,728 households were visited. Most households agreed to be surveyed 97.2% (1,944 children and 2,463 women). Key indicators obtained in these surveys are summarised in Table 1 below.

Nutritional status in children 6-59 months– Anthropometric indicators and anaemia

The overall prevalence of Global Acute Malnutrition (GAM), assessed using weight-for-length/height z-score (WHZ) <-2 and/or oedema, was 7.6%, ranging from 3.8% in Laayoune to 11.5% in Smara. The GAM prevalence in Smara was significantly higher than all other strata. Similar prevalence estimates were found when GAM was defined as Mid-Upper Arm Circumference (MUAC) <12.5 cm and/or oedema. GAM prevalence has significantly worsened since 2016. The stunting prevalence was 28.2%, ranging from 27.4% in Smara to 30% in Dakhla. Stunting prevalence has significantly worsened since 2016.

Overall, 50.1% of children aged 6-59 months suffer from anaemia. The most common types of anaemia being mild (24.2%) and moderate (24.1%), and severe anaemia was low (1.7%). There are not significant differences in the anaemia prevalence between strata. Anaemia prevalence has significantly worsened since 2016.

Infant and young child feeding (IYCF) practices

The proportion of children aged <24 months ever breastfed was high at 85.4%. Among infants aged <6 months the proportion who are exclusively or predominantly breastfed was 50.4% and 63.7%, respectively. Breastfeeding was reportedly initiated in the first hour in 58% of the children aged <24 months. Continuation of breastfeeding at 12 and 24 months was 74.2% and 28.3%, respectively. The mean duration of breastfeeding was 20.7 months. The prevalence of bottle-feeding in children aged <24 months was 21.4%.

[1] For the Dakhla stratum 36 clusters were randomly allocated.
[2] For the Dakhla stratum, 12 households were randomly selected from within each cluster.

Adequate introduction of solid, semi-solid and soft foods between the ages of 6-8 months was reported in 64.8% of children that age. Only 31.9% of all children aged 6-23 months had a minimum acceptable diet (an IYCF summary indicator). The proportion of children aged 6-23 months reporting consumption of iron-rich or iron-fortified foods was 59.5%.

Diarrhoea, feeding patterns and health seeking behaviour

Overall, 10.4% children aged 0-59 months reported to have presented diarrhoea in the previous two weeks (did not differ significantly between strata). Feeding practices during diarrhoea were poor, with only 28.7% of children being offered more fluids and more than half (61.1%) having their feeding intake reduced. Health seeking behaviours among caregivers were also low, with only 44.4% and 34.7% of children with diarrhoea being taken to the health centre or given oral rehydration, respectively.

Nutritional status in women of childbearing age (15-49years) – Anthropometric indicators and anaemia

Overall, 5.8% of non-pregnant and non-lactating women of childbearing age were classified as underweight (BMI<18.5 kg/m^2), 36.5% as overweight (BMI$\geq$25 and <30 kg/m^2) and 29.6% as obese (BMI$\geq$30 kg/m^2). The prevalence of overweight and obesity combined was 66.1%, ranging from 62.9% in Laayoune to 69.2% in Smara. Similar values of overweight and obesity prevalence were observed in 2016.

The prevalence of anaemia in non-pregnant women of reproductive age was 52.2%, ranging from 47.9% in Laayoune to 55.6% in Smara. There were no significant differences between strata. Pregnant presented similar anaemia prevalence estimates (55.1%) than their non-pregnant counterparts and lactating women presented higher anaemia prevalence (69.1%).

Food security indicators

Overall, the proportion of households classified as having an acceptable FCS was 60.3%, ranging from 57.2% in Laayoune to 62.9% In Dakhla. No significant differences were observed between strata. The mean FCS-based dietary diversity score (based on a 7-day recall) was 5.3 out of a maximum value of 7 food groups. The HDDS based on 24-hour recall was 8.2 out of a maximum value of 12 food groups. The proportion of women that reached the minimum dietary diversity was 60.3%. No significant differences between strata were observed for these indicators.

Overall, the mean value for the reduced Coping Strategies Index (rCSI) was 7.6, ranging from 6.2 in Smara to 9.4 in Laayoune. The strata of Smara presented observable lower rCSI values, but the difference did not reach statistical significance. The most common coping strategies used by the households were *reliance on less preferred or less expensive foods, borrowing of food or rely on help from friends or relatives and limiting portion size at mealtimes*.

Non-communicable diseases (NCDs)

Overall, the prevalence of reported adults (aged 25-64 years) having diabetes, high blood cholesterol, high blood pressure and cardio-vascular disease was 11.4%, 4.5%, 8.9% and 2.6%, respectively. In all Wilayas, 39.4% (95% CI 35.5; 43.5) of the households reportedly having an adult suffering either diabetes, high cholesterol or high blood pressure, displaying the societal exposure to NCDs.

Water, Sanitation and Hygiene (WASH) Indicators

Overall, 41.5% of households had their water provision meeting the UNHCR standards (20 litres/person/day). There were significant differences between strata with the stratum of Dakhla presenting the highest estimates (78.0%). Almost half of the household reported satisfaction with the water supply (48.8%). On average households had their water tanks refilled every 31.4 days, ranging from 8.9 days in the stratum of Dakhla to 38.6 days in the stratum of Smara.

A large proportion of households (79.3%) reported the presence of soap. Basic hygiene practices such as washing hands before preparing or eating food was high (97.9%) with little differences between strata.

Most households reported having access to a latrine and only a very small proportion of households (0.5%) reported to engage in open defecation.

Coverage of Moderate and Severe Acute Malnutrition care programmes and measles vaccination

Overall, the point-coverage of Moderate Acute Malnutrition (MAM) and Severe Acute Malnutrition (SAM) treatment for children aged 6-59 months with acute malnutrition was low at 5.0% and 11.1%, respectively. After including the children that were receiving MAM and SAM care but did not fit the case definition, period-coverage remained low at 12.6% and 42.5% for MAM and SAM treatment, respectively.

Measles vaccination coverage for children 9-59 months was 94.0%, almost in line with the recommended Sphere standards at 95%.

DISCUSSION

The 2019 survey results, when compared with previous surveys, suggest a worsening of the nutrition of the Sahrawi population. There is a significant worsening in both GAM and stunting, which is significantly greater than in 2016. Both GAM and stunting prevalence are considered of poor public health significance, although in the stratum of Smara these are considered of serious public health significance.

Similarly, the prevalence of anaemia has increased in children aged 6-59 months and remain at similarly high levels among women of reproductive age when compared to 2016 prevalence estimates. The worsening anaemia prevalence in children has reversed past public health gains since 2010 that followed the introduction of special products like Chaila and Ghazala.

Sahrawi refugees are facing now a high risk of chronic diseases among adults, as determined by the prevalence of overweight and obesity among women of childbearing age and the high prevalence of reported NCDs among working age adults (aged 25-64 years).

RECOMMENDATIONS

Recommendations for action based on the findings of these surveys are provided in section VI of this report (see page 75).

Table 1. Summary of key indicators

Children aged 6-59 months[1]					
Key indicators (%)	***Awserd***	***Dakhla***	***Laayoune***	***Smara***	***Aggregated***
GAM	5.2	5.7	3.8	11.5	7.6 (6.3; 9.3)
SAM	0.9	0.0	0.3	1.0	0.7 (0.3; 1.4)
Overweight	2.4	2.5	3.8	1.2	2.3 (1.7; 3.0)
MUAC <12.5 cm and/or oedema	4.7	8.7	4.2	10.1	7.3 (6.0; 8.9)
MUAC <11.5 cm and/or oedema	0.2	0.0	0.2	1.8	0.9 (0.5; 1.6)
Stunting	28.9	30.0	28.1	27.4	28.2 (25.3; 31.3)
Severe Stunting	10.0	7.1	11.9	9.6	10.0 (8.2; 12.0)
Total Anaemia	44.1	52.4	47.5	53.8	50.1 (46.7; 53.4)
Moderate Anaemia	20.3	24.3	23.2	26.4	24.1 (21.6; 26.8)
Severe Anaemia	1.9	1.7	2.2	1.4	1.7 (1.1; 2.7)
Exclusive breastfeeding (<6 months)	--	--	--	--	50.4 (38.1; 62.7)
Continued breastfeeding at 1 year	--	--	--	--	74.2 (65.7; 81.2)
Continued breastfeeding at 2 year	--	--	--	--	28.3 (20.3; 37.9)
Minimum dietary diversity	46.7	58.4	48.3	60.3	54.3 (49.5; 59.1)
Minimum meal frequency	54.5	61.7	58.4	66.3	61.4 (55.6; 66.8)
Minimum acceptable diet	27.5	38.3	27.5	34.8	31.9 (26.6; 37.7)
Consumption of iron-rich/fortified foods	53.3	61.0	57.1	63.6	59.5 (54.2; 64.6)

Women of reproductive age (15 – 49 years)					
Key indicators (%)	***Awserd***	***Dakhla***	***Laayoune***	***Smara***	***Aggregated***
Underweight (BMI <18.5 kg/m^2)	4.4	4.3	7.4	5.9	5.8 (4.6; 7.3)
Overweight+ Obesity	64.3	66.4	62.9	69.2	66.1 (63.2; 68.9)
Total Anaemia	51.9	51.2	47.9	55.6	52.2 (49.0; 55.3)
Moderate Anaemia	26.6	27.0	23.8	25.1	25.3 (22.6; 28.1)
Severe Anaemia	2.8	5.1	6.5	8.6	6.4 (5.2; 7.9)

Households food security indicators					
Key indicators (%)	***Awserd***	***Dakhla***	***Laayoune***	***Smara***	***Aggregated***
FCS acceptable	58.9	62.9	57.2	62.4	60.3 (55.0; 65.3)
FCS borderline	40.1	36.3	40.9	36.7	38.5 (33.7; 43.6)
FCS poor	1.0	0.7	1.9	1.0	1.2 (0.7; 1.9)
MDD-Women	58.9	62.9	57.2	62.4	60.3 (55.0; 65.3)
HDDS (mean)	8.2	8.3	8.2	8.3	8.2 (8.1; 8.4)
Not using coping strategies	25.4	27.8	21.4	20.9	22.8 (18.3; 28.0)

Household water quality indicators					
Key indicators (%)	***Awserd***	***Dakhla***	***Laayoune***	***Smara***	***Aggregated***
Met UNHCR water provision standards	43.7	78.0	35.6	32.9	41.5 (36.9; 46.4)
Household satisfied with water supply	47.3	66.5	25.7	60.7	48.8 (43.3; 54.3)

I. INTRODUCTION

1.1 GENERAL CONTEXT

Algeria has been hosting Sahrawi refugees since 1975, and they have been living in camps located 10 to 180 km from Tindouf, in the south-west region of Algeria. At present, the political solution for their return is at an impasse as the UN Security Council and the Secretary General are still making efforts to find a solution for the refugees' future. Their situation is considered a protracted emergency.

In 1986, after receiving assistance 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) started providing humanitarian assistance to Sahrawi refugees upon request of the Algerian Government. Currently, most Sahrawi refugee households are dependent on international assistance as they are in a remote area with limited access to markets and opportunities for local integration, and with few options for self-reliance activities in the camps. Camps' locations are characterised by a harsh desert environment where sand storms are frequent, with extremely high temperature throughout 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 Sahrawi refugee camps possess a defined administrative and health organisation. Population is organised in five camps or Wilayas (Laayoune, Awserd, Smara, Boujdour, and Dakhla). Each Wilaya is divided into dairas (districts); Laayoune and Awserd have each six dairas, Smara and Dakhla have each seven dairas and Boujdour has three dairas (29 dairas in total). Each Daira is subdivided into barrios (quarters) of approximately equal population (116 barrios in total).

Four Wilayas have a hospital, and each daira have a primary health centre (29 in total). A Central Hospital is based at Rabouni. Access to medical services is free of charge, but transportation costs are not covered.

In 2017, UNHCR supported the creation of a Population Figure Working Group (PFWG) with members including UNICEF, WFP, Sahrawi Red Crescent (SRC), Oxfam, Medicos del Mundo (MDM), Il Comitato Internazionale per lo Sviluppo dei Popoli (CISP). In 2018, UNHCR updated the estimate of the population figure of Sahrawi in-camp refugees from 90,000 to 173,600. Due to the politicization of the figures, UNHCR reverted to the planning figure of 90,000 pending a registration exercise, while acknowledging that humanitarian needs in the camps are estimated to be much higher.''

For the purposes of food security interventions, WFP has continued to rely on the higher population estimate provided by the PFWG/UNHCR report of March 2018. Recently, WFP's Executive Board approved the distribution of 133,672 rations per month (approximately three-quarters of the estimated population figure). The related vulnerability assessment completed in September 2018, has not been made public because it is linked with the updated population estimate.

1.3. NUTRITIONAL STATUS OF WOMEN AND CHILDREN

Despite sustained improvements in nutrition indicators over the years, the nutrition situation of the Sahrawi refugees remains precarious. The nutritional problems of greatest public health significance are anaemia in women, and anaemia and stunting in children (aged 6-59 months).

The last nutrition survey, undertaken in 2016[3], reported a prevalence of anaemia in non-pregnant women of reproductive age (15-49 years) and children aged 6-59 months around the threshold of medium public health significance (45.2% and 38.7, respectively). In addition, exceedingly high levels of anaemia were reported among Pregnant and Lactating Women (PLW) of reproductive age (59.8% and 72.0%, respectively). Previous nutrition surveys have shown a strong correlation between iron deficiency and anaemia prevalence in this population[4].Similarly, stunting in children aged 6-59 months is almost of medium public health significance.

[3] Nutritional Survey, Sahrawi Refugee Camps. Tindouf, Algeria. Oct-Nov 2016.

[4] Anthropometric and Micronutrient Nutrition Survey. Sahrawi Refugee Camps, Tindouf, Algeria. September 2002

In addition, there was a very high prevalence of overweight (36.4%%) and obesity (30.7%) among women of childbearing age. These estimates represent one of the main risk factors for metabolic diseases in the population such as diabetes, hypertension, cardiovascular diseases and cancer[5].

[5] Report on Nutrition Survey and Anaemia Intervention Impact Analysis. Sahrawi Refugee Camps, Tindouf, Algeria. September 2012

II. SURVEY DESIGN AND METHODS

2.1. AIM

To implement a stratified nutrition survey to establish a detailed map of the current nutritional profile of the Sahrawi refugee population. The results will be used to produce recommendations on actions to improve the nutritional status and health of the Sahrawi refugees[6].

2.2. TARGET POPULATION

- Households
- 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[7] (IYCF) practice indicators.
- Determine the anaemia prevalence in women of reproductive age (15-49 years).
- Determine the overweight prevalence in women of reproductive age (15-49 years).
- Determine the Food Consumption Score of households.
- Determine the extent to which negative coping strategies are used in households.
- Assess Household Dietary Diversity.
- Assess risk factors from chronic diseases such as tobacco use and inadequate diets.
- Determine diarrhoea prevalence in children 0-59 months, and its household management.
- Assess water and sanitation situation, and appropriate hygiene practices (WASH).
- Strengthen the health system capacity to design and implement nutritional surveys.

2.4. SAMPLE SIZE, NUMBER OF HOUSEHOLDS, AND NUMBER OF CLUSTER INCLUDED

Based on sample size calculations, it was estimated that about 420 households were needed to be surveyed per strata, to ensure a required sample size of 377 children aged 0-59 months and 383 non-pregnant women of reproductive age[8]. Following training of the survey field team and piloting of field data collection, the cluster size was set at nine households[9], with 48 clusters per stratum, with the exception of Dakhla stratum, where the number of clusters was set at 36 with 12 household in each cluster. In line with the 2010 and 2012 nutrition surveys, Boujdour was considered a district of Smara.

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 each district –Daira- was divided in quarters of approximate equal size –barrios-. Cluster allocation was then carried at the quarter level using proportionality to population size method (PPS[10]). By using the quarter as the allocating unit, we aimed at ensuring maximal dispersal of the clusters and greater representation of individual quarters[11].

In the second stage, we chose households randomly from within each selected quarter, following the EPI modified method for proximity selection. The survey team, with the assistance of the “jefas de barrio” in most cases, went to the geographical centre of the quarter and tossed a pen to select a random direction to walk to the boundary of the quarter. Choosing this initial random direction ensured randomization of the households to be visited in order to avoid systematic bias, which may arise if survey teams systematically sample households in a biased subjective manner. At the edge of the quarter/cluster, the pen was tossed again, until it pointed into the body of the quarter/cluster. The team then walked along this second line counting each house right and left on the way[12]. The first house to be visited was selected at random by

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[6] The original Nutrition Survey Terms of Reference are included in *Annex 1*

[7] 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.

[8] See *Annex 2* for the sample size and household number calculations.

[9] Due to the large set of indicators and based on pre-testing of questionnaires, no more than 12 households could be surveyed per day by each team.

[10] See *Annex 3* for cluster allocation.

[11] Surveys conducted before 2010 had allocated clusters at district level.

[12] Numbering with chalk the households.

drawing a random number between one and the number of households counted when walking along the second line. Every subsequent household located nearest to the right, when standing facing outwards from the door from which the team had entered previously, was then selected and visited up to 9-12 households.

If the team reached the boundary of the quarter before completing the required households for the cluster, they returned to the quarter's centre and repeated again the selection 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 required number of households was reached.

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/neighbours were asked to bring them to the house[13]. 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 considered as *empty or abandoned* and was replaced. If an individual or an entire household refused to participate, it was considered and labelled as a refusal, and the individual or household were not replaced.

In the selected household, all children 0-59 months and all women of reproductive age (15-49 years) were included. If a selected child presented a condition that prevented obtaining anthropometric measurements, these were not collected; however, data for all other indicators was obtained.

Data was collected using an ODK questionnaire by two trained enumerators in each household. One enumerator filled half of the questionnaire regarding all individual-level data. Afterwards, another enumerator would fill in the second half of the questionnaire with the household-level data. Detailed registration on outcomes for all surveyed household within each cluster was kept in the cluster control sheet.

2.6. NUTRITIONAL STATUS: DATA COLLECTION, AND INDICATORS

2.6.1. Biological Data Obtained for individual level indicators

Table 2 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 using ODK system from the date of birth obtained from the health card or another official document. Women were asked to recall their age in completed years.
- *Weight* was obtained using an electronic digital scale Seca 876 with mother/child function standing over a wooden board for stability. Measurements were taken to the nearest 0.1 kg. Each scale was checked regularly with a standard 1 kg weight before the start of the survey and regularly during the survey. Children that could not stand alone were weighed whilst carried by their caregiver using the mother/child function. Children were weighed with light clothes while women were clothed. PLW women were not weighed.
- *Height and length* were taken using a Shorr stadiometer (infant/child/adult) 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. The same stadiometer was used for measuring women's height. Height was not measured in PLW.
- *The presence of bilateral pitting 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 MUAC tape on the left arm of children aged 6-59 months and women. MUAC measurement was recorded to the nearest completed 0.1 cm.

[13] If the eligible child/woman was not around at the time of the first visit, the team returned later in the day to complete all the eligible members within the household. Similarly, if all the members of the household were absent, neighbours were asked to inform the absent members and the household was re-visited again before leaving the quarter at the end of the day.

Table 2. Nutritional status indicators

Type of prevalence	Indicator	Children (6-59 months)	Women (15-49 years)		
			Non-pregnant	Lactating	Pregnant
Undernutrition (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	BMI < 18.5	--	--
	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
Undernutrition (MUAC)	Global acute malnutrition	MUAC< 12.5 cm	--	MUAC<23.0 cm	
	Moderate acute malnutrition	MUAC<12.5 and ≥11.5 cm	--	--	--
	Severe acute malnutrition	MUAC <11.5 cm	--	--	--
Overweight	Overweight	WHZ>2	BMI≥25 and <30		
	Obesity		BMI≥30		

WHZ: Weight-for-length/height z-score, HAZ: Length/Height-for-age z-score, WAZ: Weight-for-age z-score, BMI: Body mass index, Hb: Haemoglobin

- *Haemoglobin* was measured for all children aged 6-59 months and women of reproductive age. Haemoglobin was measured using a portable photometer (HemoCue® 201+). 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 micro-cuvette for haemoglobin measurement. The result was expressed to the nearest 0.1gr/dL.

Referrals: Children aged 6-59 months were referred to a health centre for treatment when their WHZ was <-2, MUAC was < 12.5 cm, oedema was present, or when haemoglobin was < 7.0 g/dL. PLW were referred for treatment when MUAC was below 23.0 cm or haemoglobin was < 7.0 g/dL. Other women of reproductive age were referred when haemoglobin was < 8.0 g/dL

2.6.2. Nutritional Status Indicators

Table 2 shows the definition of the nutritional indicators for the analysis.

2.6.3. Infant and Young Child Feeding (IYCF) Indicators

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

IYCF Core indicators
IYCF-1. Early initiation of breastfeeding: Proportion of children born in the last 24 months who were put to the breast within one hour of birth.
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, semisolid, 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 an iron-rich or iron-fortified food that is designed especially for infants and young children, or that is fortified at home[16].
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 breastmilk.
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

[14] Indicators for assessing infant and young child feeding practices. 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 since October 2015.

predominantly breastfed.

IYCF-13. Duration of breastfeeding: Median duration of breastfeeding among children less than 36 months of age.

IYCF-14. Bottle feeding: Proportion of children 0-23 months who are fed with a bottle.

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 Security Indicators

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 eight food groups, had been consumed over the 7-day period prior to the interview.

For each food group, the frequency of days any item of the food group was consumed is tabulated from zero (never eaten) to seven (eaten every day). A weight was assigned to each food group, representing its nutritional importance. The frequency obtained for each food group was multiplied by the weight factor. The FCS is the sum of the weighted food groups. The food groups and weights used for calculation are shown in Table 3.

Table 3: 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 daily, 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].

Dietary diversity is defined as the number of different foods or food groups eaten over a given reference period (7 days or 24 hours), not regarding the frequency of consumption. The following dietary diversity indicators were included in the survey:

[17] Food Consumption Analysis. Calculation and use of food consumption score in food security analysis. VAM, 2008

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

Indicator	Level	Number of food groups	Recall period
Household Dietary Diversity Score (HDDS)	Household	12 (aggregated from 16 items)	24 hours
Dietary Diversity Score (DDS)	Household	7	7 days
Women Dietary Diversity Score (WDDS)	Women	10 (aggregated from 14 items)	24 hours

HDDS was calculated according to FANTA 2006 and FAO 2011[19] guidelines by summing the number of food groups consumed by any household member in and outside the house over the last 24 hour period, out of a maximum of 12 food groups, namely: 1) Cereals, 2) Meat and meat products, 3) Roots and tubers, 4) Vegetables, 5) Fruits, 6) Beans and other pulses, 7) Dairy products, 8) Fats and oil, 9) Sugars and honey, 10) Fish and sea foods, 11) Eggs, 12) beverages, spices & condiments.

DDS: For this indicator, the food groups are based on WFP´s food group classification for the FCS (table 3). Dietary diversity was assessed based on the number of food groups consumed over the past seven days before the survey, excluding sugar as per IFPRI methodology. DDS categories are derived from the seven food groups into: low (< 4.5), medium (5 and 6) and high (> 6) DDS[20].

MDD-W and WDDS: The Minimum Dietary Diversity for Women (MDD-W) is a dichotomous indicator of whether women 15–49 years of age have consumed at least five out of ten defined food groups the previous day or night[21]. The ten groups are: 1) Grains, white roots and tubers, and plantains, 2) pulses, 3) Nuts and seeds, 4) Dairy, 5) Meat, poultry and fish, 7) Eggs, 8) Dark green leafy vegetables, 8) Other vitamin A-rich fruits and vegetables, 9) Other vegetables, 10) Other fruits.

Calculation steps are similar for HDDS, DDS and WDDS. A point was awarded to each food group consumed over the reference period, and the sums of all points were calculated for each of them to create the dietary diversity score (0 as a minimum and as maximum the total number of food groups considered).

The standard FAO/FANTA questionnaires developed to assess HDDS and WDDS were adapted to the context through working sessions held with groups of Sahrawi women[22] , and further refinement was made during the training. Common local foods where included as appropriate.

Reduced Coping Strategies Index (rCSI): The rCSI score was employed to assess coping behaviours and to be compared with the on-going WFP monitoring that also captures this key indicator. The rCSI is a rapid measurement that assess the food-consumption behaviours that households undertake in the short term (previous seven days) when they cannot access sufficient food[23]. It combines the use of the following five food consumption based coping strategies into a single index: Eating less preferred foods, borrowing food/money from friends and relatives, limiting portions at mealtime, limiting adult intake in order for small children to eat, and reducing the number of meals per day. The five strategies are assigned weightings based on severity[24]. CSI scores are generated by multiplying the frequency each strategy was employed in the last seven days by its corresponding severity weight, and then summing together the totals.

2.6.5. Case definitions and calculations on other relevant indicators

Selective feeding programme point- and period-coverage were estimated using the direct method as follows:

[19] Guidelines for measuring household and individual dietary diversity. FAO. 2011
[20] WFP_IndicatorsFSandNutIntegration.pdf
[21] Minimum Dietary Diversity for Women. A guide to measurement. FAO/FANTA 2016.
[22] CISP food monitors
[23] rCSI assesses the question: "What is done by households if facing lack of food, while simultaneously having insufficient money to purchase food?"
[24] "Eating less-preferred/expensive foods", "limiting portion size at mealtime" and "reducing number of meals/day" have severity score of 1. "Borrowing food/relying on help of friends/relatives" and "restricting consumption by adults for small children to eat" a score of 2 and 3 respectively

Point-coverage:

SFP: <u>Nº surveyed children with MAM according to SFP admission criteria who reported being registered</u> x100
No. of surveyed children with MAM *according to SFP admission criteria*

OTP: <u>Nº surveyed children with SAM according to OTP admission criteria who reported being registered</u> x 100
No. of surveyed children with SAM *according to OTP admission criteria*

Period-coverage:

SFP: <u>Nº surveyed children with MAM who reported being registered + cases registered but recovered</u> x 100
No. of surveyed children with MAM + MAM cases registered but recovered

OTP: <u>Nº surveyed children with SAM who reported being registered + cases registered but recovered</u> x 100
No. of surveyed children with SAM + SAM cases registered but recovered

A child was considered in SFP/OTP if the mother confirmed that the child was receiving MAM/SAM treatment (Plumpy'Sup® or Plumpy'Nut®) at health centres. Visual support with pictures of nutritional products were shown.

Measles vaccination in children 9-59 months: Measles vaccination was assessed by checking for the measles vaccine on health card or by carers recall if no health card was available.

Diarrhoea in last 2 weeks in children 0-59 months: an episode of diarrhoea was defined as three loose stools or more in 24 hours.

Lactating women: Women that reported to be breastfeeding a child aged <6 months.

2.7. TRAINING OF SURVEY TEAMS

The training lasted two weeks and was done in Spanish whilst simultaneously translated into Hassaniya. Topics covered were malnutrition and its causes, purpose and objectives of the survey, methodology, anthropometric and haemoglobin measures and common errors, roles and responsibilities of each team member, familiarization with the questionnaires by reviewing the purpose of each question, interviewing skills and recording of data, interpretation of calendar of events and age determination, quality check after completion of questionnaires, and field procedures. Sessions were theoretical and practical.

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

- Determine average time per household to estimate how many could be measured per day and adjust accordingly the required number of clusters based on the calculated sample.
- Identify potential problems/difficulties with survey's methods or questionnaires.

Fifty-six persons participated in the training. Final selection of enumerators was made at the end of the training exercise.

2.8. THE SURVEY TEAM, FIELD DATA COLLECTION AND SUPERVISION

2.8.1. Survey Teams

The background of the staff composing the teams was nurses, laboratory technicians from the Refugee Health Institutions, and CISP food monitors. Twelve teams, of five persons each, were enrolled following training. Each team was composed of two questionnaires enumerators and two persons responsible for taking anthropometric measurements and measuring haemoglobin. One of the persons was selected as the team's supervisor.

2.8.2. Data collection

Data collection lasted from April 13th to April 30th, 2019 Each team completed one cluster/day (9 to 12 households), taking on average 25 to 30 minutes per household. Four working days were needed to complete the survey in each stratum.

2.8.3. Field Supervision and quality control checks

The survey manager (a UNHCR consultant) was in charge of coordination, training, overall management of field data collection, analyses and report writing. Other CISP, CRA, WFP and UNHCR staff supported the overall survey: training, logistics and field supervision. In addition, one coordinator from the Refugee Health Authorities and one from CISP were enrolled for teams' supervision, allowing direct field supervision and support provided to each team daily.

Questionnaires were designed as to not leave any question unanswered. Constraints were placed in the range of values entered in the android device as to minimise data entry errors. In addition, the questionnaires were designed to estimate WHZ and Length/Height-for-Age z-score (HAZ) values during data collection, and values outside of the WHO ranges for plausible values were flagged for repetition and revision. At the end of the day, the survey manager and field coordinators checked the questionnaires. If inconsistencies were found, the field teams were asked to return to the household for checking and verification (the same working day, or if there was no time left, in the following day). Data was downloaded from ONA servers, checks for inconsistencies were done, and corrections made in the database. Using ENA for SMART software (version October 24th, 2012) regular plausibility checks were produced by the survey manager to assess the quality of the data collected in the field, thus informing the team´s morning feedback for improvements as needed.

2.9. DATA ANALYSIS

All data files downloaded from ONA were cleaned before analysis. Analysis was performed using ENA for SMART and Stata (version 15). All data was checked for errors and inconsistencies, and any record with doubtful entries was marked and excluded. SMART Plausibility Reports were generated to check quality of the anthropometric data (see *Annex 8).*

2.10. ETHICS AND INFORMED CONSENT

The aims and objectives of the survey were discussed and agreed with the Sahrawi Refugee Authorities. During the survey, members of the household visited received detailed information about the nutrition survey aims and procedures. Households wishing to participate provided verbal consent and this was marked in each of the questionnaires administered[25], thus indicating the voluntary nature of the nutrition survey. In the case of children, verbal consent was sought from their caregivers. Individuals were able to consent or decline 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.

2.11. SURVEY SCHEDULE

The field work took place from early March to the second week of May 2019, 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. Survey schedule is shown in Table 4:

[25] In the event of a household refusing to participate, the household was given a number and marked as "no consent was given". These households were also computed in the database.

Table 4. Survey Timeline

Activity	Timeline
Field logistics preparation	1-31st March 2019
Teams training	March 31st – April 11th
Anthropometric standardization	April 7-8th
Pilot testing in field (Boujdour)	April 10-11th
Data collection Laayoune	April 13-16th
Data collection Awserd	April 17-21st
Data collection Dakhla	April 23-25th
Data collection Smara & Boujdour	April 27-30th
Final survey field related work	May 1-13th

III. SURVEY RESULTS

3.1) SURVEYED HOUSEHOLD CHARACTERISTICS

Table 5 summarises the number of households surveyed in each stratum. Of the total of households surveyed, over 97% consented to participate in the survey. Table 5 also summarises the total number of individuals surveyed, per target group.

Table 5. Surveyed households

	Households					Target groups	
Stratum	*Planned sample* [1]	*Surveyed sample*	*Agreed n (%)*	*Refused n (%)*	*Absent n (%)*	*Women 15-49y*	*Children <5 years*
Awserd	432	432	421 (97.5)	11 (2.5)	0 (0)	630	472
Dakhla	432	432	421 (97.5)	11 (2.5)	0 (0)	609	471
Laayoune	432	432	421 (97.5)	11 (2.5)	0 (0)	603	448
Smara [2]	432	432	417 (96.5)	15 (3.5)	0 (0)	621	553
Aggregated	1,728	1,728	1,680 (97.2)	48 (2.8)	0 (0)	2,463	1,944

[1] We planned to survey 9 households per cluster (48 clusters) in Awserd, Laayoune and Smara and 12 households per cluster (36 clusters) in Dakhla.
[2] Smara includes data collected from Boujdour.

Tables 6 and 7 summarise the age distribution and status of the target groups sampled in the participating households. On average, in the surveyed households with children, there were about 1.2 children aged 0-59 months per household. Of the 1,944 surveyed children, infants aged <6 months represented 8% of the total sample. The age and sex distribution of children aged 6-59 months is summarised in Table 8. The sex ratio (boy: girl) ranged between 1.0 and 1.2.

Table 6. Age groups of surveyed children aged 0-59 months.

	Total	<6 months	6-59 months	Children/household
Awserd	472	28	444	1.1
Dakhla	471	44	427	1.1
Laayoune	448	32	416	1.1
Smara	553	45	508	1.3
Aggregated	1,944	149	1,795	1.2

[2] Smara includes data collected from Boujdour.

Table 7. Reproductive status of surveyed women aged 15-49 years.

	Total	Non-pregnant non-lactating	Pregnant	Lactating	Unknown	Women/household
Awserd	602	483	69	49	1	1.4
Dakhla	585	474	48	60	3	1.4
Laayoune	569	452	62	54	1	1.4
Smara	586	460	57	65	4	1.4
Aggregated	2,342	1,869	236	228	9	1.4

[2] Smara includes data collected from Boujdour.

Of the 2,342 women participating in the survey approximately (see Table 7), 10% were lactating and another 10% were pregnant. Only nine of the surveyed women reported not knowing whether they were pregnant or not, or whether they were lactating. Those with unknown pregnancy or lactating status were excluded from further analysis. Three women reported to be lactating whilst pregnant and were classified as pregnant in this analysis.

Table 8. Age and sex distribution of children aged 6-59 months

Age	Boys		Girls		Total		Ratio
(months)	no.	%	no.	%	no.	%	Boy:Girl
6-17	242	53.4	219	46.6	461	25.6	1.1
18-29	207	52.8	195	47.2	402	22.5	1.1
30-41	198	53.8	156	46.2	354	19.9	1.3
42-53	195	53.8	166	46.2	361	20.1	1.2
54-59	108	48.6	109	51.4	217	11.9	1.0
Total	950	52.9	845	47.1	1,795	100	1.1

3.2) PHYSICAL STATUS IN CHILDREN AGED 6-59 MONTHS

The physical evaluation of the nutritional status in children aged 6-59 months, summarised in this section is based on the 2006 WHO Child Growth Standards. Aggregated results are the weighted prevalence from all four strata. For more details, please see the tables in the *Annex*.

3.2.1) Global acute malnutrition in children aged 6-59 months

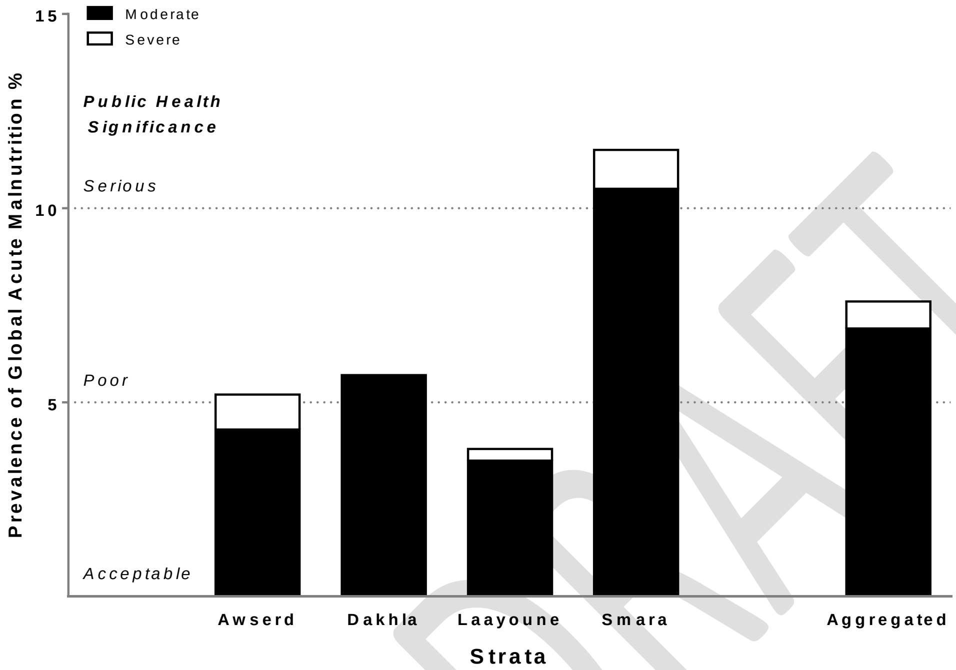

Figure 1. Global acute malnutrition (GAM) prevalence in children aged 6-59 months.
GAM prevalence estimates used the 2006 WHO Child Growth Standards. Aggregated results are the weighted prevalence (see Table A1). Smara estimates includes data collected from Boujdour

The overall prevalence of global acute malnutrition (GAM) is slightly less than 8% ranging from 4% in Laayoune to almost 12% in Smara (see **Figure 1**). Only the GAM prevalence in Smara was significantly greater than all other strata estimates and was considered of serious public health significance. Moderate acute malnutrition (MAM) accounted for 91% of the total GAM prevalence, ranging from 83% in Awserd to a 100% in Dakhla.

Overall, GAM prevalence was significantly greater for boys than for girls (see **Figure 2**), and most of this sex-difference was accounted by the difference observed in Smara. No significant differences were observed in Awserd, Dakhla or Laayoune. In boys and girls, MAM was the predominant form of acute malnutrition.

Estimates of acute malnutrition were also assessed using low MUAC values (<12.5 cm). Overall, the weighted prevalence of low MUAC was 7% ranging from 4% in Laayoune to 10% in Smara. No significant differences were found between strata in the prevalence of low MUAC. For further details on low MUAC data, see Annex **Table A3**.

It is worth noting that in this operation there was little overlap between the two indicators used to assess acute malnutrition. We observed that from a total of 1,706 children with WHZ and MUAC data available, 206 children (13.1%, 95% CI: 11.3; 15.2) presented with either a WHZ value of <-2 or a MUAC value of <12.5 cm. Of these 206 children, only 24 of them (11.7%) would present an overlap between these two indicators. From a case-definition perspective, 20.9% of children with low WHZ would also present low MUAC values and similarly, 20.9% of children with low MUAC values would present low WHZ values (see **Figure 3**).

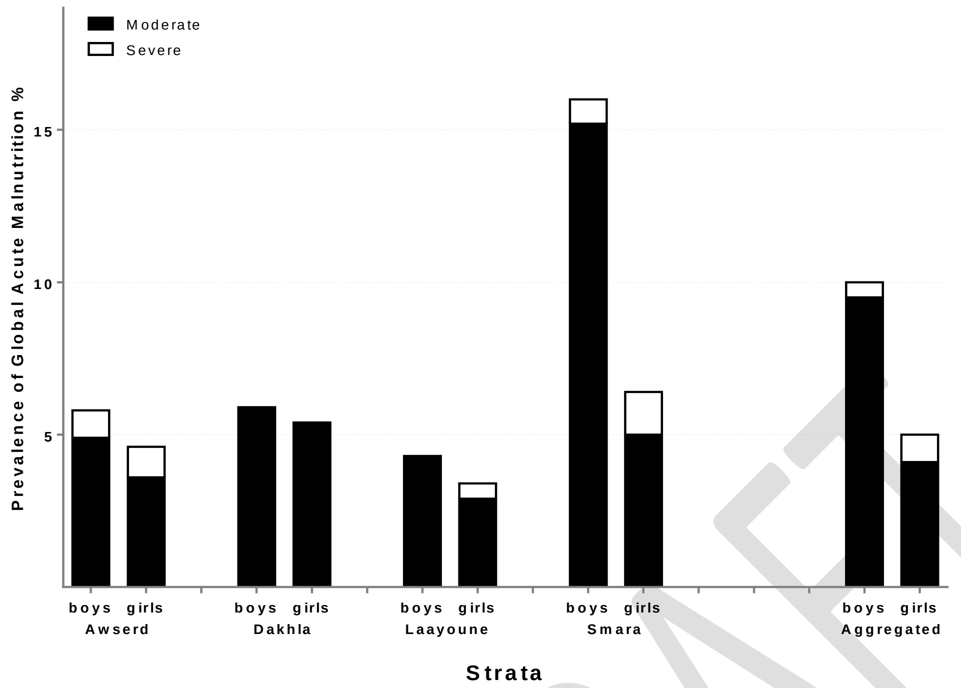

Figure 2. Global acute malnutrition (GAM) prevalence in children aged 6-59 months, by sex.
GAM prevalence estimates used the 2006 WHO Child Growth Standards. Aggregated results are the weighted prevalence (see Table A1). Smara estimates includes data collected from Boujdour

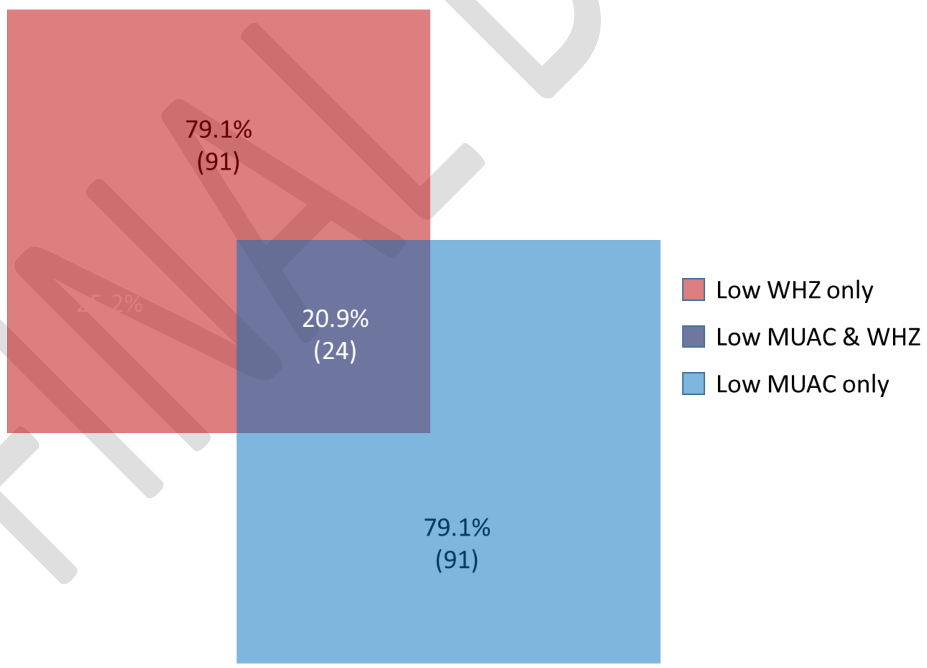

Figure 3. Overlap between low weight-for-length/height Z score (WHZ, <-2) and low MUAC (<12.5 cm) values.
Each of the two large squares represents a 100% of each malnutrition criteria.

3.2.2) Underweight in children aged 6-59 months

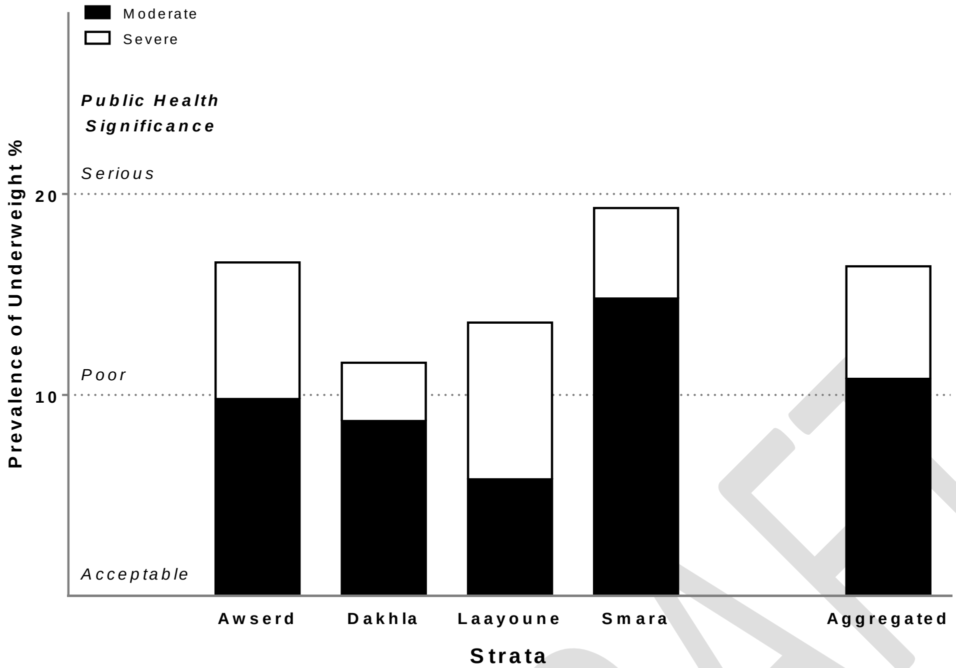

Figure 4. Underweight and overweight prevalence in children aged 6-59 months.
Underweight prevalence estimates used the 2006 WHO Child Growth Standards. Aggregated results are the weighted prevalence (see Table A5). Smara estimates includes data collected from Boujdour

The overall prevalence of underweight is 16% ranging from 12% to 19% at the strata level (see **Figure 4**). The prevalence of underweight in Dakhla was significantly lower than the prevalence observed in Smara. Of notice, severe underweight was greater than moderate underweight in Laayoune only.
Overall, the prevalence of underweight was significantly greater in boys than in girls (see **Figure 5**); and this was observed at the strata level in Smara only. None of the other differences observed between sexes were statistically significant.

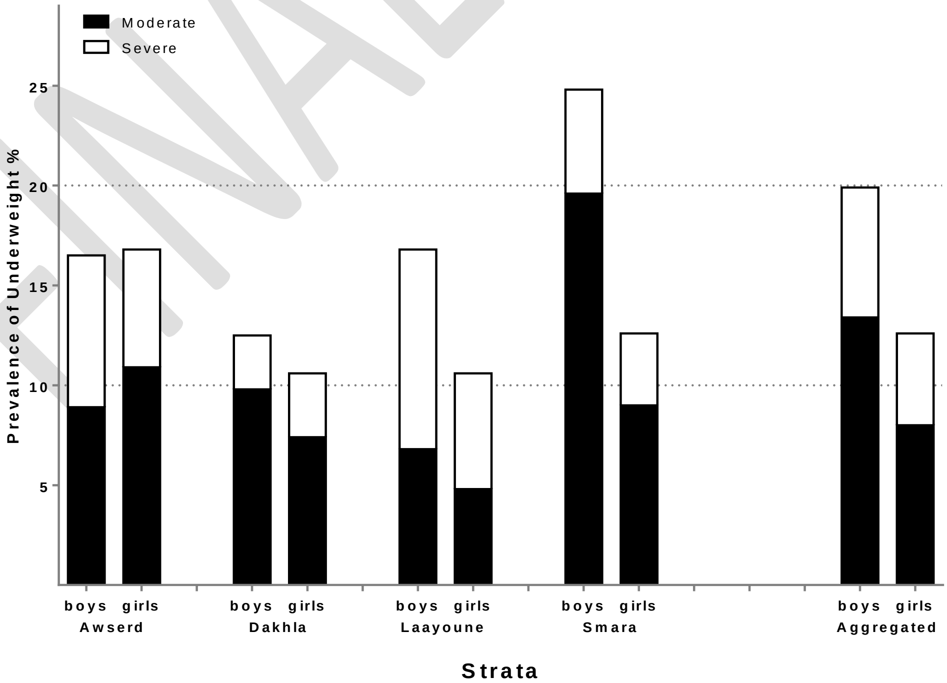

Figure 5. Underweight prevalence in children aged 6-59 months by sex.
Underweight prevalence estimates used the 2006 WHO Child Growth Standards. Aggregated results are the weighted prevalence (see Table A5). Smara estimates includes data collected from Boujdour

The overall prevalence of overweight in children aged 6-59 months was low between 1% and 4% (see **Figure 6**), with no statistical differences observed between strata.

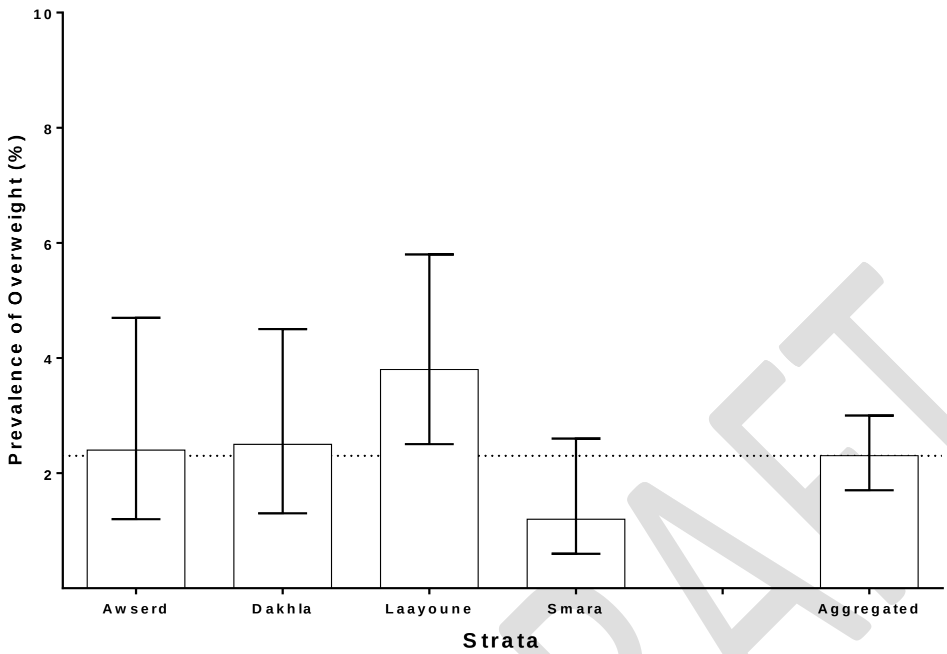

Figure 6. Overweight prevalence in children aged 6-59 months.
Overweight prevalence estimates used the 2006 WHO Child Growth Standards. Aggregated results are the weighted prevalence (see Table A7). Smara estimates includes data collected from Boujdour

3.2.3) Stunting in children aged 6-59 months

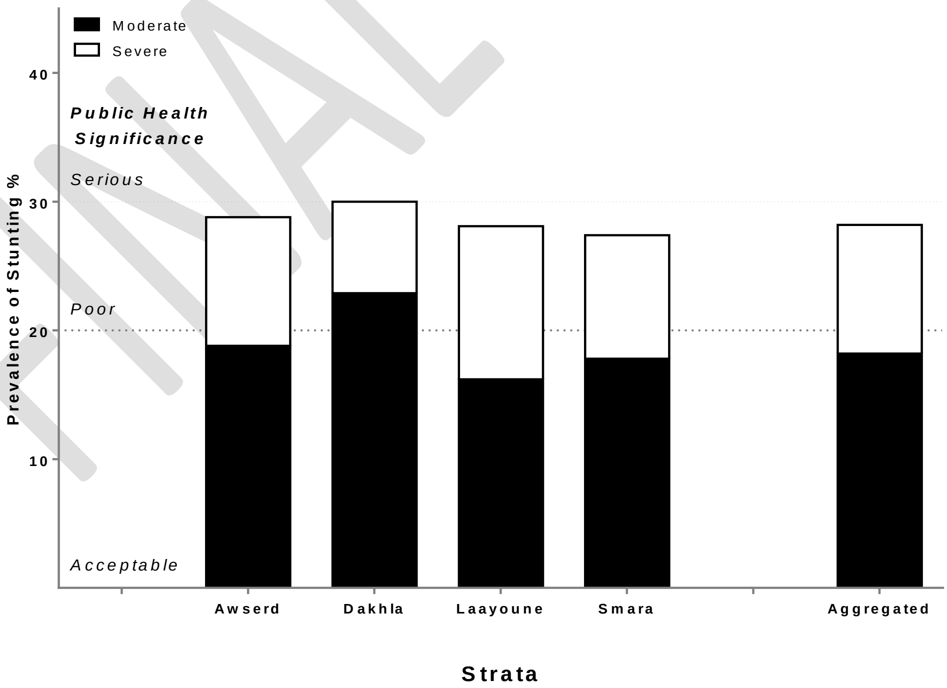

Figure 7. Stunting prevalence in children aged 6-59 months.
Stunting prevalence estimates used the 2006 WHO Child Growth Standards. Aggregated results are the weighted prevalence (see Table A8). Smara estimates includes data collected from Boujdour

Overall, the stunting prevalence is 28%, ranging from 27% in Smara to 30% in Dakhla. There were no significant differences between strata (see **Figure 7**). Overall, the prevalence of stunting was significantly greater in boys than in girls (see **Figure 8**).

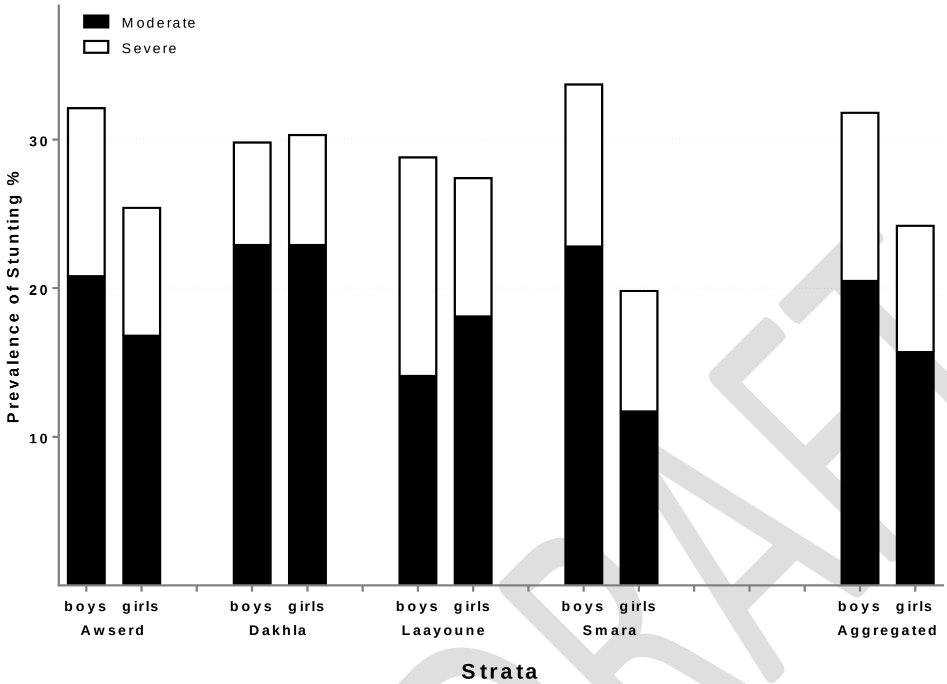

Figure 8. Stunting prevalence in children aged 6-59 months, by sex.
Stunting prevalence estimates used the 2006 WHO Child Growth Standards. Aggregated results are the weighted prevalence (see Table A8). Smara estimates includes data collected from Boujdour

3.3.4) Malnutrition age distribution in children aged 6-59 months

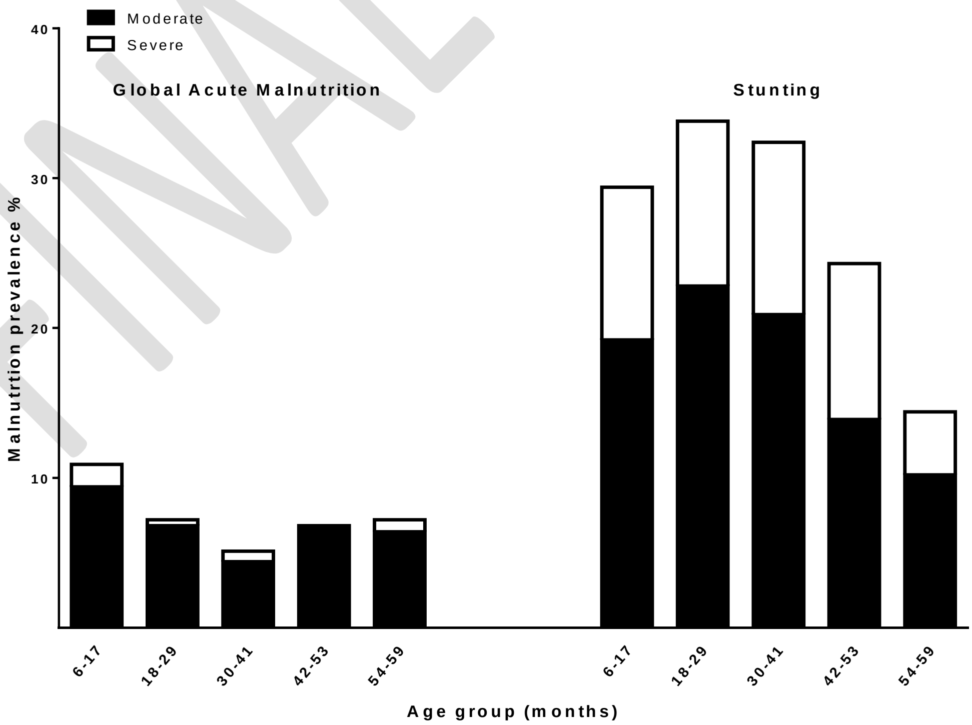

Figure 9. Malnutrition trends in children aged 6-59 months.
Prevalence estimates used the 2006 WHO Child Growth Standards. See Tables A2, A4, A6 and A9).

Age-related trends for GAM and stunting are shown in **Figure 9**. GAM prevalence is relatively high between the ages of 6-17 months. Afterwards, this prevalence decreases until the ages of 30-41 months but then increases again until the ages of 54-59 months. Conversely, stunting prevalence is already relatively high between the ages of 6-17 months (affecting about 30 in 100 children); but this prevalence increases to its highest prevalence between the ages of 18-29 months (affecting then about 33 in 100 children). An observable decrease in the stunting prevalence follows this age.

3.3) INFANT AND YOUNG CHILD FEEDING (IYCF) PRACTICES

Table 9 summarises the weighted results of IYCF indicators, which are useful indicators for measuring feeding practices at a population level.

The prevalence of breastfeeding in this population was equally high in all strata as indicated by the high prevalence of children aged <24 months reported to have been ever breastfed (see **Figure 10**). Early initiation of breastfeeding within the first hour after birth was reported by over half of the children aged <24 months (see **Figure 11** and **Table A13**), suggesting the need for further efforts to improve IYCF practices. None of the observed differences between strata, for early initiation of breastfeeding, were statistically significant.

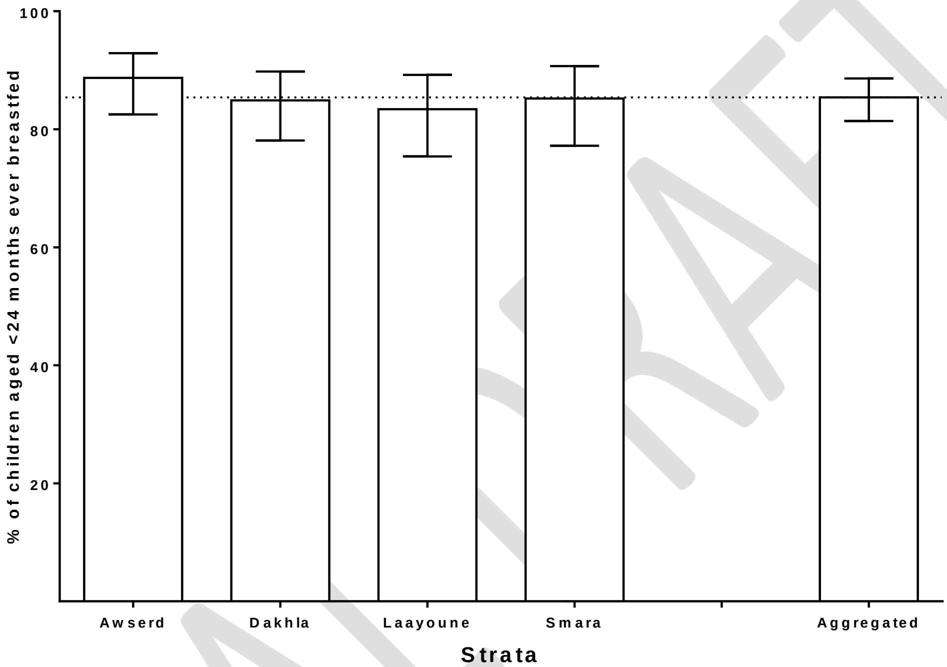

Figure 10. Proportion of infants aged <24 months ever breastfed by strata.
For detailed values, see Table A12. Smara estimates includes data collected from Boujdour

The proportion of infants aged <6 months who are exclusively breastfed was 50% (Table 9) and those predominantly breastfed were 62%. Exclusive breastfeeding was over 55% in the first four months of life and the proportion decreases rapidly with age to 31% by the age of 4-5 months (**Figure 12**).

Table 9. 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	803	803	(687) 85.4	(81.4; 88.6)
Early initiation of breastfeeding	< 24 months	803	803	(475) 58.4	(52.2; 64.3)
Exclusive breastfeeding under 6 months	< 6 months	149	149	(74) 50.4	(38.1; 62.7)
Predominant breastfeeding under 6 months	< 6 months	149	149	(94) 63.7	(52.5; 73.6)
Continued breastfeeding at 1 year	12-15 months	174	174	(129) 74.2	(65.7; 81.2)
Continued breastfeeding at 2 years	20-23 months	120	120	(37) 28.3	(20.3; 37.9)
Age-appropriate breastfeeding	< 24 months	803	803	(409) 50.2	(45.1; 55.3)
Median duration of breastfeeding	0-36 months	1,196	1,194	18.5 months	
Milk feeding frequency for non-breastfed children	6-23 months	226	226	(226) 100	N/A
Bottle feeding	< 24 months	803	802	(158) 21.4	(16.9; 26.6)
Introduction of solid, semi-solid or soft foods	6-8 months	115	115	(75) 64.8	(52.6; 75.4)
Minimum dietary diversity	6-23 months	654	654	(351) 54.3	(49.4; 59.1)
Minimum meal frequency	6-23 months	654	654	(395) 61.4	(55.6; 66.8)
Minimum acceptable diet	6-23 months	654	654	(210) 31.9	(26.6; 37.7)
Consumption of iron-rich or iron-fortified foods	6-23 months	654	654	(385) 59.5	(54.2; 64.6)

* 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.

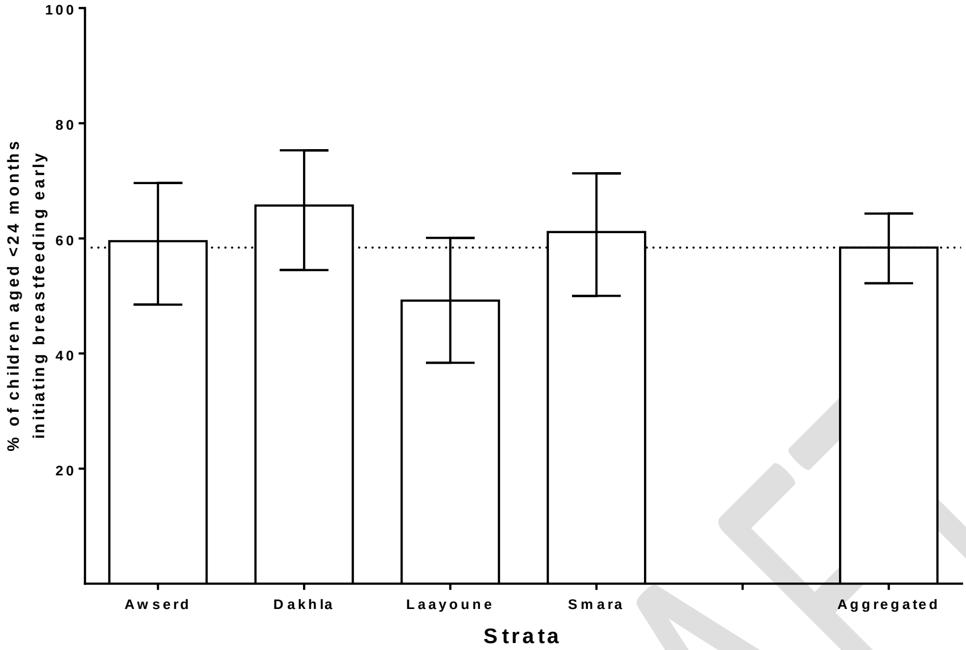

Figure 11. Proportion of infants aged <24 months that were put to the breast within the first hour after birth by strata

For detailed values, see Table A12. Smara estimates includes data collected from Boujdour

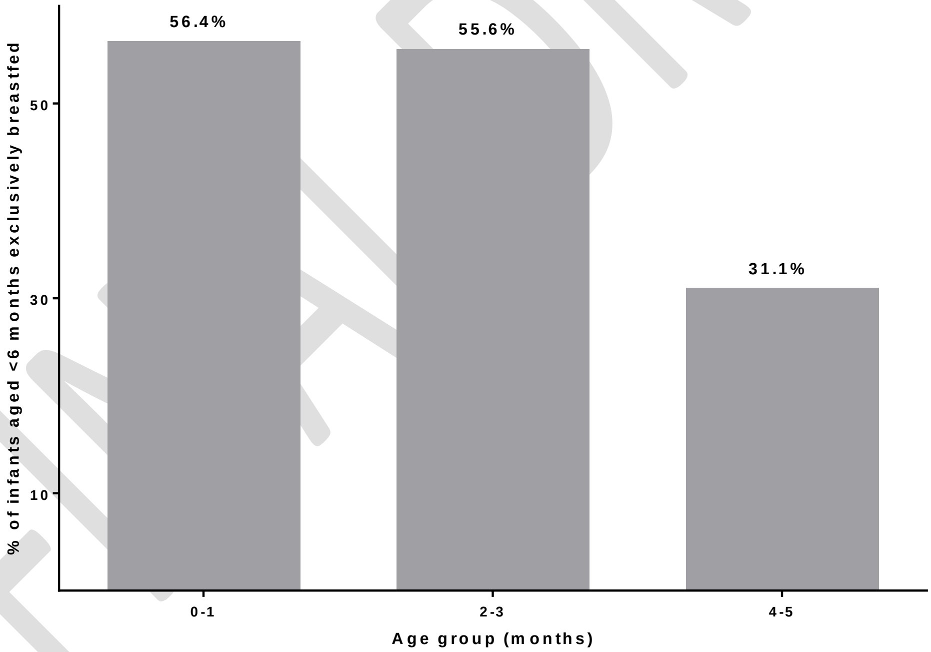

Figure 12. Proportion of infants aged <6 months exclusively breastfed by age.

Continuation of breastfeeding at ages 12 and 24 months was 74% and 28%, respectively, indicating that 26% to 72% of children aged 12-24 months would have stopped receiving breastfeeding before the current WHO recommendation of at least two years. **Figure 13** illustrates the overall reported duration of breastfeeding. The median duration of breastfeeding was 18.5 months, after which, only half of the children would continue to breastfeed. As evidenced in Figure 13 a small proportion of women continue to breastfeed beyond 24 months. For all children aged <24 months, only half are appropriately breastfed (see **Figure 14**). No difference was observed between strata regarding the proportion of children aged <24 months that were adequately breastfed.

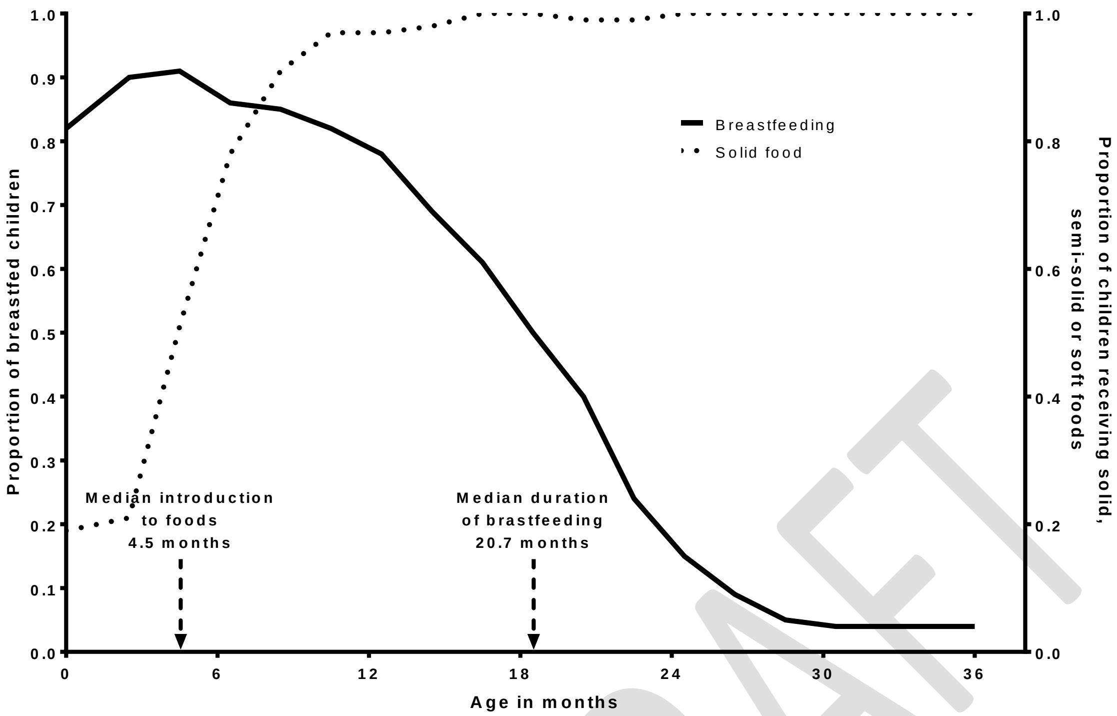

Figure 13. Age trends of breastfeeding duration and introduction to solid, semi-solid and soft foods in children aged <36 months.

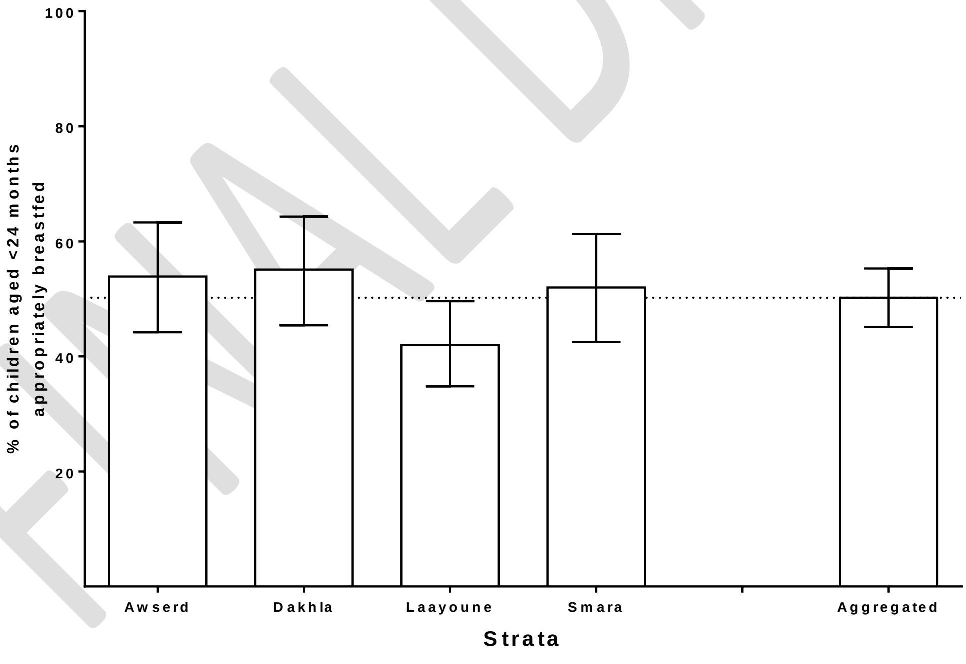

Figure 14. Proportion of infants aged <24 months appropriately breastfed by strata.
For detailed values, see Table A12. Smara estimates includes data collected from Boujdour

All the surveyed children aged 6-23 months of age who are not breastfed received at least two milk feedings the previous day. The prevalence of bottle-feeding in children aged <24 months was 21% (see **Figure 15**). All strata had comparable proportion of children aged 6-23 months that were bottle-fed. **Figure 16** presents the prevalence of bottle-feeding by age group, where 18% of children aged <6 months reported having been bottle feed.

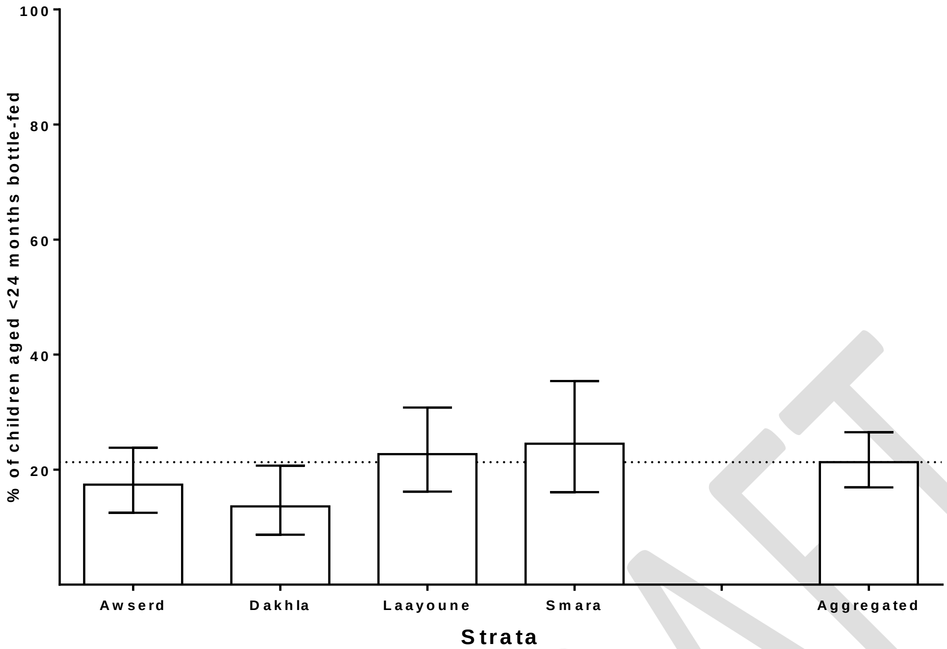

Figure 15. Proportion of infants aged <24 months bottle-fed by strata.
For detailed values, see Table A12. Smara estimates includes data collected from Boujdour

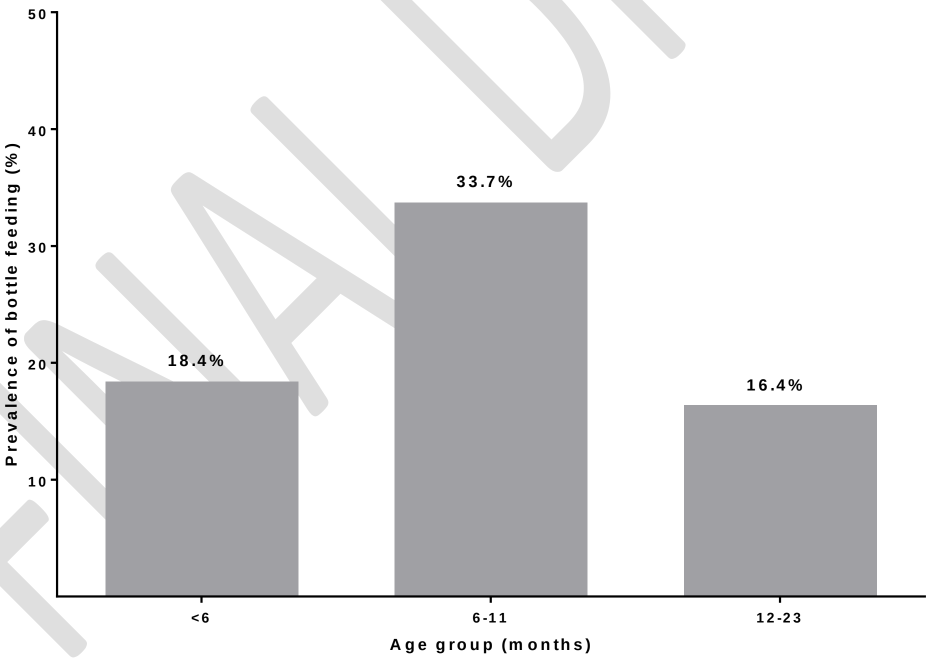

Figure 16. Prevalence of bottle-feeding among children aged <24 months by age group.

The proportion of children that reported an adequate introduction of solid, semi-solid and soft foods between the ages of 6-8 months was 64%. This simple and useful indicator for evaluating the adequate introduction of complementary foods suggests that about a third of the children aged 6-8 months have not received solid or semi-solid foods, as recommended by WHO. Figure 13 shows the age-pattern introduction to solid, semi-solid or soft food in the sample of children surveyed. In this figure, we can observe that about 20% of infants would be receiving food almost immediately after birth.

Concerning the overall feeding pattern of children aged 6-23 months, 54% of the sampled children received foods from four or more food groups and hence reached a minimum dietary diversity in their diets (see **Figure 17**). No differences were observed in this indicator between strata.

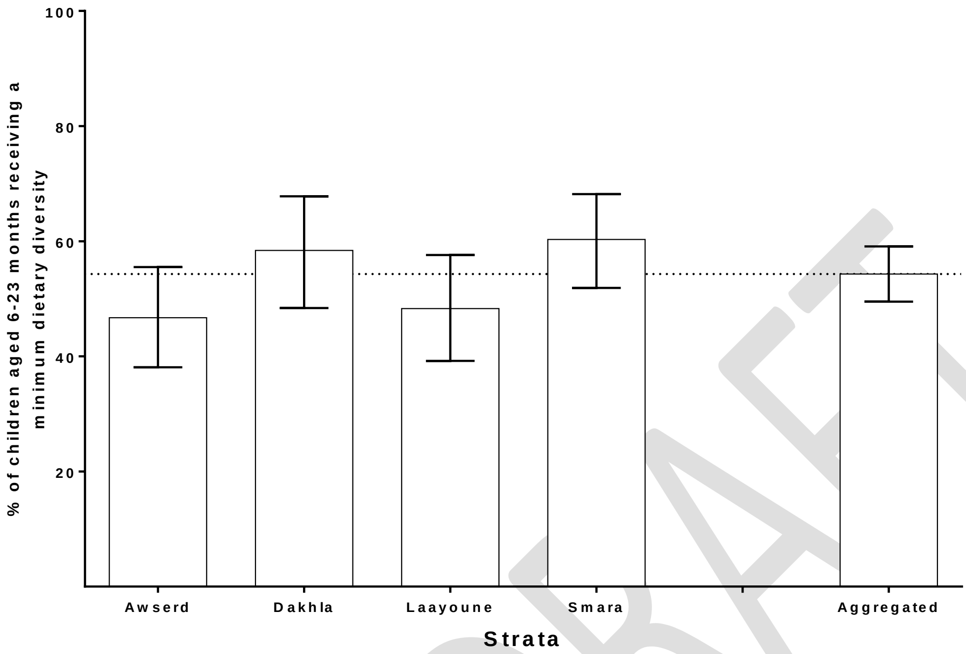

Figure 17. Minimum dietary diversity in children aged 6-23 months by strata.
For detailed values, see Table A12. Smara estimates includes data collected from Boujdour

Age affected whether children achieved dietary diversity. The proportion of children receiving a minimum of dietary diversity in their diets increased with age as observed in **Figure 18**.

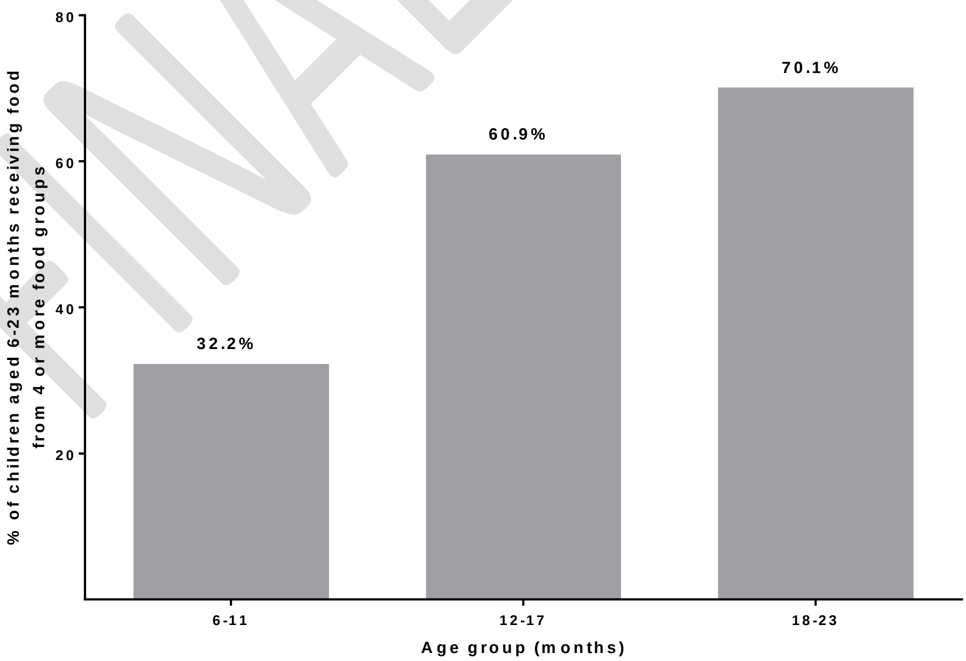

Figure 18. Minimum dietary diversity in children aged 6-23 months by age group.

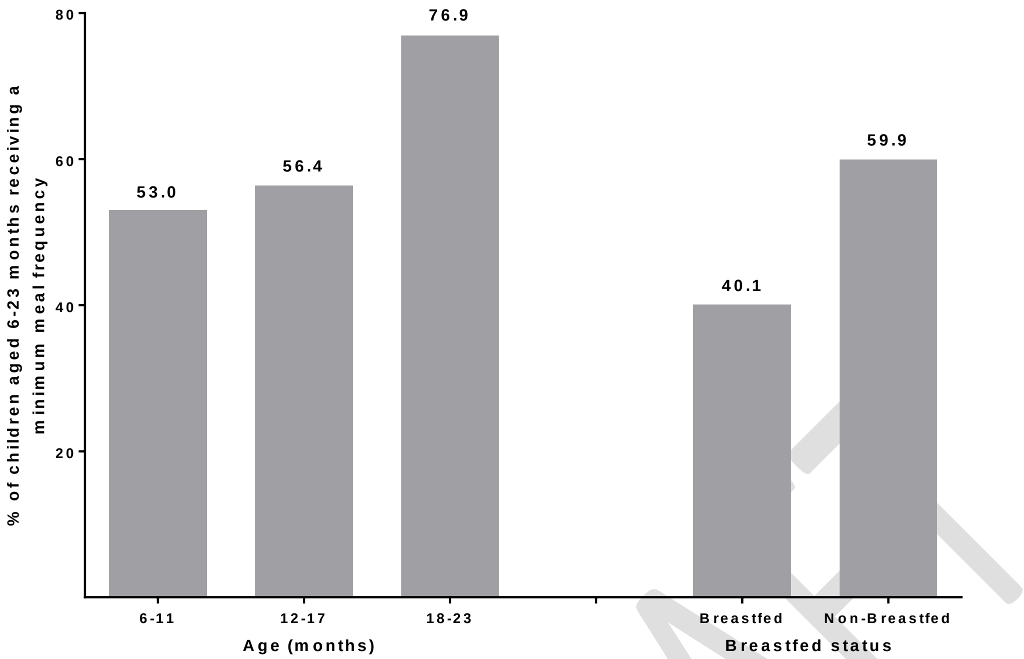

Figure 19. Minimum meal frequency in children aged 6-23 months by age and breastfed status.

The proportion of breastfed and non-breastfed children aged 6-23 months who received an adequate number of feeds according to recommendations was 61% (see Table 9). Like dietary diversity, the proportion of children receiving a minimum meal frequency increased with age (see **Figure 19**), with estimates remaining similar at ages 6-11 and 12-17 months but increasing at 18-23 months. The proportion of children aged 6-23 months with the minimum meal frequency is greater in non-breastfed children than in breastfed children (see also Figure 19). There were no statistical differences between the strata regarding the number of feeds received by children (see **Figure 20**).

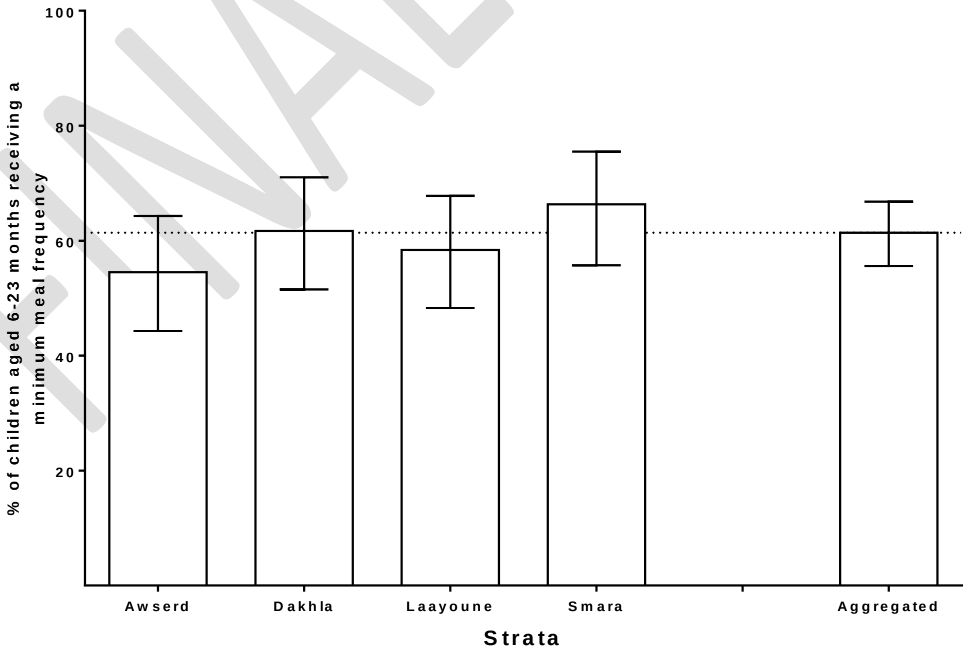

Figure 20. Minimum meal frequency in children aged 6-23 months by strata.
For detailed values, see Table A12. Smara estimates includes data collected from Boujdour.

A summary IYCF indicator is the minimum acceptable diet, which is a composite of the indicators (Minimum dietary diversity and Minimum meal frequency) described above for children aged 6-23 months. Overall, only 32% of all children aged 6-23 months are given 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 (see **Figure 21**). There were no differences between strata in the proportion of children receiving a minimum acceptable diet (see **Figure 22**).

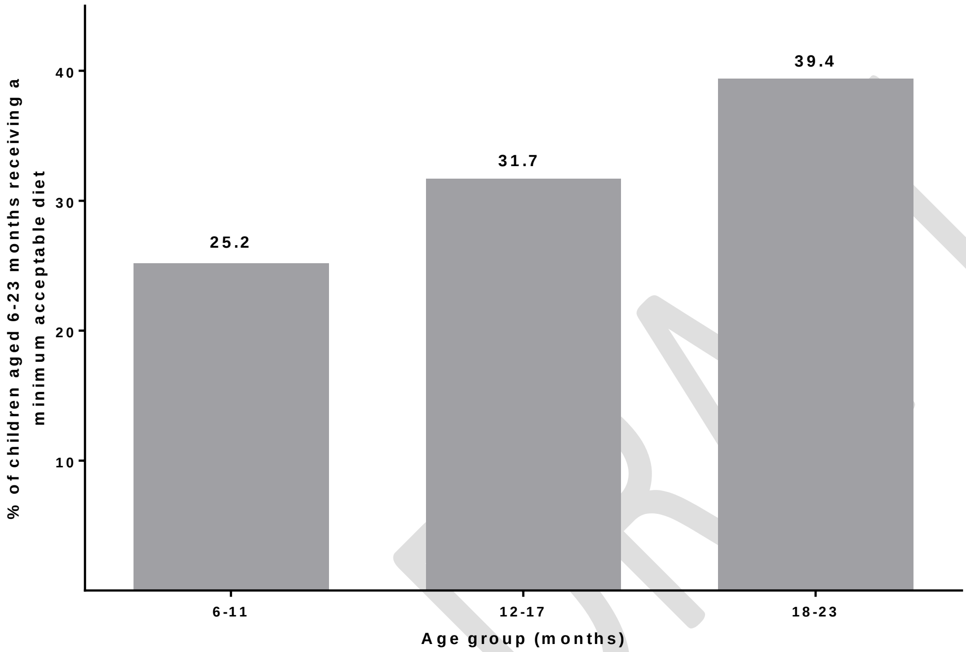

Figure 21. Minimum acceptable diet in children aged 6-23 months by age.

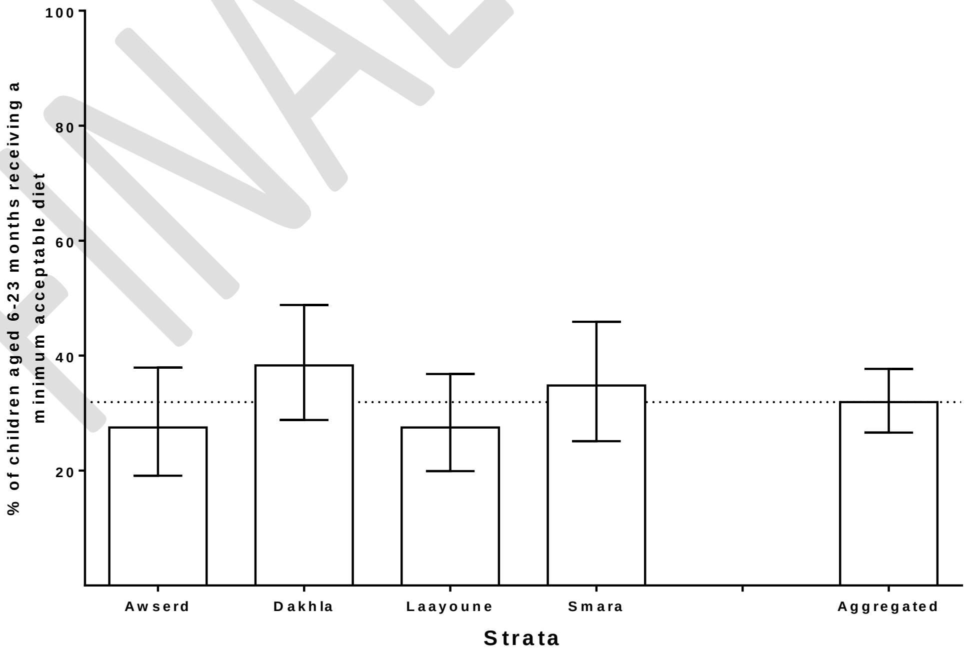

Figure 22. Minimum acceptable diet in children aged 6-23 months by strata.
For detailed values, see Table A12. Smara estimates includes data collected from Boujdour.

The proportion of children aged 6-23 months consuming iron-rich or iron-fortified foods was about 60%. Consumption of iron-rich or iron-fortified foods increased with age as shown in **Figure 23**. Consumption of iron-rich or iron-fortified foods does not seems to differ by strata (see **Figure 24**).

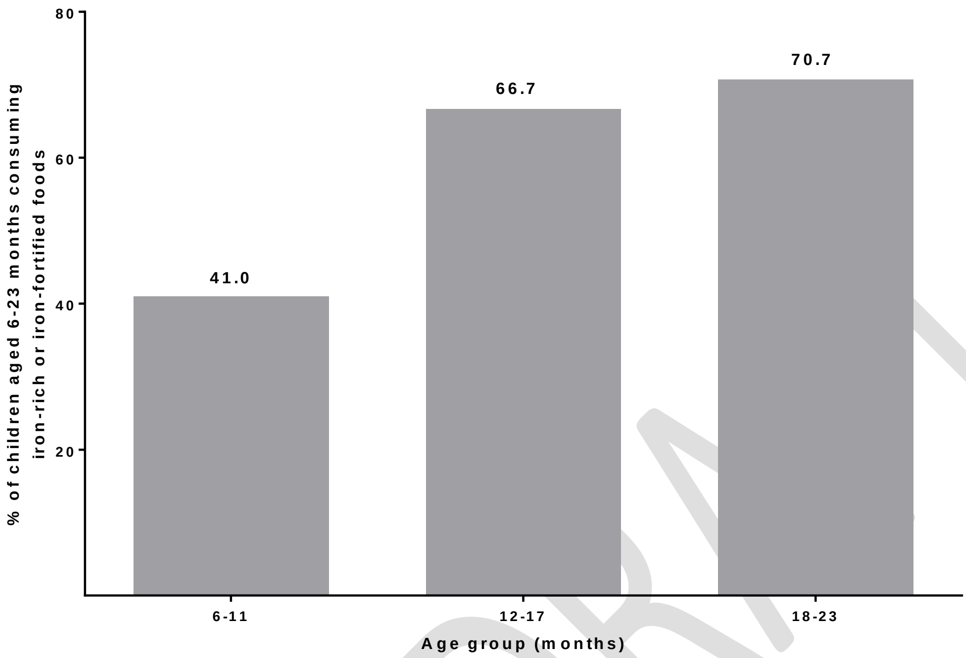

Figure 23. Consumption of iron-rich or iron-fortified foods in children aged 6-23 months by age.

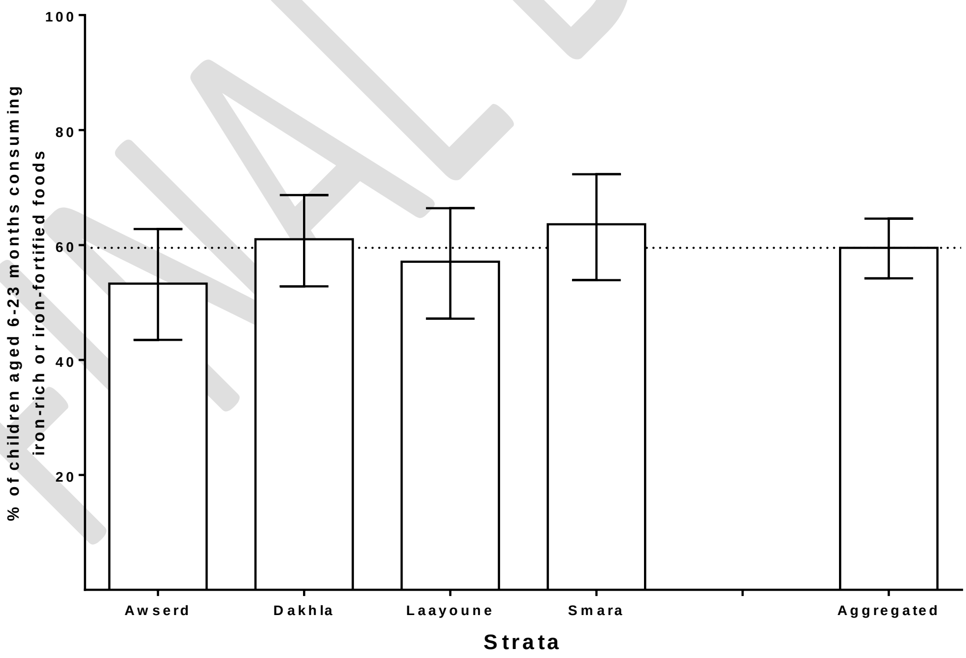

Figure 24. Consumption of iron-rich or iron-fortified foods in children aged 6-23 months by strata.
For detailed values, see Table A12. Smara estimates includes data collected from Boujdour

3.4) NINE-YEAR PREVALENCE TRENDS OF IYCF INDICATORS

Overall, infant and young child feeding practices have improved in the past nine years between 2010 and 2019 (see **Figures 24-29**). Of note: 1) Given that for some indicators the sample size available is small, some period-trends were not disaggregated by strata (see Figure 25). All other IYCF indicators with enough sample available are presented in separate figures (Figures 25-29). (2) To better judge period-trends, it is important to compare the 95% CI, as shown in the figures, where a significant change (positive or negative) will show little or no overlap with the preceding interval. (3) In the graphs with enough sample to disaggregate by strata, Boujdour data was included as part of the Smara strata.

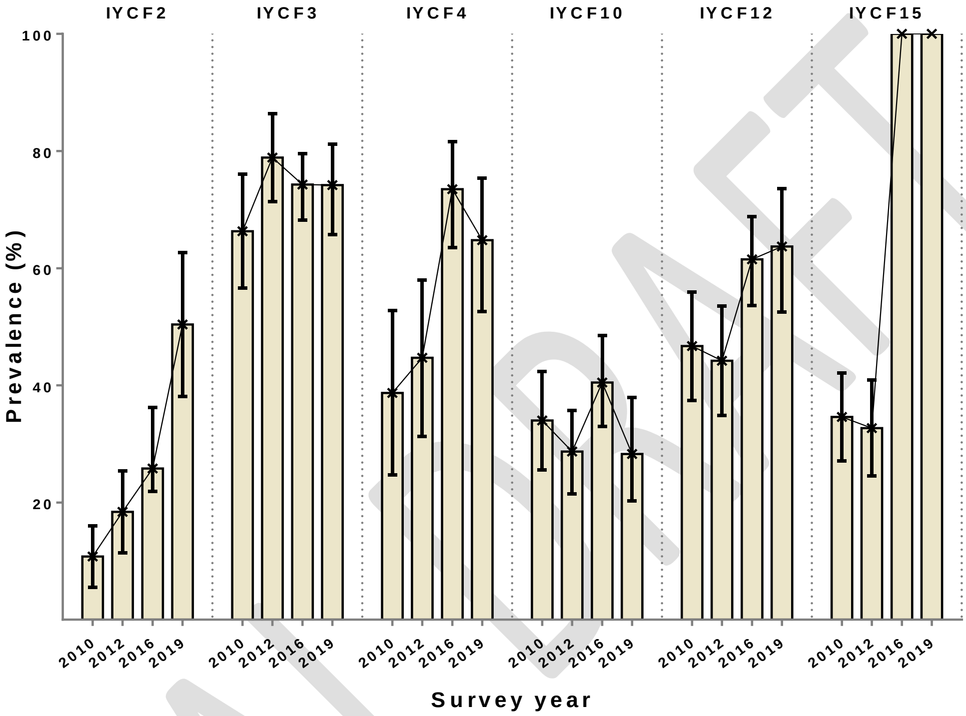

Figure 25. Nine-year prevalence trends of six Infant and Young Children Feeding (IYCF) indicators.
IYCF2: Exclusive breastfeeding under 6 months of age.
IYCF3: Continued breastfeeding at 1 year of age.
IYCF4: Timely introduction of solid, semi-solid or soft foods.
IYCF10: Continued breastfeeding at 2 years of age.
IYCF12: Predominant breastfeeding under 6 months of age.
IYCF15: Milk feeding frequency for non-breastfed children.

Early breastfeeding behaviours improved significantly in the past nine years. Exclusive breastfeeding in infants aged <6 months, a behaviour strongly associated with reduced diarrhoea risk and improved growth, increased from 10% to 50%. Similarly, more infants aged <6 months are predominantly breastfed and appropriately breastfed now than they were in 2010. A large proportion of this positive trend occurred between the years 2012-2016, but some continued up until 2019. Despite this improvement in early breastfeeding behaviours, prolonged breastfeeding has remained similar in this period with a similar proportion of children that do not continue to be breastfed at 12 and 24 months against the WHO recommendation of continuing breastfeeding up-until 24 months of age. The median duration of breastfeeding was 18.5 months in 2010 and 2012 and remains 18.5 months in 2019.

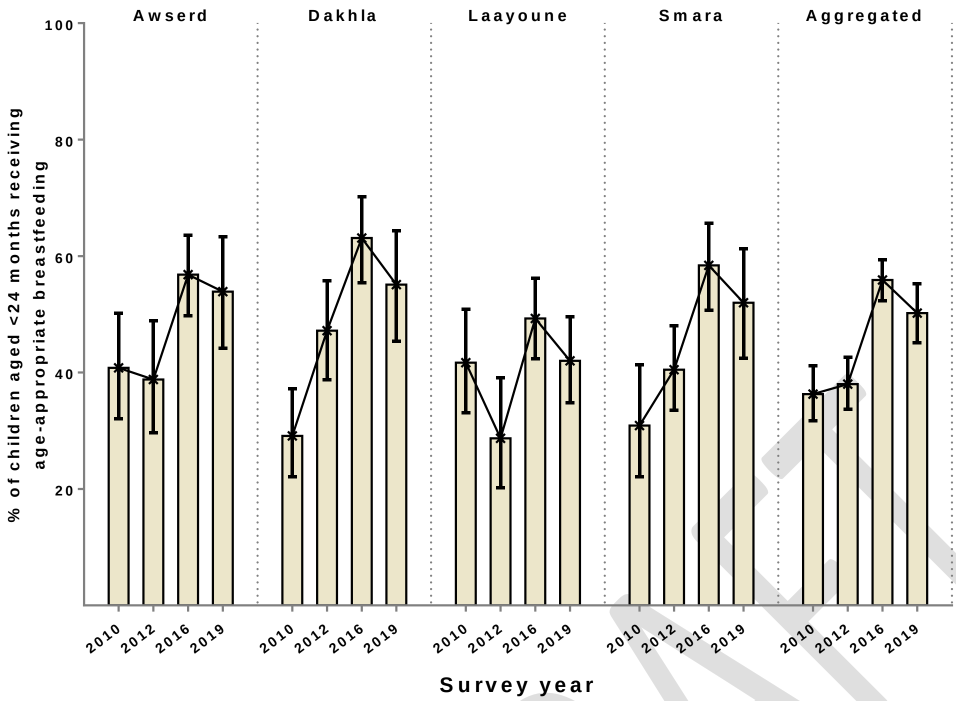

Figure 26. Nine-year prevalence trends of children aged <24 months receiving age-appropriate breastfeeding by strata.

Similarly, IYCF indicators regarding child feeding behaviours outside of breastfeeding seem to have improved in the past nine years (see Figures 24 and 26-29). We observed:

1) Improvements in dietary diversity (Figure 27) where the proportion of children reaching a minimum of 4 food groups increased from a 6-year constant of 30% to 54% in 2019;
2) Greater meal frequency (Figure 28), where the proportion of children consuming a minimum of meals has consistently improved since 2010 from 16% to 61% in 2019;
3) More acceptable diets (Figure 29), using the composite indicator that combines diet diversity and meal frequency, where the proportion of children reaching a minimum acceptable diet have consistently improved since 2012 from 6% to 32% in 2019.
4) The improvement observed in 2010-2016 in the proportion of children receiving a timely introduction of foods (solid, semi-solid and soft foods) remained similarly high in 2019 albeit slightly lower, but not significantly different (Figure 25).
5) Lastly, there was an overall improvement in the reported consumption of iron-rich or iron-fortified foods in the camps (Figure 30) when comparing the proportion of children receiving iron-rich foods in 2016 (29%) and 2019 (60%) reversing the negative trend observed between 2010 and 2016.

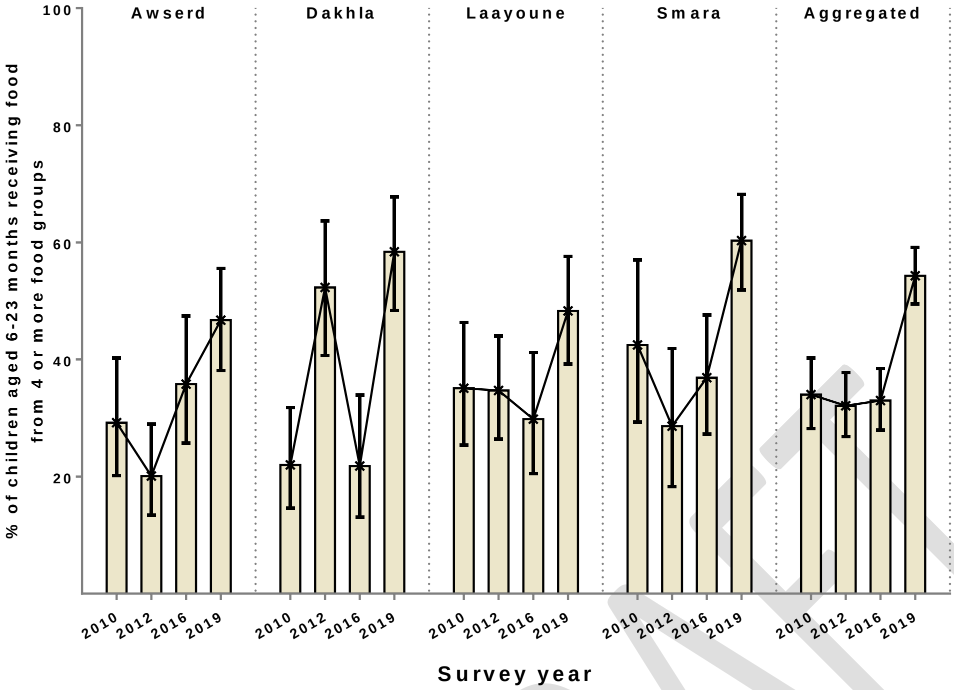

Figure 27. Nine-year prevalence trends of children aged 6-23 months receiving a minimum dietary diversity.

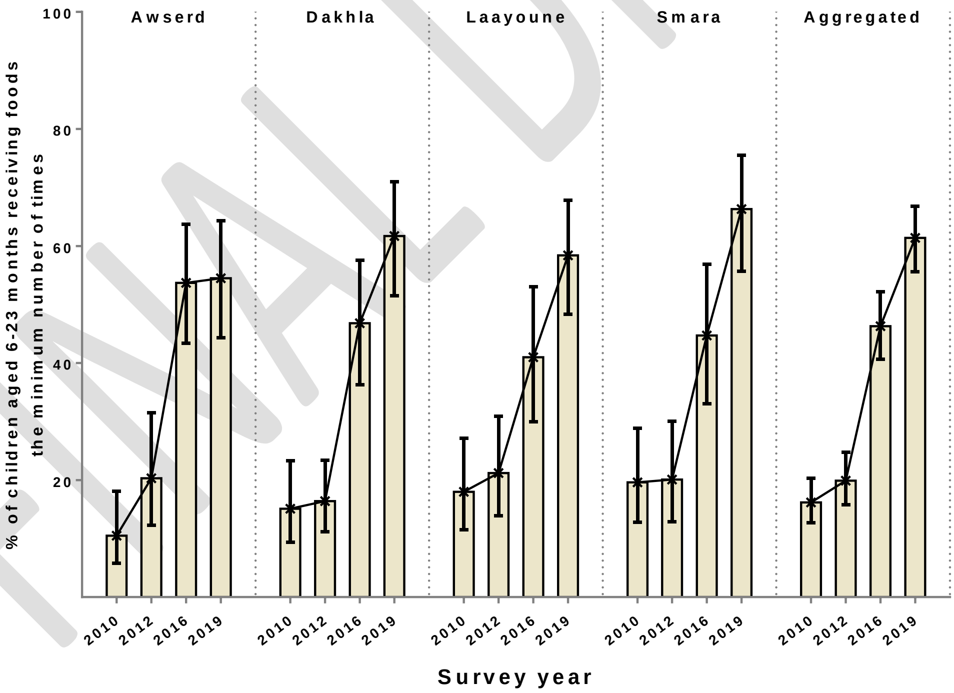

Figure 28. Nine-year prevalence trends of children aged 6-23 months receiving a minimum meal frequency.

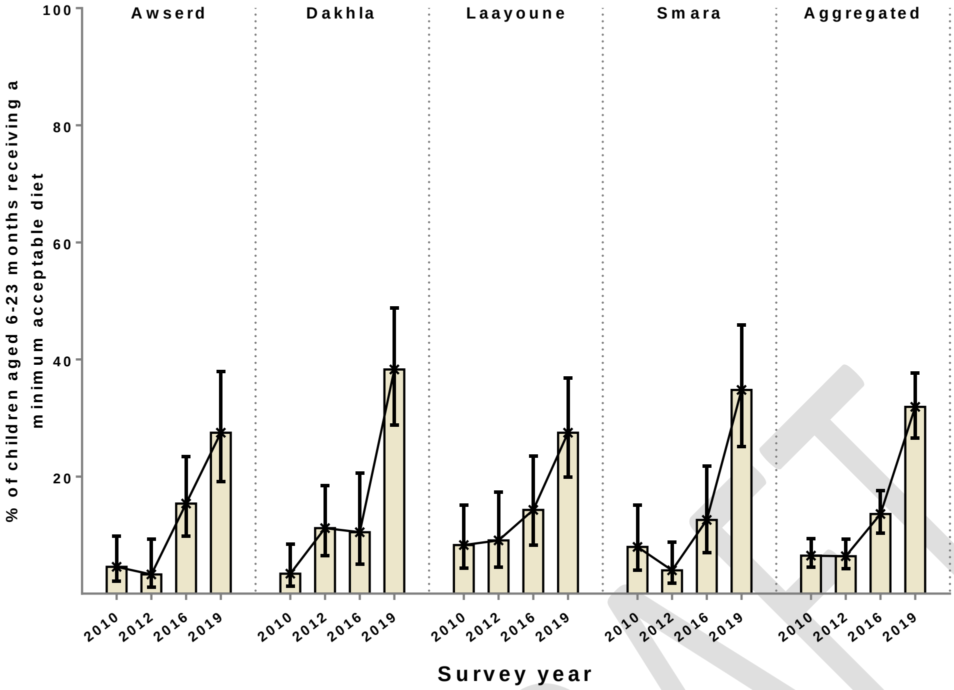

Figure 29. Nine-year prevalence trends of children aged 6-23 months receiving a minimum acceptable diet.

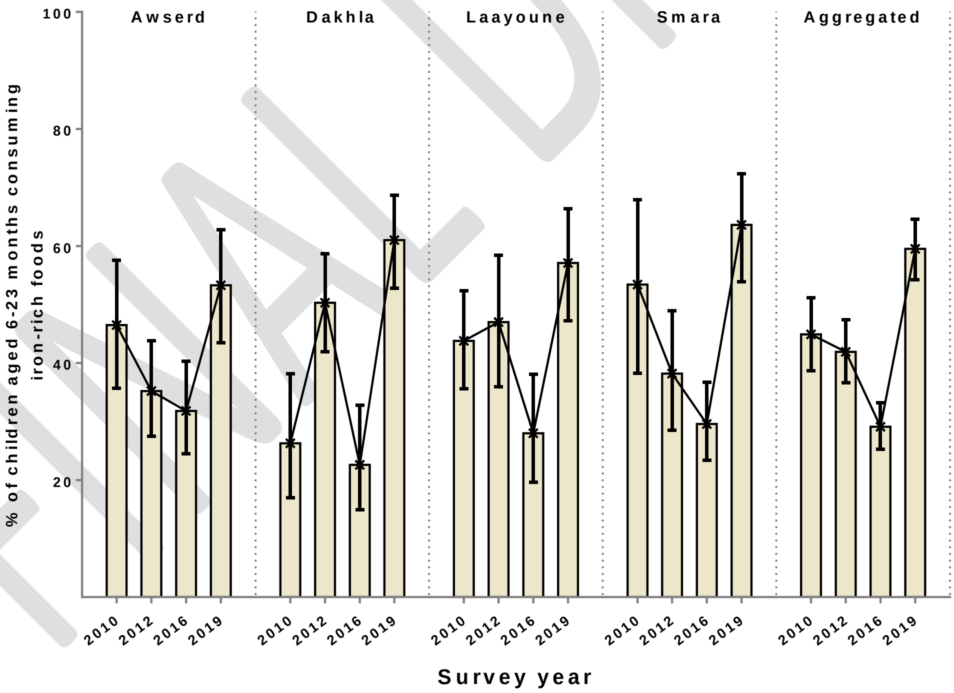

Figure 30. Nine-year prevalence trends of children aged 6-23 months consuming iron-rich foods.

3.5) ANAEMIA IN CHILDREN AGED 6-59 MONTHS

Haemoglobin concentrations were assessed in 1,740 children aged 6-59 months. Fifty percent of these children suffered from anaemia (see **Figure 31** and Annex **Table A14**). The most common anaemia types were mild and moderate, both at 24%, and severe anaemia was about 2%. There were no significant differences in the anaemia prevalence between strata or between sexes (see also **Figure 32** and **Table A14**). However, boys had significantly greater prevalence of moderate anaemia than girls did.

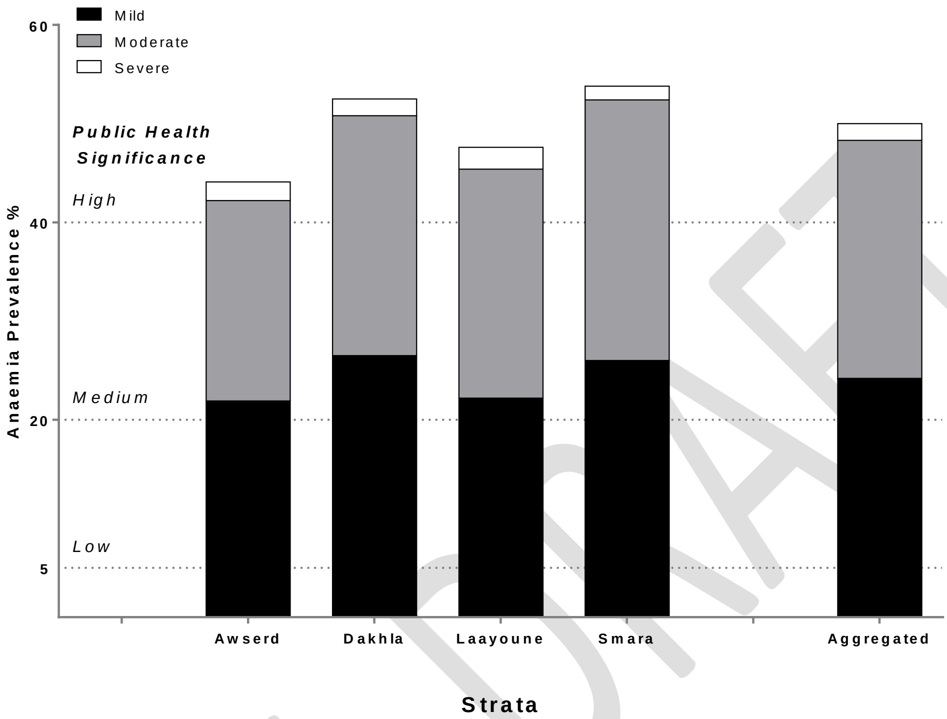

Figure 31. Anaemia prevalence in children aged 6-59 months.
Aggregated results are the weighted prevalence (see Table A14). Smara estimates includes data collected from Boujdour

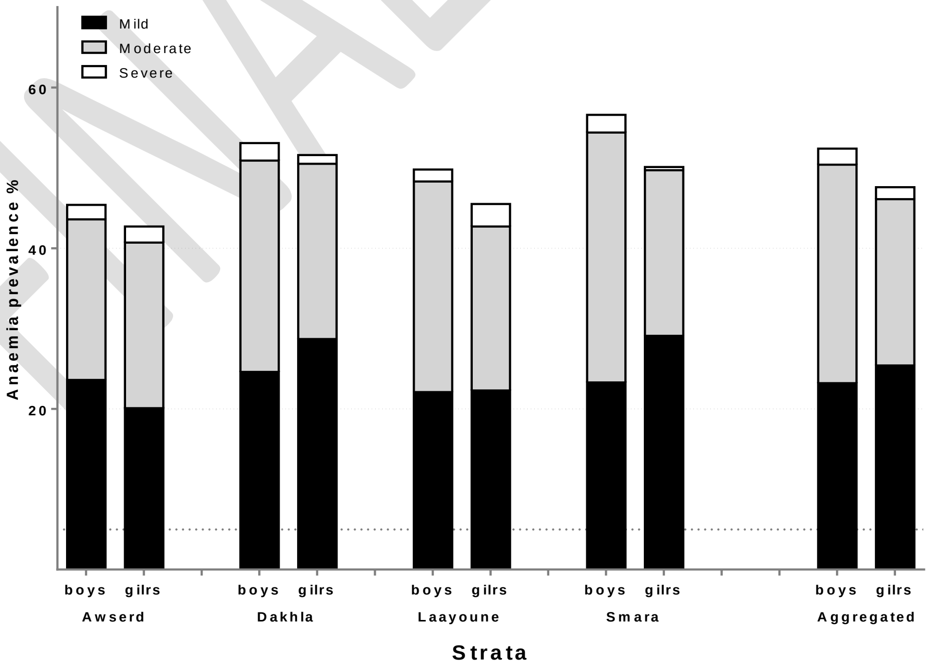

Figure 32. Anaemia prevalence in children aged 6-59 months, by sex.
Aggregated results are the weighted prevalence (see Table A14). Smara estimates includes data collected from Boujdour

Figure 33 shows the overall distribution of haemoglobin concentration in children during the ages of 6-59 months. As expected, lower Hb values are more common at earlier ages. An upward trend in haemoglobin concentration with age is evident with an increase of haemoglobin concentration of 0.033 g/dL (95% C.I 0.028 – 0.037) for every one-month unit increase in age. The slope value is significantly different from zero ($p<0.05$). As observed in Figure 33, the large proportion of children with severe anaemia cluster at ages below 36 months. A similar pattern of clustering at earlier ages was observed for moderate anaemia.

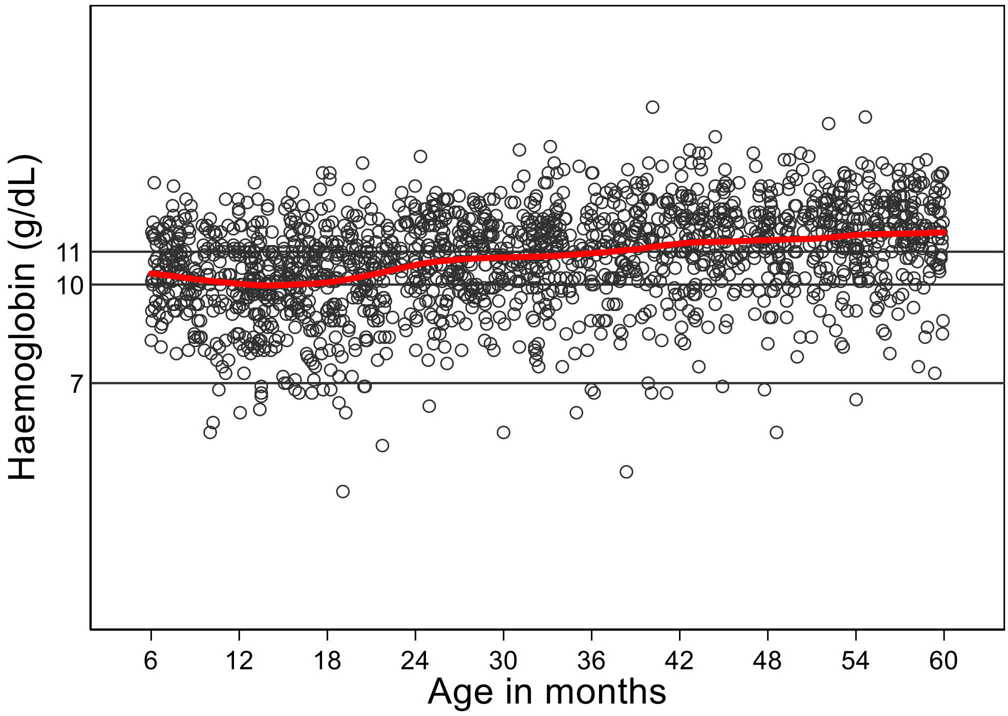

Figure 33. Haemoglobin concentration in children aged 6-59 months.

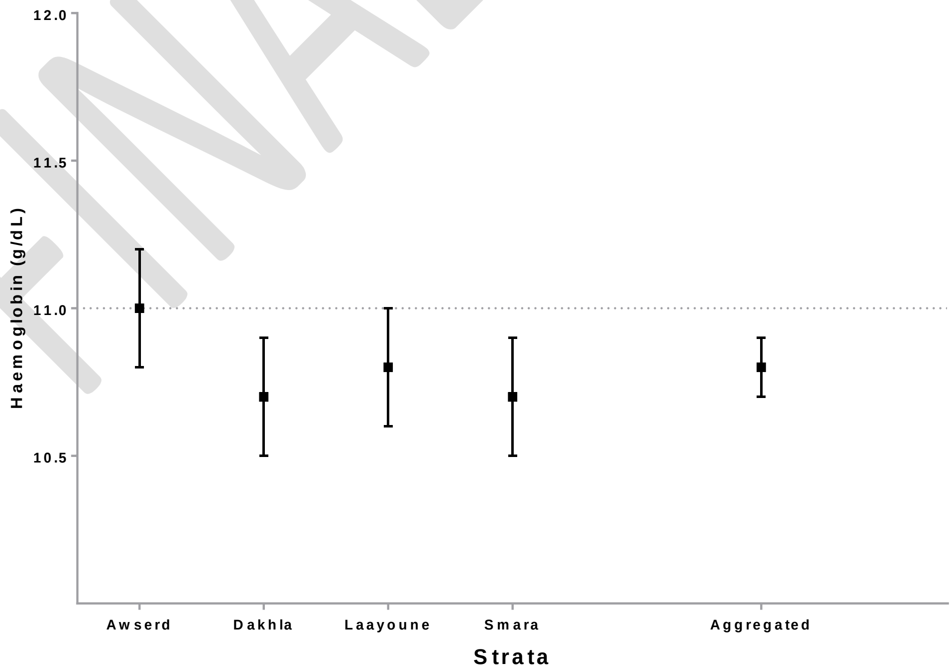

Figure 34. Mean haemoglobin values (and 95% CI) of children aged 6-59 months.
For detailed values, see Table A15.

Mean values of haemoglobin concentration are shown, by strata, in **Figure 34**. In Dakhla, Laayoune and Smara the mean haemoglobin concentration were below the cut-off values for anaemia (<11 g/dL), but only in Dakhla and Smara these values were significantly lower. The aggregated mean value was significantly lower than the anaemia cut-off.

3.6) ANAEMIA IN WOMEN OF REPRODUCTIVE AGE (15-49 YEARS)

We measured haemoglobin concentration in 2,322 women of reproductive age. Of these women, 236 reported to be pregnant and 228 reported to be lactating. For the assessment of anaemia prevalence in non-pregnant women, lactating women were considered among the non-pregnant women.

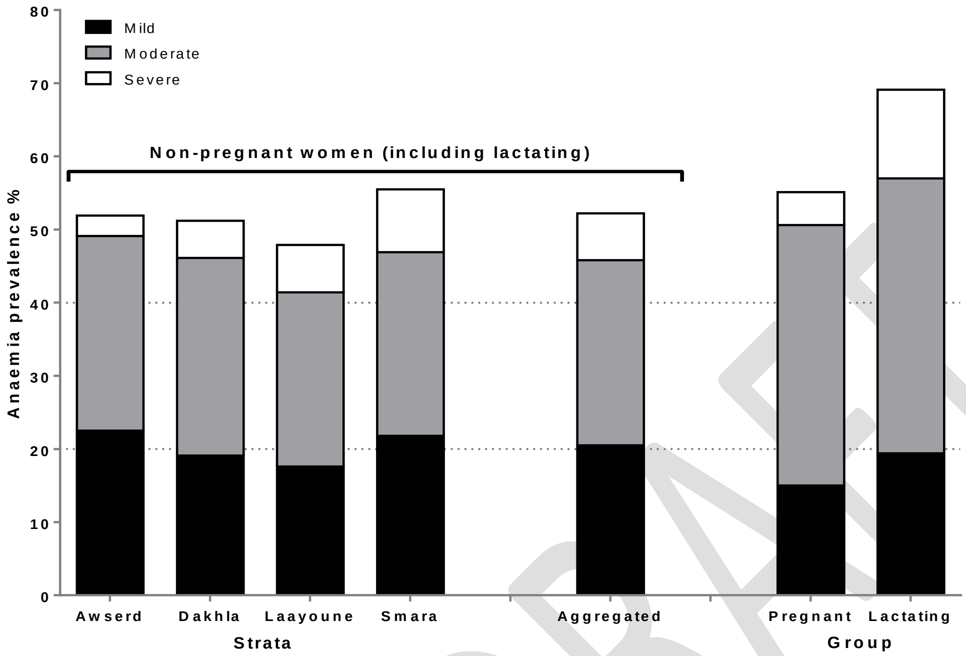

Figure 35. Anaemia prevalence in women of reproductive age (15-49 years).
Aggregated results are the weighted prevalence (see Table A16 and A17). Smara estimates includes data collected from Boujdour.

Overall, the weighted prevalence of anaemia in non-pregnant women of reproductive age is 52%. There were small differences in anaemia prevalence between strata, but none of these differences were considered statistically significant. The anaemia prevalence estimates at the strata level ranged from 48% to 56%. Lactating women presented greater anaemia prevalence estimates than their pregnant and non-pregnant counterparts, the anaemia prevalence estimates among lactating women being significantly greater (see Figure 35).

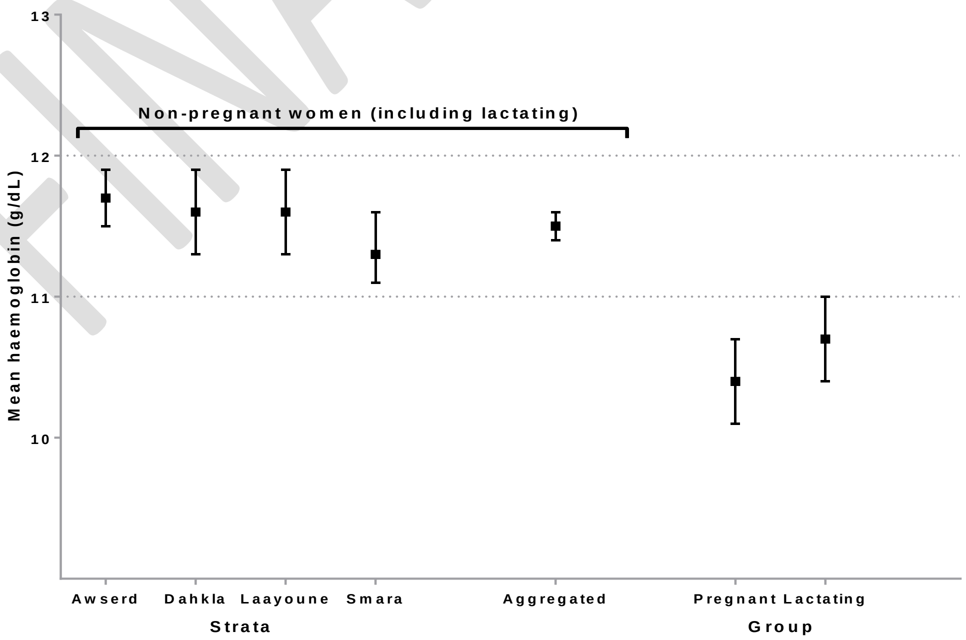

Figure 36. Mean haemoglobin values (and 95% CI) in women of reproductive age (15-49 years).
Aggregated results are the weighted prevalence (see Table A18). Smara estimates includes data collected from Boujdour.

Figure 36 shows the mean values of haemoglobin concentration by strata. In all strata, the mean concentration values of haemoglobin measured in non-pregnant women were below the threshold for anaemia (i.e. <12g/dL), but there were no significant differences between the strata. The mean haemoglobin values for PLW were significantly lower when compared with the overall mean haemoglobin value of non-pregnant women and were also lower than the threshold for anaemia (i.e. <11g/dL). Mean haemoglobin values were not different between pregnant women and lactating women.

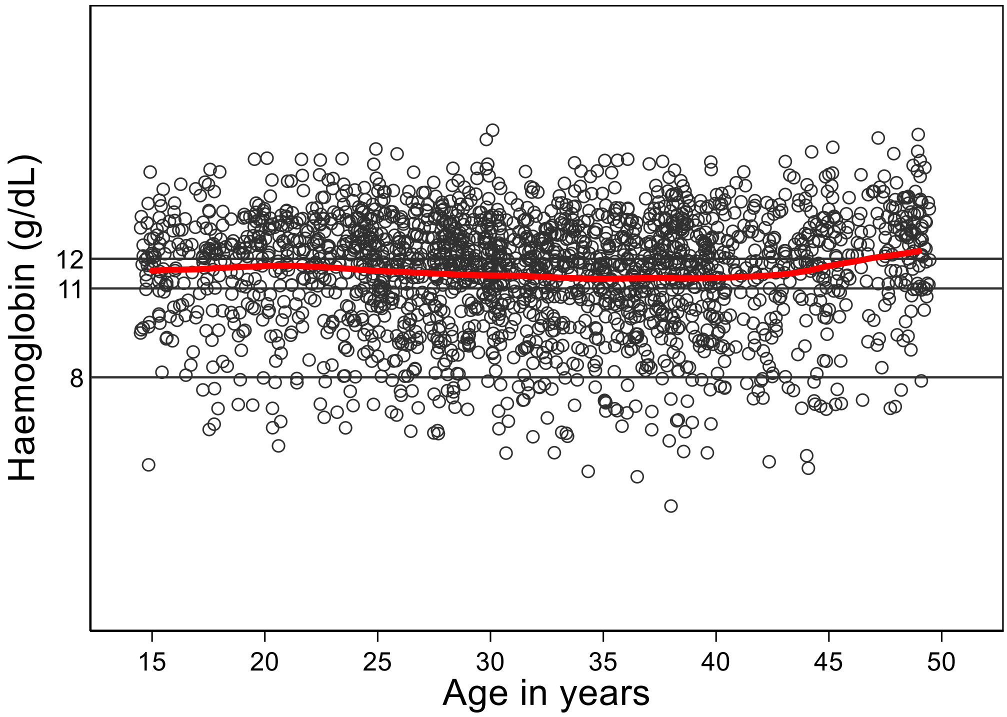

Figure 37. Haemoglobin concentration in non-pregnant women of reproductive age (15-49 years).

Age seems to be associated with haemoglobin concentrations in non-pregnant women of reproductive age as shown in Figure 37. We observed that mean haemoglobin concentration values across most of the reproductive age were below the threshold for anaemia (i.e. <12 g/dL). Mean haemoglobin values showed an upward trend from 40 years and above. This pattern is suggestive of the "costs" of reproduction reflected on haemoglobin concentrations. A similar pattern can be observed haemoglobin concentrations and gestation age within pregnancy (see Figure 38).

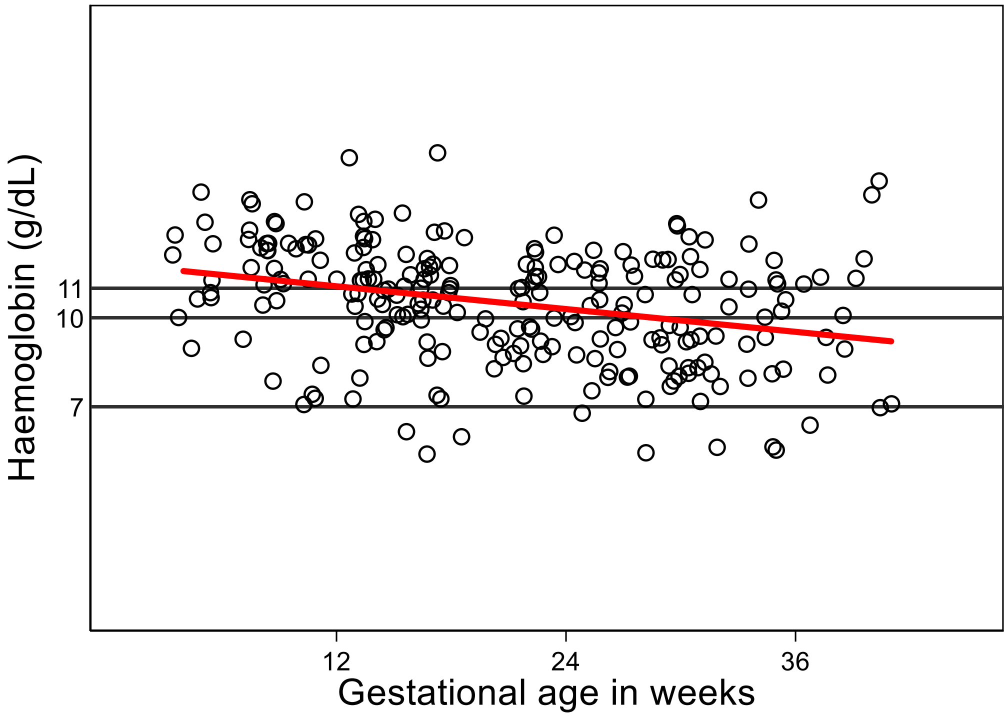

Figure 38. Haemoglobin concentration by gestational age in pregnant women of reproductive age.

3.7) PHYSICAL STATUS IN WOMEN OF REPRODUCTIVE AGE (15-49 YEARS)

One thousand eight hundred and forty-nine women that were not pregnant or lactating had their weight and height data collected and BMI data derived. These women, together with 236 pregnant and 227 lactating women had their MUAC measured.

The overall prevalence of underweight as indexed by a BMI <18.5 kg/m2 was 6%. Underweight prevalence was similar between strata ranging from 4% in Awserd to 7% in Laayoune (see Table A19). We observed a similar prevalence for low MUAC (see Table A19) at 7% with no differences between the strata.

The MUAC distribution plotted against age can be seen in Figure 39; where we can observe low MUAC values distributed across the reproductive age span. Interestingly, mean values for non-pregnant women were greater at most ages (light red line in the figure) when compared to mean values for PLW (darker red line in the figure).

The prevalence of low MUAC among PLW was 8% and 9%, respectively, which was slightly greater that their non-pregnant non-lactating counterparts. Similarly, pregnant women showed slightly greater prevalence of low MUAC than lactating women did, but none of these differences were significant.

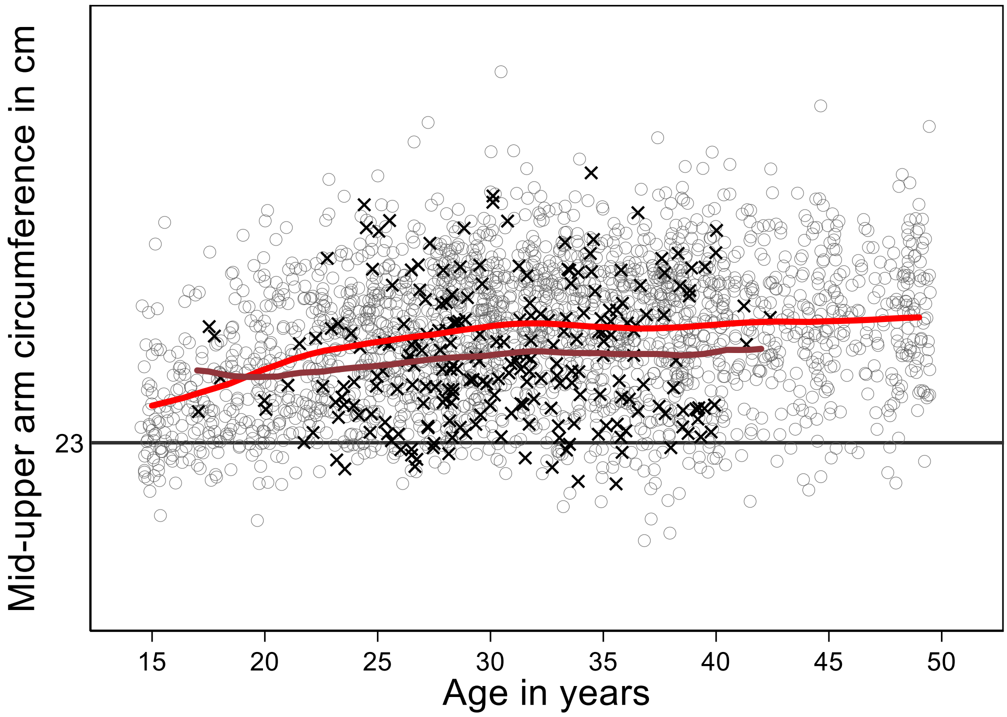

Figure 39. Scatter plot of mid-upper arm circumference by age of women (15-49 years).
Non-pregnant and pregnant women are represented as circles and crosses, respectively.

For overweight, indexed by a BMI >25 kg/m2, the prevalence was high for all strata, with a weighted prevalence of 66%. The prevalence of overweight but not obese and of obesity are shown in Figure 40, where we can also observe similar prevalence values between strata.

Interestingly, about half of the overweight women did not have obesity whilst the other half did. This pattern was similar between strata. The comparison between the low estimates of undernutrition and the large estimates of overweight suggest a significant upwards shift of the BMI distribution, an upward shift already present in the 2016 survey. Age showed an association with the mean values of BMI in our sample, as shown in Figure 41. We can observe that the mean BMI value crosses the overweight threshold at about 20 years of age and remained above that threshold thereafter.

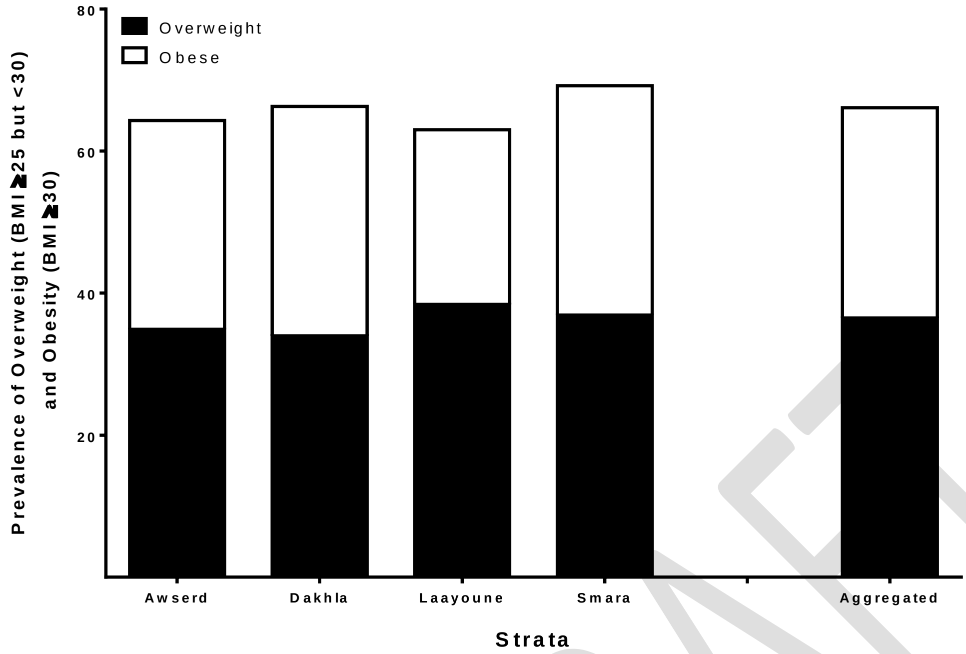

Figure 40. Prevalence of overweight and obesity, as indexed by body mass index (kg/m^2) in women of reproductive age (15-49 years) by strata.
Aggregated results are the weighted prevalence (see Table A19). Smara estimates includes data collected from Boujdour.

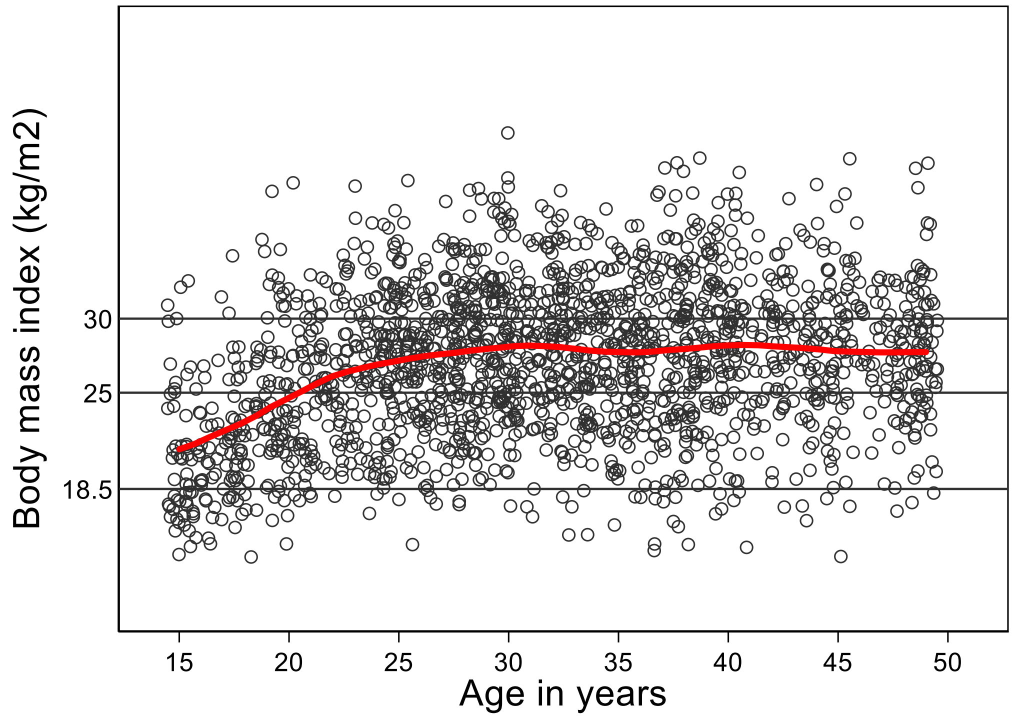

Figure 41. Scatter plot of body mass index (kg/m^2) by age of women (15-49 years).

3.8) FOOD SECURITY INDICATORS

Food security data was collected from 1,680 households, as described in the methods section. Indicators such as the FCS, HDDS, and coping strategies were then derived.

FCS categories are shown in **Figure 42**. Overall, a small proportion of households were found to be in the poor category. Nonetheless, an important proportion of 38% of the households were considered borderline between having a poor or acceptable FCS. Slightly over 60% of households have an acceptable FCS value denoting adequate access to food.

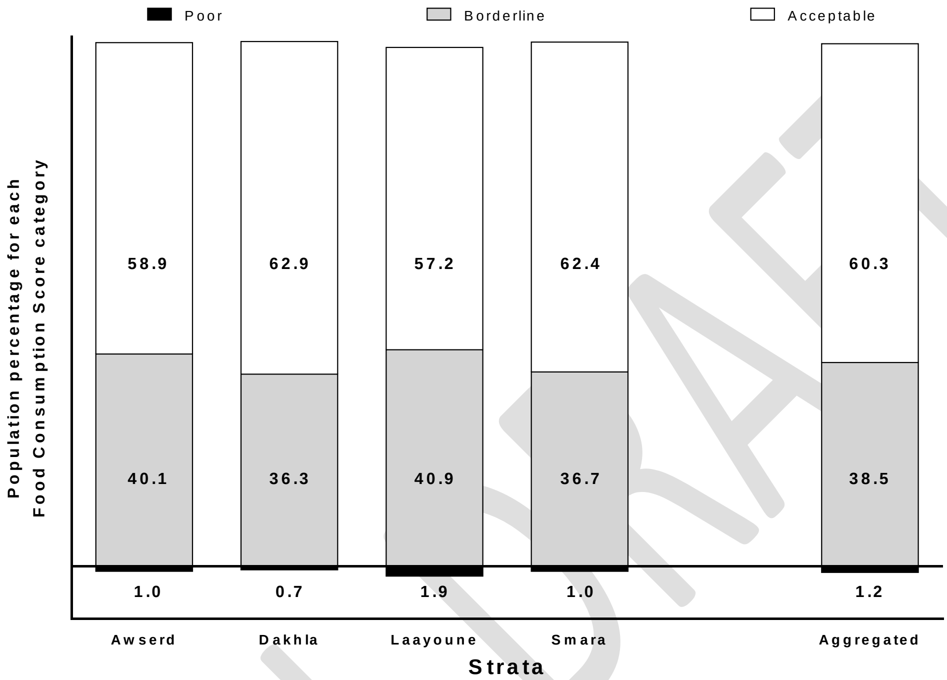

Figure 42. Household food consumption score by strata.
Aggregated results are the weighted prevalence (see Table A21). Smara estimates includes data collected from Boujdour.

We observed small but non-significant differences between strata regarding food security as indexed by the FCS. Similar results were observed when comparing the mean FCS values between strata (**Figure 43**). The mean value for FCS in each stratum and overall lies above the threshold of acceptable FCS.

Figure 44 dissects the FCS indicator by presenting each of the consumption food groups in the last 7 days prior to the household being surveyed. We can observe that most households eat everyday cereals and tubers, sugary products and oils and fats. Legumes, nuts and seeds, the next most consumed food group, are consumed an average of three days over a 7-day period, animal products like meat or milk are consumed an average of two to three days, whilst vegetables and fruit are reported to each be consumed less often than one day over a 7-day period.

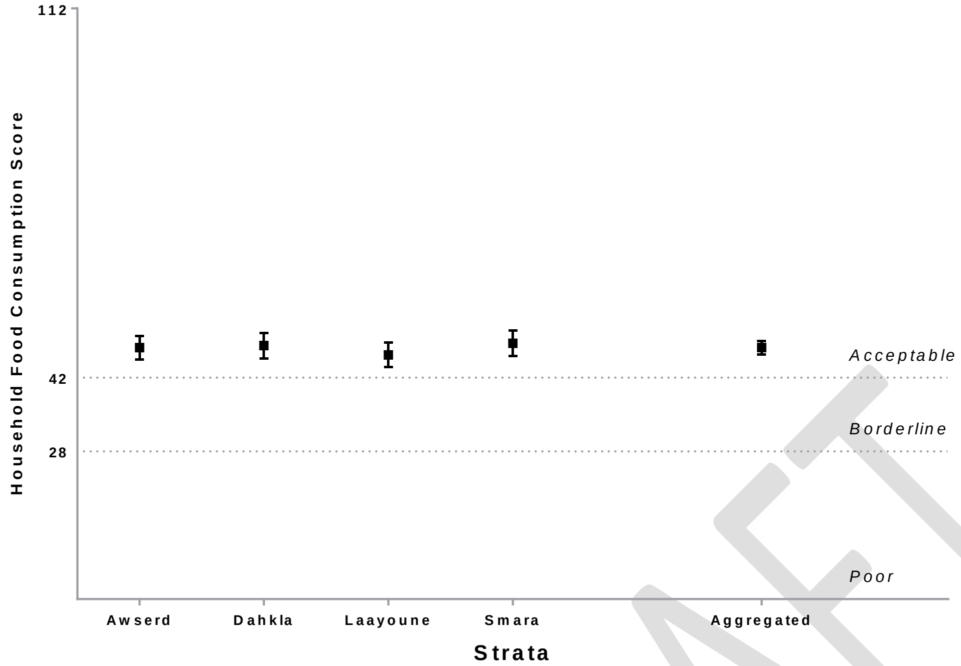

Figure 43. Mean food consumption score values shown by strata.
Aggregated results are the weighted prevalence (see Table A22). Smara estimates includes data collected from Boujdour.

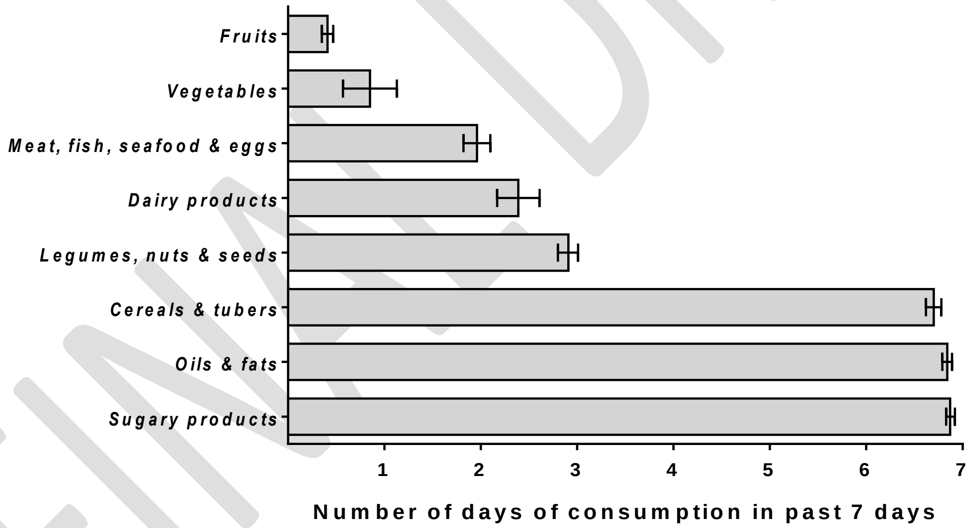

Figure 44. Reported household consumption (in days) of different food groups in the past 7-day period.

Food diversity was measured in two ways (Table A22), first over a 7-day recall period, using the data collected to calculate FCS with a maximum of 7 food groups (see **Figure 45**); and second over a 24-hr recall period with a maximum of 12 food groups (see **Figure 46**).

According to the FCS-based diversity score values, on average households experienced medium dietary diversity levels with no observable differences between strata. Interestingly, dietary diversity appeared lower when assessed using the household diversity score over a shorter recall period but with greater number of food groups than with the FCS-based diversity score values.

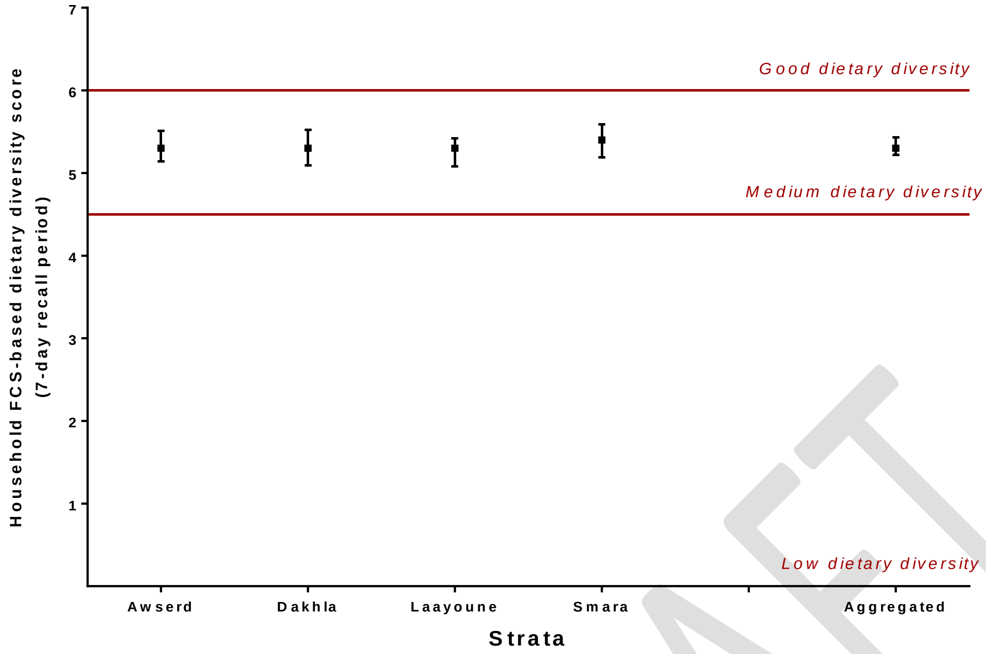

Figure 45. Mean household FCS-based dietary diversity score values shown by strata.
Aggregated results are the weighted prevalence (see Table A22). Smara estimates includes data collected from Boujdour.

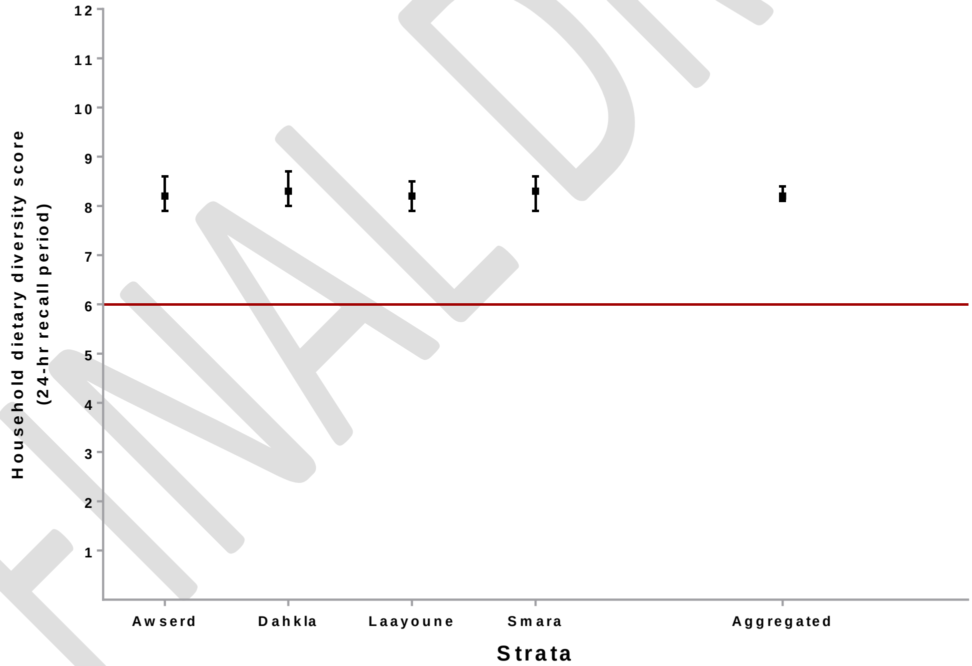

Figure 46. Mean household dietary diversity score values shown by strata.
Aggregated results are the weighted prevalence (see Table A22). Smara estimates includes data collected from Boujdour.

Figure 47 dissects household dietary diversity over the 24-hr recall period. We observed that most households reported to have eaten in the past day cereals, sugary products, oils and fats, vegetables and spices, condiments and drinks, such as tea or coffee. Legumes, tubers and roots, meat and dairy products were consumed the previous day by around 60% of households. Egg, seafood and fruits were the groups that were reported to have been consumed the least in the previous day.

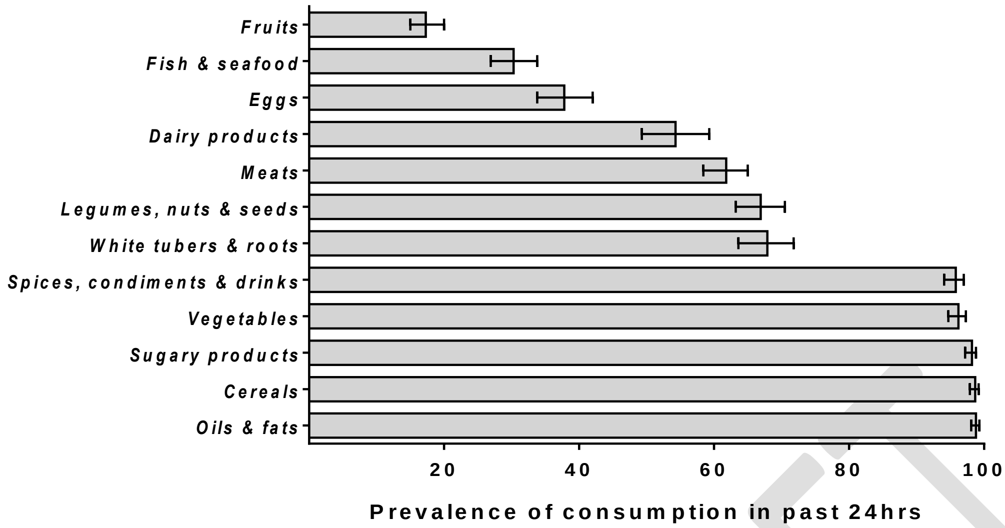

Figure 47. Reported prevalence of household consumption of different food groups in the past 24h period.

Another way to assess food insecurity is to measure behaviours considered coping mechanisms for food insufficiency. The mean values for the rCSI are shown in **Figure 48**, where higher values represent greater food insecurity. As shown in the figure, we observed some differences in food insecurity between strata with Laayoune having slightly greater values than Smara. None of the observed differences were significant.

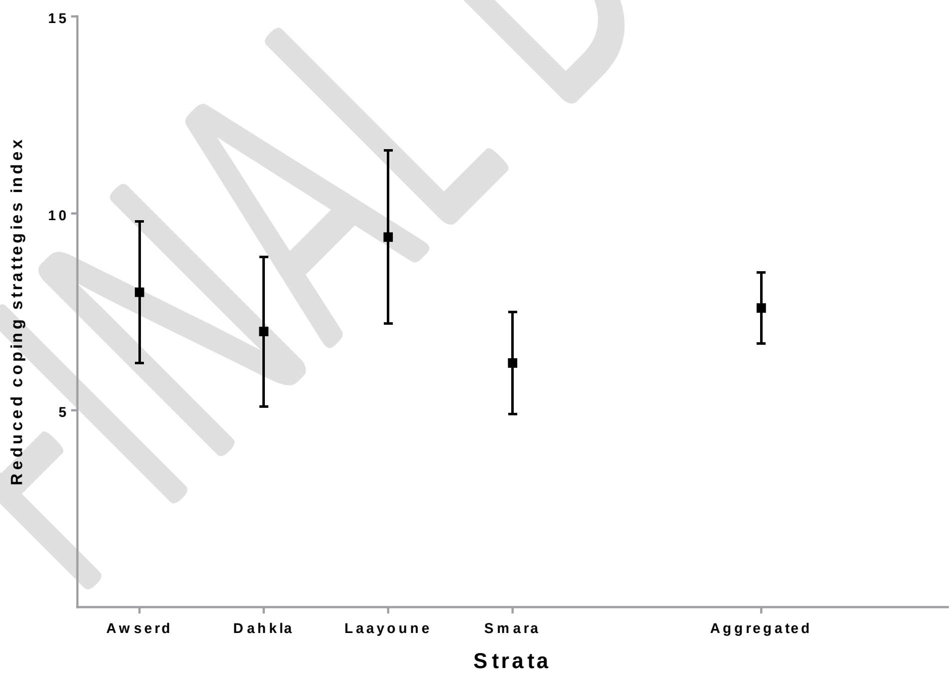

Figure 48. Mean reduced coping strategies index values shown by strata.
Aggregated results are the weighted prevalence (see Table A22). Smara estimates includes data collected from Boujdour.

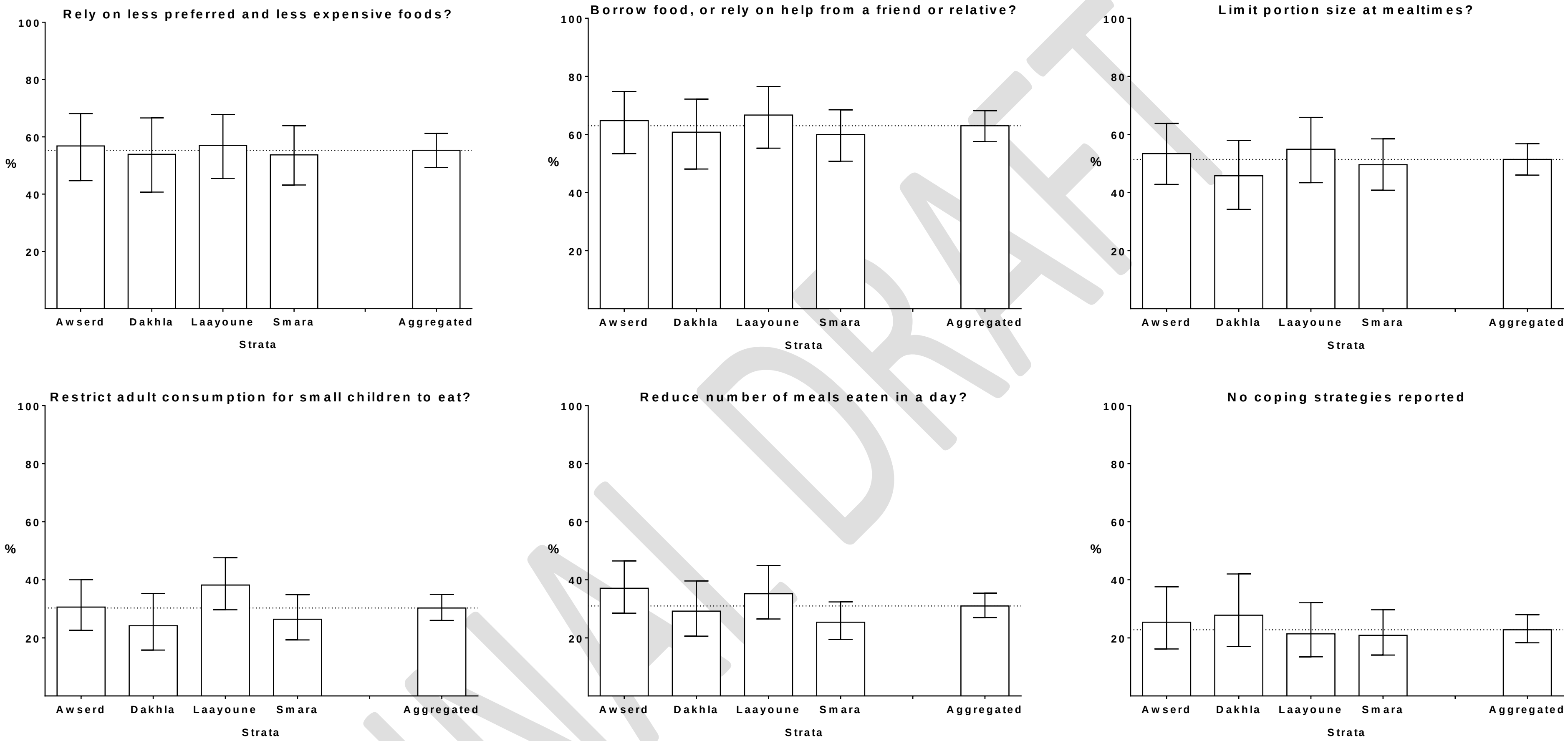

Figure 49. Proportion of households reporting using each coping strategies over the past 7 days.
Aggregated results are the weighted prevalence (see Table A24). Smara estimates includes data collected from Boujdour.

The proportion of households in each stratum that used each of the five coping strategies that were used for estimating rCSI values, are displayed in **Figure 49**. We can observe that the most common coping strategy utilised by most households in all strata was to borrow food or rely on help from friends or relatives. The utilisation of this coping strategy is wide (over 60% of households), although is lower than that observed in 2016 at 80%, that it is difficult to understand whether this behaviour is a coping mechanism for food insecurity or a common cultural food practice. Limiting the portion size also appeared highly prevalent in this context and there only small non-significant differences between strata.

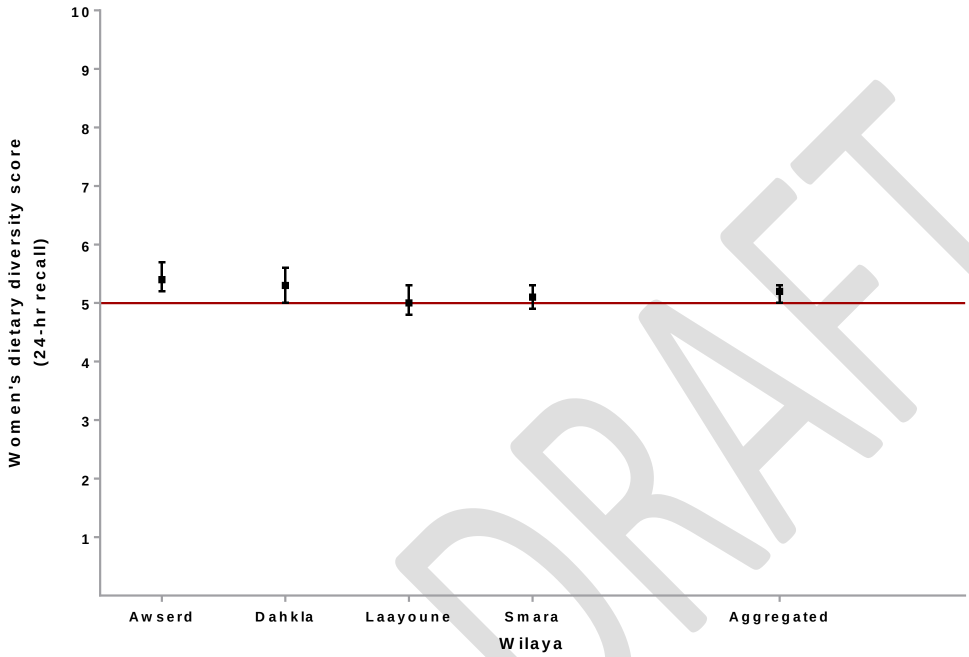

Figure 50. Mean women dietary diversity score values shown by strata.
Aggregated results are the weighted prevalence (see Table A22). Smara estimates includes data collected from Boujdour.

Food security indicators for food diversity were also collected for women of childbearing age (15-49 years). **Figure 50** shows the mean values for WDDS in each stratum. Women on average in all strata reached the minimum consumption of five food groups.

The proportion of women that reached the minimum of dietary diversity is shown in **Figure 51**. In agreement with the mean values of Figure 50, more than half of the women reached the minimum of dietary diversity in all strata. The differences observed between strata did not reach statistical significance.

The pattern of food consumptions of women in childbearing age is shown in **Figure 52**. Overall, most women reported to have consumed cereals in the past 24 hours, whilst a large proportion reported consumption of vitamin A-rich fruits and vegetables and other vegetables, while all other food groups were consumed by less than half of them. Interestingly, 70% of women consumed animal products such as meat.

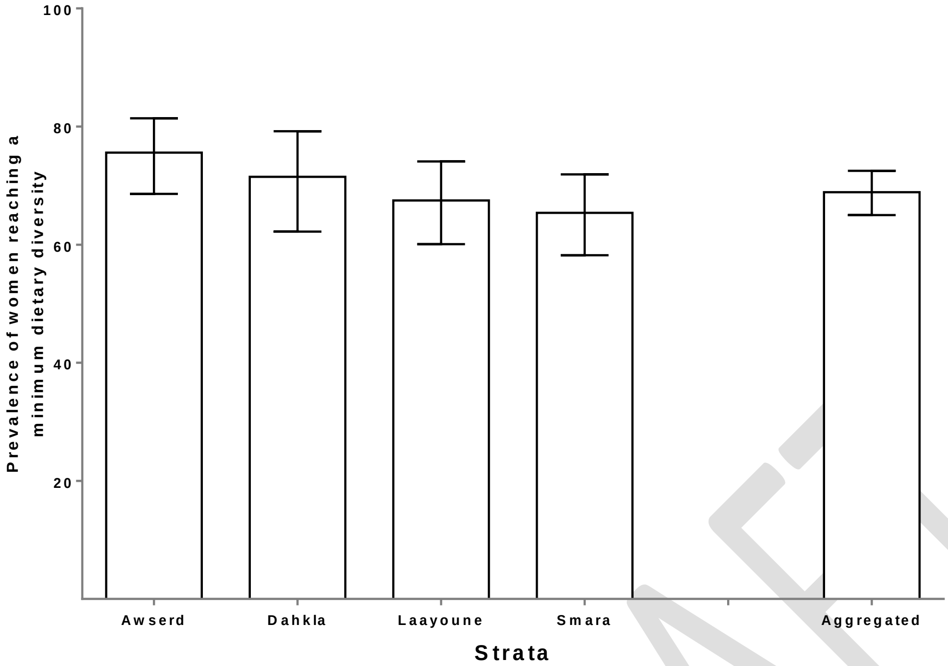

Figure 51. Proportion of women of childbearing age that reach a minimum of dietary diversity (MDD-W) by strata.

Aggregated results are the weighted prevalence (see Table A23). Smara estimates includes data collected from Boujdour.

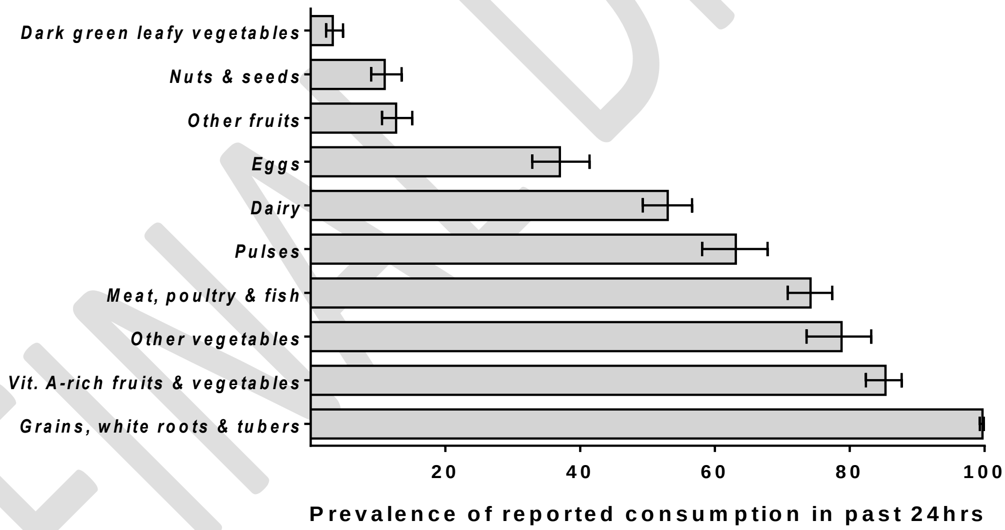

Figure 52. Reported prevalence of women's consumption of different food groups in the past 24-hour period.

3.9) NON-COMMUNICABLE DISEASES (NCDs)

Data was collected on four reported NCDs and smoking from all surveyed households, comprising a sample of 6,119 working age adults (25-64 years). We estimated prevalence of NCDs and smoking at the individual level, but also at the household level to assess the societal burden and exposure.

At the individual level, the prevalence of reported diabetes, high cholesterol, high blood pressure and cardio-vascular disease, in addition to the prevalence of smoking are shown in Figure 53. Overall, 16% of adults smoke and there is a 11%, 5% 9% and 3% prevalence of reported diabetes, high blood pressure, high cholesterol and cardio-vascular disease, respectively. We observed no differences in the individual prevalence between strata. It is worth noting that the prevalence reported is likely to under-represent the true prevalence given the limited resources of the local health systems to diagnose these conditions.

Assessed at the household level prevalence estimates are greater, displaying the societal burden of NCDs and smoking in this refugee operation (see Figure 54). Overall, 50% of households reported to have a working age adult, aged 25-64 years, suffering from either diabetes, high cholesterol, high blood pressure or cardio-vascular disease (see Table A25).

Forty-three percent of the households had a working-age adult that smokes, and the smoking prevalence was similar between strata, ranging from 38% in Laayoune to 48% in Smara. One third of households reported to have a working-age adult with diabetes, this household prevalence being similar between strata ranging from 31% in Dakhla to 35% in Awserd and Smara. Cardio-vascular disease showed the lowest household prevalence where about 9% of households have a working-age adult reported to have a cardio-vascular disease. The household prevalence of cardio-vascular disease ranged between 7% to 11% in Dakhla and Awserd, respectively. No significantly different results were observed between strata. The household prevalence of high cholesterol and high blood pressure were 15% and 28%, respectively. No differences were observed between strata in any of the household NCD prevalence.

It is important to note that the NCD data presented is reported data, not measured data, and was collected at the household level. It is likely that many of the adults that present one NCD condition would likely present other conditions simultaneously. There is at present no data of multi-morbidity in this population, but given the results observed of the individual- and household-level prevalence of NCDs, it would be reasonable to expect a high burden of multi-morbidity.

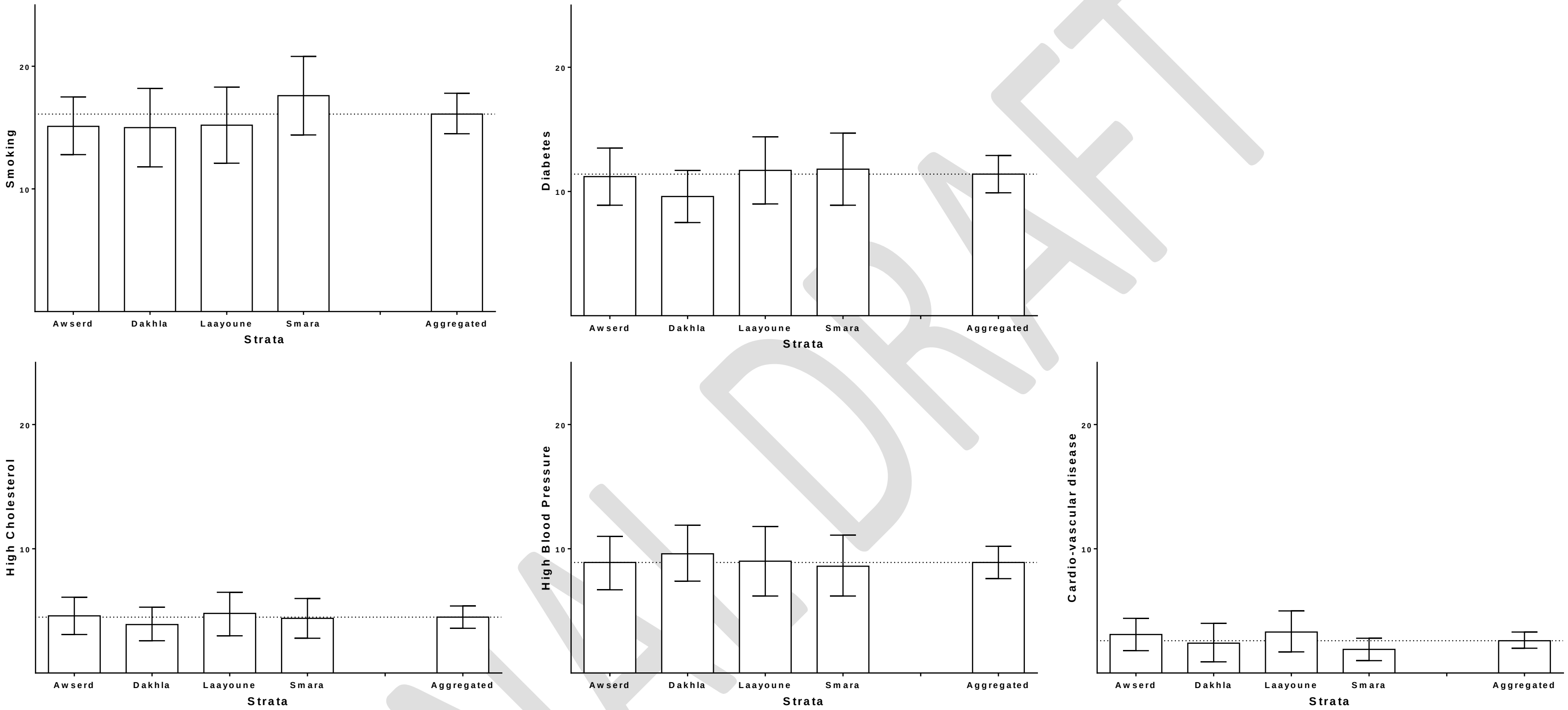

Figure 53. Individual prevalence of non-communicable diseases and smoking among adults aged 25-64 years by strata.
Aggregated results are the weighted prevalence (see Table A25). Smara estimates includes data collected from Boujdour.

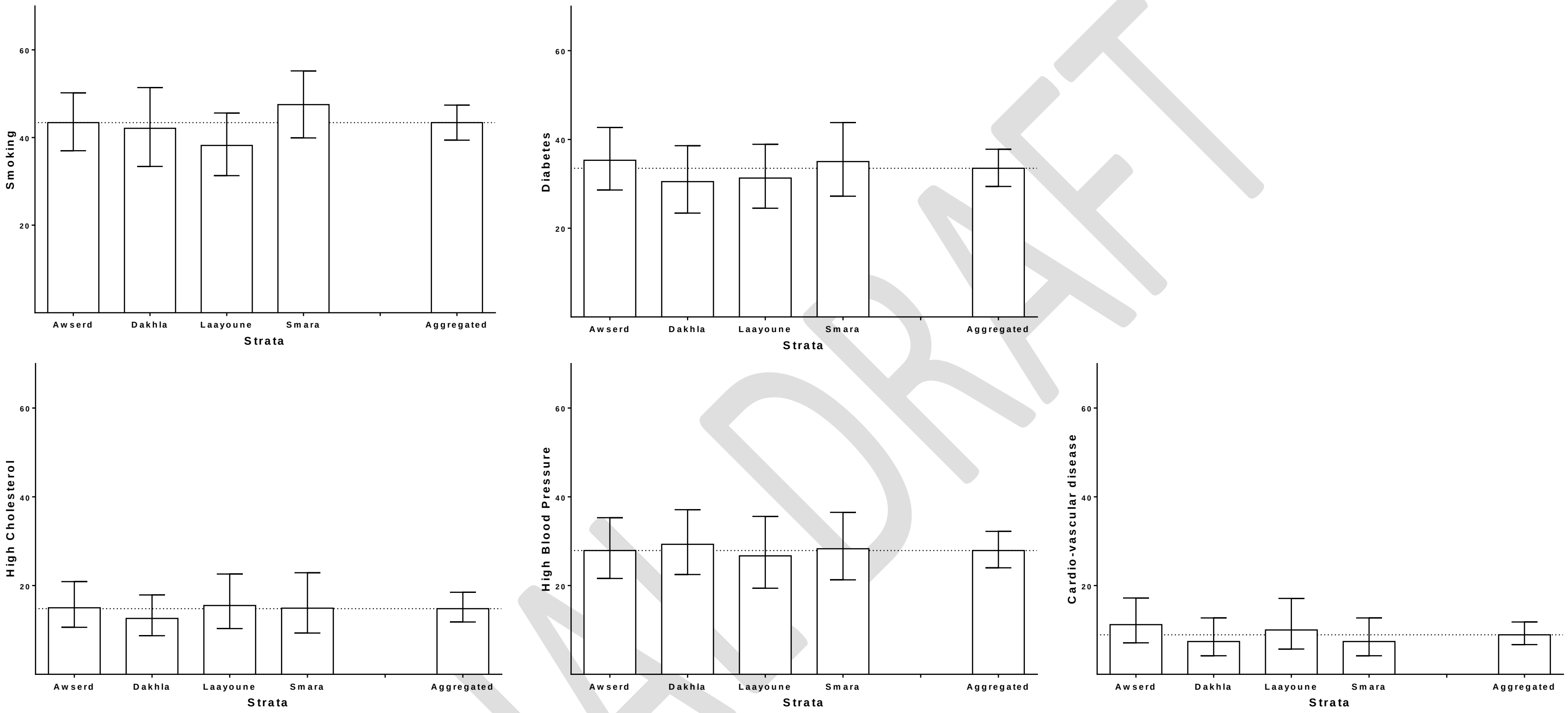

Figure 54. Household prevalence of non-communicable diseases and smoking among adults aged 25-64 years by strata.
Aggregated results are the weighted prevalence (see Table A25). Smara estimates includes data collected from Boujdour.

3.10) DIARRHOEA IN CHILDHOOD AND DIARRHOEA MANAGEMENT

We obtained the prevalence of diarrhoea over the previous two-week period, from 1,944 children aged <5 years. Overall, 10% of these children had diarrhoea in this period; ranging from 9% to 13% in Awserd and Laayoune, respectively, with no significant differences observed between strata (see **Figure 55**).

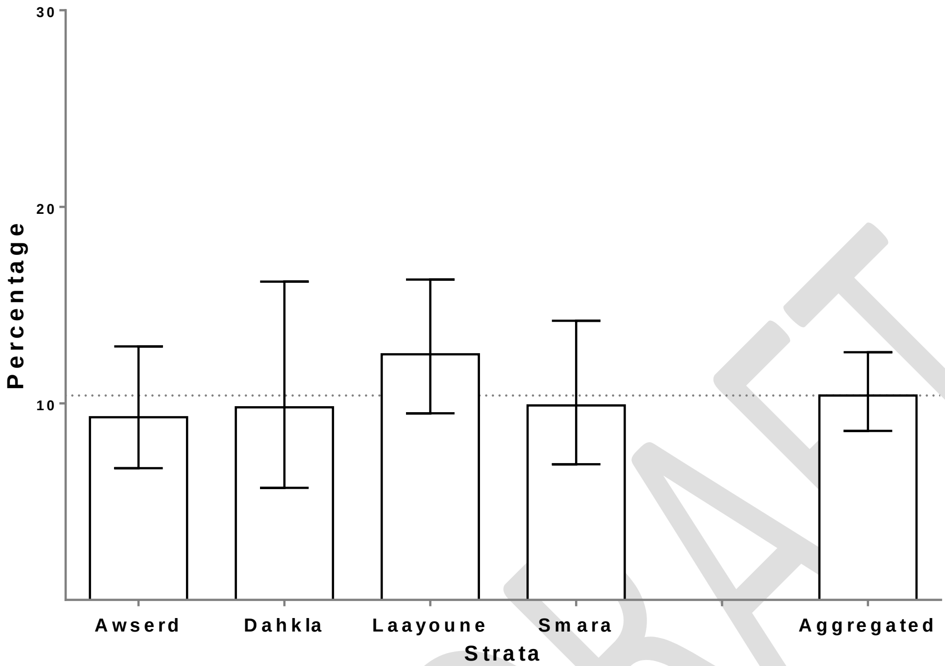

Figure 55. Diarrhoea prevalence in children aged <5 years by strata.
Aggregated results are the weighted prevalence (see Table A26). Smara estimates includes data collected from Boujdour.

Diarrhoea affected children differently at different ages as seen in **Figure 56**. Diarrhoea prevalence consistently increased between the ages of <6 months to the ages of 18-29 months. This pattern strongly suggests that IYCF practices such as introduction of food or the reduction of breastfeeding might be a potential driver for this age-increase in diarrhoea prevalence. Bottle-feeding is known to be an important factor affecting diarrhoea prevalence.

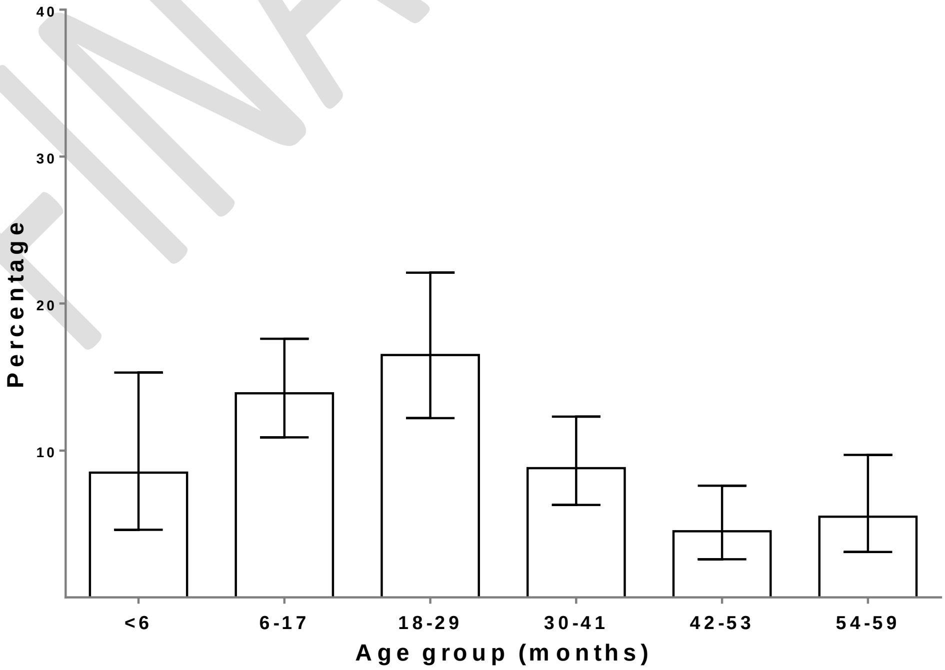

Figure 56. Diarrhoea prevalence in children aged <5 years by age group.

For detailed values, see Table A27.

The three strategies for an adequate diarrhoea management at home are (1) increase fluid intake; (2) continue feeding the same or more food and (3) take children with diarrhoea to a health centre. Fluid intake and continued feeding data are shown in **Figure 57**. Overall, only about 29% of children with diarrhoea are reported to have had their fluid intake increased, whilst worryingly, about 31% have had their fluid intake reduced, risking dehydration and death. Similarly, about 61% of children with diarrhoea had their food intake reduced against recommendations.

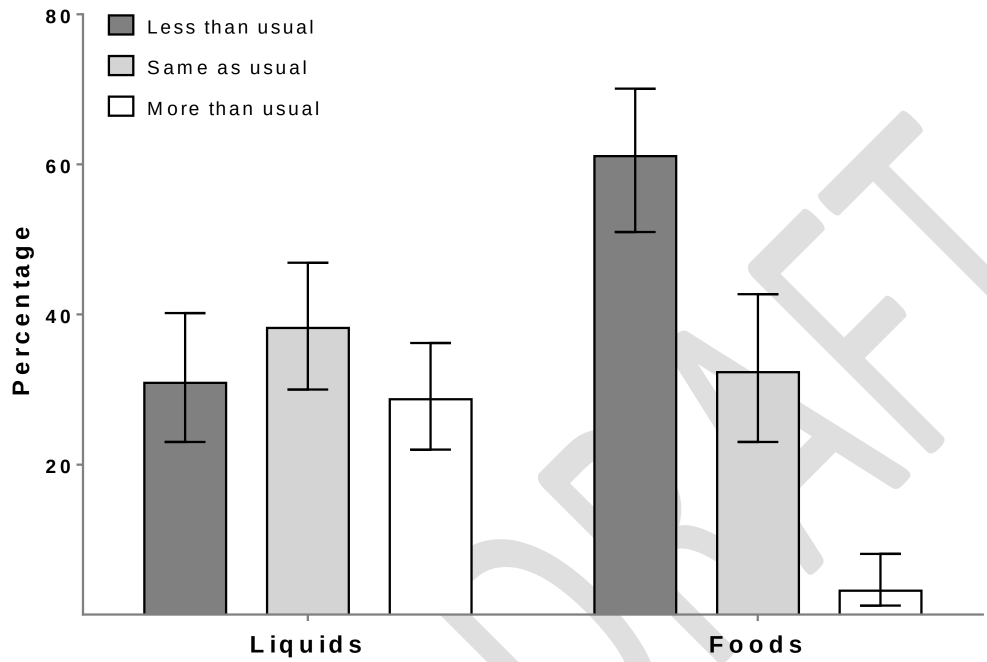

Figure 57. Feeding behaviours during diarrhoea episodes.
For detailed values, see Table A28.

Health care seeking behaviours, an important aspect for an adequate management of diarrhoea, are presented in Table 10. Overall, only 44% of children with diarrhoea were reportedly taken to a health centre and only 35% were given ORS. These low values suggest the need for interventions to improve care behaviours in this operation.

Table 10. Health seeking behaviours and point-coverage for ORS in the past two weeks among children aged <5 years with diarrhoea. (sample of 201 children)

		Yes	No	Unknown
When the child had diarrhoea was she/he…				
...taken to a health facility?	(n) %	(90) 44.4	(111) 55.6	(0) 0.0
	95% CI	(37.1; 51.9)	(48.1; 62.9)	N/A
…given oral rehydration solution?	(n) %	(135) 34.7	(66) 65.3	(0) 0.0
	95% CI	(27.9; 42.2)	(57.8; 72.1)	N/A

3.11) MEASLES VACCINATION

Measles vaccination coverage is an important indicator regarding the outreach of essential health services to prevent outbreaks of specific communicable diseases and provides information about the strength of the vaccination programmes.

Different indicators of measles vaccination coverage are presented in Table 11. According to UNHCR guidelines, the vaccination coverage meets the standards of at least 94% among children aged 9-59 months. Figure 58 provides a visual representation of the measles vaccination uptake across age. In this figure, we can observe that it is only after the age of 15 months that vaccination levels are 90% or above.

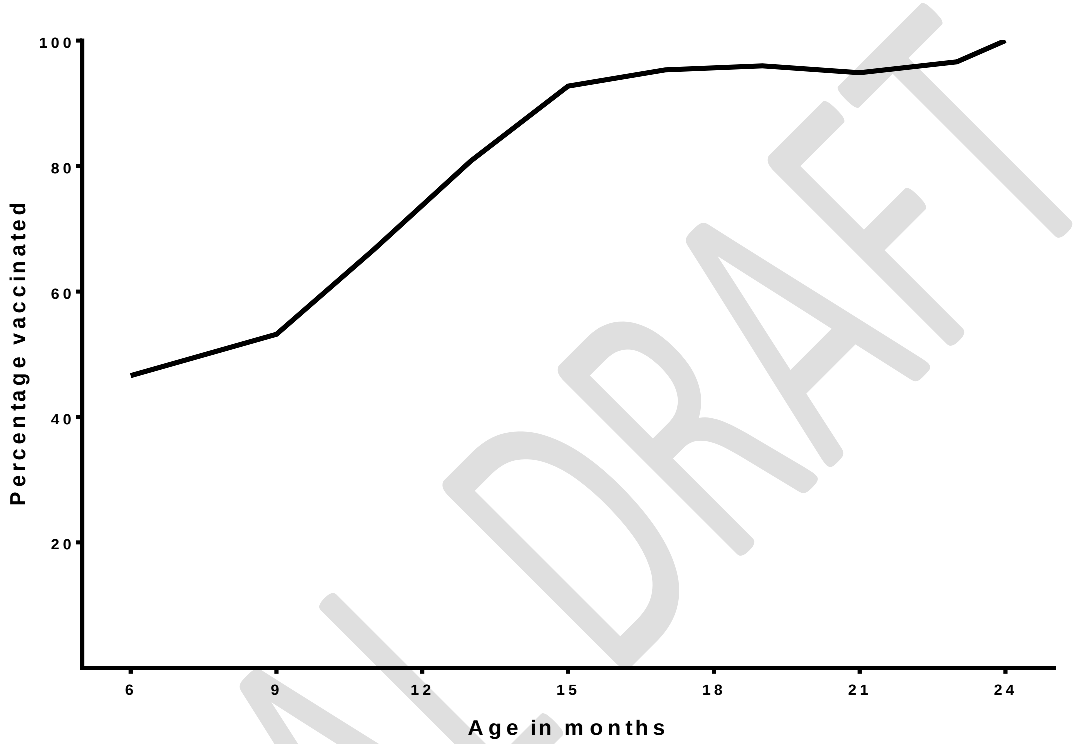

Figure 58. Trend of measles vaccination uptake in children aged 6-23 months.

Table 11. Indicators of measles vaccination coverage, by different age groups.

Age group	n	mean	95% CI
6-15 months	384	69.2	(62.8; 75.0)
9-15 months	269	79.3	(72.8; 84.6)
12-23 months	444	93.4	(89.7; 95.9)
9-59 months	1,680	94.0	(92.3; 95.4)

3.12) COVERAGE OF ANTENATAL AND POSTNATAL CARE FOR PREGNANT AND LACTATING WOMEN

The overall point-coverage of antenatal and postnatal care for pregnant women and lactating women was 71%. We did not observe significant differences in this coverage between strata (see **Figure 59**). We also observed that coverage was significantly greater for pregnant women that for lactating women. Among PLW, we collected data regarding the point-coverage of receiving iron supplementation in the forms of iron drops (see **Table A30**). We observed similarly low levels of point-coverage for intake of iron-supplements by strata (see **Figure 60**). We also compared point-coverage by women status and observed no significant differences. Overall, iron-supplementation coverage is very low at 25%.

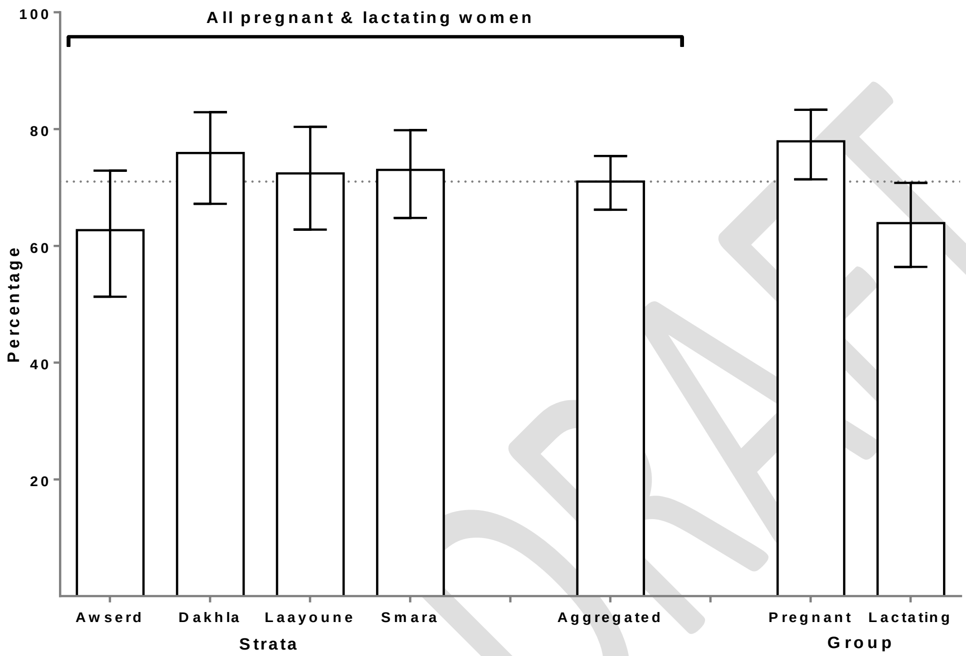

Figure 59. Point-coverage of antenatal and postnatal care for pregnant and lactating women by strata and women's status.

Aggregated results are the weighted prevalence (see Table A29). Smara estimates includes data collected from Boujdour.

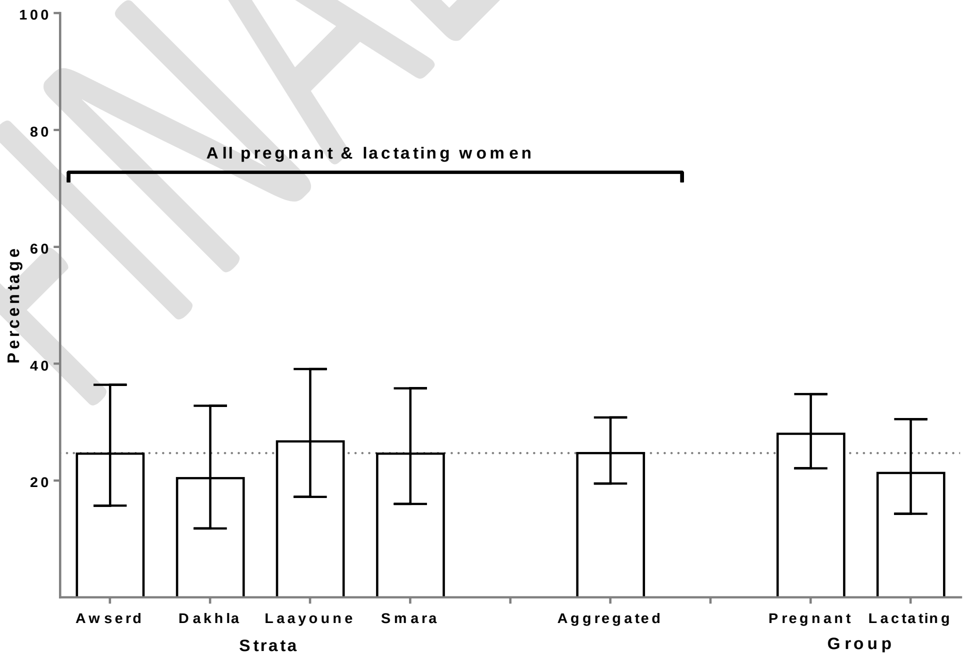

Figure 60. Point-coverage of receiving iron supplements from the antenatal and postnatal care programme for pregnant and lactating women shown by strata and women's status

Aggregated results are the weighted prevalence (see Table A30). Smara estimates includes data collected from Boujdour.

3.13) COVERAGE OF ACUTE MALNUTRITION CARE

We assessed point and period-coverage for acute malnutrition care for children aged 6-59 months with either MAM or SAM, as determined by WHZ, oedema or MUAC data; and for PLW with acute malnutrition, as indexed by a low MUAC (see Table 12).

Overall, for children aged 6-59 months with acute malnutrition point-coverage for both MAM and SAM care was low. Even after including the children that are receiving MAM and SAM care but do not fit the case definition for acute malnutrition, period-coverage was also low. Coverage estimates contrasts poorly with the expected Sphere coverage of 90% in refugee settings.

Both, point and period-coverage were greater for PLW with acute malnutrition, as indexed by MUAC values. However, the large difference between point and period-coverage suggest the possibility that acute malnutrition care for PLW is not targeted adequately.

Given the low prevalence of both, acute malnutrition and the coverage of its care, we could not perform comparisons between strata to assess local variations on coverage for malnutrition care.

Table 12. Point-coverage of malnutrition care activities for children aged 6-59 months and pregnant or lactating women. Results are shown by malnutrition type.

		Point	Period
Children with MAM (WHZ<-2 but ≥-3 and/or MUAC <12.5 but ≥11.5 cm)	N	196	215
Coverage of MAM care	(n) %	(15) 5.0	(34) 12.6
	95% CI	(2.9; 8.6)	(7.7; 19.9)
Children with SAM (WHZ <-3 and/or oedema and/or MUAC<11.5 cm)	N	21	35
Coverage of SAM care	(n) %	(2) 11.1	(8) 42.5
	95% CI	(2.5; 37.5)	(23.0; 64.7)
PLW with acute malnutrition (MUAC <23.0 cm)	N	36	123
Coverage of malnutrition care	(n) %	(11) 32.1	(98) 79.1
	95% CI	(17.0; 52.2)	(67.8; 87.2)

MAM: Moderate acute malnutrition; SAM: Severe acute malnutrition; MUAC: Mid-upper arm circumference; WHZ: Weight-for-length/height z-score; PLW: Pregnant & lactating women.

3.14) WATER, SANITATION & HYGIENE

Data for water and sanitation indicators was collected from 1,680 households. On average, it was reported that six people were living and sleeping in the household the night before being surveyed (see Table A31). In addition, on average, households had a water storage capacity of about 3,000 litres and had their water tanks refilled every 31 days. There were significant differences in the storage capacity and regularity of water distribution. Dakhla and Laayoune had on average significantly lower storage capacity than Smara. Water tanks were more frequently refilled in Dakhla than any other strata, whilst Smara had the lowest frequency of refill than any other strata.

Given the abovementioned differences in storage capacity and frequency of distribution, the estimated water provision measured in litres/person/day was different between the strata. Dakhla has the greatest water provision, Smara and Laayoune the lowest. Thirty-nine percent of household reported to have more than one container for water storage, with no significant differences between strata.

The prevalence of households meeting the UNHCR standards for water provision (20 litres/person/day) is shown in Figure 61. On average about 41% of households had reported water provision that reached this standard. However, there were significant differences between strata with three levels of prevalence of meeting the standards. Dakhla had the greatest level at 78%, then Awserd at 44%, whilst both Laayoune and Smara had the lowest level at 36% and 33%, respectively. The prevalence of households meeting the SPHERE standards were higher as the thresholds is lower at 15 litres/person/day.

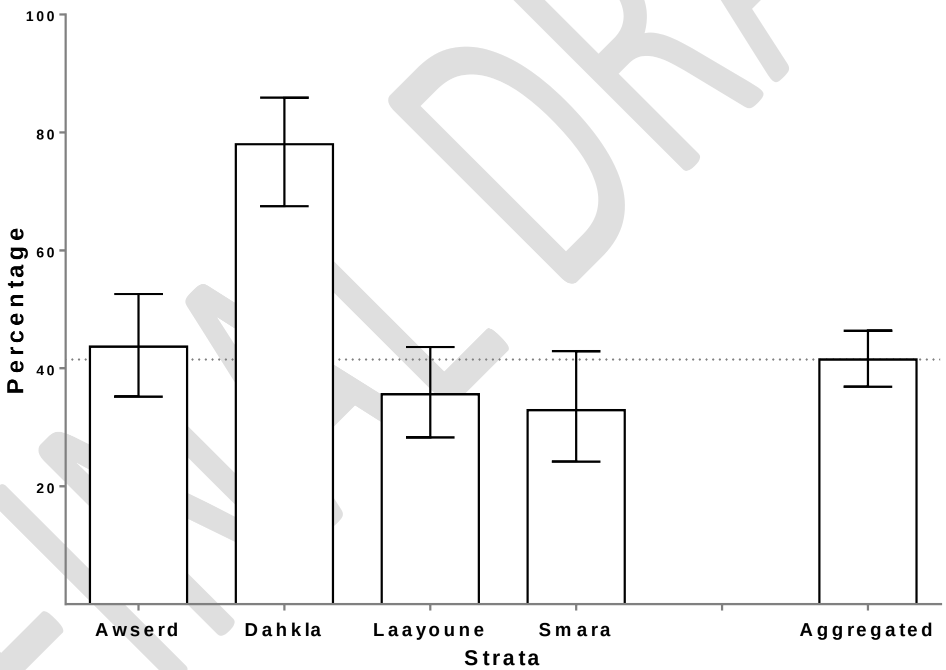

Figure 61. Prevalence of households meeting the UNHCR standards for water provision of 20 litres/person/day.

Aggregated results are the weighted prevalence (see Table A31). Smara estimates includes data collected from Boujdour.

Household satisfaction with the water supply showed a similar pattern than that observed for meeting UNHCR standards of water provision as shown in Figure 62; although differences between strata were more pronounced. Dakhla presented a very high prevalence of reported satisfaction with the water supply and contrast sharply with the very low levels of reported satisfaction observed in Laayoune.

Sixty-one percent of households reported to receive water from tanker trucks with the remaining having access to a piped water network (see Table A32). There were differences between strata regarding the mains sources of household water, with Awserd, Dakhla and Smara having greater prevalence of access to the piped network and Laayoune reported to receive water almost entirely from tanker trucks.

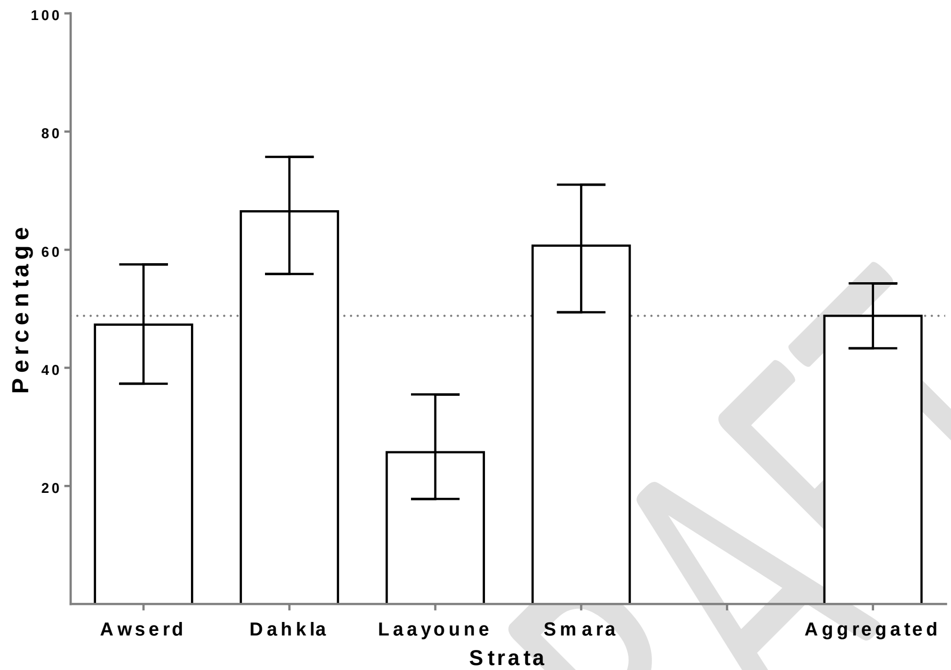

Figure 62. Prevalence of households reported satisfaction with the water provision service.
Aggregated results are the weighted prevalence (see Table A31). Smara estimates includes data collected from Boujdour.

Seventy-nine percent of households reported the presence of soap and this prevalence was equally high between strata. The prevalence of different hygiene practices with soap use are presented in Figure 63. The prevalence of all basic hygiene practices such as washing hands before preparing or eating food were high to almost 100% with little differences between strata.

Most households reported having access to a latrine (see Table A34). Only a small proportion reported to have to use neighbour or relative latrine (1.7%) or to have to pass stools in the open (0.5%). The proportion of households that engage in open defecation was equally low in all strata.

Figure 63. Reported use of soap in household.
For detailed values, see Table A33.

IV. NUTRITION INDICATORS TRENDS 1997-2019

4.1) GLOBAL ACUTE MALNUTRITION PREVALENCE IN CHILDREN AGED 6-59 MONTHS

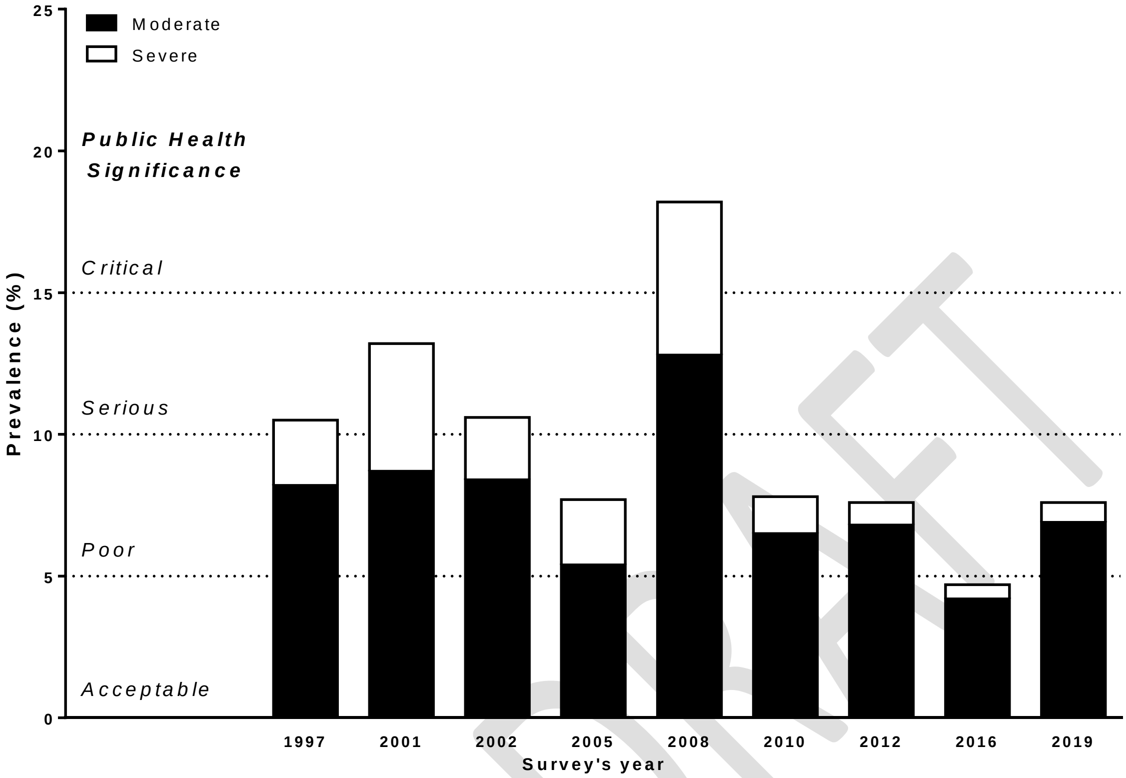

Figure 4.1. Global acute malnutrition prevalence in children aged 6-59 months (1997-2019).
For details please see Table A36. GAM estimates were obtained using the NCHS 1977 Growth References for surveys undertaken before 2007. GAM estimates were obtained using the 2006 WHO Child Growth Standards for surveys undertaken after 2007.

Figure 4.1 shows the GAM trend in the camps since 1997. We can observe that 2019 saw a reversal of the GAM reduction reported in 2016 nutrition survey. The main increase in acute malnutrition between 2016 and 2019 was a significant increase in MAM from 4.2% (95% CI: 3.3; 5.2) in 2016 to 6.9% (95% CI: 5.6; 8.6) in 2019 (an increase of 3.2 percentage points; S.E.: 0.91, $p<0.01$). SAM remains of low prevalence since 2012. GAM prevalence in this operation appears more often to be of a poor Public Health Significance. For further details on GAM trends, see Table A36.

4.2) STUNTING PREVALENCE IN CHILDREN AGED 6-59 MONTHS

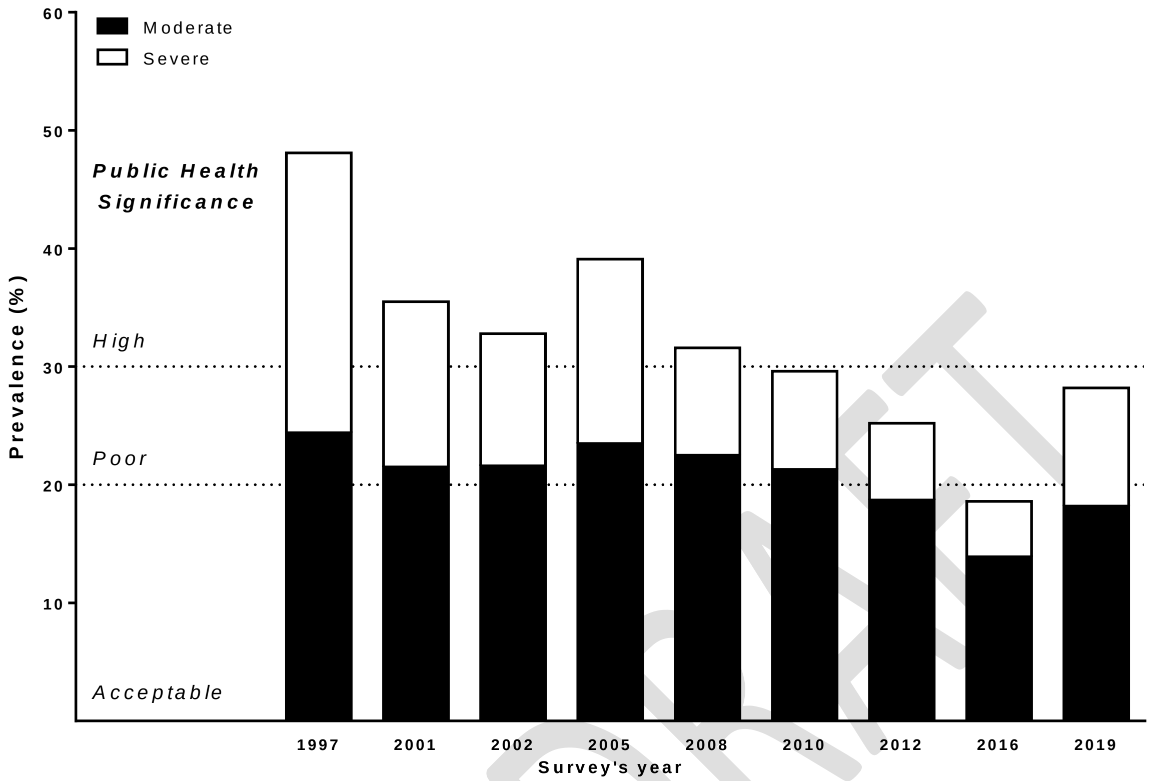

Figure 4. 2. Stunting prevalence in children aged 6-59 months (1997-2019).
For details, please see Table A37. Stunting estimates were obtained using the NCHS 1977 Growth References for surveys undertaken before 2007. Stunting estimates were obtained using the 2006 WHO Child Growth Standards for surveys undertaken after 2007.

Stunting prevalence in this operation saw the first significant increase, reversing the near 20-year decline observed in 1997-2016. From 2016 to 2019 the stunting prevalence increased from 18.6% (95% CI: 16.8; 20.6) to 28.2% (95% CI: 25.3; 31.3); a difference of -9.6 percentage points (S.E.: 1.80, p<0.01). The stunting estimates observed in 2019 are like those observed in 2010 (29.7%, 95% CI: 26.9; 32.5).

In the past 22 years the public health significance of the stunting prevalence, as denoted by the 95% confidence intervals, has fluctuated between high and poor significance. Only in 2012 and 2016, the public health significance of stunting in this context was considered either poor or acceptable.

In addition to the prevalence increase for stunting, we observed a change in the severity of stunting from a ratio in 2016 of severe: moderate of 1:3.0 to 1:1.8 in 2019 (see table A 37)

4.3) ANAEMIA PREVALENCE IN CHILDREN AGED 6-59 MONTHS

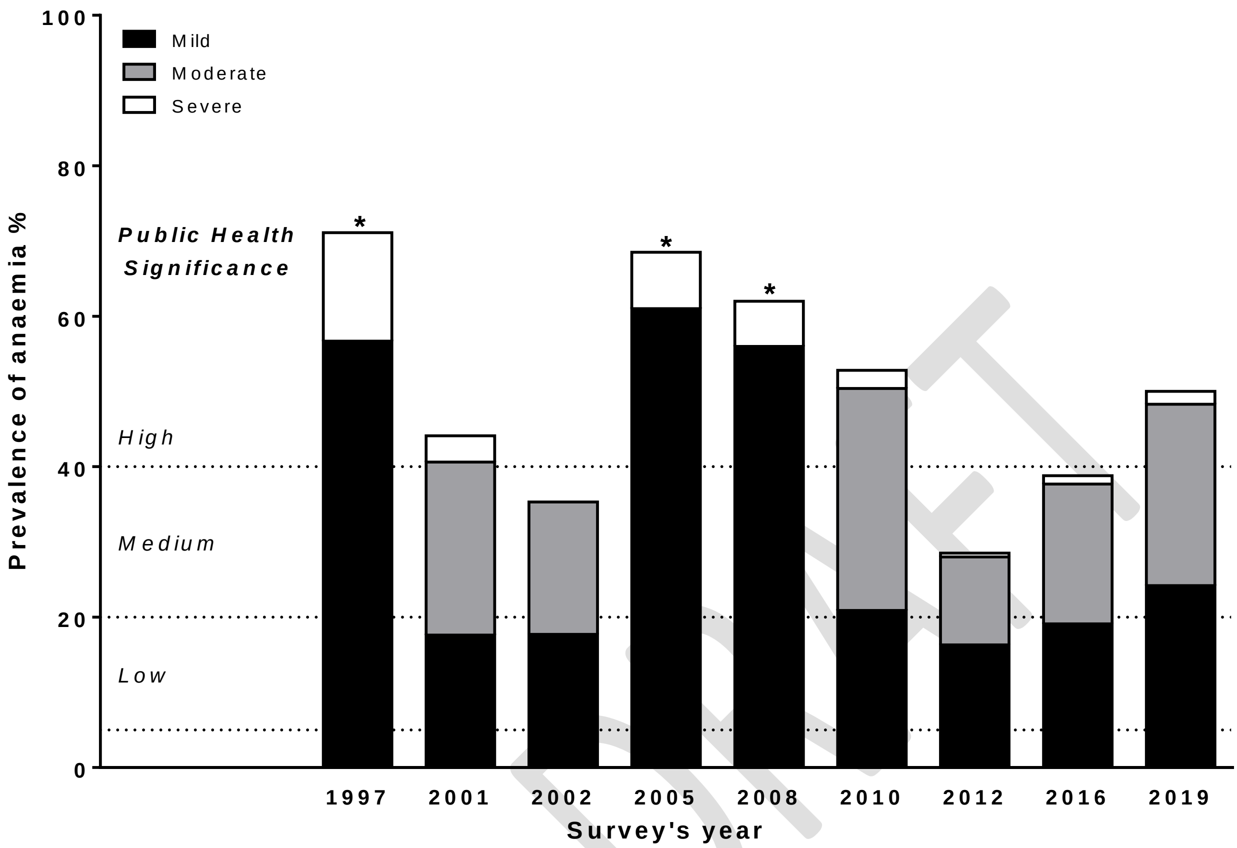

Figure 4.3. Anaemia prevalence in children aged 6-59 months (1997-2019).
* Data to differentiate mild or moderate anaemia was not available. Data was grouped as mild/moderate anaemia. For details, please see Table A38.

Anaemia prevalence has seen a consistent and significant upward trend since 2012, following a significant reduction from 2010 to 2012. In 2019, anaemia prevalence in children aged 6-59 months changed from 38% (95% CI: 36.3; 41.2) in 2016 to 50.1% (95% CI: 46.7; 53.4); that is a significant increase of 11.4 percentage points (S.E.: 2.1; p<0.01). In addition, the anaemia prevalence estimate crossed the public health significance from medium to high. Anaemia prevalence estimates are now at similar prevalence level than in 2010 (52.8%, 95% CI: 49.1; 56.6). In addition, from 2016 to 2019, all types of anaemia increased significantly.

Twice in this refugee context (early 2000's and in 2010), there has been experiences using lipid-based micronutrient supplements 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. However, both experiences were time limited and we have observed an increase in the anaemia prevalence levels after the programmes were stopped. Since 2012 anaemia prevalence in this group has almost doubled with an increase of 21.7 percentage points (S.E.: 2.16, p<0.01)

4.4) ANAEMIA PREVALENCE IN WOMEN OF REPRODUCTIVE AGE (15-49 YEARS)

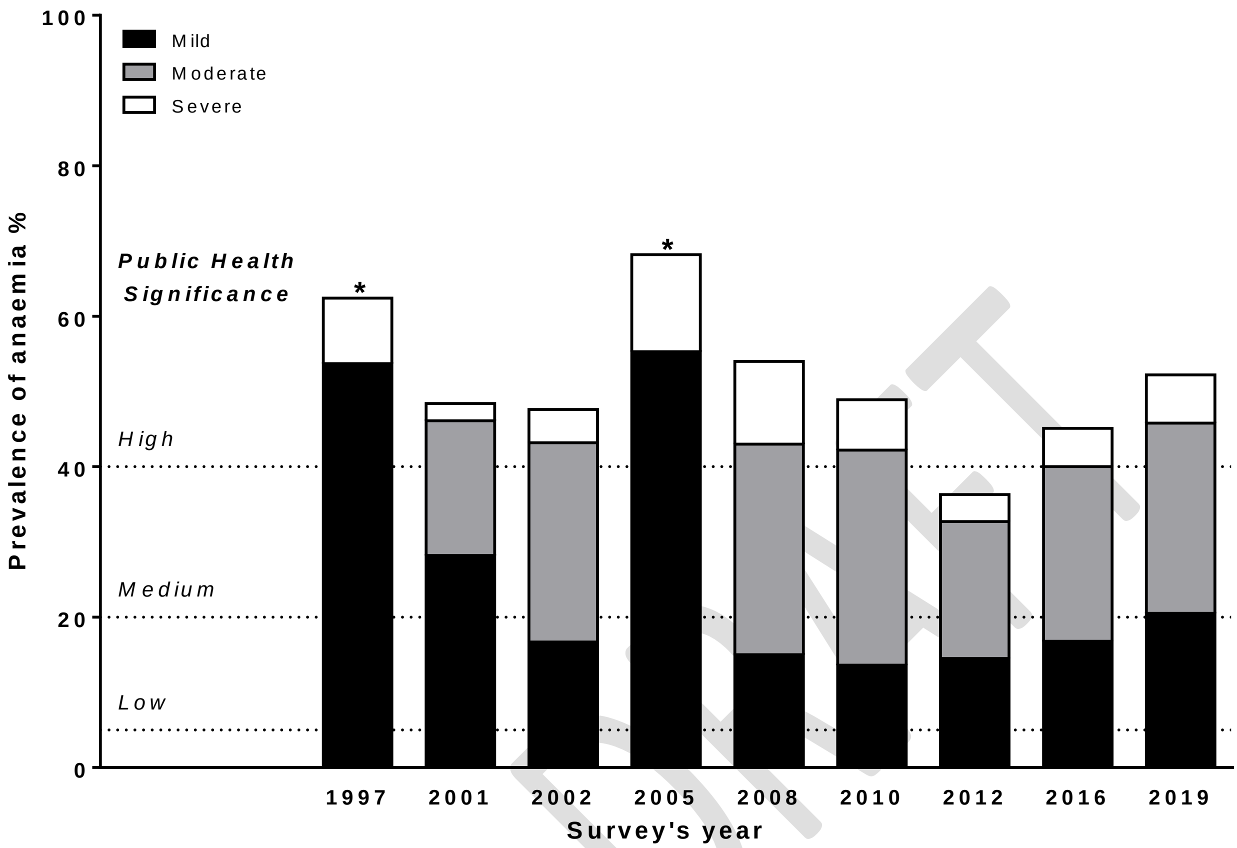

Figure 4.4. Anaemia prevalence in non-pregnant women of reproductive age (15-49 years) (1997-2019).
* Data to differentiate mild or moderate anaemia was not available. Data is grouped as mild/moderate anaemia. For details, please see Table A39.

A very similar trend in anaemia prevalence to that observed in children was observed in women of reproductive age (see **Figure 4.4**), 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 decreased until 2012. 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. However, since 2012, anaemia prevalence has significantly increased, and it is again of high public health significance. From 2016 to 2019, anaemia prevalence in this group changed from 45.2% (95% CI: 42.6; 47.4) to 52.2% (95% CI: 49.0; 55.3); a significant increase of 7.0 percentage points (S.E.: 2.07, p<0.01). Since 2012 anaemia prevalence in this group has increased by 15.8 percentage points (S.E.: 2.28, p<0.01).

Data for anaemia prevalence among pregnant women has been collected since 2002 and it is shown in **Figure 4.5**. Since 2002, anaemia prevalence for this target group is of high public health significance. Interestingly, anaemia changed in this group between 2002 and 2012, suggesting an overall improvement, as indicated by the reduction of severe and moderate anaemia. However, this pattern of improvement was arrested in 2012 and we observed a qualitative deterioration of the nutritional status of this population group regarding anaemia, although the observed changes were not statistically significant.

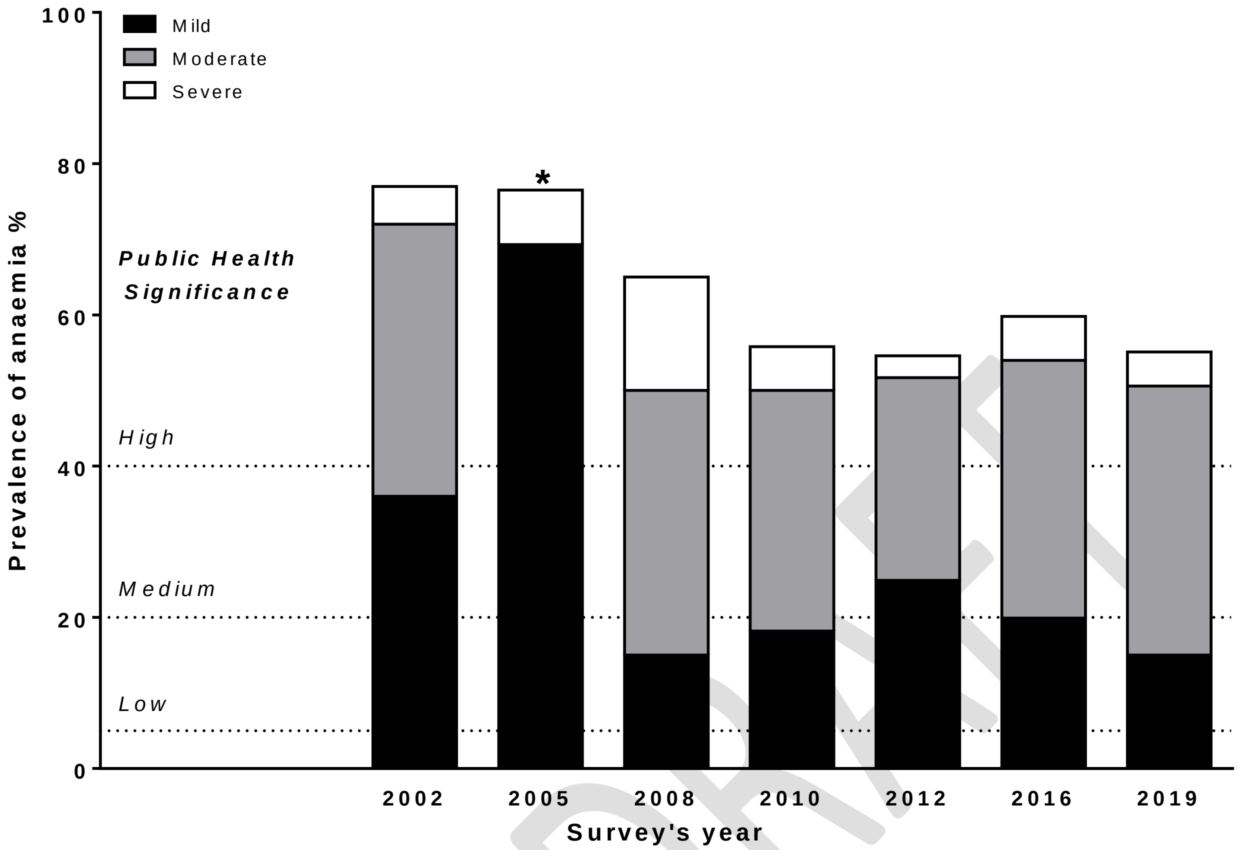

Figure 4.5. Anaemia prevalence in pregnant women of reproductive age (15-49 years) (2002-2019).
* Data to differentiate mild or moderate anaemia was not available. Data is grouped as mild/moderate anaemia. For details, please see Table A40.

4.5) UNDER-, OVER-WEIGHT AND OBESITY PREVALENCE IN WOMEN OF REPRODUCTIVE AGE (15-49 YEARS)

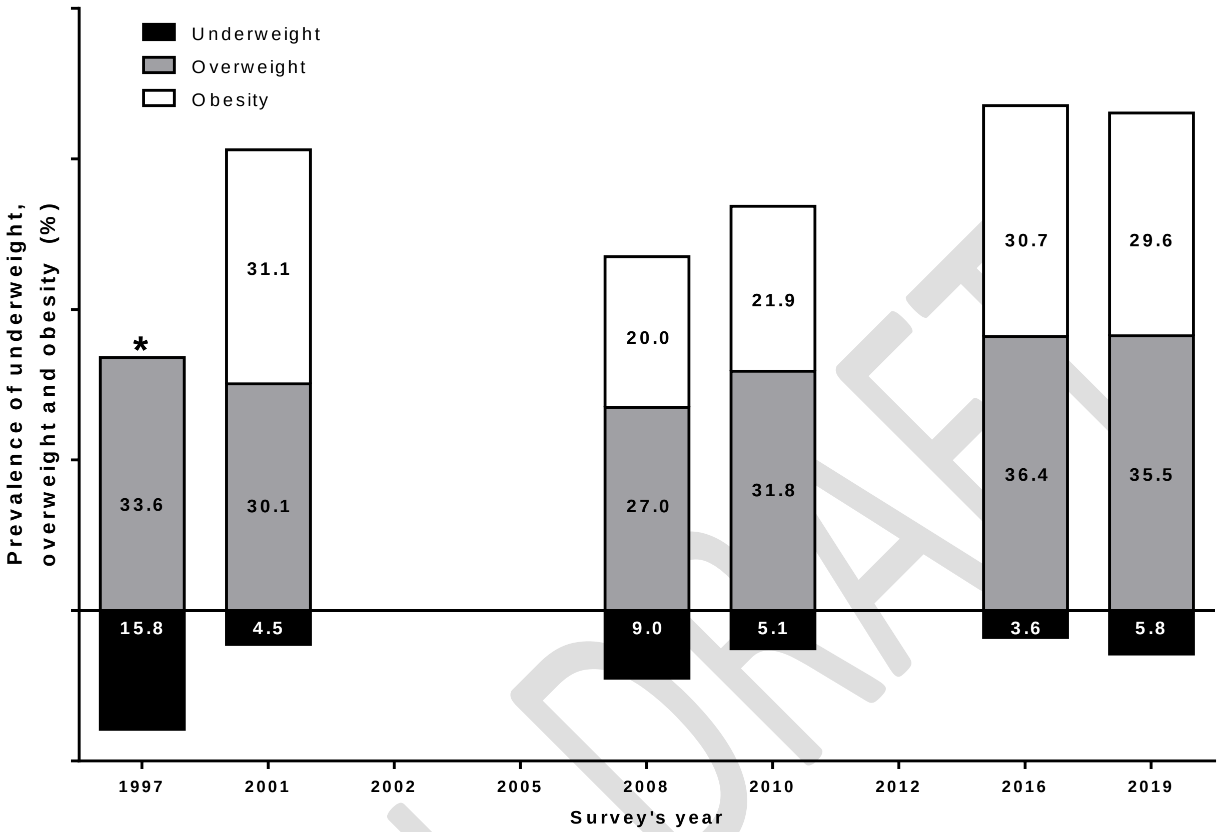

Figure 4.6. Underweight, overweight and obesity in women aged 15-49 years (1997-2019)

* No data was available to differentiate between overweight and obesity

There has been an increase to the BMI distribution in women of reproductive age as shown in Figure 4.6. The figure shows that in the past 20 years underweight prevalence has declined from 15.8% in 1997 to 3.6% in 2016, although it increased to 5.8 in 2019. Furthermore, the joint prevalence of overweight and obesity has doubled since 1997 from 33.6% to 65% in 2019, that is, almost seven out of ten women at this age are overweight or obese. This rapid rise in overweight and obesity in this population group should be considered of high public health significance.

4.6) FOOD CONSUMPTION SCORES

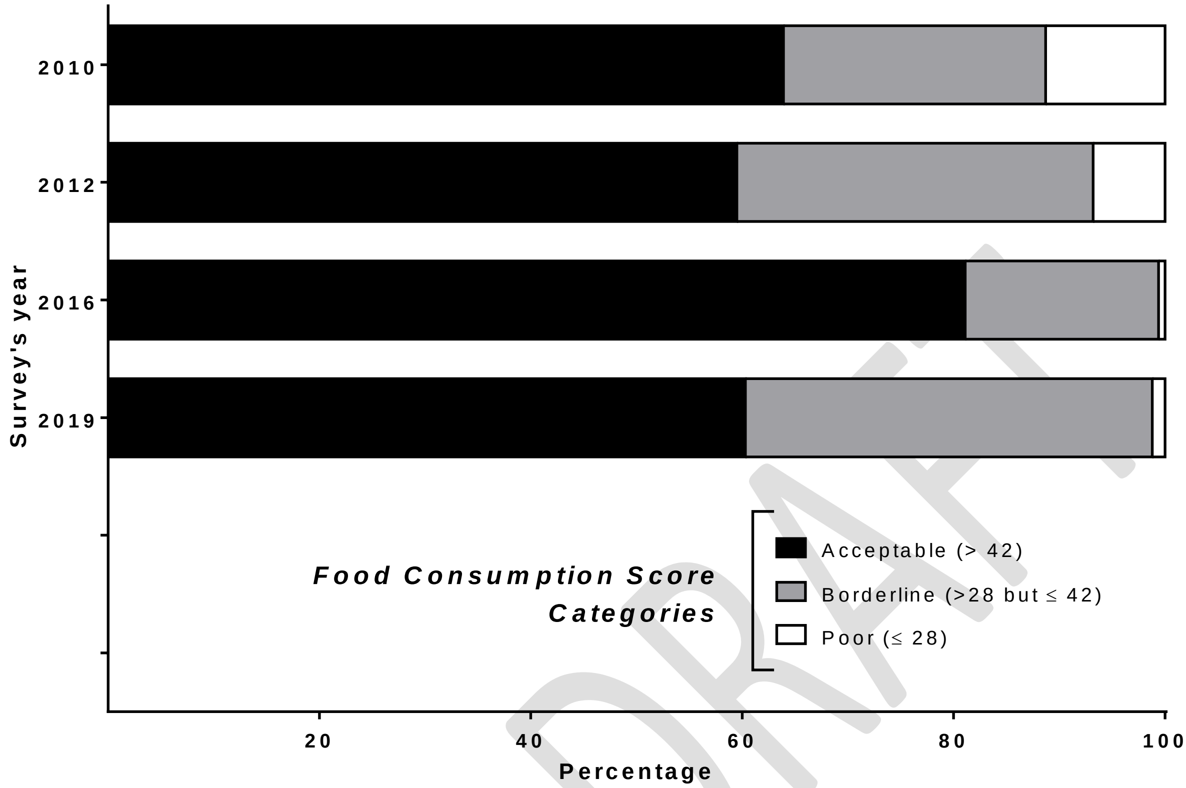

Figure 4.8. Food consumption score categories (2010-2019).

Compared to 2016, there has been a worsening of the food security as measured by FCS, as the number of households with acceptable scores declined from 91% to 60%. Nonetheless, the proportion of households with poor scores remains low.

V. RECOMENDATIONS

Based on the survey findings the following recommendations are made for improving the nutrition and health situation of the Sahrawi refugees.

5.1) FOOD SECURITY AND NUTRITION ADEQUACY

1. ***Improve the micronutrient content of the General Food Distribution (GFD) to ensure adequacy and stability.***

Rationale:	The GFD's vitamin and mineral content is known to be inadequate. Anaemia and stunting prevalence have significantly worsened and both conditions are known to be associated to micronutrient deficiencies.
Actions:	• Include fortified commodities in the GFD as a priority[26]. • Include Corn Soya Blend Plus as commodity to the Food Security Stock.

2. ***Increase household food diversity and GFD diversity.***

Rationale:	Household food diversity remains improved. However, the dietary diversity assessed by a 24-hrs recall indicates that 4 out of 8 food groups consumed on average by households comprised mainly cereals, sugary products, vegetables and spices, condiments and drinks. Furthermore, only 6 out of 10 women reached a minimum dietary diversity.
Actions:	• Increase the number of fresh food commodities. Provide a minimum monthly distribution of three different fresh food commodities. Work towards increasing this minimum to five different food commodities[27]. • Increase the number of food commodities rich in animal protein. Canned fish[28] should be distributed monthly. • Explore cash-based interventions as the strategy to increase household and individual food diversity[29].

3. ***Implement nutrition-sensitive interventions to improve food security and nutritional adequacy.***

Rationale:	Nutrition-sensitive interventions have the potential to affect nutrition indicators trough affecting the underlying causes of malnutrition such as economic development, better caring practices or improved food security.
Actions:	• Develop and strengthen linkages between actors in the Nutrition sector and actors implementing livelihood programmes. • Strengthen local livelihood activities to expand production[30] with the view of improved nutrition goals[31]. • Assess the feasibility of producing fortified commodities in this setting. Purchase of these locally produced fortified commodities would contribute to the school feeding programme and support development of the local economy. • Mainstream nutrition education in all nutrition activities and related multi-sectoral programmes.

5.2) INFANT AND YOUNG CHILD FEEDING (IYCF) PRACTICES

1. ***Prioritise and improve IYCF practices.***

[26] The micronutrient specifications of fortified products should take into account the micronutrient content of the commodities included in the food basket and those distributed in the blanket supplementary feeding programme to children aged 6-59 months and pregnant and lactating women
[27] Selection of fresh food commodities should consider its nutritional content and cultural preferences
[28] Currently the sole source of animal protein in the GFD and essential to fulfil GFD requirements regarding fat and niacin.
[29] Cash transfers and food vouchers have shown to increase household food diversity among beneficiaries; and it would potentially allow refugee households to access a wider range of food items, such as chicken (animal protein) and milk.
[30] E.g., poultry farms, cheese production at Daira/household level
[31] Implement and advocate for livelihood interventions that address anaemia, stunting and the needs of vulnerable groups, with the aim to diversify their food production and/or income, thus enabling them access a more diversified diet

Rationale:	IYCF practices remain poor in this context, despite improvements observed. Improved IYCF practices are known to improve the nutritional status of children and to reduce and/or prevent morbidity. In this setting, bottle-feeding is high and exclusive breastfeeding is low, there is evidence of inadequate weaning practices and all IYCF indicators indexing an acceptable diet are low.
Actions:	• Undertake formative research as a priority to assess factors that influence IYCF practices in this setting. Findings should inform the IYCF Behaviour Change Communication (BCC) intervention, its appropriate key messages and its priority target groups. • Develop a 5-year IYCF strategy as a priority. The strategy should integrate with the Sahrawi Nutrition Strategy. • Prioritise behaviour change counselling and support for IYCF in health and nutrition activities. • Increase or strengthen the human resource capacity[32] to promote and support IYCF during any contact between health services and mothers throughout pregnancy and the first two years of child´s life[33]. • Develop or strengthen IYCF community-based activities through community peer-to-peer support groups[34]. These activities should include other family members who traditionally influence IYCF practices of mothers, e.g. husbands and mothers-in-law. • Review and update current protocols and activities for IYCF promotion and support within PISIS activities. • Develop a package of IYCF materials[35] to facilitate user-friendly communication and dissemination of appropriate IYCF messages. • Design a media/communication campaign for IYCF awareness[36]. • Explore the feasibility of introducing the Baby Friendly Hospital Initiative[37]. • Monitor IYCF practices and interventions. Reports should be produced monthly at the Daira and Wilaya level.

5.3) ACUTE MALNUTRITION

1. Improve the performance of malnutrition treatment programmes.

Rationale:	Global Acute malnutrition (GAM) prevalence has worsened since 2016 reversing past gains. Given its potential to reduce child morbidity and mortality, improving the integration of acute malnutrition management into routine health services should be considered a priority intervention. In addition, timely treatment of MAM cases is known to prevent progression into SAM.
Actions:	• Ensure regular and timely procurement of enough quantities of nutritional products for SAM/MAM treatment. • WFP/UNHCR to reinforce the technical capacity of the implementing partners in charge of overseeing malnutrition treatment programmes through the provision of technical support and regular training.

2. Increase the coverage of malnutrition treatment programmes.

Rationale:	The survey results indicate very low coverage of malnutrition treatment programmes.

[32] Provide regular training to improve IYCF knowledge and skills of health staff and others people that care for mothers. Stress should be also made on interpersonal communication, problem solving, counselling and group facilitation

[33] Including antenatal care, delivery care, postnatal care, immunization visits, growth monitoring and promotion, sick child consultation and others child health services.

[34] E.g. mother-to-mother groups.

[35] Examples can be found at https://www.unicef.org/nutrition/files/counseling_cards_Oct._2012small.pdf and https://www.unicef.org/nutrition/files/Key_Messages_Booklet_for_counselling_cards.pdf. Include also cooking demonstrations and other IYCF practical sessions (e.g., adequate attachment to the breast) to provide more practical and efficient advices.

[36] E.g. through women´s meetings and other audiences, community & religious leaders, Sahrawi Women´s Association, TV and radio.

[37] The initiative aims to improve hospital routines and procedures so that they are supportive of the successful initiation and continuation of optimal breastfeeding practices. . A hospital is designated as "baby friendly" when it has agreed not to accept free or low-cost breastmilk substitutes, feeding bottles or teats, and to implement 10 specific steps to support breastfeeding.

Actions:	• Re-initiate and/or strengthen monthly active case finding of MAM/SAM and referral of cases through MUAC screening at community level by the “Jefas de Barrio”. • Strengthen the follow-up of identified MAM/SAM cases referred. • Expand the participation of other actors in active case finding to increase coverage. Mothers[38], carers, and educators[39] in kinder gardens could be trained to undertake monthly MUAC measurements from children to detect acute malnutrition.

3. Prevent acute malnutrition in vulnerable individuals and households.

Rationale:	Malnutrition usually occurs in vulnerable households. Furthermore, malnutrition also clusters in households with inadequate IYCF practices. The occurrence of malnutrition in any household member is a clear sign of household vulnerability.
Actions:	• Include as a priority component counselling on IYCF best practices for mothers and carers during the provision of SAM/MAM care[40]. • Evaluate household vulnerability[41] of children following MAM treatment discharge[42]. Ensure that identified vulnerable households are beneficiaries of the GFD and consider linkages with livelihood activities in the community. • Cover the additional pregnancy- and lactation-related nutritional requirements needed by non-malnourished PLW’s from the second trimester onwards by providing additional food commodities (e.g. fresh foods, eggs & dairy products) through other means such as cash transfers or food vouchers[43].

5.4) STUNTING AND ANAEMIA IN CHILDREN AND WOMEN

1. Re-establish the Anaemia and Stunting Reduction Programme.

Rationale:	In past surveys, the Anaemia and Stunting Reduction Programme has shown a strong impact on reducing anaemia prevalence. However, this programme has since stopped. The current worsening of anaemia prevalence is likely associated to a lack of micronutrient-rich food. In addition, past data showed high acceptability of this programme in the target populations.
Actions:	• Resume the blanket supplementary feeding (BSF) to children aged 6-59 months with Nutributter® and re-establish BSF for PLW with micronutrient-powder (MNP).

2. Implement complementary multi-sectorial actions to reduce anaemia and stunting.

Rationale:	Multi-sectorial actions have the potential to reduce anaemia and stunting prevalence trough affecting the underlying causes of malnutrition such as health and well-being, better caring practices or improved food security.
Actions:	• Develop and/or implement a deworming strategy • Explore delivering a minimum package for women of childbearing age addressing optimal wellbeing including maternal care, psychosocial support, and increased nutrient needs, among others. This and other nutrition education topics should be included as part of the curricula within secondary school and other relevant forums. • Mainstream nutrition education and hygiene promotion into the school curricula. • Expand the School Feeding programme to kinder-gardens. • Link livelihoods interventions with the Anaemia and Stunting Reduction Programme, including also criteria for targeting of beneficiaries[44].

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[38] Blackwell N., Myatt M., et al. Mothers Understand and Can do it (MUAC): a comparison of mothers and community health workers determining mid-upper arm circumference in 103 children aged from 6 months to 5 years. Archives of Public Health; 2015.
Guidelines for training of trainers –Mother (MUAC)-. Teaching mothers to screen for malnutrition. Available at *http://alima-ngo.org/empowering-mothers-prevent-malnutrition*
[39] They could be trained on MUAC measurement and technique, and conduct monthly MUAC to children of three and four years.
[40] IYCF best practices are known to increase the likelihood of recovery and reduce the likelihood of relapse following discharge from care.
[41] Household vulnerability should be evaluated through the development of simple “ranking household vulnerability” tool.
[42] Because every SAM child will be always referred and admitted into SFP once discharged from OTP.
[43] Cash transfer or food vouchers could be made conditional to ante- and postnatal care attendance and/or to compliance to the anaemia prevention programme (blanket supplementation of Chaila).
[44] E.g., Commodities locally produced like cheese/poultry could be given to households with anaemic PLW.

	• Explore the feasibility to develop a locally produced a nutritionally rich food for children aged 6-23 months (e.g. staple cereals or gofio) or a fortified, ready-to-eat, specialized nutritious food[45].

5.5) OBESITY AND NON-COMMUNICABLE DISEASES AMONG WOMEN

1. Reduce exposure to risk factors associated with obesity and non-communicable diseases.

Rationale:	The burden of obesity and non-communicable diseases are high in this setting. WHO recommends the reduction of risk factors as part of the priority interventions
Actions:	• Continue expanding the provision of adequate care for non-communicable diseases. • Develop a 5-year strategy for the prevention of obesity and non-communicable diseases. • Develop infrastructure and programmes to increase physical activity, especially among women of childbearing age[46]. • Develop a programme to promote a healthier life-style[47]. • Develop a programme to reduce tobacco consumption. • Undertake operational research to understand the cultural, social and biological aspects regarding overweight and non-communicable diseases. Findings should be used to develop BCC strategies.

5.6) WATER, SANITATION AND HYGIENE

1. Improve water infrastructure and hygiene practices.

Rationale:	Survey data indicate that over half of households do not meet UNHCR water provision standards and that about half of the households are not satisfied with the water provision. Improvements of water infrastructure and hygiene practices are known to improve nutrition indicators and reduce morbidity.
Actions:	• Mainstream hygiene promotion activities in all nutrition interventions. • UNHCR to continue replacement of water containers to improve access to quality water. • Provide information and education to improve the maintenance and cleanliness of water containers and to increase their utility life span.

5.7) POPULATIONAL ASSESSMENTS

1. Undertake further nutrition-related assessments.

Rationale:	Self-reported non-communicable diseases have increased significantly since 2016. The nutrition indicators in women and children continue to worsen.
Actions:	• Implement nutrition surveys every two years. Nutrition surveys should follow UNHCR SENS guidelines[48] and, when feasible, undertaken separately by Wilaya. Nutrition surveys should include infants aged <6 months as a target group. • Undertake a survey to ascertain the prevalence of metabolic diseases, specifically diabetes, hypertension and high cholesterol. Include men in the assessment of metabolic risk factors such as overweight and obesity. • Undertake an assessment to ascertain the nutritional status of school age children in order to have baseline data for future activities. • Undertake an assessment to ascertain the nutrition status of other vulnerable population groups (e.g. elderly, people with disabilities).

[45] Support of local food production and use of available foods, reduce dependency of international supplies and enhance ownership by the refugee population. In addition, it would contribute towards activating the local economy.
[46] The provision of convenient and safe exercise facilities, the allocation of time for exercise, a media focus on the role of physical activity in health promotion, and community education are all methods of increasing energy expenditure.
[47] The programme should promote a healthier diet, lifestyle, and culture change, though the provision of adequate information focused on healthy diets and unhealthy foods (e.g. higher consumption of fruits vegetables, excessive sugar consumption and sugary beverages), the health risks of diets involving excessive consumption of high energy-dense foods, and the benefits of physical activity.
[48] UNHCR Standardised Expanded Nutrition Survey (SENS) guidelines. Available at: http://sens.unhcr.org/

VI. ANNEXES

Annex 1) RESULTS TABLES

Table A1. Prevalence of acute malnutrition in children aged 6-59 months by strata and sex.[1]

		Awserd	Dakhla	Laayoune	Smara[2]	Aggregated[3]
All	N	422	407	395	485	1,709
Prevalence of GAM	(n) %	(22) 5.2	(23) 5.7	(15) 3.8	(56) 11.5	(116) 7.6
(<-2 z-scores and/or oedema)	(95% CI)	(3.4; 7.8)	(3.8; 8.3)	(2.3; 6.2)	(8.7; 15.2)	(6.3; 9.3)
Prevalence of MAM	(n) %	(18) 4.3	(23) 5.7	(14) 3.5	(51) 10.5	(106) 6.9
(<-2 but ≥-3 z-scores, no oedema)	(95% CI)	(2.8; 6.4)	(3.8; 8.3)	(2.1; 5.9)	(7.8; 14.1)	(5.6; 8.6)
Prevalence of SAM	(n) %	(4) 0.9	(0) 0.0	(1) 0.3	(5) 1.0	(10) 0.7
(<-3 z-scores and/or oedema)	(95% CI)	(0.4; 2.5)	N/A	(0.0; 1.8)	(0.4; 2.8)	(0.3; 1.4)
Oedema Prevalence	(n) %	(0) 0.0	(0) 0.0	(0) 0.0	(0) 0.0	(0) 0.0
Boys	N	225	221	185	264	895
Prevalence of GAM	(n) %	(13) 5.8	(13) 5.9	(8) 4.3	(42) 15.9	(76) 10.0
(<-2 z-scores and/or oedema)	(95% CI)	(3.5; 9.5)	(3.7; 9.1)	(2.3; 7.9)	(11.3; 21.9)	(7.9; 12.7)
Prevalence of MAM	(n) %	(11) 4.9	(13) 5.9	(8) 4.3	(40) 15.2	(72) 9.5
(<-2 but ≥-3 z-scores, no oedema)	(95% CI)	(2.9; 8.1)	(3.7; 9.1)	(2.3; 7.9)	(10.6; 21.1)	(7.4; 12.1)
Prevalence of SAM	(n) %	(2) 0.9	(0) 0.0	(0) 0.0	(2) 0.8	(4) 0.5
(<-3 z-scores and/or oedema)	(95% CI)	(0.2; 3.4)	N/A	N/A	(0.2; 3.0)	(0.2; 1.5)
Girls	N	197	186	210	221	814
Prevalence of GAM	(n) %	(9) 4.6	(10) 5.4	(7) 3.3	(14) 6.3	(40) 5.0
(<-2 z-scores and/or oedema)	(95% CI)	(2.3; 8.8)	(2.8; 10.1)	(1.5; 7.3)	(3.5; 11.2)	(3.5; 7.2)
Prevalence of MAM	(n) %	(7) 3.6	(10) 5.4	(6) 2.9	(11) 5.0	(34) 4.1
(<-2 but ≥-3 z-scores, no oedema)	(95% CI)	(1.6; 7.7)	(2.8; 10.1)	(1.2; 6.8)	(2.6; 9.3)	(2.8; 6.1)
Prevalence of SAM	(n) %	(2) 1.0	(0) 0.0	(1) 0.5	(3) 1.4	(6) 0.9
(<-3 z-scores and/or oedema)	(95% CI)	(0.2; 4.1)	N/A	(0.1; 3.4)	(0.5; 4.0)	(0.4; 2.0)

1. Acute malnutrition results based on weight-for-length/height z-scores and/or oedema using the 2006 WHO Child Growth Standards. 2 Smara estimates includes data collected from Boujdour. 3 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A2. Prevalence of acute malnutrition in children aged 6-59 months by age.[1]

Age	Total	GAM (<-2 z-scores and/or oedema)		MAM (<-2 but ≥-3 z-scores)		SAM (<-3 z-scores and/or oedema)		Oedema	
Age (months)	No.	No.	%	No.	%	No.	%	No.	%
6 - 17	438	42	10.9	36	9.4	6	1.5	0	0.0
18 - 29	394	24	7.2	23	6.8	1	0.4	0	0.0
30 - 41	330	16	5.1	14	4.4	2	0.7	0	0.0
42 - 53	345	22	6.8	22	6.8	0	0.0	0	0.0
54 - 59	202	12	7.2	11	6.4	1	0.8	0	0.0
Total	1,709	116	7.6	106	6.9	10	0.7	0	0.0

1. Acute malnutrition results based on weight-for-length/height z-scores and/or oedema using the 2006 WHO Child Growth Standards.

Table A3. Prevalence of acute malnutrition in children aged 6-59 months by strata and sex.[1]

		Awserd	Dakhla	Laayoune	Smara[2]	Aggregated[3]
All	N	430	413	407	496	1,746
Prevalence of GAM	(n) %	(20) 4.7	(36) 8.7	(17) 4.2	(50) 10.1	(123) 7.3
(<12.5 cm and/or oedema)	(95% CI)	(3.1; 7.0)	(5.9; 12.8)	(2.4; 7.1)	(7.7; 13.1)	(6.0; 8.9)
Prevalence of MAM	(n) %	(19) 4.4	(36) 8.7	(16) 3.9	(41) 8.3	(112) 6.4
(<12.5 but ≥11.5 cm, no oedema)	(95% CI)	(2.9; 6.8)	(5.9; 12.8)	(2.3; 6.5)	(6.3; 10.8)	(5.3; 7.8)
Prevalence of SAM	(n) %	(1) 0.2	(0) 0.0	(1) 0.2	(9) 1.8	(11) 0.9
(<11.5 cm and/or oedema)	(95% CI)	(0.0; 1.7)	N/A	(0.0; 1.8)	(1.0; 3.4)	(0.5; 1.6)
Oedema Prevalence	(n) %	(0) 0.0	(0) 0.0	(0) 0.0	(0) 0.0	(0) 0.0
Boys	N	226	223	195	272	916
Prevalence of GAM	(n) %	(12) 5.3	(17) 7.6	(5) 2.6	(31) 11.4	(65) 7.7
(<12.5 cm and/or oedema)	(95% CI)	(2.9; 9.4)	(4.5; 12.7)	(1.0; 6.7)	(8.2; 15.6)	(5.9; 9.9)
Prevalence of MAM	(n) %	(12) 5.3	(17) 7.6	(5) 2.6	(23) 8.5	(57) 6.4
(<12.5 but ≥11.5 cm, no oedema)	(95% CI)	(2.9; 9.4)	(4.5; 12.7)	(1.0; 6.7)	(6.2; 11.4)	(5.0; 8.1)
Prevalence of SAM	(n) %	(0) 0.0	(0) 0.0	(0) 0.0	(8) 2.9	(8) 1.3
(<11.5 cm and/or oedema)	(95% CI)	N/A	N/A	N/A	(1.5; 5.6)	(0.7; 2.7)
Girls	N	204	190	212	224	830
Prevalence of GAM	(n) %	(8) 3.9	(19) 10.0	(12) 5.7	(19) 8.5	(58) 7.0
(<12.5 cm and/or oedema)	(95% CI)	(2.1; 7.2)	(6.2; 15.9)	(2.9; 10.6)	(5.6; 12.7)	(5.3; 9.1)
Prevalence of MAM	(n) %	(7) 3.4	(19) 10.0	(11) 5.2	(18) 8.0	(55) 6.5
(<12.5 but ≥11.5 cm, no oedema)	(95% CI)	(1.7; 6.7)	(6.2; 15.9)	(2.8; 9.3)	(5.2; 12.3)	(4.9; 8.6)
Prevalence of SAM	(n) %	(1) 0.5	(0) 0.0	(1) 0.5	(1) 0.4	(3) 0.4
(<11.5 cm and/or oedema)	(95% CI)	(0.1; 3.4)	N/A	(0.1; 3.3)	(0.1; 3.2)	(0.1; 1.3)

1. Acute malnutrition results based on middle-upper arm circumference data. 2 Smara estimates includes data collected from Boujdour. 3 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A4. Prevalence of acute malnutrition in children aged 6-59 months by age.[1]

Age	**Total**	**GAM** (<12.5 cm and/or oedema)		**MAM** (<12.5 but ≥11.5 cm)		**SAM** (<11.5 cm and/or oedema)		**Oedema**	
Age (months)	No.	No.	%	No.	%	No.	%	No.	%
6 - 17	455	81	18.3	77	16.9	4	1.3	0	0.0
18 - 29	398	28	7.4	25	6.2	3	1.1	0	0.0
30 - 41	339	7	2.0	5	1.4	2	0.6	0	0.0
42 - 53	348	4	1.3	3	0.9	1	0.4	0	0.0
54 - 59	206	3	2.3	2	1.5	1	0.8	0	0.0
Total	1,746	123	7.3	112	6.4	11	0.9	0	0.0

1. Acute malnutrition results based on middle-upper arm circumference data.

Table A5. Prevalence of underweight in children aged 6-59 months by strata and sex.[1]

		Awserd	Dakhla	Laayoune	Smara[2]	Aggregated[3]
All	N	427	413	398	493	1,731
Prevalence of underweight	(n) %	(71) 16.6	(48) 11.6	(54) 13.6	(95) 19.3	(268) 16.4
(<-2 z-scores)	(95% CI)	(12.5; 21.8)	(9.0; 14.9)	(10.1; 18.0)	(16.4; 22.5)	(14.6; 18.4)
Prevalence of moderate underweight	(n) %	(42) 9.8	(36) 8.7	(23) 5.8	(73) 14.8	(174) 10.8
(<-2 but ≥-3 z-scores)	(95% CI)	(7.1; 13.5)	(6.3; 12.0)	(3.7; 8.8)	(11.9; 18.3)	(9.3; 12.6)
Prevalence of severe underweight	(n) %	(29) 6.8	(12) 2.9	(31) 7.8	(22) 4.5	(94) 5.6
(<-3 z-scores)	(95% CI)	(4.3; 10.5)	(1.7; 5.0)	(5.3; 11.2)	(2.9; 6.7)	(4.5; 7.0)
Boys	N	202	189	208	223	822
Prevalence of underweight	(n) %	(34) 16.4	(20) 12.5	(22) 16.8	(28) 24.8	(104) 19.9
(<-2 z-scores)	(95% CI)	(12.3; 21.6)	(9.0; 17.2)	(11.5; 24.0)	(20.3; 29.9)	(17.3; 22.8)
Prevalence of moderate underweight	(n) %	(20) 8.9	(22) 9.8	(13) 6.8	(53) 19.6	(108) 13.4
(<-2 but ≥-3 z-scores)	(95% CI)	(6.1; 12.8)	(6.8; 13.9)	(4.1; 11.1)	(15.0; 25.2)	(11.1; 16.0)
Prevalence of severe underweight	(n) %	(17) 7.6	(6) 2.7	(19) 10.0	(14) 5.2	(56) 6.5
(<-3 z-scores)	(95% CI)	(4.6; 12.1)	(1.3; 5.5)	(6.1; 16.0)	(3.0; 8.9)	(4.8; 8.6)
Girls	N	202	189	208	223	822
Prevalence of underweight	(n) %	(34) 16.8	(20) 10.6	(22) 10.6	(28) 12.6	(104) 12.6
(<-2 z-scores)	(95% CI)	(11.4; 24.2)	(6.8; 16.2)	(7.2; 15.2)	(8.8; 17.5)	(10.3; 15.3)
Prevalence of moderate underweight	(n) %	(22) 10.9	(14) 7.4	(10) 4.8	(20) 9.0	(66) 8.0
(<-2 but ≥-3 z-scores)	(95% CI)	(6.5; 17.6)	(3.9; 13.5)	(2.5; 9.0)	(5.8; 13.6)	(6.1; 10.5)
Prevalence of severe underweight	(n) %	(12) 5.9	(6) 3.2	(12) 5.8	(8) 3.6	(38) 4.6
(<-3 z-scores)	(95% CI)	(3.0; 11.4)	(1.3; 7.4)	(3.6; 9.2)	(1.9; 6.8)	(3.3; 6.4)

1. Underweight results based on weight-for-age z-scores using the 2006 WHO Child Growth Standards. 2 Smara estimates includes data collected from Boujdour. 3 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A6. Prevalence of underweight in children aged 6-59 months by age.[1]

Age	Total	Underweight (<-2 z-scores)		Moderate underweight (<-2 but ≥-3 z-scores)		Severe underweight (<-3 z-scores)	
months	No.	No.	%	No.	%	No.	%
6 - 17	449	75	17.4	54	12.5	21	4.9
18 - 29	391	69	19.5	38	11.8	31	7.7
30 - 41	336	52	15.8	36	10.7	16	5.1
42 - 53	349	51	15.8	30	9.6	21	6.2
54 - 59	206	21	10.5	16	7.8	5	2.7
Total	1,731	268	16.4	174	10.8	94	5.6

1. Underweight results based on weight-for-age z-scores using the 2006 WHO Child Growth Standards.

Table A7. Prevalence of overweight in children aged 6-59 months by strata and sex.[1]

		Awserd	Dakhla	Laayoune	Smara[2]	Aggregated[3]
Prevalence of overweight (>2 z-scores)	N	422	407	395	485	1,709
All	(n) %	(10) 2.4	(10) 2.5	(15) 3.8	(6) 1.2	(41) 2.3
	(95% CI)	(1.2; 4.7)	(1.3; 4.5)	(2.5; 5.8)	(0.6; 2.6)	(1.7; 3.0)
Boys	(n) %	(6) 2.7	(6) 2.7	(7) 3.8	(3) 1.1	(22) 2.2
	(95% CI)	(1.1; 6.4)	(1.3; 5.5)	(1.9; 7.4)	(0.4; 3.3)	(1.5; 3.4)
Girls	(n) %	(4) 2.0	(4) 2.2	(8) 3.8	(3) 1.4	(19) 2.3
	(95% CI)	(0.8; 5.3)	(0.8; 5.6)	(2.0; 7.2)	(0.5; 4.0)	(1.4; 3.6)

1. Overweight results based on weight-for-age z-scores using the 2006 WHO Child Growth Standards. 2 Smara estimates includes data collected from Boujdour. 3 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A8. Prevalence of stunting in children aged 6-59 months by strata and sex.[1]

		Awserd	Dakhla	Laayoune	Smara[2]	Aggregated[3]
All	N	409	406	370	489	1,674
Prevalence of stunting	(n) %	(118) 28.9	(122) 30.0	(104) 28.1	(134) 27.4	(478) 28.2
(<-2 z-scores)	(95% CI)	(23.3; 35.1)	(25.1; 35.5)	(22.8; 34.1)	(22.5; 32.9)	(25.3; 31.3)
Prevalence of moderate stunting	(n) %	(77) 18.8	(93) 22.9	(60) 16.2	(87) 17.8	(317) 18.2
(<-2 but ≥-3 z-scores)	(95% CI)	(14.3; 24.4)	(19.1; 27.2)	(12.6; 20.6)	(13.8; 22.6)	(15.9; 20.8)
Prevalence of severe stunting	(n) %	(41) 10.0	(29) 7.1	(44) 11.9	(47) 9.6	(161) 10.0
(<-3 z-scores)	(95% CI)	(6.5; 15.2)	(4.9; 10.3)	(8.4; 16.6)	(7.0; 13.1)	(8.2; 12.0)
Boys	N	212	218	177	267	874
Prevalence of stunting	(n) %	(68) 32.1	(65) 29.8	(51) 28.8	(90) 33.7	(274) 31.8
(<-2 z-scores)	(95% CI)	((25.5; 39.5)	(22.5; 38.4)	(22.5; 36.1)	(27.9; 40.1)	28.3; 35.6)
Prevalence of moderate stunting	(n) %	(44) 20.8	(50) 22.9	(25) 14.1	(61) 22.8	(180) 20.5
(<-2 but ≥-3 z-scores)	(95% CI)	(15.3; 27.5)	(17.1; 30.0)	(10.2; 19.2)	(17.9; 28.7)	(17.6; 23.7)
Prevalence of severe stunting	(n) %	(24) 11.3	(15) 6.9	(26) 14.7	(29) 10.9	(94) 11.3
(<-3 z-scores)	(95% CI)	(7.3; 17.2)	(4.3; 10.9)	(9.9; 21.2)	(7.4; 15.6)	(9.1; 14.0)
Girls	N	197	188	193	222	800
Prevalence of stunting	(n) %	(50) 25.4	(57) 30.3	(53) 27.5	(44) 19.8	(204) 24.1
(<-2 z-scores)	(95% CI)	(19.3; 32.6)	(24.0; 37.4)	(20.8; 35.4)	(14.3; 26.8)	(20.7; 27.9)
Prevalence of moderate stunting	(n) %	(33) 16.8	(43) 22.9	(35) 18.1	(26) 11.7	(137) 15.7
(<-2 but ≥-3 z-scores)	(95% CI)	(11.7; 23.4)	(17.3; 29.5)	(12.9; 24.9)	(7.3; 18.2)	(12.8; 19.0)
Prevalence of severe stunting	(n) %	(17) 8.6	(14) 7.4	(18) 9.3	(18) 8.1	(67) 8.5
(<-3 z-scores)	(95% CI)	(4.8; 15.0)	(4.4; 12.4)	(5.7; 14.9)	(4.9; 13.1)	(6.4; 11.1)

1. Stunting results based on length/height-for-age z-scores using the 2006 WHO Child Growth Standards. 2 Smara estimates includes data collected from Boujdour. 3 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A9. Prevalence of stunting in children aged 6-59 months by strata and sex.[1]

Age	Total	Stunting (<-2 z-scores)		Moderate stunting (<-2 but ≥-3 z-scores)		Severe stunting (<-3 z-scores)	
months	No.	No.	%	No.	%	No.	%
6 - 17	425	130	29.3	89	19.2	41	10.2
18 - 29	376	127	33.8	84	22.8	43	11.0
30 - 41	331	107	32.4	74	20.9	33	11.5
42 - 53	338	84	24.4	50	13.9	34	10.4
54 - 59	204	30	14.4	20	10.2	10	4.2
Total	1,674	478	16.4	317	18.2	161	10.0

1. Stunting results based on length/height-for-age z-scores using the 2006 WHO Child Growth Standards.

Table A10. Mean z-score values of growth indicators in children aged 6-59 months, design effects and included and excluded subjects.[1]

Indicator	Wilaya	Available	Mean z-scores ± S.D.	Design Effect (z-score < -2)	z-scores not available	z-scores out of range
Weight-for-Length/Height	Awserd	422	-0.23 ± 1.25	0.80	1	9
	Dakhla	407	-0.31 ± 1.51	0.45	1	7
	Laayoune	395	-0.11 ± 1.06	1.07	3	10
	Smara[2]	485	-0.54 ± 0.93	1.94	3	10
	Aggregated[3]	1,709	-0.34 ± 1.14	1.43	8	36
Weight-for-Age	Awserd	428	-0.99 ± 1.17	1.36	0	4
	Dakhla	413	-0.94 ± 1.34	0.44	1	1
	Laayoune	399	-0.88 ± 0.99	1.45	2	7
	Smara[2]	493	-1.10 ± 0.83	1.17	3	2
	Aggregated[3]	1,733	-1.00 ± 1.03	1.18	6	14
Length/Height-for-Age	Awserd	409	-1.41 ± 1.30	1.43	1	22
	Dakhla	406	-1.42 ± 1.51	0.65	1	8
	Laayoune	370	-1.40 ± 1.16	1.68	1	37
	Smara[2]	489	-1.38 ± 0.93	2.63	1	8
	Aggregated[3]	1,674	-1.40 ± 1.16	1.92	4	75

1. Growth indicators are based on z-scores using the 2006 WHO Child Growth Standards. 2 Smara estimates includes data collected from Boujdour. 3 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A11. Household prevalence of malnutrition in children aged 6-59 months by strata and severity.[1]

		Awserd	Dakhla	Laayoune	Smara[2]	Aggregated[3]
Acute malnutrition by weight-for-length/height	N	302	299	293	315	1,209
Household prevalence of GAM	(n) %	(21) 6.95	(22) 7.36	(15) 5.12	(53) 16.8	(111) 10.5
(<-2 z-scores and/or oedema)	(95% CI)	(4.63; 10.3)	(5.10; 10.5)	(3.11; 8.30)	(12.6; 22.1)	(8.58; 12.8)
Household prevalence of MAM	(n) %	(18) 5.96	(22) 7.36	(14) 4.78	(48) 15.2	(102) 9.56
(<-2 but ≥-3 z-scores, no oedema)	(95% CI)	(3.94; 8.93)	(5.10; 10.5)	(2.83; 7.97)	(11.3; 20.3)	(7.74; 11.8)
Household prevalence of SAM	(n) %	(4) 1.32	(0) 0.00	(1) 0.34	(5) 1.59	(10) 1.00
(<-3 z-scores and/or oedema)	(95% CI)	(0.51; 3.42)	N/A	(0.05; 2.43)	(0.57; 4.3)	(0.49; 2.06)
Acute malnutrition MUAC	N	307	302	297	322	1,228
Household prevalence of GAM	(n) %	(20) 6.51	(35) 11.6	(17) 5.72	(47) 14.6	(119) 10.2
(<12.5 cm and/or oedema)	(95% CI)	(4.29; 9.78)	(7.60; 17.3)	(3.31; 9.73)	(10.95; 19.2)	(8.32; 12.4)
Household prevalence of MAM	(n) %	(19) 6.19	(35) 11.6	(16) 5.39	(39) 12.1	(109) 9.03
(<12.5 but ≥-3 z-scores, no oedema)	(95% CI)	(4.00; 9.46)	(7.60; 17.3)	(3.21; 8.91)	(9.13; 15.9)	(7.42; 10.9)
Household prevalence of SAM	(n) %	(1) 0.33	(0) 0.00	(1) 0.34	(9) 2.80	(11) 1.29
(<-3 z-scores and/or oedema)	(95% CI)	(0.04; 2.32)	N/A	(0.05; 2.39)	(1.44; 5.35)	(0.70; 2.37)
Stunting by length/height-for-age	N	299	296	273	319	1187
Household prevalence of stunting	(n) %	(104) 34.8	(106) 35.8	(92) 33.7	(111) 34.8	(413) 34.6
(<-2 z-scores)	(95% CI)	(27.9; 42.4)	(29.7; 42.5)	(27.6; 40.43)	(28.2; 42.0)	(31.0; 38.5)
Household prevalence of moderate stunting	(n) %	(70) 23.4	(82) 27.7	(55) 20.2	(78) 24.5	(285) 23.5
(<-2 but ≥-3 z-scores)	(95% CI)	(17.8; 30.2)	(22.5; 33.6)	(15.8; 25.31)	(18.9; 31.1)	(20.5; 26.9)
Household prevalence of severe stunting	(n) %	(39) 13.0	(28) 9.46	(42) 15.38	(42) 13.2	(151) 13.3
(<-3 z-scores)	(95% CI)	(8.28; 20.0)	(6.45; 13.7)	(11.0; 21.1)	(9.42; 18.1)	(10.9; 16.0)

1. Malnutrition results are based on z-scores using the 2006 WHO Child Growth Standards. 2 Smara estimates includes data collected from Boujdour. 3 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A12. Prevalence of selected Infant and Young Child Feeding Practices indicators by strata.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
Children aged <24 months	N	195	198	181	229	803
Children ever breastfed	(n) %	(173) 88.7	(168) 84.9	(151) 83.4	(195) 85.2	(687) 85.4
	(95% CI)	(82.5; 92.9)	(78.1; 89.8)	(75.4; 89.2)	(77.2; 90.7)	(81.4; 88.6)
Early initiation of breastfeeding	(n) %	(116) 59.5	(130) 65.7	(89) 49.2	(140) 61.1	(475) 58.4
	(95% CI)	(48.5; 69.6)	(54.5; 75.3)	(38.3; 60.1)	(50.0; 71.3)	(52.2; 64.3)
Age-appropriate breastfeeding	(n) %	(105) 53.9	(109) 55.1	(76) 42.0	(119) 52.0	(409) 50.2
	(95% CI)	(44.4; 63.3)	(45.4; 64.3)	(34.8; 49.6)	(42.5; 61.3)	(45.1; 55.3)
Bottle-feeding	(n) %	(34) 17.4	(27) 13.6	(41) 22.7	(56) 24.5	(158) 21.3
	(95% CI)	(12.5; 23.8)	(8.73; 20.7)	(16.2; 30.8)	(16.1; 35.4)	(16.9; 26.5)
Children aged ≥6 but <24 months	N	167	154	149	184	654
Minimum dietary diversity	(n) %	(78) 46.7	(90) 58.4	(72) 48.3	(111) 60.3	(351) 54.3
	(95% CI)	(38.1; 55.5)	(48.4; 67.8)	(39.2; 57.6)	(51.9; 68.2)	(49.5; 59.1)
Minimum meal frequency	(n) %	(91) 54.5	(95) 61.7	(87) 58.4	(122) 66.3	(395) 61.4
	(95% CI)	(44.3; 64.3)	(51.5; 71.0)	(48.3; 67.8)	(55.7; 75.5)	(55.6; 66.8)
Minimum acceptable diet	(n) %	(46) 27.5	(59) 38.3	(41) 27.5	(64) 34.8	(210) 31.9
	(95% CI)	(19.1; 37.9)	(28.8; 48.8)	(19.9; 36.8)	(25.1; 45.9)	(26.6; 37.7)
Consumption of iron-rich or	(n) %	(89) 53.3	(94) 61.0	(85) 57.1	(117) 63.6	(385) 59.5
iron-fortified foods	(95% CI)	(43.5; 62.8)	(52.8; 68.7)	(47.2; 66.4)	(53.9; 72.3)	(54.2; 64.6)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A13. Timing for breastfeeding initiation among children aged <24 months by strata.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
Children aged <24 months	N	195	198	181	229	803
<1 hour after birth	(n) %	(116) 59.5	(130) 65.7	(89) 49.2	(140) 61.1	(475) 58.4
	(95% CI)	(48.5; 69.6)	(54.5; 75.3)	(38.4; 60.1)	(50.0; 71.3)	(52.2; 64.3)
1-23 hours after birth	(n) %	(34) 17.4	(29) 14.7	(38) 21.0	(42) 18.3	(143) 18.4
	(95% CI)	(11.7; 25.2)	(8.98; 23.0)	(14.1; 30.1)	(12.3; 26.5)	(14.7; 22.7)
>24 hours after birth	(n) %	(21) 10.8	(8) 4.04	(23) 12.7	(13) 5.68	(65) 8.22
	(95% CI)	(5.09; 21.4)	(1.79; 8.89)	(7.83; 20.0)	(2.81; 11.2)	(5.83; 11.5)
No breastfed	(n) %	(22) 11.3	(30) 15.2	(30) 16.6	(34) 14.9	(116) 14.6
	(95% CI)	(7.10; 17.5)	(10.2; 21.9)	(10.8; 24.7)	(9.34; 22.8)	(11.4; 18.6)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A14. Prevalence of anaemia in children aged 6-59 months by strata and severity.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
All	N	429	412	406	493	1,740
Total Anaemia	(n) %	(189) 44.1	(216) 52.4	(193) 47.5	(265) 53.8	(863) 50.1
(Hb < 11.0 g/dL)	(95% CI)	(37.7; 50.6)	(45.9; 58.9)	(41.3; 53.8)	(47.9; 59.5)	(46.7; 53.4)
Mild Anaemia	(n) %	(94) 21.9	(109) 26.5	(90) 22.2	(128) 26.0	(421) 24.2
(Hb 10.0 - 10.9 g/dL)	(95% CI)	(17.5; 27.1)	(21.7; 31.8)	(18.0; 27.0)	(22.3; 30.0)	(22.0; 26.6)
Moderate Anaemia	(n) %	(87) 20.3	(100) 24.3	(94) 23.2	(130)26.4	(411) 24.1
(Hb 7.0 - 9.9 g/dL)	(95% CI)	(16.1; 25.2)	(20.1; 29.0)	(18.2; 29.0)	(22.0; 31.3)	(21.6; 26.8)
Severe Anaemia	(n) %	(8) 1.9	(7) 1.7	(9) 2.2	(7) 1.4	(31) 1.7
(Hb < 7.0 g/dL)	(95% CI)	(0.8; 4.5)	(0.6; 4.4)	(1.0; 4.9)	(0.6; 3.1)	(1.1; 2.7)
Boys	N	225	224	195	270	914
Total Anaemia	(n) %	(102) 45.3	(119) 53.1	(97) 49.7	(153) 56.7	(471) 52.4
(Hb < 11.0 g/dL)	(95% CI)	(37.2; 53.7)	(45.0; 61.1)	(40.3; 59.2)	(49.3; 63.7)	(48.0; 56.8)
Mild Anaemia	(n) %	(53) 23.6	(55) 24.6	(43) 22.1	(63) 23.3	(214) 23.2
(Hb 10.0 - 10.9 g/dL)	(95% CI)	(18.0; 30.2)	(18.2; 32.2)	(16.6; 28.7)	(18.7; 28.8)	(20.3; 26.4)
Moderate Anaemia	(n) %	(45) 20.0	(59) 26.3	(51) 26.2	(84) 31.1	(239) 27.2
(Hb 7.0 - 9.9 g/dL)	(95% CI)	(14.7; 26.6)	(20.7; 32.9)	(19.5; 34.1)	(25.2; 37.7)	(23.8; 30.9)
Severe Anaemia	(n) %	(4) 1.8	(5) 2.2	(3) 1.5	(6) 2.2	(18) 2.0
(Hb < 7.0 g/dL)	(95% CI)	(0.7; 4.5)	(0.6; 7.7)	(0.5; 4.6)	(1.1; 4.6)	(1.2; 3.2)
Girls	N	204	188	211	223	826
Total Anaemia	(n) %	(87) 42.6	(97) 51.6	(96) 45.5	(112) 50.2	(392) 47.5
(Hb < 11.0 g/dL)	(95% CI)	(35.3; 50.3)	(42.9; 60.2)	(39.3; 51.8)	(43.3; 57.1)	(43.8; 51.3)
Mild Anaemia	(n) %	(41) 20.1	(54) 28.7	(47) 22.3	(65) 29.1	(207) 25.4
(Hb 10.0 - 10.9 g/dL)	(95% CI)	(15.2; 26.1)	(22.6; 35.7)	(17.8; 27.5)	(24.0; 34.8)	(22.5; 28.5)
Moderate Anaemia	(n) %	(42) 20.6	(41) 21.8	(43) 20.4	(46) 20.6	(172) 20.7
(Hb 7.0 - 9.9 g/dL)	(95% CI)	(15.4; 26.9)	(17.0; 27.5)	(14.9; 27.2)	(15.7; 26.6)	(17.8; 23.9)
Severe Anaemia	(n) %	(4) 2.0	(2) 1.1	(6) 2.8	(1) 0.4	(13) 1.5
(Hb < 7.0 g/dL)	(95% CI)	(0.6; 6.3)	(0.3; 4.1)	(1.1; 7.4)	(0.1; 3.1)	(0.8; 2.9)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A15. Mean values of haemoglobin in children aged 6-59 months by strata.

Wilaya	N	Mean values	95% CI	Design Effect (Hb < 11g/dL)
Awserd	429	11.0	10.8; 11.2	1.50
Dakhla	412	10.7	10.5; 10.9	0.87
Laayoune	406	10.8	10.6; 11.0	1.82
Smara[1]	493	10.7	10.5; 10.9	2.62
Aggregated[2]	1,740	10.8	10.7; 10.9	2.00

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A16. Prevalence of anaemia in non-pregnant women of reproductive age (15-49 years) by strata and severity.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
	N	530	529	505	522	2,086
Total Anaemia	(n) %	(275) 51.9	(271) 51.2	(242) 47.9	(290) 55.6	(1,078) 52.2
(Hb < 12.0 g/dL)	(95% CI)	(46.7; 57.0)	(44.9; 57.5)	(41.5; 54.4)	(49.7; 61.2)	(49.0; 55.3)
Mild Anaemia	(n) %	(119) 22.5	(101) 19.1	(89) 17.6	(114) 21.8	(423) 20.5
(Hb 11.0 - 11.9 g/dL)	(95% CI)	(18.9; 26.5)	(16.0; 22.7)	(14.3; 21.5)	(18.2; 26.0)	(18.5; 22.6)
Moderate Anaemia	(n) %	(141) 26.6	(143) 27.0	(120) 23.8	(131) 25.1	(535) 25.3
(Hb 8.0 - 10.9 g/dL)	(95% CI)	(22.4; 31.3)	(22.5; 32.0)	(19.2; 29.1)	(20.1; 30.9)	(22.6; 28.1)
Severe Anaemia	(n) %	(15) 2.8	(27) 5.1	(33) 6.5	(45) 8.6	(120) 6.4
(Hb < 8.0 g/dL)	(95% CI)	(1.7; 4.8)	(3.0; 8.6)	(4.5; 9.3)	(6.3; 11.7)	(5.2; 7.9)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A17. Prevalence of anaemia in pregnant & lactating women (15-49 years)

		Pregnant[1]	Lactating
	N	236	227
Total Anaemia	(n) %	(125) 55.1	(151) 69.1
(Hb < 11.0 g/dL)	95% CI	(47.7; 62.2)	(62.6; 74.9)
Mild Anaemia	(n) %	(38) 15.0	(42) 19.4
(Hb 10.0-10.9 g/dL)	95% CI	(10.9; 20.1)	(14.6; 25.3)
Moderate Anaemia	(n) %	(78) 35.6	(86) 37.6
(Hb 7.0-9.9 g/dL)	95% CI	(29.1; 42.7)	(30.7; 45.0)
Severe Anaemia	(n) %	(9) 4.5	(23) 12.1
(Hb <7.0 g/dL)	95% CI	(2.2; 8.7)	(8.3; 17.4)

1 Women were classified as pregnant or lactating if they reported to be pregnant or lactating. Women who reported to be concomitantly lactating whilst pregnant were classified as pregnant for the survey analysis.

Table A18. Mean values of haemoglobin in women of childbearing age (15-49 years) by strata

Wilaya	Sample size	Mean values	95% CI	Design Effect (Hb < 11g/dL)
Awserd	530	11.7	(11.5; 11.9)	1.21
Dakhla	529	11.6	11.3; 11.9)	1.07
Laayoune	505	11.6	(11.3; 11.9)	2.44
Smara[1]	522	11.3	(11.1; 11.6)	2.85
Aggregated[2]	2,086	11.5	(11.4; 11.6)	2.15
Lactating	236	10.4	(10.1; 10.7)	1.30
Pregnant[3]	227	10.7	(10.4; 11.0)	1.04

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation. 3. Women were classified as pregnant or lactating if they reported to be pregnant or lactating. Women who reported to be concomitantly lactating whilst pregnant were classified as pregnant for the survey analysis.

Table A19. Prevalence of underweight, low MUAC, overweight and obesity in non-pregnant non-lactating women of reproductive age (15-49 years) by strata.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
Body Mass Index	N	476	467	448	458	1,849
Underweight	(n) %	(21) 4.4	(20) 4.3	(33) 7.4	(27) 5.9	(101) 5.8
(BMI <18.5 kg/m^2)	(95% CI)	(2.7; 7.2)	(2.8; 6.4)	(5.0; 10.7)	(3.8; 9.0)	(4.6; 7.3)
Overweight	(n) %	(166) 34.9	(159) 34.0	(172) 38.4	(169) 36.9	(666) 36.5
(BMI ≥25 but <30 kg/m^2)	(95% CI)	(29.6; 40.5)	(29.7; 38.7)	(34.0; 43.0)	(33.0; 41.0)	(34.2; 38.9)
Obesity	(n) %	(140) 29.4	(151) 32.3	(110) 24.6	(148) 32.3	(549) 29.6
(BMI ≥30 kg/m^2)	(95% CI)	(23.6; 36.0)	(27.4; 37.7)	(20.4; 29.2)	(27.6; 37.4)	(26.9; 32.4)
Overweight + Obesity	(n) %	(306) 64.3	(310) 66.4	(282) 62.9	(317) 69.2	(1,215) 66.1
(BMI ≥25 kg/m^2)	(95% CI)	(58.4; 69.7)	(60.1; 72.1)	(57.9; 67.7)	(63.8; 74.1)	(63.2; 68.9)
MUAC	N	476	467	448	458	1,849
Low MUAC	(n) %	(31) 6.5	(31) 6.6	(36) 8.0	(30) 6.6	(128) 7.0
(MUAC <23.0 cm)	(95% CI)	(4.6; 9.2)	(4.4; 9.9)	(5.4; 11.7)	(4.3; 9.9)	(5.6; 8.6)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A20. Prevalence of low MUAC in pregnant and lactating women (aged 15-49 years).

		Pregnant	Lactating
	N	236	227
Low MUAC	(n) %	(17) 7.9	(19) 8.9
(MUAC <23.0 cm)	(95% CI)	(4.8; 12.8)	(5.4; 14.3)

Table A21. Household Food Consumption Score (FCS) prevalence by strata.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
	N	421	421	421	417	1,680
Acceptable	(n) %	(248) 58.9	(265) 62.9	(241) 57.2	(260) 62.4	(1,014) 60.3
FCS >42	(95% CI)	(48.5; 68.6)	(50.8; 73.7)	(47.3; 66.6)	(52.9; 70.9)	(55.0; 65.3)
Borderline	(n) %	(169) 40.1	(153) 36.3	(172) 40.9	(153) 36.7	(647) 38.5
FCS 28.5 - 42	(95% CI)	(30.6; 50.5)	(25.9; 48.3)	(31.9; 50.4)	(28.4; 45.9)	(33.7; 43.6)
Poor	(n) %	(4) 1.0	(3) 0.7	(8) 1.9	(4) 1.0	(19) 1.2
FCS 0 - 28	(95% CI)	(0.4; 2.5)	(0.2; 2.1)	(0.9; 3.9)	(0.4; 2.5)	(0.7; 1.9)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A22. Food security indicators mean values by strata.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
Households	N	421	421	421	417	1,680
Household Food Consumption Score (FCS)	mean	47.7	48.1	46.3	48.5	47.7
(range 0 - 112)	(95% CI)	(45.4; 49.9)	(45.6; 50.5)	(44.0; 48.6)	(46.1; 50.9)	(46.4; 48.9)
FCS-based Dietary Diversity Score	mean	5.3	5.3	5.3	5.4	5.3
(range 0 - 7)	(95% CI)	(5.14; 5.51)	(5.09; 5.52)	(5.08; 5.42)	(5.19; 5.59)	(5.22; 5.43)
Household Dietary Diversity Score	mean	8.2	8.3	8.2	8.3	8.2
(range 0 - 12)	(95% CI)	(7.9; 8.6)	(8.0; 8.7)	(7.9; 8.5)	(7.9; 8.6)	(8.1; 8.4)
Reduced Coping Strategies Index	mean	8.0	7.0	9.4	6.2	7.6
(range 0 - 56)	(95% CI)	(6.2; 9.8)	(5.1; 8.9)	(7.2; 11.6)	(4.9; 7.5)	(6.7; 8.5)
Women aged 15-49 years	N	602	585	569	586	2,342
Women Dietary Diversity Score	mean	5.4	5.3	5.0	5.1	5.2
(range 0 - 10)	(95% CI)	(5.2; 5.7)	(5.0; 5.6)	(4.8; 5.3)	(4.9; 5.3)	(5.0; 5.3)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A23. Prevalence of minimum dietary diversity in women (MDD-W) by strata.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
	N	421	421	421	417	1,680
MDD-W	(n) %	(248) 58.9	(265) 62.9	(241) 57.2	(260) 62.4	(1,014) 60.3
WDDS≥5	(95% CI)	(48.5; 68.6)	(50.8; 73.7)	(47.3; 66.6)	(52.9; 70.9)	(55.0; 65.3)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation. WDDS: Women's dietary diversity score (range 0-10).

Table A24. Proportion of households reporting using the following coping strategies over the past 7 days by strata.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
	N	421	421	421	417	1,680
Rely on less preferred and less	(n) %	(239) 56.8	(227) 53.9	(240) 57.0	(224) 53.7	(930) 55.3
expensive foods?	(95% CI)	(44.7; 68.1)	(40.7; 66.6)	(45.5; 67.8)	(43.2; 63.9)	(49.3; 61.2)
Borrow food, or rely on help from a	(n) %	(273) 64.8	(256) 60.8	(281) 66.7	(250) 60.0	(1,060) 63.0
friend or relative?	(95% CI)	(53.4; 74.8)	(48.1; 72.2)	(55.3; 76.5)	(50.8; 68.5)	(57.5; 68.2)
Limit portion size at mealtimes?	(n) %	(225) 53.4	(193) 45.8	(231) 54.9	(207) 49.6	(856) 51.4
	(95% CI)	(42.8; 63.8)	(34.2; 58.0)	(43.4; 65.9)	(40.8; 58.5)	(46.0; 56.8)
Restrict consumption by adults in	(n) %	(129) 30.6	(102) 24.2	(161) 38.2	(110) 26.4	(502) 30.3
order for small children to eat?	(95% CI)	(22.6; 40.0)	(15.8; 35.3)	(29.7; 47.6)	(19.3; 34.9)	(26.0; 35.0)
Reduce number of meals eaten in a	(n) %	(156) 37.1	(123) 29.2	(148) 35.2	(106) 25.4	(533) 31.0
day?	(95% CI)	(28.5; 46.5)	(20.6; 39.6)	(26.5; 44.9)	(19.5; 32.4)	(27.0; 35.4)
No coping strategies reported	(n) %	(107) 25.4	(117) 27.8	(90) 21.4	(87) 20.9	(401) 22.8
	(95% CI)	(16.2; 37.6)	(17.0; 42.0)	(13.5; 32.1)	(14.1; 29.7)	(18.3; 28.0)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A25. Prevalence of non-communicable diseases and risk factors among adults aged 25-64 years by strata.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
Adults aged 25-64 years	N	1,611	1,542	1,373	1,593	6,119
Reported smoking	(n) %	(239) 15.1	(237) 15.0	(210) 15.2	(272) 17.6	(958) 16.1
	(95% CI)	(12.8; 17.5)	(11.8; 18.2)	(12.1; 18.3)	(14.4; 20.8)	(14.5; 17.8)
Reported diabetes	(n) %	(171) 11.2	(140) 9.6	(158) 11.7	(175) 11.8	(644) 11.4
	(95% CI)	(8.9; 13.5)	(7.5; 11.7)	(9.0; 14.4)	(8.9; 14.7)	(9.9; 12.9)
Reported high cholesterol	(n) %	(71) 4.6	(59) 3.9	(67) 4.8	(75) 4.4	(272) 4.5
	(95% CI)	(3.1; 6.1)	(2.6; 5.3)	(3.0; 6.5)	(2.8; 6.0)	(3.6; 5.4)
Reported high blood pressure	(n) %	(137) 8.9	(139) 9.6	(132) 9.0	(144) 8.6	(552) 8.9
	(95% CI)	(6.7; 11.0)	(7.4; 11.9)	(6.2; 11.8)	(6.2; 11.1)	(7.6; 10.2)
Reported cardio-vascular disease	(n) %	(56) 3.1	(36) 2.4	(51) 3.3	(36) 1.9	(179) 2.6
	(95% CI)	(1.8;4.4)	(0.9;4.0)	(1.7;5.0)	(1.0;2.8)	(2.0;3.3)
Households	N	419	420	419	417	1,675
With adults aged 25-64 years who smokes	(n) %	(182) 43.4	(177) 42.1	(160) 38.2	(198) 47.5	(717) 43.4
	(95% CI)	(37.0; 50.2)	(33.4; 51.4)	(31.3; 45.6)	(39.9; 55.2)	(39.4; 47.4)
With adults aged 25-64y with diabetes	(n) %	(148) 35.3	(128) 30.5	(131) 31.3	(146) 35.0	(553) 33.5
	(95% CI)	(28.6; 42.7)	(23.4; 38.6)	(24.5; 38.9)	(27.2; 43.8)	(29.4; 37.8)
With adults aged 25-64y with high cholesterol	(n) %	(63) 15.0	(53) 12.6	(65) 15.5	(62) 14.9	(243) 14.8
	(95% CI)	(10.6; 20.9)	(8.7; 17.9)	(10.3; 22.6)	(9.3; 22.9)	(11.8; 18.5)
With adults aged 25-64y with high blood pressure	(n) %	(117) 27.9	(123) 29.3	(112) 26.7	(118) 28.3	(470) 27.9
	(95% CI)	(21.6;35.3)	(22.5;37.1)	(19.4;35.6)	(21.3;36.5)	(24.0;32.2)
With adults aged 25-64y with cardiovascular disease	(n) %	(47) 11.2	(31) 7.4	(42) 10.0	(31) 7.4	(151) 8.9
	(95% CI)	(7.1; 17.2)	(4.2; 12.7)	(5.7; 17.1)	(4.2; 12.7)	(6.7; 11.8)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A26. Prevalence of diarrhoea in children aged <5 years by strata.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
	N	472	471	448	553	1,944
Presented diarrhoea in the last 2 weeks?	(n) %	(44) 9.3	(46) 9.8	(56) 12.5	(55) 9.9	(201) 10.4
	(95% CI)	(6.7; 12.9)	(5.7; 16.2)	(9.5; 16.3)	(6.9; 14.2)	(8.6; 12.6)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A27. Prevalence of diarrhoea in children aged <5 years by age group.

		<6 months	6-17 months	18-29 months	30-41 months	42-53 months	54-59 months
	N	245	576	489	550	521	431
Presented diarrhoea in the last 2-weeks	(n) %	(22) 10.4	(167) 28.8	(90) 17.5	(51) 9.1	(47) 9.0	(35) 7.8
	95% CI	(6.5; 16.3)	(24.6; 33.5)	(14.3; 21.3)	(7.1; 11.7)	(6.6; 12.2)	(5.6; 10.8)

Table A28. Feeding behaviours following a diarrhoeal episode in children aged <5 years. (sample of 201 children)

		Less than usual	Same as usual	More than usual	Don't know
When the child had diarrhoea…					
...how much liquid was she/he given?	(n) %	(66) 30.9	(72) 38.2	(59) 28.7	(4) 2.2
	95% CI	(22.9; 40.2)	(30.2; 46.9)	(22.3; 36.2)	(0.8; 6.0)
…how much food was she/he given?	(n) %	(123) 61.1	(66) 32.3	(6) 3.2	(6) 3.4
	95% CI	(51.3; 70.1)	(23.3; 42.7)	(1.2; 8.1)	(1.5; 7.9)

Table A29. Point-coverage enrolment of antenatal and postnatal care for pregnant & lactating women (PLW) by strata and women status.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
All Pregnant or Lactating Women	N	118	108	116	122	464
	(n) %	(74) 62.7	(82) 75.9	(84) 72.4	(89) 73.0	(329) 71.0
	(95% CI)	(51.3; 72.9)	(67.2; 82.9)	(62.8; 80.4)	(64.8; 79.8)	(66.2; 75.4)
Pregnant Women	N	--	--	--	--	236
	(n) %	--	--	--	--	(180) 77.9
	(95% CI)	--	--	--	--	(71.4; 83.3)
Lactating women	N	--	--	--	--	228
	(n) %	--	--	--	--	(149) 63.9
	(95% CI)	--	--	--	--	(56.4; 70.8)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A30. Point-coverage for receiving iron supplements for pregnant and lactating women by strata and women status.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
All Pregnant or Lactating Women	N	118	108	116	122	464
	(n) %	(29) 24.6	(22) 20.4	(31) 26.7	(30) 24.6	(112) 24.7
	(95% CI)	(15.7; 36.4)	(11.8; 32.8)	(17.2; 39.1)	(16.0; 35.8)	(19.5; 30.8)
Pregnant Women	N	--	--	--	--	236
	(n) %	--	--	--	--	(62) 28.0
	(95% CI)	--	--	--	--	(22.1; 34.8)
Lactating women	N	--	--	--	--	228
	(n) %	--	--	--	--	(50) 21.3
	(95% CI)	--	--	--	--	(14.3; 30.5)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A31. Household indicators of water provision. Results by strata.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
	N	421	421	421	417	1,680
People living/sleeping in household last night	mean	6.1	6.2	5.3	6.4	6.0
	(95% CI)	(5.7; 6.5)	(5.7; 6.7)	(5.0; 5.7)	(5.9; 6.9)	(5.8; 6.3)
	N	420	420	406	413	1,659
Household water storage capacity (litres)	mean	3064	2510	2791	3257	2995
	(95% CI)	(2719; 3409)	(2146; 2873)	(2547; 3034)	(2907; 3606)	(2820; 3169)
	N	421	421	421	417	1,680
Refill frequency of water containers (days)	mean	27.9	8.9	33.8	38.6	31.4
	(95% CI)	(24.9; 30.9)	(7.1; 10.7)	(31.7; 35.8)	(34.7; 42.5)	(29.6; 33.1)
	N	419	419	405	411	1,654
Water provision (litres/person/day)	mean	36.4	122.3	26.5	23	39.2
	(95% CI)	(21.1; 51.7)	(88.0; 156.5)	(16.2; 36.8)	(15.8; 30.3)	(32.5; 45.9)
	N	419	419	405	411	1,654
Meeting UNHCR water provision standards	(n) %	(183) 43.7	(327) 78.0	(144) 35.6	(135) 32.9	(789) 41.5
(minimum of 20 litres/person/day)	(95% CI)	(35.2; 52.6)	(67.5; 85.9)	(28.3; 43.6)	(24.2; 42.9)	(36.9; 46.4)
	N	419	419	405	411	1,654
Meeting SPHERE water provision standards	(n) %	(235) 56.1	(349) 83.3	(197) 48.6	(179) 43.6	(960) 52.6
(minimum of 15 litres/person/day)	(95% CI)	(47.6; 64.3)	(74.3; 89.6)	(40.8; 56.5)	(34.3; 53.2)	(47.8; 57.3)
	N	421	421	421	417	1,680
Household satisfied with water supply	(n) %	(199) 47.3	(280) 66.5	(108) 25.7	(253) 60.7	(840) 48.8
	(95% CI)	(37.3; 57.5)	(55.9; 75.7)	(17.8; 35.5)	(49.4; 71.0)	(43.3; 54.3)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A32. Household indicators of water infrastructure by strata.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
Main source of household drinking water	N	421	421	421	417	1,680
UNHCR tanker truck	(n) %	(89) 21.1	(180) 42.8	(417) 99.0	(247) 59.2	(933) 60.5
	(95% CI)	(13.4; 31.7)	(29.5; 57.2)	(95.6; 99.8)	(46.0; 71.3)	(54.8; 66.0)
Piped water	(n) %	(331) 78.6	(241) 57.2	(4) 1.0	(169) 40.5	(745) 39.3
	(95% CI)	(68.1; 86.4)	(42.8; 70.5)	(0.2; 4.4)	(28.5; 53.9)	(33.8; 45.1)
Household has more than one water container	N	421	421	421	417	1,680
	(n) %	(179) 42.5	(155) 36.8	(148) 35.2	(170) 40.8	(652) 39.1
	(95% CI)	(35.3; 50.0)	(29.7; 44.6)	(28.8; 42.1)	(33.1; 48.9)	(35.1; 43.2)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A33. Household availability and use of soap by strata.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
	N	421	421	421	417	1,680
Presence of soap in the household	(n) %	(331) 78.6	(319) 75.8	(356) 84.6	(321) 77.0	(1,327) 79.3
	(95% CI)	(70.3; 85.1)	(65.4; 83.8)	(77.0; 90.0)	(68.7; 83.6)	(75.1; 82.9)
Yesterday, soap was used for:	N	331	319	356	321	1,659
Washing after defecation	(n) %	(329) 99.4	(317) 99.4	(355) 99.7	(317) 98.8	(1,318) 99.3
	(95% CI)	(97.6; 99.9)	(97.5; 99.9)	(98.0; 100)	(96.7; 99.5)	(98.5; 99.6)
Washing hands before preparing food	(n) %	(327) 98.8	(312) 97.8	(349) 98.0	(312) 97.2	(1,300) 97.9
	(95% CI)	(96.9; 99.5)	(94.5; 99.1)	(95.6; 99.1)	(94.3; 98.6)	(96.7; 98.6)
Washing hands before eating	(n) %	(323) 97.6	(310) 97.2	(348) 97.8	(312) 97.2	(1,293) 97.4
	(95% CI)	(95.0; 98.9)	(93.7; 98.8)	(95.3; 98.9)	(94.3; 98.6)	(96.2; 98.3)
Yesterday, soap was used for:	N	254	245	258	260	1,017
Washing hands before feeding children	(n) %	(249) 98.0	(242) 98.8	(253) 98.1	(256) 98.5	(1,000) 98.3
	(95% CI)	(95.4; 99.2)	(96.2; 99.6)	(94.7; 99.3)	(96.0; 99.4)	(97.1; 99.0)
Washing hands after cleaning children	(n) %	(250) 98.4	(242) 98.8	(251) 97.3	(251) 96.5	(994) 97.4
	(95% CI)	(96.0; 99.4)	(96.3; 99.6)	(91.2; 99.2)	(93.0; 98.3)	(95.6; 98.5)
Washing children's hands	(n) %	(247) 97.2	(240) 98.0	(250) 96.9	(255) 98.1	(992) 97.6
	(95% CI)	(93.9; 98.8)	(95.0; 99.2)	(93.0; 98.7)	(94.7; 99.3)	(96.0; 98.5)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A34. Household toilet facilities by strata.

		Awserd	Dakhla	Laayoune	Smara[1]	Aggregated[2]
Type of toilet the household use	N	421	421	421	417	1,680
Pit latrine with septic tank	(n) %	(377) 89.6	(370) 87.9	(311) 73.9	(375) 89.9	(1,433) 85.1
	(95% CI)	(78.6; 95.2)	(75.2; 94.6)	(62.1; 83.0)	(78.7; 95.6)	(79.7; 89.2)
Pit latrine	(n) %	(39) 9.3	(37) 8.8	(95) 22.6	(36) 8.6	(207) 12.7
	(95% CI)	(3.8; 20.8)	(3.3; 21.4)	(14.0; 34.3)	(3.4; 20.2)	(8.8; 18.1)
Use neighbour/relative latrine	(n) %	(4) 1.0	(8) 1.9	(11) 2.6	(6) 1.4	(29) 1.7
	(95% CI)	(0.3; 3.1)	(0.9; 4.2)	(1.3; 5.2)	(0.6; 3.5)	(1.1; 2.7)
Open defecation/other	(n) %	(1) 0.2	(6) 1.4	(4) 1.0	(0) 0.0	(11) 0.5
	(95% CI)	(0.0; 1.7)	(0.7; 3.0)	(0.4; 2.5)	(N/A)	(0.3; 0.9)

1. Smara estimates includes data collected from Boujdour. 2 Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A35. Methods used in different surveys carried in the Sahrawi refugee camps (1997 – 2019).

Year	Children aged 6-59 months	Women of reproductive age	Sampling	Households	Clusters	Households/ cluster	Household selection	Cleaning criteria
1997	N/A	487	Cluster Sampling (CS). PPS method.	310	31	10	EPI method	N/A
2001	580	753	CS. PPS.	N/A	40	N/A	EPI method	Plotting and outlier selection
2002	881 (anthropometry) 204 (anaemia)	223	CS. PPS.	900	30	30	EPI method	Epi-Info criteria
2005	785 (anthropometry) 758 (anaemia)	772	CS. PPS.	660	30	22	Systematic random (list of food distribution)	± 4 z-scores
2008	889	689	CS. PPS.	215	48	5	Modified EPI	± 5 z-scores
2010	1,609 (anthropometry) 949 (anaemia)	1,689 (anthropometry) 1,556 (anaemia)	CS. PPS.	2,040	120	17	EPI method	SMART criteria (± 3 z-scores)
2012	2,022 (anthropometry) 2,009 (anaemia)	0 (anthropometry) 983 (anaemia)	CS. PPS.	2,049	120	17	EPI method	SMART criteria (± 3 z-scores)
2016	2,579 (anthropometry) 2,564 (anaemia)	3,225 (anthropometry) 3,479 (anaemia)	CS. PPS.	2,100	175	12	Modified EPI	SMART criteria (± 3 z-scores)
2019	1,746 (anthropometry) 1,740 (anaemia)	1,849 (anthropometry) 2,086 (anaemia)	CS. PPS.	1,680	180	9-12	Modified EPI	SMART criteria (± 3 z-scores)

Table A36. Global acute malnutrition prevalence in children aged 6-59 months (1997-2019)

Year	Global	Moderate	Severe	Sample	Mean WHZ	SAM:MAM
1997	10.5 (6.1; 14.9)	8.2 (N/A)	2.3 (0.4; 4.1)	N/A	N/A	1 : 3.6
2001	13.2 (9.9; 16.4)	8.7 (6.3 – 11.1)	4.5 (2.4; 6.5)	580	-0.83 ± 1.15	1 : 1.9
2002	10.6 (7.7; 13.5)	8.4 (N/A)	2.2 (1.3; 3.1)	881	-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)	785	N/A	1 : 2.3
2008	18.2 (14.7; 21.7)**	12.8 (9.9; 15.8)	5.4 (3.7; 7.1)	873	N/A	1 : 2.4
2010	7.9 (6.5; 9.3)**	6.5 (5.3; 7.8)	1.3 (0.8; 1.8)	1,495	-0.37 ± 1.11	1 : 5.0
2012	7.6 (6.4; 8.8)	6.8 (5.7; 7.9)	0.8 (0.3; 1.3)	1,980	-0.46 ± 1.02	1 : 8.5
2016	4.7 (3.8; 5.8)**	4.2 (3.3; 5.2)	0.5 (0.3; 0.9)	2,546	-0.24 ± 0.99	1 : 8.4
2019	7.9 (6.3; 9.3)**	6.9 (5.6; 8.6)	0.7 (0.3; 1.4)	1,709	-0.34 ± 1.14	1 : 9.9

CI: 95% Confidence Intervals; GAM: Global Acute Malnutrition. Prevalence of children, aged 6-59 months, presenting a weight-for-length/height z-score <-2 z-scores and/or bilateral pitting oedema. MAM: Moderate Acute Malnutrition. Prevalence of children aged 6-59 months presenting a weight-for-length/height z-score < -2 z-scores and >= -3 z-scores. SAM: Severe Acute Malnutrition. Prevalence of children, aged 6-59 months, presenting a weight-for-length/height z-score <-3 z-scores and/or bilateral pitting oedema. GAM estimates were obtained using the NCHS 1977 Growth References for surveys undertaken before 2007. GAM estimates were obtained using the 2006 WHO Child Growth Standards for surveys undertaken after 2007.

Test for the difference against the previous survey is different than zero: * p<0.05. ** p<0.01

Table A37. Stunting prevalence in children aged 6-59 months (1997-2019)

Year	Total	Moderate	Severe	Mean HAZ	Sample	Severe : Moderate
1997	49.1 (44.2; 54.1)	24.4 (N/A)	23.7 (19.2; 28.2)	N/A	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	580	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)	881	1 : 1.9
2005	39.1 (34.4; 43.8)*	23.5 (N/A)	15.6 (12.2; 19.6)	-1.62 ± 1.51	785	1 : 1.5
2008	31.6 (28.2; 35.0)*	22.5 (19.2; 25.7)	9.1 (7.4; 10.8)	N/A	864	1 : 2.5
2010	29.7 (26.9; 32.5)	21.3 (19.0; 23.7)	8.3 (6.9; 9.8)	-1.19 ± 1.12	1,457	1 : 2.6
2012	25.2 (22.8; 27.6)*	18.7 (16.7; 20.7)	6.5 (5.3; 7.7)	-1.18 ± 1.03	1,962	1 : 2.9
2016	18.6 (16.8; 20.6)**	13.9 (12.3; 15.8)	4.7 (3.8; 5.7)	-1.14 ± 1.03	2,507	1 : 3.0
2019	28.2 (25.3; 31.3)**	18.2 (15.9; 20.8)	10.0 (8.2; 12.0)	-1.40 ± 1.16	1,674	1 : 1.8

CI: 95% Confidence Intervals; Global stunting: Prevalence of children, aged 6-59 months, presenting a length/height-for-age z-score <-2 z-scores. Moderate stunting: Prevalence of children, aged 6-59 months, presenting a length/height-for-age z-score <-2 z-scores and >= -3 Z-scores. Severe stunting: Prevalence of children, aged 6-59 months, presenting a length/height-for-age z-score <-3 z-scores. GAM estimates were obtained using the NCHS 1977 Growth References for surveys undertaken before 2007. GAM estimates were obtained using the 2006 WHO Child Growth Standards for surveys undertaken after 2007.

Test for the difference against the previous survey is different than zero: * p<0.05. ** p<0.01

Table A38. Anaemia prevalence in children aged 6-59 months (1997-2019)

Year	Total	Mild	Moderate	Severe	Sample	Mean
1997	71.1 (N/A)	56.7 (47.5; 65.9)		14.4 (8.0; 20.1)	N/A	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)	580	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)	204	11.5 ± 1.6
2005	68.5 (64.4; 72.5)	6.1 (N/A)		7.5 (5.4; 9.7)	758	9.9 ± 1.9
2008	62.0 (N/A)	56.0 (N/A)		6.0 (N/A)	864	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)	949	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)	2,009	11.6 ± 1.4
2016	38.7 (36.3; 41.2)**	16.3 (14.5; 18.0)	11.7 (9.9; 13.4)	0.5 (0.1; 0.8)	2,564	11.2 ± 1.6
2019	50.1 (46.7; 53.4)**	24.2 (22.0; 26.6)	24.1 (21.6; 26.8)	1.7 (1.1; 2.7)	1,740	10.8 ± 1.5

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
Test for the difference against the previous survey is different than zero: * p<0.05. ** p<0.01

Table A39. Anaemia prevalence in non-pregnant women of reproductive age (15-49 years) (1997-2019).

Year	Total	Mild	Moderate	Severe	Sample	Mean
1997	62.4 (N/A)	53.7 (47.0; 60.3)		8.7 (4.6; 12.8)	487	(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)	753	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)	223	11.8 ± 2.0
2005	66.4 (60.5; 72.3)	53.5 (N/A)		12.9 (10.1; 15.7)	772	10.7 ± 2.3
2008	54.0 (N/A)	15 (N/A)	28 (N/A)	11.0 (N/A)	689	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)	1,556	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)	983	12.3 ± 2.0
2016	45.2 (42.6; 47.4)**	16.8 (15.3; 18.4)	23.2 (21.5; 25.1)	5.1 (4.4; 5.9)	3,479	11.8 ± 2.1
2019	52.2 (49.0; 55.3)**	20.5 (18.5; 22.6)	25.3 (22.6; 28.1)	6.4 (5.2; 7.9)	2,086	11.5 ± 2.0

CI: 95% Moderate Anaemia: Hb 8.0-10.9g/dL. Severe Anaemia: Hb <8 g/dL. Total Anaemia: Hb <12 g/dL.
Test for the difference against the previous survey is different than zero: * p<0.05. ** p<0.01

Table A40. Anaemia prevalence in pregnant women of reproductive age (15-49 years) (1997-2019).

Year	Sample	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
2016	331	59.8 (54.3; 65.0)	19.9 (16.0; 24.4)	34.1 (29.4; 39.1)	5.8 (3.8; 9.0)	10.3 ± 1.9
2019	236	55.1 (47.7; 62.2)	15.0 (10.9; 20.1)	35.6 (29.1; 42.7)	4.5 (2.2; 8.7)	10.4 ± 2.0

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.
Test for the difference against the previous survey is different than zero: * p<0.05. ** p<0.01

Table A41. Food consumption score categories (2010-2019).

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)
2016	81.1 (77.0; 84.5)	18.3 (15.0; 22.2)	0.6 (0.3; 1.2)
2019	60.3 (55.0; 65.3)	38.5 (33.7; 43.6)	1.2 (0.7; 1.9)

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

Annex 2) CLUSTER ALLOCATION

Laayoune

Daira	Barrio	Population	Clusters (48)
Edchera	Barrio 1	1,326	1,2
	Barrio 2	1,326	RC,3
	Barrio 3	1,326	4,5
	Barrio 4	1,326	6,7
Amgala	Barrio 1	1,478	8,9
	Barrio 2	1,477	RC,10,11
	Barrio 3	1,478	12,13
	Barrio 4	1,478	14,RC
Daoura	Barrio 1	1,502	15,16
	Barrio 2	1,501	RC,17,18
	Barrio 3	1,502	19,20
	Barrio 4	1,502	21,22
Hagounia	Barrio 1	1,414	23,24
	Barrio 2	1,413	25,26
	Barrio 3	1,414	27,28,29
	Barrio 4	1,413	RC,30
Bucraa	Barrio 1	1,516	31,32
	Barrio 2	1,517	33,34
	Barrio 3	1,516	35,36,37
	Barrio 4	1,516	38,39
Guelta	Barrio 1	1,514	40,41
	Barrio 2	1,513	42,43
	Barrio 3	1,514	44,45,46
	Barrio 4	1,513	47,48
		34,995	

Awserd

Daira	Barrio	Population	Clusters (48)
Zug	Barrio 1	981	1,2
	Barrio 2	982	3,4
	Barrio 3	981	5,6
	Barrio 4	981	7,8
Miyek	Barrio 1	1,113	9,10,11
	Barrio 2	1,114	12,13
	Barrio 3	1,113	14,RC
	Barrio 4	1,113	15,16,17
Bir-Guenduz	Barrio 1	1,078	18,19
	Barrio 2	1,078	20,21
	Barrio 3	1,078	22,RC
	Barrio 4	1,078	23,24,RC
Agüenit	Barrio 1	964	25,26
	Barrio 2	965	27,28
	Barrio 3	965	29,30
	Barrio 4	965	31,32
Tichla	Barrio 1	1,016	33,34
	Barrio 2	1,017	35,36
	Barrio 3	1,017	37,38
	Barrio 4	1,017	39,40
Güera	Barrio 1	1,263	RC,41,42
	Barrio 2	1,263	RC,43
	Barrio 3	1,263	44,45,46
	Barrio 4	1,263	47,48
		25,668	

Dakhla

Daira	Barrio	Population	Clusters (36)
Ain-el Beida	Barrio 1	476	1
	Barrio 2	477	2
	Barrio 3	476	3,RC
	Barrio 4	476	4
Bir-Enzaran	Barrio 1	551	5
	Barrio 2	550	6,7
	Barrio 3	551	8
	Barrio 4	551	9,10
Glaibat el Fula	Barrio 1	552	11
	Barrio 2	553	12,13
	Barrio 3	552	14
	Barrio 4	552	15
Tiniguir	Barrio 1	538	16,17
	Barrio 2	538	18
	Barrio 3	538	RC,19
	Barrio 4	538	20
J-Raifia	Barrio 1	601	RC,21
	Barrio 2	602	22
	Barrio 3	601	23,24
	Barrio 4	601	25
El-Argub	Barrio 1	501	26,27
	Barrio 2	502	28
	Barrio 3	501	RC
	Barrio 4	502	29,30
Um-Edraiga	Barrio 1	619	31
	Barrio 2	618	32,33
	Barrio 3	619	34
	Barrio 4	619	35,36
		15,355	

Smara & Boujdour

Daira	Barrio	Population	Clusters (48)
Edjeiria	Barrio 1	1,378	1
	Barrio 2	1,377	2,3
	Barrio 3	1,378	4
	Barrio 4	1,378	5,6
Farsia	Barrio 1	1,453	7
	Barrio 2	1,453	8,9
	Barrio 3	1,453	10
	Barrio 4	1,453	11,12
Bir-Lehlu	Barrio 1	1,039	13
	Barrio 2	1,038	14
	Barrio 3	1,039	15
	Barrio 4	1,039	16,17
Mahbes	Barrio 1	1,114	18
	Barrio 2	1,115	19
	Barrio 3	1,114	20
	Barrio 4	1,115	21
Hauza	Barrio 1	1,313	22,23
	Barrio 2	1,314	24
	Barrio 3	1,313	25,26
	Barrio 4	1,314	27
Tifariti	Barrio 1	1,203	28,29
	Barrio 2	1,204	30
	Barrio 3	1,203	RC
	Barrio 4	1,203	31,32
Mheiriz	Barrio 1	1,279	33
	Barrio 2	1,278	RC
	Barrio 3	1,279	34,35
	Barrio 4	1,279	36
February 27th	Barrio 1	1,152	37
	Barrio 2	1,153	RC,38
	Barrio 3	1,152	39
	Barrio 4	1,152	40
Lemsid	Barrio 1	1,153	41
	Barrio 2	1,152	RC,RC
	Barrio 3	1,153	42
	Barrio 4	1,153	43
Agti	Barrio 1	976	44
	Barrio 2	976	45
	Barrio 3	976	46
	Barrio 4	976	47,48
		48,242	

Annex 3) TERMS OF REFERENCE

Nutrition Survey

Sahrawi Refugee Camps, Tindouf, Algeria

2019

Terms of Reference

Background

Algeria has been hosting Sahrawi refugees since 1975. At present, the political solution for their return is at an impasse as the UN Security Council and the Secretary General are still making efforts to find a solution for the refugees' future. Consequently, Sahrawi refugees have been hosted for over 40 years in the south-west region of Tindouf, Algeria. Their situation is considered a protracted emergency.

Several nutrition surveys have been undertaken over the years. **Table 1** summarises key findings for women and children for the last three nutrition surveys. 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 of the 2010, 2012 and 2016 nutrition surveys. All values are % (95% CI). Acute malnutrition and stunting were calculated based on the 2006 WHO Growth Standards.

	Women [a]		Children				
	Anaemia		Anaemia		Acute Malnutrition		Stunting
Year	Severe	Total	Severe	Total	SAM	GAM	
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)	1.3 (0.8 – 1.3)	7.9 (6.5 – 9.3)	29.7 (26.9 – 32.5)
2012	3.6 (2.5 – 4.8)	36.4 (33.2 – 39.6)	0.5 (0.1 – 0.8)	28.4 (25.7 – 31.0)	0.8 (0.3 – 1.3)	7.6 (6.4 – 8.8)	25.2 (22.8 – 27.6)
2016	5.1 (4.4 – 5.9)	45.2 (42.6 – 47.4)	0.5 (0.1 – 0.8)	38.7 (36.3 – 41.2)	0.5 (0.3 – 0.9)	4.7 (3.8 – 5.8)	18.6 (16.8 – 20.6)

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

The latest nutrition survey undertaken in the camps in 2016[49] reported a prevalence of anaemia in non-pregnant women of reproductive age (15-49 years) and children aged 6-59 months around the threshold of medium public health significance (see **Table 1**). In addition, exceedingly high levels of anaemia were reported among pregnant and lactating women of reproductive age (59.8, 95% CI: 54.3 – 65.0; and 72.0, 95% CI: 65.5 – 77.7, respectively). Moreover, the overall burden of anaemia was found to be different between each camp. Similarly, stunting in children aged 6-59 months is almost of medium public health significance. In addition, the is a very high prevalence of overweight (36.4%; 95% CI: 34.7 – 38.1) and obesity (30.7%; 95% CI: 28.6 – 32.8) among women of childbearing age.

Among the strategies to assess and improve the monitoring of nutrition-related issues in this refugee operation, the 2016 nutrition survey recommended the systematic implementation of nutrition surveys at least every two years.

[49] UNHCR and WFP. Nutrition Survey. Sahrawi Refugee Camps, Tindouf, Algeria. Oct-Nov 2016

Methods

Aim

- To implement a stratified nutrition survey, one stratum per camp (five in total), to establish a detailed map of the current nutritional profile of the Sahrawi refugee population. The results will be used to produce recommendations on actions to improve the nutritional status and health of the Sahrawi refugees.

Target population

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

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[50] (IYCF) practice indicators.
- Determine the anaemia prevalence in women of reproductive age (15-49 years).
- Determine the overweight prevalence in women of reproductive age (15-49 years).
- Determine the Food Consumption Score of households.
- Determine the extent to which negative coping strategies are used in households.
- Assess Household Dietary Diversity.
- Assess risk factors from chronic diseases such as tobacco use and inadequate diets.
- 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 nutrition survey is programmed to take place in the spring[51] of 2019. This period also includes feedback and de-briefing meetings in Rabouni, Tindouf and Algiers.

Outputs and Documents

- **Nutrition survey - Terms of reference (TORs):** The nutrition survey TORs will be produced first in English to be later translated into Spanish.
- **Nutrition survey tools and questionnaires:** Survey questionnaires will be produced in XLSForm format first in English to facilitate discussion of what information will be included. The final version will then be translated into Spanish. The questionnaires will be further refined and finalised during the training of nutrition survey enumerators, to ensure collection of high-quality data.
- **Nutrition survey training package:** A training package will be produced in Spanish that will include training slides and the enumerators' field guide.
- **Training of Nutrition survey enumerators:** A 12-day long training will be delivered to nutrition survey enumerators to ensure complete understanding of roles and responsibilities, the survey design; as well as the correct utilisation of the nutrition survey tools.
- **Technical oversight and supervision for the Nutrition survey implementation:** Together with UNHCR and WFP personnel, technical oversight and supervision of survey teams will be delivered during the nutrition survey implementation.
- **Nutrition survey datasets:** Using an ODK platform for digital capture of questionnaire data, the below listed datasets will be created for survey analysis at the end of the survey. All dataset will be thoroughly clean and adequately labelled in English language.

[50] 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.

[51] At the time of writing, the exact dates for the nutrition survey implementation are still to be determined between the UN agencies and the refugee authorities.

    - Household dataset – containing all household level data
    - Women of childbearing age dataset – containing all individual level data of women of childbearing age (15-49 years)
    - Children dataset – containing all individual level data of children aged 6-59 months
    - ENA dataset – containing all anthropometric and survey design data of children aged 6-59 months
- **Nutrition survey preliminary results report:** Three weeks after the end of the survey data collection, a report will be delivered written in English and containing the nutrition survey preliminary results. The results will include all standard anthropometric and anaemia indicators, as defined by the SENS guides
- **Nutrition survey final report:** The final version of the full report will be produced first in English to facilitate discussion. The final approved and cleared version will then be translated into Spanish to be presented to the Sahrawi health authorities. Only after the translation of the survey report is finalised, will dissemination of the survey results be carried out.

Table A1. Indicators and procedures by population group

Population group	Indicators	Measurements/ tools	Materials/ methods
Children (0-5 months)	***IYCF indicators***		
	• Exclusive breastfeeding under 6 months	Questionnaire	Questionnaire
	• Early initiation of breastfeeding		
	• Bottle feeding		
	• Diarrhoea prevalence		
	• Continued or increased feeding during diarrhoea		
Children (6-59 months)	***Nutritional status indicators***		
	• Underweight: WAZ <-2	Weight	Weight scale
	• Stunting: HAZ <-2		
	• Global acute malnutrition: WHZ <-2 and/or oedema	Length/height	Stadiometer
	• Moderate acute malnutrition: WHZ <-2 but ≥-3		
	• Severe acute malnutrition: WHZ z-score <-3 and/or oedema	Age	Questionnaire
	• Low MUAC: <12.5 cm	MUAC	MUAC tape
	• Very low MUAC: <11.5 cm		
	• Oedema	Clinical evaluation	
	• Total anaemia: Haemoglobin <11.0g/dL	Haemoglobin	HemoCue
	• Mild anaemia: Haemoglobin 10.0-10.9g/dL		
	• Moderate anaemia: Haemoglobin 7.0-9.9g/dL		
	• Severe anaemia: Haemoglobin <7.0g/dL		
	IYCF indicators (6-23 months)		
	• Child ever breastfed	Questionnaire	Questionnaire
	• Continued breastfeeding at 1 year		
	• Continued breastfeeding at 2 years		
	• Age-appropriate breastfeeding		
	• Median duration of breastfeeding		
	• Milk frequency for non-breastfed children		
	• Introduction of solid, semi-solid or soft foods		
	• Minimum dietary diversity		
	• Minimum meal frequency		
	• Minimum acceptable diet		
	• Consumption of iron-rich or iron-fortified foods		
Women (15 – 49 years)	***Nutritional status indicators***		
	• Anaemia	Haemoglobin	HemoCue
	Pregnant women		
	Total: Haemoglobin <11.0g/dL		
	Mild: Haemoglobin 10.0-10.9g/dL		
	Moderate: Haemoglobin 7.0-9.9g/dL		
	Severe: Haemoglobin <7.0g/dL		
	Non-pregnant women		
	Total: Haemoglobin <12.0g/dL		
	Mild: Haemoglobin 11.0-11.9g/dL		
	Moderate: Haemoglobin 8.0-10.9g/dL		
	Severe: Haemoglobin <8.0g/dL		
	• Low MUAC (Pregnant women) <23.0 cm	MUAC	MUAC tape
	• Underweight: body mass index <18.5 kg/m^2	Weight	Weight scale
	• Overweight: Body mass index ≥25 but <30 kg/m^2		
	• Obesity: Body mass index ≥30 kg/m^2	Height	Stadiometer
	• Central obesity: waist circumference >80 cm	Waist circumference	Tape
Household	***Food Security***		
	• Food Consumption Score	Questionnaire	Questionnaire
	• Household Diet Diversity Score		
	• Coping Strategies Index		
	Chronic disease		
	• Tobacco consumption	Questionnaire	Questionnaire
	• Reported hypertension in household		
	• Reported diabetes in household		

MUAC: Mid-upper arm circumference; HAZ: Length/Height-for-age z-score. WAZ: Weight-for-age z-score. WHZ: Weight-for-length/height z-score.

Annex 4) SAMPLE SIZE CALCULATION

Sample size calculation

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

Sample size calculations were carried out using ENA for SMART 2011 software (version July 9th, 2015)[52], following UNHCR Standardised Expanded Nutrition Surveys (SENS) Guidelines for Refugee Populations (version 2)[53]. Calculations were based on prevalence data for Global Acute Malnutrition (GAM), stunting and anaemia reported in the past three surveys (see **Table A2.1**).

As one survey per strata (camp) is planned (five strata in total), it was assumed that there would be less heterogeneity within the population of each camp. In the 2016 nutrition survey, the average values observed of the design effect for anthropometric indicators in children aged 6-59 months ranged between 1.22 and 1.60; while those for anaemia ranged between 0.84 and 2.66. For non-pregnant women of childbearing age, the design effect ranged between 0.99 and 2.74 and between 0.95 and 1.35 for anaemia and overweight, respectively. We used a design effect value of 1.5 for calculations of sample size on anthropometric and anaemia indicators in children. A value of 2.0 was used for anaemia and overweight 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)				
	Prevalence reported % (95% CI)	Prevalence used %	Precision %	Design Effect	Calculated sample size
GAM (Awserd, 2012)	5.9 (4.2 – 7.6)	8	3.5	1.5	377*
GAM (Laayoune, 2012)	10.5 (7.8 – 13.2)	13	4.5	1.5	350
GAM (Dakhla, 2016)	3.7 (2.0 – 6.8)	7	3.5	1.5	333
GAM (Laayoune, 2016)	6.6 (4.2 – 10.3)	10	4.0	1.5	353
Stunting (Dakhla, 2012)	22.5 (19.3 – 25.7)	26	7.0	1.5	335
Stunting (Smara, 2012)	28.3 (23.8 – 32.8)	33	7.0	1.5	283
Stunting (Boujdour, 2016)	13.6 (10.3 – 17.8)	18	5.0	1.5	370
Stunting (Laayoune, 2016)	21.0 (16.7 – 26.1)	26	6.0	1.5	335
Anaemia (Dakhla, 2010)	46.2 (39.3 – 53.0)	53	7.0	1.5	319
Anaemia (Laayoune, 2012)	61.3 (54.1 – 68.6)	68	7.0	1.5	279
Anaemia (Boujdour, 2016)	29.5 (23.8 – 35.8)	36	6.5	1.5	342
	Non-pregnant women of reproductive age (15 – 49 years)				
	Reported prevalence % (95% CI)	Prevalence used %	Precision %	Design effect	Calculated sample size
Anaemia (Dakhla, 2012)	44.0 (37.9 – 50.2)	50	7.5	2.0	372
Anaemia (Smara, 2012)	28.6 (23.2 – 34.1)	34	7.0	2.0	383*
Anaemia (Awserd, 2016)	51.8 (46.1 – 57.4)	57	7.5	2.0	364
Anaemia (Boujdour, 2016)	35.9 (30.5 – 41.6)	42	7.5	2.0	362
Overweight (Laayoune, 2010)	48.1 (43.9 – 52.4)	52	7.5	2.0	371
Overweight (Dakhla, 2010)	59.7 (53.5 – 65.5)	66	7.5	2.0	334
Overweight (Awserd, 2016)	65.2 (61.5 – 68.7)	69	7.5	2.0	318

95% CI: 95% Confidence Interval. GAM, Global Acute Malnutrition: Prevalence in children aged 6-59 months with weight-for-length/height z-score <-2 z-scores and/or bilateral pitting oedema. Stunting: Prevalence in children aged 6-59 months with length/height-for-age z-score <-2 z-scores. Anaemia: Prevalence in children aged 6-59 months with haemoglobin values <11 g/dL or in non-pregnant women of reproductive age (15-49 years) with haemoglobin values <12 g/dL. Overweight: Prevalence in women of childbearing age with body mass index >25 k/m^2.

[a] Sample size calculation was carried using ENA for SMART software (version July 9th, 2015). [b] Nutrition survey carried out in Nov 2016. Only the highest and lowest prevalence values for each indicator were used for calculating sample size. * Highest sample size value.

[52] Available at www.nutrisurvey.net/ena/ena.html
[53] Available at www.sens.unhcr.org

Based on the calculations, a sample of **377 children** aged 6-59 months and a sample of **383 non-pregnant women** of reproductive age (15-49 years), per camp, are needed to be included in each camp survey (see **Table A2.1**).

<u>A2.4. Number of households required for sampling</u>

Household characteristics were obtained from the 2016 nutrition survey data (see **Table A2.3**) to allow calculating the required number of households.

Table A2.3. Household characteristics observed in the 2016 nutrition survey. All values are household numbers (rounded to two decimal points) unless otherwise specified.

Category	Awserd	Dakhla	Laayoune	Smara	Boujdour	Combined
Children aged 6-59 months/household	1.51	1.11	1.15	1.54	0.92	1.25
Non-pregnant women aged 15-49 years/household	1.77	1.74	1.26	1.67	1.39	1.57
Household refusals (%)	0.48	0.48	1.43	0.95	3.10	1.29

Based on the data obtained from the 2016 nutrition survey it was assumed, for this survey, an average household would have 0.92 children aged 6-59 months and 1.26 non-pregnant women of reproductive age (15-49 years). It was further assumed that 3% of the households would refuse to participate in the survey.

					Households per cluster needed	
	Sample required		Households	+ refusal ≈3%	30 clusters	35 clusters
Children 6-59 months	377	÷ 0.92 =	410	422	14	12
Women 15-49 years	383	÷ 1.26 =	304	313	11	9

Based on the calculations above, about **420 households will need to be surveyed** per camp, to ensure that all the required sample sizes for all target groups are covered. In every household surveyed, all children aged <5 years and all women of childbearing age (15-49) 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 35 clusters with a range of 12 to 14 households per cluster.

Annex 5) PLAUSIBILITY 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**
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	**0** (2.1 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.290)
Age ratio(6-29 vs 30-59)	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**2** (p=0.060)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (5)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (11)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (9)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>=1.20	
.			and	and	and	or	
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	**5** (1.12)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (0.00)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**1** (-0.26)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**0** (p=0.620)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**12** %

The overall score of this survey is 12 %, this is good.

There were no duplicate entries detected.

Missing or wrong data:

HEIGHT: Line=1/ID=1190601

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=2/ID=1410301: HAZ (14.090), WAZ (5.287), Age may be incorrect
Line=22/ID=1440801: **WHZ (5.017)**, WAZ (2.735), Weight may be incorrect
Line=80/ID=1470401: **WHZ (-3.450)**, Weight may be incorrect
Line=86/ID=1030201: **WHZ (3.070)**, Weight may be incorrect
Line=114/ID=1120301: **WHZ (-3.585)**, Weight may be incorrect
Line=283/ID=1280701: **WHZ (3.085)**, Weight may be incorrect
Line=340/ID=1100801: **WHZ (3.380)**, WAZ (2.607), Weight may be incorrect
Line=368/ID=1480101: **WHZ (-3.828)**, Height may be incorrect
Line=378/ID=1480103: **WHZ (-3.372)**, Height may be incorrect
Line=412/ID=1040801: HAZ (1.809), Age may be incorrect
Line=413/ID=1260401: HAZ (-4.691), Height may be incorrect
Line=414/ID=1180602: HAZ (-4.715), Height may be incorrect
Line=415/ID=1430501: HAZ (2.008), Height may be incorrect
Line=416/ID=1350701: HAZ (2.012), Height may be incorrect

```
Line=417/ID=1330901:   HAZ (-4.933), Age may be incorrect
Line=418/ID=1070503:   HAZ (2.244), Age may be incorrect
Line=419/ID=1440201:   HAZ (-5.058), Height may be incorrect
Line=420/ID=1470302:   HAZ (-5.146), Age may be incorrect
Line=421/ID=1390802:   HAZ (-5.202), Height may be incorrect
Line=422/ID=1300602:   HAZ (-5.205), Height may be incorrect
Line=423/ID=1180102:   HAZ (-5.256), Height may be incorrect
Line=424/ID=1060901:   HAZ (-5.362), Height may be incorrect
Line=425/ID=1020801:   HAZ (2.901), Height may be incorrect
Line=426/ID=1390302:   HAZ (-5.994), Age may be incorrect
Line=427/ID=1390902:   HAZ (-6.003), Age may be incorrect
Line=428/ID=1390801:   HAZ (-6.304), Height may be incorrect
Line=429/ID=1130202:   HAZ (-6.356), Age may be incorrect
Line=430/ID=1080201:   HAZ (-6.527), Height may be incorrect
Line=431/ID=1440601:   WHZ (3.847), HAZ (-6.735), Height may be incorrect
Line=432/ID=1460901:   HAZ (-6.836), WAZ (-6.795), Age may be incorrect

Percentage of values flagged with SMART flags:WHZ:  2.1 %, HAZ:  5.1 %, WAZ:  0.9 %
```

Age distribution:

```
Month 6  : #####
Month 7  : ##########
Month 8  : ########
Month 9  : ######
Month 10 : ########
Month 11 : ###
Month 12 : ##############
Month 13 : ##################
Month 14 : ###########
Month 15 : ########
Month 16 : ######
Month 17 : #########
Month 18 : ###############
Month 19 : #######
Month 20 : ###########
Month 21 : #########
Month 22 : #######
Month 23 : #####
Month 24 : #########
Month 25 : #############
Month 26 : #####
Month 27 : #######
Month 28 : #######
Month 29 : ############
Month 30 : ######
Month 31 : ######
Month 32 : ########
Month 33 : ########
Month 34 : ########
Month 35 : ####
Month 36 : ###########
Month 37 : ###
Month 38 : ######
Month 39 : #######
Month 40 : ########
Month 41 : #####
Month 42 : ######
Month 43 : ##########
Month 44 : #########
Month 45 : ########
Month 46 : ####
Month 47 : #######
Month 48 : #############
Month 49 : ######
Month 50 : ######
Month 51 : #######
Month 52 : ########
Month 53 : ######
Month 54 : ########
Month 55 : ####
Month 56 : ######
Month 57 : #########
Month 58 : ########
Month 59 : #########
Month 60 : #####

Age ratio of 6-29 months to 30-59 months: 1.02 (The value should be around 0.85).:
```

p-value = 0.060 (as expected)

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

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	57/52.7 (1.1)	55/47.6 (1.2)	112/100.2 (1.1)	1.04
18 to 29	12	58/51.4 (1.1)	48/46.4 (1.0)	106/97.7 (1.1)	1.21
30 to 41	12	43/49.8 (0.9)	34/44.9 (0.8)	77/94.7 (0.8)	1.26
42 to 53	12	46/49.0 (0.9)	45/44.2 (1.0)	91/93.2 (1.0)	1.02
54 to 59	6	23/24.2 (0.9)	23/21.9 (1.1)	46/46.1 (1.0)	1.00
6 to 59	54	227/216.0 (1.1)	205/216.0 (0.9)		1.11

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

Overall sex ratio: p-value = 0.290 (boys and girls equally represented)
Overall age distribution: p-value = 0.244 (as expected)
Overall age distribution for boys: p-value = 0.666 (as expected)
Overall age distribution for girls: p-value = 0.412 (as expected)
Overall sex/age distribution: p-value = 0.117 (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: **5** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.251

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: **11** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.000 (significant difference)

Digit preference MUAC:

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

Digit preference score: **9** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.000 (significant difference)

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

.	**no exclusion**	**exclusion from reference mean**	**exclusion from observed mean**

.		(WHO flags)	(SMART flags)
WHZ			
Standard Deviation SD:	1.23	1.20	1.12
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	6.0%	6.0%	5.2%
calculated with current SD:	7.3%	7.0%	5.7%
calculated with a SD of 1:	3.7%	3.8%	3.8%
HAZ			
Standard Deviation SD:	1.64	1.34	1.16
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	31.1%	30.2%	28.9%
calculated with current SD:	37.7%	34.1%	30.5%
calculated with a SD of 1:	30.4%	29.2%	27.6%
WAZ			
Standard Deviation SD:	1.15	1.07	1.05
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	16.7%	16.5%	16.6%
calculated with current SD:	18.5%	16.9%	16.7%
calculated with a SD of 1:	15.2%	15.2%	15.6%

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

WHZ	p= 0.041	p= 0.676	p= 0.715
HAZ	p= 0.000	p= 0.004	p= 0.030
WAZ	p= 0.000	p= 0.383	p= 0.454

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

Skewness

WHZ	0.20	0.05	0.00
HAZ	1.53	-0.23	-0.06
WAZ	0.12	0.06	-0.09

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

Kurtosis

WHZ	0.82	0.32	-0.26
HAZ	19.21	0.69	-0.24
WAZ	2.99	0.10	-0.25

Kurtosis characterizes the relative size of the body versus the tails of the distribution. Positive kurtosis indicates relatively large tails and small body. Negative kurtosis indicates relatively large body and small tails.
If the absolute value is:
-above 0.4 it indicates a problem. There might have been a problem with data collection or sampling.
-between 0.2 and 0.4, the data may be affected with a problem.
-less than an absolute value of 0.2 the distribution can be considered as normal.

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

WHZ < -2: ID=0.92 (p=0.620)
WHZ < -3: ID=0.94 (p=0.598)
GAM: ID=0.92 (p=0.620)
SAM: ID=0.94 (p=0.598)
HAZ < -2: ID=1.75 (p=0.001)
HAZ < -3: ID=2.04 (p=0.000)
WAZ < -2: ID=1.67 (p=0.003)
WAZ < -3: ID=1.38 (p=0.042)

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: 1.18 (n=48, f=2)  ################
02: 1.20 (n=47, f=1)  #################
03: 1.18 (n=46, f=1)  ################
04: 1.21 (n=45, f=0)  #################
05: 1.05 (n=42, f=0)  ##########
06: 1.20 (n=42, f=1)  #################
07: 1.34 (n=37, f=1)  #######################
08: 1.23 (n=33, f=1)  ##################
09: 1.18 (n=29, f=0)  ################
10: 1.81 (n=24, f=2)  ##########################################
11: 1.12 (n=18, f=0)  OOOOOOOOOOOOOO
12: 0.91 (n=08, f=0)  ~~~~~
13: 1.22 (n=06, f=0)  ~~~~~~~~~~~~~~~~~~
14: 0.22 (n=02, f=0)
15: 0.32 (n=02, f=0)
16: 1.21 (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**	**10**	**11**	**12**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
n =	40	38	53	19	33	31	31	34	46	34	32	41
Percentage of values flagged with SMART flags:												
WHZ:	0.0	2.6	1.9	15.8	0.0	3.2	3.2	0.0	0.0	3.0	6.3	0.0
HAZ:	2.5	2.6	3.8	0.0	6.1	12.9	3.2	2.9	8.7	9.1	9.4	2.4
WAZ:	0.0	5.3	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	3.1	0.0
Age ratio of 6-29 months to 30-59 months:	0.54	1.24	0.77	0.73	1.06	1.07	0.94	1.43	1.09	1.13	1.91	1.05
Sex ratio (male/female):	1.00	0.90	1.04	0.90	2.30	1.82	0.82	1.62	0.92	1.27	0.78	0.95
Digit preference Weight (%):												
.0 :	8	8	4	0	15	3	13	6	9	3	13	7
.1 :	18	37	8	5	9	19	6	12	2	18	3	17
.2 :	13	13	9	0	9	16	13	12	7	12	9	17
.3 :	8	11	13	0	3	3	13	18	7	21	16	17
.4 :	8	3	13	11	12	0	6	6	17	3	16	12
.5 :	10	0	8	21	15	3	10	15	2	3	9	7
.6 :	13	11	9	11	0	10	13	3	20	9	9	10
.7 :	8	13	4	11	9	23	10	15	4	3	9	5
.8 :	8	5	11	32	9	13	10	6	20	18	9	5
.9 :	10	0	21	11	18	10	6	9	13	12	6	2
DPS:	11	34	16	32	18	24	9	15	22	22	12	18

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

Digit preference Height (%):												
.0 :	5	8	6	0	27	16	3	15	9	3	19	10
.1 :	8	18	9	11	18	23	10	6	22	18	6	17

.2 :	10	13	8	21	3	10	6	18	24	15	19	22
.3 :	25	16	28	16	6	19	16	3	2	9	9	12
.4 :	10	16	6	11	15	19	13	15	17	6	9	24
.5 :	3	8	4	0	3	0	13	9	9	9	13	2
.6 :	18	3	8	11	9	3	13	12	4	15	13	10
.7 :	8	13	15	0	9	3	6	6	4	6	3	0
.8 :	5	5	6	26	6	0	10	12	9	6	9	0
.9 :	10	0	11	5	3	6	10	6	0	12	0	2
DPS:	21	20	23	29	25	27	12	15	26	16	19	28

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

Digit preference MUAC (%):

.0 :	5	11	9	11	36	13	6	9	2	3	9	29
.1 :	23	13	11	11	3	10	3	3	13	22	6	7
.2 :	13	32	6	0	9	23	19	21	9	9	16	15
.3 :	10	21	15	32	3	16	16	9	13	9	16	20
.4 :	8	5	8	0	12	3	23	18	15	13	9	7
.5 :	5	5	17	16	21	6	0	9	13	6	9	7
.6 :	10	5	6	5	3	10	3	6	17	6	13	10
.7 :	5	3	8	11	3	6	6	6	9	9	3	2
.8 :	10	3	4	5	6	10	10	9	4	16	19	2
.9 :	13	3	17	11	3	3	13	12	4	6	0	0
DPS:	17	30	15	29	35	19	24	17	16	17	19	28

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

Standard deviation of WHZ:

SD	0.87	1.37	1.01	1.79	1.19	1.28	1.04	1.01	1.18	1.16	1.74	1.04
Prevalence (< -2) observed:												
%		10.5	5.7	36.8	9.1	0.0	3.2	0.0	2.2	9.1	6.3	4.9
Prevalence (< -2) calculated with current SD:												
%		10.8	6.2	33.0	5.9	7.1	2.8	1.8	3.8	10.4	13.9	4.1
Prevalence (< -2) calculated with a SD of 1:												
%		4.5	6.0	21.5	3.1	3.0	2.4	1.7	1.8	7.2	3.0	3.5

Standard deviation of HAZ:

SD	1.28	1.27	1.39	1.24	1.58	1.72	1.15	2.98	1.47	1.16	1.83	1.22
observed:												
%	17.5	21.1	37.7	31.6	27.3	54.8	38.7	23.5	47.8	12.1	31.3	26.8
calculated with current SD:												
%	29.3	32.5	38.7	37.3	30.0	63.0	40.1	33.6	50.5	14.7	40.8	28.2
calculated with a SD of 1:												
%	24.2	28.2	34.5	34.4	20.4	71.6	38.7	10.5	50.7	11.3	33.5	24.1

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

Team 1:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	3/4.6 (0.6)	4/4.6 (0.9)	7/9.3 (0.8)	0.75
18 to 29	12	2/4.5 (0.4)	5/4.5 (1.1)	7/9.0 (0.8)	0.40
30 to 41	12	3/4.4 (0.7)	5/4.4 (1.1)	8/8.8 (0.9)	0.60

42 to 53	12	7/4.3 (1.6)	4/4.3 (0.9)	11/8.6 (1.3)	1.75
54 to 59	6	5/2.1 (2.3)	2/2.1 (0.9)	7/4.3 (1.6)	2.50
6 to 59	54	20/20.0 (1.0)	20/20.0 (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 = 0.480 (as expected)
Overall age distribution for boys: p-value = 0.094 (as expected)
Overall age distribution for girls: p-value = 0.992 (as expected)
Overall sex/age distribution: p-value = 0.085 (as expected)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	5/4.2 (1.2)	4/4.6 (0.9)	9/8.8 (1.0)	1.25
18 to 29	12	7/4.1 (1.7)	5/4.5 (1.1)	12/8.6 (1.4)	1.40
30 to 41	12	3/3.9 (0.8)	4/4.4 (0.9)	7/8.3 (0.8)	0.75
42 to 53	12	2/3.9 (0.5)	3/4.3 (0.7)	5/8.2 (0.6)	0.67
54 to 59	6	1/1.9 (0.5)	4/2.1 (1.9)	5/4.1 (1.2)	0.25
6 to 59	54	18/19.0 (0.9)	20/19.0 (1.1)		0.90

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

Overall sex ratio: p-value = 0.746 (boys and girls equally represented)
Overall age distribution: p-value = 0.552 (as expected)
Overall age distribution for boys: p-value = 0.427 (as expected)
Overall age distribution for girls: p-value = 0.698 (as expected)
Overall sex/age distribution: p-value = 0.194 (as expected)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	5/6.3 (0.8)	6/6.0 (1.0)	11/12.3 (0.9)	0.83
18 to 29	12	7/6.1 (1.1)	5/5.9 (0.9)	12/12.0 (1.0)	1.40
30 to 41	12	8/5.9 (1.4)	3/5.7 (0.5)	11/11.6 (0.9)	2.67
42 to 53	12	4/5.8 (0.7)	7/5.6 (1.2)	11/11.4 (1.0)	0.57
54 to 59	6	3/2.9 (1.0)	5/2.8 (1.8)	8/5.7 (1.4)	0.60
6 to 59	54	27/26.5 (1.0)	26/26.5 (1.0)		1.04

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

Overall sex ratio: p-value = 0.891 (boys and girls equally represented)
Overall age distribution: p-value = 0.885 (as expected)
Overall age distribution for boys: p-value = 0.792 (as expected)
Overall age distribution for girls: p-value = 0.472 (as expected)
Overall sex/age distribution: p-value = 0.266 (as expected)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	2/2.1 (1.0)	2/2.3 (0.9)	4/4.4 (0.9)	1.00
18 to 29	12	1/2.0 (0.5)	3/2.3 (1.3)	4/4.3 (0.9)	0.33
30 to 41	12	3/2.0 (1.5)	2/2.2 (0.9)	5/4.2 (1.2)	1.50
42 to 53	12	3/1.9 (1.5)	2/2.2 (0.9)	5/4.1 (1.2)	1.50
54 to 59	6	0/1.0 (0.0)	1/1.1 (0.9)	1/2.0 (0.5)	0.00
6 to 59	54	9/9.5 (0.9)	10/9.5 (1.1)		0.90

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

Overall sex ratio: p-value = 0.819 (boys and girls equally represented)
Overall age distribution: p-value = 0.918 (as expected)
Overall age distribution for boys: p-value = 0.626 (as expected)
Overall age distribution for girls: p-value = 0.989 (as expected)
Overall sex/age distribution: p-value = 0.583 (as expected)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	7/5.3 (1.3)	7/2.3 (3.0)	14/7.7 (1.8)	1.00
18 to 29	12	3/5.2 (0.6)	0/2.3 (0.0)	3/7.5 (0.4)	

30 to 41	12	3/5.0 (0.6)	0/2.2 (0.0)	3/7.2 (0.4)	
42 to 53	12	7/5.0 (1.4)	2/2.2 (0.9)	9/7.1 (1.3)	3.50
54 to 59	6	3/2.5 (1.2)	1/1.1 (0.9)	4/3.5 (1.1)	3.00
6 to 59	54	23/16.5 (1.4)	10/16.5 (0.6)		2.30

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

Overall sex ratio: p-value = 0.024 (significant excess of boys)
Overall age distribution: p-value = 0.027 (significant difference)
Overall age distribution for boys: p-value = 0.519 (as expected)
Overall age distribution for girls: p-value = 0.008 (significant difference)
Overall sex/age distribution: p-value = 0.001 (significant difference)

Team 6:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	4/4.6 (0.9)	3/2.6 (1.2)	7/7.2 (1.0)	1.33
18 to 29	12	7/4.5 (1.5)	2/2.5 (0.8)	9/7.0 (1.3)	3.50
30 to 41	12	2/4.4 (0.5)	2/2.4 (0.8)	4/6.8 (0.6)	1.00
42 to 53	12	3/4.3 (0.7)	1/2.4 (0.4)	4/6.7 (0.6)	3.00
54 to 59	6	4/2.1 (1.9)	3/1.2 (2.6)	7/3.3 (2.1)	1.33
6 to 59	54	20/15.5 (1.3)	11/15.5 (0.7)		1.82

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

Overall sex ratio: p-value = 0.106 (boys and girls equally represented)
Overall age distribution: p-value = 0.140 (as expected)
Overall age distribution for boys: p-value = 0.312 (as expected)
Overall age distribution for girls: p-value = 0.423 (as expected)
Overall sex/age distribution: p-value = 0.021 (significant difference)

Team 7:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	4/3.2 (1.2)	5/3.9 (1.3)	9/7.2 (1.3)	0.80
18 to 29	12	4/3.2 (1.3)	2/3.8 (0.5)	6/7.0 (0.9)	2.00
30 to 41	12	3/3.1 (1.0)	3/3.7 (0.8)	6/6.8 (0.9)	1.00
42 to 53	12	3/3.0 (1.0)	4/3.7 (1.1)	7/6.7 (1.0)	0.75
54 to 59	6	0/1.5 (0.0)	3/1.8 (1.7)	3/3.3 (0.9)	0.00
6 to 59	54	14/15.5 (0.9)	17/15.5 (1.1)		0.82

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

Overall sex ratio: p-value = 0.590 (boys and girls equally represented)
Overall age distribution: p-value = 0.947 (as expected)
Overall age distribution for boys: p-value = 0.756 (as expected)
Overall age distribution for girls: p-value = 0.715 (as expected)
Overall sex/age distribution: p-value = 0.365 (as expected)

Team 8:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	7/4.9 (1.4)	2/3.0 (0.7)	9/7.9 (1.1)	3.50
18 to 29	12	5/4.8 (1.1)	6/2.9 (2.0)	11/7.7 (1.4)	0.83
30 to 41	12	6/4.6 (1.3)	2/2.9 (0.7)	8/7.5 (1.1)	3.00
42 to 53	12	0/4.5 (0.0)	1/2.8 (0.4)	1/7.3 (0.1)	0.00
54 to 59	6	3/2.2 (1.3)	2/1.4 (1.4)	5/3.6 (1.4)	1.50
6 to 59	54	21/17.0 (1.2)	13/17.0 (0.8)		1.62

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

Overall sex ratio: p-value = 0.170 (boys and girls equally represented)
Overall age distribution: p-value = 0.107 (as expected)
Overall age distribution for boys: p-value = 0.188 (as expected)
Overall age distribution for girls: p-value = 0.266 (as expected)
Overall sex/age distribution: p-value = 0.009 (significant difference)

Team 9:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	7/5.1 (1.4)	7/5.6 (1.3)	14/10.7 (1.3)	1.00

18 to 29	12	4/5.0 (0.8)	6/5.4 (1.1)	10/10.4 (1.0)	0.67
30 to 41	12	5/4.8 (1.0)	4/5.3 (0.8)	9/10.1 (0.9)	1.25
42 to 53	12	4/4.7 (0.8)	6/5.2 (1.2)	10/9.9 (1.0)	0.67
54 to 59	6	2/2.3 (0.9)	1/2.6 (0.4)	3/4.9 (0.6)	2.00
6 to 59	54	22/23.0 (1.0)	24/23.0 (1.0)		0.92

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

Overall sex ratio: p-value = 0.768 (boys and girls equally represented)
Overall age distribution: p-value = 0.752 (as expected)
Overall age distribution for boys: p-value = 0.899 (as expected)
Overall age distribution for girls: p-value = 0.770 (as expected)
Overall sex/age distribution: p-value = 0.557 (as expected)

Team 10:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	6/4.4 (1.4)	2/3.5 (0.6)	8/7.9 (1.0)	3.00
18 to 29	12	4/4.3 (0.9)	6/3.4 (1.8)	10/7.7 (1.3)	0.67
30 to 41	12	4/4.2 (1.0)	1/3.3 (0.3)	5/7.5 (0.7)	4.00
42 to 53	12	4/4.1 (1.0)	5/3.2 (1.5)	9/7.3 (1.2)	0.80
54 to 59	6	1/2.0 (0.5)	1/1.6 (0.6)	2/3.6 (0.6)	1.00
6 to 59	54	19/17.0 (1.1)	15/17.0 (0.9)		1.27

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

Overall sex ratio: p-value = 0.493 (boys and girls equally represented)
Overall age distribution: p-value = 0.625 (as expected)
Overall age distribution for boys: p-value = 0.890 (as expected)
Overall age distribution for girls: p-value = 0.248 (as expected)
Overall sex/age distribution: p-value = 0.165 (as expected)

Team 11:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	5/3.2 (1.5)	7/4.2 (1.7)	12/7.4 (1.6)	0.71
18 to 29	12	2/3.2 (0.6)	7/4.1 (1.7)	9/7.2 (1.2)	0.29
30 to 41	12	2/3.1 (0.7)	1/3.9 (0.3)	3/7.0 (0.4)	2.00
42 to 53	12	5/3.0 (1.7)	3/3.9 (0.8)	8/6.9 (1.2)	1.67
54 to 59	6	0/1.5 (0.0)	0/1.9 (0.0)	0/3.4 (0.0)	
6 to 59	54	14/16.0 (0.9)	18/16.0 (1.1)		0.78

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

Overall sex ratio: p-value = 0.480 (boys and girls equally represented)
Overall age distribution: p-value = 0.058 (as expected)
Overall age distribution for boys: p-value = 0.338 (as expected)
Overall age distribution for girls: p-value = 0.080 (as expected)
Overall sex/age distribution: p-value = 0.008 (significant difference)

Team 12:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	2/4.6 (0.4)	6/4.9 (1.2)	8/9.5 (0.8)	0.33
18 to 29	12	12/4.5 (2.7)	1/4.8 (0.2)	13/9.3 (1.4)	12.00
30 to 41	12	1/4.4 (0.2)	7/4.6 (1.5)	8/9.0 (0.9)	0.14
42 to 53	12	4/4.3 (0.9)	7/4.5 (1.5)	11/8.8 (1.2)	0.57
54 to 59	6	1/2.1 (0.5)	0/2.2 (0.0)	1/4.4 (0.2)	
6 to 59	54	20/20.5 (1.0)	21/20.5 (1.0)		0.95

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

Overall sex ratio: p-value = 0.876 (boys and girls equally represented)
Overall age distribution: p-value = 0.290 (as expected)
Overall age distribution for boys: p-value = 0.002 (significant difference)
Overall age distribution for girls: p-value = 0.090 (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: 0.83 (n=05, f=0)  #
02: 0.48 (n=04, f=0)
03: 0.58 (n=04, f=0)
04: 0.35 (n=04, f=0)
05: 0.98 (n=04, f=0)  #######
06: 0.72 (n=04, f=0)
07: 1.47 (n=03, f=0)  ############################
08: 1.31 (n=03, f=0)  #####################
09: 0.70 (n=03, f=0)
10: 1.65 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
11: 0.52 (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: 0.60 (n=04, f=0)
02: 0.86 (n=04, f=0)  ###
03: 1.97 (n=04, f=0)  #################################################
04: 0.32 (n=03, f=0)
05: 0.72 (n=03, f=0)
06: 1.81 (n=03, f=0)  ##########################################
07: 1.73 (n=03, f=0)  #######################################
08: 1.06 (n=03, f=0)  ###########
09: 0.10 (n=03, f=0)
10: 2.22 (n=03, f=1)  ############################################################
11: 2.20 (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: 0.49 (n=04, f=0)
02: 0.84 (n=04, f=0)  ##
03: 1.18 (n=04, f=0)  ################
04: 1.37 (n=04, f=0)  ########################
05: 0.45 (n=04, f=0)
06: 1.51 (n=04, f=1)  ##############################
07: 0.68 (n=04, f=0)
08: 0.80 (n=04, f=0)
09: 1.48 (n=04, f=0)  ############################
10: 1.17 (n=04, f=0)  ################
11: 0.41 (n=03, f=0)
12: 0.26 (n=02, f=0)
13: 0.08 (n=02, f=0)
14: 0.22 (n=02, f=0)
15: 0.32 (n=02, f=0)
16: 1.21 (n=02, f=0)  OOOOOOOOOOOOOOOOO
```

(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: 2.02 (n=04, f=0)  ###################################################
02: 1.30 (n=03, f=0)  #####################
03: 2.67 (n=03, f=0)  ################################################################
04: 2.65 (n=03, f=1)  ################################################################
05: 1.13 (n=02, f=0)  ##############
06: 0.75 (n=02, f=0)
```

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

Team: 5

```
Time                                              SD for WHZ
point                     0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.55 (n=04, f=0)
02: 0.54 (n=04, f=0)
03: 1.10 (n=04, f=0)  #############
04: 1.76 (n=04, f=0)  ########################################
05: 0.14 (n=04, f=0)
06: 1.20 (n=04, f=0)  #################
07: 2.18 (n=04, f=0)  ##########################################################
08: 0.31 (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: 6

```
Time                                              SD for WHZ
point                     0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 2.02 (n=04, f=1)  ###################################################
02: 1.00 (n=04, f=0)  ########
03: 0.25 (n=03, f=0)
04: 0.23 (n=03, f=0)
05: 1.23 (n=03, f=0)  ##################
06: 0.01 (n=02, f=0)
07: 0.42 (n=02, f=0)
08: 2.40 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
09: 1.14 (n=02, f=0)  OOOOOOOOOOOOOO
10: 1.60 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
11: 0.72 (n=02, f=0)
12: 0.25 (n=02, f=0)
```

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

Team: 7

```
Time                                              SD for WHZ
point                     0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.18 (n=04, f=0)  ################
02: 0.77 (n=04, f=0)
03: 0.45 (n=04, f=0)
04: 1.26 (n=04, f=0)  ###################
05: 0.97 (n=03, f=0)  #######
06: 0.19 (n=03, f=0)
07: 0.33 (n=03, f=0)
08: 2.18 (n=02, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
09: 0.98 (n=02, f=0)  OOOOOOOO
10: 0.02 (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: 8

```
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: 1.09 (n=04, f=0)  ############
02: 0.78 (n=04, f=0)
03: 1.10 (n=04, f=0)  #############
04: 0.83 (n=04, f=0)  #
05: 1.06 (n=04, f=0)  ###########
06: 1.05 (n=04, f=0)  ##########
07: 0.72 (n=03, f=0)
08: 0.06 (n=02, f=0)
09: 1.47 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOO
10: 0.87 (n=02, f=0)  OOO
```

(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: 9

```
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: 1.08 (n=05, f=0)  ############
02: 1.83 (n=05, f=0)  ###########################################
03: 0.64 (n=04, f=0)
04: 0.75 (n=04, f=0)
05: 0.62 (n=04, f=0)
06: 1.31 (n=04, f=0)  #####################
07: 1.54 (n=04, f=0)  ###############################
08: 0.91 (n=04, f=0)  #####
09: 0.63 (n=04, f=0)
10: 1.15 (n=03, f=0)  ###############
11: 0.63 (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: 10

```
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: 1.16 (n=04, f=0)  ###############
02: 1.10 (n=04, f=0)  #############
03: 0.59 (n=04, f=0)
04: 0.83 (n=04, f=0)  #
05: 1.02 (n=03, f=0)  #########
06: 0.99 (n=04, f=0)  ########
07: 1.16 (n=04, f=0)  ###############
08: 1.30 (n=03, f=0)  #####################
09: 0.98 (n=02, f=0)  OOOOOOOO
```

(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: 11

```
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: 1.31 (n=04, f=0)  ######################
02: 1.89 (n=04, f=0)  ##############################################
03: 0.71 (n=04, f=0)
04: 1.13 (n=04, f=0)  ##############
05: 0.34 (n=04, f=0)
06: 1.32 (n=04, f=0)  ######################
07: 4.02 (n=02, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
08: 1.65 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
09: 1.39 (n=02, 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: 12

```
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: 0.86 (n=04, f=0)  ###
02: 0.76 (n=04, f=0)
03: 1.15 (n=04, f=0)  ###############
04: 1.32 (n=04, f=0)  ######################
05: 1.45 (n=04, f=0)  ###########################
06: 0.72 (n=04, f=0)
07: 1.10 (n=04, f=0)  #############
08: 1.38 (n=04, f=0)  #########################
09: 0.49 (n=03, f=0)
10: 2.18 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
11: 0.49 (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: 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**
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	**0** (1.7 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**2** (p=0.086)
Age ratio(6-29 vs 30-59)	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.412)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (5)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (12)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (9)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>=1.20	
.			and	and	and	or	
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	**0** (1.05)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (0.18)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (0.03)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**0** (p=0.624)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**6** %

The overall score of this survey is 6 %, this is excellent.

There were no duplicate entries detected.

Missing or wrong data:

WEIGHT: Line=1/ID=3040302
HEIGHT: Line=1/ID=3040302

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=78/ID=3120101: **WHZ (-3.712),** Weight may be incorrect
Line=298/ID=3280201: **WHZ (-3.719),** Weight may be incorrect
Line=325/ID=3361101: **WHZ (3.137),** Weight may be incorrect
Line=351/ID=3030902: **WHZ (3.115),** Weight may be incorrect
Line=387/ID=3020601: **WHZ (2.951),** Height may be incorrect
Line=397/ID=3031002: **WHZ (2.816),** Height may be incorrect
Line=398/ID=3310301: WAZ (2.124), Weight may be incorrect
Line=404/ID=3210401: **WHZ (2.729),** Height may be incorrect
Line=408/ID=3241001: HAZ (1.834), Age may be incorrect
Line=409/ID=3220401: HAZ (1.842), Age may be incorrect
Line=410/ID=3090101: HAZ (2.457), Age may be incorrect
Line=411/ID=3290201: HAZ (2.461), Age may be incorrect
Line=412/ID=3170901: HAZ (2.671), Height may be incorrect
Line=413/ID=3180301: HAZ (3.358), Age may be incorrect

```
Line=414/ID=3351102:   HAZ (3.501), Age may be incorrect
Line=415/ID=3070801:   HAZ (4.002), Age may be incorrect
```

Percentage of values flagged with SMART flags:WHZ: 1.7 %, HAZ: 1.9 %, WAZ: 0.2 %

Age distribution:

```
Month 6  : ######
Month 7  : ########
Month 8  : ####
Month 9  : #############
Month 10 : ###########
Month 11 : ######
Month 12 : ######
Month 13 : ###############
Month 14 : ##########
Month 15 : ########
Month 16 : #############
Month 17 : #######
Month 18 : ##########
Month 19 : ###########
Month 20 : ######
Month 21 : ########
Month 22 : ######
Month 23 : ####
Month 24 : #####
Month 25 : #############
Month 26 : ############
Month 27 : ###
Month 28 : #####
Month 29 : ######
Month 30 : ####
Month 31 : #######
Month 32 : ############
Month 33 : ########
Month 34 : ######
Month 35 : ###
Month 36 : ######
Month 37 : #######
Month 38 : #######
Month 39 : ########
Month 40 : #####
Month 41 : ########
Month 42 : ######
Month 43 : ######
Month 44 : ####
Month 45 : ########
Month 46 : #####
Month 47 : ###
Month 48 : ######
Month 49 : ############
Month 50 : ##
Month 51 : ###
Month 52 : #############
Month 53 : ###########
Month 54 : ###
Month 55 : ########
Month 56 : #####
Month 57 : ############
Month 58 : ############
Month 59 : #########
Month 60 : ##########
```

Age ratio of 6-29 months to 30-59 months: 0.92 (The value should be around 0.85).:
p-value = 0.412 (as expected)

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

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	59/52.2 (1.1)	53/44.1 (1.2)	112/96.3 (1.2)	1.11
18 to 29	12	37/50.9 (0.7)	50/43.0 (1.2)	87/93.9 (0.9)	0.74
30 to 41	12	53/49.3 (1.1)	27/41.7 (0.6)	80/91.0 (0.9)	1.96
42 to 53	12	46/48.5 (0.9)	32/41.0 (0.8)	78/89.5 (0.9)	1.44
54 to 59	6	30/24.0 (1.2)	28/20.3 (1.4)	58/44.3 (1.3)	1.07
6 to 59	54	225/207.5 (1.1)	190/207.5 (0.9)		1.18

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

Overall sex ratio: p-value = 0.086 (boys and girls equally represented)
Overall age distribution: p-value = 0.038 (significant difference)
Overall age distribution for boys: p-value = 0.160 (as expected)
Overall age distribution for girls: p-value = 0.011 (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: **5** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.298

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

Digit preference MUAC:

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

Digit preference score: **9** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.001 (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	1.13	1.05
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	6.0%	6.0%	5.7%
calculated with current SD:	6.4%	6.4%	5.3%
calculated with a SD of 1:	4.3%	4.3%	4.5%
HAZ			
Standard Deviation SD:	1.19	1.19	1.05
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	29.5%	29.5%	30.0%

calculated with current SD:	29.1%	29.1%	29.1%
calculated with a SD of 1:	25.6%	25.6%	28.2%

WAZ

Standard Deviation SD:	0.94	0.94	0.93
(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= 0.014	p= 0.014	p= 0.178
HAZ	p= 0.000	p= 0.000	p= 0.097
WAZ	p= 0.126	p= 0.126	p= 0.299

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

Skewness

WHZ	0.24	0.24	0.18
HAZ	0.66	0.66	-0.09
WAZ	0.25	0.25	0.19

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

Kurtosis

WHZ	0.50	0.50	0.03
HAZ	1.91	1.91	-0.37
WAZ	0.30	0.30	0.18

Kurtosis characterizes the relative size of the body versus the tails of the distribution. Positive kurtosis indicates relatively large tails and small body. Negative kurtosis indicates relatively large body and small tails.
If the absolute value is:
-above 0.4 it indicates a problem. There might have been a problem with data collection or sampling.
-between 0.2 and 0.4, the data may be affected with a problem.
-less than an absolute value of 0.2 the distribution can be considered as normal.

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

```
WHZ < -2: ID=0.91 (p=0.624)
GAM:      ID=0.91 (p=0.624)
HAZ < -2: ID=1.83 (p=0.002)
HAZ < -3: ID=1.26 (p=0.136)
WAZ < -2: ID=0.99 (p=0.492)
WAZ < -3: ID=0.86 (p=0.708)
```

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: 1.07 (n=36, f=1)  ###########
02: 0.95 (n=36, f=0)  ######
03: 1.26 (n=36, f=1)  ###################
04: 1.10 (n=35, f=0)  ############
05: 1.27 (n=36, f=1)  ####################
06: 0.96 (n=35, f=0)  #######
07: 0.97 (n=32, f=1)  #######
```

```
08: 1.20 (n=30, f=1)  #################
09: 1.25 (n=26, f=0)  ###################
10: 1.21 (n=23, f=0)  #################
11: 0.89 (n=21, f=0)  ####
12: 1.60 (n=17, f=1)  ##################################
13: 0.89 (n=15, f=0)  ####
14: 1.13 (n=09, f=1)  OOOOOOOOOOOOOO
15: 1.07 (n=05, f=0)  ~~~~~~~~~~~~
16: 0.98 (n=03, f=0)  ~~~~~~~~
17: 1.63 (n=03, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
18: 0.81 (n=02, f=0)
19: 0.72 (n=02, f=0)
20: 0.83 (n=02, f=0)  ~
21: 1.90 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
22: 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)

Analysis by Team

Team	**1**	**10**	**11**	**12**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
n =	41	37	62	19	31	39	36	34	37	24	25	30
Percentage of values flagged with SMART flags:												
WHZ:	0.0	0.0	0.0	10.5	3.2	5.1	5.7	0.0	0.0	0.0	0.0	3.3
HAZ:	0.0	2.7	1.6	5.3	0.0	0.0	2.9	5.9	2.7	4.2	0.0	3.3
WAZ:	0.0	0.0	0.0	0.0	0.0	0.0	2.9	0.0	0.0	4.2	0.0	0.0
Age ratio of 6-29 months to 30-59 months:	0.95	0.61	0.59	1.38	0.94	1.17	0.64	1.13	1.18	0.85	2.57	0.88
Sex ratio (male/female):	1.16	1.06	1.70	0.73	1.58	0.86	1.40	0.89	0.85	2.00	0.67	2.00
Digit preference Weight (%):												
.0 :	5	3	13	5	19	8	17	12	19	21	16	27
.1 :	15	16	16	5	3	8	6	6	3	13	0	23
.2 :	10	11	3	11	3	18	11	15	8	4	16	23
.3 :	15	35	3	11	3	18	6	6	3	8	8	3
.4 :	12	11	8	11	10	18	9	12	11	25	16	7
.5 :	12	8	3	16	16	5	9	18	16	0	8	10
.6 :	10	11	15	16	13	5	3	6	8	4	0	7
.7 :	5	0	6	5	10	5	29	12	16	8	12	0
.8 :	7	5	21	11	13	3	3	9	16	8	16	0
.9 :	10	0	11	11	10	13	9	6	0	8	8	0
DPS:	11	32	20	12	18	19	25	13	21	24	20	33

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

Digit preference Height (%):												
.0 :	2	11	5	0	26	13	9	12	3	4	28	20
.1 :	10	22	8	32	10	18	6	3	19	17	12	20
.2 :	20	27	11	0	0	26	9	12	24	29	16	27
.3 :	22	14	27	21	3	13	9	9	16	4	8	13
.4 :	17	8	8	5	3	3	11	6	14	17	0	7
.5 :	5	5	8	5	23	3	0	15	5	0	16	13
.6 :	7	5	10	5	13	3	20	15	8	21	4	0

.7 :	7	3	8	11	10	10	11	9	3	8	0	0
.8 :	5	5	8	11	3	8	9	12	8	0	12	0
.9 :	5	0	6	11	10	5	17	9	0	0	4	0
DPS:	22	27	20	31	27	24	18	12	25	32	27	32

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

Digit preference MUAC (%):

.0 :	2	3	15	16	23	15	9	9	3	0	32	17
.1 :	10	27	13	11	13	5	14	0	16	9	24	10
.2 :	12	19	8	21	6	5	17	26	8	13	8	7
.3 :	7	14	16	16	19	10	17	18	11	17	0	13
.4 :	12	19	10	21	0	15	3	21	14	0	4	20
.5 :	7	8	8	5	23	15	3	6	14	9	8	27
.6 :	15	0	6	5	6	5	9	3	14	13	12	3
.7 :	5	3	6	0	0	10	11	6	11	13	0	0
.8 :	20	8	8	5	6	10	9	12	5	4	8	3
.9 :	10	0	10	0	3	8	9	0	5	22	4	0
DPS:	16	29	11	25	28	13	16	28	14	22	33	29

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

Standard deviation of WHZ:

SD	0.97	1.02	0.92	1.62	1.15	1.35	1.20	1.09	1.09	0.79	1.09	1.14
Prevalence (< -2) observed:												
%		5.4		15.8	0.0	5.1	8.6	8.8	10.8		8.0	3.3
Prevalence (< -2) calculated with current SD:												
%		6.3		17.3	3.1	7.5	9.8	7.9	9.2		7.6	1.9
Prevalence (< -2) calculated with a SD of 1:												
%		5.9		6.4	1.6	2.6	5.9	6.2	7.4		6.0	0.9

Standard deviation of HAZ:

SD	0.69	1.16	1.18	1.20	1.05	1.10	1.03	1.27	1.35	1.46	1.11	1.48
observed:												
%		32.4	30.6	26.3	16.1	35.9	22.9	17.6	51.4	20.8	28.0	40.0
calculated with current SD:												
%		31.7	31.1	25.2	17.6	37.6	25.9	16.0	41.1	26.8	20.9	41.2
calculated with a SD of 1:												
%		29.1	28.0	21.1	16.4	36.4	25.2	10.2	38.1	18.4	18.4	37.1

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

Team 1:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	11/5.1 (2.2)	6/4.4 (1.4)	17/9.5 (1.8)	1.83
18 to 29	12	2/5.0 (0.4)	1/4.3 (0.2)	3/9.3 (0.3)	2.00
30 to 41	12	3/4.8 (0.6)	6/4.2 (1.4)	9/9.0 (1.0)	0.50
42 to 53	12	2/4.7 (0.4)	3/4.1 (0.7)	5/8.8 (0.6)	0.67
54 to 59	6	4/2.3 (1.7)	3/2.0 (1.5)	7/4.4 (1.6)	1.33
6 to 59	54	22/20.5 (1.1)	19/20.5 (0.9)		1.16

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

Overall sex ratio: p-value = 0.639 (boys and girls equally represented)
Overall age distribution: p-value = 0.010 (significant difference)
Overall age distribution for boys: p-value = 0.017 (significant difference)

Overall age distribution for girls: p-value = 0.322 (as expected)
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	1/4.4 (0.2)	6/4.2 (1.4)	7/8.6 (0.8)	0.17
18 to 29	12	4/4.3 (0.9)	3/4.1 (0.7)	7/8.4 (0.8)	1.33
30 to 41	12	6/4.2 (1.4)	3/3.9 (0.8)	9/8.1 (1.1)	2.00
42 to 53	12	5/4.1 (1.2)	2/3.9 (0.5)	7/8.0 (0.9)	2.50
54 to 59	6	3/2.0 (1.5)	4/1.9 (2.1)	7/3.9 (1.8)	0.75
6 to 59	54	19/18.5 (1.0)	18/18.5 (1.0)		1.06

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

Overall sex ratio: p-value = 0.869 (boys and girls equally represented)
Overall age distribution: p-value = 0.542 (as expected)
Overall age distribution for boys: p-value = 0.389 (as expected)
Overall age distribution for girls: p-value = 0.346 (as expected)
Overall sex/age distribution: p-value = 0.072 (as expected)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	4/9.0 (0.4)	4/5.3 (0.7)	8/14.4 (0.6)	1.00
18 to 29	12	11/8.8 (1.2)	4/5.2 (0.8)	15/14.0 (1.1)	2.75
30 to 41	12	6/8.6 (0.7)	4/5.0 (0.8)	10/13.6 (0.7)	1.50
42 to 53	12	9/8.4 (1.1)	4/5.0 (0.8)	13/13.4 (1.0)	2.25
54 to 59	6	9/4.2 (2.2)	7/2.5 (2.9)	16/6.6 (2.4)	1.29
6 to 59	54	39/31.0 (1.3)	23/31.0 (0.7)		1.70

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

Overall sex ratio: p-value = 0.042 (significant excess of boys)
Overall age distribution: p-value = 0.002 (significant difference)
Overall age distribution for boys: p-value = 0.044 (significant difference)
Overall age distribution for girls: p-value = 0.051 (as expected)
Overall sex/age distribution: p-value = 0.000 (significant difference)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	2/1.9 (1.1)	3/2.6 (1.2)	5/4.4 (1.1)	0.67
18 to 29	12	1/1.8 (0.6)	5/2.5 (2.0)	6/4.3 (1.4)	0.20
30 to 41	12	2/1.8 (1.1)	2/2.4 (0.8)	4/4.2 (1.0)	1.00
42 to 53	12	2/1.7 (1.2)	0/2.4 (0.0)	2/4.1 (0.5)	
54 to 59	6	1/0.9 (1.2)	1/1.2 (0.9)	2/2.0 (1.0)	1.00
6 to 59	54	8/9.5 (0.8)	11/9.5 (1.2)		0.73

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

Overall sex ratio: p-value = 0.491 (boys and girls equally represented)
Overall age distribution: p-value = 0.766 (as expected)
Overall age distribution for boys: p-value = 0.976 (as expected)
Overall age distribution for girls: p-value = 0.279 (as expected)
Overall sex/age distribution: p-value = 0.149 (as expected)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	3/4.4 (0.7)	4/2.8 (1.4)	7/7.2 (1.0)	0.75
18 to 29	12	5/4.3 (1.2)	3/2.7 (1.1)	8/7.0 (1.1)	1.67
30 to 41	12	6/4.2 (1.4)	1/2.6 (0.4)	7/6.8 (1.0)	6.00
42 to 53	12	1/4.1 (0.2)	1/2.6 (0.4)	2/6.7 (0.3)	1.00
54 to 59	6	4/2.0 (2.0)	3/1.3 (2.3)	7/3.3 (2.1)	1.33
6 to 59	54	19/15.5 (1.2)	12/15.5 (0.8)		1.58

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

Overall sex ratio: p-value = 0.209 (boys and girls equally represented)
Overall age distribution: p-value = 0.109 (as expected)

Overall age distribution for boys: p-value = 0.228 (as expected)
Overall age distribution for girls: p-value = 0.302 (as expected)
Overall sex/age distribution: p-value = 0.016 (significant difference)

Team 6:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	4/4.2 (1.0)	4/4.9 (0.8)	8/9.0 (0.9)	1.00
18 to 29	12	4/4.1 (1.0)	9/4.8 (1.9)	13/8.8 (1.5)	0.44
30 to 41	12	2/3.9 (0.5)	2/4.6 (0.4)	4/8.6 (0.5)	1.00
42 to 53	12	5/3.9 (1.3)	5/4.5 (1.1)	10/8.4 (1.2)	1.00
54 to 59	6	3/1.9 (1.6)	1/2.2 (0.4)	4/4.2 (1.0)	3.00
6 to 59	54	18/19.5 (0.9)	21/19.5 (1.1)		0.86

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

Overall sex ratio: p-value = 0.631 (boys and girls equally represented)
Overall age distribution: p-value = 0.306 (as expected)
Overall age distribution for boys: p-value = 0.755 (as expected)
Overall age distribution for girls: p-value = 0.187 (as expected)
Overall sex/age distribution: p-value = 0.071 (as expected)

Team 7:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	7/4.9 (1.4)	3/3.5 (0.9)	10/8.4 (1.2)	2.33
18 to 29	12	1/4.8 (0.2)	3/3.4 (0.9)	4/8.1 (0.5)	0.33
30 to 41	12	5/4.6 (1.1)	2/3.3 (0.6)	7/7.9 (0.9)	2.50
42 to 53	12	5/4.5 (1.1)	5/3.2 (1.5)	10/7.8 (1.3)	1.00
54 to 59	6	3/2.2 (1.3)	2/1.6 (1.2)	5/3.8 (1.3)	1.50
6 to 59	54	21/18.0 (1.2)	15/18.0 (0.8)		1.40

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

Overall sex ratio: p-value = 0.317 (boys and girls equally represented)
Overall age distribution: p-value = 0.474 (as expected)
Overall age distribution for boys: p-value = 0.376 (as expected)
Overall age distribution for girls: p-value = 0.795 (as expected)
Overall sex/age distribution: p-value = 0.119 (as expected)

Team 8:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	7/3.7 (1.9)	6/4.2 (1.4)	13/7.9 (1.6)	1.17
18 to 29	12	1/3.6 (0.3)	4/4.1 (1.0)	5/7.7 (0.7)	0.25
30 to 41	12	3/3.5 (0.9)	1/3.9 (0.3)	4/7.5 (0.5)	3.00
42 to 53	12	4/3.5 (1.2)	4/3.9 (1.0)	8/7.3 (1.1)	1.00
54 to 59	6	1/1.7 (0.6)	3/1.9 (1.6)	4/3.6 (1.1)	0.33
6 to 59	54	16/17.0 (0.9)	18/17.0 (1.1)		0.89

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

Overall sex ratio: p-value = 0.732 (boys and girls equally represented)
Overall age distribution: p-value = 0.203 (as expected)
Overall age distribution for boys: p-value = 0.262 (as expected)
Overall age distribution for girls: p-value = 0.462 (as expected)
Overall sex/age distribution: p-value = 0.064 (as expected)

Team 9:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	5/3.9 (1.3)	9/4.6 (1.9)	14/8.6 (1.6)	0.56
18 to 29	12	0/3.8 (0.0)	6/4.5 (1.3)	6/8.4 (0.7)	0.00
30 to 41	12	5/3.7 (1.3)	1/4.4 (0.2)	6/8.1 (0.7)	5.00
42 to 53	12	6/3.7 (1.6)	4/4.3 (0.9)	10/8.0 (1.3)	1.50
54 to 59	6	1/1.8 (0.6)	0/2.1 (0.0)	1/3.9 (0.3)	
6 to 59	54	17/18.5 (0.9)	20/18.5 (1.1)		0.85

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

Overall sex ratio: p-value = 0.622 (boys and girls equally represented)

Overall age distribution: p-value = 0.119 (as expected)
Overall age distribution for boys: p-value = 0.171 (as expected)
Overall age distribution for girls: p-value = 0.053 (as expected)
Overall sex/age distribution: p-value = 0.003 (significant difference)

Team 10:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	7/3.7 (1.9)	1/1.9 (0.5)	8/5.6 (1.4)	7.00
18 to 29	12	1/3.6 (0.3)	2/1.8 (1.1)	3/5.4 (0.6)	0.50
30 to 41	12	7/3.5 (2.0)	2/1.8 (1.1)	9/5.3 (1.7)	3.50
42 to 53	12	1/3.5 (0.3)	2/1.7 (1.2)	3/5.2 (0.6)	0.50
54 to 59	6	0/1.7 (0.0)	1/0.9 (1.2)	1/2.6 (0.4)	0.00
6 to 59	54	16/12.0 (1.3)	8/12.0 (0.7)		2.00

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

Overall sex ratio: p-value = 0.102 (boys and girls equally represented)
Overall age distribution: p-value = 0.154 (as expected)
Overall age distribution for boys: p-value = 0.019 (significant difference)
Overall age distribution for girls: p-value = 0.972 (as expected)
Overall sex/age distribution: p-value = 0.001 (significant difference)

Team 11:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	3/2.3 (1.3)	4/3.5 (1.1)	7/5.8 (1.2)	0.75
18 to 29	12	3/2.3 (1.3)	8/3.4 (2.4)	11/5.7 (1.9)	0.38
30 to 41	12	3/2.2 (1.4)	2/3.3 (0.6)	5/5.5 (0.9)	1.50
42 to 53	12	1/2.2 (0.5)	1/3.2 (0.3)	2/5.4 (0.4)	1.00
54 to 59	6	0/1.1 (0.0)	0/1.6 (0.0)	0/2.7 (0.0)	
6 to 59	54	10/12.5 (0.8)	15/12.5 (1.2)		0.67

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

Overall sex ratio: p-value = 0.317 (boys and girls equally represented)
Overall age distribution: p-value = 0.038 (significant difference)
Overall age distribution for boys: p-value = 0.658 (as expected)
Overall age distribution for girls: p-value = 0.041 (significant difference)
Overall sex/age distribution: p-value = 0.005 (significant difference)

Team 12:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	5/4.6 (1.1)	3/2.3 (1.3)	8/7.0 (1.1)	1.67
18 to 29	12	4/4.5 (0.9)	2/2.3 (0.9)	6/6.8 (0.9)	2.00
30 to 41	12	5/4.4 (1.1)	1/2.2 (0.5)	6/6.6 (0.9)	5.00
42 to 53	12	5/4.3 (1.2)	1/2.2 (0.5)	6/6.5 (0.9)	5.00
54 to 59	6	1/2.1 (0.5)	3/1.1 (2.8)	4/3.2 (1.2)	0.33
6 to 59	54	20/15.0 (1.3)	10/15.0 (0.7)		2.00

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

Overall sex ratio: p-value = 0.068 (boys and girls equally represented)
Overall age distribution: p-value = 0.970 (as expected)
Overall age distribution for boys: p-value = 0.926 (as expected)
Overall age distribution for girls: p-value = 0.287 (as expected)
Overall sex/age distribution: p-value = 0.097 (as expected)

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

Team: 1

```
Time                                             SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.20 (n=03, f=0)  #################
02: 0.46 (n=03, f=0)
03: 1.09 (n=03, f=0)  ############
04: 0.57 (n=03, f=0)
05: 1.86 (n=03, f=0)  #############################################
```

```
06: 0.18 (n=03, f=0)
07: 0.49 (n=03, f=0)
08: 1.09 (n=03, f=0)  ############
09: 1.16 (n=03, f=0)  ###############
10: 1.45 (n=03, f=0)  ###########################
11: 0.27 (n=03, f=0)
12: 1.14 (n=03, f=0)  ##############
13: 0.42 (n=03, f=0)
14: 0.30 (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: 0.20 (n=03, f=0)
02: 0.60 (n=03, f=0)
03: 1.65 (n=03, f=0)  ####################################
04: 0.41 (n=03, f=0)
05: 1.04 (n=03, f=0)  ##########
06: 1.31 (n=03, f=0)  #####################
07: 1.02 (n=03, f=0)  #########
08: 0.61 (n=03, f=0)
09: 0.39 (n=03, f=0)
10: 0.58 (n=03, f=0)
11: 1.58 (n=03, f=0)  #################################
12: 2.71 (n=02, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
13: 0.35 (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: 1.26 (n=03, f=0)  ###################
02: 1.08 (n=03, f=0)  ############
03: 0.60 (n=03, f=0)
04: 0.51 (n=03, f=0)
05: 0.81 (n=03, f=0)  #
06: 0.64 (n=03, f=0)
07: 0.84 (n=03, f=0)  ##
08: 0.71 (n=03, f=0)
09: 1.62 (n=03, f=0)  ###################################
10: 0.65 (n=03, f=0)
11: 0.70 (n=03, f=0)
12: 0.99 (n=03, f=0)  ########
13: 0.09 (n=02, f=0)
14: 0.25 (n=02, f=0)
15: 1.41 (n=02, f=0)  #########################
16: 0.55 (n=02, f=0)
17: 0.77 (n=02, f=0)
18: 0.81 (n=02, f=0)
19: 0.72 (n=02, f=0)
20: 0.83 (n=02, f=0)  #
21: 1.90 (n=02, f=0)  ##############################################
22: 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: 1.92 (n=03, f=1)  ###############################################
02: 1.14 (n=03, f=0)  ##############
03: 1.35 (n=03, f=0)  #######################
04: 2.41 (n=03, f=0)  ################################################################
05: 0.58 (n=03, f=0)
06: 1.26 (n=02, f=0)  ###################
```

(when n is much less than the average number of subjects per cluster different symbols are used: 0

for n < 80% and ~ for n < 40%; The numbers marked "f" are the numbers of SMART flags found in the different time points)

Team: 5

```
Time                                               SD for WHZ
point                     0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.93 (n=03, f=0)  ######
02: 0.29 (n=03, f=0)
03: 1.00 (n=03, f=0)  ########
04: 0.69 (n=03, f=0)
05: 1.80 (n=03, f=0)  ##########################################
06: 0.80 (n=03, f=0)
07: 1.52 (n=03, f=0)  ##############################
08: 0.62 (n=03, f=0)
09: 0.79 (n=02, f=0)
```

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

Team: 6

```
Time                                               SD for WHZ
point                     0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.89 (n=03, f=0)  ####
02: 0.45 (n=03, f=0)
03: 2.25 (n=03, f=0)  #############################################################
04: 0.20 (n=03, f=0)
05: 1.33 (n=03, f=0)  ######################
06: 1.27 (n=03, f=0)  ####################
07: 0.47 (n=03, f=0)
08: 0.85 (n=03, f=0)  ##
09: 2.00 (n=03, f=0)  ##################################################
10: 1.09 (n=03, f=0)  ############
11: 0.83 (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: 7

```
Time                                               SD for WHZ
point                     0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.95 (n=03, f=0)  ######
02: 1.77 (n=03, f=0)  #########################################
03: 1.97 (n=03, f=1)  #################################################
04: 0.04 (n=02, f=0)
05: 1.61 (n=03, f=0)  ##################################
06: 0.57 (n=03, f=0)
07: 1.46 (n=03, f=0)  ############################
08: 0.92 (n=03, f=0)  #####
09: 0.48 (n=02, f=0)
10: 0.80 (n=02, f=0)
11: 0.08 (n=02, f=0)
12: 0.35 (n=02, f=0)
13: 1.36 (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: 8

```
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=03, f=0)  #############################
02: 1.05 (n=03, f=0)  ###########
03: 0.97 (n=03, f=0)  #######
04: 1.84 (n=03, f=0)  ############################################
05: 0.47 (n=03, f=0)
06: 1.41 (n=03, f=0)  ##########################
07: 0.92 (n=03, f=0)  #####
08: 0.52 (n=03, f=0)
09: 0.81 (n=03, f=0)
10: 1.21 (n=02, f=0)  00000000000000000
11: 0.10 (n=02, f=0)
12: 1.55 (n=02, f=0)  00000000000000000000000000000000
```

(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: 9

```
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: 0.48 (n=03, f=0)
02: 1.34 (n=03, f=0)  #######################
03: 0.89 (n=03, f=0)  ####
04: 0.17 (n=03, f=0)
05: 1.23 (n=03, f=0)  ##################
06: 0.89 (n=03, f=0)  ####
07: 0.36 (n=03, f=0)
08: 2.17 (n=03, f=0)  #########################################################
09: 0.39 (n=03, f=0)
10: 1.72 (n=03, f=0)  #######################################
11: 1.40 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOO
12: 0.42 (n=02, f=0)
13: 1.61 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
```

(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: 10

```
Time                                            SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.92 (n=03, f=0)  #####
02: 0.22 (n=03, f=0)
03: 1.40 (n=03, f=0)  #########################
04: 0.62 (n=03, f=0)
05: 0.10 (n=03, f=0)
06: 0.92 (n=03, f=0)  #####
07: 0.71 (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: 11

```
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: 0.39 (n=03, f=0)
02: 0.26 (n=03, f=0)
03: 0.69 (n=03, f=0)
04: 1.73 (n=03, f=0)  #######################################
05: 1.32 (n=03, f=0)  ######################
06: 0.89 (n=03, f=0)  ####
07: 0.37 (n=03, f=0)
08: 0.39 (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: 12

```
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=03, f=0)  ##############
02: 1.15 (n=03, f=0)  ###############
03: 1.16 (n=03, f=0)  ###############
04: 0.46 (n=03, f=0)
05: 1.55 (n=03, f=0)  ###############################
06: 1.30 (n=03, f=0)  #####################
07: 0.30 (n=02, f=0)
08: 2.33 (n=02, f=0)  ################################################################
09: 1.09 (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**
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	**0** (2.5 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.428)
Age ratio(6-29 vs 30-59)	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.454)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (7)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**4** (15)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**4** (17)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>=1.20	
.			and	and	and	or	
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	**5** (1.12)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (0.12)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**1** (-0.26)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**0** (p=0.522)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**14** %

The overall score of this survey is 14 %, this is good.

There were no duplicate entries detected.

Missing or wrong data:

WEIGHT: Line=303/ID=4120101, Line=360/ID=4120501
HEIGHT: Line=1/ID=4160701

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=2/ID=4060201: HAZ (-7.276), Height may be incorrect
Line=3/ID=4300101: HAZ (-8.270), Age may be incorrect
Line=4/ID=4020602: HAZ (6.449), WAZ (3.827), Age may be incorrect
Line=5/ID=4060401: HAZ (6.511), WAZ (2.692), Age may be incorrect
Line=24/ID=4150403: **WHZ (3.895)**, WAZ (2.451), Weight may be incorrect
Line=115/ID=4260101: **WHZ (-3.400)**, Weight may be incorrect
Line=175/ID=4310301: **WHZ (3.940)**, WAZ (2.480), Weight may be incorrect
Line=281/ID=4100802: **WHZ (-3.717)**, WAZ (-3.990), Weight may be incorrect
Line=368/ID=4480201: **WHZ (4.471)**, Height may be incorrect
Line=375/ID=4080301: **WHZ (3.276)**, Height may be incorrect
Line=376/ID=4150901: HAZ (1.618), Age may be incorrect
Line=377/ID=4360901: HAZ (-4.453), Age may be incorrect
Line=378/ID=4200301: HAZ (-4.472), Age may be incorrect
Line=379/ID=4020402: HAZ (1.741), Age may be incorrect

Line=380/ID=4020601: HAZ (-4.627), Age may be incorrect
Line=381/ID=4420501: HAZ (-4.645), Age may be incorrect
Line=382/ID=4060701: HAZ (-4.664), Age may be incorrect
Line=383/ID=4110701: HAZ (1.869), Age may be incorrect
Line=384/ID=4040101: HAZ (-4.700), Height may be incorrect
Line=385/ID=4420801: HAZ (-4.706), Age may be incorrect
Line=386/ID=4140801: HAZ (1.940), Age may be incorrect
Line=387/ID=4420601: HAZ (-4.758), Height may be incorrect
Line=388/ID=4060803: HAZ (-4.796), Age may be incorrect
Line=389/ID=4190601: HAZ (-4.914), Height may be incorrect
Line=390/ID=4080402: HAZ (-4.929), Age may be incorrect
Line=391/ID=4200101: HAZ (2.120), Age may be incorrect
Line=392/ID=4170201: HAZ (2.225), Age may be incorrect
Line=393/ID=4430402: **WHZ (-4.223)**, HAZ (2.294), Height may be incorrect
Line=394/ID=4100101: **WHZ (3.637)**, HAZ (-5.111), Height may be incorrect
Line=395/ID=4160301: HAZ (2.358), Age may be incorrect
Line=396/ID=4380501: **WHZ (-4.057)**, HAZ (2.520), Height may be incorrect
Line=397/ID=4320201: HAZ (2.940), Age may be incorrect
Line=398/ID=4280701: HAZ (3.098), Age may be incorrect
Line=399/ID=4080401: **WHZ (-3.322)**, HAZ (3.201), Height may be incorrect
Line=400/ID=4320101: HAZ (-6.112), Age may be incorrect
Line=401/ID=4320901: HAZ (-6.120), Height may be incorrect
Line=402/ID=4320601: HAZ (-6.170), Age may be incorrect
Line=403/ID=4140701: HAZ (-6.366), WAZ (-4.096), Age may be incorrect
Line=404/ID=4040201: HAZ (-6.436), Age may be incorrect
Line=405/ID=4200401: HAZ (3.658), Age may be incorrect
Line=406/ID=4330903: HAZ (-6.575), Height may be incorrect
Line=407/ID=4180101: HAZ (-6.818), Height may be incorrect
Line=408/ID=4200901: HAZ (4.203), Age may be incorrect

Percentage of values flagged with SMART flags:WHZ: 2.5 %, HAZ: 9.1 %, WAZ: 1.5 %

Age distribution:

Month 6 : #########
Month 7 : ##########
Month 8 : ###
Month 9 : #########
Month 10 : ####
Month 11 : ####
Month 12 : ##########
Month 13 : ########
Month 14 : #########
Month 15 : ##########
Month 16 : ########
Month 17 : ################
Month 18 : ######
Month 19 : #########
Month 20 : #######
Month 21 : ##########
Month 22 : ######
Month 23 : ######
Month 24 : ######
Month 25 : #######
Month 26 : #######
Month 27 : ############
Month 28 : ########
Month 29 : ######
Month 30 : ########
Month 31 : #####
Month 32 : #######
Month 33 : ########
Month 34 : #######
Month 35 : ######
Month 36 : #######
Month 37 : #########
Month 38 : ###########
Month 39 : ########
Month 40 : ####
Month 41 : #######
Month 42 : #####
Month 43 : #############
Month 44 : ########
Month 45 : ########
Month 46 : ####
Month 47 : ####
Month 48 : ########
Month 49 : ###

```
Month 50 : ######
Month 51 : ########
Month 52 : ##########
Month 53 : #####
Month 54 : #########
Month 55 : ##########
Month 56 : #####
Month 57 : #########
Month 58 : #####
Month 59 : ########
Month 60 : ###
```

Age ratio of 6-29 months to 30-59 months: 0.92 (The value should be around 0.85).:
p-value = 0.454 (as expected)

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

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	44/45.5 (1.0)	58/49.2 (1.2)	102/94.7 (1.1)	0.76
18 to 29	12	47/44.3 (1.1)	46/48.0 (1.0)	93/92.3 (1.0)	1.02
30 to 41	12	40/43.0 (0.9)	44/46.5 (0.9)	84/89.5 (0.9)	0.91
42 to 53	12	44/42.3 (1.0)	43/45.7 (0.9)	87/88.0 (1.0)	1.02
54 to 59	6	21/20.9 (1.0)	21/22.6 (0.9)	42/43.5 (1.0)	1.00
6 to 59	54	196/204.0 (1.0)	212/204.0 (1.0)		0.92

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

Overall sex ratio: p-value = 0.428 (boys and girls equally represented)
Overall age distribution: p-value = 0.914 (as expected)
Overall age distribution for boys: p-value = 0.975 (as expected)
Overall age distribution for girls: p-value = 0.722 (as expected)
Overall sex/age distribution: p-value = 0.518 (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: **7** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.037 (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** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.000 (significant difference)

Digit preference MUAC:

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

Digit .7 : #############
Digit .8 : ###############
Digit .9 : ###########

Digit preference score: **17** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.000 (significant difference)

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

.	no exclusion	exclusion from reference mean (WHO flags)	exclusion from observed mean (SMART flags)
WHZ			
Standard Deviation SD:	1.25	1.25	1.12
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	4.9%	4.9%	3.8%
calculated with current SD:	6.5%	6.5%	4.5%
calculated with a SD of 1:	2.9%	2.9%	2.9%
HAZ			
Standard Deviation SD:	1.78	1.51	1.21
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	30.7%	29.3%	28.1%
calculated with current SD:	37.7%	33.7%	31.2%
calculated with a SD of 1:	28.9%	26.3%	27.6%
WAZ			
Standard Deviation SD:	1.13	1.13	1.05
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	14.0%	14.0%	13.8%
calculated with current SD:	15.8%	15.8%	14.5%
calculated with a SD of 1:	12.9%	12.9%	13.4%

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

WHZ	p= 0.011	p= 0.011	p= 0.289
HAZ	p= 0.000	p= 0.000	p= 0.041
WAZ	p= 0.005	p= 0.005	p= 0.512

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

Skewness

WHZ	0.16	0.16	0.12
HAZ	0.08	0.24	-0.12
WAZ	0.23	0.23	0.01

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

Kurtosis

WHZ	0.90	0.90	-0.26
HAZ	2.86	0.87	-0.18
WAZ	1.00	1.00	0.14

Kurtosis characterizes the relative size of the body versus the tails of the distribution. Positive kurtosis indicates relatively large tails and small body. Negative kurtosis indicates relatively large body and small tails.
If the absolute value is:
-above 0.4 it indicates a problem. There might have been a problem with data collection or sampling.
-between 0.2 and 0.4, the data may be affected with a problem.
-less than an absolute value of 0.2 the distribution can be considered as normal.

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

WHZ < -2: ID=0.97 (p=0.522)
WHZ < -3: ID=1.00 (p=0.473)
GAM: ID=0.97 (p=0.522)
SAM: ID=1.00 (p=0.473)
HAZ < -2: ID=1.34 (p=0.059)

```
HAZ < -3: ID=1.39 (p=0.040)
WAZ < -2: ID=1.26 (p=0.107)
WAZ < -3: ID=1.01 (p=0.448)
```

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: 1.55 (n=47, f=3)  ################################
02: 1.31 (n=48, f=2)  ######################
03: 1.09 (n=47, f=0)  ############
04: 1.34 (n=47, f=2)  #######################
05: 1.00 (n=45, f=0)  #########
06: 1.02 (n=44, f=0)  #########
07: 1.44 (n=38, f=2)  ###########################
08: 1.42 (n=30, f=1)  ##########################
09: 1.02 (n=23, f=0)  #########
10: 1.05 (n=16, f=0)  OOOOOOOOOOO
11: 1.07 (n=09, f=0)  ~~~~~~~~~~~
12: 0.44 (n=05, f=0)
13: 1.24 (n=04, f=0)  ~~~~~~~~~~~~~~~~~~~
```

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

Analysis by Team

Team	**1**	**10**	**11**	**12**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
n =	34	31	39	27	52	29	29	34	33	32	35	33
Percentage of values flagged with SMART flags:												
WHZ:	0.0	6.5	0.0	12.0	3.8	3.4	7.1	0.0	0.0	3.1	5.7	0.0
HAZ:	0.0	3.2	2.6	3.7	11.5	3.4	21.4	2.9	27.3	3.1	28.6	3.0
WAZ:	0.0	3.2	0.0	8.0	3.8	3.4	0.0	0.0	3.0	3.1	0.0	0.0
Age ratio of 6-29 months to 30-59 months:	1.43	1.21	0.70	0.80	1.00	0.61	0.93	0.70	0.74	0.68	1.69	0.94
Sex ratio (male/female):	0.55	1.38	0.70	1.08	1.36	0.61	1.07	0.89	1.54	0.60	0.94	0.83
Digit preference Weight (%):												
.0 :	6	6	18	4	15	17	14	6	9	19	31	12
.1 :	9	16	13	4	6	14	10	9	12	16	11	15
.2 :	6	6	13	0	2	7	3	15	12	25	17	9
.3 :	15	10	8	8	10	0	14	24	9	22	9	12
.4 :	21	19	3	12	4	3	10	12	9	3	0	12
.5 :	9	6	13	8	12	10	10	9	21	0	6	9
.6 :	9	10	15	12	10	10	17	12	9	13	6	9
.7 :	3	6	3	4	17	14	3	3	3	3	3	3
.8 :	6	13	10	28	17	21	3	9	9	0	11	12

.9 :	18	6	5	20	8	3	14	3	6	0	6	6
DPS:	18	15	17	27	17	21	16	19	15	31	28	11

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

Digit preference Height (%):

.0 :	21	6	26	30	19	21	4	21	12	6	14	36
.1 :	15	23	8	7	4	10	21	3	9	6	3	0
.2 :	0	13	8	15	10	28	4	21	12	19	20	9
.3 :	26	13	10	15	4	17	14	24	15	3	6	12
.4 :	6	10	13	11	12	14	7	6	9	13	9	9
.5 :	15	23	5	4	17	3	4	12	18	41	23	12
.6 :	12	3	5	4	6	0	4	6	9	0	3	15
.7 :	3	0	15	15	12	3	11	0	12	6	9	6
.8 :	0	10	8	0	13	0	7	0	3	3	14	0
.9 :	3	0	3	0	4	3	25	9	0	3	0	0
DPS:	29	26	21	29	18	30	25	28	17	38	24	34

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

Digit preference MUAC (%):

.0 :	9	23	15	19	42	48	0	18	12	25	23	42
.1 :	6	16	8	11	2	0	14	3	15	13	11	0
.2 :	9	10	10	7	8	10	7	9	6	9	11	9
.3 :	26	13	13	7	2	24	11	9	12	13	11	12
.4 :	12	3	5	11	6	3	11	15	18	6	9	12
.5 :	12	16	13	22	15	3	4	9	12	19	11	6
.6 :	9	0	13	7	4	7	11	3	9	3	9	9
.7 :	3	10	10	4	8	0	11	12	3	6	3	6
.8 :	12	10	8	4	6	0	14	15	9	0	9	3
.9 :	3	0	5	7	8	3	18	9	3	6	3	0
DPS:	21	23	11	19	38	48	17	15	16	24	18	39

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

Standard deviation of WHZ:

SD	0.92	1.58	1.13	1.46	1.31	1.14	1.18	0.93	1.34	1.43	1.29	1.02
Prevalence (< -2) observed:												
%		9.7	5.1	12.0	11.5	0.0	3.6		3.0	6.3	2.9	0.0
Prevalence (< -2) calculated with current SD:												
%		9.8	11.3	16.4	9.5	2.0	4.5		7.5	6.6	6.0	2.4
Prevalence (< -2) calculated with a SD of 1:												
%		2.0	8.6	7.7	4.3	0.9	2.3		2.7	1.6	2.3	2.2

Standard deviation of HAZ:

SD	1.06	1.12	1.52	1.55	1.96	0.90	1.94	1.27	2.57	1.14	2.62	1.40
observed:												
%	26.5	51.6	30.8	40.7	17.3		21.4	23.5	66.7	31.3	25.7	24.2
calculated with current SD:												
%	30.5	60.4	30.5	38.9	24.6		31.6	23.4	62.3	41.2	39.6	35.5
calculated with a SD of 1:												
%	29.5	61.6	21.9	33.1	8.8		17.6	17.8	79.5	40.1	24.6	30.1

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

Team 1:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	1/2.8 (0.4)	9/5.1 (1.8)	10/7.9 (1.3)	0.11
18 to 29	12	5/2.7 (1.8)	5/5.0 (1.0)	10/7.7 (1.3)	1.00
30 to 41	12	1/2.6 (0.4)	2/4.8 (0.4)	3/7.5 (0.4)	0.50
42 to 53	12	5/2.6 (1.9)	3/4.7 (0.6)	8/7.3 (1.1)	1.67
54 to 59	6	0/1.3 (0.0)	3/2.3 (1.3)	3/3.6 (0.8)	0.00
6 to 59	54	12/17.0 (0.7)	22/17.0 (1.3)		0.55

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

Overall sex ratio: p-value = 0.086 (boys and girls equally represented)
Overall age distribution: p-value = 0.394 (as expected)
Overall age distribution for boys: p-value = 0.107 (as expected)
Overall age distribution for girls: p-value = 0.244 (as expected)
Overall sex/age distribution: p-value = 0.004 (significant difference)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	6/4.2 (1.4)	2/3.0 (0.7)	8/7.2 (1.1)	3.00
18 to 29	12	5/4.1 (1.2)	4/2.9 (1.4)	9/7.0 (1.3)	1.25
30 to 41	12	3/3.9 (0.8)	3/2.9 (1.1)	6/6.8 (0.9)	1.00
42 to 53	12	3/3.9 (0.8)	3/2.8 (1.1)	6/6.7 (0.9)	1.00
54 to 59	6	1/1.9 (0.5)	1/1.4 (0.7)	2/3.3 (0.6)	1.00
6 to 59	54	18/15.5 (1.2)	13/15.5 (0.8)		1.38

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

Overall sex ratio: p-value = 0.369 (boys and girls equally represented)
Overall age distribution: p-value = 0.855 (as expected)
Overall age distribution for boys: p-value = 0.758 (as expected)
Overall age distribution for girls: p-value = 0.931 (as expected)
Overall sex/age distribution: p-value = 0.448 (as expected)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	1/3.7 (0.3)	3/5.3 (0.6)	4/9.0 (0.4)	0.33
18 to 29	12	6/3.6 (1.7)	6/5.2 (1.2)	12/8.8 (1.4)	1.00
30 to 41	12	1/3.5 (0.3)	5/5.0 (1.0)	6/8.6 (0.7)	0.20
42 to 53	12	4/3.5 (1.2)	4/5.0 (0.8)	8/8.4 (1.0)	1.00
54 to 59	6	4/1.7 (2.3)	5/2.5 (2.0)	9/4.2 (2.2)	0.80
6 to 59	54	16/19.5 (0.8)	23/19.5 (1.2)		0.70

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

Overall sex ratio: p-value = 0.262 (boys and girls equally represented)
Overall age distribution: p-value = 0.035 (significant difference)
Overall age distribution for boys: p-value = 0.075 (as expected)
Overall age distribution for girls: p-value = 0.410 (as expected)
Overall sex/age distribution: p-value = 0.012 (significant difference)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	5/3.2 (1.5)	3/3.0 (1.0)	8/6.3 (1.3)	1.67
18 to 29	12	1/3.2 (0.3)	3/2.9 (1.0)	4/6.1 (0.7)	0.33
30 to 41	12	2/3.1 (0.7)	5/2.9 (1.8)	7/5.9 (1.2)	0.40
42 to 53	12	5/3.0 (1.7)	2/2.8 (0.7)	7/5.8 (1.2)	2.50
54 to 59	6	1/1.5 (0.7)	0/1.4 (0.0)	1/2.9 (0.3)	
6 to 59	54	14/13.5 (1.0)	13/13.5 (1.0)		1.08

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

Overall sex ratio: p-value = 0.847 (boys and girls equally represented)
Overall age distribution: p-value = 0.580 (as expected)

Overall age distribution for boys: p-value = 0.372 (as expected)
Overall age distribution for girls: p-value = 0.518 (as expected)
Overall sex/age distribution: p-value = 0.108 (as expected)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	8/7.0 (1.1)	7/5.1 (1.4)	15/12.1 (1.2)	1.14
18 to 29	12	7/6.8 (1.0)	4/5.0 (0.8)	11/11.8 (0.9)	1.75
30 to 41	12	4/6.6 (0.6)	3/4.8 (0.6)	7/11.4 (0.6)	1.33
42 to 53	12	8/6.5 (1.2)	5/4.7 (1.1)	13/11.2 (1.2)	1.60
54 to 59	6	3/3.2 (0.9)	3/2.3 (1.3)	6/5.5 (1.1)	1.00
6 to 59	54	30/26.0 (1.2)	22/26.0 (0.8)		1.36

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

Overall sex ratio: p-value = 0.267 (boys and girls equally represented)
Overall age distribution: p-value = 0.595 (as expected)
Overall age distribution for boys: p-value = 0.819 (as expected)
Overall age distribution for girls: p-value = 0.776 (as expected)
Overall sex/age distribution: p-value = 0.340 (as expected)

Team 6:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	3/2.6 (1.2)	4/4.2 (1.0)	7/6.7 (1.0)	0.75
18 to 29	12	2/2.5 (0.8)	2/4.1 (0.5)	4/6.6 (0.6)	1.00
30 to 41	12	3/2.4 (1.2)	4/3.9 (1.0)	7/6.4 (1.1)	0.75
42 to 53	12	2/2.4 (0.8)	5/3.9 (1.3)	7/6.3 (1.1)	0.40
54 to 59	6	1/1.2 (0.9)	3/1.9 (1.6)	4/3.1 (1.3)	0.33
6 to 59	54	11/14.5 (0.8)	18/14.5 (1.2)		0.61

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

Overall sex ratio: p-value = 0.194 (boys and girls equally represented)
Overall age distribution: p-value = 0.839 (as expected)
Overall age distribution for boys: p-value = 0.982 (as expected)
Overall age distribution for girls: p-value = 0.738 (as expected)
Overall sex/age distribution: p-value = 0.347 (as expected)

Team 7:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	5/3.5 (1.4)	3/3.2 (0.9)	8/6.7 (1.2)	1.67
18 to 29	12	2/3.4 (0.6)	4/3.2 (1.3)	6/6.6 (0.9)	0.50
30 to 41	12	4/3.3 (1.2)	3/3.1 (1.0)	7/6.4 (1.1)	1.33
42 to 53	12	2/3.2 (0.6)	1/3.0 (0.3)	3/6.3 (0.5)	2.00
54 to 59	6	2/1.6 (1.2)	3/1.5 (2.0)	5/3.1 (1.6)	0.67
6 to 59	54	15/14.5 (1.0)	14/14.5 (1.0)		1.07

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

Overall sex ratio: p-value = 0.853 (boys and girls equally represented)
Overall age distribution: p-value = 0.522 (as expected)
Overall age distribution for boys: p-value = 0.743 (as expected)
Overall age distribution for girls: p-value = 0.540 (as expected)
Overall sex/age distribution: p-value = 0.281 (as expected)

Team 8:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	3/3.7 (0.8)	7/4.2 (1.7)	10/7.9 (1.3)	0.43
18 to 29	12	3/3.6 (0.8)	1/4.1 (0.2)	4/7.7 (0.5)	3.00
30 to 41	12	3/3.5 (0.9)	3/3.9 (0.8)	6/7.5 (0.8)	1.00
42 to 53	12	4/3.5 (1.2)	5/3.9 (1.3)	9/7.3 (1.2)	0.80
54 to 59	6	3/1.7 (1.8)	2/1.9 (1.0)	5/3.6 (1.4)	1.50
6 to 59	54	16/17.0 (0.9)	18/17.0 (1.1)		0.89

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

Overall sex ratio: p-value = 0.732 (boys and girls equally represented)

Overall age distribution: p-value = 0.475 (as expected)
Overall age distribution for boys: p-value = 0.847 (as expected)
Overall age distribution for girls: p-value = 0.311 (as expected)
Overall sex/age distribution: p-value = 0.166 (as expected)

Team 9:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	1/4.6 (0.2)	3/3.0 (1.0)	4/7.7 (0.5)	0.33
18 to 29	12	6/4.5 (1.3)	4/2.9 (1.4)	10/7.5 (1.3)	1.50
30 to 41	12	8/4.4 (1.8)	2/2.9 (0.7)	10/7.2 (1.4)	4.00
42 to 53	12	3/4.3 (0.7)	4/2.8 (1.4)	7/7.1 (1.0)	0.75
54 to 59	6	2/2.1 (0.9)	0/1.4 (0.0)	2/3.5 (0.6)	
6 to 59	54	20/16.5 (1.2)	13/16.5 (0.8)		1.54

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

Overall sex ratio: p-value = 0.223 (boys and girls equally represented)
Overall age distribution: p-value = 0.364 (as expected)
Overall age distribution for boys: p-value = 0.151 (as expected)
Overall age distribution for girls: p-value = 0.639 (as expected)
Overall sex/age distribution: p-value = 0.020 (significant difference)

Team 10:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	2/2.8 (0.7)	5/4.6 (1.1)	7/7.4 (0.9)	0.40
18 to 29	12	3/2.7 (1.1)	3/4.5 (0.7)	6/7.2 (0.8)	1.00
30 to 41	12	2/2.6 (0.8)	8/4.4 (1.8)	10/7.0 (1.4)	0.25
42 to 53	12	3/2.6 (1.2)	4/4.3 (0.9)	7/6.9 (1.0)	0.75
54 to 59	6	2/1.3 (1.6)	0/2.1 (0.0)	2/3.4 (0.6)	
6 to 59	54	12/16.0 (0.8)	20/16.0 (1.3)		0.60

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

Overall sex ratio: p-value = 0.157 (boys and girls equally represented)
Overall age distribution: p-value = 0.719 (as expected)
Overall age distribution for boys: p-value = 0.929 (as expected)
Overall age distribution for girls: p-value = 0.224 (as expected)
Overall sex/age distribution: p-value = 0.045 (significant difference)

Team 11:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	6/3.9 (1.5)	7/4.2 (1.7)	13/8.1 (1.6)	0.86
18 to 29	12	3/3.8 (0.8)	6/4.1 (1.5)	9/7.9 (1.1)	0.50
30 to 41	12	3/3.7 (0.8)	3/3.9 (0.8)	6/7.7 (0.8)	1.00
42 to 53	12	4/3.7 (1.1)	2/3.9 (0.5)	6/7.6 (0.8)	2.00
54 to 59	6	1/1.8 (0.6)	0/1.9 (0.0)	1/3.7 (0.3)	
6 to 59	54	17/17.5 (1.0)	18/17.5 (1.0)		0.94

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

Overall sex ratio: p-value = 0.866 (boys and girls equally represented)
Overall age distribution: p-value = 0.217 (as expected)
Overall age distribution for boys: p-value = 0.773 (as expected)
Overall age distribution for girls: p-value = 0.208 (as expected)
Overall sex/age distribution: p-value = 0.098 (as expected)

Team 12:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	3/3.5 (0.9)	5/4.2 (1.2)	8/7.7 (1.0)	0.60
18 to 29	12	4/3.4 (1.2)	4/4.1 (1.0)	8/7.5 (1.1)	1.00
30 to 41	12	6/3.3 (1.8)	3/3.9 (0.8)	9/7.2 (1.2)	2.00
42 to 53	12	1/3.2 (0.3)	5/3.9 (1.3)	6/7.1 (0.8)	0.20
54 to 59	6	1/1.6 (0.6)	1/1.9 (0.5)	2/3.5 (0.6)	1.00
6 to 59	54	15/16.5 (0.9)	18/16.5 (1.1)		0.83

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

```
Overall sex ratio: p-value = 0.602 (boys and girls equally represented)
Overall age distribution: p-value = 0.858 (as expected)
Overall age distribution for boys: p-value = 0.382 (as expected)
Overall age distribution for girls: p-value = 0.886 (as expected)
Overall sex/age distribution: p-value = 0.255 (as expected)
```

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

Team: 1

```
Time                                               SD for WHZ
point                  0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.18 (n=05, f=0)  ################
02: 0.48 (n=05, f=0)
03: 0.69 (n=05, f=0)
04: 1.35 (n=03, f=0)  #######################
05: 1.14 (n=03, f=0)  ##############
06: 1.41 (n=03, f=0)  ##########################
07: 0.21 (n=03, f=0)
08: 2.06 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
09: 0.42 (n=02, f=0)
10: 0.46 (n=02, f=0)
```

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

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: 2.33 (n=04, f=1)  ################################################################
02: 1.68 (n=04, f=0)  #####################################
03: 1.61 (n=04, f=0)  ##################################
04: 0.85 (n=04, f=0)  ##
05: 0.72 (n=04, f=0)
06: 1.91 (n=04, f=0)  ###############################################
07: 0.87 (n=03, f=0)  ###
08: 2.32 (n=03, 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)

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: 0.52 (n=04, f=0)
02: 1.55 (n=04, f=1)  ###############################
03: 0.45 (n=04, f=0)
04: 1.47 (n=04, f=0)  ############################
05: 1.75 (n=04, f=0)  ########################################
06: 1.00 (n=04, f=0)  ########
07: 0.16 (n=04, f=0)
08: 0.81 (n=03, f=0)
09: 0.85 (n=03, f=0)  ##
10: 0.37 (n=02, f=0)
```

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

Team: 4

```
Time                                               SD for WHZ
point                  0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 2.96 (n=03, f=1)  ################################################################
02: 0.46 (n=04, f=0)
03: 0.35 (n=03, f=0)
04: 1.61 (n=04, f=0)  ##################################
05: 0.85 (n=03, f=0)  ##
06: 0.98 (n=03, f=0)  #######
07: 1.13 (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: 5

```
Time                                                 SD for WHZ
point                      0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 2.25 (n=04, f=1)  #############################################################
02: 1.17 (n=04, f=0)  ################
03: 1.40 (n=04, f=0)  #########################
04: 1.24 (n=04, f=0)  ##################
05: 0.45 (n=04, f=0)
06: 0.41 (n=04, f=0)
07: 1.78 (n=04, f=1)  #########################################
08: 0.93 (n=04, f=0)  #####
09: 1.17 (n=04, f=0)  ################
10: 0.66 (n=04, f=0)
11: 1.07 (n=04, f=0)  ###########
12: 0.55 (n=03, f=0)
13: 1.47 (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: 6

```
Time                                                 SD for WHZ
point                      0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.47 (n=04, f=0)
02: 0.93 (n=04, f=0)  #####
03: 0.80 (n=04, f=0)
04: 2.30 (n=04, f=1)  ###############################################################
05: 0.87 (n=04, f=0)  ###
06: 1.27 (n=04, f=0)  ####################
07: 0.38 (n=03, f=0)
08: 1.85 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO

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

Team: 7

```
Time                                                 SD for WHZ
point                      0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.14 (n=05, f=0)  ##############
02: 1.77 (n=05, f=1)  #########################################
03: 0.67 (n=04, f=0)
04: 0.88 (n=04, f=0)  ####
05: 0.41 (n=03, f=0)
06: 1.00 (n=03, f=0)  ########
07: 0.31 (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: 8

```
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: 1.40 (n=04, f=0)  #########################
02: 0.81 (n=04, f=0)
03: 0.88 (n=04, f=0)  ####
04: 0.43 (n=04, f=0)
05: 0.67 (n=04, f=0)
06: 0.73 (n=04, f=0)
07: 1.55 (n=03, f=0)  ################################
08: 0.93 (n=02, f=0)  OOOOOO
09: 0.14 (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: 9

```
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: 0.93 (n=04, f=0)  #####
02: 0.65 (n=04, f=0)
03: 0.76 (n=04, f=0)
04: 1.30 (n=04, f=0)  #####################
05: 1.25 (n=04, f=0)  ###################
06: 1.21 (n=03, f=0)  #################
07: 0.91 (n=03, f=0)  #####
08: 1.27 (n=03, f=0)  ####################
09: 1.66 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
10: 1.23 (n=02, f=0)  OOOOOOOOOOOOOOOOOO
```

(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: 10

```
Time                                             SD for WHZ
point                  0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.25 (n=04, f=0)  ###################
02: 2.31 (n=04, f=1)  ###############################################################
03: 1.21 (n=03, f=0)  #################
04: 0.20 (n=03, f=0)
05: 1.87 (n=03, f=1)  #############################################
06: 0.82 (n=03, f=0)  #
07: 1.59 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
08: 0.23 (n=03, f=0)
09: 1.13 (n=03, f=0)  ##############
10: 0.97 (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: 11

```
Time                                             SD for WHZ
point                  0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.84 (n=04, f=0)  ##
02: 1.99 (n=04, f=1)  ##################################################
03: 0.83 (n=04, f=0)  #
04: 1.58 (n=04, f=1)  #################################
05: 0.58 (n=04, f=0)
06: 0.63 (n=04, f=0)
07: 1.66 (n=04, f=0)  ####################################
08: 1.91 (n=03, f=0)  ###############################################
09: 0.89 (n=02, f=0)  OOOO
```

(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: 12

```
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: 1.03 (n=04, f=0)  ##########
02: 0.84 (n=04, f=0)  ##
03: 1.27 (n=04, f=0)  ####################
04: 0.67 (n=04, f=0)
05: 0.64 (n=04, f=0)
06: 0.92 (n=04, f=0)  #####
07: 1.03 (n=03, f=0)  #########
08: 1.22 (n=03, f=0)  #################
09: 0.97 (n=02, f=0)  OOOOOOO
```

(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

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

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	**0** (2.0 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**4** (p=0.039)
Age ratio(6-29 vs 30-59)	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.172)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (5)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (10)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (6)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>=1.20	
.			and	and	and	or	
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	**5** (1.15)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (0.08)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**1** (-0.28)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**0** (p=0.478)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**12** %

The overall score of this survey is 12 %, this is good.

There were no duplicate entries detected.

Missing or wrong data:

WEIGHT: Line=1/ID=5060202, Line=335/ID=5240201, Line=342/ID=5150401
HEIGHT: Line=1/ID=5060202

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=2/ID=5090901: HAZ (5.256), Age may be incorrect
Line=49/ID=2400201: **WHZ (-3.598)**, Weight may be incorrect
Line=68/ID=2370201: **WHZ (2.671)**, Weight may be incorrect
Line=223/ID=5330303: **WHZ (2.771)**, Weight may be incorrect
Line=231/ID=5310103: **WHZ (-3.840)**, Weight may be incorrect
Line=256/ID=5110902: **WHZ (-3.786)**, Weight may be incorrect
Line=273/ID=5080901: **WHZ (2.945)**, Weight may be incorrect
Line=400/ID=5080801: **WHZ (2.856)**, Height may be incorrect
Line=439/ID=5030201: **WHZ (2.906)**, Height may be incorrect
Line=445/ID=2390301: **WHZ (2.512)**, Height may be incorrect
Line=474/ID=5350601: WAZ (2.351), Weight may be incorrect
Line=477/ID=5300301: **WHZ (-3.564)**, WAZ (-4.648), Weight may be incorrect
Line=492/ID=5130702: HAZ (1.816), Age may be incorrect
Line=493/ID=5340601: HAZ (1.951), Age may be incorrect

Line=494/ID=5040202: HAZ (2.071), Height may be incorrect
Line=495/ID=2380202: HAZ (2.173), Age may be incorrect
Line=496/ID=5330102: HAZ (3.060), Age may be incorrect
Line=497/ID=2420401: HAZ (3.347), Age may be incorrect
Line=498/ID=5330101: HAZ (3.522), Age may be incorrect

Percentage of values flagged with SMART flags:WHZ: 2.0 %, HAZ: 1.6 %, 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: 0.96 (The value should be around 0.85).:
p-value = 0.172 (as expected)

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

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	79/63.1 (1.3)	52/52.4 (1.0)	131/115.5 (1.1)	1.52
18 to 29	12	62/61.5 (1.0)	51/51.1 (1.0)	113/112.7 (1.0)	1.22
30 to 41	12	50/59.6 (0.8)	48/49.6 (1.0)	98/109.2 (0.9)	1.04
42 to 53	12	53/58.7 (0.9)	42/48.8 (0.9)	95/107.5 (0.9)	1.26
54 to 59	6	28/29.0 (1.0)	33/24.1 (1.4)	61/53.2 (1.1)	0.85

```
-----------------------------------------------------------------------------------
6  to 59     54    272/249.0 (1.1)    226/249.0 (0.9)                       1.20
```

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

Overall sex ratio: p-value = 0.039 (significant excess of boys)
Overall age distribution: p-value = 0.213 (as expected)
Overall age distribution for boys: p-value = 0.188 (as expected)
Overall age distribution for girls: p-value = 0.372 (as expected)
Overall sex/age distribution: p-value = 0.005 (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** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.232

Digit preference Height:

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

Digit preference score: **10** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.000 (significant difference)

Digit preference MUAC:

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

Digit preference score: **6** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.107

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:	1.22	1.22	1.15
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	12.1%	12.1%	11.5%
calculated with current SD:	11.4%	11.4%	10.1%
calculated with a SD of 1:	7.0%	7.0%	7.2%
HAZ			
Standard Deviation SD:	1.27	1.27	1.15

(The SD should be between 0.8 and 1.2)
Prevalence (< -2)

observed:	27.0%	27.0%	27.4%
calculated with current SD:	29.4%	29.4%	29.5%
calculated with a SD of 1:	24.6%	24.6%	26.8%

WAZ

Standard Deviation SD:	1.05	1.05	1.03
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	19.4%	19.4%	19.3%
calculated with current SD:	19.5%	19.5%	19.0%
calculated with a SD of 1:	18.3%	18.3%	18.3%

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

WHZ	p= 0.146	p= 0.146	p= 0.055
HAZ	p= 0.000	p= 0.000	p= 0.003
WAZ	p= 0.870	p= 0.870	p= 0.625

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

Skewness

WHZ	0.14	0.14	0.08
HAZ	0.57	0.57	-0.03
WAZ	0.07	0.07	0.08

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

Kurtosis

WHZ	0.06	0.06	-0.28
HAZ	1.89	1.89	-0.09
WAZ	0.21	0.21	-0.05

Kurtosis characterizes the relative size of the body versus the tails of the distribution. Positive kurtosis indicates relatively large tails and small body. Negative kurtosis indicates relatively large body and small tails.
If the absolute value is:
-above 0.4 it indicates a problem. There might have been a problem with data collection or sampling.
-between 0.2 and 0.4, the data may be affected with a problem.
-less than an absolute value of 0.2 the distribution can be considered as normal.

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

```
WHZ < -2: ID=1.00 (p=0.478)
WHZ < -3: ID=1.32 (p=0.068)
GAM:      ID=1.00 (p=0.478)
SAM:      ID=1.32 (p=0.068)
HAZ < -2: ID=2.07 (p=0.000)
HAZ < -3: ID=1.59 (p=0.006)
WAZ < -2: ID=0.74 (p=0.905)
WAZ < -3: ID=0.87 (p=0.724)
```

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: 1.38 (n=48, f=1)  ########################
02: 1.39 (n=48, f=1)  #########################
```

```
03: 1.28 (n=46, f=3)  ####################
04: 1.22 (n=46, f=1)  ##################
05: 1.19 (n=46, f=1)  ################
06: 0.90 (n=43, f=0)  ####
07: 1.12 (n=38, f=0)  #############
08: 1.26 (n=33, f=0)  ###################
09: 1.03 (n=31, f=0)  ##########
10: 1.05 (n=28, f=0)  ##########
11: 1.23 (n=24, f=0)  ##################
12: 1.20 (n=21, f=1)  #################
13: 1.64 (n=13, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
14: 1.34 (n=09, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~
15: 0.82 (n=05, f=0)  ~
16: 0.91 (n=04, f=0)  ~~~~
17: 1.44 (n=04, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~
18: 1.15 (n=02, f=0)  ~~~~~~~~~~~~~~~
19: 1.28 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~
20: 0.41 (n=02, f=0)
21: 2.23 (n=02, f=1)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

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

Analysis by Team

Team	**1**	**10**	**11**	**12**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
n =	40	32	73	26	34	45	27	50	47	39	46	39
Percentage of values flagged with SMART flags:												
WHZ:	2.5	0.0	1.4	4.0	0.0	6.8	3.7	0.0	4.3	2.6	4.3	2.6
HAZ:	2.5	3.1	0.0	0.0	2.9	0.0	3.7	0.0	4.3	0.0	0.0	7.7
WAZ:	0.0	0.0	1.4	4.0	0.0	2.3	0.0	0.0	4.3	0.0	0.0	0.0
Age ratio of 6-29 months to 30-59 months:	1.50	1.46	0.66	0.86	0.79	0.96	0.93	0.47	1.47	1.44	1.30	0.77
Sex ratio (male/female):	0.74	1.13	1.70	1.60	1.00	1.81	2.86	1.00	1.24	0.86	0.77	1.17
Digit preference Weight (%):												
.0 :	8	6	8	8	9	9	7	8	13	15	20	41
.1 :	18	13	12	8	3	16	0	12	15	21	9	13
.2 :	5	9	10	0	15	20	11	10	9	8	4	10
.3 :	10	31	3	20	9	7	15	14	7	10	11	5
.4 :	13	13	7	8	12	5	19	8	11	10	9	8
.5 :	5	3	12	12	6	7	15	8	11	3	2	5
.6 :	5	6	5	4	9	5	19	14	13	3	13	3
.7 :	8	6	10	4	18	2	4	10	7	21	11	10
.8 :	20	0	10	12	12	18	11	16	9	5	9	3
.9 :	10	13	23	24	9	11	0	0	7	5	13	3
DPS:	17	27	17	23	13	20	22	14	10	21	15	36

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

Digit preference Height (%):												
.0 :	5	3	5	4	21	20	19	8	13	0	20	23
.1 :	13	19	5	12	3	16	22	4	2	8	11	18
.2 :	10	16	23	8	3	9	19	14	15	15	7	13
.3 :	15	28	14	15	9	13	7	12	15	21	4	15
.4 :	13	25	15	12	9	13	4	12	20	15	9	13

.5 :	10	0	10	12	24	4	4	10	15	8	15	13
.6 :	0	0	5	12	6	0	7	16	4	21	7	3
.7 :	13	3	7	0	9	7	4	14	7	5	9	3
.8 :	13	0	4	12	12	4	0	6	4	5	13	0
.9 :	10	6	11	15	6	13	15	4	4	3	7	0
DPS:	14	34	19	15	22	19	25	14	20	23	15	26

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

Digit preference MUAC (%):

.0 :	0	16	10	12	41	16	11	4	7	0	22	21
.1 :	13	25	11	8	9	11	7	4	7	13	11	5
.2 :	18	9	14	8	6	14	11	22	7	3	13	5
.3 :	13	3	5	15	3	16	11	20	9	10	13	23
.4 :	13	6	8	4	6	14	7	8	15	26	13	8
.5 :	5	6	10	4	15	5	11	8	20	0	13	15
.6 :	3	13	8	15	3	2	11	14	11	18	2	5
.7 :	10	6	4	19	6	5	11	2	11	21	2	5
.8 :	13	6	12	8	3	9	7	4	7	3	2	8
.9 :	15	9	18	8	9	9	11	14	9	8	9	5
DPS:	18	20	13	16	36	16	6	23	14	29	20	22

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

Standard deviation of WHZ:

SD	1.18	1.15	1.27	0.90	1.08	1.38	1.37	1.06	1.13	1.25	1.39	1.00
Prevalence (< -2) observed:												
%	17.5	12.5	5.5		2.9	15.9	14.8	20.0	13.0	12.8	15.2	5.1
Prevalence (< -2) calculated with current SD:												
%	13.4	9.2	6.8		4.5	13.1	13.0	17.8	14.5	13.5	13.7	4.8
Prevalence (< -2) calculated with a SD of 1:												
%	9.5	6.3	2.9		3.3	6.0	6.2	16.4	11.6	8.3	6.5	4.7

Standard deviation of HAZ:

SD	1.08	1.25	1.31	1.04	1.39	1.33	1.31	0.92	1.14	1.07	1.23	1.75
observed:												
%	12.5	34.4	41.1	46.2	17.6	31.1	14.8		23.9	25.6	30.4	17.9
calculated with current SD:												
%	18.6	33.7	43.0	44.7	21.2	30.4	24.9		22.6	22.6	27.5	29.8
calculated with a SD of 1:												
%	16.8	30.0	40.8	44.4	13.4	24.7	18.8		19.6	21.1	23.1	17.6

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	9/3.9 (2.3)	4/5.3 (0.7)	13/9.3 (1.4)	2.25
18 to 29	12	3/3.8 (0.8)	8/5.2 (1.5)	11/9.0 (1.2)	0.38
30 to 41	12	4/3.7 (1.1)	2/5.0 (0.4)	6/8.8 (0.7)	2.00
42 to 53	12	1/3.7 (0.3)	3/5.0 (0.6)	4/8.6 (0.5)	0.33
54 to 59	6	0/1.8 (0.0)	6/2.5 (2.4)	6/4.3 (1.4)	0.00
6 to 59	54	17/20.0 (0.9)	23/20.0 (1.1)		0.74

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

Overall sex ratio: p-value = 0.343 (boys and girls equally represented)
Overall age distribution: p-value = 0.201 (as expected)
Overall age distribution for boys: p-value = 0.034 (significant difference)
Overall age distribution for girls: p-value = 0.048 (significant difference)
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	8/3.9 (2.0)	4/3.5 (1.1)	12/7.4 (1.6)	2.00
18 to 29	12	3/3.8 (0.8)	4/3.4 (1.2)	7/7.2 (1.0)	0.75
30 to 41	12	1/3.7 (0.3)	5/3.3 (1.5)	6/7.0 (0.9)	0.20
42 to 53	12	3/3.7 (0.8)	0/3.2 (0.0)	3/6.9 (0.4)	
54 to 59	6	2/1.8 (1.1)	2/1.6 (1.2)	4/3.4 (1.2)	1.00
6 to 59	54	17/16.0 (1.1)	15/16.0 (0.9)		1.13

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

Overall sex ratio: p-value = 0.724 (boys and girls equally represented)
Overall age distribution: p-value = 0.259 (as expected)
Overall age distribution for boys: p-value = 0.165 (as expected)
Overall age distribution for girls: p-value = 0.353 (as expected)
Overall sex/age distribution: p-value = 0.025 (significant difference)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	8/10.7 (0.7)	4/6.3 (0.6)	12/16.9 (0.7)	2.00
18 to 29	12	9/10.4 (0.9)	8/6.1 (1.3)	17/16.5 (1.0)	1.13
30 to 41	12	8/10.1 (0.8)	4/5.9 (0.7)	12/16.0 (0.7)	2.00
42 to 53	12	12/9.9 (1.2)	6/5.8 (1.0)	18/15.8 (1.1)	2.00
54 to 59	6	9/4.9 (1.8)	5/2.9 (1.7)	14/7.8 (1.8)	1.80
6 to 59	54	46/36.5 (1.3)	27/36.5 (0.7)		1.70

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

Overall sex ratio: p-value = 0.026 (significant excess of boys)
Overall age distribution: p-value = 0.102 (as expected)
Overall age distribution for boys: p-value = 0.274 (as expected)
Overall age distribution for girls: p-value = 0.464 (as expected)
Overall sex/age distribution: p-value = 0.007 (significant difference)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	5/3.7 (1.3)	2/2.3 (0.9)	7/6.0 (1.2)	2.50
18 to 29	12	3/3.6 (0.8)	2/2.3 (0.9)	5/5.9 (0.9)	1.50
30 to 41	12	6/3.5 (1.7)	3/2.2 (1.4)	9/5.7 (1.6)	2.00
42 to 53	12	2/3.5 (0.6)	2/2.2 (0.9)	4/5.6 (0.7)	1.00
54 to 59	6	0/1.7 (0.0)	1/1.1 (0.9)	1/2.8 (0.4)	0.00
6 to 59	54	16/13.0 (1.2)	10/13.0 (0.8)		1.60

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

Overall sex ratio: p-value = 0.239 (boys and girls equally represented)
Overall age distribution: p-value = 0.435 (as expected)
Overall age distribution for boys: p-value = 0.326 (as expected)
Overall age distribution for girls: p-value = 0.983 (as expected)
Overall sex/age distribution: p-value = 0.116 (as expected)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	6/3.9 (1.5)	2/3.9 (0.5)	8/7.9 (1.0)	3.00
18 to 29	12	3/3.8 (0.8)	4/3.8 (1.0)	7/7.7 (0.9)	0.75
30 to 41	12	3/3.7 (0.8)	4/3.7 (1.1)	7/7.5 (0.9)	0.75
42 to 53	12	3/3.7 (0.8)	5/3.7 (1.4)	8/7.3 (1.1)	0.60
54 to 59	6	2/1.8 (1.1)	2/1.8 (1.1)	4/3.6 (1.1)	1.00
6 to 59	54	17/17.0 (1.0)	17/17.0 (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 = 0.996 (as expected)
Overall age distribution for boys: p-value = 0.820 (as expected)
Overall age distribution for girls: p-value = 0.829 (as expected)
Overall sex/age distribution: p-value = 0.553 (as expected)

Team 6:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	8/6.7 (1.2)	5/3.7 (1.3)	13/10.4 (1.2)	1.60
18 to 29	12	9/6.6 (1.4)	0/3.6 (0.0)	9/10.2 (0.9)	
30 to 41	12	8/6.4 (1.3)	7/3.5 (2.0)	15/9.9 (1.5)	1.14
42 to 53	12	2/6.3 (0.3)	2/3.5 (0.6)	4/9.7 (0.4)	1.00
54 to 59	6	2/3.1 (0.6)	2/1.7 (1.2)	4/4.8 (0.8)	1.00
6 to 59	54	29/22.5 (1.3)	16/22.5 (0.7)		1.81

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

Overall sex ratio: p-value = 0.053 (boys and girls equally represented)
Overall age distribution: p-value = 0.140 (as expected)
Overall age distribution for boys: p-value = 0.302 (as expected)
Overall age distribution for girls: p-value = 0.084 (as expected)
Overall sex/age distribution: p-value = 0.003 (significant difference)

Team 7:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	7/4.6 (1.5)	0/1.6 (0.0)	7/6.3 (1.1)	
18 to 29	12	4/4.5 (0.9)	2/1.6 (1.3)	6/6.1 (1.0)	2.00
30 to 41	12	2/4.4 (0.5)	2/1.5 (1.3)	4/5.9 (0.7)	1.00
42 to 53	12	7/4.3 (1.6)	3/1.5 (2.0)	10/5.8 (1.7)	2.33
54 to 59	6	0/2.1 (0.0)	0/0.7 (0.0)	0/2.9 (0.0)	
6 to 59	54	20/13.5 (1.5)	7/13.5 (0.5)		2.86

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

Overall sex ratio: p-value = 0.012 (significant excess of boys)
Overall age distribution: p-value = 0.160 (as expected)
Overall age distribution for boys: p-value = 0.174 (as expected)
Overall age distribution for girls: p-value = 0.394 (as expected)
Overall sex/age distribution: p-value = 0.001 (significant difference)

Team 8:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	7/5.8 (1.2)	4/5.8 (0.7)	11/11.6 (0.9)	1.75
18 to 29	12	4/5.7 (0.7)	1/5.7 (0.2)	5/11.3 (0.4)	4.00
30 to 41	12	2/5.5 (0.4)	7/5.5 (1.3)	9/11.0 (0.8)	0.29
42 to 53	12	7/5.4 (1.3)	7/5.4 (1.3)	14/10.8 (1.3)	1.00
54 to 59	6	5/2.7 (1.9)	6/2.7 (2.2)	11/5.3 (2.1)	0.83
6 to 59	54	25/25.0 (1.0)	25/25.0 (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 = 0.028 (significant difference)
Overall age distribution for boys: p-value = 0.243 (as expected)
Overall age distribution for girls: p-value = 0.051 (as expected)
Overall sex/age distribution: p-value = 0.005 (significant difference)

Team 9:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	7/6.0 (1.2)	9/4.9 (1.8)	16/10.9 (1.5)	0.78
18 to 29	12	8/5.9 (1.4)	4/4.8 (0.8)	12/10.6 (1.1)	2.00
30 to 41	12	4/5.7 (0.7)	3/4.6 (0.7)	7/10.3 (0.7)	1.33
42 to 53	12	3/5.6 (0.5)	3/4.5 (0.7)	6/10.1 (0.6)	1.00
54 to 59	6	4/2.8 (1.4)	2/2.2 (0.9)	6/5.0 (1.2)	2.00
6 to 59	54	26/23.5 (1.1)	21/23.5 (0.9)		1.24

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

Overall sex ratio: p-value = 0.466 (boys and girls equally represented)
Overall age distribution: p-value = 0.240 (as expected)
Overall age distribution for boys: p-value = 0.528 (as expected)
Overall age distribution for girls: p-value = 0.317 (as expected)
Overall sex/age distribution: p-value = 0.082 (as expected)

Team 10:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	3/4.2 (0.7)	5/4.9 (1.0)	8/9.0 (0.9)	0.60
18 to 29	12	7/4.1 (1.7)	8/4.8 (1.7)	15/8.8 (1.7)	0.88
30 to 41	12	2/3.9 (0.5)	2/4.6 (0.4)	4/8.6 (0.5)	1.00
42 to 53	12	5/3.9 (1.3)	4/4.5 (0.9)	9/8.4 (1.1)	1.25
54 to 59	6	1/1.9 (0.5)	2/2.2 (0.9)	3/4.2 (0.7)	0.50
6 to 59	54	18/19.5 (0.9)	21/19.5 (1.1)		0.86

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

Overall sex ratio: p-value = 0.631 (boys and girls equally represented)
Overall age distribution: p-value = 0.124 (as expected)
Overall age distribution for boys: p-value = 0.385 (as expected)
Overall age distribution for girls: p-value = 0.436 (as expected)
Overall sex/age distribution: p-value = 0.086 (as expected)

Team 11:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	4/4.6 (0.9)	9/6.0 (1.5)	13/10.7 (1.2)	0.44
18 to 29	12	5/4.5 (1.1)	8/5.9 (1.4)	13/10.4 (1.2)	0.63
30 to 41	12	5/4.4 (1.1)	3/5.7 (0.5)	8/10.1 (0.8)	1.67
42 to 53	12	5/4.3 (1.2)	5/5.6 (0.9)	10/9.9 (1.0)	1.00
54 to 59	6	1/2.1 (0.5)	1/2.8 (0.4)	2/4.9 (0.4)	1.00
6 to 59	54	20/23.0 (0.9)	26/23.0 (1.1)		0.77

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

Overall sex ratio: p-value = 0.376 (boys and girls equally represented)
Overall age distribution: p-value = 0.507 (as expected)
Overall age distribution for boys: p-value = 0.919 (as expected)
Overall age distribution for girls: p-value = 0.319 (as expected)
Overall sex/age distribution: p-value = 0.140 (as expected)

Team 12:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	7/4.9 (1.4)	4/4.2 (1.0)	11/9.0 (1.2)	1.75
18 to 29	12	4/4.8 (0.8)	2/4.1 (0.5)	6/8.8 (0.7)	2.00
30 to 41	12	5/4.6 (1.1)	6/3.9 (1.5)	11/8.6 (1.3)	0.83
42 to 53	12	3/4.5 (0.7)	2/3.9 (0.5)	5/8.4 (0.6)	1.50
54 to 59	6	2/2.2 (0.9)	4/1.9 (2.1)	6/4.2 (1.4)	0.50
6 to 59	54	21/19.5 (1.1)	18/19.5 (0.9)		1.17

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

Overall sex ratio: p-value = 0.631 (boys and girls equally represented)
Overall age distribution: p-value = 0.377 (as expected)
Overall age distribution for boys: p-value = 0.804 (as expected)
Overall age distribution for girls: p-value = 0.258 (as expected)
Overall sex/age distribution: p-value = 0.143 (as expected)

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

Team: 1

```
Time                                          SD for WHZ
point                0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.38 (n=04, f=0)
```

```
02: 2.60 (n=04, f=1)  ################################################################
03: 0.55 (n=04, f=0)
04: 2.06 (n=04, f=0)  #####################################################
05: 0.70 (n=04, f=0)
06: 0.63 (n=04, f=0)
07: 1.09 (n=04, f=0)  ############
08: 0.59 (n=03, f=0)
09: 0.31 (n=03, f=0)
10: 2.10 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
11: 0.71 (n=02, f=0)
12: 0.09 (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: 1.43 (n=04, f=0)  ##########################
02: 1.10 (n=04, f=0)  ############
03: 0.49 (n=04, f=0)
04: 0.94 (n=04, f=0)  ######
05: 1.96 (n=04, f=0)  #################################################
06: 1.51 (n=04, f=0)  ##############################
07: 0.62 (n=03, f=0)
08: 1.51 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
```

(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: 1.60 (n=04, f=0)  ##################################
02: 1.69 (n=04, f=1)  #####################################
03: 0.31 (n=04, f=0)
04: 0.36 (n=04, f=0)
05: 1.18 (n=04, f=0)  ################
06: 1.03 (n=04, f=0)  ##########
07: 1.54 (n=04, f=0)  ###############################
08: 1.20 (n=04, f=0)  #################
09: 1.19 (n=04, f=0)  ################
10: 1.21 (n=04, f=0)  #################
11: 1.12 (n=04, f=0)  #############
12: 1.41 (n=04, f=0)  ##########################
13: 1.07 (n=04, f=0)  ############
14: 1.38 (n=04, f=0)  #########################
15: 0.88 (n=03, f=0)  ####
16: 0.41 (n=03, f=0)
17: 1.75 (n=03, f=0)  ########################################
18: 1.15 (n=02, f=0)  OOOOOOOOOOOOOOO
19: 1.28 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOO
20: 0.41 (n=02, f=0)
21: 2.23 (n=02, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
```

(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: 0.88 (n=04, f=0)  ###
02: 1.13 (n=04, f=0)  ##############
03: 0.48 (n=03, f=0)
04: 1.41 (n=04, f=0)  ##########################
05: 0.98 (n=04, f=0)  #######
06: 0.60 (n=04, f=0)
07: 0.20 (n=02, f=0)
```

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

Team: 5

```
Time                                             SD for WHZ
point                      0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.02 (n=04, f=0)  #########
02: 1.59 (n=04, f=0)  #################################
03: 1.46 (n=04, f=0)  ############################
04: 0.58 (n=04, f=0)
05: 0.86 (n=04, f=0)  ##
06: 0.27 (n=03, f=0)
07: 1.86 (n=03, f=0)  #############################################
08: 1.64 (n=03, f=0)  ###################################
09: 1.02 (n=03, f=0)  #########
10: 0.36 (n=02, f=0)
```

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

Team: 6

```
Time                                             SD for WHZ
point                      0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.98 (n=04, f=0)  #######
02: 1.60 (n=04, f=0)  ##################################
03: 1.57 (n=04, f=1)  ################################
04: 0.45 (n=04, f=0)
05: 0.97 (n=04, f=0)  #######
06: 1.44 (n=03, f=0)  ###########################
07: 0.99 (n=04, f=0)  ########
08: 0.67 (n=04, f=0)
09: 0.98 (n=04, f=0)  #######
10: 0.95 (n=04, f=0)  ######
11: 1.34 (n=03, f=0)  #######################
12: 0.71 (n=02, f=0)
```

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

Team: 7

```
Time                                             SD for WHZ
point                      0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 2.34 (n=04, f=1)  ################################################################
02: 1.26 (n=04, f=0)  ###################
03: 1.03 (n=04, f=0)  ##########
04: 1.26 (n=04, f=0)  ###################
05: 1.76 (n=03, f=0)  #########################################
06: 1.27 (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: 8

```
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=04, f=0)  #################
02: 0.62 (n=04, f=0)
03: 0.96 (n=04, f=0)  #######
04: 1.17 (n=04, f=0)  ################
05: 0.54 (n=04, f=0)
06: 0.77 (n=04, f=0)
07: 0.82 (n=04, f=0)  #
08: 1.66 (n=04, f=0)  ####################################
09: 0.58 (n=04, f=0)
10: 1.19 (n=03, f=0)  ################
11: 0.66 (n=03, f=0)
12: 0.74 (n=03, f=0)
13: 0.81 (n=02, f=0)
14: 0.46 (n=02, f=0)
```

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

Team: 9

```
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: 0.58 (n=04, f=0)
02: 0.64 (n=04, f=0)
03: 0.98 (n=04, f=0)  ########
04: 2.19 (n=03, f=0)  ##########################################################
05: 0.54 (n=04, f=0)
06: 0.36 (n=04, f=0)
07: 1.00 (n=04, f=0)  ########
08: 2.53 (n=03, f=0)  ################################################################
09: 1.15 (n=03, f=0)  ###############
10: 0.85 (n=03, f=0)  ##
11: 1.62 (n=03, f=0)  ##################################
12: 0.74 (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: 10

```
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: 1.73 (n=04, f=0)  #######################################
02: 1.26 (n=04, f=0)  ###################
03: 1.85 (n=03, f=1)  ############################################
04: 1.03 (n=03, f=0)  ##########
05: 1.26 (n=03, f=0)  ###################
06: 0.22 (n=03, f=0)
07: 0.55 (n=03, f=0)
08: 0.93 (n=03, f=0)  #####
09: 0.71 (n=03, f=0)
10: 0.91 (n=03, f=0)  ####
11: 0.94 (n=02, f=0)  OOOOOO
12: 0.09 (n=02, f=0)
13: 1.24 (n=02, f=0)  OOOOOOOOOOOOOOOOOOO
```

(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: 11

```
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: 1.40 (n=04, f=0)  #########################
02: 1.31 (n=04, f=0)  #####################
03: 1.00 (n=04, f=0)  #########
04: 1.41 (n=04, f=0)  ##########################
05: 1.78 (n=04, f=0)  #########################################
06: 0.84 (n=04, f=0)  ##
07: 2.15 (n=03, f=0)  #########################################################
08: 0.62 (n=03, f=0)
09: 1.68 (n=03, f=0)  #####################################
10: 0.97 (n=03, f=0)  #######
11: 0.85 (n=03, f=0)  ##
12: 1.56 (n=03, f=1)  ################################
13: 2.75 (n=03, 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)

Team: 12

```
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: 1.22 (n=04, f=0)  ##################
02: 0.98 (n=04, f=0)  ########
03: 0.54 (n=04, f=0)
04: 0.73 (n=04, f=0)
05: 1.89 (n=04, f=1)  ##############################################
06: 0.64 (n=04, f=0)
07: 0.05 (n=03, f=0)
08: 1.04 (n=03, f=0)  ##########
09: 1.59 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
10: 1.22 (n=02, f=0)  OOOOOOOOOOOOOOOOOO
11: 1.42 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOO
```

12: 0.34 (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)