Nutrition Survey
Saharawi Refugee Camps, Tindouf, Algeria

Survey Conducted: October-November 2016

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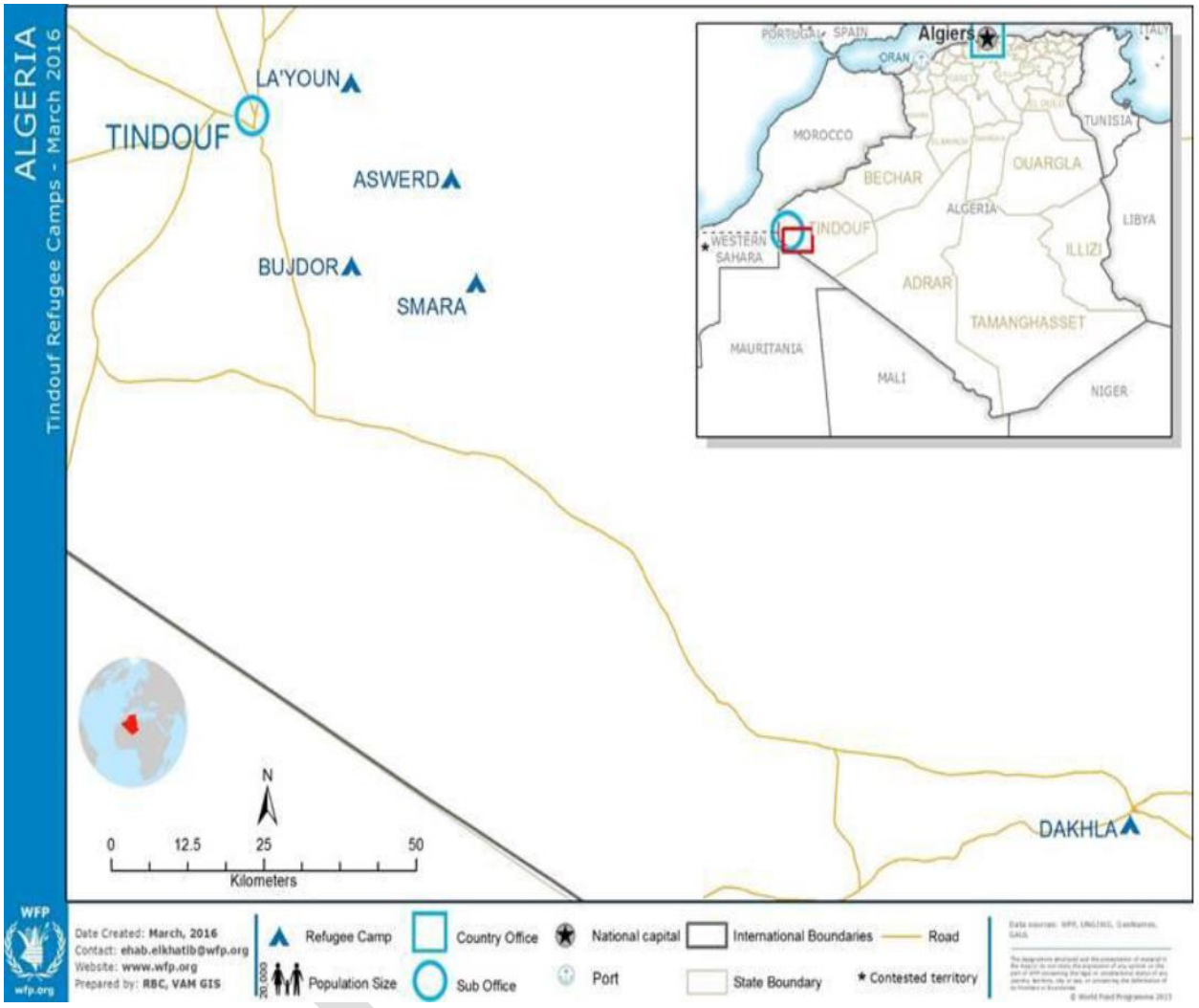
ALGERIA
Tindouf Refugee Camps - March 2016
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Refugee Camp
Population Size
20,000
Country Office
Sub Office
National capital
Port
International Boundaries
State Boundary
Road
Contested territory

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LIST OF ACRONYMS

AAPSIB	Associació d'Amics del Poble Sahrauí de les Illes Balears
AECID	Spanish Agency for International Development Cooperation
ARC	Algerian Red Crescent
BMI	Body Mass Index
BSFP	Blanket Supplementary Feeding Program
CI	Confidence Interval
CISP	Comittato Internazionalle per lo Sviluppo dei poppoli
CMAM	Community Management of Acute Malnutrition
CSB	Corn Soya Blend
ECHO	European Commission's Humanitarian Aid & Civil Protection Office
EDP	Extended Delivery Points
ENA	Emergency Nutrition Assessment
ENN	Emergency Nutrition Network
FCS	Food Consumption Score
FSS	Food Security Stock
GAM	Global Acute Malnutrition
HDDS	Household Dietary Diversity Score
HH	Household
IYCF	Infant and Young Child Feeding Practices
JAM	Joint Assessment Mission
LNS	Lipid-based Nutrient Supplement
MAM	Moderate Acute Malnutrition
MdM	Médicos del Mundo
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 Saharawi Child Health Programme
PLW	Pregnant and Lactating Women
rCSI	Reduced Coping Strategy Index
TSFP	Targeted Supplementary Feeding Program
SAM	Severe Acute Malnutrition
SRC	Spanish Red Cross
UN	United Nations
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
WC	Waist Circumference
WMDD	Women Minimum Dietary Diversity
WFP	World Food Programme
WHO	World Health Organisation
WSRC	Western Saharawi Red Crescent

EXECUTIVE SUMMARY

INTRODUCTION

Five nutritional surveys were conducted, one in each of the Saharawi refugee camps/Wilayas (Laayoune, Awserd, Smara, Dakhla and Boujdour), located near Tindouf, Algeria. The surveys took place in October-November 2016, with the overall aim of establishing a detailed mapping of the current nutritional profile of the population, which has been considered precarious. Findings of the survey are intended to produce recommendations on actions to improve the nutritional status and health of the Saharawi refugees.

METHODS

A two-stage cluster sampling design was used, with 35 clusters randomly selected for each survey in the respective camps using probability proportional to size. Cluster allocation was based on available estimates used for humanitarian programming, and using the quarter (barrio) as the sampling unit in the first stage. In the second stage, 12 households were selected randomly 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 aged (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. On women, body mass index and waist circumference indicators were 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® 301). At the household level the food consumption score and household dietary diversity score -both food security indicators-, as well as coping mechanisms, were measured in all surveyed households. For the first time, interviews to households included questions on selected non-communicable diseases to assess risk factors and intra-household water and sanitation issues.

RESULTS

A total of 2,100 households were visited (2834 children and 3830 women). Only 1.3% of households refused to participate, and 0.2% of the households were found empty. 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) was 4.7% (95% CI 3.7; 5.8) ranging from 3% in Boujdour to almost 6.6% in Laayoune. The prevalence of GAM in Laayoune was significantly higher from that in Boujdour, and no differences were found with the other Wilayas. The overall prevalence of underweight is 10.3% (95% CI 9.0; 11.6) ranging from 6.2% to 12.2% at the Wilaya level, the prevalence of underweight in Boujdour was significantly lower than in Dakhla, Laayoune and Smara. Stunting prevalence was 18.6% (95% CI 16.8 – 20.6), ranging from 13.6% in Boujdour to 21% in Laayoune. Again, Boujdour showed a significantly lower prevalence than Awserd, Dakhla and Smara.

Overall, 38.7% (95% CI 36.3 – 41.2) of children aged 6-59 months suffer from anaemia. The most common types of anaemia being mild (19.1%) and moderate (18.6%), and severe anaemia was low (1.1%). There are significant differences in the anaemia prevalence between Wilayas, with Smara and Boujdour having significantly lower prevalence than Awserd, Laayoune and Dakhla.

Infant and young child feeding (IYCF) practices

The proportion of children aged <24 months ever breastfed was high (92.3%). However, the proportion of infants aged <6 months who are exclusively breastfed was low at 26%, although more than half (62%) of the infants <6 months were predominantly breastfed. Breastfeeding is initiated in the first hour in 55% of the children. Exclusive breastfeeding decreased sharply with age, 38% in the first two months of life to less than

18% by the age of 4-5 months. Continuation of breastfeeding at 12 and 24 months was 74% and 40%, respectively. The mean duration of breastfeeding was 20.7 months. The prevalence of bottle-feeding in children aged <24 months was 24%, and about 44% of children aged <6 months reported having been bottle-fed. Introduction of solid, semi-solid and soft foods between the ages of 6-8 months was 74%. Only 13.6% of all children aged 6-23 months had a minimum acceptable diet (an IYCF summary indicator). The proportion of children aged 6-23 months consuming iron-rich or iron-fortified foods was 29%.

Diarrhoea, feeding patterns and health seeking behaviour

Overall, 15% children aged 0-59 months reportedly having diarrhoea in the previous two weeks (did not differ significantly between camps). Feeding practices during diarrhoea were poor, with only 19% of children being offered more fluids and more than half (55%) having their feeding intake reduced. Health seeking behaviours among caregivers were also low, with only about half of children with diarrhoea being taken to the health centre (53%) or given ORS (46%).

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

Overall, 3.6% (95% CI 2.8; 4.5) of non-pregnant and non-lactating women of childbearing age were classified as underweight (BMI<18.5 kg/m^2), 36.4% (95% CI 34.7 – 38.1) as overweight (BMI≥25 and <30kg/m^2) and 30.7% (95% CI 28.6; 32.8) as obese (BMI≥30 kg/m^2). The prevalence of overweight and obesity combined was 67% (95% CI 64.9; 69.1), ranging from 63.5% in Laayoune to 75.5% in Boujdour. The combined prevalence was significantly higher in Boujdour than in all other Wilayas. Waist circumference is an indicator of central obesity and the risk of metabolic disorders; among non-pregnant and non-lactating women of childbearing age, 19.3% (95% CI 17.6; 21.1) had increased metabolic risk, and 61% (95% CI 58.7; 63.5) had very increased risk.

The weighted prevalence of anaemia in non-pregnant women of reproductive age is 45.2% (95% CI 42.6; 47.4), ranging from 36% to 53%. There were differences between Wilayas with Dakhla, Awserd and Laayoune having higher prevalence than Smara and Boujdour. Pregnant and lactating women presented higher anaemia prevalence estimates than their non-pregnant counterparts, being the anaemia prevalence estimates among lactating women the higher. All these differences were statistically significant ($p<0.05$).

Food security indicators

Overall, the weighted proportion of households classified as having an acceptable food consumption score (FCS) was 81.1% (95% CI 77.0; 54.8). A significantly larger proportion of households in Laayoune (30%) did not have adequate FCS values compared to the other Wilayas. Conversely, Boujdour presented a significantly lower proportion (8.3%).

For all Wilayas, mean FCS-based dietary diversity (7-day recall) was 6.2 (95% CI 6.1; 6.3); there were differences, with Dakhla and Laayoune having significantly lower values that Smara and Boujdour. The household dietary diversity score based on 24-hour recall (HDDS) was 7.2 (95% CI 7.1; 7.4), and only the difference between Dakhla and Boujdour remained significant. The proportion of women that reached the minimum dietary diversity in all Wilayas was 43.3% (95% CI 39.0; 47.7); no significant differences were found in between Wilayas.

Overall, the mean value for the reduced coping strategy index (rCSI) was 8.0 (95% CI 7.2; 8.9), ranging from 3.1 to 10.5. The Wilayas of Dakhla and Boujdour presented significantly lower rCSI than Awserd, Smara and Laayoune. The most common coping strategy used by the majority of households in all five Wilayas was *borrowing of food or rely on help from friends or relatives* (82% of households). Dakhla presented a significantly lower prevalence for this behaviour that all other Wilayas.

Non-communicable diseases

Overall, the weighted prevalence of reported adults (aged 25-64 years) having diabetes, high blood pressure and high cholesterol is 5.9% (95% CI 5.0; 6.8), 6.7% (95% CI 5.8; 7.7) and 1.1% (95% CI 0.7; 1.5), 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 non-communicable diseases.

Water, Sanitation and Hygiene (WASH) Indicators

Overall, 52.2% (95% CI 47.9; 56.4) households had their water provision meeting the UNHCR standards (20 litres/person/day). There were significant differences between Wilayas with three levels of prevalence of meeting the standards. Dakhla had the greatest level, Boujdour and Awserd had then a lower level, whilst both Laayoune and Smara had the lowest level. Household satisfaction with the water supply showed the same pattern than that observed for meeting UNHCR standards of water provision. The majority of households reported to receive water from tanker trucks (61.9% -95%CI 56.6; 66.9-) with the remaining having access to a piped water network. On average, households had their water tanks refilled every 22 days, ranging from 8 days in Dakhla to 26 days in Smara.

Most households (98%) reported the presence of soap. Basic hygiene practices such as washing hands before preparing or eating food was almost 100% with little differences between Wilayas. About 7% of households reported not washing their hands with soap after defecation. Soap usage is observable lower when dealing with children than for other hygiene practices.

The large majority of households reported having access to a latrine and only a very small proportion of households (0.3%) reported to engage in open defecation.

Coverage of MAM and SAM care programmes and measles vaccination

Overall, for children aged 6-59 months with acute malnutrition point coverage was low, ranging from 7% to 16% for MAM and SAM treatment, respectively. After including the children that were receiving MAM and SAM care but did not fit the case definition, period coverage was also low (11% for MAM treatment and 53% for SAM treatment).

Measles vaccination coverage for children 9-59 months was about 97%, well in line with the recommended Sphere standards.

DISCUSSION

The 2016 survey results, when compared with previous surveys, suggest an improvement in the nutrition of the Saharawi population. There is an observable downward trend in both Global Acute Malnutrition (GAM), and of stunting, which is significantly lower than in 2012. Overall, both, GAM and stunting are considered for the first time of low public health significance, although in some Wilayas each would remain of medium public health significance. In addition, there have been also improvements in food security –as indexed by food security indicators at household level-, and in Infant and Young Feeding Practices.

However, other nutritional problems persist and some are worsening. The prevalence of anaemia has increased, in both children aged 6-59 months and women of reproductive age, reversing a past downward trend and shifting the public health significance from medium to serious. In addition, despite encouraging improvements, IYCF practices remain poor. Furthermore, Saharawi refugees are facing now a greater risk of chronic diseases among adults, as determined by the significant increase of overweight, obesity, and central obesity prevalence among women of childbearing age.

RECOMMENDATIONS

Recommendations for action based on the findings of these surveys are provided in section VI of this report (see page 104).

Table 1. Summary of key indicators

Children aged 6-59 months[1]						
Key indicators (%)	**Awserd**	**Dakhla**	**Laayoune**	**Smara**	**Boujdour**	**Combined**
GAM	4.5	3.7	6.6	4.0	3.0	4.7 (3.7 – 5.8)
SAM	0.6	0.2	0.6	0.3	0.5	0.5 (0.3 – 0.9)
Overweight	1.5	2.0	0.9	1.4	1.4	1.3 (1.0- 1.9)
MUAC <125mm &/or oedema	4.1	3.9	2.9	3.5	3.5	3.5 (2.9 – 4.3)
MUAC <115 &/or oedema	0.5	0.6	0.2	0.5	0.8	0.5 (0.2 – 0.8)
Stunting	19.2	20.0	21.0	17.1	13.6	18.6 (16.8 –20.6)
Severe Stunting	4.8	6.2	5.0	4.3	3.0	4.7 (5.3 – 7.7)
Total Anaemia	41.3	47.9	42.6	33.1	29.5	38.7 (36.3 –41.2)
Moderate Anaemia	18.4	22.1	20.8	16.9	14.1	18.6 (16.8 –20.5)
Severe Anaemia	1.4	1.7	1.7	0.2	0.8	1.1 (0.7 – 1.7)
Exclusive breastfeeding (<6 months)	--	--	--	--		25.8 (21.9-36.2)
Continued breastfeeding at 1 year	--	--	--	--		74.3 (68.2 –79.6)
Continued breastfeeding at 2 year	--	--	--	--		40.5 (33.0 –48.5)
Minimum dietary diversity	35.8	21.8	29.8	36.9	31.0	33.0 (27.9 –38.5)
Minimum meal frequency	53.7	46.8	41.0	44.7	48.1	46.3 (40.6 –52.2)
Minimum acceptable diet	15.4	10.5	14.3	12.6	13.2	13.6 (10.3 –17.6)
Consumption of iron-rich or iron-fortified foods	31.8	22.6	28.0	29.6	29.5	29.1 (25.3 –33.2)
Women of reproductive age (15 – 49 years)						
Key indicators (%)	**Awserd**	**Dakhla**	**Laayoune**	**Smara**	**Boujdour**	**Combined**
Overweight+ Obesity	65.2	65.6	63.5	69.2	75.5	67.0 (64.9 –69.1)
Underweight	4.0	4.8	3.1	3.5	2.1	3.6 (2.8 - 4.5)
Total Anaemia	48.2	52.8	51.2	39.1	35.9	45.2 (42.6 –47.4)
Moderate Anaemia	26.0	23.5	26.9	20.0	16.9	23.2 (21.5 –25.1)
Severe Anaemia	6.2	3.8	6.9	4.0	3.7	5.1 (4.4 – 5.9)
Households food security indicators						
Key indicators (%)	**Awserd**	**Dakhla**	**Laayoune**	**Smara**	**Boujdour**	**Combined**
FCS acceptable	82.4	84.4	70.0	85.7	91.6	81.1 (77.0 –54.8)
FCS borderline	17.3	15.1	28.3	14.3	8.4	18.3 (15.0 –22.2)
FCS poor	0.2	0.5	1.7	0.0	0.0	0.6 (0.3 – 1.2)
Women MDD	48.7	40.0	36.8	43.9	48.7	43.3 (39.0- 47.7)
HDDS (mean)	7.3	7.1	7.2	7.2	7.4	7.2 (7.1- 7.4)
Not using coping strategies	5.5	18.9	4.8	4.4	10.6	7.2 (5.5- 9.4)
Household water quality indicators						
Key indicators (%)	**Awserd**	**Dakhla**	**Laayoune**	**Smara**	**Boujdour**	**Combined**
Meeting UNHCR water provision standards	52.6	88.2	40.3	44.9	60.9	52.2 (47.9- 56.4)
Using improved drinking water source	100.0	100.0	100.0	100.0	100.0	100.0

I. INTRODUCTION

1.1 GENERAL CONTEXT

Algeria has been hosting Saharawi 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, Saharawi refugees have been hosted for over forty years, living in camps located 10 to 180 km from Tindouf, in the south-west region of Algeria. 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 basic assistance to Saharawi refugees upon request of the Algerian Government. Currently, most Saharawi refugee households are dependent on international assistance as they are located in a remote area with limited access to markets and opportunities for local integration, 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 Saharawi refugee camps possess a specific 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 each have six Dairas while Smara and Dakhla have seven; Boujdour has only three Dairas (29 Dairas in total). Each Daira in turn, is subdivided into barrios (quarters) of approximately equal population (116 barrios in total).

Regarding health systems' structure each Wilaya has a hospital (4 in total), and each district except those in Boujdour[1] have a primary health centre (27 in total). Finally, a Central Hospital is based at Rabouni. Access to medical services is free of charge, transportation costs being the only expense.

Accurate Saharawi refugee population estimates are not available. In the absence of formal registration, UNHCR and WFP humanitarian assistance is based on a planning figure of 90,000 most vulnerable persons among the Saharawi refugee population; whereas since 2006 an additional 35,000 supplementary rations are provided in an attempt to respond to the pressing nutritional needs.

1.3. NUTRITIONAL STATUS OF WOMEN AND CHILDREN

Despite steady decline in the nutrition indicators over the years, the nutrition situation of the Saharawi refugees has remained precarious. The nutritional problems of greatest public health significance are anaemia in women, and anaemia and stunting in children (aged 6-59 months). The latest nutrition survey, undertaken in 2012[2], indicated that there was a slight improvement in the overall nutrition situation of women and children, although the levels of both acute and chronic malnutrition, as well as anaemia, were still within the medium public health significance. Global acute malnutrition (GAM) amongst children 6-59 months was 7.6% while chronic malnutrition stand at 25.2%[3]. The most significant and encouraging results came from the levels of anaemia in children 6-59 months that dropped from 52.8% in 2010 to 28.4% in 2012. Anaemia in women of childbearing age also showed an improvement from 48.9% in 2010 to 36.4% in 2012. However, anaemia for both groups remained of medium public health significance. Previous nutrition surveys have shown a strong correlation between iron deficiency and anaemia prevalence in this population[4].

[1] There is one health centre in the district 27th February. Two other health centres (in Lemsid. and Agti) are already built and will be opened in the short term.

[2] Nutritional Survey, Saharawi Refugee Camps. Tindouf, Algeria. November 2012.

[3] Slight significant decrease since 2010 (29.7%; CI: 26.9% - 35.2%)

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

Another nutrition related concern is the growing prevalence of overweight and obesity among women of childbearing age. This trend represents one of the main risk factors for metabolic diseases in the population such as diabetes, hypertension, cardiovascular diseases and cancer[5]

The present nutrition survey, though initially planned to take place in October 2015, it was postponed to October 2016 due to an emergency triggered by the floods[6].

1.4. DESCRIPTION OF HUMANITARIAN ASSISTANCE AND HEALTH PROGRAMMES

1.4.1. General Food Distribution

The main actors providing food assistance are WFP, the European Commission Humanitarian Aid & Civil Protection (ECHO), the Spanish Agency of International Development Cooperation (AECID), and UNHCR. WFP is responsible for commodities of the basic food ration (cereals, edible oils, pulses and other sources of protein, sugar, and fortified blended foods), that amounts about 2,150 Kcal per day. WFP is responsible of the timely transport of the commodities under its responsibility to agreed extended delivery points (EDPs) as well as the storage and management of the EDPs. This is done mainly through the ARC (and their partner, the Saharawi Red Crescent), WFP's implementing partner. UNHCR is responsible to provide yeast for backing bread. UNHCR is also responsible for the transportation of WFP food items from the EDPs to the final delivery points, for their final distribution to beneficiaries, and for reporting food diversions, misuse and losses.[7] This is done by UNHCR through their implementing partner the ARC.

OXFAM and Spanish Red Cross (SRC) are responsible for distributing additional fresh food (vegetables and fruits) to complement the basic WFP food ration. Different partners, during the Ramadan period, distribute additional commodities like dates, camel meat, fresh vegetables, and fruits. Praktisk Solidarität distributed canned mackerel regularly since 2009 and up to 2015[8]. Additional food commodities are distributed throughout the year by bilateral assistance, though concentrate mainly during Ramadan in so-called 'caravans'. These caravans are mostly civil society lead (mainly from Europe), and reliable data about these commodities is lacking.

A Food Security Stock (FSS) of about 4,000-6,000 Mt (equivalent to two-three months of refugees´ food requirements) became functional in January 2012. The FSS is managed by SRC; and governed by a tripartite agreement between SRC, WFP and ARC. The FSS was established to prevent delays/shortfalls in WFP distributions.

1.4.2. Integrated programme for Saharawi Child Health (PISIS[9])

The Integrated Programme for Saharawi Child Health (PISIS by its Spanish acronym) was formally adopted 2009[10] and has since being rolled-out in all 27 health clinics in the Wilayas[11]. Key activities under the PISIS remit, which are expected to affect positively the nutritional profile of children, are described below:

Growth monitoring and vaccination: Growth monitoring is implemented in all the health centres and a health card is given to mothers[12]. Children failing to thrive or children losing weight are referred to targeted nutrition programmes supported by WFP, UNHCR and/or NGOs. Likewise, health staff in all health centres implement the expanded vaccination programme (EPI). The health prevention sector of the Saharawi Refugee Health Authorities lead the vaccination programme and UNICEF currently supports it through the procurement of vaccines and logistics including the cold chain. As part of EPI, there are two vaccination activities, a regular one implemented at the dispensary level in the 18th and 19th of each month and an

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

[6] The floods of October 2015 severely affected approximately 11,500 households. Houses were destroyed or damaged, in particular in the camp of Dakhla, which was badly hit by the torrential rains. Social and productive infrastructures such as health centres, hospitals, schools, warehouses, businesses, workshops and assets were also destroyed (Source: Humanitarian SITREP, 17 December 2015, UNICEF).

[7] Memorandum of Understanding between UNHCR and WFP January 2011.

[8] Mackerel was not part of the food basket in 2015 and distributed irregularly in 2016.

[9] Programa Integral de Salud Infantil Saharawi

[10] This resulted on the introduction of the Integrated Management of Childhood Illness (IMCI) approach.

[11] Guía Programa Integral de Salud Infantil Saharaui. PISIS, December 2009.

[12] The previous programme in charge of these activities was called 'Programa Niño Sano, this programme is superseded by PISIS.

outreach programme at the community level in order to catch-up defaulters. According to HIS data, the percentage of children completing the nine consultations established in the growth-monitoring programme raised from 26% in December 2013 to 68% by June 2016; and the proportion of children vaccinated in accordance to the schedule improved from 64% in 2013 to about 90% in 2016[13].

Community management of Acute Malnutrition (CMAM): The CMAM programme is functional in all health clinics. It is implemented by SHA with the technical support of UNHCR, WFP, Médicos del Mundo (MDM) Spain and ARC.

- *Management of Moderate Acute Malnutrition (MAM) through Targeted Supplementary Feeding Programme (TSFP):* Since 2004, WFP and UNHCR are jointly implementing a TSFP through their implementing partner the ARC. Children discharged from SAM treatment are admitted automatically into TSFP for follow-up during two months.
- *Management of Severe Acute Malnutrition (SAM) through Outpatient Treatment (OTP) in health centres and Stabilization Centre (SC) -located at the Central Hospital in Rabouni-*: Since 2008, MdM Spain provides support to the SHA in the management of SAM, while UNHCR is responsible for the procurement of Plumpy'Nut®, F-75 and F-100.
- *Community mobilization* through the "Jefas de Barrio" supported by MDM Spain. Activities under this component include active case finding of malnourished children through monthly MUAC screening, and follow up of children under treatment at household level[14].

Anaemia and Stunting Reduction Programme

Since December 2010, following the recommendations from the joint 2009 UNHCR/WFP nutrition mission[15], the 2009 UNHCR/WFP Joint Assessment Mission (JAM)[16], and the Saharawi Nutrition Strategy[17], an Anaemia and Stunting Reduction Programme comprising a blanket supplementary feeding programme (BSFP) providing Micro-Nutrient Powder (MNP) to PLW and children aged 36-59 months, and Nutributter®[18] to children aged 6-35 months is being implemented in the five Wilayas[19]. The programme, initially piloted by UNHCR, was handed over to WFP in January 2014 and is implemented through the ARC.

1.4.3. Maternal and Child Health Programme

Reproductive health services are provided at health centre[20] and hospital levels, and trained midwives attend deliveries at the health facilities. More than 30% of the deliveries take place at home, 88% of them being assisted by skilled midwives[21].

MdM Spain provides technical support in all health centres. According to HIS data, antenatal coverage has substantially improved in the last years, with 29% pregnant women attending three or more visits in 2012 and 69% by December 2016. Following programme guidelines, all pregnant women have haemoglobin levels tested and will receive blood transfusion at the Central Hospital if they show haemoglobin values <7 mg/dL. Pregnant women are expected to receive iron supplementation. However, it is reported that a number of women refuse to take the pills due to its side effects and concern for its positive impact on the foetal growth of their offspring[22].

[13] Mesa de Concertación y Coordinación Salud. Health Indicators. October 2016.
[14] Guía de contenidos para las jefas de barrio. PISIS.
[15] Joint UNHCR-WFP Nutrition Mission to the Saharawi Refugee Camps in Algeria, March 2009
[16] UNHCR/WFP Joint Assessment Mission. Assistance to Saharawi refugees. Algeria, September 27th to October 9th 2009.
[17] Saharawi Nutrition Strategy. May 2009.
[18] A Lipid-based Nutrient Supplement (LNS)
[19] The implementation followed an acceptability study carried out in 2009: Salse Ubach N, Wilkinson C. Nutributter® and MNP Acceptability Test. Saharawi Refugee Camps – Algeria. October 2009.
[20] There is one delivery room in each health centre.
[21] UNHCR/WFP Joint Assessment Mission. Assistance to Saharawi refugees. Algeria, September 27th to October 9th 2016.
[22] Salse Ubach N, Wilkinson C. Nutributter® and MNP Acceptability Test. Saharawi Refugee Camps – Algeria. October 2009.

II. SURVEY DESIGN AND METHODS

2.1. AIM

To establish the current nutritional profile of the Saharawi refugee population, by implementing a stratified nutrition survey, one stratum per Wilaya[23]. The findings will be used to produce recommendations on actions to improve the nutritional status and health of the Saharawi refugees. The original Nutrition Survey Terms of Reference are included in *Annex 1.*

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[24] (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 prevalence of coping strategies used in households.
- Assess Household Dietary Diversity.
- Assess risk factors from chronic diseases such as tobacco use and inadequate diets.
- Determine the prevalence of diarrhoea among children 0-59 months, and feeding 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 Wilaya, to ensure a required sample size of 377 children aged 0-59 months and 383 non-pregnant women of reproductive age. See *Annex 2* for the sample size and household number calculations. Following training of the survey field team and piloting of field data collection, the cluster size was set at 12 households[25], with 35 clusters per stratum.

For the first time, Boujdour was included as an independent Wilaya. In previous surveys it 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 (for every Wilaya) each district –Daira- was divided in 4 quarters of approximate equal size –barrios-. Cluster allocation was then carried at the quarter level using proportionality to population size method (PPS, see *Annex 3* for cluster allocation). By using the quarter as the allocating unit, we aimed at ensuring maximal dispersal of the clusters and greater representation of individual quarters[26].

[23] Each stratum is an independent survey

[24] 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.

[25] 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.

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

In the second stage, households were chosen 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[27]. The first house to be visited was selected at random by drawing a 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 12 households.

If the team reached the boundary of the quarter before completing 12 households, they returned to the quarter's centre and repeated again the whole procedure. If the quarter was exhausted without obtaining the required number of households, then the nearest quarter was selected and the procedure repeated until the remaining number of households was obtained.

A household was defined as a group of people living together (sharing the same meals and/or sleeping under the same roof) in accordance with most previous surveys. If any of the household members of our target population were not present at the time of the visit, community members/neighbours were asked to bring them to the house[28]. 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 a refusal and the individual or household were not replaced with another household or individual.

In the selected household, all children 0-65 months and all women of reproductive age 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.

The food security questionnaire was administered to all households and the WASH questionnaire was administered to the first six households within each cluster. Detailed registration on outcomes for all surveyed household within each cluster was thoroughly kept in the cluster control sheet *(see annex 4)*.

2.6. NUTRITIONAL STATUS: DATA COLLECTION, AND INDICATORS

2.6.1. Biological Data Obtained for individual level indicators

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

- *Age* in children was estimated from the date of birth obtained from the health card or another official document. If an official document was not available, the caregiver was asked to recall the date of birth, and this was checked against a calendar of events[29] *(see annex 5)*. Women were asked to recall their age.
- *Weight* was obtained using an electronic digital scale Seca 876 with mother/child function with a wooden board to stabilize it on the ground. Measurements were taken to the nearest 0.1kg. Each scale was checked regularly with a standard 1kg weight before the start of the survey and regularly during the survey. Children that could not stand alone were weighed carried by their caregiver using the

[27] Numbering with chalk the households.

[28] 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.

[29] Asking probing questions to cross check recalled date of birth/month.

mother/child function. Children were weighted with light clothes while women were clothed. PLW women were not weighted.

- *Height* and length were taken using a Shorr child stadiometer (adult/child) following standard recommendations. The measurement was recorded to the nearest 0.1 cm. Children aged less than 24 months were measured in a supine position. Children older than 24 months were measured standing. Children older than 24 months and measuring less than 87 cm were measured in a supine position. 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 0.1 mm.
- *Haemoglobin* was measured to all children aged 6-59 months and in women of reproductive age. Haemoglobin was measured using a portable photometer (HemoCue® 301). Peripheral blood was collected from a finger prick using a safety lancet. The first drop was allowed to form and wiped away using a tissue paper. The second drop was transferred into a HemoCue microcuvette for haemoglobin measurement. The result was expressed to the nearest 0.1gr/dL.
- Waist circumference was measured using a Chasmors WM02 body measuring tape to the nearest 0.1cm. The measurement was taken at the umbilical level and without clothes around the waist area or just wearing light clothing.

Referrals: Children aged 6-59 months were referred to health centre for treatment when MUAC was < 12.5 cm, when 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.

Table 2. Nutritional status indicators

Type of prevalence	Indicator	Children (6-59 months)	Women (15-49 years)		
			Non-pregnant	Lactating	Pregnant
Malnutrition (weight + height)	Global acute malnutrition	WHZ<-2 and/or oedema	--	--	--
	Moderate acute malnutrition	WHZ<-2 and ≥-3	--	--	--
	Severe acute malnutrition	WHZ<-3 and/or oedema	--	--	--
	Stunting	HAZ<-2	--	--	--
	Moderate stunting	HAZ<-2 and ≥-3	--	--	--
	Severe stunting	HAZ<-3	--	--	--
	Underweight	WAZ<-2	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
Malnutrition (MUAC)	Global acute malnutrition	MUAC< 125mm	--	MUAC<23.0cm	
	Moderate acute malnutrition	MUAC<125 and 115mm	--	--	--
	Severe acute malnutrition	MUAC <115mm	--	--	--
Overweight	Overweight	BMI≥25 & <30			
	Obesity	BMI≥30			
Metabolic risk	Increased risk	WC≥80 and <88			
	Substantially increased risk	WC≥88			

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

2.6.3. Infant and Young Child Feeding (IYCF) Indicators

Indicators of IYCF practices were obtained and assessed following WHO recommendations[30]. 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[31]
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[32].
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 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[33]. To examine food consumption patterns, sampled households were asked the number of days that specific food items, grouped in 8 food groups, had been consumed over the 7-day period prior to the interview.

For each food group, the frequency of days any item of the food group was consumed is tabulated from 0 (never eaten) to 7 (eaten every day). A weight was assigned to each food group, representing 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.

[30] Indicators for assessing infant and young child feeding practices. WHO-UNICEF, 2010.
[31] Only breast milk (including milk expressed or from a wet nurse), ORS, drops or syrups (vitamins, breastfeeding minerals, medicines)
[32] LNS was not considered during the survey, as there has been a shortage of LNS since October 2015.
[33] Food Consumption Analysis. Calculation and use of food consumption score in food security analysis. VAM, 2008

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 on a daily basis, as recommended. A household with a score value between 0-28 was classified as having 'poor' FCS, 28.5-42 as 'borderline', and a score >42 as 'acceptable'[34].

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:

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[35] 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 7 food groups into: low (< 4.5), medium (5 and 6) and high (> 6) DDS[36].

MDD-W and WDDS: MDD-W is a dichotomous indicator of whether or not women 15–49 years of age have consumed at least five out of ten defined food groups the previous day or night[37]. 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 Saharawi women[38] , and further refinement was made during the training. Common local foods where included as appropriate.

[34] 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)
[35] Guidelines for measuring household and individual dietary diversity. FAO. 2011
[36] WFP_IndicatorsFSandNutIntegration.pdf
[37] Minimum Dietary Diversity for Women. A guide to measurement. FAO/FANTA 2016.
[38] CISP food monitors

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[39]. 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[40]. 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:

Point coverage:

$$\text{SFP: } \frac{\text{Nº surveyed children with MAM according to SFP admission criteria who reported being registered}}{\text{No. of surveyed children with MAM } \textit{according to SFP admission criteria}} \times 100$$

$$\text{OTP: } \frac{\text{Nº surveyed children with SAM according to OTP admission criteria who reported being registered}}{\text{No. of surveyed children with SAM } \textit{according to OTP admission criteria}} \times 100$$

Period coverage:

$$\text{SFP: } \frac{\text{Nº surveyed children with MAM who reported being registered + cases registered but recovered}}{\text{No. of surveyed children with MAM + MAM cases registered but recovered}} \times 100$$

$$\text{OTP: } \frac{\text{Nº surveyed children with SAM who reported being registered + cases registered but recovered}}{\text{No. of surveyed children with SAM + SAM cases registered but recovered}} \times 100$$

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 show.

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 6-59 months: an episode of diarrhoea was defined as three loose stools or more in 24 hours.

Lactating women: women with a child less six months old.

2.7. SURVEY TOOLS

Four questionnaires were designed to provide information on the relevant indicators. They were prepared in English language, then translated into Spanish and administered in Hassaniya. All questionnaires were refined during the training and pre-tested before the survey. Areas and measurements covered in each of them:

Children questionnaire- Information was collected on anthropometric status, oedema, enrolment in SFP/OTP, measles vaccination, diarrhoea morbidity together with feeding- and health-seeking behaviours during the episode, haemoglobin testing for children 6-59 months, and feeding practices for children aged 0-36 months.

Women questionnaire- Information was collected on women's pregnancy and lactating status, participation in antenatal and post-natal services, coverage and acceptability of iron-folic acid pills and MNP, enrolment in

[39] rCSI assesses the question: "What is done by households if facing lack of food, while simultaneously having insufficient money to purchase food?"
[40] "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

MAM treatment for PLW and information on individual dietary diversity. Measurements taken were MUAC and haemoglobin for all women and weight, height and waist circumference for non-pregnant women only.

Food Security Questionnaire- This included questions on coping mechanisms employed by households when they cannot access enough food, and on household dietary diversity. Questions on individual´s within household smoking habits, and reporting on any member aged 25-64 years with diabetes, hypertension and/or high levels of cholesterol were also included here.

WASH Questionnaire- This included questions on access to improved drinking water source, storage of water, quantity of water used per household, satisfaction with the water supply, type and quality of excreta disposal facilities in use, safe disposal of young children's stools and hygienic practices.

2.8. TRAINING OF SURVEY TEAMS

The training lasted two weeks and was carried out in Spanish and translated simultaneously 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 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 Laayoune. 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.

Thirty-three persons participated in the training. Final selection of enumerators was made at the end of the training exercise. A surveyor manual with detailed instructions was provided to support fieldwork.

2.9. THE SURVEY TEAM, FIELD DATA COLLECTION AND SUPERVISION

2.9.1. Survey Teams

The background of the staff composing the teams was nurses, laboratory technicians from the SHA, and CISP food monitors. Five teams, of five persons each, were enrolled following training. Each team was composed of one household/WASH questionnaires enumerator, one child and women questionnaires enumerator, two persons responsible of anthropometric measurements, and one person measuring haemoglobin. One of the five persons was selected as team's supervisor.

2.9.2. Data collection

Data collection lasted from 8th October to 22nd November 2016. Each team completed one cluster/day (12 households), taking on average 20 to 25 minutes per household. Seven days were needed to complete the survey in each Wilaya.

2.9.3. Field Supervision and quality control checks

Three survey managers (one from UNHCR and two WFP consultant) were in charge of coordination, training, overall management of field data collection, analyses and report writing. Other WFP and UNHCR staff supported the overall survey: training, logistics and field supervision. In addition, three coordinators from the SHA and CISP were enrolled for teams' supervision, allowing direct field supervision and support provided to each team daily. The WFP Field Survey Manager consultant daily carried out overall coordination.

During fieldwork, each questionnaire was reviewed after completion by the team leader and SHA supervisors (check for missing out of any field, inconsistencies and clarity), and at the completion of the cluster before

giving the questionnaires to the survey managers. Administered questionnaires were also crosscheck during and at the end of the daily work before leaving the Wilaya by the UNHCR/WFP survey managers to ensure quality of data gathered[41]. Given the security restrictions limiting the movements, 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). This formed a check basis upon which feedback would be given to all the teams in the morning before proceeding to the field.

The use of cluster control sheet, thorough enumerator training, pilot testing prior to data collection exercise, close supervision during the actual survey for consistency, and the checks during data entry that were also routinely performed (see section 2.10.) ensured that the collected data was of good quality.

2.10. DATA ENTRY TEAMS, DATA ENTRY SUPERVISION and ANALYSIS

A WFP data entry manager was in charge of training and supervision of the data entry team (composed of seven people). Data entry was done daily at WFP sub-office in Tindouf and was undertaken whilst the surveys' fieldwork was ongoing. Twice two independent data entry clerks entered data (the following day to data collection). 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 technical manager to be able to manage near real-time the quality of the data collected in the field, thus informing team´s morning feedback for improvements as needed.

All data files were cleaned before analysis. Analysis was performed using ENA for SMART and STATA. 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).*

2.11. ETHICS AND INFORMED CONSENT

The aims and objectives of the survey were discussed and agreed with members of the SHA. Community dissemination about the survey was carried by the SHA. During the survey, members of the household visited received detailed information about the nutrition survey aims and procedures using the informed consent form *(see annex 7)*. Households wishing to participate provided verbal consent, ant this was marked in each of the questionnaires administered[42], thus indicating the voluntary nature of the nutrition survey. In the case of children, verbal consent was sought from the caregiver. 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.

2.12. SURVEY SCHEDULE

The field work took place from late September to the first week of December 2016, 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:

[41] Crosscheck followed a systematic approach in 2 phases, 1) rapid review of questionnaires in the field with survey team, 2) upon leaving the camp.
[42] In the event of a household refusing to participate, the questionnaire was given a number (1-12) and marked as "consent not taken". These households were also computed in the database.

Table 4. Survey Timeline

Activity	Timeline
Field logistics preparation	21 – 24 September 2016
Teams training	25 September – 6 October 2016
Anthropometric standardization	2 – 3 October 2016
Pilot testing in field (Laayoune)	4 – 5 October 2016
Data collection Laayoune	8 – 15 October 2016
Data collection Smara	16 – 23 October 2016
Data collection Awserd	29 October – 5 November 2016
Data collection Boujdour	6 – 13 November 2016
Data collection Dakhla	15 – 22 November 2016
Secondary data collection	23 – 30 November 2016

III. PRIMARY FIELD DATA RESULTS

3.1. CHARACTERISTICS OF THE SURVEYED HOUSEHOLDS

Table 1 summarises the number of households surveyed in each Wilaya (strata). Of the total of households surveyed, over 98% consented to participate. Table 5 also summarises the total number of individuals surveyed, per target group.

Table 5. Surveyed households

	Households					Target groups	
Wilaya	*Planned sample*[1]	*Surveyed sample*	*Agreed*	*Refused*	*Absent*	*Women 15-49y*	*Children <5 years*
Awserd	420	420	416 (98.8%)	2 (0.5%)	2 (0.5%)	872	686
Dakhla	420	420	418 (99.3%)	2 (0.5%)	0 (0.0%)	834	526
Laayoune	420	420	413 (98.3%)	6 (1.4%)	1 (0.2%)	650	524
Smara	420	420	414 (98.6%)	4 (1.0%)	2 (0.5%)	813	687
Boujdour	420	420	407 (96.9%)	13 (3.1%)	0 (0.0%)	661	411
Aggregated	2,100	2,100	2,068 (98.4%)	27 (1.3%)	5 (0.2%)	3,830	2,834

[1] The planned number of households was calculated as 12 households per cluster (35 in total) per Wilaya; based on the sample size calculation (see *Annex 1*).

Tables 6 and 7 summarise the age distribution and status of the target groups sampled in the participating households. On average, there were about 1.7 children aged 0-59 months per household, in the surveyed households with children. Of the 2,834 surveyed children, infants aged <6 months represented about 9% of the total. 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 to 1.2.

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

	Total	<6 months	6-59 months	≥60 months	Children/Household
Awserd	686	56	628	2	1.9
Dakhla	526	63	463	0	1.6
Laayoune	524	48	476	0	1.6
Smara	687	51	636	0	2.0
Boujdour	411	34	376	1	1.4
Aggregated	2,834	252	2,579	3	1.7

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

	Total	Non-pregnant non-lactating	Lactating	Pregnant	Unknown	Women/Household
Awserd	872	738	77	57	0	2.1
Dakhla	834	727	45	62	0	2.0
Laayoune	650	522	80	47	1	1.6
Smara	813	693	73	47	0	2.0
Boujdour	661	566	59	36	0	1.7
Aggregated	3,830	3,246	334	249	1	1.9

Of the 3,830 women participating in the survey approximately (see Table 7) 9% were lactating and 7% were

pregnant. Only one 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 the analysis. Five women reported to be lactating whilst pregnant; they were classified as pregnant for the survey analysis.

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

Age	Boys		Girls		Total		Ratio
(months)	no.	%	no.	%	no.	%	Boy:Girl
6-17	292	50.8	284	49.2	576	22.6	1.0
18-29	249	50.5	243	49.5	492	19.2	1.0
30-41	299	54.5	252	45.5	551	21.3	1.2
42-53	268	51.6	257	48.4	525	20.9	1.0
54-59	212	49.5	223	50.5	435	16.0	1.0
Total	1,320	51.5	1,259	48.5	2,579	100	1.0

3.2. NUTRITIONAL STATUS IN CHILDREN AGED 6-59 MONTHS - ANTHROPOMETRIC INDICATORS

The anthropometric evaluation of the nutritional status in children aged 6-59 months, summarised in this section, is based on the WHO 2006 Growth Standards. Aggregated results are the weighted prevalence from all five Wilayas. Please see the tables in the *Annex* for more details.

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

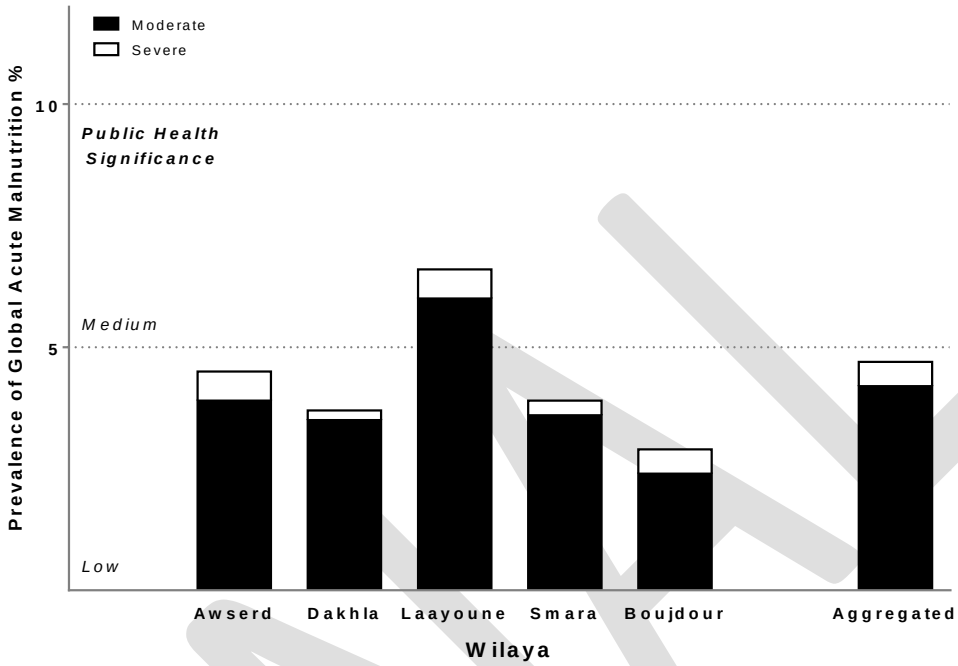


Figure 1. Global acute malnutrition (GAM) prevalence in children aged 6-59 months (see Table A1).
GAM prevalence was estimated using the 2006 WHO Growth Standards. Aggregated results are the weighted prevalence.

The overall prevalence of global acute malnutrition (GAM) is slightly less than 5% ranging from 3% in Boujdour to almost 7% in Laayoune (see **Figure 1**). Only the GAM difference between Boujdour and Laayoune was significant. For all other Wilayas, the 95% CI for GAM of each Wilaya overlapped suggesting no significant differences. Of the total GAM prevalence, MAM accounted for about 89%, ranging from 80% in Boujdour to 91% in Laayoune. GAM prevalence for most Wilayas, and in the aggregated results, were visually greater in boys than girls (see **Figure 2**). Nonetheless, the overall difference was not statistically significant. Interestingly, in Dakhla girls presented seemingly greater prevalence of GAM than boys did. For both sexes, MAM was the predominant form of acute malnutrition.

Estimates of acute malnutrition were also assessed using low MUAC values. Overall, the weighted prevalence of low MUAC was about 4% ranging from 3% in Laayoune to 4% in Dakhla and Awserd. No significant differences were found between Wilayas in the prevalence of low MUAC. For further details on low MUAC data, see Annex **Table A3**.

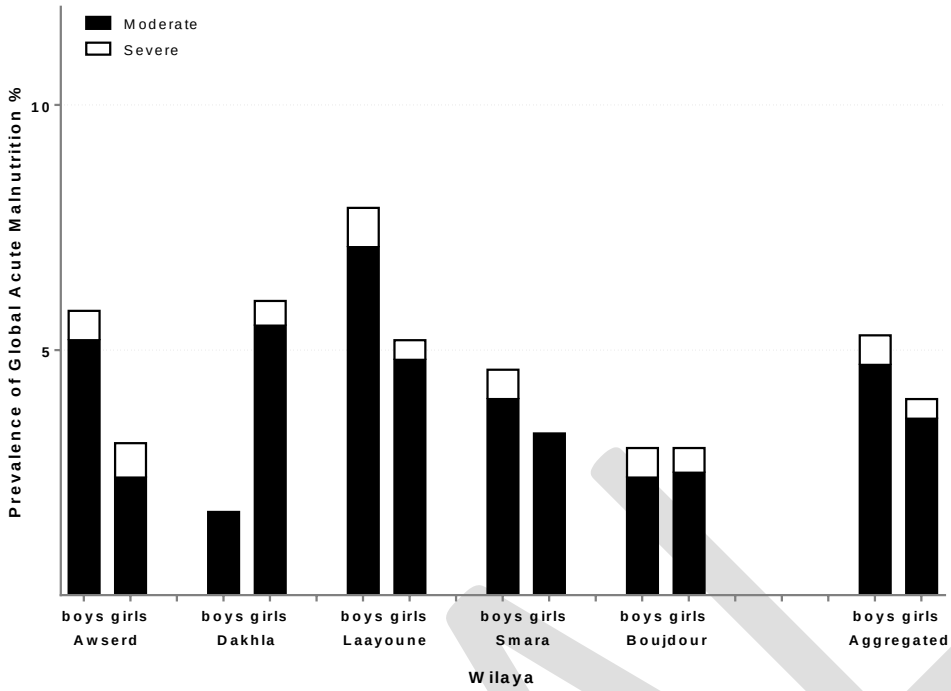


Figure 2. Global acute malnutrition (GAM) prevalence in children aged 6-59 months, by sex (see Table A1).
GAM prevalence was obtained using the 2006 WHO Growth Standards. Aggregated results are the weighted prevalence.

3.2.2. *Underweight and overweight in Children Aged 6-59 Months*

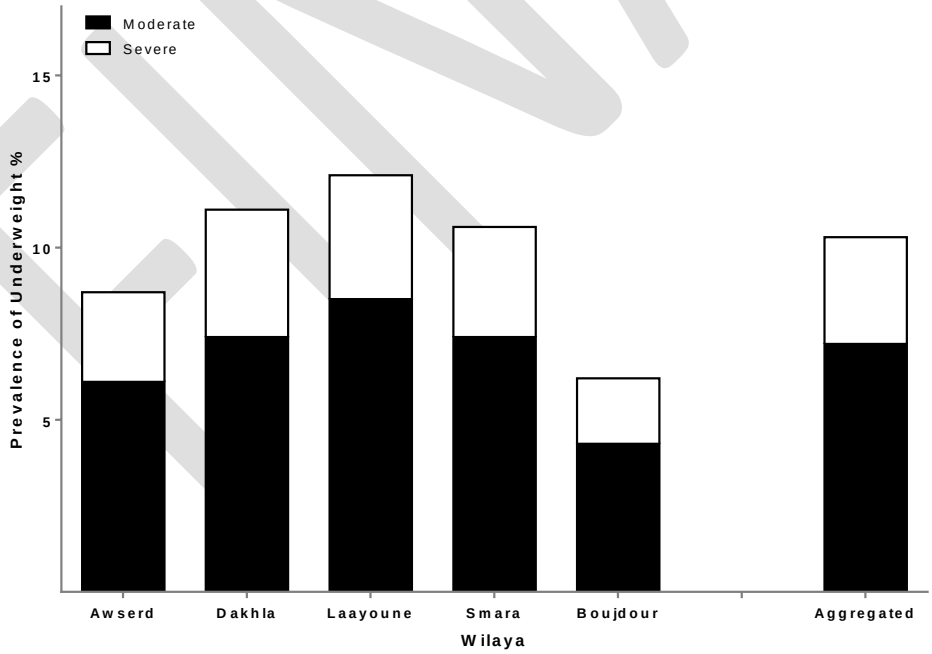


Figure 3. Underweight prevalence in children aged 6-59 months (see Table A5).
Underweight prevalence was obtained using the 2006 WHO Growth Standards. Aggregated results are the weighted prevalence.

The overall prevalence of underweight is 10% ranging from 6% to 12% at the Wilaya level (see **Figure 3**). The prevalence of underweight in Boujdour was significantly lower than the prevalence observed in Dakhla, Laayoune and Smara but not Awserd. Overall, the prevalence of underweight was consistently greater in boys than in girls (see **Figure 4**); except in Boujdour. However, none of the differences observed between

sexes were statistically significantly.

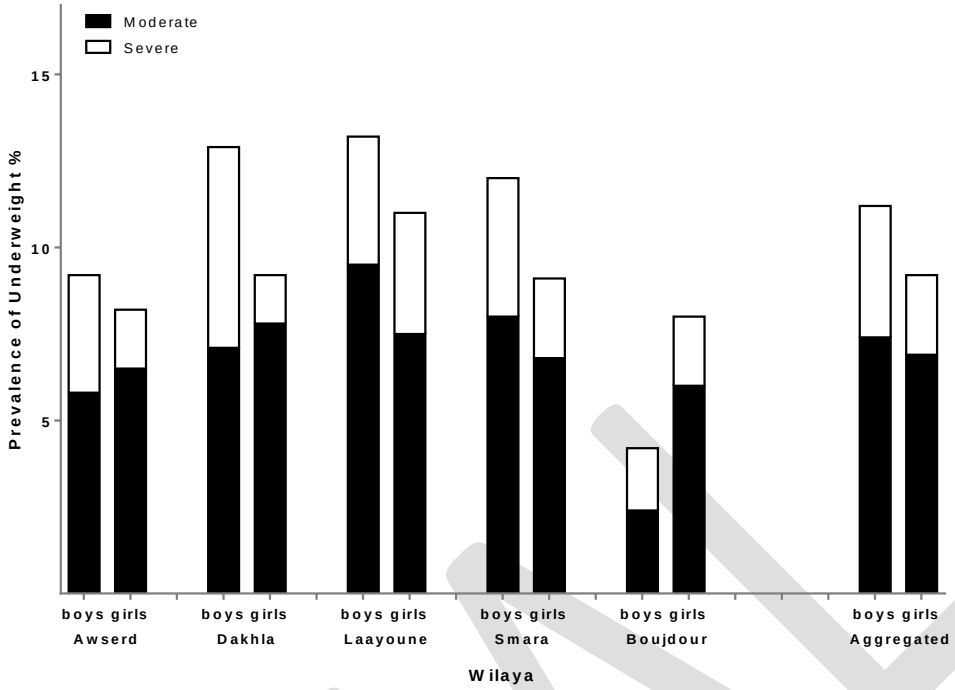


Figure 4. Underweight prevalence in children aged 6-59 months, by sex (see Table A5).
Underweight prevalence was obtained using the 2006 WHO Growth Standards. Aggregated results are the weighted prevalence.

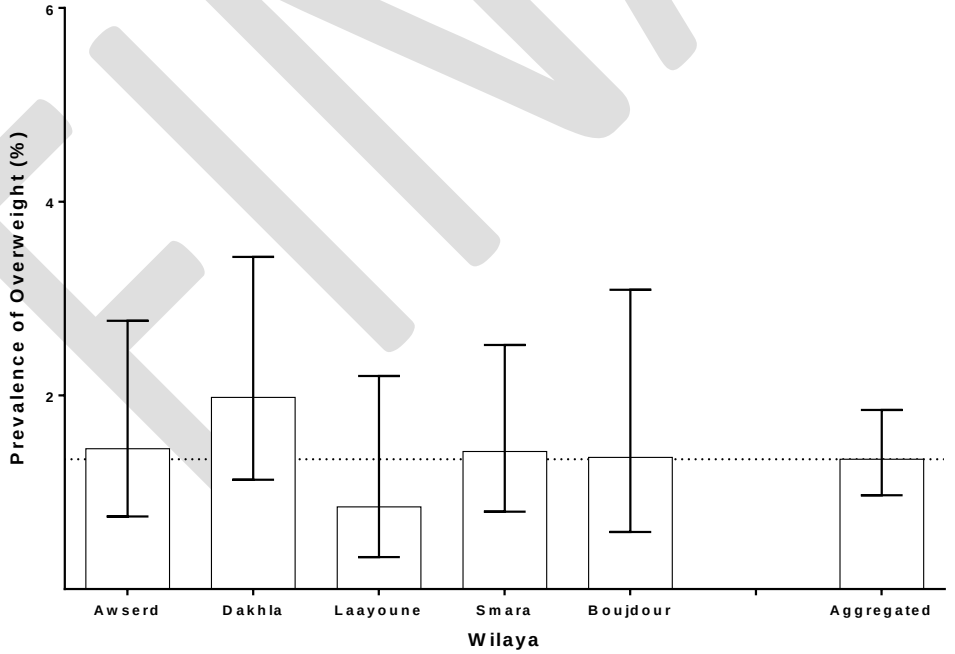


Figure 5. Overweight prevalence in children aged 6-59 months (see Table A7).
Overweight prevalence was obtained using the 2006 WHO Growth Standards. Aggregated results are the weighted prevalence.

The overall prevalence of overweight in children aged 6-59 months was between 1% and 2% (see **Figure 5**), with no statistical differences observed between Wilayas.

3.2.3. *Stunting in Children Aged 6-59 months*

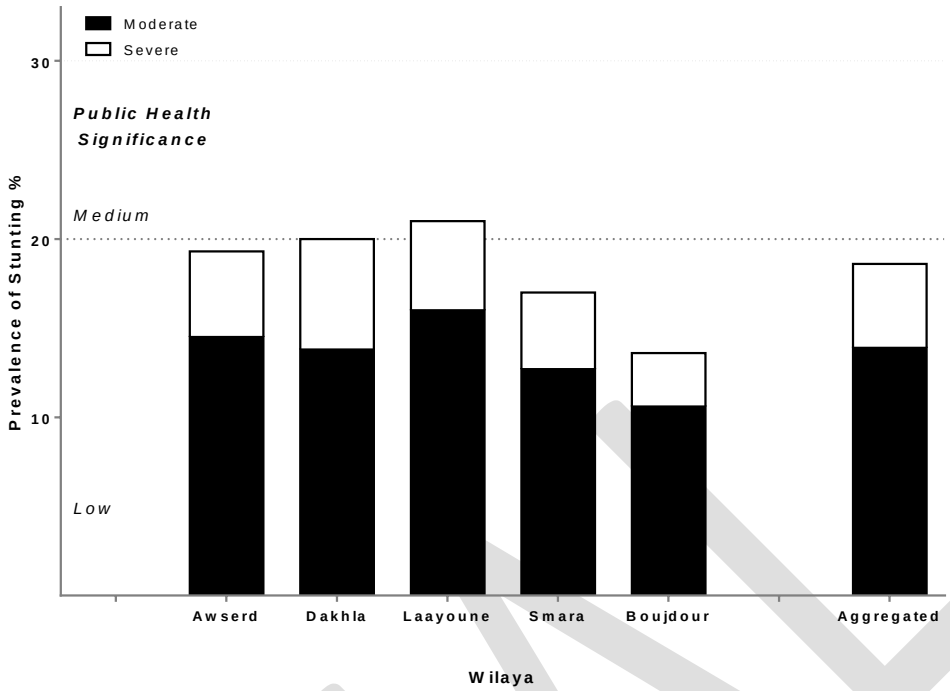


Figure 6. Stunting prevalence in children aged 6-59 months (see Table A8).
Stunting prevalence was obtained using the 2006 WHO Growth Standards. Aggregated results are the weighted prevalence.

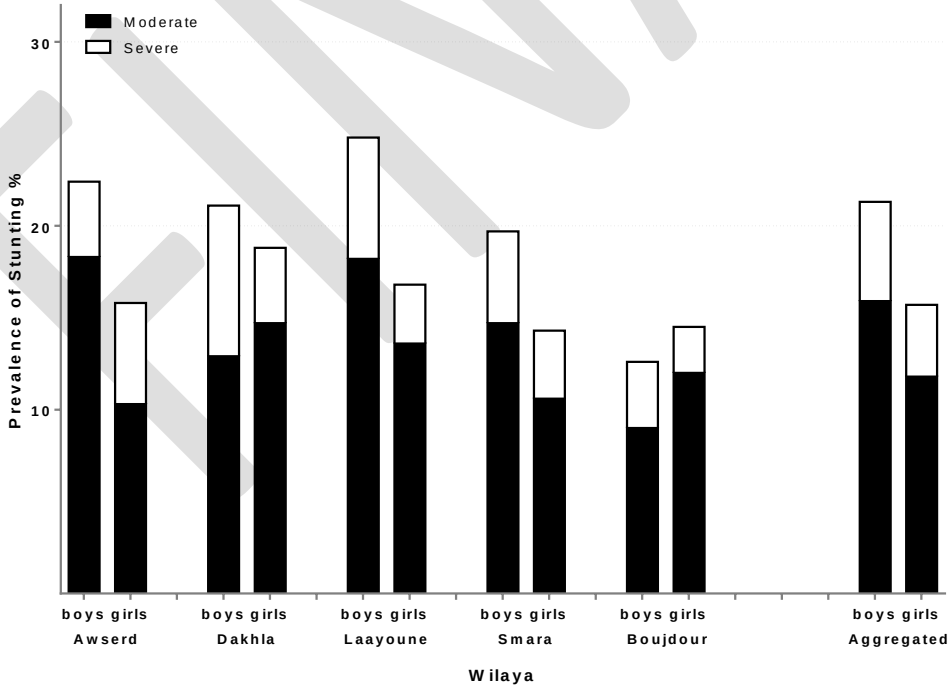


Figure 7. Stunting prevalence in children aged 6-59 months, by sex (see Table A7 for details).
Stunting prevalence was obtained using the 2006 WHO Growth Standards. Aggregated results are the weighted prevalence

Overall, the stunting prevalence is 19%, ranging from 14% in Boujdour to 21% in Laayoune. Boujdour presented a significantly lower stunting prevalence than Awserd, Dakhla and Laayoune (see **Figure 6**). No other statistically significant difference between Wilayas were found for stunting prevalence. Overall, the prevalence of stunting was significantly greater in boys than in girls (see **Figure 7**).

3.2.4. *Age Distribution of Malnutrition in Children Aged 6-59 Months*

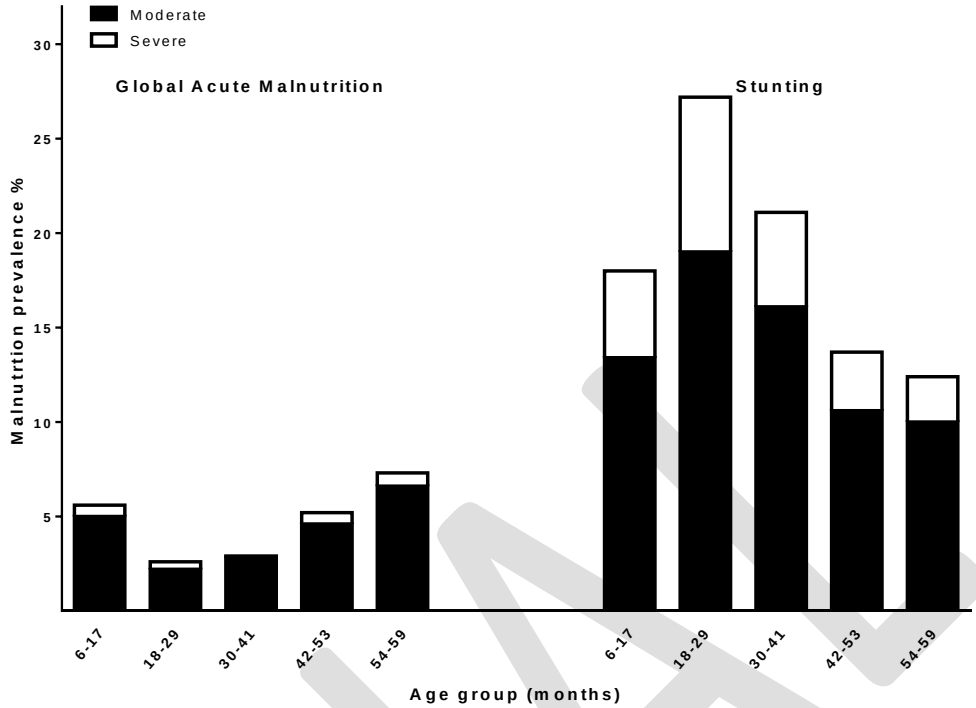


Figure 8. Malnutrition trends in children aged 0-59 months (see Tables A2, A4, A6 and A9).
Results are the weighted prevalence obtained using the 2006 WHO Growth Standards.

Age-related trends for GAM and stunting are shown in **Figure 8**. GAM prevalence is relatively high between the ages of 6-17 months. Afterwards, this prevalence decreases between the ages of 18-29 months but continues to increase until the ages of 54-59 months. Conversely, stunting prevalence is already relatively high between the ages of 6-17 months (affecting about 18 in 100 children); but this prevalence increases to its highest prevalence between the ages of 18-29 months (affecting then about 27 in 100 children). An observable decrease in the stunting prevalence follows this age.

3.3. INFANT AND YOUNG CHILDREN FEEDING (IYCF) PRACTICES

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

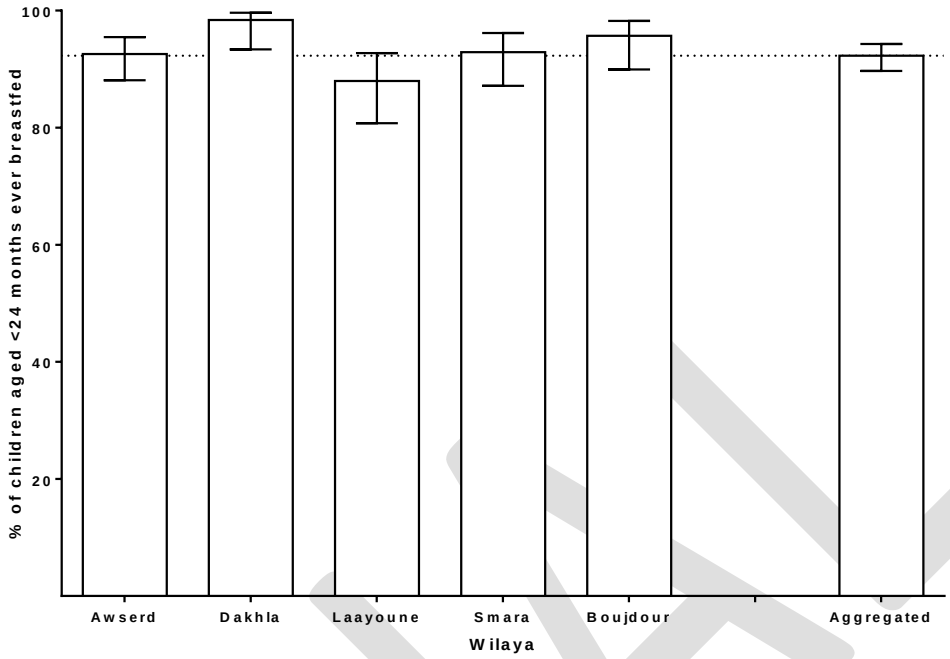


Figure 9. Proportion of infants aged <24 months ever breastfed by Wilaya (see Table A11).

The prevalence of breastfeeding in this population is high as indicated by the high prevalence of children aged <24 months being reported to have been ever breastfed (**Figure 9**), with Laayoune having a lower prevalence than Dakhla and Boujdour. Early initiation of breastfeeding within the first hour after birth was reported by slightly over half of the children aged <24 months (see **Figure 10** and **Table A12**), suggesting the need for further efforts to improve IYCF practices. None of the observed differences between Wilayas, for early initiation of breastfeeding, were statistically significant.

The proportion of infants aged <6 months who are exclusively breastfed was low, at about 26% (**Table 9**). Nonetheless, about 62% of infants <6 months are predominantly breastfed. Exclusive breastfeeding was 38% in the first two months of life and the proportion decreases rapidly with age to less than 18% by the age of 4-5 months (**Figure 11**).

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	1,073	1,066	(994) 92.3	(89.7; 94.3)
Early initiation of breastfeeding	< 24 months	1,073	1,066	(586) 55.1	(48.6; 61.4)
Exclusive breastfeeding under 6 months	< 6 months	252	252	(74) 25.8	(21.9; 36.2)
Predominant breastfeeding under 6 months	< 6 months	252	252	(157) 61.5	(53.6; 68.8)
Continued breastfeeding at 1 year	12-15 months	200	200	(149) 74.3	(68.2; 79.6)
Continued breastfeeding at 2 years	20-23 months	177	177	(74) 40.5	(33.0; 48.5)
Age-appropriate breastfeeding	< 24 months	1,073	1,066	(608) 56.3	(52.7; 59.9)
Median duration of breastfeeding	0-36 months	1,574	1,350	20.7 months	
Milk feeding frequency for non-breastfed children	6-23 months	170	170	(170) 100	N/A
Bottle feeding	< 24 months	1,073	1,066	(253) 23.8	(20.2; 27.8)
Introduction of solid, semi-solid or soft foods	6-8 months	134	134	(101) 73.5	(63.5; 81.6)
Minimum dietary diversity	6-23 months	821	821	(263) 33.0	(27.9; 38.5)
Minimum meal frequency	6-23 months	821	821	(386) 46.3	(40.6; 52.2)
Minimum acceptable diet	6-23 months	821	821	(110) 13.6	(10.3; 17.6)
Consumption of iron-rich or iron-fortified foods	6-23 months	821	821	(236) 29.1	(25.3; 33.2)

* 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.

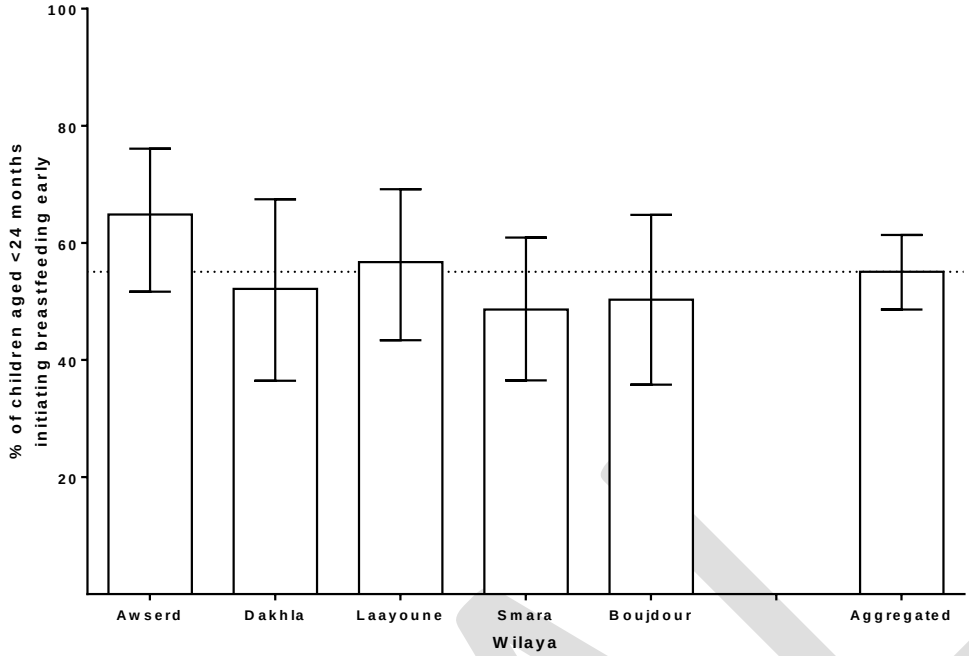


Figure 10. Proportion of infants aged <24 months that were put to the breast within the first hour after birth by Wilaya (see Table A11).

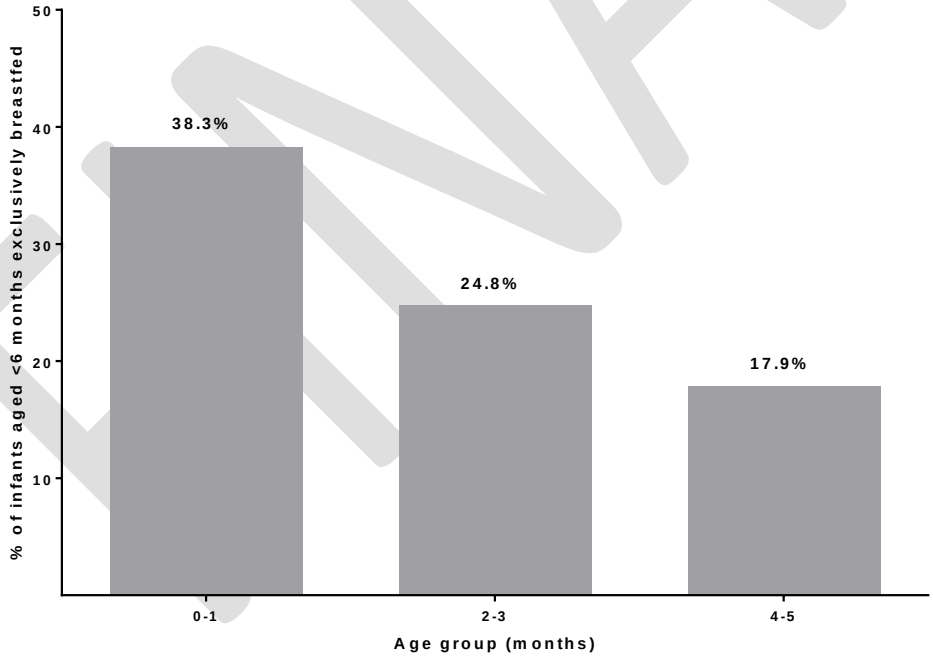


Figure 11. Proportion of infants aged <6 months exclusively breastfed by age.

Continuation of breastfeeding at ages 12 and 24 months was 74% and 40%, respectively; indicating that by 12 months about 26% of women have stopped breastfeeding before the current WHO recommendation of at least two years. By 24 months, about 60% of women have stopped breastfeeding. **Figure 12** illustrates the overall reported duration of breastfeeding. The mean duration of breastfeeding was 20.7 months, after which, only half of the children would continue to breastfeed. As evidenced in **Figure 12** a small proportion of women continue to breastfed beyond 24 months. For all children aged <24 months, 56% are appropriately breastfed, but this prevalence was significantly lower for Laayoune (**Figure 13**).

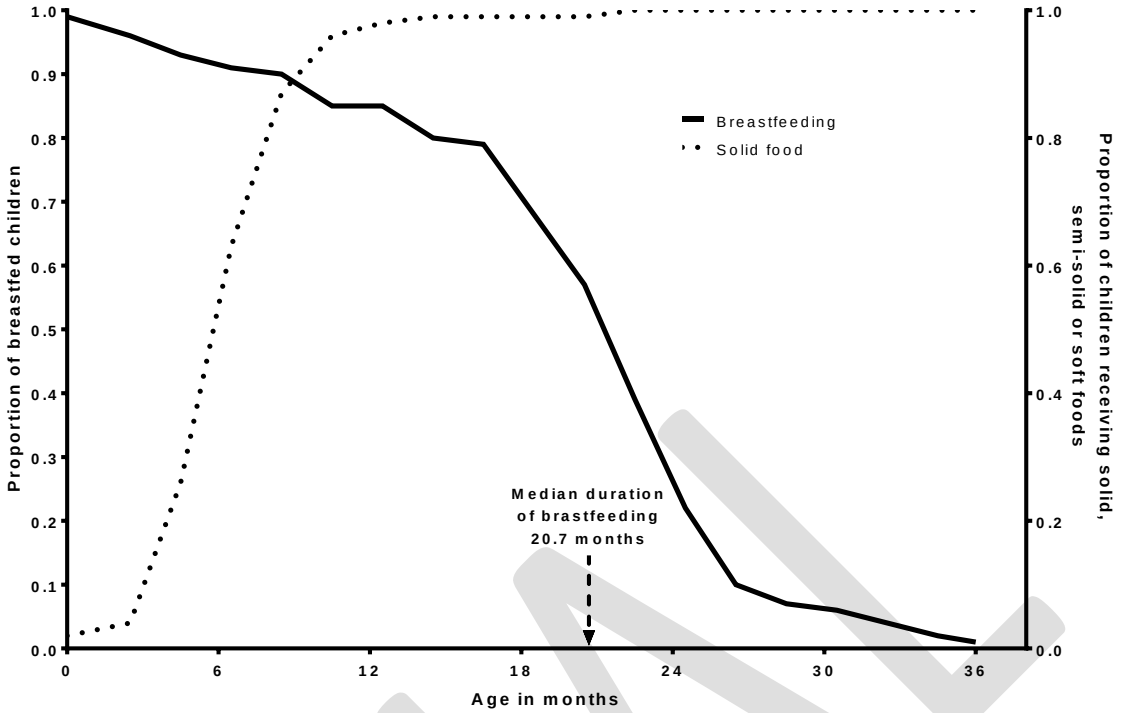


Figure 12. Age trends of breastfeeding duration and introduction to solid, semi-solid and soft foods in children aged 0-35 months.

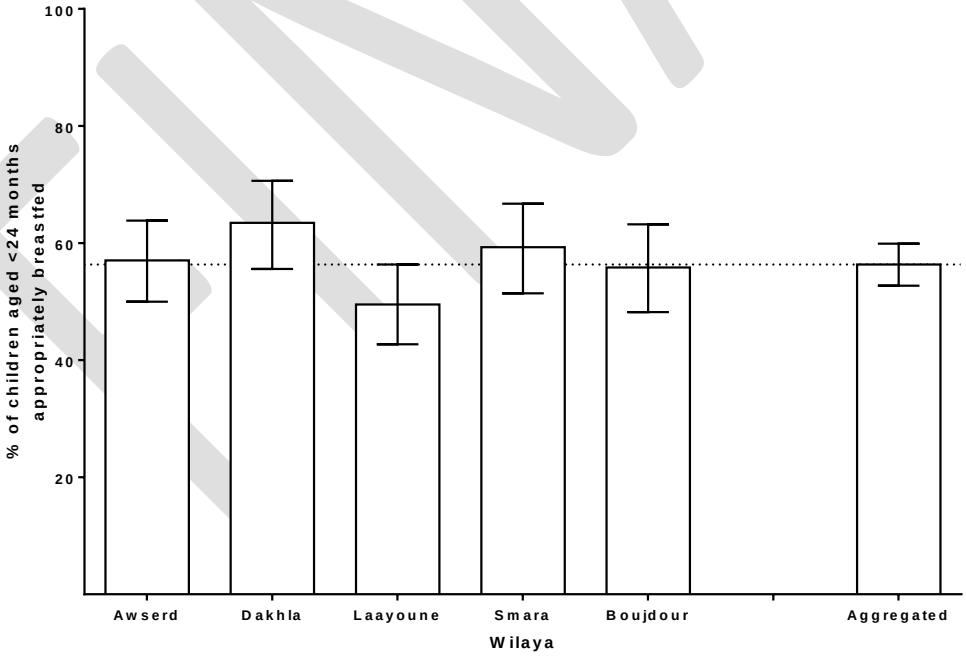


Figure 13. Proportion of infants aged <24 months appropriately breastfed by Wilaya (see Table A11).

All of 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 24% (see **Figure 14**) with Boujdour presenting a greater prevalence when compare only to Dakhla. **Figure 15** presents the prevalence of bottle-feeding by age group, where about 44% of children aged <6 months reported having been bottle feed.

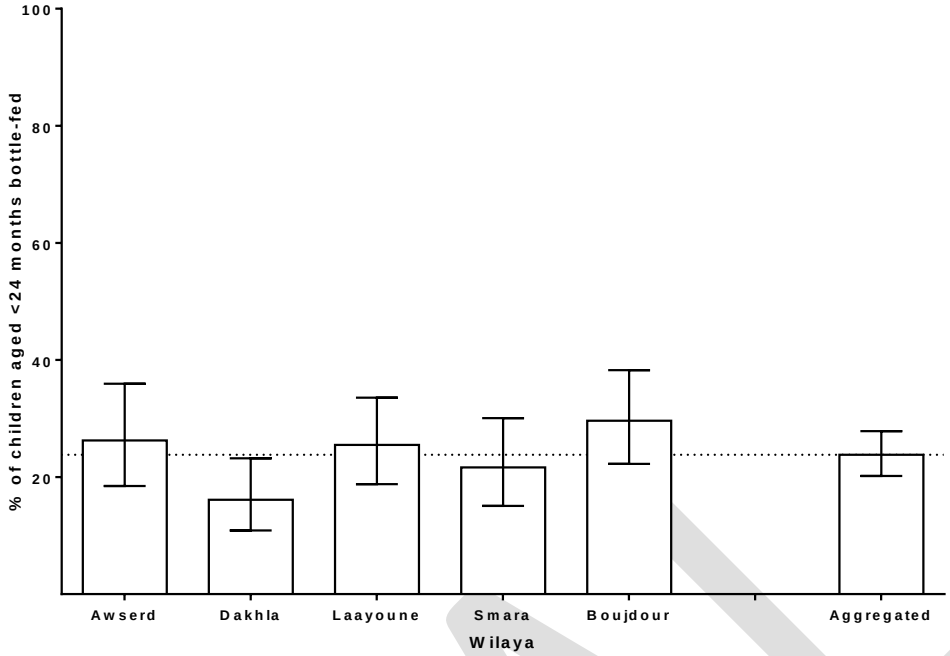


Figure 14. Proportion of infants aged <24 months bottle-fed by Wilaya (see Table A11).

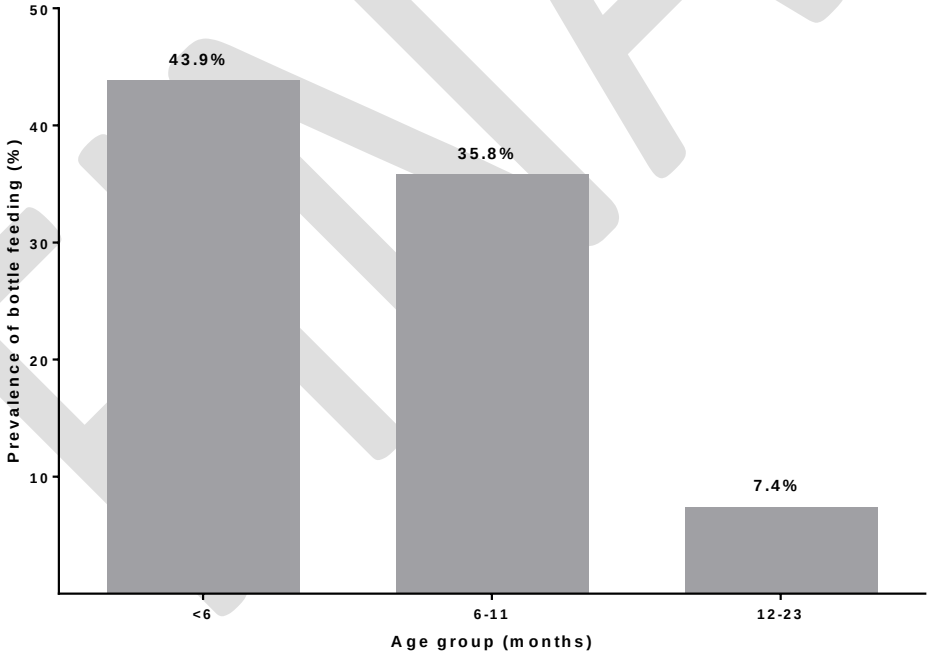


Figure 15. Prevalence of bottle-feeding among children aged <24 months by age group.

Introduction of solid, semi-solid and soft foods between the ages of 6-8 months was 74%. This simple and useful indicator for evaluating the adequate introduction of complementary foods suggests that about a quarter of the children aged 6-8 months have not received solid or semi-solid foods, as recommended by WHO. **Figure 12** shows the pattern of introduction to solid, semi-solid or soft food by age in the sample of children surveyed.

Concerning the overall feeding pattern of children aged 6-23 months, only 33 % of the sampled children reached the minimum dietary diversity in their diets, that is, they received foods from four or more food groups (see **Figure 16**). Dakhla had the lower prevalence of children reaching this minimum dietary diversity, but the difference was only statistically significant when compared with Smara.

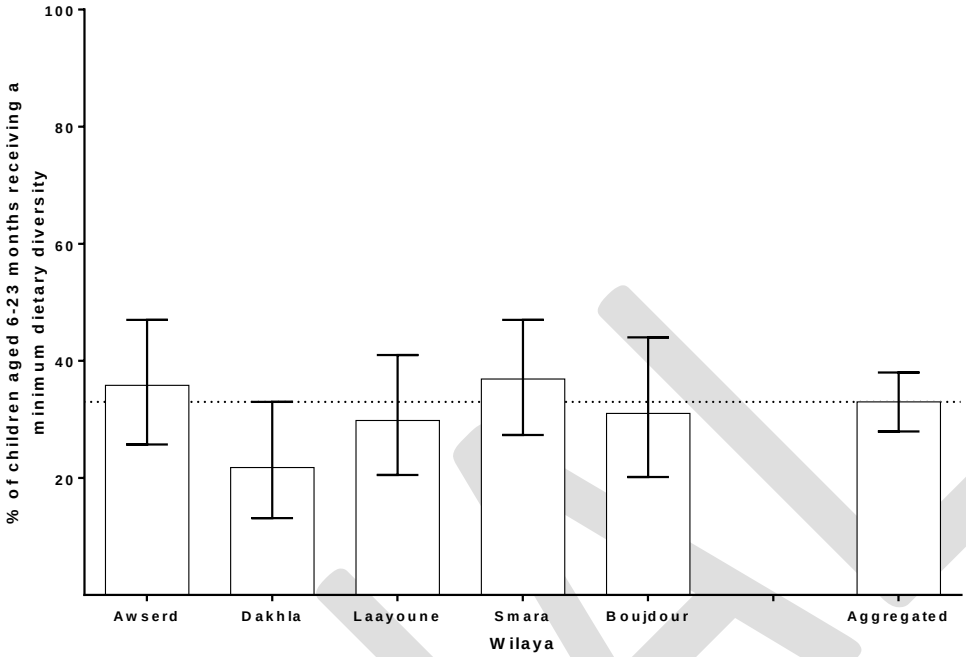


Figure 16. Minimum dietary diversity in children aged 6-23 months by Wilaya (see Table A11).

Age affected the dietary diversity of children. The proportion of children receiving a minimum of dietary diversity in their diets increased with age as observed in **Figure 17**.

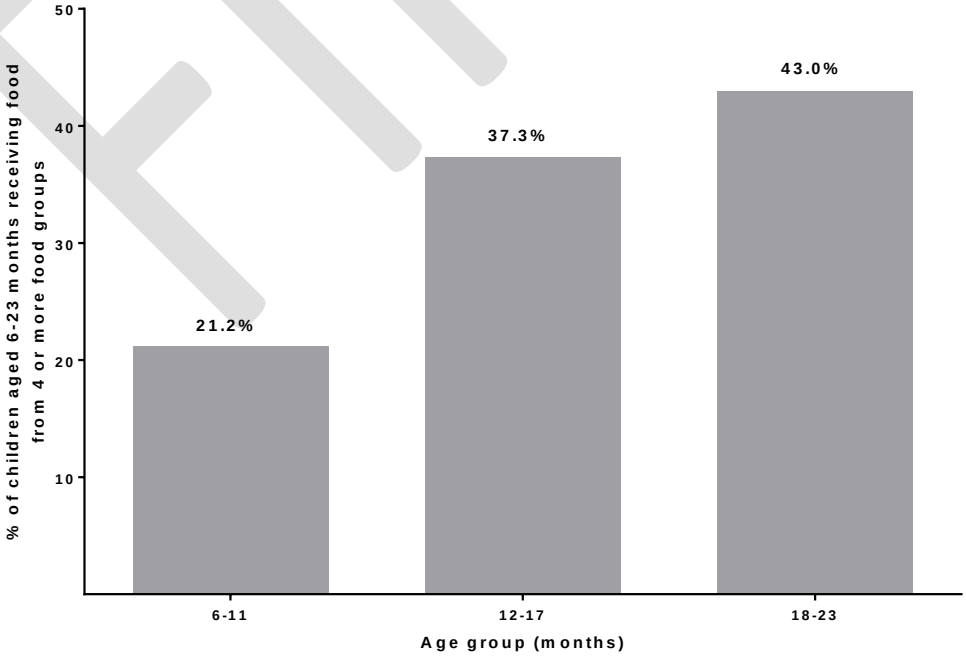


Figure 17. Minimum dietary diversity in children aged 6-23 months by age group.

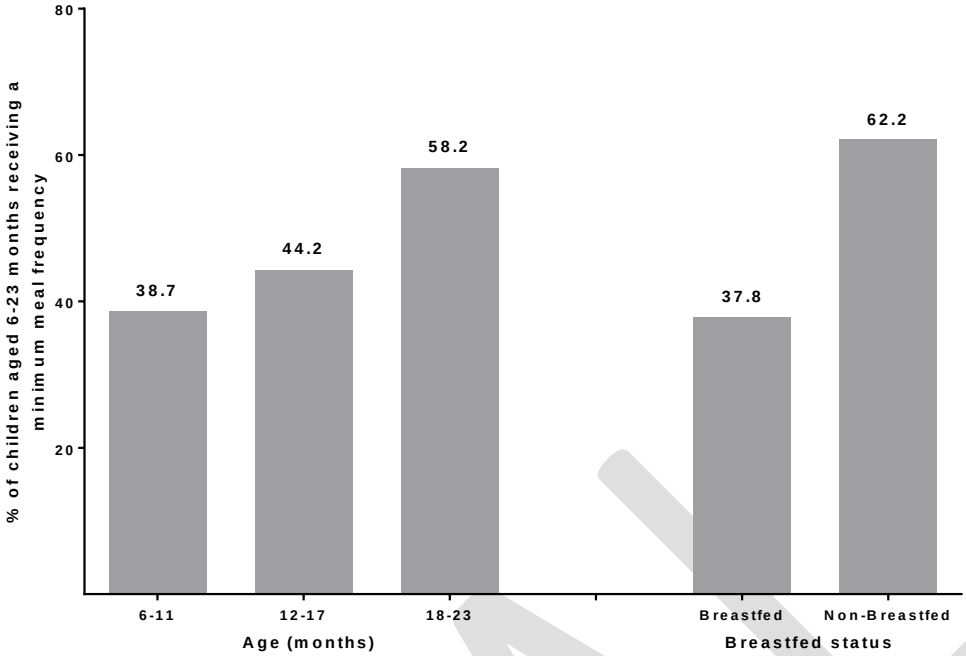


Figure 18. Minimum meal frequency in children aged 6-23 months by age and breastfed status.

The proportion of breastfed and non-breastfed children aged 6-23 months who received an adequate number of feeds according to recommendations was less than half. Similarly, the proportion of children receiving a minimum meal frequency increases with age (see **Figure 18**), 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 (**Figure 18**). There were some differences between the Wilayas (see **Figure 19**), but none of the differences reached statistical significance.

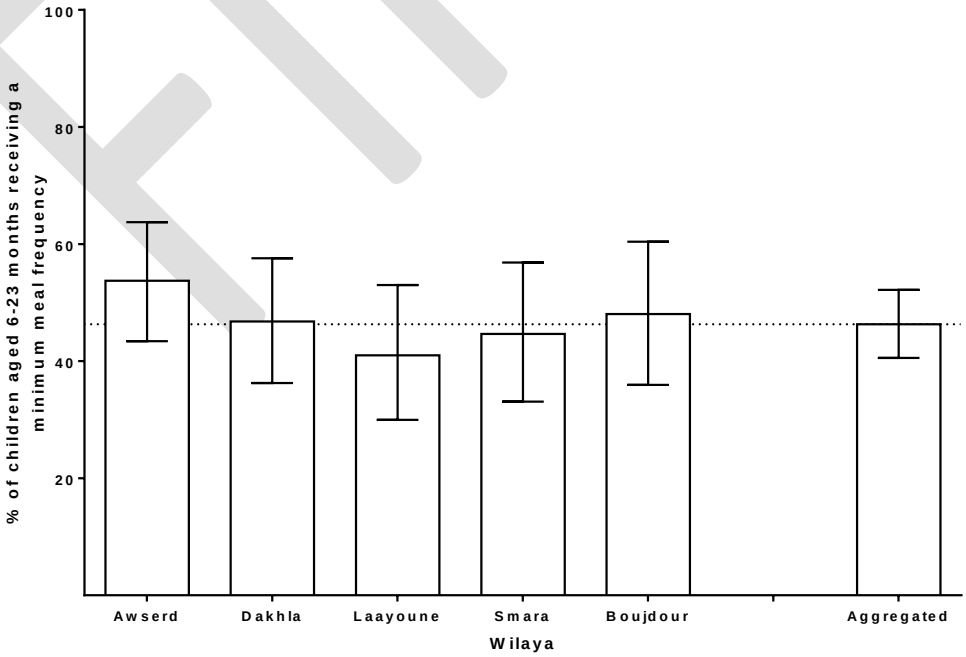


Figure 19. Minimum meal frequency in children aged 6-23 months by Wilaya (see Table A11).

A summary IYCF indicator is the minimum acceptable diet, which is a composite of the indicators described above for children aged 6-23 months. Overall, only about 14% 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 (**Figure 20**). There were small differences between Wilayas in the proportion of children receiving a minimum acceptable diet (see **Figure 21**), but none were statistically significant.

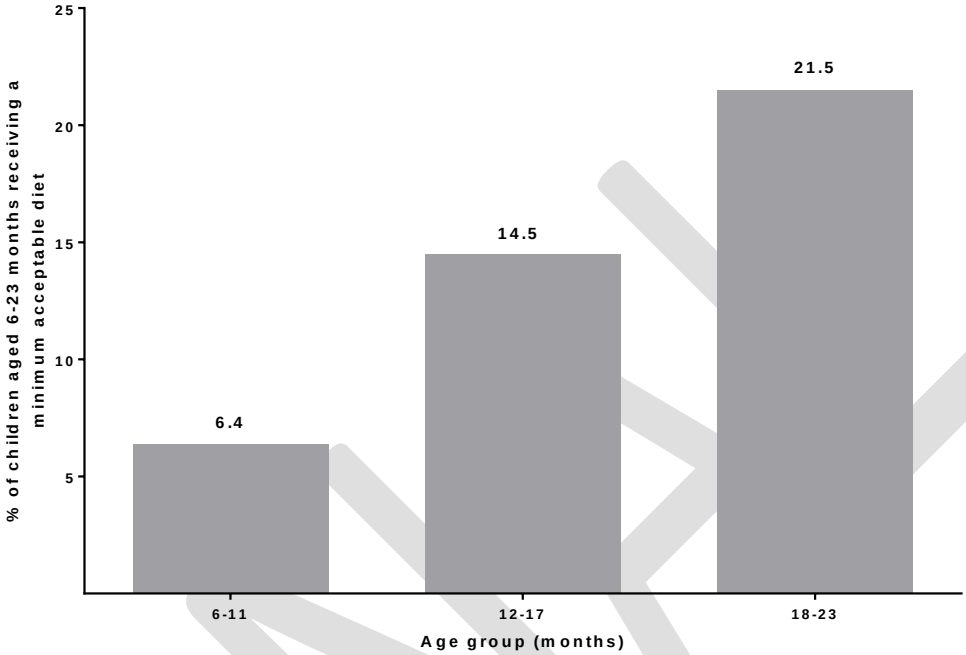


Figure 20. Minimum acceptable diet in children aged 6-23 months by age.

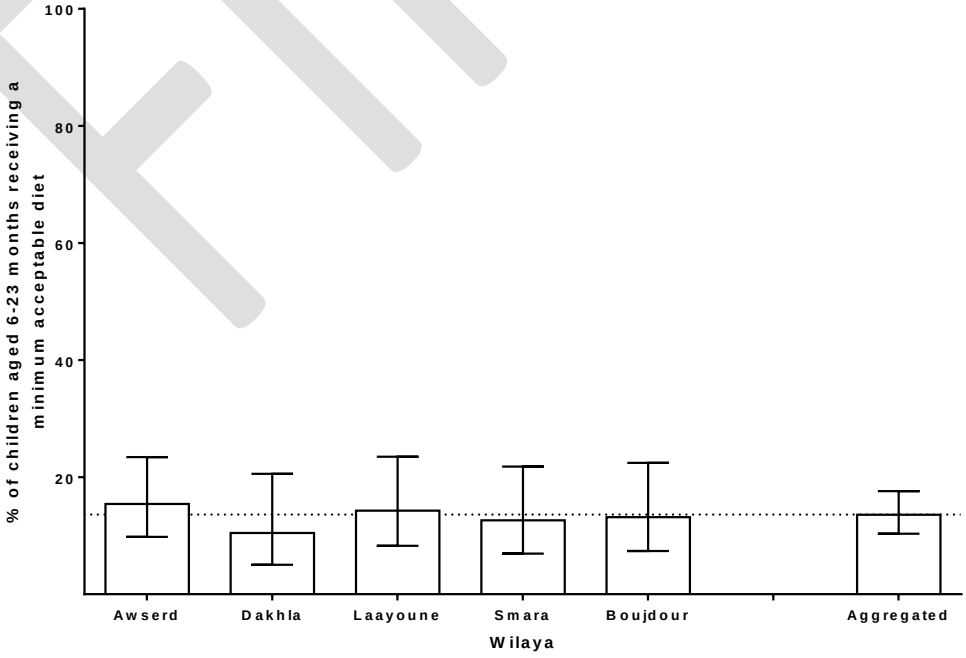


Figure 21. Minimum acceptable diet in children aged 6-23 months by Wilaya (see Table A11).

The proportion of children aged 6-23 months consuming iron-rich or iron-fortified foods was about 29%. Consumption of iron-rich or iron-fortified foods did not increase with age as shown in **Figure 22**. The pattern of consumption seems to differ slightly by Wilaya (**Figure 23**), with Awserd and Dakhla having the highest and lowest prevalence of consumption of iron-rich or iron-fortified foods, respectively. However, no statistically significant differences were observed.

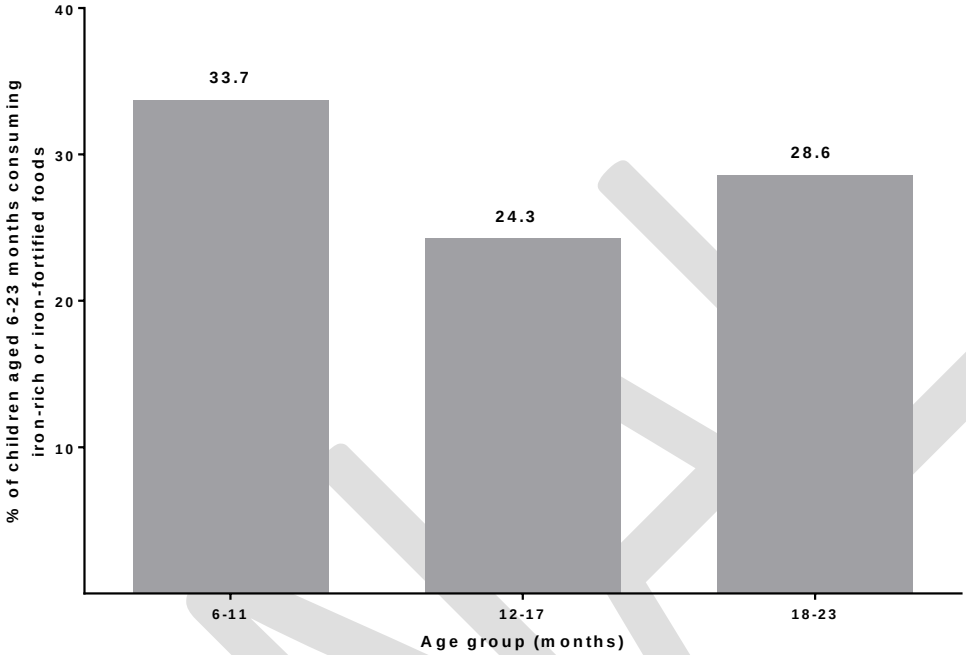


Figure 22. Consumption of iron-rich or iron-fortified foods in children aged 6-23 months by age.

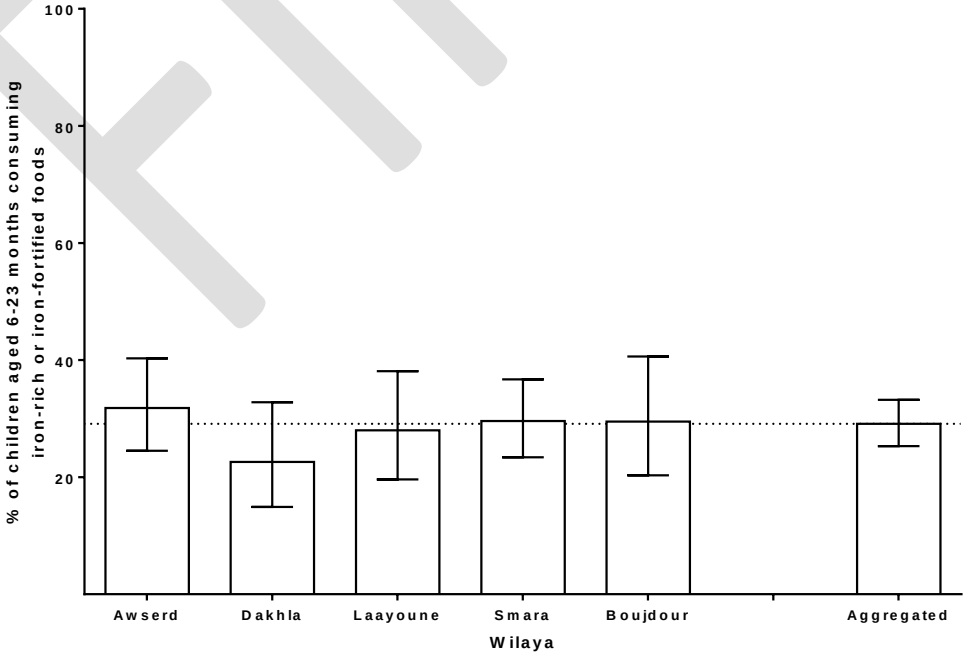


Figure 23. Consumption of iron-rich or iron-fortified foods in children aged 6-23 months by Wilaya.

3.4. SIX-YEAR PREVALENCE CHANGE OF IYCF INDICATORS

Overall, there have been mostly positive significant changes in many of the aggregated IYCF indicators between 2010 and 2016, as observed by comparing the IYCF trends obtained from the 2010, 2012 and 2016 nutrition surveys (as shown in **Figures 24-29**). Of note: (1) Given that the sample size available for some indicators is small, these could not be disaggregated by Wilaya and only the aggregated results are presented in **Figure 24**. All other IYCF indicators with sufficient sample size available are presented in separate figures (**Figures 25-29**). (2) To better judge 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) Boujdour is not included in these graphs as the current survey is the only survey that has surveyed Boujdour as an independent Wilaya.

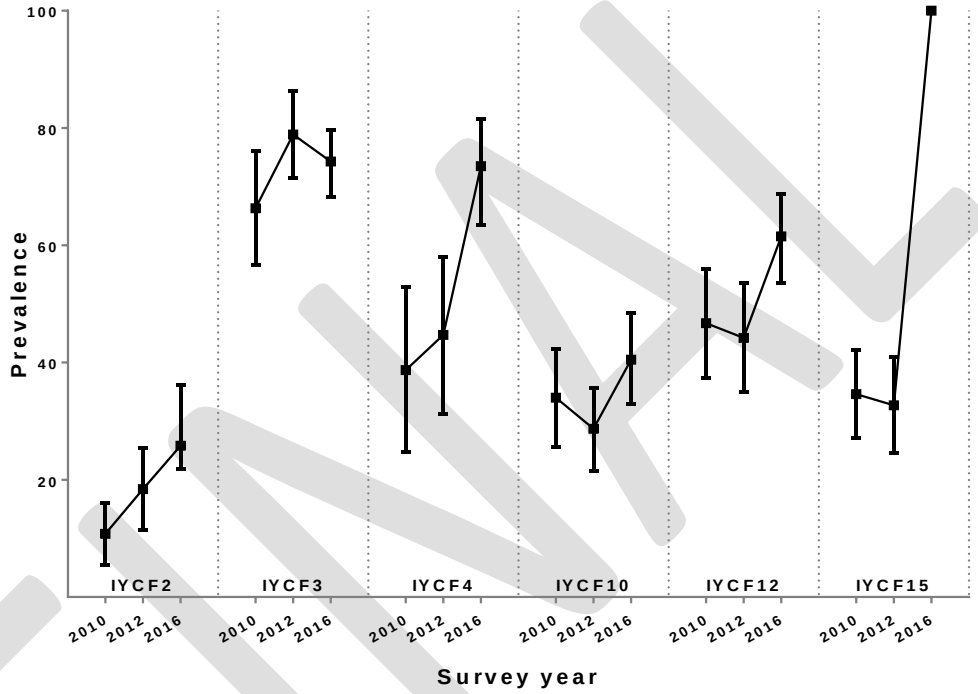


Figure 24. Six-year prevalence trends of five Infant and Young Children Feeding indicators.

Note: IYCF2: Exclusive breastfeeding under 6 months of age; IYCF3: Continued breastfeeding at 1 year of age; IYCF4: 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.

The overall trend is that most of the indicators denoting feeding behaviours have improved in this six-year period. For instance, breastfeeding of children in the early years has shown improvement as denoted by the positive trends in exclusive breastfeeding, predominantly breastfeeding, and age-appropriate breastfeeding. However, we observed little evidence of change for the prevalence of children having ever breastfed or the duration of breastfeeding as denoted for the lack of a visible trend in the continuation of breastfeeding at 1 and at 2 years, and the mean duration of breastfeeding (about 18.5 months in 2010 and 2012 and 20.7 months in 2016).

Similarly, IYCF indicators regarding feeding behaviours outside of breastfeeding seems to have improved, as denoted by the positive trends observed for children receiving timely introduction of solid, semi-solid and soft foods, or reaching the minimum meal frequency, or acceptable diet for non-breastfed children reaching an expected milk feeding frequency. Nonetheless, we fail to observe any positive trend on children receiving a minimum dietary diversity and we observed a negative trend on the prevalence of children's consumption

of iron-rich foods. The last two indicators have a behaviour component that is affected by food availability and access.

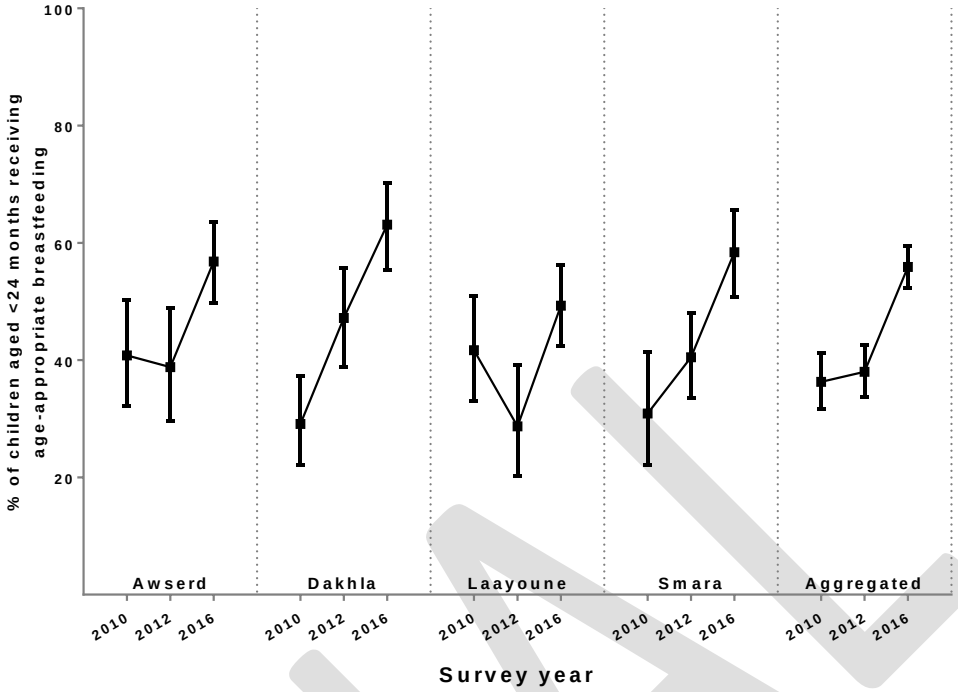


Figure 25. Six-year prevalence change of children aged <24 months receiving age-appropriate breastfeeding.

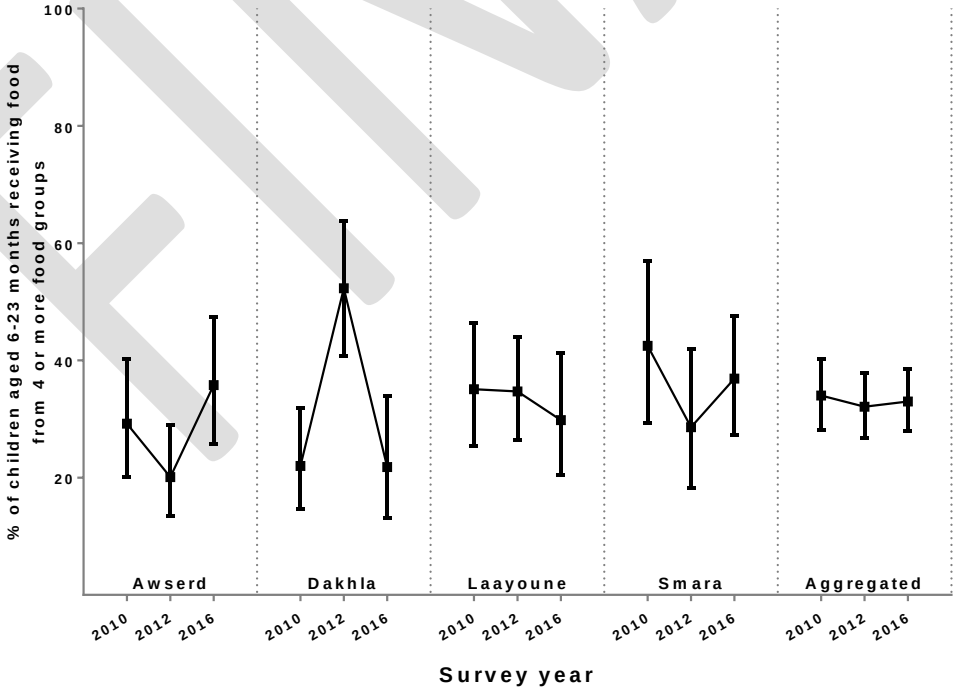


Figure 26. Six-year prevalence change of children aged 6-23 months receiving a minimum dietary diversity.

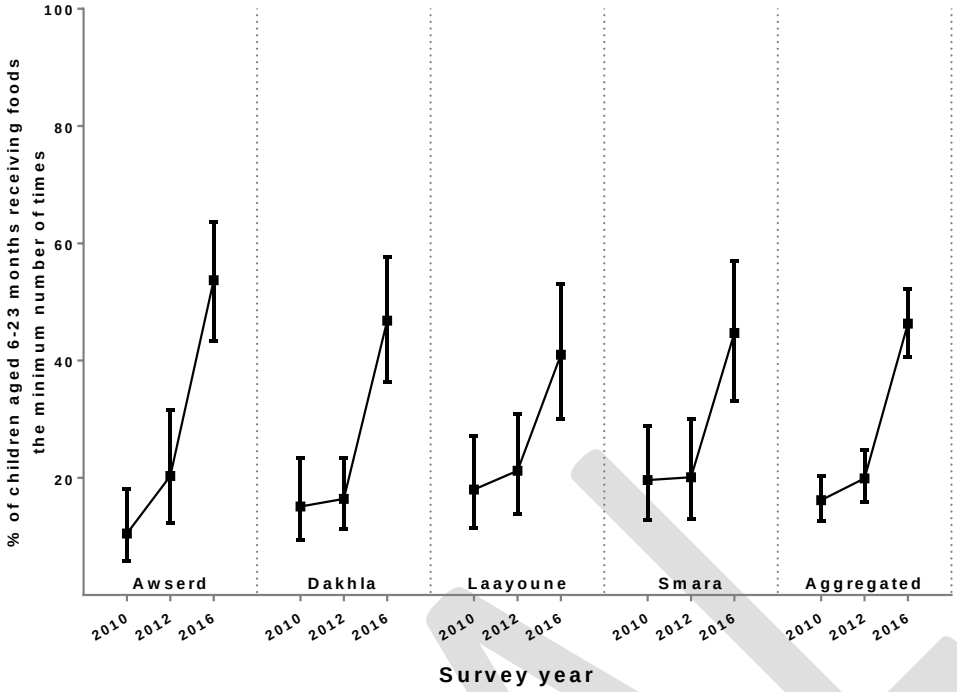


Figure 27. Six-year prevalence change of children aged 6-23 months receiving a minimum meal frequency.

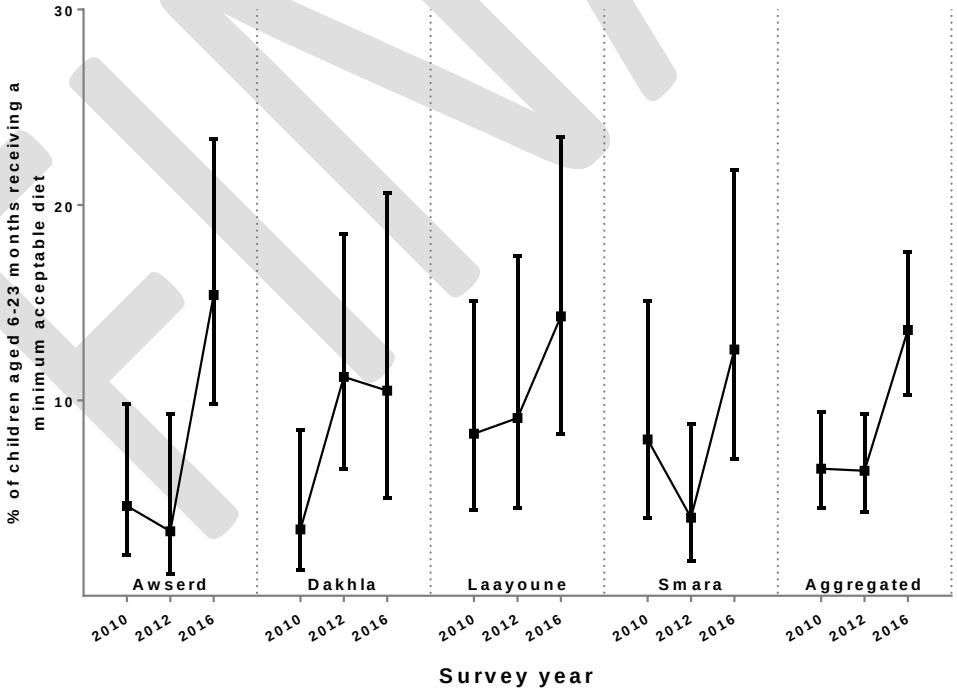


Figure 28. Six-year prevalence change of children aged 6-23 months receiving a minimum acceptable diet.

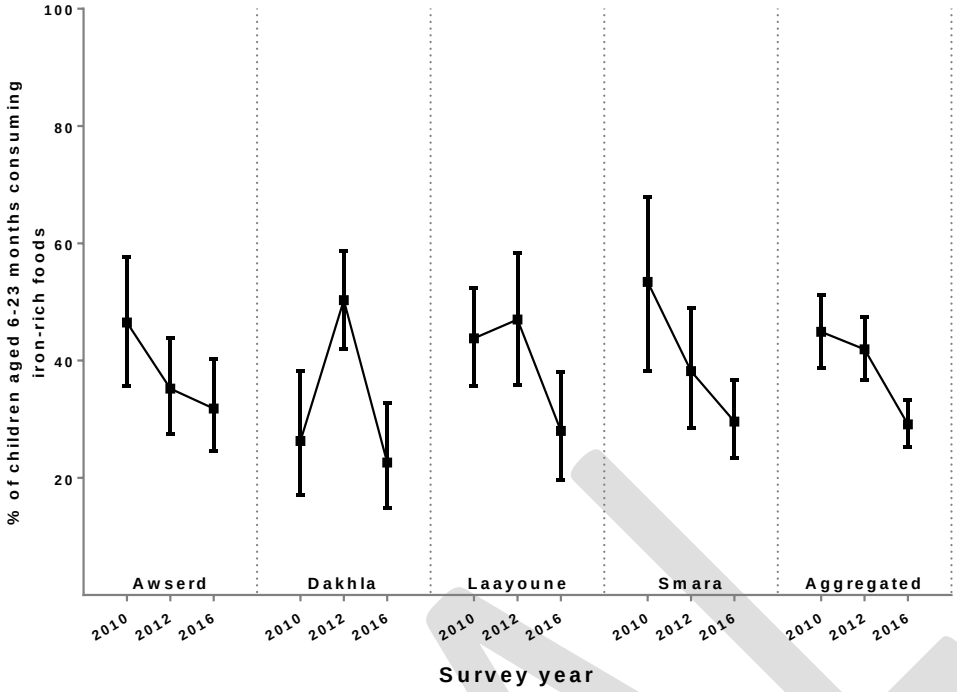


Figure 29. Six-year prevalence change of children aged 6-23 months consuming iron-rich foods.

3.5. ANAEMIA IN CHILDREN AGED 6-59 MONTHS

Two thousand five hundred and sixty four children aged 6-59 months were assessed for haemoglobin concentrations. About 39% of these children suffer some form of anaemia (see **Figure 30** and Annex **Table A13**). The most common types of anaemia were mild and moderate, both at 19%, and severe anaemia was low (1%). There are significant differences in the anaemia prevalence between Wilayas, with Smara and Boujdour having significantly lower anaemia prevalence than Awserd, Laayoune and Dakhla. Overall, anaemia prevalence was significantly greater in boys than in girls (see **Figure 31** and **Table A13**).

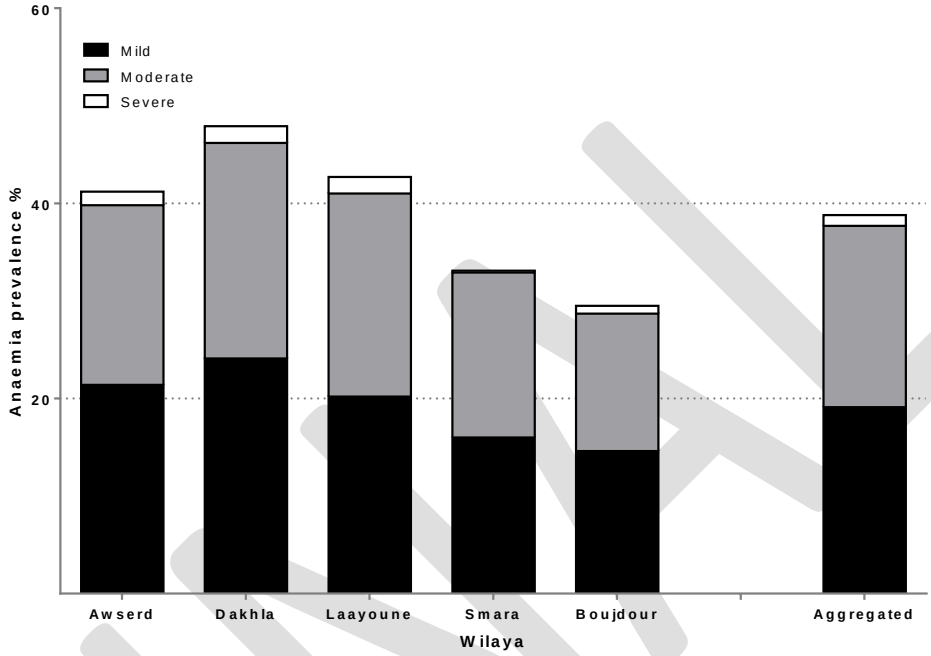


Figure 30. Anaemia prevalence in children aged 6-59 months. Aggregated results are the weighted prevalence (see Table A13).

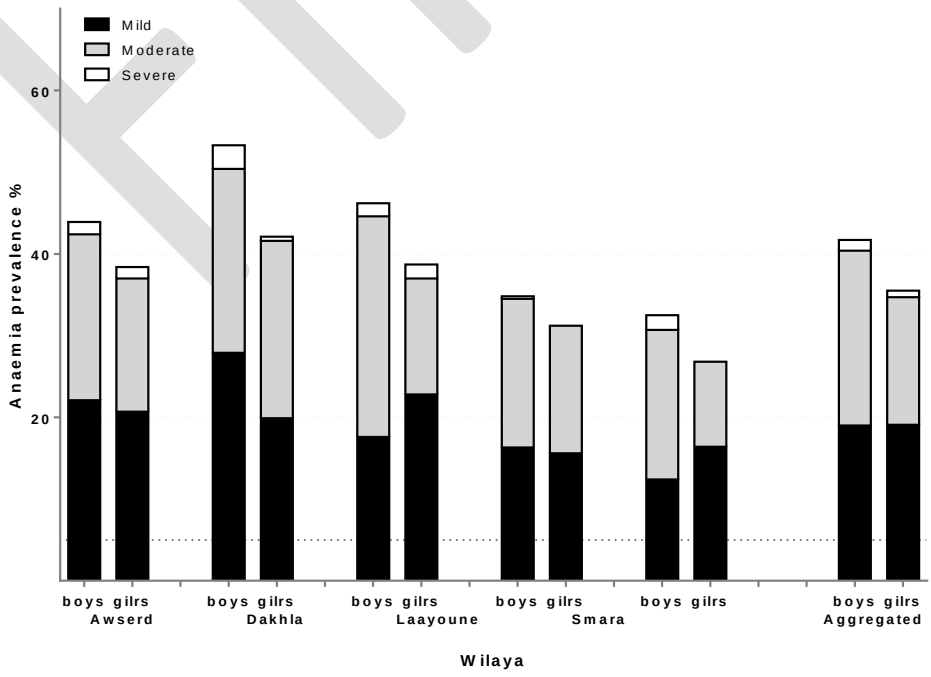


Figure 31. Anaemia prevalence in children aged 6-59 months, by sex. Aggregated results are the weighted prevalence (see Table A13).

Figure 32 shows the overall distribution of haemoglobin concentration 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 0.039 g/dL (95% C.I 0.035 – 0.042) for every one-month unit increase in age. The slope value is significantly different than zero ($p<0.05$). As observed in **Figure 32**, the majority of children with severe anaemia cluster at ages below 30 months. A similar pattern of clustering at earlier ages was observed for moderate anaemia.

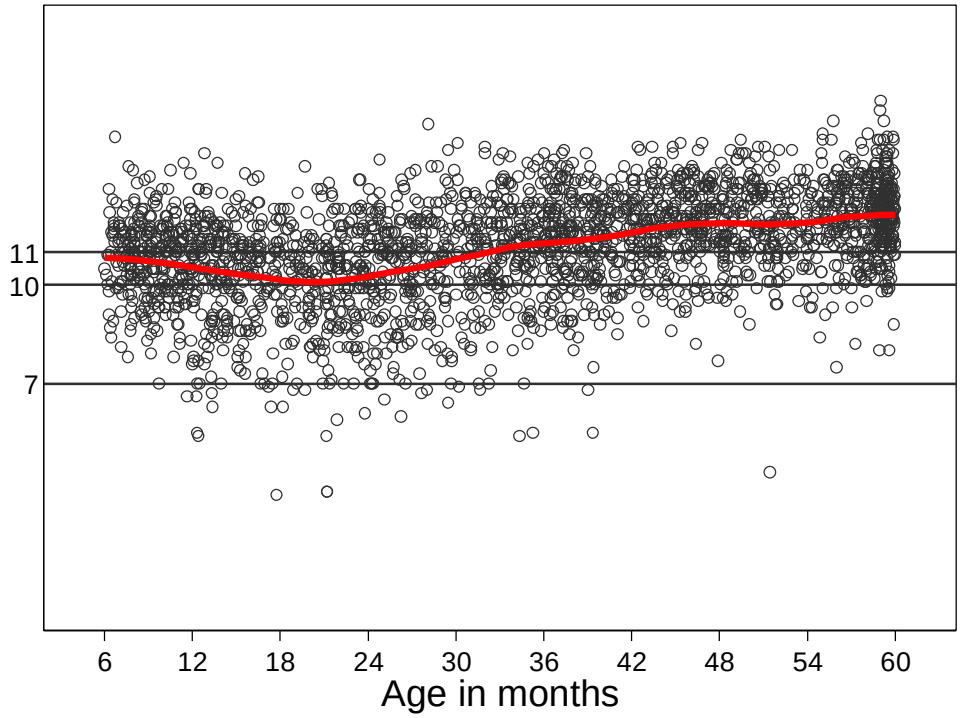


Figure 32. Haemoglobin concentration in children aged 6-59 months.

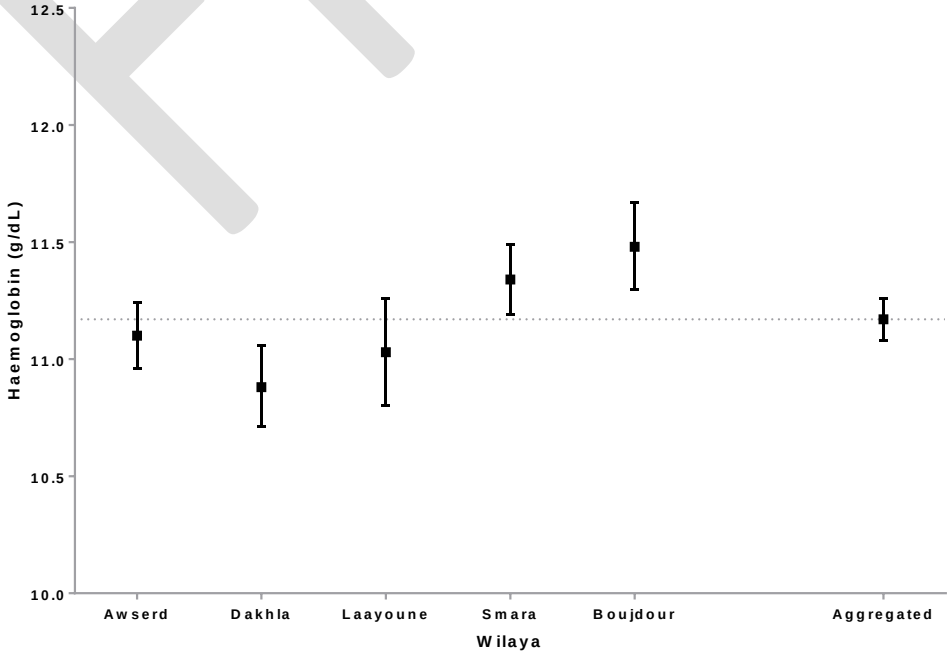


Figure 33. Mean haemoglobin values (and 95% CI) of children, aged 6-59 months (see Table A14).

Mean values of haemoglobin concentration are shown, by Wilaya, in **Figure 33**. In accordance with the anaemia prevalence data above described, the mean haemoglobin concentration values were higher where prevalence of anaemia was also high. Dakhla, Awserd and Laayoune presented significantly lower haemoglobin concentration values than Smara and Boujdour ($p<0.05$).

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

We measured haemoglobin concentration in 3,810 women of reproductive age. Of these women, 331 reported to be pregnant and 249 reported to be lactating. For the assessment of anaemia prevalence in non-pregnant women, lactating women were considered among the non-pregnant women.

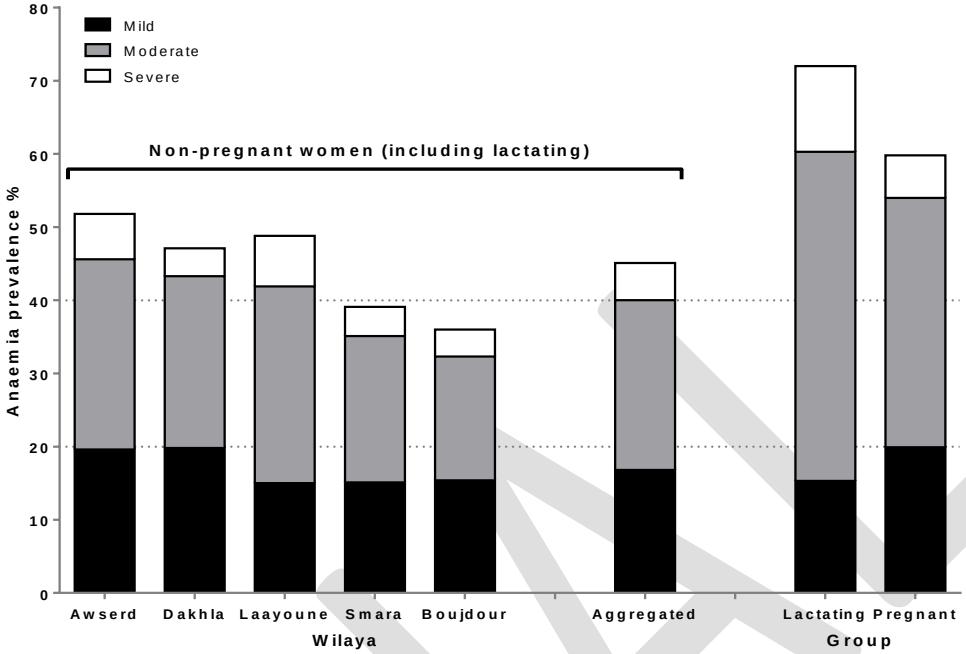


Figure 34. Anaemia prevalence in women of reproductive age (15-49 years), (see Tables A15 and A16).

Overall, the weighted prevalence of anaemia in non-pregnant women of reproductive age is 45%. There were differences in anaemia prevalence between Wilayas with Dakhla, Awserd and Laayoune having higher prevalence values than Smara and Boujdour. Pregnant and lactating women presented higher anaemia prevalence estimates than their non-pregnant counterparts, being the anaemia prevalence estimates among lactating women the higher (see **Figure 34**). All these differences were statistically significant ($p<0.05$).

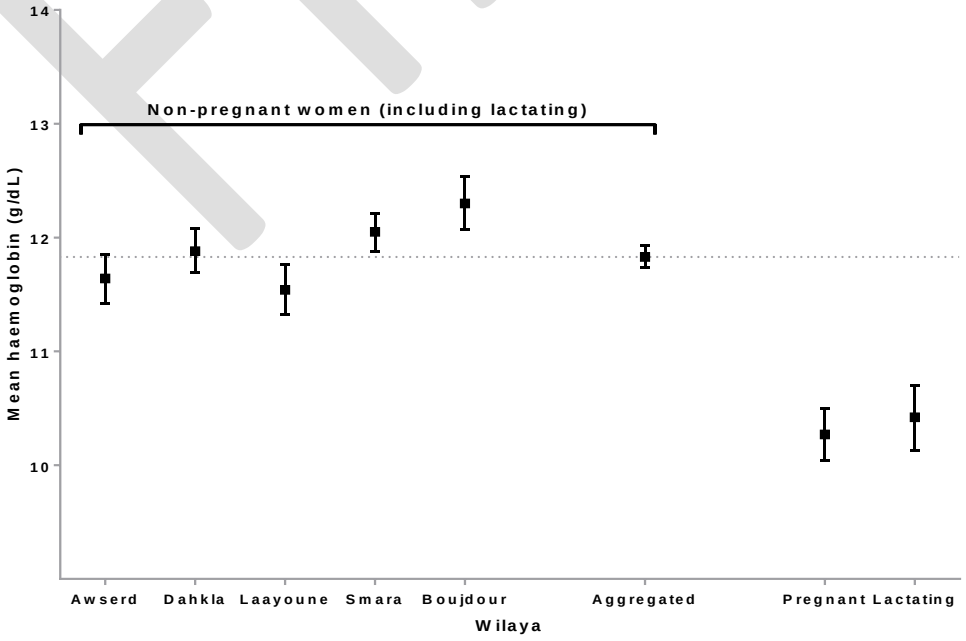


Figure 35. Mean haemoglobin values (and 95% CI) in women of reproductive age (15-49 years). See Table

A17).

Figure 35 shows the mean values of haemoglobin concentration, by Wilaya. The mean concentration values observed created three categories, (1) with Smara and Boujdour having the greatest mean values, (2) Dakhla having greater values than Awserd and Laayoune but lower than Smara and Boujdour, and (3) Awserd and Laayoune having the lowest values. All the differences between categories being statistically significant. The mean haemoglobin values for pregnant and lactating women were significantly lower when compared with the overall mean haemoglobin value of non-pregnant women; but were not different between pregnant and lactating women.

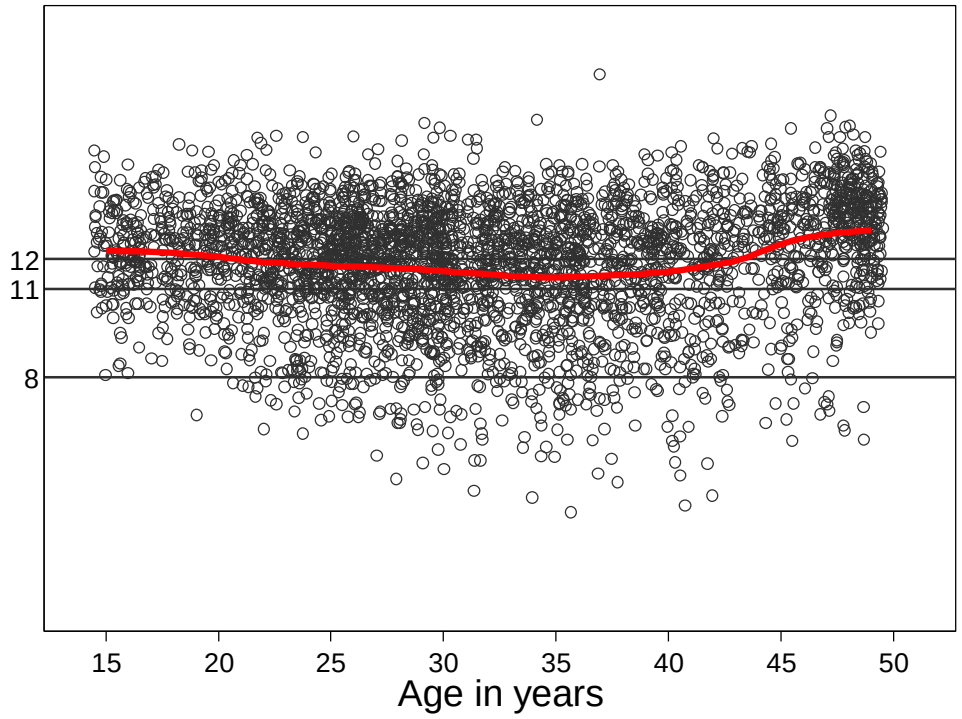


Figure 36. Haemoglobin concentration in women of reproductive age (15-49 years).

Age seems to be associated with haemoglobin concentrations in women of reproductive age as shown in **Figure 36**. We observed that mean haemoglobin concentration values cross the anaemia threshold of 12mmHg at about age 20 years and continues to decrease with age up until the age of 35 years, where mean values start to increase, crossing the anaemia threshold at about 44 years. This pattern is suggestive of the "costs" of reproduction reflected on haemoglobin concentrations. A similar pattern can be observed within pregnancy for a relationship between haemoglobin concentrations and gestation age (see **Figure 37**). Interestingly, very little severe anaemia is observed at younger ages (see **Figure 36**) between ages 15-20 years, where pregnancies are less common or have occurred less often than at older ages.

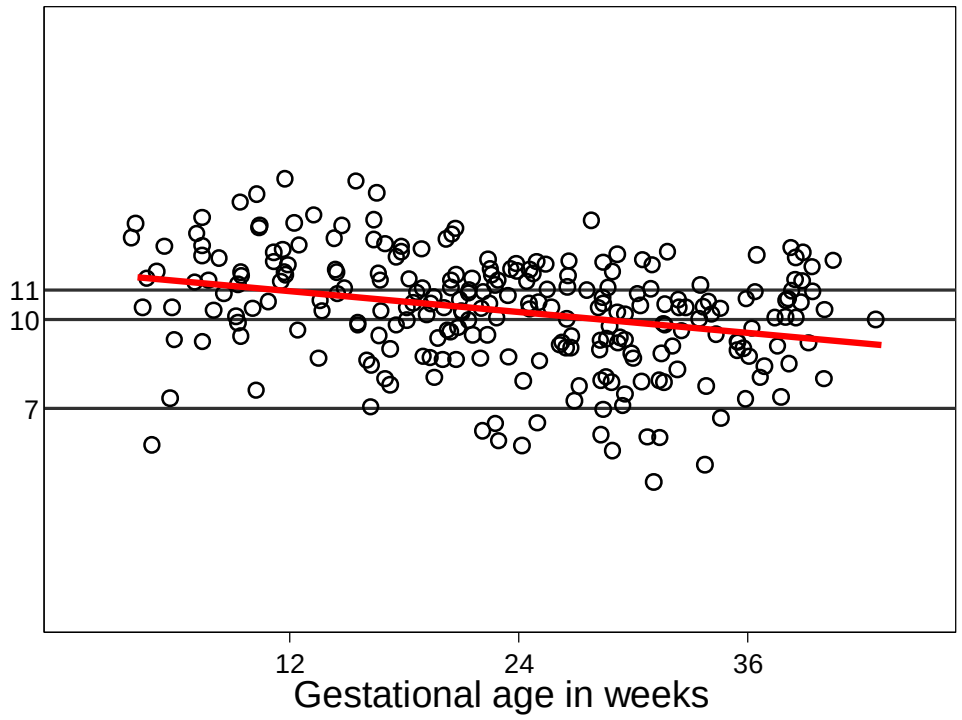


Figure 37. Haemoglobin concentration by gestational age in pregnant women of reproductive age

3.7. NUTRITIONAL STATUS IN WOMEN OF REPRODUCTIVE AGE (15-49 YEARS) - ANTHROPOMETRIC INDICATORS

Three thousand two hundred and twenty five non-pregnant and non-lactating women had their weight and height data collected and body mass index data (BMI) derived. In addition, 3,228 had their MUAC measured.

Overall, the prevalence of undernutrition as measured by a BMI <18.5 kg/m^2 was low at about 4%, ranging from about 2% in Boujdour to about 5% in Dakhla (see **Table A18**). The only significant differences for undernutrition prevalence between Wilayas were those observed between Dakhla and Boujdour. We observed a similar prevalence for low MUAC (see **Table A18**) with Boujdour having the lowest prevalence but being significantly different from all other Wilayas.

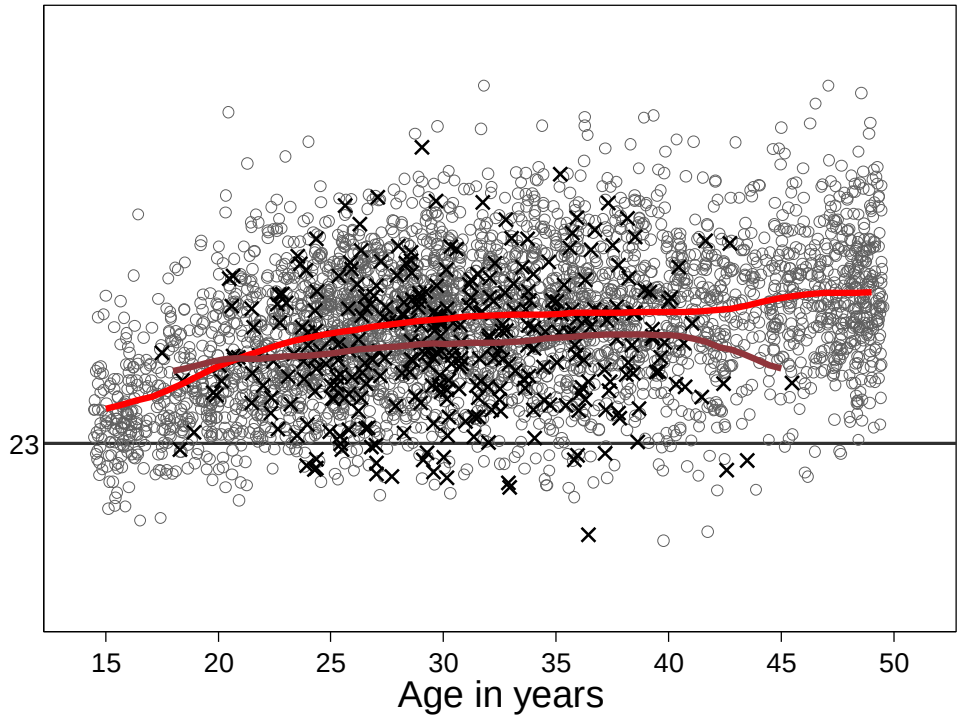


Figure 38. Scatter plot of mid-upper arm circumference (MUAC) by age of women (15-49 years)

The distribution of MUAC by age can be seen in **Figure 38**; where we can observed low MUAC values distributed across the age span. Interestingly, mean values for non-pregnant women were, on average, 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 6.6% (95% CI: 4.6; 9.5), which was greater that their non-pregnant non-lactating counterparts (difference 2.3, 95% CI: -4.7, 0.0). Furthermore, pregnant women showed greater prevalence of low MUAC than lactating women, 8.1% (95% CI: 5.4; 12.1) and 4.5% (95% CI: 2.1; 9.2) respectively, but the difference was not significant (difference 3.6, 95% CI: -0.9; 8.1).

For overweight, that is a BMI >25kg/m^2, the prevalence was high for all Wilayas, with a weighted prevalence of almost 70%, that is, 7 out of 10 non-pregnant and non-lactating women of childbearing age has overweight or obesity. The prevalence of overweight but not obese and obesity are shown in **Figure 39**, where we can also observe prevalence differences between Wilayas; where Boujdour presented significantly greater values than all other Wilayas.

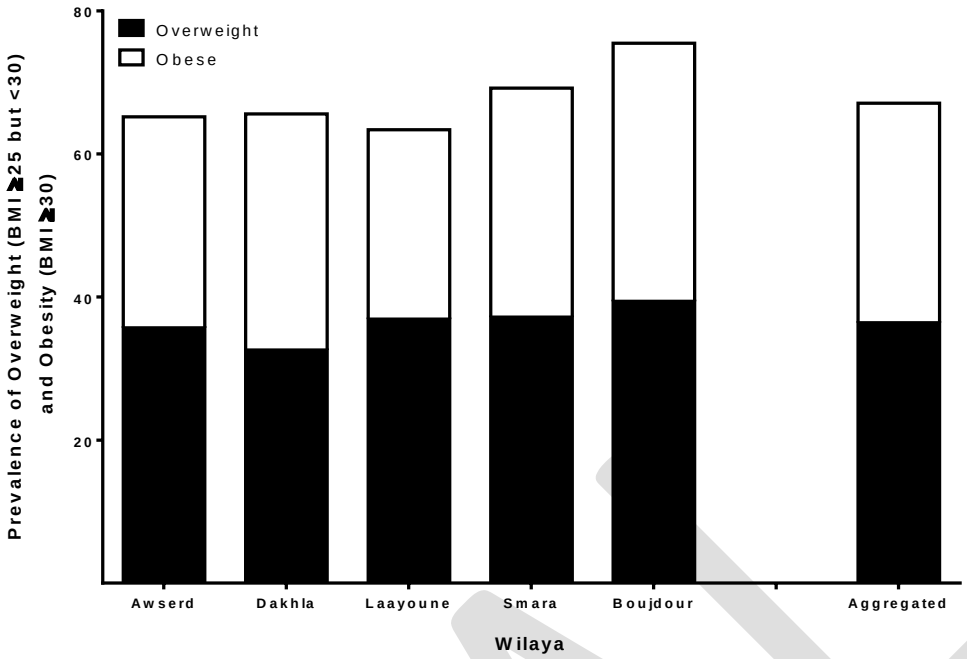


Figure 39. Prevalence of overweight and obesity, as indexed by body mass index (kg/m^2) in women of reproductive age (15-49 years) by Wilaya (see Table A18).

Interestingly, about half of the overweight women did not have obesity whilst the other half did. This pattern was similar between Wilayas. The comparison between the low estimates of undernutrition and the large estimates of overweight suggest a significant upwards shift of the BMI distribution. Age showed an association with the mean values of BMI in our sample, as shown in **Figure 40**. We can observe that the mean BMI value crosses the overweight threshold at about 20 years of age, but this mean value continues to raise and becomes borderline with obesity at age 45 years.

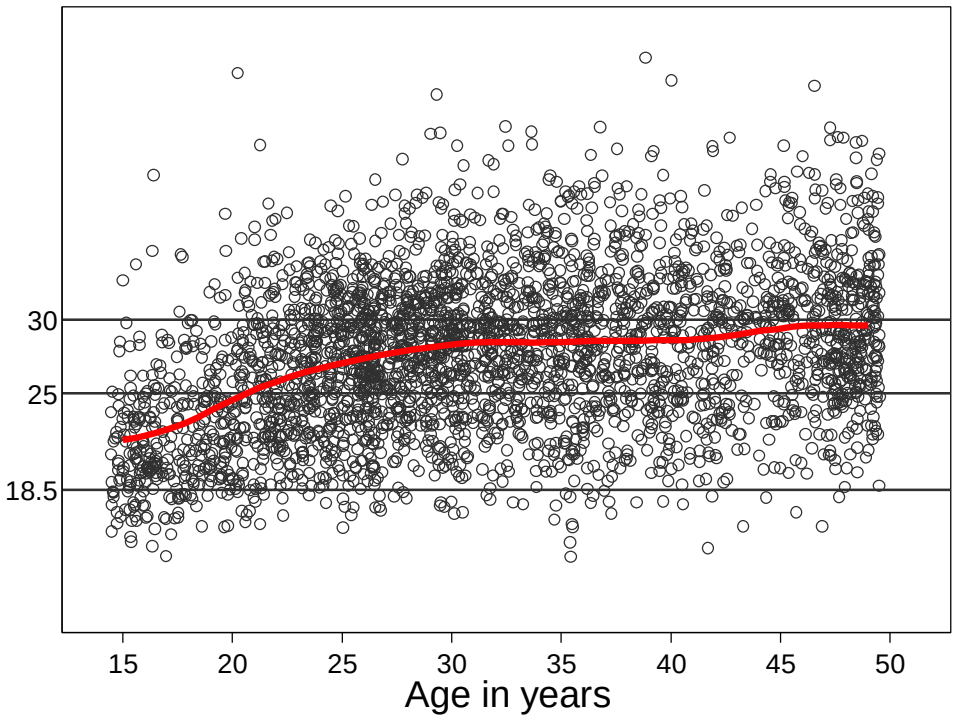


Figure 40. Scatter plot of body mass index (kg/m2) by age of women (15-49 years)

Similarly, we observed very high prevalence estimates for central obesity and metabolic risk as determined

by a waist circumference greater than 80 cm (see **Figure 41**). Overall, about 20% of women of childbearing age have increased metabolic risk, and 60% have very increased risk.

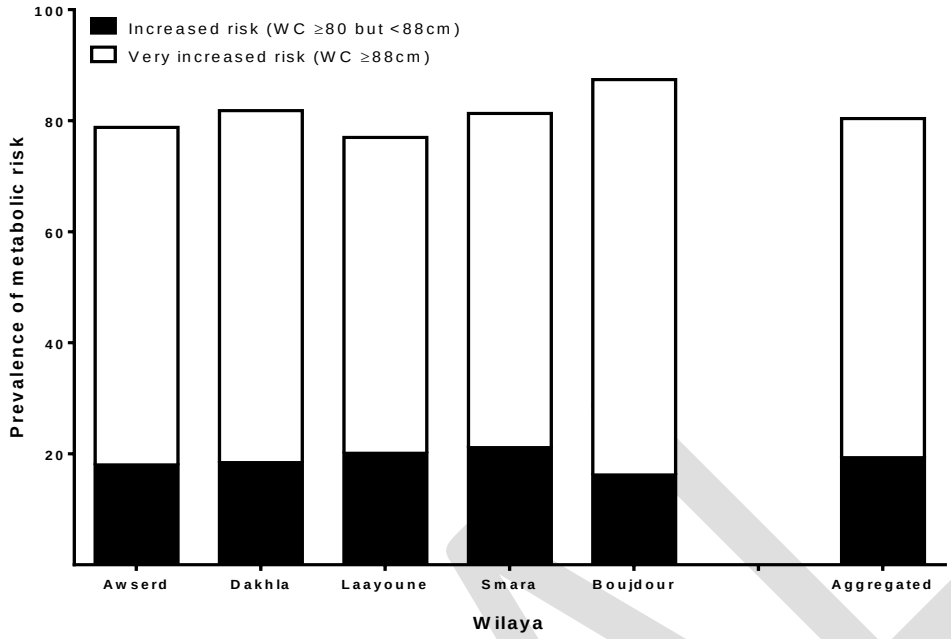


Figure 41. Prevalence of central obesity and metabolic risk, as indexed by waist circumference in women of reproductive age (15-49 years) by Wilaya (see Table A19)

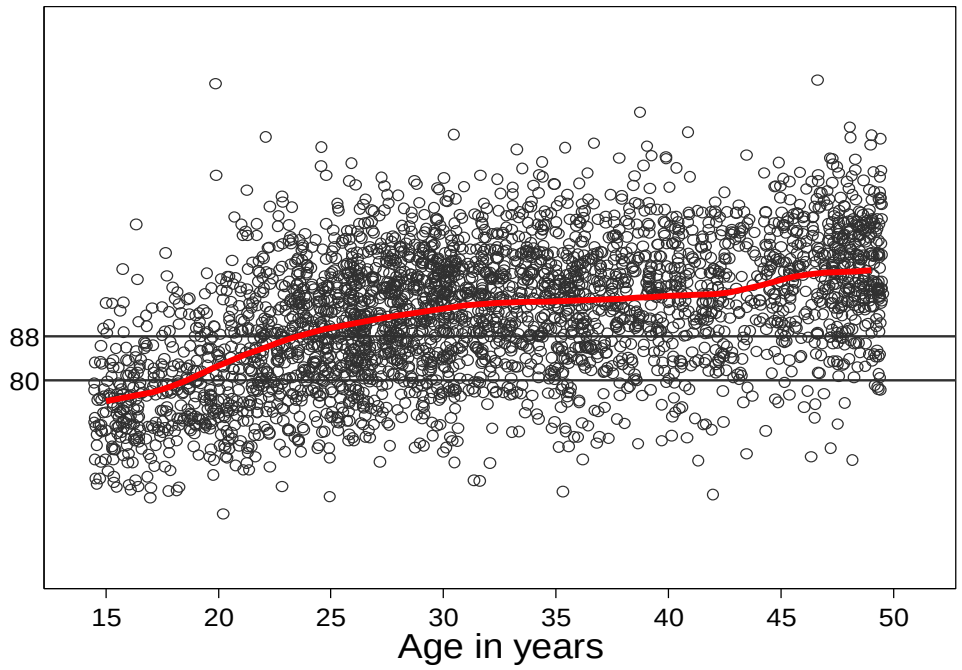


Figure 42. Scatter plot of waist circumference by age of women (15-49 years)

We observed a similar pattern than with BMI in the association between age and a large waist circumference as observed in **Figure 42**. Waist circumference, and consequently metabolic risk, increases rapidly with age crossing the increased and very increased risk thresholds at about 19 and 25 years of age. The mean values of waist circumference remain above this threshold thereafter. It is important to note that the most steep rise observed for the mean values of both, BMI and waist circumference, among women of childbearing age, occurred between the ages of 15 and 30 years, a time when most women would initiate reproduction.

3.8. FOOD SECURITY INDICATORS

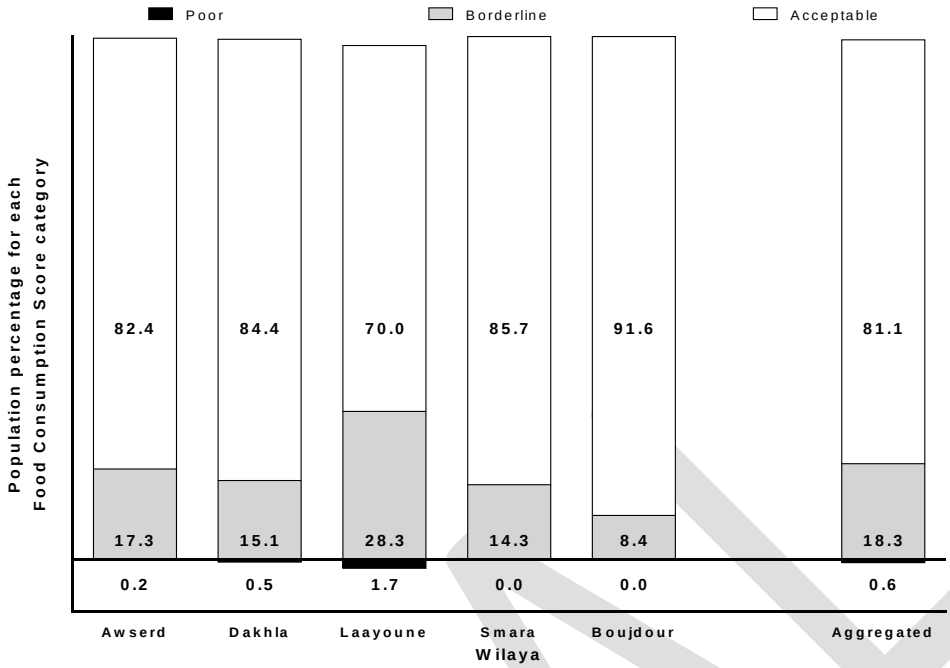


Figure 43. Household food consumption core by Wilaya (see Table A20).

Food security data was collected from 2,066 households, as described in the methods section. Indicators such as Food consumption scores (FCS), household dietary diversity, and coping strategies were then derived. FCS categories are shown in **Figure 43**. Overall, a very small proportion of household were found to be on the poor category. Nonetheless, about 18% of the households were considered borderline between having a poor or an acceptable FCS. Slightly over 80% of households have an acceptable FCS value denoting adequate access to food.

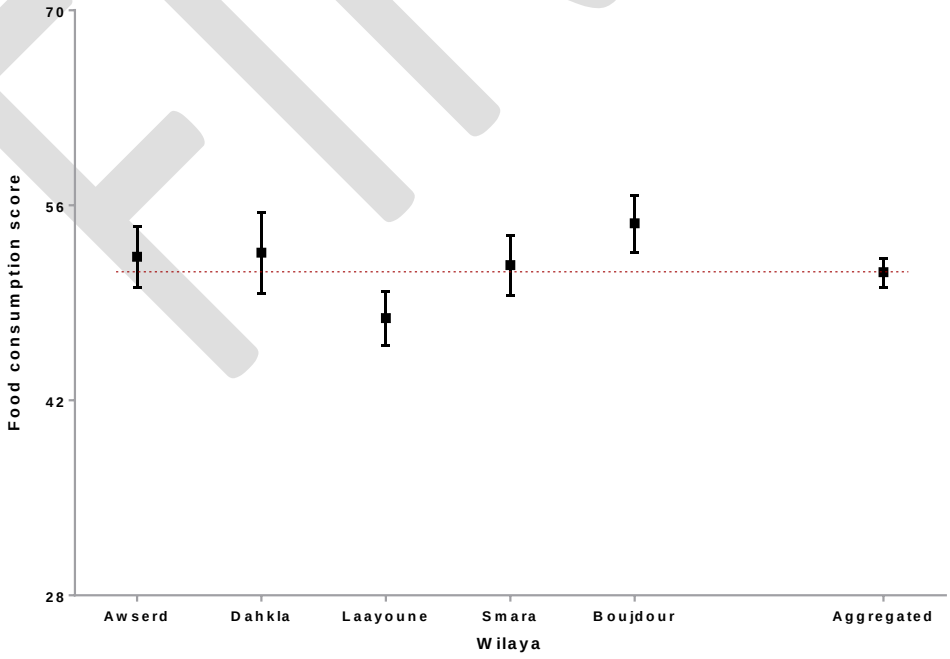


Figure 44. Mean food consumption score values shown by Wilaya (See table A21)

We observed differences between Wilayas regarding food security as indexed by the FCS. A significantly larger proportion of households in Laayoune did not have adequate FCS values compared to the other

Wilayas. Conversely, Boujdour presented a significantly lower proportion. Similar results were observed when comparing the mean FCS values between Wilayas; with Boujdour having greater mean FCS values and Laayoune lower mean FCS values (**Figure 44**).

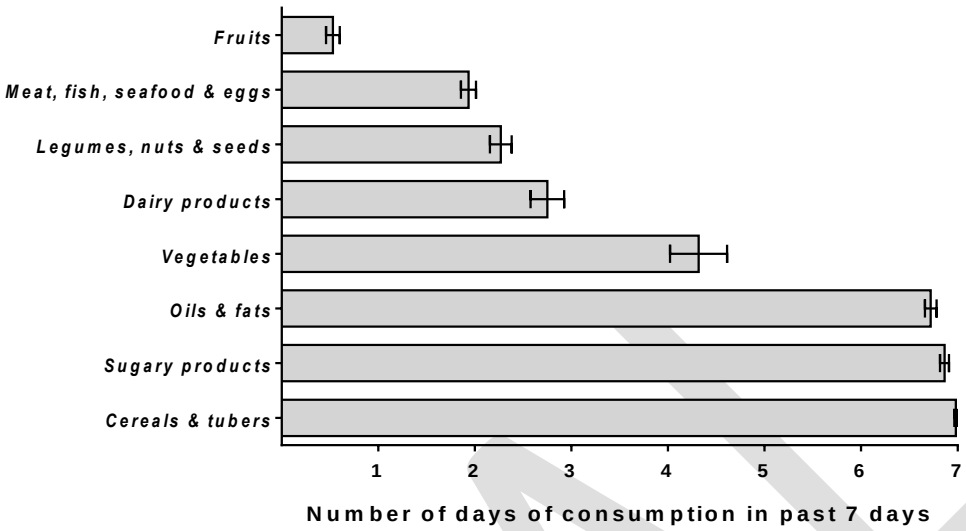


Figure 45. Reported household consumption (in days) of different food groups in the past 7-day period

Figure 45 dissects the consumption of the food groups that comprise this indicator, in the last 7 days prior to the household been surveyed. We can observe that households eat cereals and tubers, sugary products and oils and fats daily. Vegetables are consumed an average of over four days over a 7-day period, whilst dairy products, legumes, nuts and seeds, as well as animal products are eaten, each, an average of two days over a 7-day period. Lastly, fruits are eaten rarely and on average less than one day over a 7-day period.

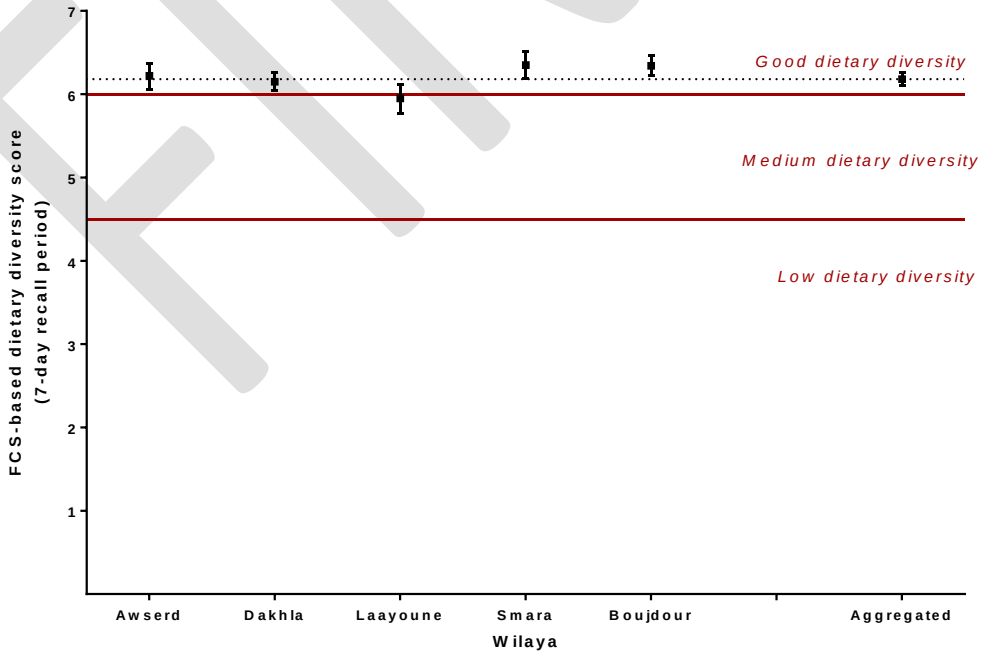


Figure 46. Mean household FCS-based dietary diversity score values shown by Wilaya (see Table A21).

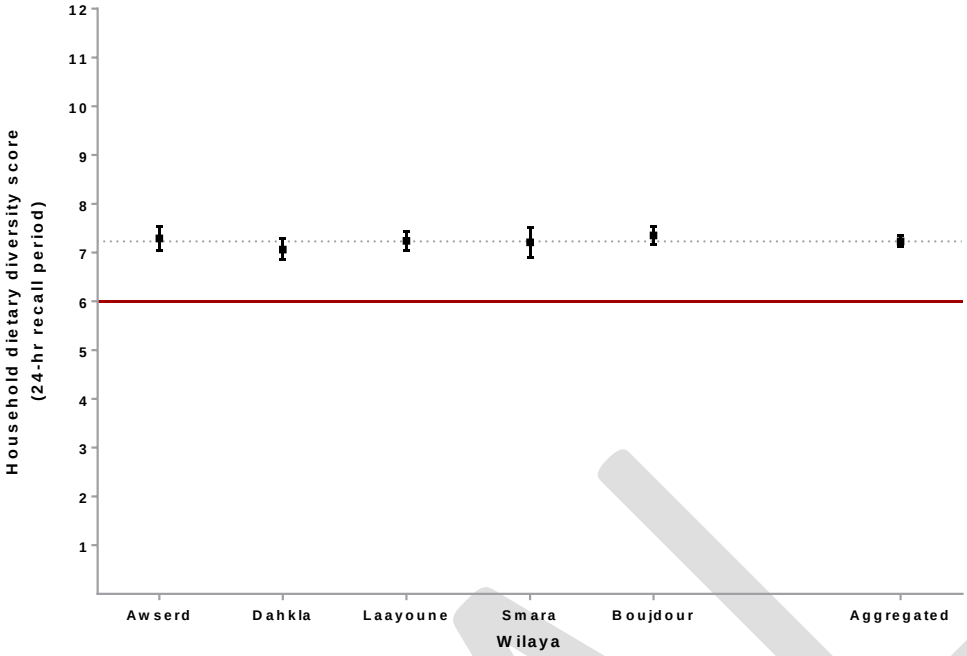


Figure 47. Mean household dietary diversity score values shown by Wilaya (See table A21)

Food diversity was measured in two ways (**Table A21**), first, on a 7-day recall period, using the data collected to calculate FCS with a maximum of 7 food groups (see **Figure 46**); and second, on a 24-hr recall period with a maximum of 12 food groups (see **Figure 47**).

According to the FCS-based diversity score values, households experienced good dietary diversity levels. There were differences between Wilayas, with Dakhla and Laayoune having significantly lower values that Smara and Boujdour. Interestingly, dietary diversity seemed lower when assessed using the household diversity score over a shorter recall period, but with greater number of food groups. In addition, only the difference between Dakhla and Boujdour remained significant.

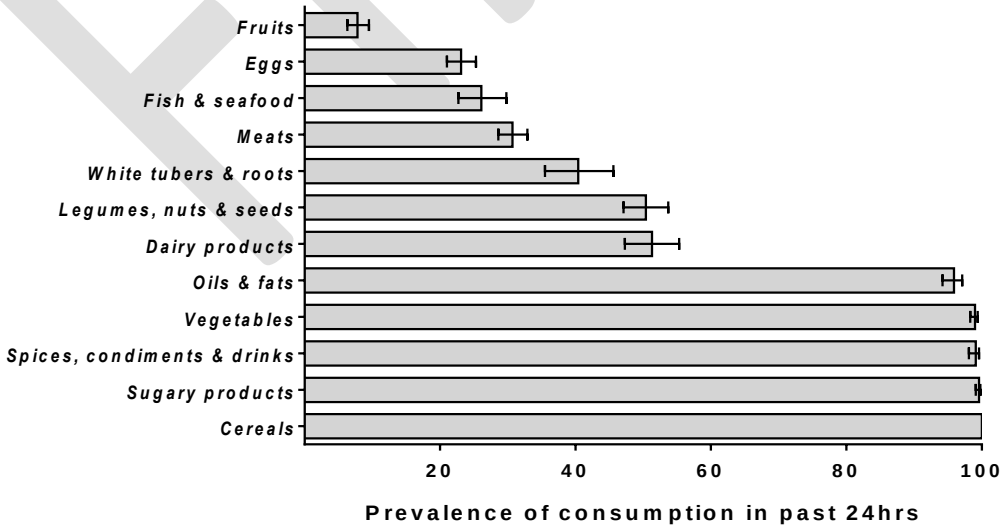


Figure 48. Reported prevalence of household consumption of different food groups in the past 24h period.

Figure 48 dissects household food consumption over the 24-hr recall period. We observed that most households reported to eat cereals, sugary products, oils and fats, vegetables and spices, condiments and drinks, such as tea or coffee. Most of the other food groups were reported to have been eaten by half of the households or less. We observed that the least consumed food groups are animal products like meat or eggs and fruits in this context.

Another way to assess food insecurity is to measure behaviours that are considered coping mechanisms for food insufficiency. The mean values for the reduced coping mechanisms index (rCSI) are shown in **Figure 49**, where higher values denotes greater food insecurity. As shown in the figure, we observed differences in food insecurity between the Wilayas of Laayoune and Smara, with greater values or food insecurity as denoted by greater rCSI values compared to Dakhla and Boujdour. In addition, Awserd show greater levels of food insecurity compared with Dakhla and Boujdour.

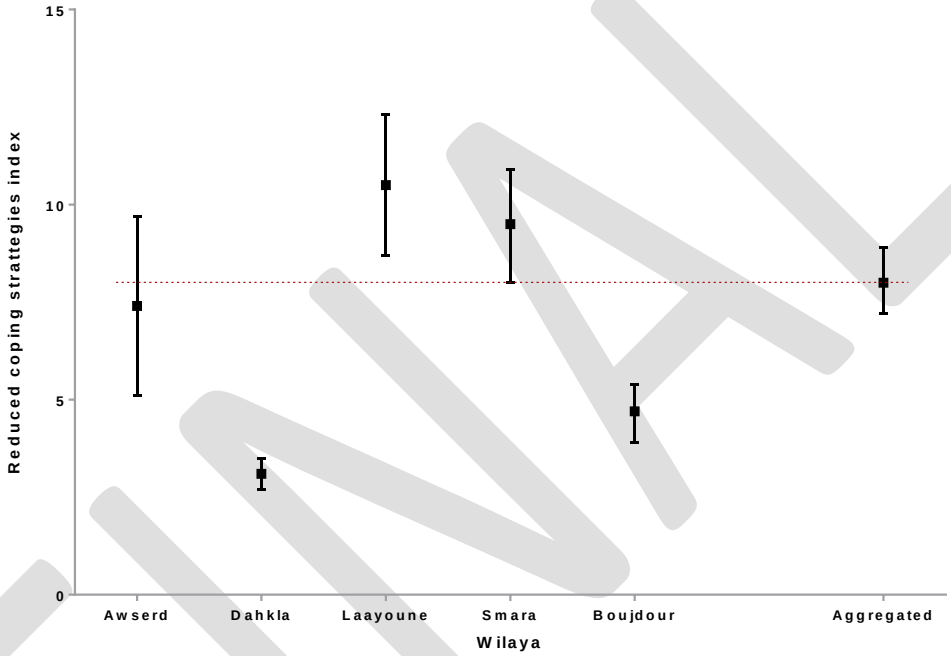


Figure 49. Mean reduce coping strategies index values shown by Wilaya (See table A21)

The proportion of households in each Wilaya that used each of the five coping strategies, used for estimating rCSI values, are displayed in **Figure 50**. We can observe that the most common coping strategy utilised by the majority of households in all five Wilayas was that of requesting food from friends or relatives. The utilisation of this coping strategy is so wide (about 80% of households) that it is difficult to understand whether this behaviour is a coping mechanism for food insecurity or a common cultural food practice. Nonetheless, we observe that Dakhla present a significantly lower prevalence for this behaviour that all other Wilayas.

Restricting food or feeding times does seem prevalent in this context and there are differences between Wilayas. More households in the Wilayas of Laayoune and Smara utilise these types of coping mechanism than in Dakhla or Boujdour. Awserd seems to stand between these two groups of Wilayas. The pattern above described for coping strategies suggest two issues. First, comparing the 95% CI of the mean rCSI values and the large proportion of households engaging in coping strategies in Awserd, Laayoune and Smara against those in Dakhla and Boujdour it suggest that the former Wilayas have greater wealth disparities. Second, that the Wilayas with the lowest rCSI values are also those that are smaller, suggesting that food resources might not be distributed adequately between Wilayas according to population.

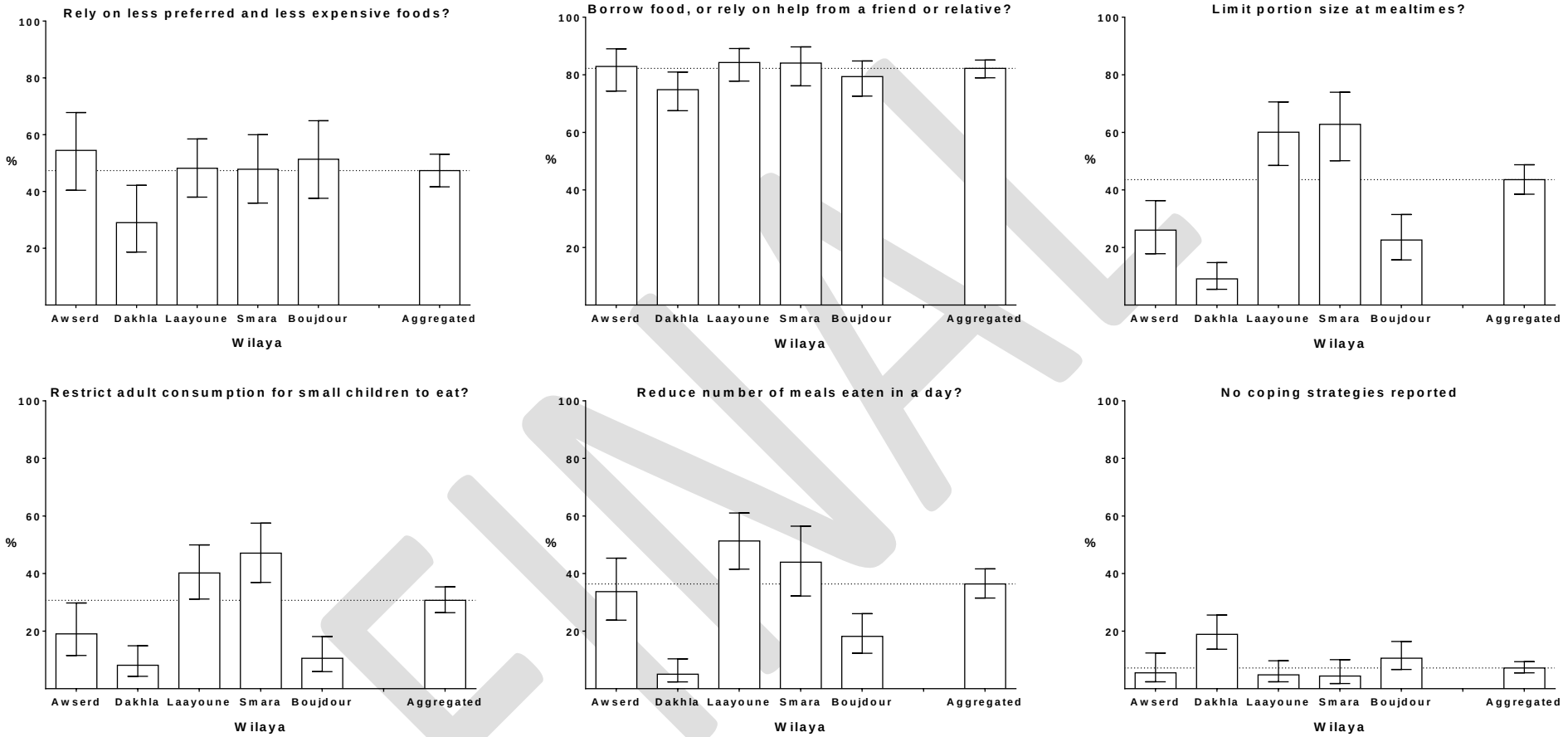


Figure 50. Proportion of households reporting using each coping strategies over the past 7 days (see Table A23).

Food security indicators for food diversity were also collected for women in childbearing age (15-49 years). **Figure 51** shows the mean values for WDDS in each Wilaya. Women on average in each Wilaya did not reached the minimum consumption of five food groups. Of note, only Laayoune and Boujdour presented significantly different average WDDS values.

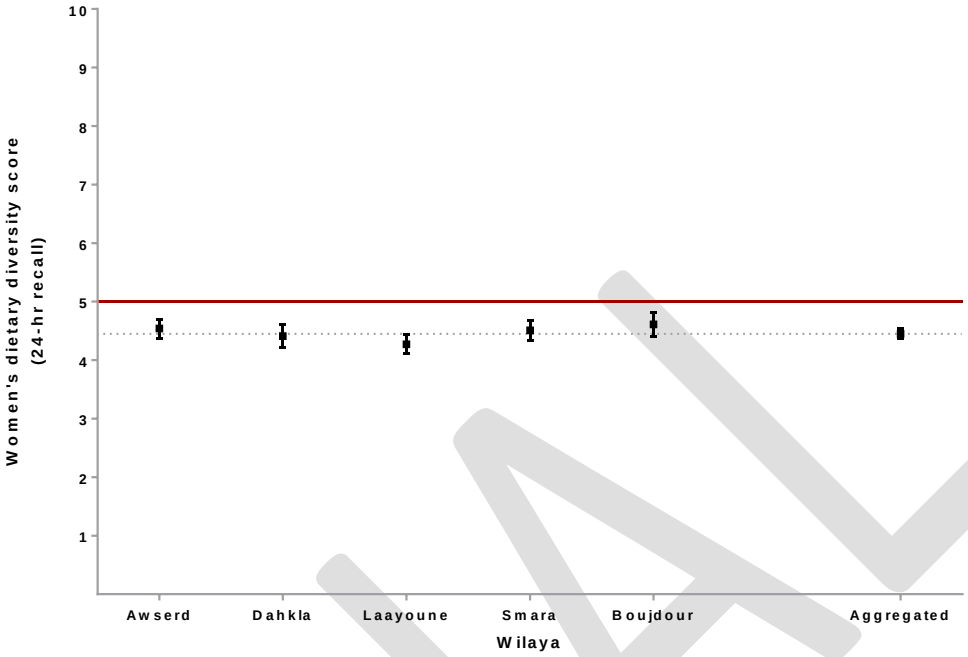


Figure 51. Mean women dietary diversity score values shown by Wilaya (See table A21)

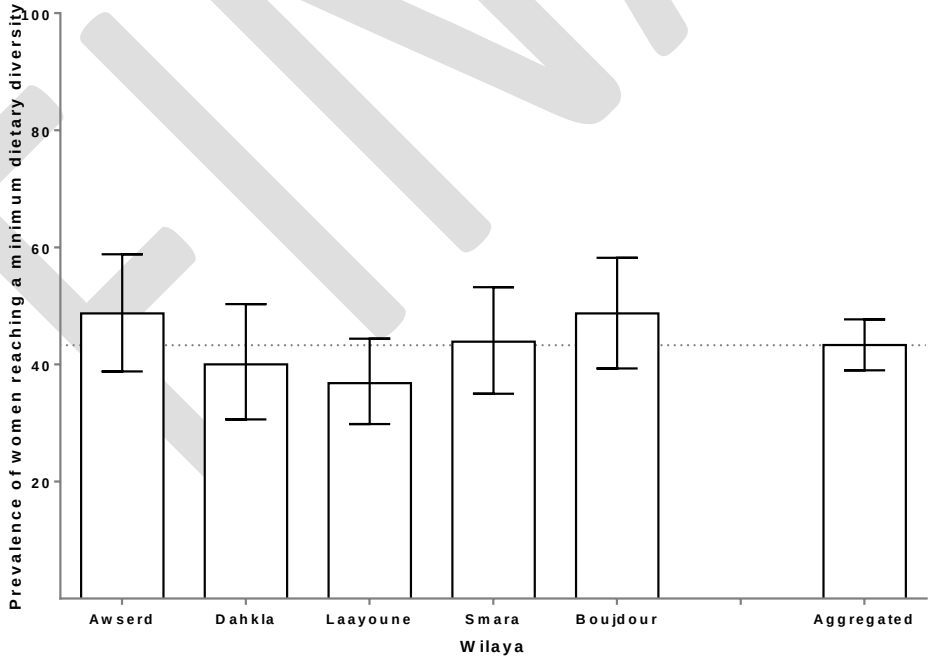


Figure 52. Proportion of women of childbearing age that reaches a minimum of dietary diversity (MDD-W). Results are shown by Wilaya (see table A22).

The proportion of women that did not reached the minimum of dietary diversity is shown in **Figure 52**. In agreement with the mean values of **Figure 51**, less than half of the women reached the minimum of dietary diversity in all Wilayas. The differences observed between Wilayas did not reach statistical significance.

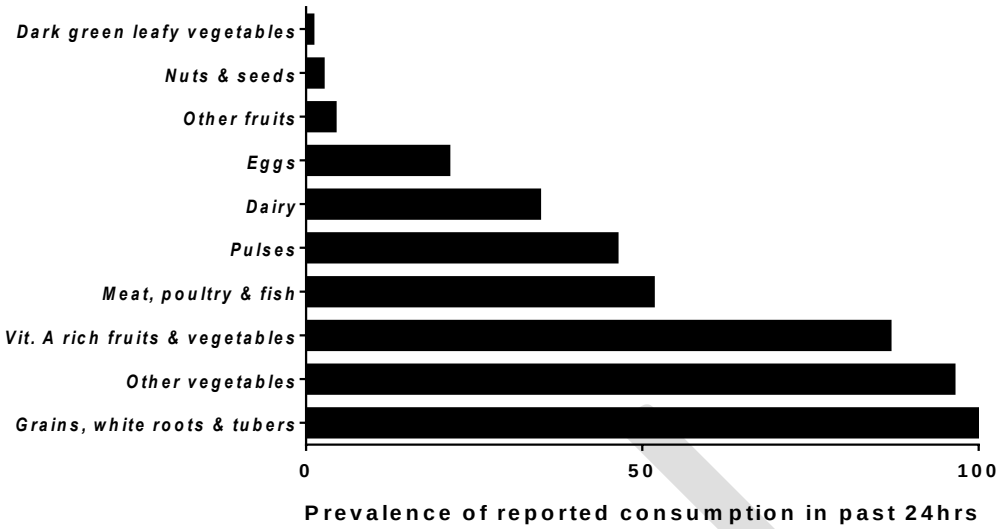


Figure 53. Reported prevalence of women's consumption of different food groups in the past 24-hour period.

The patter of food consumptions of women in childbearing age is shown in **Figure 53**. Overall, most women reported to have consumed in the past 24 hours cereals, roots and tubers, vegetables and vitamin A-rich fruits, while all other food groups were consumed by less than half of them. Interestingly, half the women consumed animal products such as meat.

3.9. NON-COMMUNICABLE DISEASES AND SMOKING

Data was collected on reported NCDs and smoking from all surveyed households, comprising a sample of about 7,500 adults of working age (25-64 years). We estimated prevalence of NCDs and smoking at the individual level, but also at the household level to assess the social burden and exposure.

At the individual level, the prevalence of reported diabetes, high cholesterol and high blood pressure, in addition to the prevalence of smoking are shown in **Figure 54**. Overall, about one in every five adults smokes and there is a 6%, 7% and 1% prevalence of diabetes, high blood pressure and high cholesterol, respectively. There were no differences in the individual prevalence of smoking between Wilayas but statistically significant differences were observed for diabetes, between Awserd and Dakhla, high cholesterol, between Laayoune and Boujdour, and high blood pressure, between Smara and Boujdour.

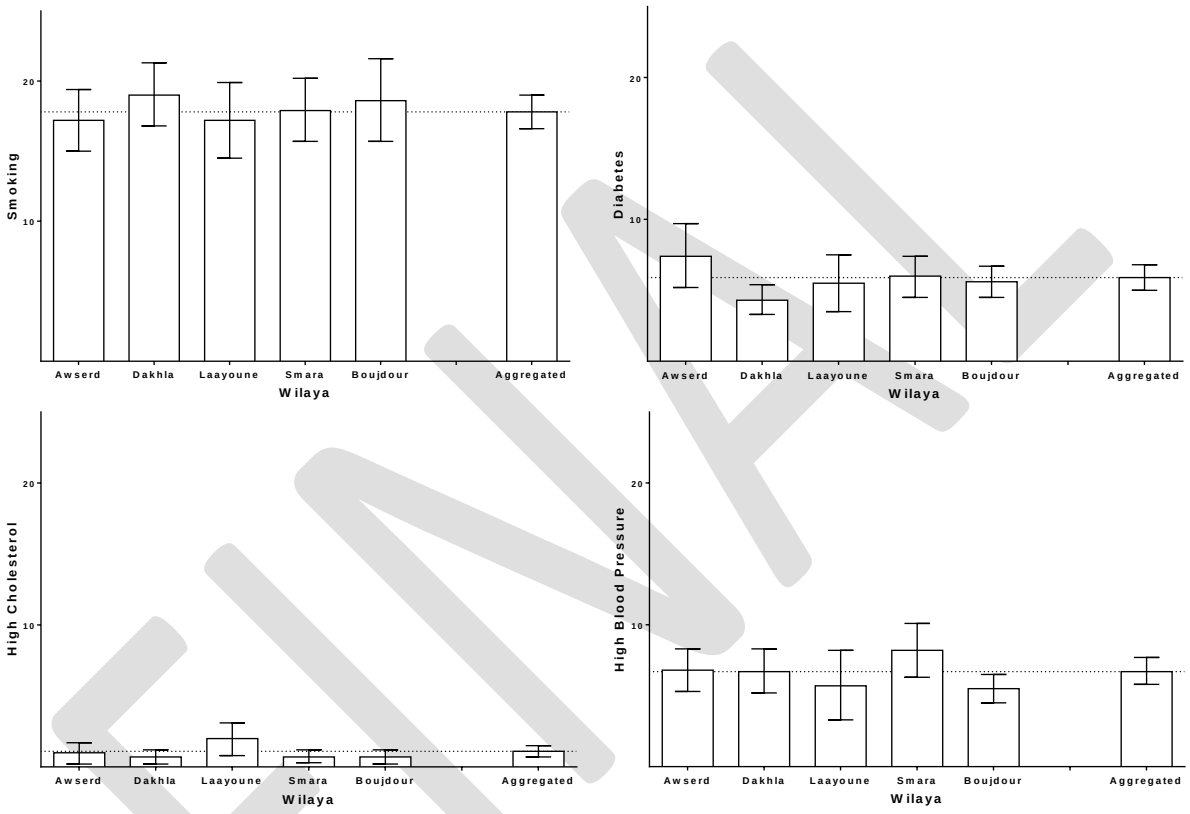


Figure 54. Individual prevalence of non-communicable diseases and smoking among adults aged 25-64 years (see Table A24).

Despite the seemingly low prevalence of NCDs among working-age adults, when assessed at the household level, estimates are higher displaying the societal exposure to NCDs and smoking in this refugee operation. Overall, about 40% of all households reported to have an adult, aged 25-64 years, suffering either diabetes, high cholesterol or high blood pressure (see **Table A24**). The household prevalence of NCDs and smoking are shown in **Figure 55**.

About half of the households had an adult that smoked, and this prevalence was significantly greater in Dakhla compared with Laayoune. Diabetes was reported to affect about one in five households, and its prevalence was greater in Awserd than in Laayoune and Boujdour. High cholesterol showed the lowest prevalence affecting about 4% of households and was no significantly different between Wilayas. Lastly, high blood pressure affected adults of working age also in about one in five households, with statistical differences observed between Smara and Laayoune only. As already mentioned, about four in every ten households had one adult with one of the three NCDs, with Awserd having a significantly greater proportion of households affected than Laayoune and Boujdour.

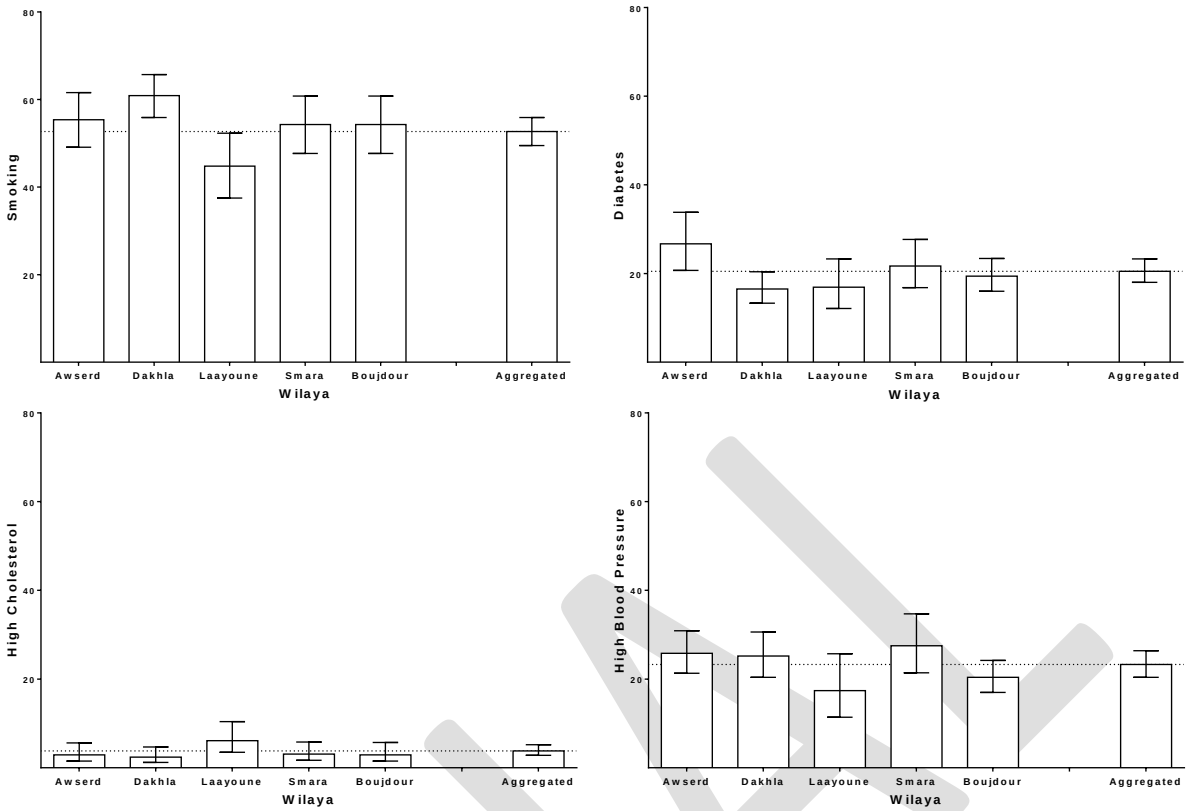


Figure 55. Household prevalence of non-communicable diseases and smoking among adults aged 25-64 years (see Table A24).

3.10. DIARRHOEA IN CHILDHOOD AND DIARRHOEA MANAGEMENT

We obtained the prevalence of diarrhoea, over the previous two-week period, from over 2,800 children aged <5 years. Overall, about 15% of these children presented diarrhoea during this period; ranging from 13 to 17%, in Boujdour and Awserd respectively, with no significant differences in prevalence observed between Wilayas (see **Figure 56**).

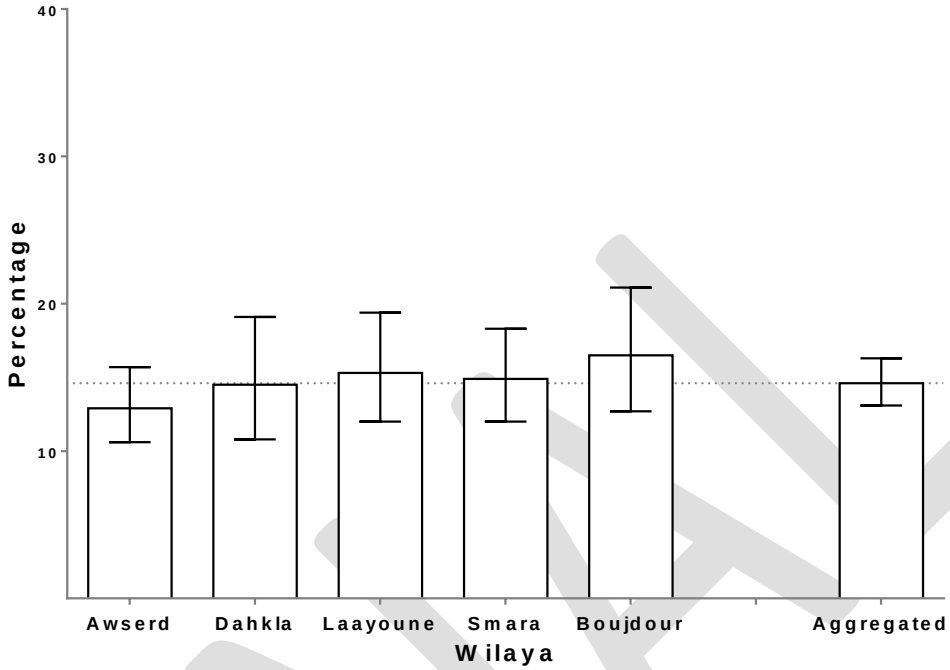


Figure 56. Diarrhoea prevalence in children aged <5 years. (See table A25)

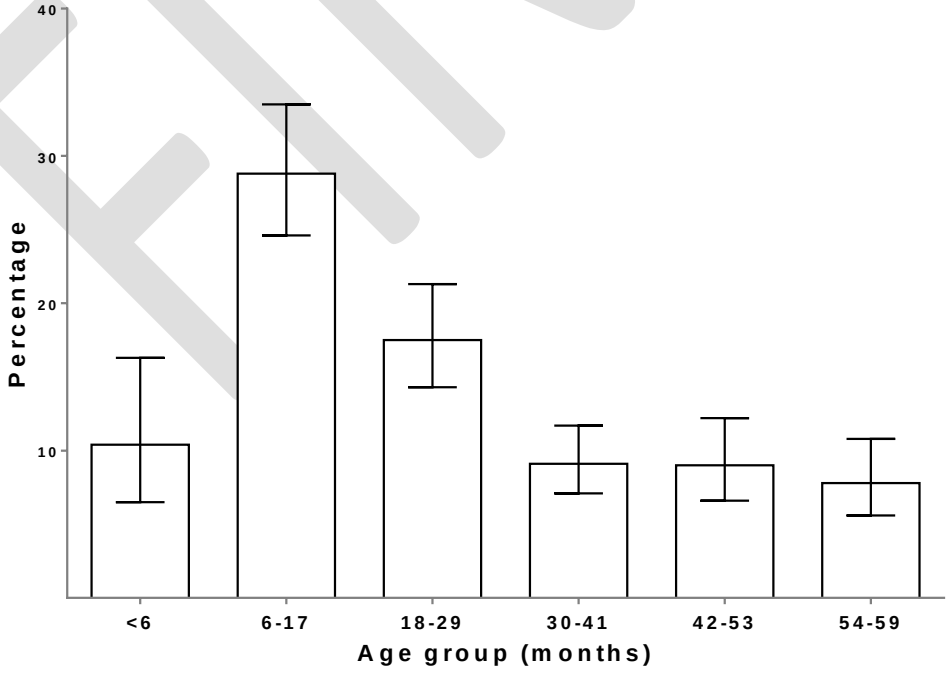


Figure 56. Diarrhoea prevalence in children aged <5 years by age group. (See Table A26).

Child's age affected the diarrhoea prevalence as observed in **Figure 56**. We observed a large increase of diarrhoea prevalence between the ages of 6-17 and 18-29 months strongly suggesting IYCF practices such as

weaning being a potential driver for this increase. Bottle-feeding was shown to be potentially an important factor affecting diarrhoea prevalence. The odds ratio for diarrhoea among bottle-fed infants aged <6 months was 8.09 (95%CI: 2.54; 25.7) compared to those not bottle-fed; and for bottle-fed children aged 6-11 months was 1.66 (95% CI: 0.99; 2.77) compared to those not bottle-fed.

The three rules for home diarrhoea management are (1) increase fluid intake, (2) continue feeding the same of 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 19% of children with diarrhoea are reported to have had their fluid intake increased, whilst worryingly, about 33% have had their fluid intake reduced, risking dehydration. Similarly, about 55% of children with diarrhoea had their food intake reduced against recommendations.

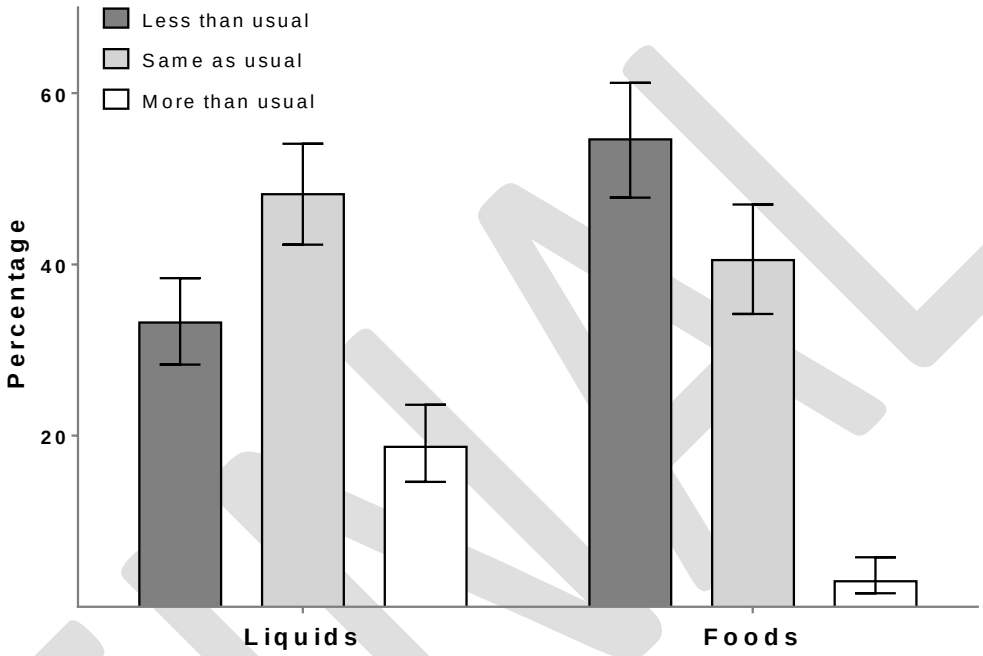


Figure 57. Feeding behaviours during diarrhoea episodes (see Table A27).

Health care seeking behaviours, an important aspect for an adequate management of diarrhoea, are presented in **Table 10**. Overall, only about half of children with diarrhoea were taken to a health centre or were given ORS, against recommendations. These low values suggest the need for interventions to improve care practices.

Table 10. Health seeking behaviours and point coverage for ORS in the past two weeks among children aged <5 years with diarrhoea. (sample of 412 children)

		Yes	No	Unknown
When the child had diarrhoea was she/he…				
...taken to a health centre?	(n) %	(231) 53.2	(175) 45.1	(6) 1.8
	95% CI	(47.5; 58.8)	(39.4; 50.9)	(0.8; 4.0)
…given oral rehydration solution?	(n) %	(197) 46.0	(210) 52.4	(5) 1.6
	95% CI	(39.9; 52.1)	(46.3; 58.4)	(0.7; 3.9)

3.11. MEASLES VACCINATION COVERAGE

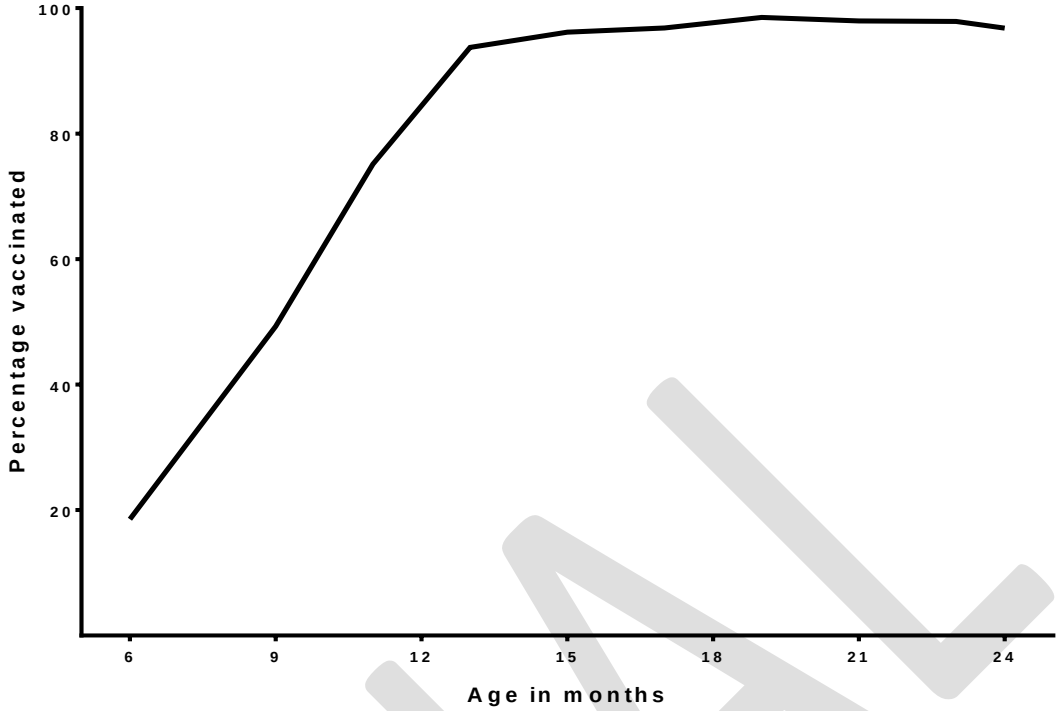


Figure 58. Trend of measles vaccination uptake in children aged 6-23 months.

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 12**. According to UNHCR guidelines, the vaccination coverage meets the standards of at least 95% 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 12 months that vaccination levels are 90% or above.

Table 12. Indicators of measles vaccination coverage, by different age groups.

Age group	n	mean	95% CI
6-15 months	503	68.8	(64.3; 73.0)
9-15 months	369	87.6	(83.8; 90.6)
12-23 months	518	97.0	(94.8; 98.3)
9-59 months	2,445	97.8	(96.5; 97.8)

3.12. ANTENATAL AND POSTNATAL CARE FOR PREGNANT AND LACTATING WOMEN

Overall, there was about 80% point coverage of antenatal and postnatal care for pregnant women and lactating women, normally within the first 6-months post-partum. We observed significant differences in this coverage between Awserd and Laayoune and Boujdour, with the latter having greater coverage (see **Figure 59**). We also observed that coverage seemed greater for lactating women that for pregnant women, but the difference did not reached statistical significance.

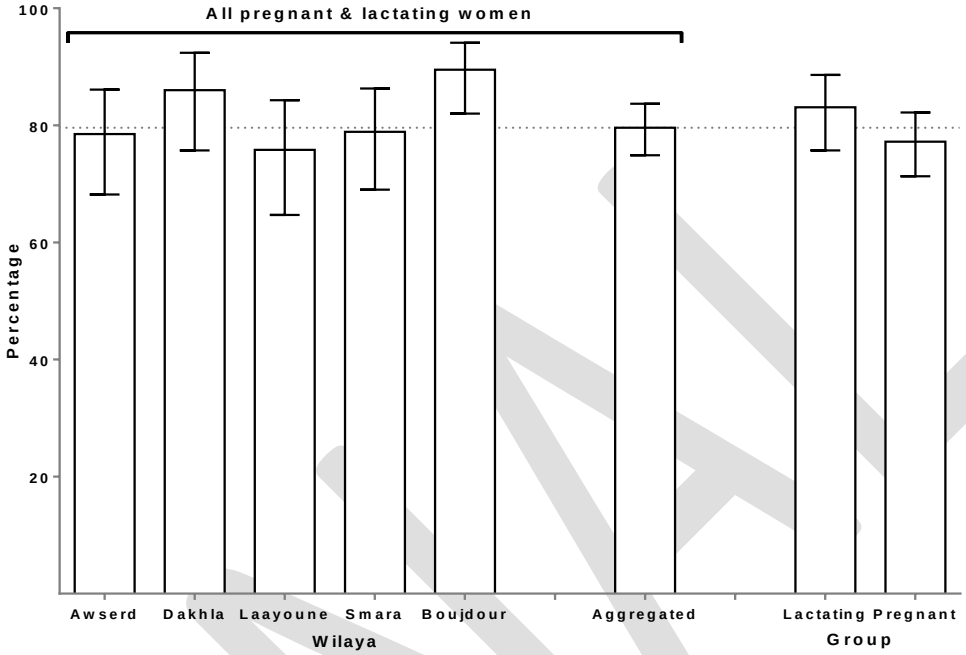


Figure 59. Point coverage of antenatal and postnatal care for pregnant and lactating women shown by Wilaya and women's status (see Table A28).

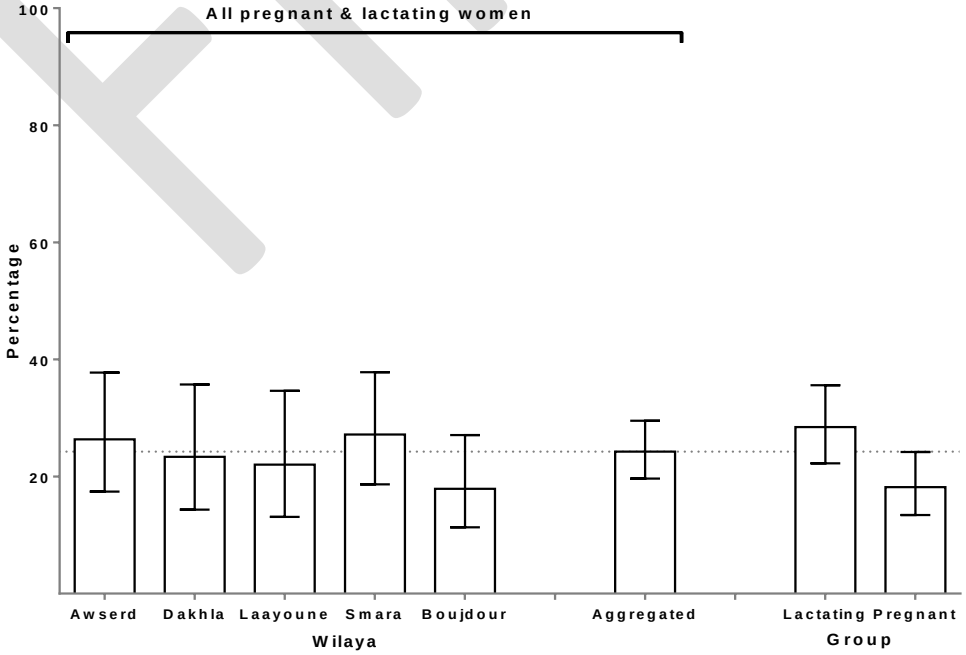


Figure 60. Point coverage of receiving Chaila from the antenatal and postnatal care programme for pregnant and lactating women shown by Wilaya and women's status (see Table A29).

Among PLW, we collected data regarding the point coverage of receiving iron supplementation in the forms of either iron drop or the local multiple micronutrient supplement called Chaila (see **Table A29**). We observed similar levels of point coverage for both iron-supplements overall and by Wilaya (see **Figure 60** were only the Chaila coverage is shown). We also compared point coverage by women status, and observed a significant difference between the two groups, with pregnant having significantly greater point coverage. Overall, Chaila coverage is much lower than the recommended UNHCR coverage of 70%.

We assessed uptake of both iron supplements and the acceptability of Chaila among PLW (see **Table 13**). We observed a greater uptake of Chaila compared with iron-drops, oils or syrup. Unfortunately, the sample was not large enough to undertake statistical tests. The greater uptake for Chaila was observed for both pregnant and lactating women, being this greater in the latter group. In addition, Chaila uptake, here used as a proxy measure for adherence, reached the recommended UNHCR minimum of 70%

Overall, among those that received Chaila, acceptability was high, being this greater among pregnant women. Nonetheless, given the restricted sample size, no statistical tests for the difference were undertaken.

Table 13. Uptake and acceptability of specific blanket antenatal care activities for pregnant or lactating women (PLW) of childbearing reported as enrolled in antenatal care. Results are shown by women status.

		Pregnant	Lactating	Combined
If received, took of iron/folate pills, drop or syrup yesterday?	N	89	36	125
	(n) %	(59) 68.6	(21) 54.7	(80) 64.5
	95% CI	(56.3; 78.7)	(35.9; 72.3)	(53.3; 74.3)
If received, took Chaila in the past 7 days?	N	85	46	131
	(n) %	(67) 78.0	(35) 75.4	(102) 77.2
	95% CI	(69.2; 84.8)	(59.7; 86.4)	(69.3; 83.6)
If received, would want to receive Chaila again?	N	82	45	127
	(n) %	(78) 94.7	(38) 81.1	(116) 90.4
	95% CI	(87.6; 97.9)	(64.9; 90.9)	(82.9; 94.9)

3.13. COVERAGE OF ACUTE MALNUTRITION CARE

We assessed point and period coverage for acute malnutrition care for children aged 6-59 months (either with moderate or severe acute malnutrition, as determined by weight-for-length/height z-scores, oedema or MUAC data), and for PLW with acute malnutrition (as indexed by a low MUAC) (see **Table 14**).

Table 14. 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 z-scores and/or MUAC <12.5 but ≥11.5 cm)	N	164	171
Coverage of MAM care	(n) %	(9) 7.2	(16) 11.2
	95% CI	(3.5; 14.4)	(6.5; 18.7)
Children with SAM (WHZ <-3 and/or oedema and/or MUAC<11.5 cm)	N	21	34
Coverage of SAM care	(n) %	(3) 15.7	(16) 52.7
	95% CI	N/A	N/A
PLW with acute malnutrition (MUAC <23.0 cm)	N	24	63
Coverage of malnutrition care	(n) %	(5) 20.3	(44) 70.9
	95% CI	N/A	(54.5; 83.1)

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

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, 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 its care, we could not performed comparisons between Wilayas to assess local variations on coverage for malnutrition care.

3.14. WATER, SANITATION AND HYGIENE

Data for water and sanitation indicators was collected from 1,045 households in the five Wilayas. On average, it was reported that six people were living and sleeping in the household the night before being surveyed (see **Table A30**). In addition, on average, households had a water storage capacity of about 3,000 litres and had their water tanks refilled every 22 days. Most Wilayas showed similar values for storage capacity and refill frequency but Laayoune and Dakhla, the former having, on average, a significantly lower water storage capacity; and the latter a significantly greater refill frequency.

The prevalence of households meeting the UNHCR standards for water provision (20 litres/person/day) is shown in **Figure 61**. On average about 52% of households had reported water provision that reached this standard. However, there were significant differences between Wilayas with three levels of prevalence of meeting the standards. Dakhla had the greatest level, Boujdour and Awserd had then a lower level, whilst both Laayoune and Smara had the lowest level.

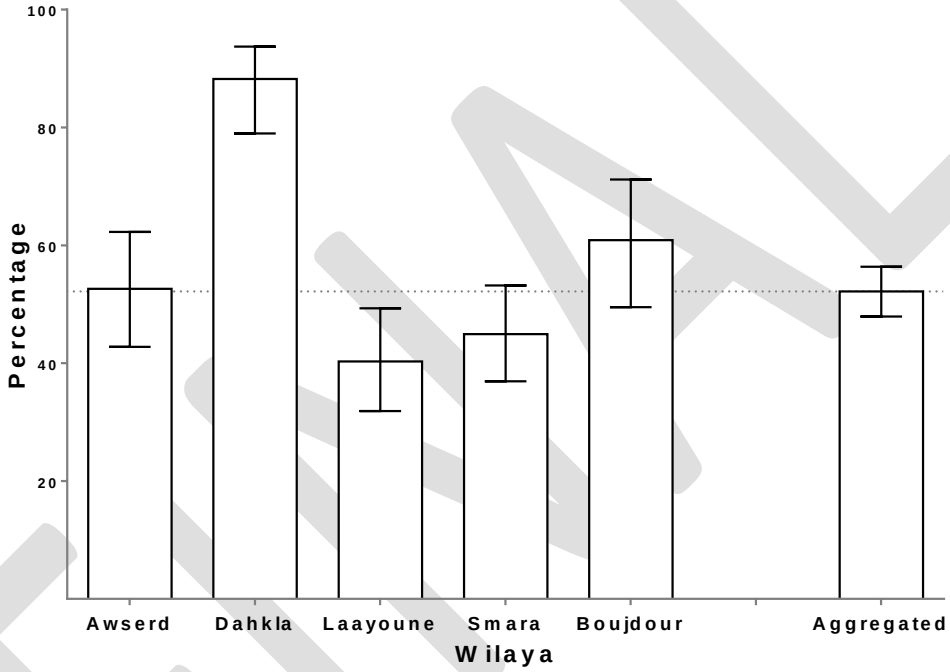


Figure 61. Prevalence of households meeting the UNHCR standards for water provision of 20 litres/person/day (see table A30).

Household satisfaction with the water supply showed the same pattern than that observed for meeting UNHCR standards of water provision as shown in **Figure 62**; although differences between Wilayas 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 Awserd, Laayoune and Smara. Boujdour had greater levels of reported satisfaction than the latter three Wilayas, but this level was lower than the observed prevalence of households meeting UNHCR water provision standards.

Interestingly, there seemed to be observable differences in the variance of satisfaction with the water supply, as indexed by the 95% CI. We observed that the 95% CI are narrower in Smara and Dakhla, suggesting a more homogenised perception about their water supply, albeit in opposite sides of the satisfaction scale. In contrast, Awserd and Boujdour had wider 95% CI suggesting more heterogeneity regarding their water supply satisfaction.

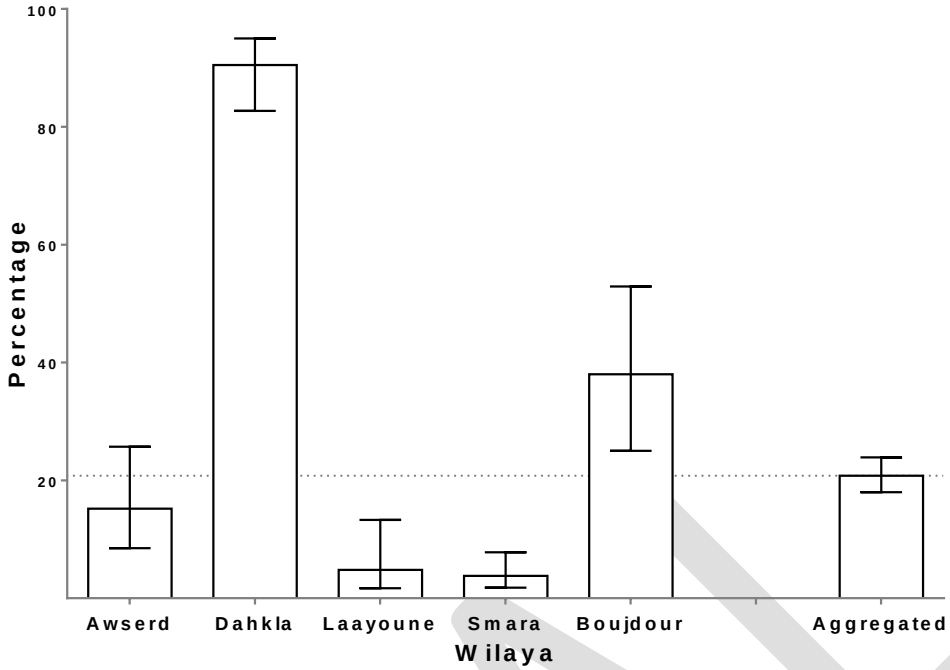


Figure 62. Prevalence of households reported satisfaction with the water provision service (see table A30).

The majority of households reported to receive water from tanker trucks (about 62%) with the remaining having access to a piped water network (see **Table A31**). There were differences between Wilayas regarding the mains sources of household water, with Awserd, Dakhla and Smara having greater prevalence of access to the piped network and Laayoune and Boujdour reported to receive water almost entirely from tanker trucks.

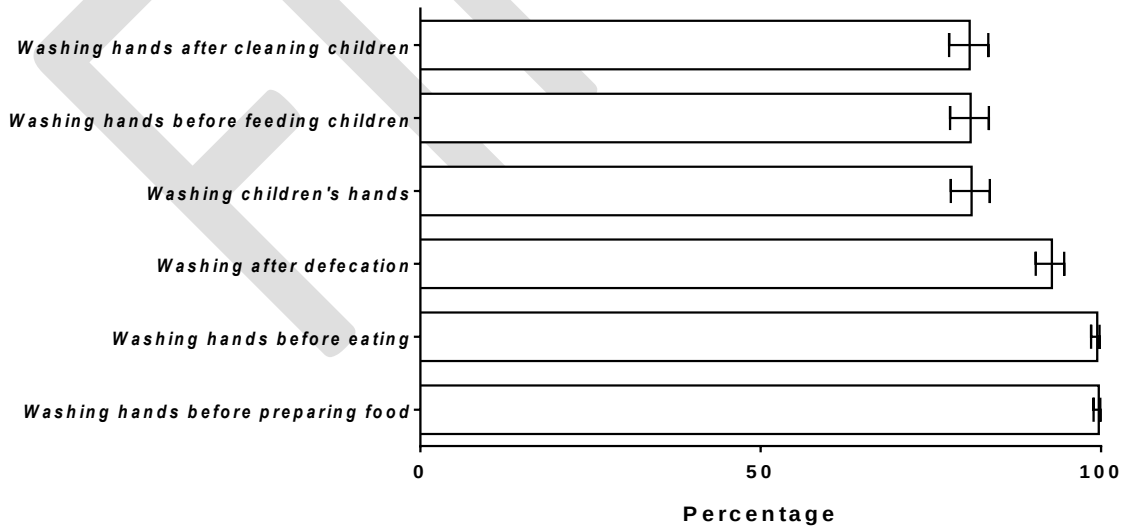


Figure 63. Reported use of soap in household (see Table A32)

The large majority of households reported to have one container for storing water, although about 10% reported to have more than one container, with no statistical differences between Wilayas. The main materials of these containers were plastic and metal, 63% and 35%, respectively (see **Table A31**). Concrete water containers were rare, about 1%, and only reported by the households in the Wilayas of Laayoune,

Smara and Boujdour.

The majority of households (98%) reported the presence of soap. The prevalence of different hygiene practices with soap use are presented in **Figure 63**. Basic hygiene practices such as washing hands before preparing or eating food was almost 100% with little differences between Wilayas. There was about 7% of households that reported not washing hands with soap after defecation (see **Figure 64**) and this proportion was significantly greater in Dakhla that Awserd, Laayoune and Smara, but not Boujdour.

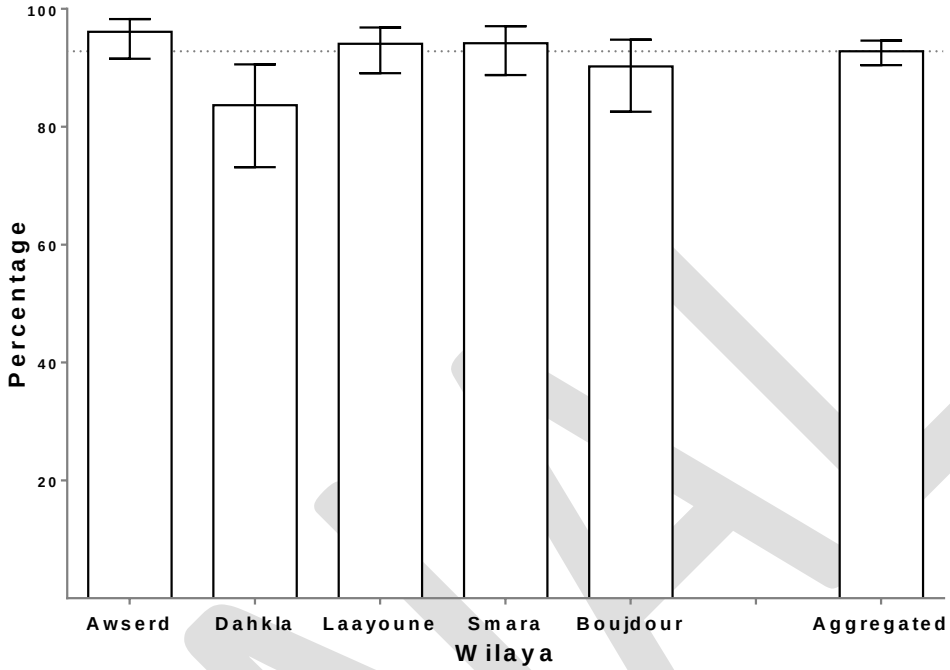


Figure 64. Prevalence of soap use for <u>washing hands after defecation</u>. Results shown by Wilaya (see Table A32).

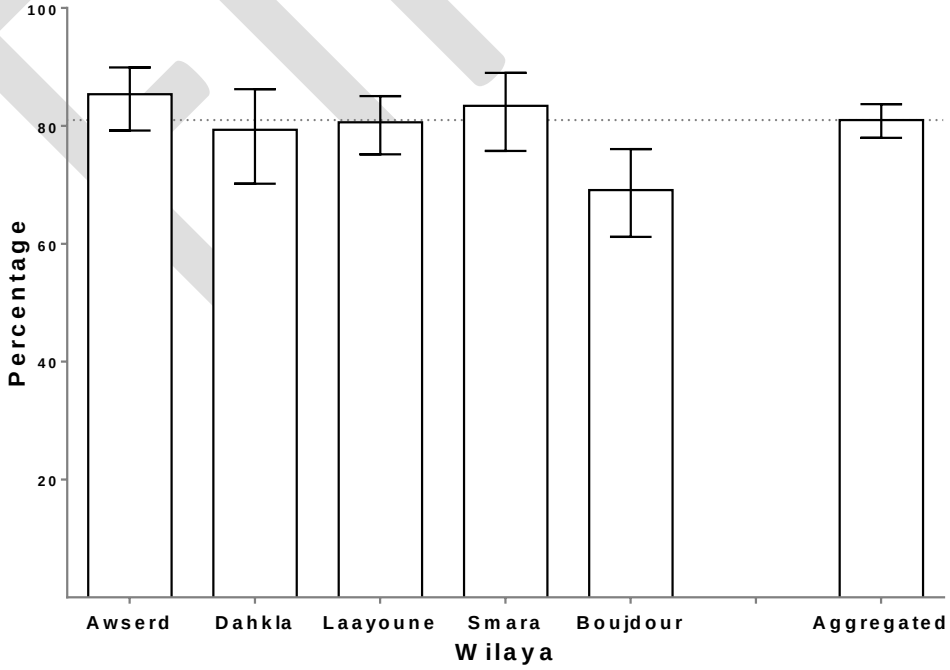


Figure 65. Prevalence of soap use for <u>washing children's hands</u>. Results shown by Wilaya (see Table A32).

Soap usage is observable lower when dealing with children than for other hygiene practices (see **Figure 63**). We observed differences by Wilaya in soap utilization for children's hygiene as shown in **Figure 65**, **Figure 66** and **Figure 67**. Boujdour had a significantly lower prevalence of soap utilization for washing children's hands, for washing hands before feeding children, and for washing hands after cleaning children. The large majority of households reported having access to a latrine (see **Table A33**) and only a very small proportion of households (0.3%) reported to engage in open defecation.

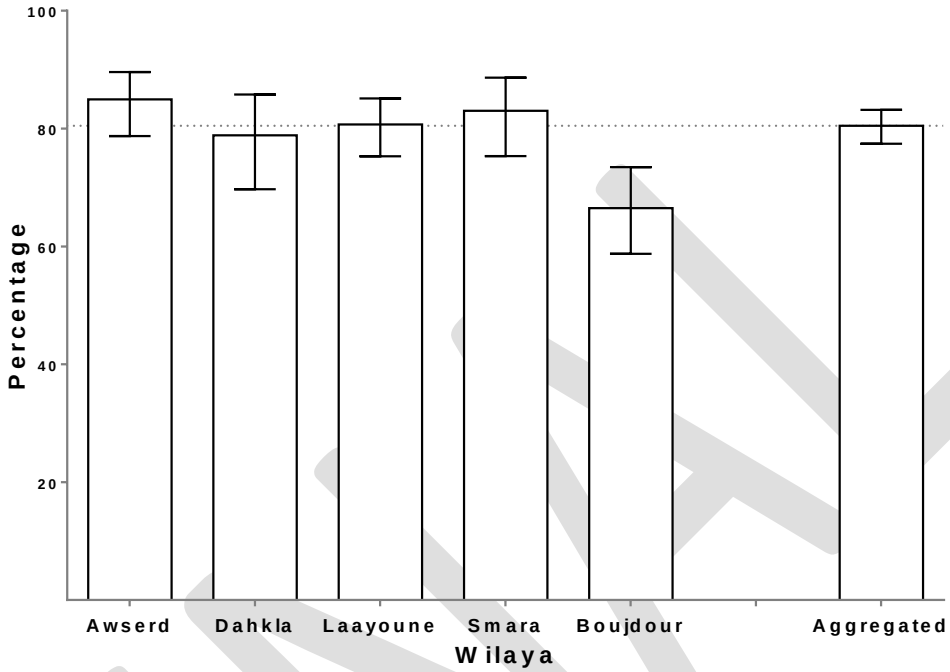


Figure 66. Prevalence of soap use for <u>washing hands before feeding children</u>. Results shown by Wilaya (see Table A32).

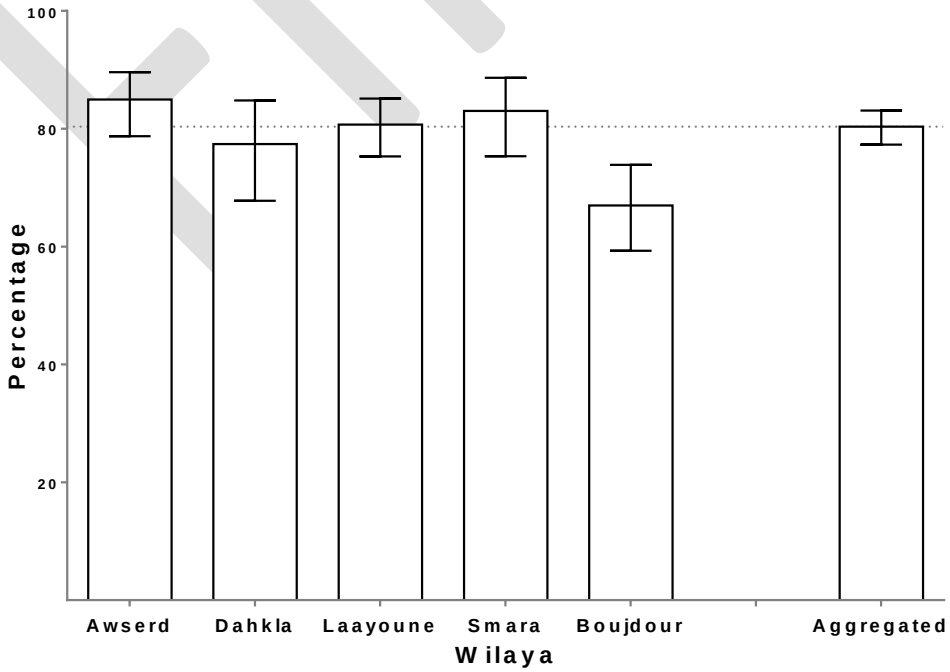


Figure 67. Prevalence of soap use for <u>washing hands after cleaning children</u>. Results shown by Wilaya (see Table A32).

About 66% of households reported having children aged <3 years whose stools need to be managed (see **Table A34**). Of those households with children, the majority reported children passing stools in nappies (70%) and some using the latrine (19%) or a potty (9%). A small proportion (1%) reported that their children passed stools outside in the open (**Figure 67**).

We observed some differences between Wilayas regarding management of children's stools. In Dakhla, a lower proportion of children aged <3 years used the potty. In addition, in spite of a very low prevalence, Dakhla and Boujdour have a greater proportion of children aged <3 years passing stools in the open.

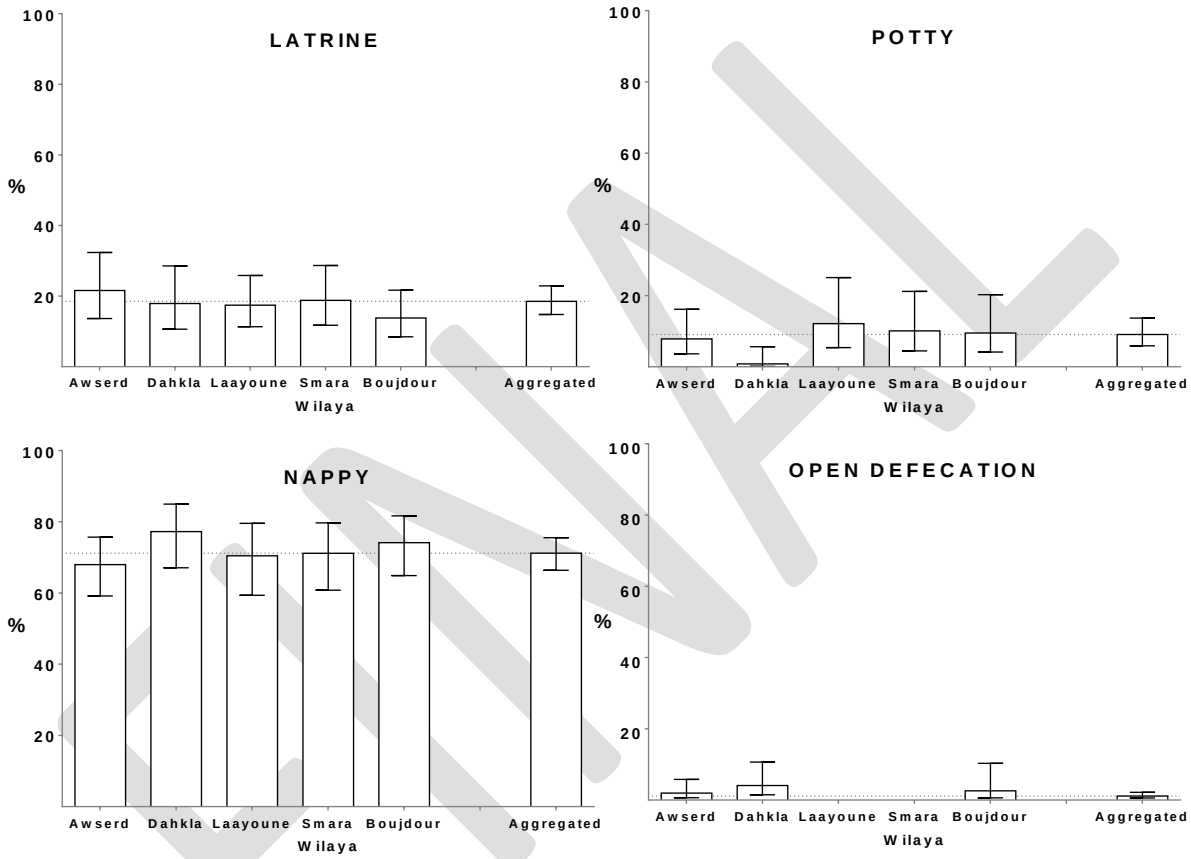


Figure 67. Where did children aged <3 years last pass stools? Results are shown by Wilaya (see Table A34).

Lastly, about 72% of households disposed of these stools into the garbage and 28% put them into the latrines (Table 34), identifying garbage management as an important area of sanitation.

IV. SECONDARY DATA ANALYSIS

4.1. UNDERLYING CAUSES OF MALNUTRITION

Additional secondary data was gathered to obtain an insight on the underlying causes of malnutrition. Data was available for two known underlying causes of malnutrition, namely unhealthy environment and household food insecurity.

4.1.1. Unhealthy environment: Water, Sanitation and Hygiene (WASH)

Inadequate WASH conditions facilitate ingestion of faecal pathogens, which leads to diarrhoea, intestinal worms and environmental enteric dysfunction, the three key pathways from poor WASH to undernutrition.

The WASH mission carried out in 2012 and the JAM in 2013 reported that, despite good quality water at treatment stations, high risk of water contamination at household level was of critical concern. This was due to the poor practices of water storage at household level and the inadequate conditions of the tankers carrying water. In addition, the quantity of water available in many households was also insufficient to satisfy daily needs.

Because of the above concerns, efforts to improve WASH services delivery were scaled, and the water system and supply of quality water is described to have substantially improved in last years. The quantity of water distributed has increased from 15 litres/person/day in 2012 to 18 litres/person/day in 2015, and seventeen trucks were replaced between 2011 and 2015[43]. Likewise, with the expansion of the water networks, it was reported that around 90% refugees had access to water within 250 m from water points, while in 2012 only 50% of the population was living 150 m from water points. In addition, to improve refugee hygiene conditions, a soap workshop was established in 2013, actually covering the needs of public institutions and the blanket distribution of 250mg of soap to all refugees –the latter started in December 2015. However, household best quality containers replacement is on-going[44], majority of water storage tanks still are in poor conditions (poorly maintained metallic rusty tanks, among others).

The KAP survey on water, sanitation and hygiene conducted in November 2016[45] describes that 64% households are not satisfied with the refilling period of their water tanks and, though the average quantity of water available was 19.6 litres/person/day, it was found in the range of 8 to 45 litres (the lower quantities reported in Laayoune, Boujdour and Awserd). The survey also highlights the importance of water treatment practices at the household level, as water treated and distributed to the population is generally stored under poor conditions and for a considerable period. In this regard, the survey describes that the commonest practice of households (62%) is washing the water tanks once a month (though it remains unknown how cleaning is performed), but 27% households never wash it or only clean it once a year. Water treatment is neither a common practice, with only one fourth of the household reporting to treat the water before drinking (either through boiling, using disinfection products or by filtration). Regarding hand washing practices, 89% seemed to know three critical hand-washing times.

Yet, knowledge of the importance of handwashing does not necessarily mean putting into practice. As an example of this, the study conducted by WSRC/SRC in March 2016 found that, despite all respondents mentioning the importance to wash hands after defecation, only 77% had water stored in the toilet facility. Furthermore, 70% of households considered that washing hands before feeding with only water could be enough. Both studies concluded that hygiene related knowledge, attitudes and practices remain very weak.

[43] WFP/UNHCR Joint Assessment Mission Saharawi Refugee Camps. April 2016

[44] UNHCR is producing water storage tanks with most durable material (Ferro-cement) for the most vulnerable households in order to replace all damaged tanks gradually.

[45] WASH Draft Survey Report, Knowledge, attitudes and practices in Saharawi Refugee Camps. UNHCR; January 2017.

4.1.2. Household Food Insecurity

4.1.2.1. The General Food Distribution Ration and the Food Security Stock

The distribution records for the period covered in the survey were obtained from WFP[46] and UNHCR[47] and were analysed for macro and micronutrient content using NutVal version 4.1. The records include foods supplied by WFP (basic food ration) and other donors (complementary ration comprising mainly fresh products and mackerel).

On average since 2009[48], the total energy provided by the basic food ration remained stable above 2,000Kcal. In addition, since 2013, except for the year 2015, it has provided over the 2,100 Kcal minimum energy requirements (2,281 Kcal in 2013, 2,187 Kcal in 2014, 2,073 Kcal in 2015 and 2,128 Kcal in 2016[49]). **Figure 4.1** illustrates trends on total energy provided by the food ration (basic + additional commodities) supplied since 2009 (data updated until November 2016), comprising WFP and other donor´s commodities.

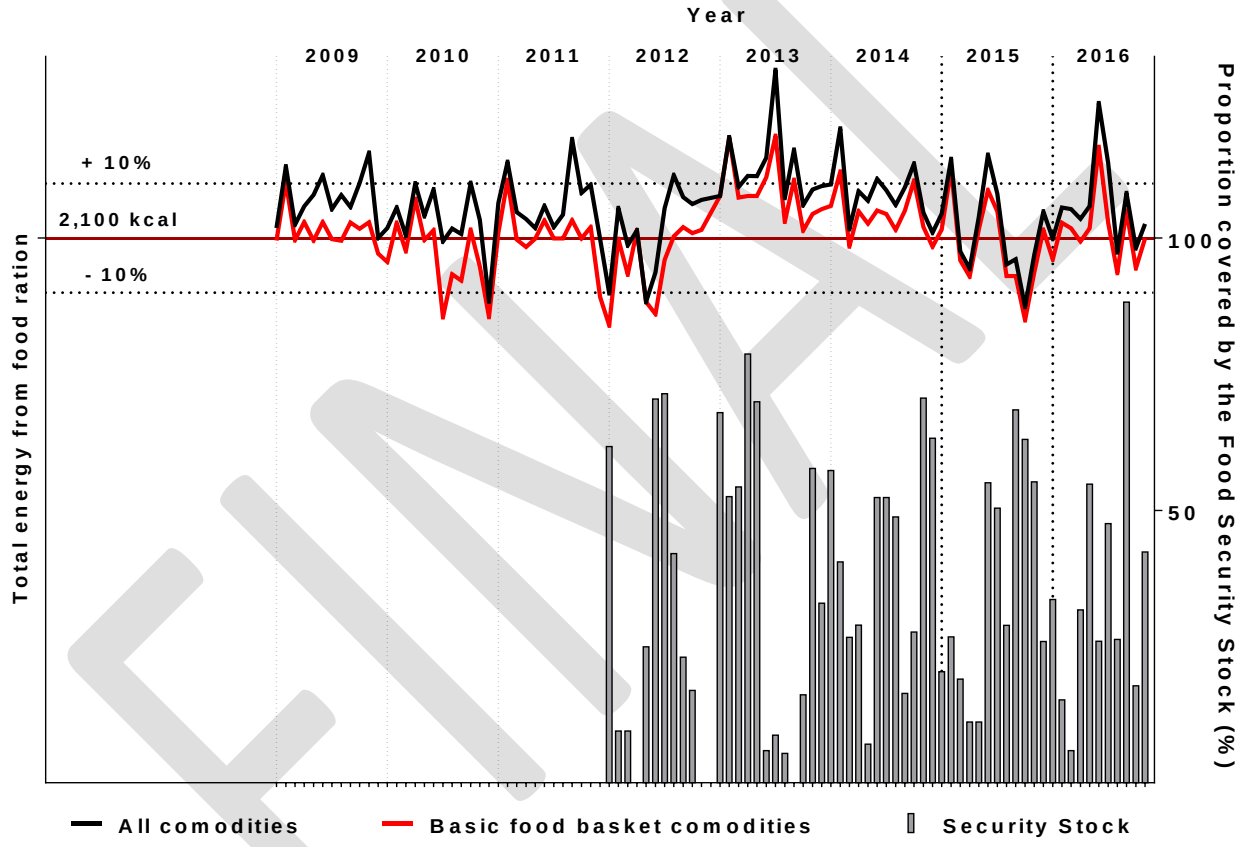


Figure 4.1. Food ration's energy provision (basic and all commodities) for the period 2009-2016.

The average total energy provided by the food ration (including fresh products) has steadily decreased since 2013, though it has still remained above the 2,100 Kcal minimum energy requirements all the years (2,366 Kcal in 2013, 2,278 Kcal in 2014, 2,132 Kcal in 2015 and 2,224 Kcal in 2016). As it can be observed in **Figure 4.1**, the food rations distributed consistently reached 100% energy requirements in 2013 and 2014, while from there on in eight distributions (six in 2015 and two in 2016) daily energy requirements met were in the range of 85% to 98%. In 2016 the average energy content improved[50] again, however this trend suggest an increasing uncertainty affecting the food pipeline to secure the 2,100 Kcal minimum requirement.

[46] WFP Planned versus Action (PVA) files
[47] ARC monthly distribution reports were made available by UNHCR.
[48] 2112 kcal in 2009, 2056 kcal in 2010, 2115 kcal in 2011, and 2020 kcal in 2012 (up to November).
[49] Up to November 2016.
[50] Average of 2224 kcal in 2016 against 2132kcal in 2015

During the four-year period (2013-2016) the basic food ration was below 2100 Kcal in eleven distributions (two in 2014, six in 2015 and three in 2016). It is worth to note that in three of those distributions (two in 2014 and one in 2016) minimum energy requirements were reached when adding up the additional commodities[51], thus highlighting its importance not only to improve the overall quality of the diet in terms of micronutrients but also in ensuring the minimum energy content is reached.

As it can be observed in the **Figure 4.1**, the food security stock (FSS) plays a very important role in ensuring that the 2100 Kcal minimum requirement is met. Each year since 2013, the average energy contributed by the security stock to the GFD of that year ranges from 35.4% to 37.5%, with only one month not contributing energy to the food distributions, while in nineteen distributions it has contributed more than 50% of the total energy provided. The crucial role of the FSS in ensuring stability of food distribution is evident from **Figure 4.1** and it is likely that this sustained stability that has been experienced now for over eight years (see **Figure 4.2**) must has strongly contributed towards the observed improvements in nutritional indicators.

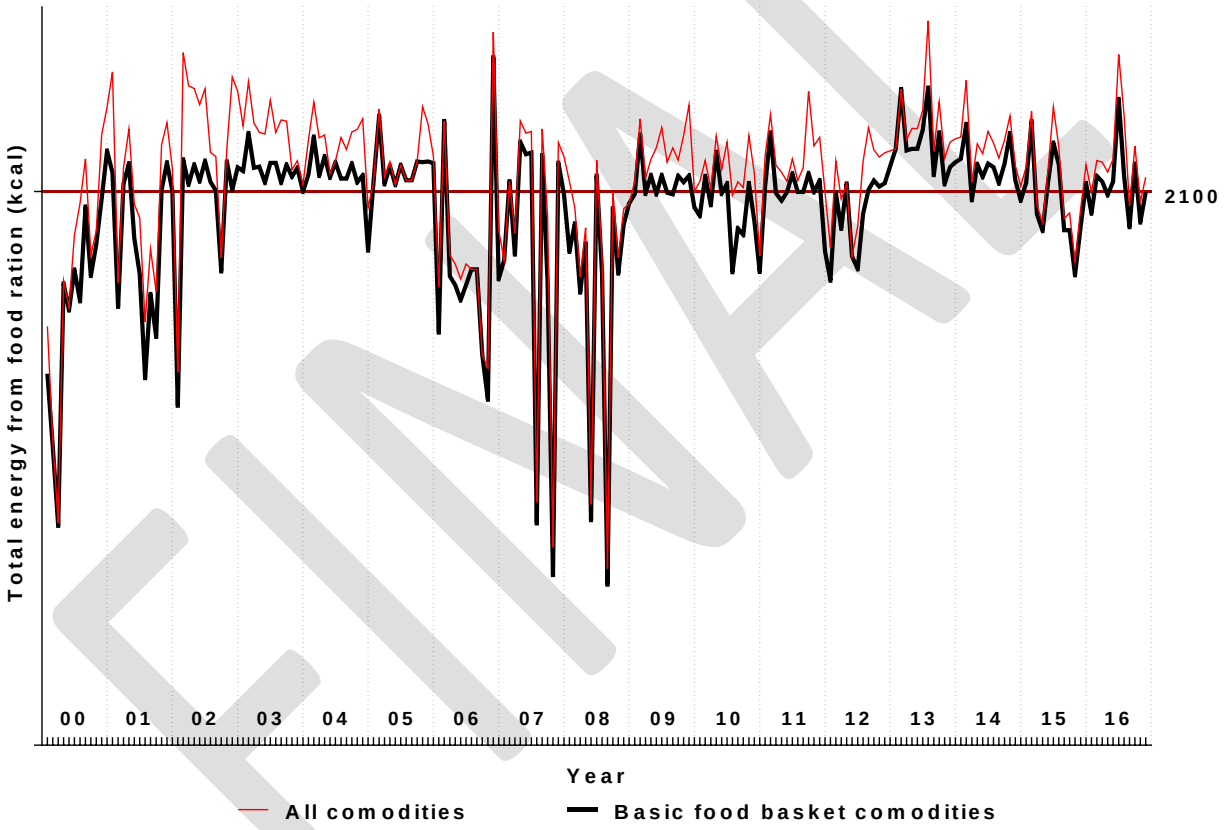


Figure 4.2. Food ration's energy trend (basic commodities and total) for the period of 2000-2016.

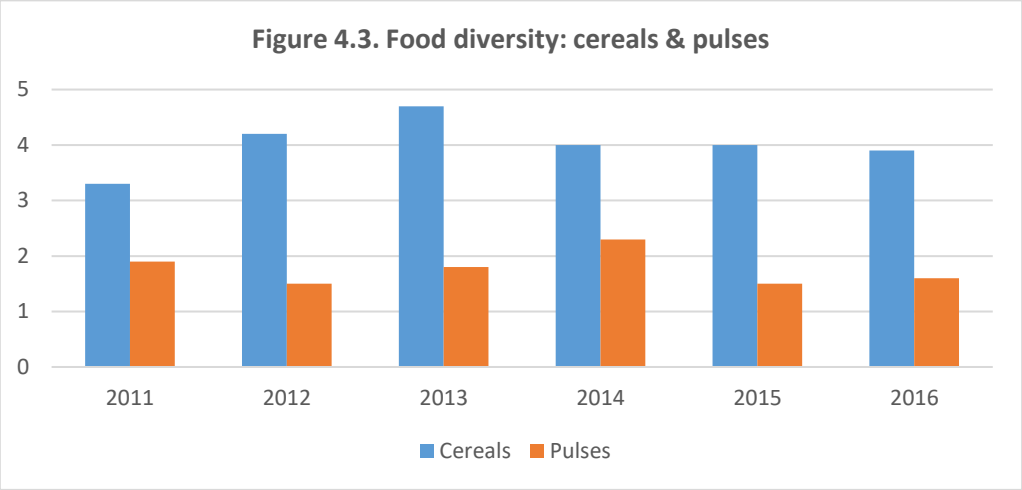
Food diversity

The review of the GFD data available reveals that, during the last years, no less than 11 commodities were distributed[52] including 3-5 different types of cereals, 1-3 different pulses, 2-5 fresh products, CSB and canned fish[53] and yeast in most months. However, the supply of these commodities is not always consistent leading to variations in the composition of the ration.

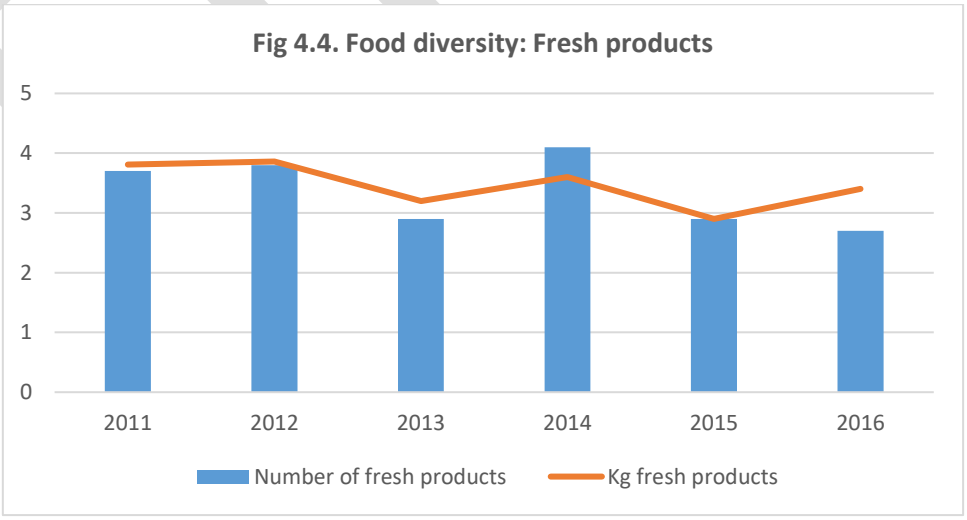
Diversity of cereals and pulses, two of the main commodities in the GFD, is shown in table 15, and **Figure 4.3** shows trends over the last years. Overall, while diversity of cereals improved in 2013 reaching a monthly

[51] Mean values of additional commodities: 85 Kcal in 2013, 90 Kcal in 2014, 56 Kcal in 2015 and 97 Kcal in 2016.
[52] On average, 13.1 items in 2013 (range 8-16), 13.5 in 2014 (range 11-16), 11 in 2015 (range 9-14) and 12 in 2016 (range 10-14).
[53] Canned fish unavailable in 2015

average of 4.2 commodities, it decreased and remains stable since 2014 with a monthly average of 3.9 cereals. Diversity of pulses also improved from 1.5 items per month in 2012 to 2.3 in 2014, though decreased again in 2015 and remains stable since with an average of 1.6 commodities.



Regarding fresh foods, table 16 compiles fresh food distributions in the period 2013-2016, and **Figure 4.4** below illustrates trends of number and kilograms of distributed fresh items since 2011 and up to date. In the figure it can be observed that, overall, despite improvements in 2014[54], diversity of fresh products (as well as the number of kg) during the last four years has been kept at a lower level when compared to 2012, where the food basket contained on average 3.9kg per month through the provision of an average 3.8 fresh items. Overall, in the period 2013-2016, there is an average of 3.2 fresh food items and 3.3kg distributed per month, with potatoes, onions and carrots accounting for the majority of these fresh foods[55]. When any of these three specific fresh items is not available, the gap is mostly compensated by the presence of other fresh commodities; however, un-covered monthly gaps are observed more frequently since 2015 (see table 16). The above-mentioned results contrast with the recommendation of at least 10kg/month[56]



[54] Mean values of 3.6kg and 4.1 fresh items.
[55] Other fresh foods distributed sporadically as part of the food basket include tomatoes, cucumber, beetroot, pepper, dates, zucchini and fruits (pear, orange or apple).
[56] WSRC / CISP, Food Aid Western Sahara Red Crescent "Mesa" presentation 14-15 November 2010.

Table 15: Number of items of cereals and pulses distributed during the period of 2013-2016 *(empty spaces are 0).*

Cereals	2013													2014											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Mean**	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Mean**
Wheat	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	
Barley	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	
Rice	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	
CSB+	x	x		x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	
Gofio	x	x	x	x	x	x	x	x	x																	
Total	**5**	**5**	**4**	**5**	**5**	**5**	**5**	**5**	**5**	**4**	**4**	**4**	**4.7**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**	**4**
Pulses																										
Lentils	x	x	x	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	
Beans							x		x	x	x	x		x	x	x	x	x								
Chickpeas						x	x		x	x																
Split peas											x	x		x	x	x	x			x	x	x	x	x	x	
Total	**1**	**1**	**1**	**1**	**1**	**2**	**3**	**0**	**3**	**3**	**3**	**3**	**1.8**	**3**	**3**	**3**	**3**	**2**	**1**	**2**	**2**	**2**	**2**	**2**	2	**2.3**

Cereals	2015													2016											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Mean**	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Mean**
Wheat	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x		
Barley	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x		
Rice	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x		
CSB+	x	x	x		x	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x		
Pasta																				x						
Total	4	4	3	4	4	4	4	4	4	4	4	4	**3.92**	**3**	**3**	**4**	**4**	**4**	**4**	**5**	**4**	**4**	**4**	**4**		**3.9**
Pulses																										
Lentils	x	x	x	x	x	x	x	x	x	x		x		x	x		x	x	x		x			x		
Beans														x	x	x	x	x	x	x	x					
Split peas	x				x	x	x	x	x	x												x	x	x		
Total	**2**	**1**	**1**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**0**	**1**	**1.5**	**2**	**2**	**1**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**2**		**1.6**

Table 16: Fresh food distribution in kg/ration/month during the period of 2013-2016 *(empty spaces are 0).*

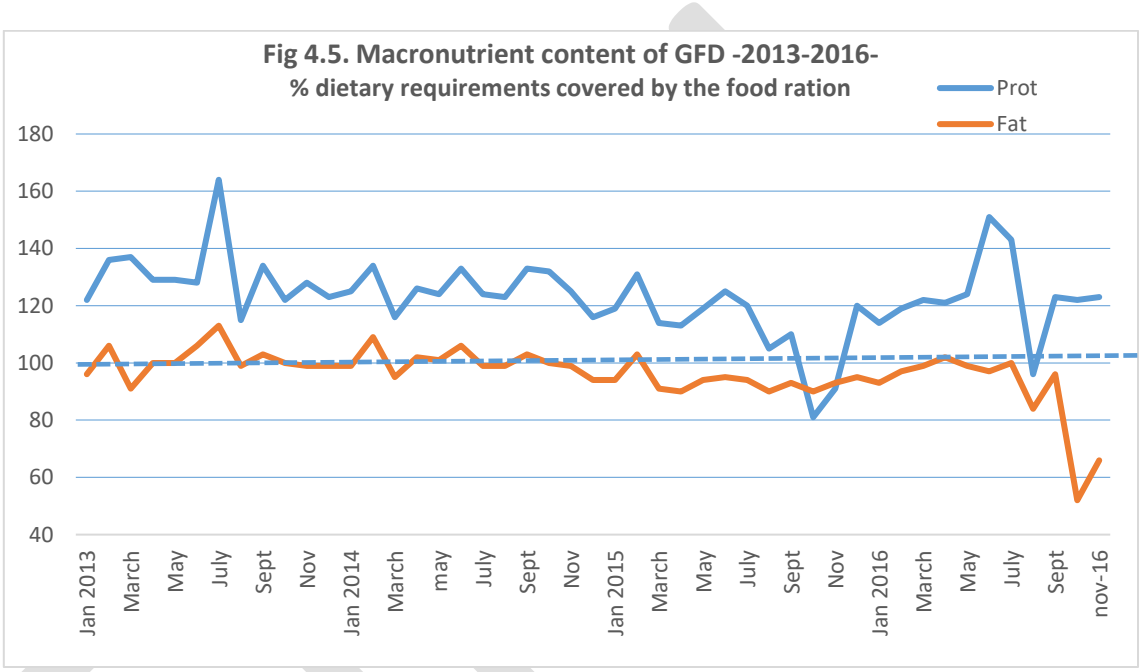
	2013													2014											
Fresh products	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Mean**	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Mean**
Potatoes, kg			1.0	1.0	1.0	1.0	1.5	2.0	2.0	2.0	1.5	1.5	**1.2**	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
Carrots, kg			1.0	1.0							1.0	0.75	**0.3**	0.8	1,.0	1.0	1.0	1.0	1.0	1.0	0.5			1.0	1.0	**0.8**
Onions, kg			1.0		1.5	1.5	1.0	1.0	1.0	1.5		1.0	**0.8**	1.0	1.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
Tomatoes, kg					0.5	1.0	1.0	1.0	1.0		1.0		**0.5**	0.5				0.5		0.5		1.0				**0.2**
Dates, kg							1.6	0.5			0.5	0.93	**0.3**	0.9	0.7					0.7						**0.2**
Zucchini, kg				0.5									**0.0**						0.5							**0.0**
Beetroots, kg																		0.5	0.5	0.5	0.5					**0.2**
Peppers, kg								0.5					**0.0**													
Apples, kg									1.0				**0.1**								1.0	0.5				**0.1**
Pears, kg																						0.5				**0.0**
Total, kg	0.0	0.0	3.0	2.5	3.0	3.5	5.1	5.0	5.0	3.5	4.0	4.18	**3.2**	4.7	4.0	3.0	3.0	4.0	4.0	4.7	4.0	4.0	2.0	3.0	3.0	**3.6**
№ of fresh products	**0**	**0**	**3**	**3**	**3**	**3**	**4**	**5**	**4**	**2**	**4**	**4**	**2.9**	**5**	**4**	**3**	**3**	**5**	**5**	**6**	**5**	**5**	**2**	**3**	**3**	**4.1**

	2015													2016											
Fresh products	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Mean**	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Mean**
Potatoes, kg	0.5	0.6	0.4	0.6	1.0	1.0	1.0	1.0	2.0	1.0	2.0	2.0	**1.1**	1.0	1.0	1.0	1.5	1.5	2.5	1.0	2.0	2.0	2.0	1.0		**1.5**
Carrots, kg			1.0	1.0	0.5					1.0			**0.3**	1.0	1.0	1.0	0.5	0.5	0.5					1.0		**0.5**
Onions, kg	1.0		1.0			1.0	1.5	1.0	1.0	1.0	1.0	1.0	**0.8**	1.0	1.0	1.0	1.0	1.0	2.0	1.5	2.0	1.0	1.0	1.0		**1.2**
Tomatoes, kg																										
Dates, kg						2.0	0.8			0.3			**0.3**						2.1							**0.2**
Beetroots, kg				0.5	1.0								**0.1**													
Cucumber, kg							0.5	0.5					**0.1**													
Peppers, kg																										
Apples, kg							1.0						**0.1**													
Orange, kg	1.0	0.9											**0.2**													
Total, kg	2.5	1.5	2.4	2.1	2.5	4.0	4.8	2.5	3.0	3.3	3.0	3.0	**2.9**	3.0	2.5	3.0	3.0	3.0	7.1	2.5	4.0	3.0	3.0	3.0		**3.4**
№ of fresh products	**3**	**2**	**3**	**3**	**3**	**3**	**5**	**3**	**2**	**4**	**2**	**2**	**2.9**	**3**	**3**	**3**	**3**	**3**	**4**	**2**	**2**	**2**	**2**	**3**		**2.7**

Macro and micronutrient assessment of the General Food Ration

Overall, and similar to the period 2011-2012, the GFD covers well above 120% of protein dietary requirements (see **Figure 4.5**) except in 2015 (112%); the only months in which the food ration did not met requirements was in October-November 2015 and in August 2016, where the ration was particularly low or absent in pulses, without being complemented by other protein source. It is important to note that proteins of vegetable origin meet protein requirements, albeit with a lower biological value; and when mackerel is not present in the GFD, proteins of animal origin are null[57]

Fat requirements are well covered in 2013-14. The lower fat content of the distributed rations in 2015-2016[58] appears to be explained by the overall reduction in the energy content of the food ration and specifically, 1) in 2015 the absence of mackerel that accounted globally for 4% of fat needs and, 2) in 2016 the reduction of the oil distributed in the food basket to half in October and November because of pipeline constraints.



The micronutrient provision of the diet is less stable in its adequacy for covering dietary requirements as shown in **Figure 4.6** and **Figure 4.7** below. Regarding minerals and trace elements, particularly calcium and iron, the GFD did not met dietary requirements at any time, with an overall average value of 30% and 43% daily requirements met for calcium and iron respectively[59]. This is in contrast with the period 2011-2012, where requirements for iron and calcium were met in the months where fortified staples were distributed[60]. It is important to point that where both minerals reach its lower values coincide with months where CSB was lacking in the food basket (or quantities distributed were half)[61]. The iodine content in the food basket is kept at very low levels or null[62] given the high concentration of this mineral in the drinking water.

[57] Mackerel accounts for 5% of the total proteins provided when is part of the GFD (10% during Ramadan period in most years). The upper peaks in figure 4.5 coincide with the Ramadán period, where DSM was also part of the GFD.

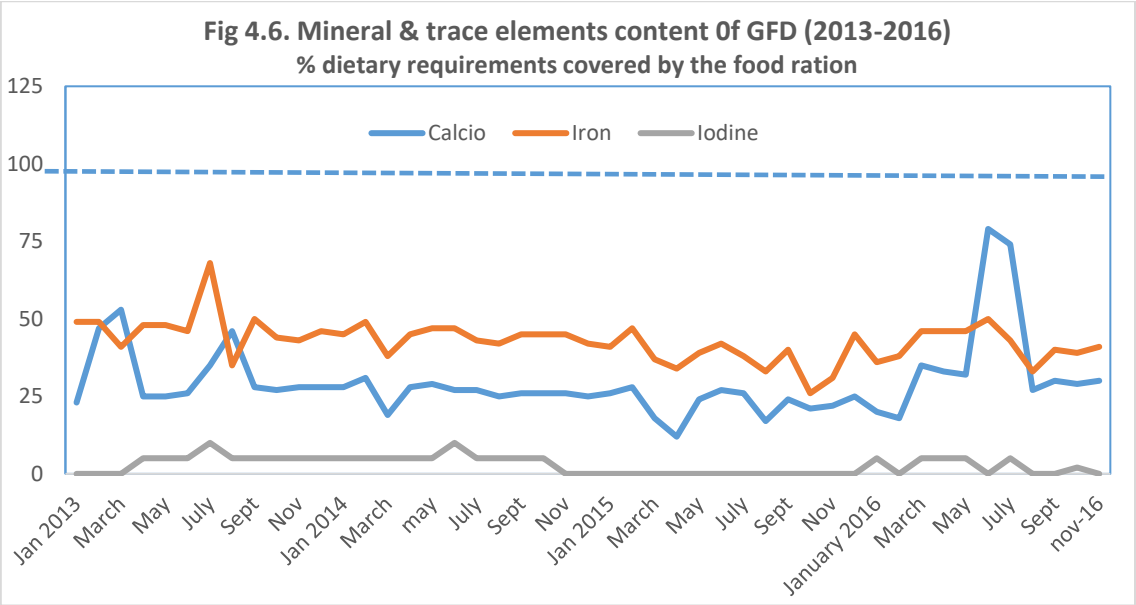
[58] Mean fat requirements met in 2015-16 are 93.5% and 90% respectively (range from 52% to 103%)

[59] For Ca: 33%, 26%, 23% and 25% in 2013, 2014, 2015 and 2016
For Fe: 47%, 44%, 38% and 42% in 2013, 2014, 2015 and 2016

[60] It is well known that at most times dietary requirements of calcium and iron are not met by the GFD itself if fortified staples are not part of the ration.

[61] CSB was not distributed in March 2013, April 2015 and January- February 2016. The quantities of CSB distributed in March 2014 and in March and August 2015 were half or less of the quantities set.

[62] The only item with iodine in the food basket is mackerel.

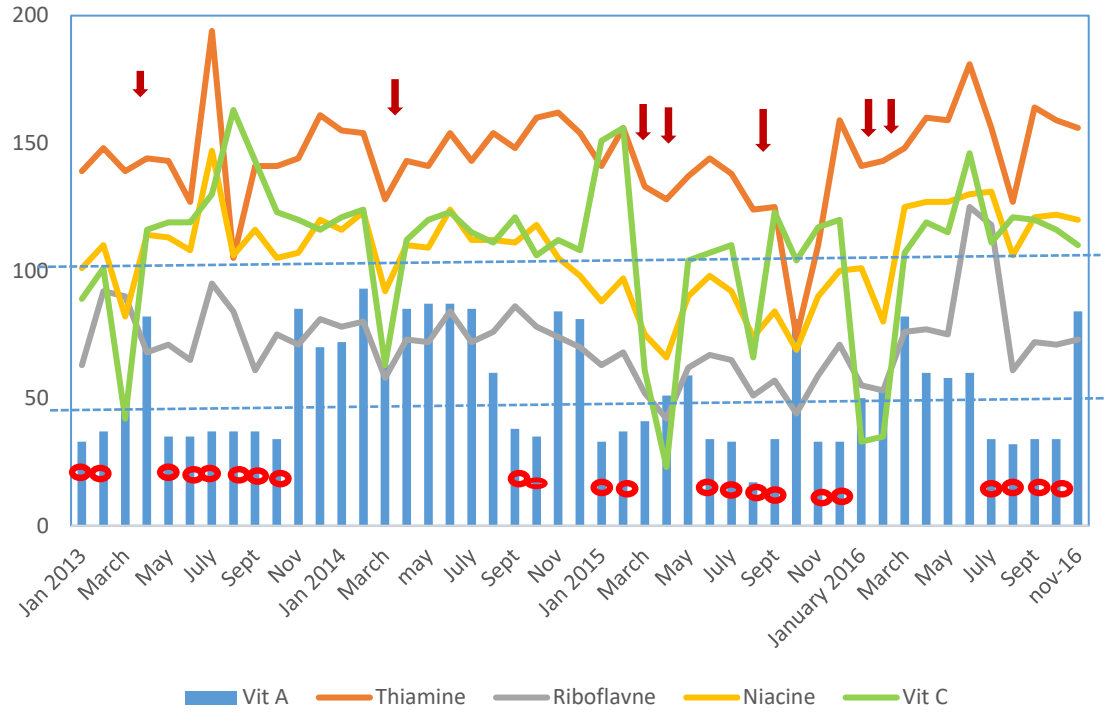


Following similar pattern that minerals, most of the vitamins in the GFD lacks stability in its adequacy to meet requirements (see **Figure 4.7**). Overall, in 2013 and 2014, dietary requirements for niacin, thiamine and vitamin C are met at most times by the GFD, while on the second half of the period the niacin content in the food basket drops consistently below minimum requirements all along 2015 to again recover in 2016, and vitamin C is also less regular in meeting dietary requirements (see red arrows in figure 4.6). The sustained drop of niacin content in 2015 would be explained by the combination of the following: 1) the absence of mackerel in the GFD, 2) the variety of rice distributed, and 3) the overall decrease of the energy content in the food basket[63]. On the other hand, the higher fluctuations of vitamin C below minimum requirements coincide with the absence –or reduction- of CSB in the food basket (twice in the period 2013-1014 and five in the period 2014-2015).

In contrast with the above mentioned vitamins, riboflavin and vitamin A content of the food basket did not met the minimum dietary requirements at any time. Vitamin A is the one showing the greatest instability, ranging from 80% to 90% when adequate amounts of CSB and carrots are present. Vitamin A fluctuates the most due to lack –or reduced quantities- of carrots in the diet on regular basis (see circles in figure 4.6).

[63] The usual quantities of mackerel is 13-14 gr, which contains 1,7mg of niacin; this accounts for 12.3% of the minimum dietary requirements for niacin. The variety of rice consumed also affect total quantities of niacin available in the diet. In the present analysis - and following the rice specifications made available and the WFP PvAs- for the years 2013-2015 we have used the variety "*rice, white, medium grain*" in Nutval v4.1. , which contains 1,6mg of niacin per 100g of rice. For the analysis in 2016, we used the variety *"rice, white, long grain, parboiled"*, which has 5,0mg niacin/100g. In addition, a reduction of the overall energy content (usually at the expense of grains and pulses) decreases proportionally the niacin concentrations available in the diet.

Fig 4.7. Vitamin content of GFD (2013-2016)

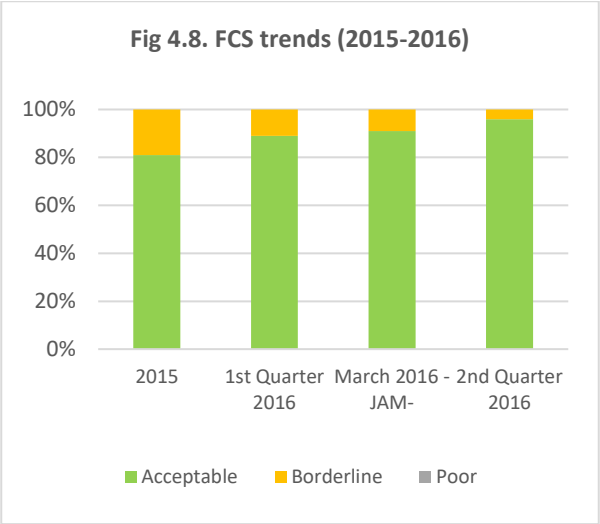


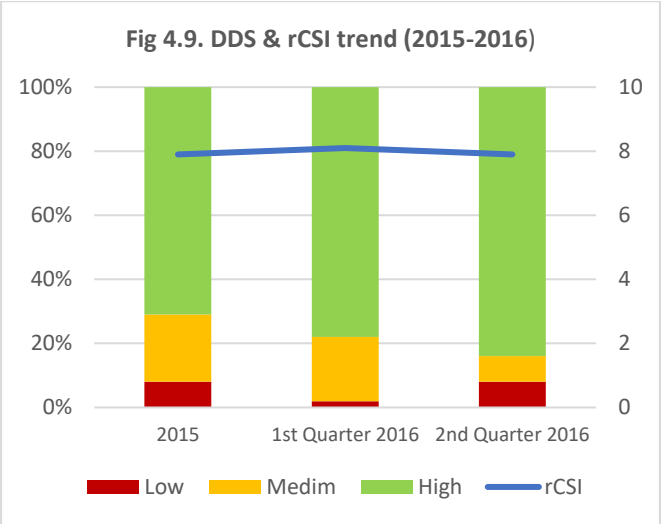
4.1.2.2. Food Security Indicators from Post-Distribution Monitoring (PDM) household visits

As part of the WFP/UNHCR Monitoring and Evaluation system, data on food consumption and coping strategies is collected periodically through PDM household visits of a stratified sample that is representative at the Wilaya level on annual basis. Data is gathered on monthly bases by WFP/UNHCR food monitors (100 household per month) and complimented by CISP third party monitoring (2,000 per year)[64]. Households are visited randomly the week after receiving the monthly food ration. Key food security outcome indicators monitored, among other relevant information[65], are FCS, DDS and rCSI. Monitoring reports produced are meant to feed the Food Security and Coordination Cell meetings and to support evidence-based decision-making. Though quarterly reports are to be produced, regular compilation of data, analysis and reporting was delayed for many months in 2015, thus only annual results are available. **Figure 4.8** and **4.9** present FCS, DDS and rCSI trends for 2015-2016 combined for all Wilayas.

Overall, food security indicators in 2015 and 2016 are indicative of a stable food security situation among refugee population, with zero percent households having a poor FCS and a decreasing trend of households in the borderline category compared to 2015. Similar overall improvements seem to be observed for the DDS, with 8% of the households found having a low DDS and 84% with high DDS in the second quarter of 2016. This is most likely attributable to the slight improvements and more sustained stability in the GFD[66], and the reception by refugees of several bilateral donations following the floods in late 2015. To note also that in the second quarter of 2016 the increased FCS is also due to the provision of additional food commodities during the Ramadan period. Average rCSI did reflect no changes all over the period.

[64] Reviewed figure starting from 2015. The analysis of the joint monitoring team and CISP data is to be conducted on bi-annual basis.
[65] PDMs Provides also a whole range of data to monitor process indicators, from targeting, registration, use of the transferring modalities and the Community Help Desks at distribution points, as well as beneficiary satisfaction on the food basket.
[66] Overall fewer shortages of commodities, and canned fish that has been re-introduced in the food basket.





4.2. NUTRITIONAL PROGRAMMES

4.2.1. Management of Acute Malnutrition

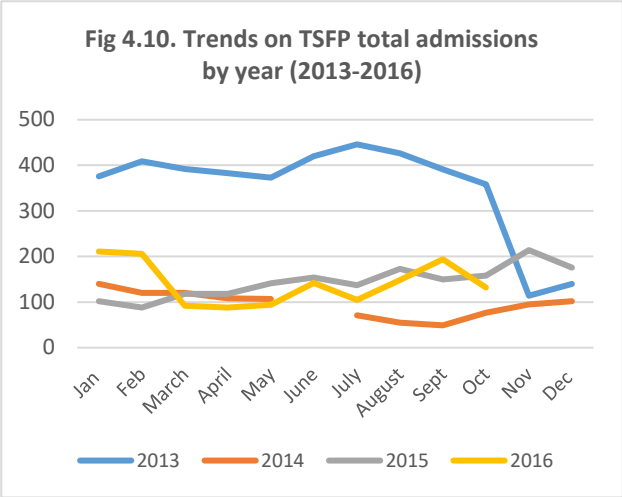
According to TSFP monthly reports, the average number of children aged 6-59 months with MAM enrolled in the programme were 8519, 1036, 522 and 654 in 2013, 2014, 2015 and 2016 respectively. Likewise and following a similar pattern, the average number of children with MAM admitted monthly in TSFP has also dropped over the years (from 352 MAM admissions in 2013 to 141 in 2016) [67].

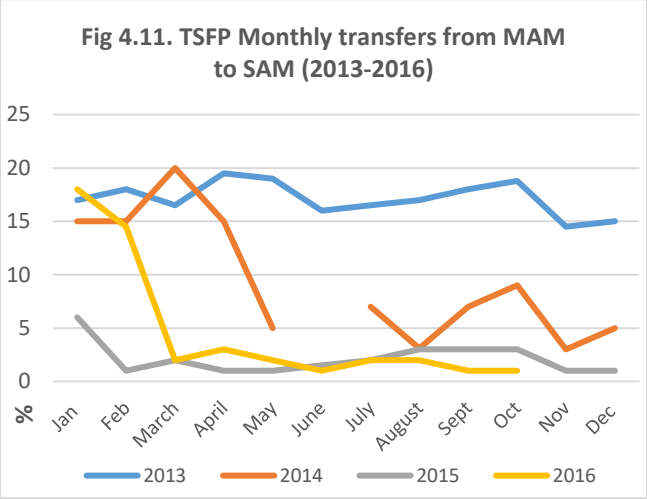
Figure 4.10 and **4.11** illustrates trends in the number of total TSFP admissions and proportion of transfers over the four years. Analysis of seasonality in monthly admissions does not show any consistent rising trend or recurrent peaks over the years for any particular month/s; though a slight upward trend appears in June for all years and again in October-November 2014 and 2015. By contrast, it can be observed a more clear increased proportion of transfers in October all over the four years. Taken together, this might suggest a seasonal variation with cases of acute malnutrition rising during the autumn period in the Saharawi refugee camps (due, e.g., to seasonal peaks of infectious diseases)[68]. Yet, it is difficult to fully assess nutrition-related seasonal variations as well as quality performance of TSFP, as the reporting of the programme performance indicators raises questions on data quality and reliability -due to the absence of registers[69]/monitoring and the inconsistencies found- and contradict other more reliable results.

[67] Monthly average values for children aged 6-59 months suffering from MAM that were admitted in the program: 352 (range 140-446), 92 (range 49-140), 144 (range 88-176) and 141 (range 88-211) in 2013, 2014, 2015 and 2016 respectively.

[68] Though it is reportedly that the most frequent illnesses amongst children 6-59 months are respiratory infections during the winter season and diarrhoea –together with skin infections and conjunctivitis- in summer, there is no quantitative data on morbidity trends, thus making impossible to somehow assess the potential relationship of usual month-wise seasonal rising in infectious diseases and nutrition in the refugee camps.

[69] At health centres, there are no TSFP registration books or any other similar monitoring tool, but only the TSFP individual monitoring cards. Though all the information should be in the TSFP individual monitoring cards, these are attached to the child´s individual PISIS monitoring card (or the SAM individual monitoring card if child deteriorates and develops SAM) after exiting the programme, and then the monitoring cards are filed by alphabetical order together with all the child´s PISIS cards. If the information needed (e.g. new admission or re-admission, date of discharge, category of discharge) is not available in a registration book it makes really very difficult –f not impossible- to adequately filling monthly statistics report (or transmit the correct information to the head nurse/other in charge at Daira level), and raises the question on how the figures included in the different categories have been calculated.

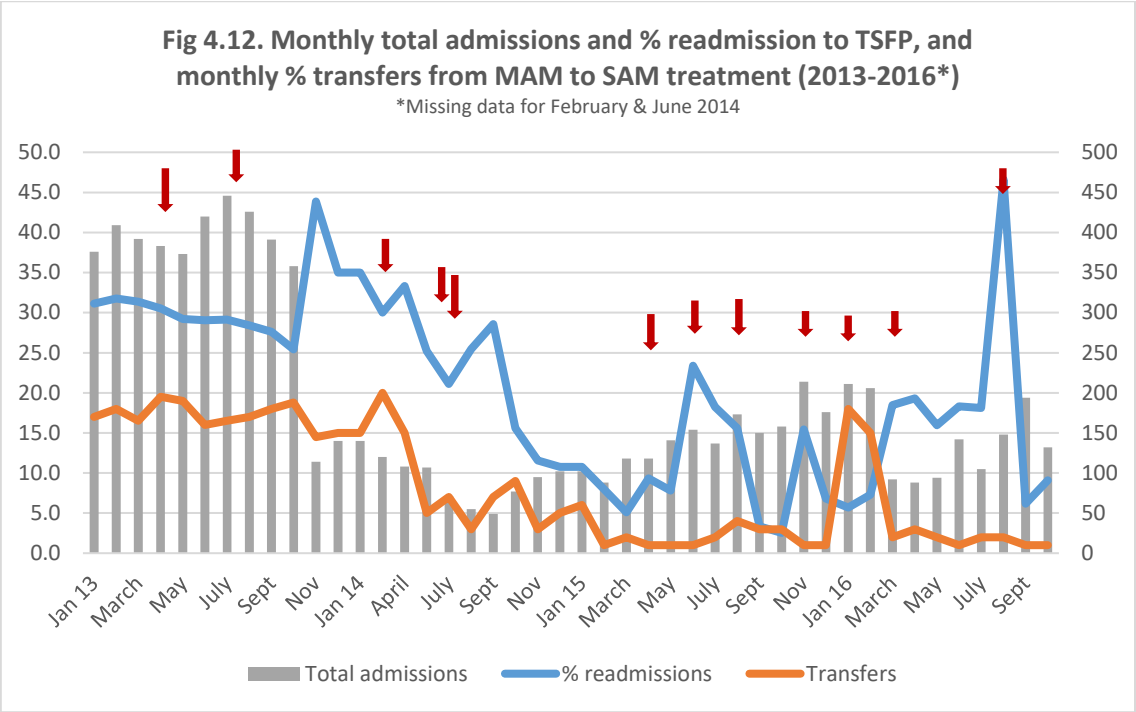




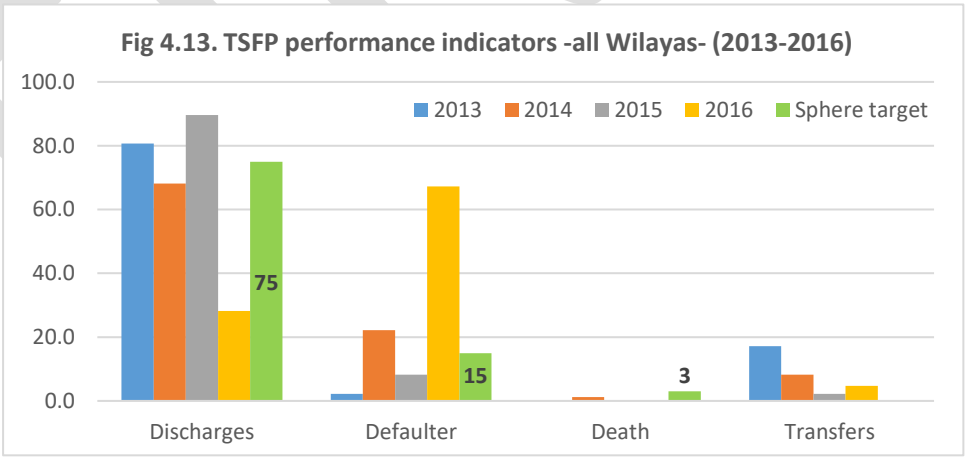
For instance, by the end of October there were 648 children aged 6-59 months benefitting the TSFP. Based on the planning figure of 125,000 people and an estimated 18% population of children 6-59 months, programme coverage would be somewhere around 68%[70]. However, TSFP point and period coverage in the present survey was 7% and 11%, respectively. Screening activities have not been carried out all along this year as there was not Plumpy Sup for MAM treatment[71]; therefore, without active –or very erratic- case finding, it does not seem very realistic to have, overall, similar number of admissions than those in 2015, -were screening activities were reported to be in place-, except in the event of sudden nutrition deterioration, and the latter is not shown either in the survey results or in other key indicators as it is illustrated in following paragraph. Worth noting is also that the number of children enrolled in TSFP might not always coincide with the figures presented in the monthly reports[72]. All the above raises concerns on case admissions reported.

Trends in transfers and re-admissions (both indicators of nutrition worsening) should normally follow similar pattern, i.e. increasing or decreasing concomitantly, and this be followed by a likely similar trend in the number of total admissions. **Figure 4.12** illustrates TSFP trends of total admissions, percentage of transfers and of re-admissions over the last four years. As it can be observed in the figure, trend fluctuations for each of the indicators are not consistent; with frequent opposite peak patterns (see arrows in red). For example, in November 2013 there is a sudden increase in re-admissions (from 25% to 44%) at the same time that a reduction in the proportion of transfers (from 19% to 14%). Likewise, In January 2016 the proportion of transfers increases drastically (from 1% to 18%) and this might have been explained by a worsening of the nutritional situation after the floods; however, this was not followed by any increase in the re-admissions but the contrary, a progressive reduction from 15% in November 2015 to 6% in January 2016. Thereafter, re-admissions scaled up consistently to more than 15% and up to 46% in August. This upward trend would suggest once again a deterioration of the nutrition situation, and if this was the case it should be expected to show an impact on those children receiving MAM treatment (and falling into SAM)[73] through the increase in the proportion of transfers, but this is not reflected in the monthly reports. Yet, a sustained drop in the proportion of transfers from 15% in February to 1%-3% from March on.

[70] Estimated number of children under 5 (18% of total population) is 22,500. Considering MAM prevalence of 4.2% (3.3-5.2), this would give a total of 945 (743-1170) children with MAM in need of treatment: 648 children in TSFP gives a coverage of 68.6% (87.2-55.4).
[71] Interviews with health staff during survey implementation.
[72] During the fieldwork in Boujdour, the nutrition survey manager hold interviews with the nutritionist and the health staff in charge of TSFP, confirming that by that time (November 2016) they had only 5 children aged 6-59 months with MAM; however, the monthly report for October 2016 reflects that 44 children were under MAM treatment.
[73] Even more during this period due to the lack of Plumpy Sup to treat the children with MAM at the time.



Plumpy Sup distribution in TSFP was interrupted in January 2016 and until September, due WFP funding constraints. As a direct consequence, though TSFP activities did continue and health staff continued assisting MAM cases through follow up bi-monthly monitoring visits and provision of health and nutrition advice to mothers and caregivers, defaulter rates raised consistently above 60% through over the months and up to September, where Plumpy Sup distribution was resumed (500Kcal/day). It is well established that at the start (or resumption) of a programme there are not recovered patients yet during the first months, as there has not been time enough for them to recover from MAM[74]. Yet, proportion of recovered in September is as high as 93%.

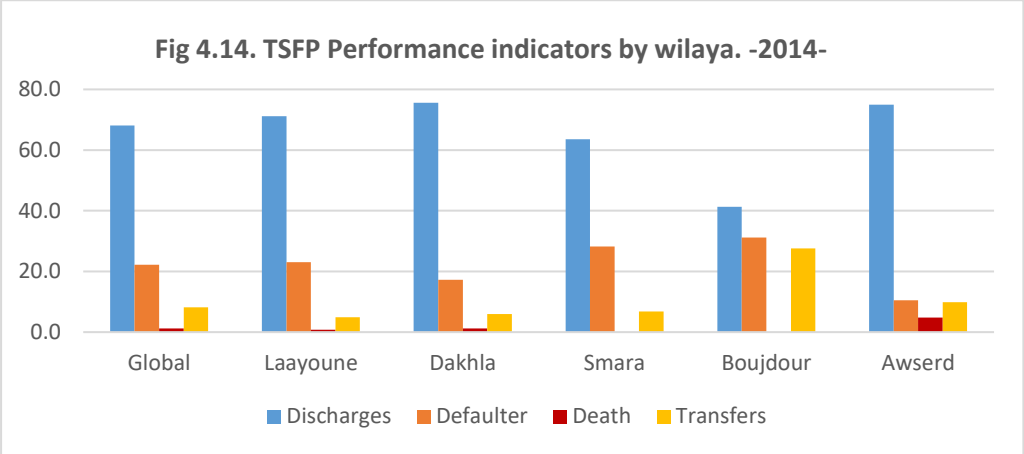


Assuming that monthly reporting is reliable, performance indicators of TSFP are satisfactory in 2013 and 2015, with the programme reportedly meeting all three outcome indicators for recovery, deaths and defaulters in line with Sphere Standards (despite transfers remained very high during 2013), while in 2014 and 2016 they were not met (**Figure 4.13**). Following results are disaggregated by Wilaya, as presentation of rates aggregated by all TSFP sites and/or Wilayas can mask poor performance within one/more

[74] This is also reflected in the TSFP nutrition protocols (directly quoted from PISIS guidelines): *Once the children are admitted to the MAM protocol, they will be treated for a minimum of two months, during which they will be visited on a fortnightly basis, and in which the child is expected to recover until the Protocol exit criteria.*

sites/Wilayas[75].

Figure 4.14 shows the performance indicators disaggregated by Wilaya for the year 2014 (*other years in annex 9)*. Recovery rates are below the Sphere standards in Boujdour (41.3%), Smara (63.6%), and Laayoune (71.2%). Rates of defaulters above 15% were found also in all the Wilayas except in Awserd (10.5%). However, Awserd also stood out for having a very alarming death rate of 4.9%[76]. Transfer rates were also alarming in Boujdour. In 2016 (*annex 9*), indicators are considered a reflexion of the lack of Plumpy Sup to support MAM treatment, with defaulter rates well above 60%. It is worth noting, that in spite of the absence of Plumpy Sup for MAM treatment, there is a proportion of children reported to exit the programme as cured.



At the time of writing, monthly statistic reports for SAM treatment were not made available, making impossible to evaluate its performance. Furthermore, these data would have been also important to triangulate with trend indicators reported for MAM treatment, as both of them are inter-related, and to evaluate the essential linkages in between CMAM components.

In regards to PLW, a Blanket Supplementary Feeding programme (BSFP) with Supercereal-Plus® -plus oil and sugar- has been on-going up to December 2015. Number of beneficiaries varied from 10,000 PLW in 2013 and 2014 to a monthly average of 8,220 PLW in 2015, and quantities distributed were reduced from the initial 969 Kcal/day to 495 Kcal/day in 2015[77]. The recently developed national protocols for the management of malnutrition and anaemia for PLW[78] include, among other activities, the treatment of malnourished PLW with CSB premix, as well as an extra-ration of about 500 Kcal to fulfil extra nutrition needs to non-malnourished PLW. The latter was not attained in 2016 due to WFP budgetary constraints, though since August all PLW receive a monthly ration of dates (107-160 Kcal/day)[79]. For the same reason, treatment of MAM for this vulnerable group was only resumed in April 2016, and since then a monthly average of 472 PLW are benefiting from the MAM treatment programme (ranging from 416 to 541)[80], receiving a ration of CSB premix -495 Kcal/d- fortnightly. It is not possible to assess its performance, as there is no specific

[75] MAM database available makes it possible to analyse trends over the implementation period by Wilaya – not at Daira/site level-.
[76] While the exit category "deaths" is null during the four years period in all Wilayas, in Awserd, out of all exit categories, proportion of deaths from July to December 2014 ranged from 3.9% to 10.5%. Similarly, Dakhla also had a proportion of deaths in the period July-September 2014 ranging from 1.6% to 6.3%.
[77] In May 2014, WFP/UNHCR reached agreement with SHA for a change in the approach. The rationale for the changes (from blanket to a targeted approach for the malnourished PLW and the provision of non-therapeutic food support for the non-malnourished PLW) were: the provision of BSF to PLW was not the most adequate approach in a context with GAM below 10% and absence of aggravating factors; the ration in 2014 was providing 4 times the needs of non-malnourished PLW; and the CSB premix ration should be targeted to PLW with MAM. *(Source: NFR May 2014. Meeting between SHA, WFP/UNHCR and WSRC/ARC).* Therefore, WFP reduced progressively the BSFP during the transition phase to these two new approaches.
[78] *Saharawi Health Authorities.* Management of malnutrition and anaemia in Saharawi´s Pregnant and Lactating Women´s protocol. December 2014.
[79] In December dates will be replaced by cheese, as this in kind "blanket" is subject to donations and is not part of the regular WFP programme at the time.
[80] Source: WFP PVA for 2016. Monthly statistics made available by ARC does not match these figures (8,274 PLW at the start of October 2016). It might be that the latter figures reflect a mix of PLW receiving MNP and/or CSB premix/dates.

monitoring and reporting system in place for this activity[81].

4.2.2. The Stunting and Anaemia Reduction Programme

According to ARC annual reports and WFP PVA records from 2013-2016, there have been more than 11,000 children aged 6-59 months enrolled in the programme every month with slight variability in-between years[82], and the number of PLW has remained stable at around 8,300 all over the period. Regarding specialized nutrition products, children aged 6-35 months were receiving 20g Nutributter® every other day while children aged 36-59 months and PLW were receiving micronutrient-powder (locally known as Chaila). Protocols changed in 2014, and Nutributter® was provided since then to all children 6-59 months[83]. The BSF intervention with Nutributter® to children under five, as reported by health staff and women refugees, has good acceptance among beneficiaries, and faced only very occasional stock shortages[84] up until September 2015, when WFP budgetary constraints prevented its continuation. While instability in the supply of Chaila to PLW has been more pronounced in 2013-2015[85], distributions have been resumed in April 2016 and it is regularly available at health centres since then.

In contrast to the evidence on Nutributter®, Chaila beneficiary acceptability was reported to be low by different stakeholders interviewed[86]. As a tentative to get some insight on the underlying factors that could potentially act as barriers to Chaila acceptability, five focus group discussions (FGD) with PLW were held in Dakhla[87]. Despite the inherent limitations derived from its small number and that the qualitative exercise was only conducted in one Wilaya, the findings illustrate a number of issues to be potentially considered, the most salient that emerged and that were shared among all groups with little inter-group variation are presented in Box 1.

In total 39 women participated in the discussions and only 15 were taking Chaila (though not always regularly). For those that were not taking Chaila, 1) Few women had never heard about it -either because they were attending private ante-natal care, they were not attending ante-natal care at all, or they had not been offered Chaila during follow up visits-, 2) others were not collecting or using Chaila because they had received negative information or had wrong perceptions and, 3) others reported not knowing how to use it.

[81] Despite the national protocols having a section on monitoring and monthly reporting, including the "PLW monthly report" template. Id 37.
[82] Monthly average of 14,615 children in 2013, 12,785 in 2014 and 11,453 in 2015.
[83] Reason for this shift were: 1) children 36-59 months liked more and were taking Nutributter® in spite of sensitization, 2) it is hard to manage at household level two different products for two different age groups (how to explain to a child that one day he can have Nutributter® and the following he must take MNP), 3) facilitate management at clinic level and, 4) the micronutrient value of the two products is very similar and Nutributter® provides additional energy. From November 2014 to May 2015, children 36-59 were distributed Eeze cup, with also good acceptability.
[84] Three months: in January 2013, February and June 2014.
[85] Pipeline breaks in June 2013-March 2014, June 2014 and September 2015-April 2016.
[86] SHA and health staff, local and international agencies.
[87] This was possible because the survey team stayed in the camp all over the 14 days. FGDs were held in five out of the seven Wilayas. Each group was composed of seven to ten participants.

Box 1: FGD´s summary of most salient emerging factors to MNP low acceptability

-*Insufficient information about Chaila as result of insufficient sensitization efforts*[88]: all the participants agreed that the last community sensitization they remembered was provided during one day and as far as two years ago, and there were quite a number of beneficiaries that had never participated (it might be that many potential beneficiaries and refugees in general missed the initial/periodic sensitization efforts made, mainly if the main target audience during the sensitization campaigns would only be PLW - they might not participate as they do not belong to that group at the time of the sensitization-). During follow up visits, the health staff may not have time enough to answer the different questions/doubts posed by beneficiaries.

Without appropriate information beneficiaries rely on information about Chaila from other person´s experiences and rumours they had available and come to their own conclusions about the product (e.g. undesirable changes in taste and colour[89], side effects as nauseas and vomiting, it makes you feel week, it is a medicine).

- *Misconception about what Chaila is*: out of those knowing about Chaila, many of them referred to it as if would be a medicine to treat anaemia, and even some -out of those that were collecting Chaila at the health centre- reported keeping the sachets at home and giving them to relatives/others when they were sick[90].

- *Understanding of health staff about programme protocols -and procedures not homogeneous-, thus creating potential confusion among beneficiaries:* in one group women had received seven boxes (enough for three months) and should come back for more when finished, others received Chaila for 2 weeks or 1 month and others only if they were anaemic -in one of the groups with 10 participants there was only one woman that had been offered Chaila at the health centre, and as she explained *"this was after a blood transfusion and to recover from anaemia"*[91]-. Instability in the supply of MNP might have also contributed to the low acceptability.

As a result, participants in all the group discussions emphasized that they needed more education and awareness about the product itself. Suggestions made on potential channels/means that should be used included on-going and periodical sensitization through community IEC sessions with cooking demonstrations and tasting of meal, illustrated pamphlets and posters, radio and TV[92] broadcasts, the Saharawi Women´s Association and the use of positive deviant mothers using/having used Chaila to spread messages and encourage other women. All participants expressed their desire for the continuation of the Chaila intervention.

4.2.3. Infant and Young Child Feeding (IYCF) best practices promotion

As part of PISIS activities, IYCF counselling would be provided at every point of contact that mothers/carers have with health staff (antenatal and postnatal visits, maternity, child visits to health centres, paediatric and SC wards). Added to this, improved knowledge and practice on IYCF is promoted since 2009 through the IYCF support programme[93]. Main activities are the so-called "Feeding workshops" that include IEC session one-day per week in each health centre. One completed IEC cycle is composed of four workshops -each workshop targeting a specific beneficiary group and thematic area- divided as shown in the table below. Sessions are also meant to include individual counselling and on the spot cooking of recipes, which are then tasted by children. As an incentive to attend, women receive a voucher of 200 DZD as well as a feeding set[94] in the second workshop (when the child is 6 months old).

[88] ARC jointly with SHA carries out Chaila sensitization campaigns: Campaigns are carried out in May-June each year, and have a duration of one-two days in each Wilaya *(Source: interviews with health/ARC staff and ARC annual reports).*

[89] Two women consumed Chaila only one day, "the meal had a very bad taste and colour". They were surprised when listening the correct preparation of the meal with Chaila and when other women reported that the meal organoleptic properties had basically not changed.

[90] Some health staff reported that Chaila was also given to children when they were anaemic.

[91] In other group of seven participants, only two were taken Chaila regularly, the other five reported they were not taking it because they were not anaemic.

[92] Particularly the Haha TV programme ("de poco hago mucho").

[93] Activities supported by the Associació d'Amics del Poble Sahrauí de les Illes Balears (AAPSIB)

[94] Bowl, plate, spoon and fork.

	Target group	Thematic area
1	Pregnant women in third trimester and lactating women with children less 6 months	Feeding during pregnancy EBF and BF techniques.
2	Women with children 6 months old	Complementary feeding according to age
3	Women with children 9-12 months	Age-adapted recipes with local available products and
4	Women with children 12-24 months	with CSB. Hygienic practices. Use of Nutributter®/Chaila

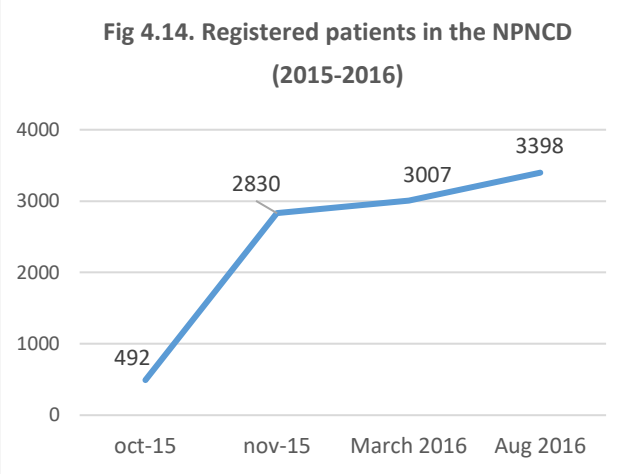
As result of the very low exclusive breastfeeding (EBF) rates found in the last nutrition survey in 2012 (18.4%), UNHCR funded a two-year awareness raising campaign on the importance of EBF that was jointly implemented by all partners (2014-2015). During this period, thirty campaigns were held[95], involving IEC community sessions, distribution of leaflets and posters, and radio broadcast. Awareness sessions were targeted primarily to women of childbearing age, and discussions were held with those involved in intra-household decision making, as grandmothers and husbands. In addition, the *Week of Breastfeeding* is on-going also since 2013[96] and the Nursing school has included in the curricula an extended module on EBF and supporting BF techniques.

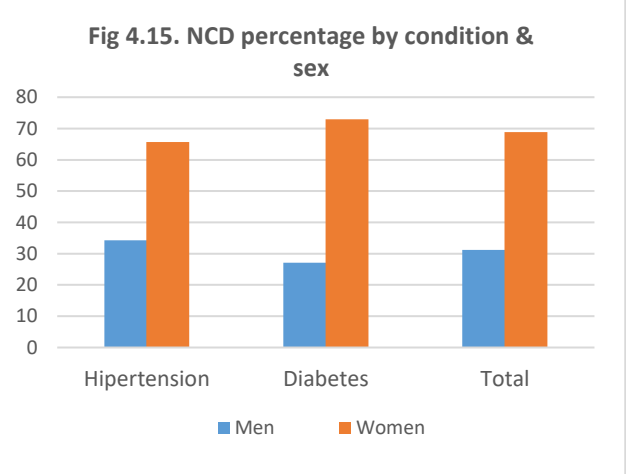
4.3. EMERGING NUTRITION RELATED PROBLEMS

Obesity among women of childbearing age and nutrition related non-communicable diseases

As already reported in previous surveys (see figure 5.6), there is an alarmingly high prevalence of overweight and obesity, which has continued to rise in the camps among women of childbearing age (15-49 years). Overweight and obesity are among the main risk factors for metabolic diseases in the population, for diseases such as diabetes, hypertension, cardiovascular diseases and cancer.

The recently initiated National Programme on Non Communicable Diseases (NPNCD) is implemented at the health centres by SHA and supported by MDM Spain. Capacity building of health staff and development of clinical protocols is also supported by UNHCR. NPNCD initial focus is on diabetes and hypertension as the most prevalent chronic diseases, and other chronic conditions will progressively be included. Patients are diagnosed at the central hospital in Rabouni, and then followed up monthly in the health centres. According to the HIS, there are more than 3,000 patients who are regularly followed-up for treatment of chronic diseases in the five Wilayas (see figure 4.14), and almost 70% of those being followed up are women (figure 4.15) [97]. Although these data suggest a higher risk of NCDs among women, caution should be exercised. The data might be biased since women tend to attend health centres more frequently for other reasons; in addition, a proportion of the male population is often absent from the Wilaya for long periods which favours a lower attendance to the centres and, therefore, less possibilities of being diagnosed.





[95] Each campaign included independent sessions at barrio level in each of the camps
[96] During this week it is organized a conference on EBF in each Wilaya (targeting camp authorities at all levels and professionals of different sectors).
[97] Programa Nacional de Enfermedades Crónicas. XV Mesa de Concertación y Coordinación en Salud. Rabouni, 12-13 Nov. 2016

V. TRENDS IN NUTRITION INDICATORS 1997-2016

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

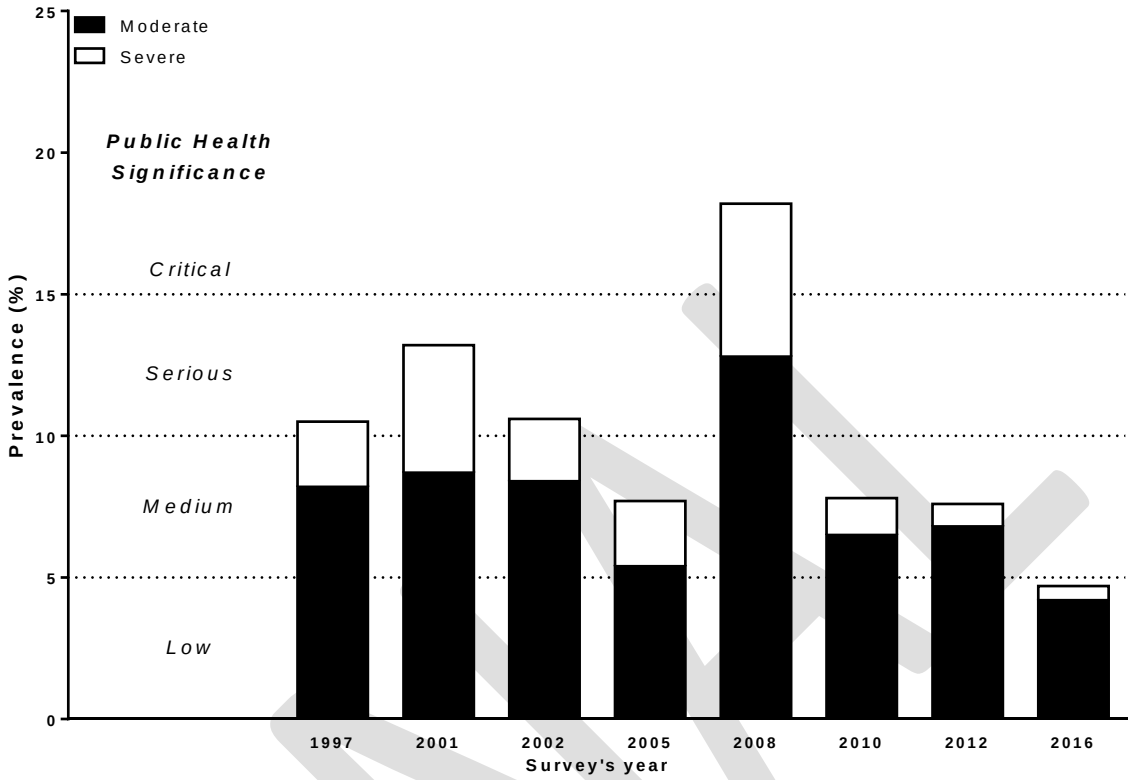


Figure 5.1. Global acute malnutrition (GAM) prevalence in children aged 6-59 months (1997-2016) (see Table A36). GAM estimates were obtained using the NCHS 1977 Growth References for surveys undertaken before 2007. GAM estimates were obtained using the WHO 2006 Growth Standards for surveys undertaken after 2007.

Global acute malnutrition prevalence, for the first time in almost 20 years, has crossed the threshold of been considered of low public health significance, although GAM 95% CI suggest it to be of borderline medium significance (see **Figure 5.1**). The prevalence reduction observed was statistically significant.

We can observe that the main reduction was on moderate acute malnutrition.

5.2. STUNTING PREVALENCE IN CHILDREN AGED 6-59 MONTHS

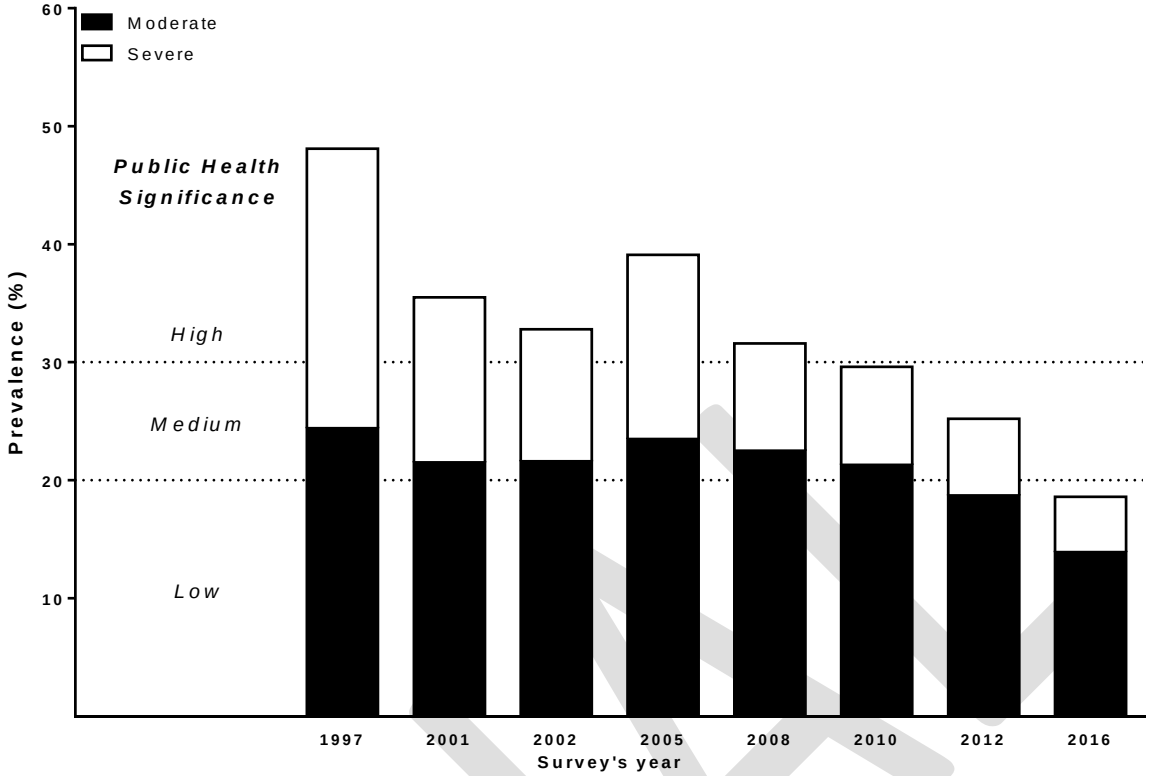


Figure 5. 2. Stunting prevalence in children aged 6-59 months (1997-2016).
Stunting estimates were obtained using the NCHS 1977 Growth References for surveys undertaken before 2007. Stunting estimates were obtained using the WHO 2006 Growth Standards for surveys undertaken after 2007.

In the past 20 years we can observe a steady decline on stunting prevalence in children aged 6-59 months, and for the first time in those 20 years, stunting prevalence is of low public health significance, also borderline with medium public health significance (see **Figure 5.2**). The most significant observation is the observable decline of severe stunting, where the severe to moderate stunting ratio was 1:1 in 1997, while in 2016 it was almost 1:3. The stunting prevalence reduction observed between 2012 and 2016 was statistically significant.

5.3. ANAEMIA PREVALENCE IN CHILDREN AGED 6-59 MONTHS

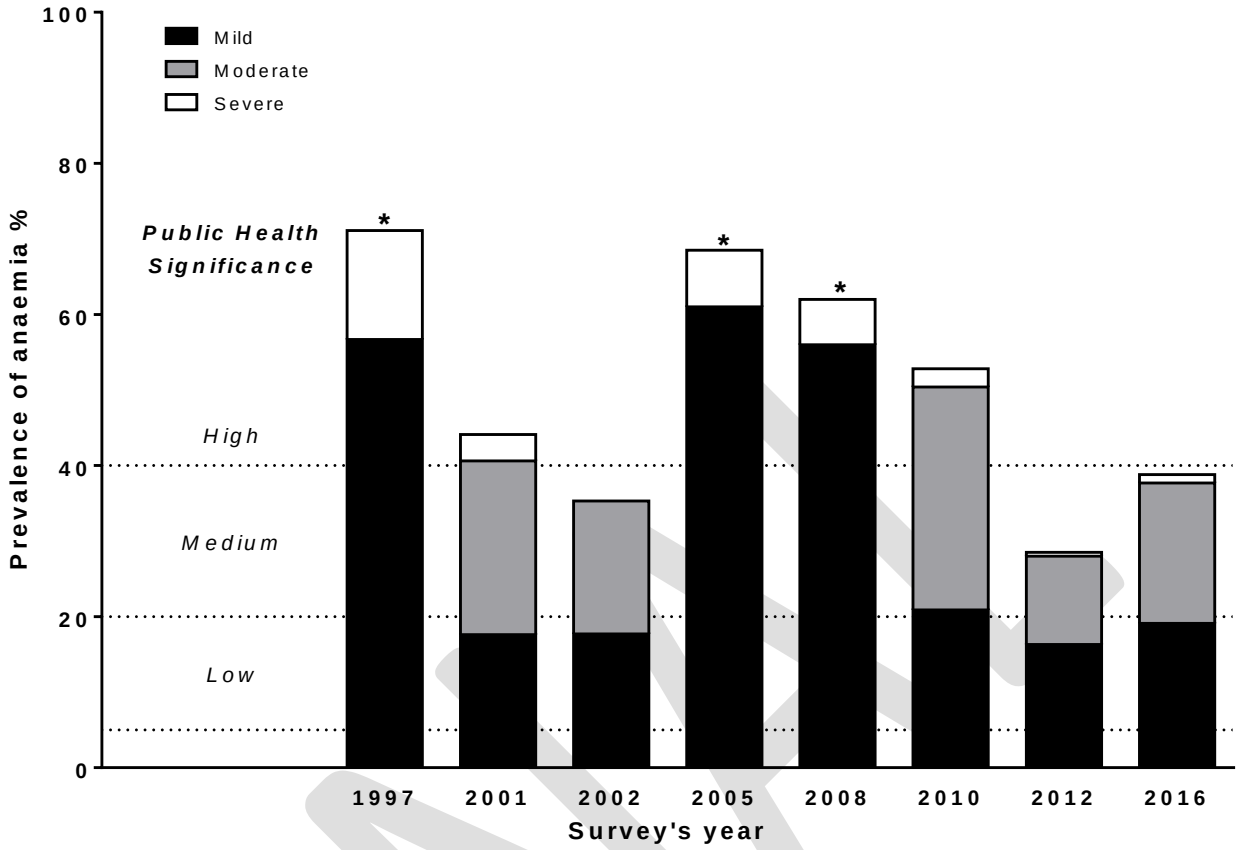


Figure 5.3. Anaemia prevalence in children aged 6-59 months (1997-2016).
* Data to differentiate mild or moderate anaemia was not available. Data was grouped as mild/moderate anaemia

Anaemia prevalence in children aged 6-59 months showed an important and consistent trend (see **Figure 5.3**). 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. In addition, for this population group, since 2005, the public health significance of anaemia has been downgraded now from high to medium level. However, anaemia prevalence in children aged 6-59 months increased significantly between 2012 and 2016 and it is now borderline between medium and high priority.

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

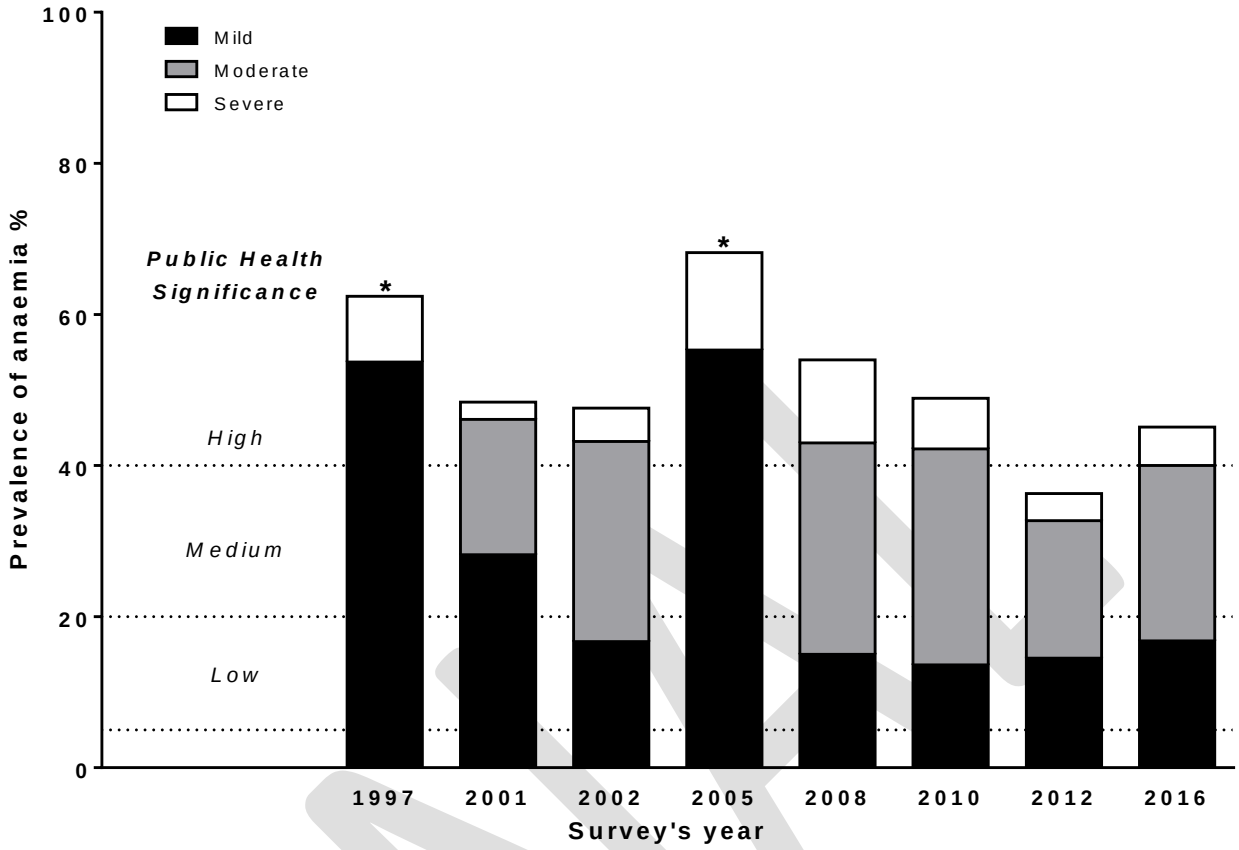


Figure 5.4. Anaemia prevalence in non-pregnant women of reproductive age (15-49 years) (1997-2016).
* Data to differentiate mild or moderate anaemia was not available. Data is grouped as mild/moderate anaemia

A very similar trend in anaemia prevalence to that observed in children was observed in women of reproductive age (see **Figure 5.4**), although some differences exist. For instance, from the high prevalence values observed in 1997, there was a prevalence reduction by 2001. Yet, unlike for children, no further prevalence reduction was observed for 2002. Anaemia prevalence increased again by 2005 and 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, in the last four years, anaemia prevalence has significantly increased, and it is again of high public health significance.

Data for anaemia prevalence among pregnant women has been collected since 2002 and it is shown in **Figure 5.4**. 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 the last four years and we observed a deterioration of the nutritional status of this population group with a significant increase in anaemia prevalence.

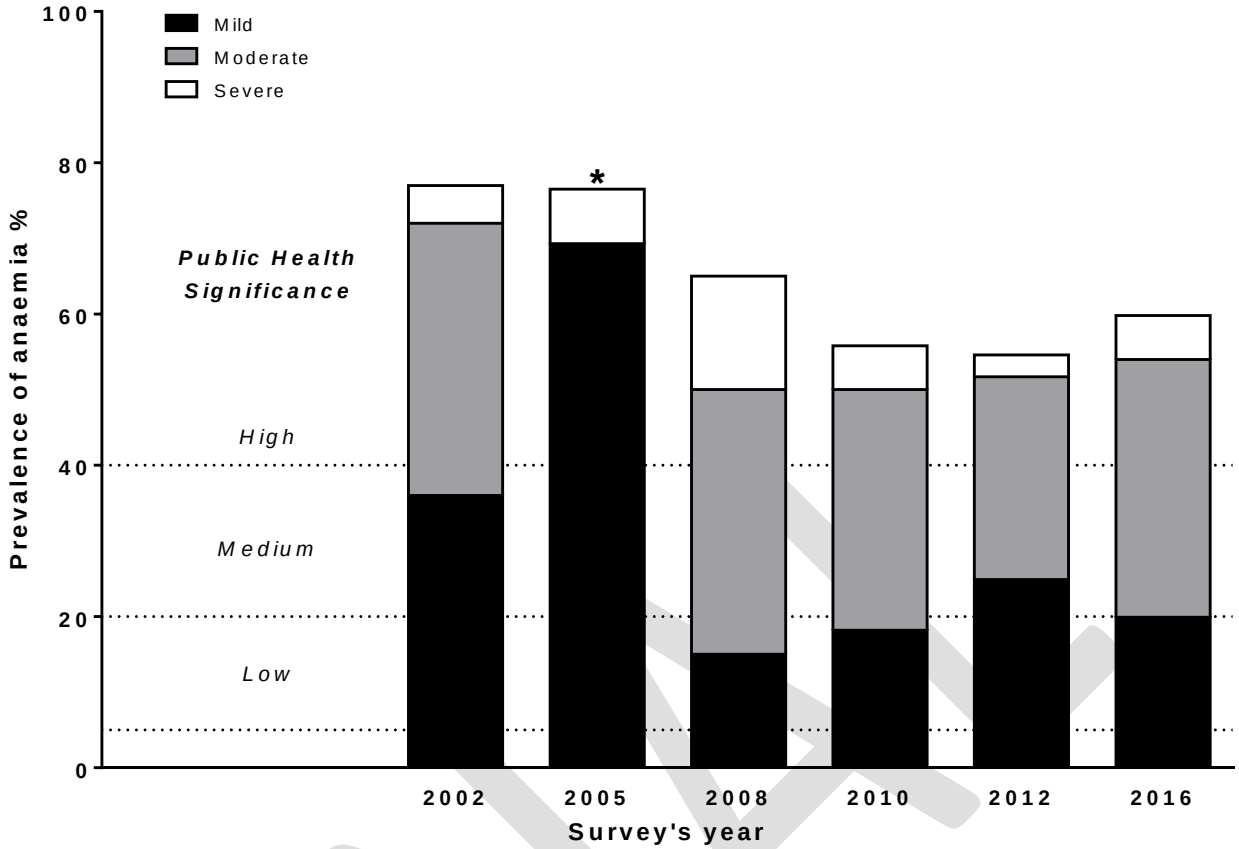


Figure 5.5. Anaemia prevalence in pregnant women of reproductive age (15-49 years) (2002-2016).
* Data to differentiate mild or moderate anaemia was not available. Data is grouped as mild/moderate anaemia.

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

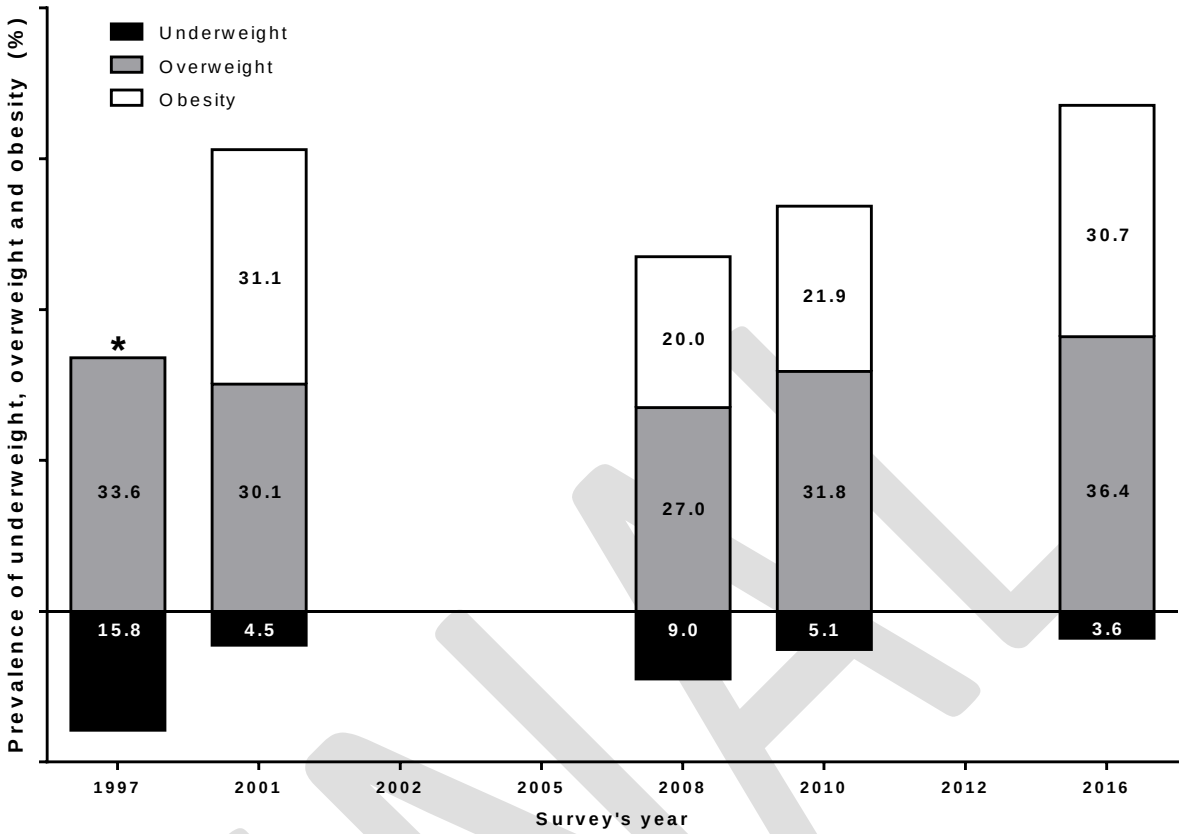


Figure 5.6. Underweight, overweight and obesity in women aged 15-49 years (1997-2016)
* No data was available to differentiate between overweight and obesity

There has been a positive shift to the body mass index distribution in women of reproductive age as shown in **Figure 5.6**. The figure shows that in the past 20 years underweight prevalence has steadily declined from 15.8% in 1997 to 3.6% in 2016. Furthermore, the joint prevalence of overweight and obesity has doubled since 1997 from 33.6% to 67% in 2016, 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.

5.6. FOOD CONSUMPTION SCORES

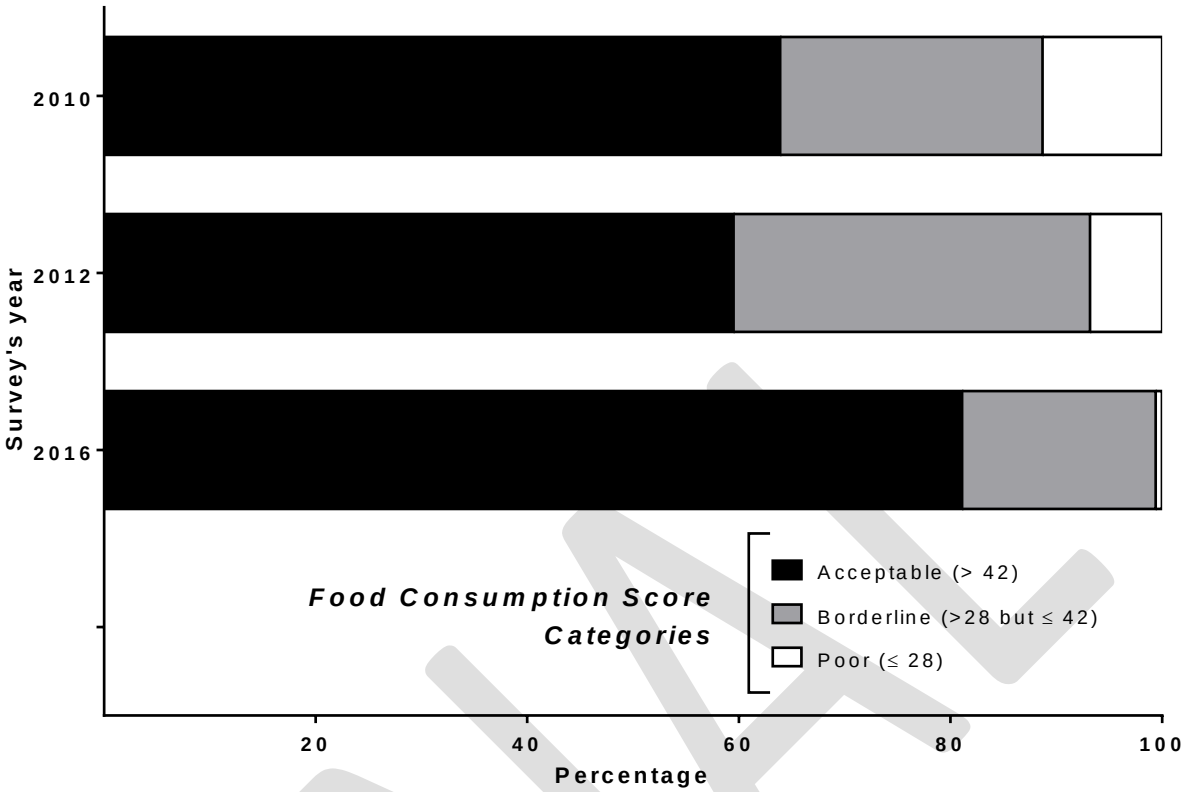


Figure 5.7. Food consumption score categories (2010-2016).

In the past fours, based on the prevalence of food consumption score categories (see **Figure 5.7**) there has been an improvement in the food security situation in the Saharawi refugee camps. We observed a positive shift with a greater proportion of households reaching acceptable FCS values and a lower proportion of households presenting poor FCS values.

VI. DISCUSSION

The 2016 survey results, when compared with previous surveys, suggest an improvement in the nutrition of the Saharawi population. We observed a downward trend in both Global Acute Malnutrition (GAM), observed since 2010, and of Stunting, which is significantly lower than in 2012. Overall, both, GAM and stunting are considered for the first time of low public health significance, although in some Wilayas each remain of medium public health significance (see Table A8). The GAM prevalence of the Saharawi refugees is comparable to that of their host community in South Algeria, with GAM prevalence of 5.9%. However stunting among refugees is greater when compared with a prevalence of 11.8% of their host community[98]. Furthermore, we have also observed improvements in food security, as indexed by the Food Consumption Score (FCS), and in Infant and Young Feeding Practices (IYCF).

Nonetheless, we have seen also a nutritional deterioration among Saharawi refugees. The prevalence of anaemia has increased, in both children aged 6-59 months and women of reproductive age, reversing a past downward trend and shifting the public health significance from medium to serious. In addition, despite encouraging improvements, IYCF practices remain poor, indicating the need for a sustained and expanded programming in this area. Furthermore, Saharawi refugees are facing now a greater risk of chronic diseases among adults, as determined by the significant increase of overweight, obesity, and central obesity prevalence among women of childbearing age. Of notice, despite the significant increase of overweight and obesity among women, the prevalence of overweight in children aged 6-59 months remain low.

Table 17. Clustering of nutrition indicators by Wilaya. Each indicator is ranked from one (best) to four (worst). The total represents the sum of all indicators

Indicator	Awserd	Dakhla	Laayoune	Smara	Boujdour
Children (6-59 months)					
MAM	4	3	5	2	1
SAM	2	1	3	1	4
Underweight	2	4	5	3	1
Stunting	3	4	5	2	1
Anaemia	3	5	4	2**	1**
Early initiation BF	1	3	2	5	4
Minimum dietary diversity	2	5	4	1	3
Minimum meal frequency	1	3	5	4	2
Minimum acceptable diet	1	5	2	4	3
Consumption iron-rich/fortified foods	1	5	4	3	2
Non-PLW (15-49 years)					
Anaemia	5	3	4	2**	1**
Underweight	4	5	2	3	1
Overweight & obesity	2	1	3	4	5**
Households					
FCS	4	3	5	2	1
rCSI	3	1	5	4	2
% women reaching MDD	2	4	5	3	1
% Households not using coping strategies	3	1	4	5	2
% meeting water UNHCR standards	3	1**	5	4	2
Total	**46**	**57**	**72**	**54**	**37**

MAM: Moderate Acute Malnutrition; SAM: Severe Acute Malnutrition; FCS: Food Consumption Score; rCSI: Reduced Coping Strategy Index; MDD: Minimum Dietary Diversity.
**Significantly different from the combined weighted results of the remaining Wilayas ($p<0.05$).

At the Wilaya level, past surveys have shown that malnutrition burden differences exist between Wilayas. The 2016 Nutrition Survey expands this by showing that differences also exist for water infrastructure and supply, food security and chronic diseases. However, these differences do not always cluster (see Table 17).

[98] Multiple Indicator Cluster Survey; Algeria 2015.

Overall, Laayoune presents the greatest clustering of problems. Laayoune presents the highest GAM, stunting and underweight prevalence, and the lowest scores for food security indicators and water supply per household. Additionally, Laayoune anaemia prevalence in children and women is among the greatest and has some of the lowest scores of IYCF indicators.

After Laayoune, Dakhla has also a great cluster of problems. Dakhla has the greatest anaemia prevalence in children of underweight in women. In addition, in Dakhla the prevalence of stunting is high and it has the lowest scores of IYCF indicators.

Paradoxically, Boujdour (and Smara) presents low GAM and stunting prevalence in children but higher overweight/obesity prevalence in women, coupled with a lower anaemia prevalence for both population groups. In addition, Boujdour presents the lowest food security scores.

The significantly lower anaemia prevalence and higher overweight/obesity prevalence observed in Boujdour potentially underscore the role that greater wealth and better infrastructure has on the different indicators, in contrast to the pattern observed in Laayoune, Dakhla and Awserd. Other potential reasons to explain the differences observed between Wilayas are difficult to ascertain given the lack of Health Information System (HIS) data and more detailed food distribution and consumption information.

The analysis of the **General Food Distribution** (GFD) in the last four years indicate that the energy requirements of the beneficiary population had being met adequately. The analysis also shows the prominent role that the food security stock plays to ensure the stability of the food distribution. In addition, the content levels of protein and fat were also generally good, except for fat during 2015.

In contrast, the micronutrient content of the GFD, in particular the iron, vitamin A and calcium content was consistently inadequate, with average estimated levels being lower than the minimum requirements for the entirety of this period. For instance, contrary to the reported procurement of food commodities before 2013, the procured wheat flour and vegetable oil were not fortified, reportedly due to constraints in funding. Furthermore, in this period the supply of food basket commodities was not always consistent leading in turn to variations in the micronutrient composition of the food rations distributed. That the micronutrient content of the food basket is inadequate and unstable strongly suggest that efforts are needed to continue to improve the stability of the GFD, regarding quantities and micronutrient content whilst ensuring diet diversification.

The significant increase in **anaemia** prevalence since 2012 can be attributed to the insufficient availability and consumption of iron rich foods from the GFD. The low iron content in the GFD is likely due to a lack of fortified products, in contrast to previous years, and to the limited economic access of households to iron-rich foods such as meat. In addition, the phasing out in late 2015 of the blanket supplementary programme with CSB+, a programme targeted to pregnant and lactating, without any replacement, such as the suggested extra ration of fresh products stated in the Saharawi protocols, is likely to have also contributed to this increase in anaemia prevalence.

It is of interest to note that anaemia prevalence is higher among PLW, suggesting it to be one of the main drivers of anaemia prevalence in younger children. We also observed how haemoglobin concentrations decrease with gestational age among pregnant women suggesting the importance of this period for intervention. In addition, there is a growing body of evidence showing the role that adequate vitamin A intake has on maintaining normal haemoglobin levels and minimising anaemia risk[99]; and the GFD has been consistently low in vitamin A. Although at present we lack data regarding the prevalence of vitamin A deficiency in this population, given the prevalence of anaemia and the low vitamin A content of the GDF, it is likely that vitamin A deficiency is a public health concern in the Saharawi refugees[100].

[99] Thorne Lyman et al. 2012. Vitamin A and Carotenoids during Pregnancy and Maternal, Neonatal and Infant Health Outcomes: a Systematic Review and Meta-Analysis." Paediatric and Perinatal Epidemiology 26 (June 28): 36–54

[100] Though no recent data are available, a survey carried out in 2005[100] (WFP/UNHCR and the National Institute of Research of Food and Nutrition. Nutrition Survey; 2005) reported presence of night blindness among one fifth of women of reproductive age. Also, directly quoted from survey

Other potential factors affecting the effectiveness of anaemia reduction activities are the low coverage and poor compliance to iron supplements during pregnancy and lactation. It is worth noting the improvements in the antenatal and post-natal care coverage as observed in the survey, as it contrasts with a lower coverage reported in the first quarter of 2016 by the Health Information System[101]. This coverage improvement could be attributed to the recent implementation of a blanket dates distribution, targeting PLW (July 2016), as this was likely a strong motivator for increasing attendance of antenatal and postnatal health care.

Lastly, the blanket distribution of Nutributter, that is targeted at children aged 6-59 months and was reported to have reduced anaemia prevalence by half in the past survey, has not functioned since the last quarter of 2015. The sharp increase in anaemia prevalence observed in this population is likely to be explained by the discontinuation of this programme.

In contrast, the blanket distribution to PLW of micronutrient powders (locally known as Chaila) remains active but not improvements were observed. The proportion of surveyed women that reported to have received Chaila was low (about 24%). Some stakeholders have attributed this low coverage of the product to a low acceptability among beneficiaries. However, our survey results contradict this suggestion. Chaila uptake[102], among PLW that reported to have received it was found to be above the minimum recommended by UNHCR standards (about 70%). Furthermore, among those who reported to have received Chaila, acceptability[103] was high (about 90%). These results, together with an also high coverage of antenatal and post-natal care for PLW strongly suggest that improvements on this programme should prioritise the supply side of the Chaila distribution, i.e. adequate supply and distribution channels up to the beneficiary, rather than focus only on the demand for Chaila, e.g. mobilisation for better acceptability. Nonetheless, actions to increase coverage should be aimed concomitantly at improving acceptability and uptake among beneficiaries. The results presented from this survey are not different from those observed in the original feasibility study, undertaken in 2009[104], that found widespread acceptability and an adequate or high adherence to Chaila of about 80% among PLW.

At present, it is unknown if this observed low coverage and performance for the Chaila supplementation programme has been consistent since the beginning of its implementation, or if it has decreased progressively over time. The results observed in 2016 appear similar to those observed in 2012, but there is no reliable monitoring data to ascertain changing patterns of coverage as the tools developed to monitor programme performance, reportedly, have never been put in place. The registers made available refer only to the number of beneficiaries that theoretically are enrolled in the programme and that should benefit from it each month. Consequently, the aggregated data available about the quantities of Chaila distributed to the Wilayas suggest that the supplementation programme covers the great majority of PLW, contradicting in turn our survey findings. Furthermore, assuming that enrolment is high, PLW participating in the focus group discussions showed little knowledge about their programme entitlements providing a potential explanation of the seeming contradiction between high enrolment and low coverage, as these entitlements might not be offered to them at the health centres with sufficient clarity. Similarly, high programme enrolment does not account for potential low attendance during follow-ups at distribution days and explain further the seeming contradiction. Lastly, even if enrolment, attendance and delivery of Chaila to PLW were high, we have no information to understand if PLW are taking Chaila home with them.

The high levels of Chaila uptake and acceptability observed among PLW, together with the findings from focus group discussions with PLW (see section 4.2.2.), strongly suggests the need to undertake a qualitative assessment of the programme. This qualitative assessment would help understand the underlying factors acting as barriers to achieve adequate coverage and related overall acceptability of Chaila. In addition, it

report: *A study carried out in the Saharawi refugee camps in 2001 indicated that 51 % of the children had moderate vitamin A deficiency (serum retinol < 20 µg/dL) and 7% had biochemical severe vitamin A deficiency (serum retinol < 10 µg/dL) (Ferrari M, personnel communication).*

[101] Prenatal and postnatal coverage of 64% and 17% respectively.

[102] Here used as a proxy measure for adherence

[103] Defined as the desire to receive again MNP among the PLW that had ever received it.

[104] Salse Ubach N, Wilkinson C. Nutributter® and MNP Acceptability Test. Saharawi Refugee Camps – Algeria. October 2009.

would help unravel the enabling factors for improving programme implementation in this context. Achieving greater coverage and acceptability for this supplementation programme is crucial in this context, given the resource and logistical difficulties to achieve a well-balanced diet for this population due to the extreme environmental conditions in which they live.

In the survey sample, all children aged <19 months have potentially never received Nutributter®, given that the last Nutributter® distribution was done in September 2015; whilst their older counterparts should have received it at various time points, increasing their exposure to Nutributter® with age. In addition, children aged 36-59 months enrolled in kinder-gardens were receiving a mid-morning micronutrient-enriched snack (during the first four months of the scholar year in 2015[105] this was based on eeZeeCup®[106] and since September 2016 it is based on enriched milk[107]). This has potentially created a large micronutrient gap between younger and older children, accentuating micronutrient deficiencies among the young who often have greater demands of vitamins and minerals for adequate growth and development.

Regarding **stunting**, the sustained improvements of diversification of the GFD has ensured the presence of micronutrients in the children's diet that are known to prevent stunting[108]. In addition, strengthening of activities has improved IYCF practices and increased enrolment in growth monitoring and antenatal/postnatal services. These improvements, in conjunction with the improvements in water supply and sanitation are likely the main contributing factors to the observed reduction on stunting prevalence. A better nutritional status during pregnancy, likely due to the blanket supplementary programme with CSB+ for PLW that lasted up to late in 2015, might have contributed also to the observed downward trend in stunting prevalence. Lastly, the stability of food distribution, potentially attributed to the functioning FSS, is also likely to have contributed to this observed downward trend. Nonetheless, stunting prevalence remains high among Saharawi refugee children, despite the observed improvement, and a greater reduction of stunting prevalence would have been expected at the end of this four-year period (2013-2016) if the distribution of Nutributter® had not stopped since 2015.

An inadequate diet of low quality, nutrition illiteracy, diseases along with poor health seeking practices and water & sanitation, and poverty (lack of livelihoods) remain the main causes of malnutrition in this context.

Infant young child feeding indicators have improved since 2010. However, most indicators remain low suggesting poor practices. Overall, only about one quarter of children aged <6 months are exclusively breastfed, whilst other types of milk, water and other liquids are introduced very early in life against recommendations. Breastfeeding is initiated within the first hour in only half of the children while the other half loses the beneficial immune properties of colostrum at birth. Despite the large majority of children being breastfed, less than half continue to be breastfed up to two years. Bottle feeding is reported in one fourth of the children, a concerning findings given that bottle-fed children are often given less breastmilk and are thus prone to increased morbidity and mortality due to bottles with a nipple being prone to contamination. Complementary feeding starts timely for 75% of the children; but less than half of the children received the minimum number of meals, only one third reached the minimum dietary diversity, and the consumption of iron-rich food has dropped significantly since 2012 primarily due to the stopping of Nutributter® distribution. Of note, the last two indicators index feeding behaviour, but they are strongly affected by food availability and access.

Diarrhoea is often associated with poor caring, poor hygiene practices and insufficient water quality. The diarrhoea prevalence observed in 2016 is lower than that reported last year, in November 2015, at a time when diarrhoea prevalence was reported to have increased because of the floods[109]. Unfortunately, we lack epidemiological data to be able to ascertain usual diarrhoea seasonal patterns. Feeding practices for

[105] WFP Standard Project Report 2015.
[106] Lipid based nutrient supplement specifically designed to prevent stunting.
[107] 80 gr Dry Skimmed Milk per day, which contains good amounts of most of the micronutrients in Nutributter (except vitamin A, phosphorus, potassium, manganese and copper).
[108] Zinc, Sulphur, phosphor, potassium, sodium, magnesium.
[109] Rapid Food Security Assessment –Saharawi Refugee Camps- Tindouf. South Algeria. WFP. November 2015.

diarrhoea care were found to be poor; only a small portion of children were offered more fluids and more than half had their food intake reduced. These poor practices often reduce the likelihood of a full and speedy recovery and places the child into an increased risk of malnutrition. Furthermore, health seeking behaviours among caregivers were also poor, with only about half of children with diarrhoea being taken to the health centre or given ORS.

C**overage of malnutrition care** for children aged 6-59 months was found to be low for both MAM and SAM treatment[110], and both where far below the 90% Sphere target for camp settings. There is evidence from different interviews undertaken during the survey that activities for community screening of malnutrition with MUAC were not in place in most Dairas due to the absence of nutritional products for treatment that lasted until September 2016, and this most likely would account for the low coverage found. Likewise, since MUAC is used as a screening tool, there is the possibility that children with a high MUAC measurement but a low weight-for-height would not be detected during population screening. In addition, point coverage of malnutrition care for PLW was low, but period coverage was greater. That a large difference between point and period coverage exists suggest the possibility that malnutrition care for PLW is not always targeted adequately. The latter would be also suggested by the findings of the FGDs held with PLW; while in some instances none of the PLW in the FGD were admitted in the programme, in others, all PLW were receiving CSB+ regardless of their nutritional status[111].

Food security indicators indicated that the food security situation among the refugee population has improved, and has been kept stable. There was an upward trend of households having acceptable FCS scores. Likewise, the reduced coping strategy index (rCSI), an indicator of the coping mechanisms utilised by beneficiaries to cope with lack of food or resources to acquire food, remained stable throughout 2015 and 2016 and showed similar values in the survey, providing support about the stability of food security.

Less than one in ten households reported using no coping strategies, suggesting that the majority of households were under stress to meet their food needs. Borrowing of food or reliance on help from friends or relatives was the most common food-based coping strategy reported in all Wilayas. However, borrowing of food is so widespread that it is difficult to understand whether this behaviour is a real coping mechanism for food insecurity or whether it is a cultural practice; consequently, caution is advised when interpreting this finding. Nonetheless, even after removal of this coping mechanism from our analysis, only 20.7% (95% CI: 17.4; 24.4) of the households reported not using any coping mechanisms suggesting the need to understand food insecurity in this context beyond what can be understood from commonly used indicators such as FCS or HDDS.

Household dietary diversity was measured in two commonly used ways; using a 7-day (using FCS data with a maximum of 7 food groups) and a 24-hr recall period (i.e. HDDS with a maximum of 12 food groups). According to the FCS-based diversity score, households experienced good dietary diversity, with an average daily intake of cereals and tubers, vegetable oil and sugary products. Vegetables[112] were consumed an average of four times in the 7-day period, whilst household´s intake of protein sources such as dairy products, legumes and animal products were reported to be eaten, each on average, two days in 7-day period. Fruits consumption was reported rarely. Conversely, dietary diversity seemed lower when it was assessed using HDDS. It is difficult to understand which indicator better reflects the food diversity of households as each is affected by food access and availability differently. Shorter but more detailed food diversity indicators (i.e. HDDS) are likely better at measuring the everyday household experience of diversity, being in this context not greatly diverse. Conversely, a diversity indicator that is less detailed but with a longer recall period is

[110] Even after including the children that are receiving MAM and SAM care but do not fit the case definition, period coverage was also low (11% for MAM treatment and 53% for SAM treatment).

[111] PLW referred that: MUAC had not been taken at the health centre and all women attending antenatal/postnatal care were receiving CSB+, sugar and oil until the child was 6 months old.

[112] The consumption of vegetables, primarily stimulated by the distribution of fresh products, is a very positive improvement since 2012, and now households seem to have integrated vegetable consumption as part of their diet (as illustrated in the JAMs expenditure pattern analysis). Yet, of note is that dietary diversity indicators are used to estimate the extent of food access at household level but they do not account for quantities, and in the Saharawi population vegetable consumption is mostly translated into *"small quantities of tomato and onions as part of the main meal, even no one piece sometimes"*, as reported frequently during field interviews.

likely better at measuring the aggregated household food diversity, albeit with less detail, being in this context cumulatively adequate.

The 2016 WFP/UNHCR Joint Assessment Mission (JAM)[113] reported that the large majority of households remain fully dependent on food assistance, despite some wealthier households being able to afford their provision of food and other basic needs. There is very limited access to livelihoods and remunerated employment as the available employment opportunities are voluntary or incentive based. Consequently, household purchasing power is weak among most refugees and only a few are likely to be self-reliant. A market assessment undertaken in October 2015[114] reported that it is feasible to transition from an in-kind only food assistance modality to a mixed in-kind/cash/voucher modality. This transition, already implemented in other refugee settings, might foster the capacity of the local market and local economy; and in turn could sustain or support greater dietary diversity whilst empowering refugees in their food choices.

The high prevalence of **overweight, obesity and central obesity** observed among non -pregnant women of reproductive age is a great concern, and should be considered of high public health significance. The positive trend in overweight and obesity prevalence is likely the outcome of a combination of factors. One such factors is the synergy across the life span[115] between undernutrition, experienced early in childhood, the long-term exposure to a micronutrient-poor but carbohydrate-rich diet, especially high in sugar[116] and refined cereals, and the low levels of physical activity[117]. Another contributing factor increasing obesity in women might be that traditionally larger bodies are associated to wealth and beauty[118], as it was frequently mentioned during individual discussions with the survey team members.

It is important to note that the secular trend in obesity observed among women might not be observed in other population groups. For instance, we observed a very low prevalence in children aged 6-59 months. Furthermore, mean values of both BMI and central obesity were observed to increase with age being this increase more prominent between the ages of 15 and 30 years, a time when most women would initiate reproduction. It is unclear whether becoming pregnant is a risk factor for overweight and obesity in our population, whether poor breastfeeding practices do not allow women to lose the weight gained during pregnancy, or whether other factors such as an inadequate diet acting in conjunction with reproductive patterns might be driving the observed rise in BMI values. Nonetheless, the reproductive patterns seems to be associated with overweight and obesity patterns and further studies are needed to understand better its role. Additionally, while women are often at more risk for overweight and obesity[119], further work is needed on other population groups, such as adult males or school-age children, to better identify the main drivers for obesity among the Saharawi population.

We assessed the relationship between patterns of tea consumption frequency, as measured by the number of times in a day women reported to drink tea, and indicators of anaemia and obesity (see **Table A42**). We assessed this relationship with anaemia, given that consumption of green and black tea is often associated with a reduced iron absorption; and with obesity, given that tea is often consumed with high quantities of sugar, a known risk factor for overweight and obesity.

For anaemia in women, we did not find any association between tea consumption and haemoglobin concentration or an increase in the odds for presenting anaemia. Conversely, tea consumption showed a

[113] WFP/UNHCF Joint Assessment Mission. April 2016

[114] Inter-sectoral Assessment. Saharawi Refugee Camps in Algeria. October 2015.

[115] Wells JCK. The Evolutionary Biology of Human Body Fatness. Cambridge University Press, 2010

[116] Tea and zrig consumption is part of Saharawi social life, and both include in their preparation high quantities of sugar. The Spanish Red Cross/Saharawi Red Crescent study on feeding habits conducted in 2016 (see food note below for reference) found that more than two thirds of those interviewed take tea three or more times in a day, and more than 80% take also zrig more than twice. In the same line, the JAM in 2013 reported that the purchase of sugar was extremely high, with 65% of the families interviewed consuming more than 20 kg per person/month, and again the JAM in 2016 highlighted similar pattern, with the purchase of sugar and soft drinks/juices constituting one third of total food expenditures. In addition, a vast majority of women in our survey reported taking sweet beverages within the previous 24h before the survey.

[117] Encuesta de hábitos nutricionales de la población refugiada Saharawi. Cruz Roja Española y Media Luna Roja Saharawi. Enero-Marzo 2016.

[118] Rguibi M et al. Fattening practices among Moroccan Saharawi adult women. Eastern Mediterranean Health Journal. October 2006.

[119] Trends in adult body-mass index in 200 countries from 1975 to 2014: a pooled analysis of 1698 population-based measurement studies with 19.2 million participants. Lancet 387: 1377-1396. April 2016.

direct positive association with BMI and waist circumference. Furthermore, greater frequency of tea consumption was associated with greater odds of obesity (see annex 20).

Overweight and obesity are among the main known risk factors for non-communicable diseases such as diabetes, hypertension or cardiovascular diseases. Our results found seemingly low prevalence of reported diabetes, high blood pressure and/or cholesterol among working age adults (25-64 years). However, it is difficult for us to ascertain whether these seemingly low prevalence values might be mostly measuring the low capacity and coverage of health services for adequately screen and diagnose metabolic diseases in the population; and also the health seeking behaviours of this population for chronic diseases e.g., reluctance to attend health services[120]. Nonetheless, about 40% of all households reported to have a working-age adult, aged 25-64 years, suffering from at least one of these conditions, suggesting a large societal burden of non-communicable diseases that is likely to present a high economic cost to both, households and the population.

It is important to emphasise that this high prevalence of obesity should not interpreted incorrectly as an indicator of the population receiving excessive amounts of food commodities from the GFD. Saharawi refugees remain dependent of food assistance to cover most of their nutritional needs and at present have little means to improve their diets. Moreover, both undernutrition and obesity are known to co-exist within the same households strongly suggesting the need to improve the quality of the diet, which at present is inadequate to achieve and sustain health, rather than to aim at reducing the provision of food assistance. Furthermore, improvements in the quality of the diet, such as achieving greater diversity or reducing sugar intake, is likely to combat both undernutrition and obesity. Nonetheless, meeting the needs to address undernutrition, overweight, obesity, and their related non-communicable diseases will require careful planning. Public health interventions should prioritise increasing levels of physical activity and improving the quality of the diet provided through the development of an environment that support improved and appropriate eating habits for the entire community. Furthermore, the approaches adopted should depend on the population profile, and especially its economic circumstances.

[120] It was not unusual that some respondents would report, *"I do not know, better not going to the hospital because if there is any important disease they will not be able to provide treatment and we do not have the means. What to do then?*

VII. RECOMMENDATIONS

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

7.1. 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 inadequate. There are large monthly variability in the GFD's vitamin and mineral content.
Actions:	• Re-establish the distribution of iron-fortified wheat flour and vitamin A-enriched vegetable oil as a priority[121]. • Include CSB+ as commodity to the Food Security Stock.

2. Increase household food diversity and GFD diversity.

Rationale:	Household food diversity has improved in the past 4 years. However, the dietary diversity assessed by a 24-hrs recall indicates that 4 out of 7 food groups consumed on average by households comprised only cereals, sugary products, vegetables and spices, condiments and drinks. Furthermore, only about 4 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[122]. • Increase the number of food commodities rich in animal protein. Canned fish[123] should be distributed monthly. • In line with the 2013 and 2016 JAM recommendations and the 2015 market assessment[124], work towards a shift in the GFD from an in-kind only to a hybrid food assistance modality that includes cash transfers of food vouchers[125].

3. Strengthen the Food Security Stock to support the stability of the GFD.

Rationale:	The Food Security Stock has supported the stability of the GFD to provide rations with a minimum of 2,100 kcal since 2012; contributing up to 50% of the energy of the ration. In addition, it has contributed commodities to all GFD monthly distributions in the past three years. Secondary data suggest that the Food Security Stock has contributed to the improvement observed in nutritional indicators in children aged 6-59 months.
Actions:	• Revise Food Security Stock protocols[126] between WFP and the Spanish Red Cross to streamline procedures. Revised protocols should help inform timely on Food Security Stock inputs needed to fulfil GFD monthly distribution, and to prevent Food Security Stock shortages. • Increase the Food Security Stock capacity to cover one additional month worth of food commodities.

4. 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.

[121] 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

[122] Selection of fresh food commodities should consider its nutritional content and cultural preferences

[123] Currently the sole source of animal protein in the GFD and essential to fulfil GFD requirements regarding fat and niacin.

[124] Inter-sectoral Assessment. Saharawi Refugee Camps in Algeria. October 2015.

[125] 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.

[126] Communication deadlines and procedures

	• Strengthen local livelihood activities to expand production[127] with the view of improved nutrition goals[128]. • Assess the feasibility of producing fortified date bars 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. • Re-launch the Saharawi TV programme "*Hacer mucho con poco*"[129]. Include the delivery of key nutrition, health and hygiene messages aimed to improve nutrition and well-being.

5. Strengthen monitoring and evaluation (M&E) of the food security situation.

Rationale:	M&E of food security indicators has improved in previous years. However, delays in data compilation, analysis and reporting remain. In addition, despite the availability of additional data from a sufficient sample, no regular reporting of combined data are produced to aid understanding the food security situation.
Actions:	• Strengthen post-distribution monitoring (PDM) activities so that data compilation, analysis and reporting is undertaken timely on a quarterly basis[130]. • Collect and report M&E at the Wilaya level. • Implement regular refresher training for staff working on PDM activities. • WFP/UNHCR should conduct a yearly comprehensive food security assessment. At present, insufficient information is available on the food security situation within the Wilayas.

7.2. INFANT AND YOUNG CHILD FEEDING (IYCF) PRACTICES

1. Prioritise and improve IYCF practices.

Rationale:	IYCF practices remain poor in this context, despite improvements observed in the past 4 years. 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:	• Develop a 5-year IYCF strategy as a priority. The strategy should integrate with the Saharawi Nutrition Strategy. • Prioritise behaviour change counselling and support for IYCF in health and nutrition activities • Increase or strengthen the human resource capacity[131] to promote and support IYCF during any contact between health services and mothers throughout pregnancy and the first two years of child´s life[132]. • Develop or strengthen IYCF community-based activities through community peer-to-peer support groups[133]. 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[134] to facilitate user-friendly communication and dissemination of appropriate IYCF messages. • Design a media/communication campaign for IYCF awareness[135]. • Explore the feasibility of introducing the Baby Friendly Hospital Initiative[136].

[127] E.g., poultry farms, cheese production at Daira/household level

[128] 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

[129] The TV programme should provide learning sessions on how to preserve, combine (to obtain the best nutritional gains) and cook (offering a varied set of innovative and non-expensive recipes) the different food items distributed through the GFD.

[130] The report should include process and outcome indicators using the combined data produced by the different partners involved in PDM

[131] 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

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

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

[134] 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.

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

[136] 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.

	• 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. • Monitor IYCF practices and interventions. Reports should be produced monthly at the Daira and Wilaya level.

7.3. ACUTE MALNUTRITION

1. Improve the performance of malnutrition treatment programmes.

Rationale:	Global Acute malnutrition (GAM) prevalence has improved in the last years. For the first time GAM prevalence is considered of low public health significance. 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 sufficient 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. • Review and update MAM treatment based on current practice with RUSF in the CMAM protocols. Until extra-nutritional requirements are ensured to PLW, those found with acute malnutrition should receive a premix ration of about 1,000 kcal/day to account for intra-household sharing[137].

2. Improve the monitoring of malnutrition treatment programmes' performance.

Rationale:	There is poor monitoring of malnutrition programmes' performance. In addition, there are unreliable and conflicting registers of malnutrition treatment programmes.
Actions:	• WFP/UNHCR should increase resources to improve the monitoring of programme performance and to strengthen staff capacities within UN agencies, implementing partners and Saharawi Health Authorities staff *(see annex 22)*. • WFP, UNHCR and SHA should develop and/or update monitoring and reporting tools with the aim to adequately monitor programme performance of MAM treatment for children and PLW[138], based on internationally agreed standards. • Produce monthly statistic reports for MAM treatment, one for children and another for PLW, from each health centre[139]. Given the differences observed between Wilayas, indicators should be reported at Daira and Wilaya levels[140]. • Develop a MAM monitoring database. • Develop training programme[141] to build capacities on revised protocols and programme monitoring tailored to different monitoring levels, in order to produce reliable registers.

3. Increase the coverage of malnutrition treatment programmes.

Rationale:	The survey results indicate very low coverage of malnutrition treatment programmes. Furthermore, secondary data indicates that active case finding of SAM/MAM for referral was very limited in the last year.
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.

[137] Guidelines for selective feeding. The management of malnutrition in emergencies. WFP/UNHCR 2011.
[138] In addition, develop easy to use step-by-step guidelines for adequate filling of monthly reporting.
[139] A combined monthly report including the different groups (PLW and children) can be developed to reduce paperwork at health centres.
[140] Aggregated analysis can mask poor performance on one/more sites, analysis of performance indicators should be carried out at different levels to prompt corrective actions as needed
[141] Regular on the job coaching and training during supportive supervisory visits should be also carried out.

- Expand the participation of other actors in active case finding to increase coverage. Mothers[142], carers, and educators[143] in kinder gardens could be trained to undertake monthly MUAC measurements from children to detect acute malnutrition.

4. 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[144]. • Evaluate household vulnerability[145] of children following MAM treatment discharge[146]. 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[147].

7.4. STUNTING AND ANAEMIA IN CHILDREN AND WOMEN

1. Strengthen 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 functioned poorly in recent years, and the current worsening of anaemia prevalence is likely the result of this poor functioning. In addition, data indicates high acceptability of this programme in the target populations but very poor coverage due to lack of special products (in children) or inadequate implementation (in PLW).
Actions:	• Resume the blanket supplementary feeding (BSF) to children aged 6-59 months with Nutributter® and continue BSF for PLW with micronutrient-powder (MNP). • Ensure regular and timely procurement of sufficient quantities of Nutributter® and Chaila[148]. • Revise and overhaul implementation and distribution protocols of the Anaemia and Stunting Reduction Programme to improve performance and aid integration into PISIS and reproductive health services. Develop documentation and guides to define the distribution systems, roles and responsibilities of stakeholders, and improve implementation[149]. • For the BSF to children aged 6-59 months with Nutributter®, WFP should coordinate with UNICEF, SHA and partners involved in health and nutrition to provide, develop and/or review information, education and communication (IEC) materials on IYCF and caring practices until a more comprehensive BCC package for IYCF is developed. • Conduct formative research to understand challenges, barriers and enabling factors affecting MNP coverage among PLW[150]. • Develop a BCC component regarding the BSF programme for PLW. Findings from the formative research should guide its development. • Implement an extensive social sensitization campaign through different means[151], combined with adequate training given to service providers to provide sufficient, adequate, and timely information to the beneficiaries in order to promote regular use of the product.

[142] 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*

[143] They could be trained on MUAC measurement and technique, and conduct monthly MUAC to children of three and four years.

[144] IYCF best practices are known to increase the likelihood of recovery and reduce the likelihood of relapse following discharge from care.

[145] Household vulnerability should be evaluated through the development of simple "ranking household vulnerability" tool.

[146] Because every SAM child will be always referred and admitted into SFP once discharged from OTP.

[147] 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).

[148] Long shortage periods of nutritional products can soon reverse gains on anaemia prevention and it creates confusion among beneficiaries and health service providers regarding entitlements and guidelines; and in turn potentially reducing programme acceptability/effectiveness.

[149] These materials include updated protocol on modality of implementation, step-by-step manual to guide implementers, registration and reporting tools, job aids and pictorial materials, supervisor checklists.

[150] Results should be used to make recommendations on ways to improve MNP coverage and uptake, among PLW, and to develop the BCC component of BSF to PLW accordingly.

[151] Household visits, IEC sessions, and peer support groups. Include also other media channels, like TV and radio for better outreach and impact.

2. Improve the monitoring of the Anaemia and Stunting Reduction Programme's performance.

Rationale:	At present, there is no functioning monitoring system in place.
Actions:	• Strengthen as priority the monitoring and evaluation of the Anaemia and Stunting Reduction Programme. Monitoring reports should be produced monthly, according to UNHCR guidelines[152]. Monitoring indicators should be reported at Daira level[153]. Twice a year, an additional M&E report should be produced and shared with the SHA and other stakeholders. • Develop a training plan to build capacities on revised protocols and programme monitoring tailored to different monitoring levels. • Integration of revised/new protocols/monitoring tools into the programme should be done in one Wilaya at any given time[154]. • Develop a monitoring programme database. • To assess effectiveness and impact of the programme, WFP/UNHCR in collaboration with partners could include a research component (this apart from the bi-annual survey planned), by monitoring the cohort of children and PLW in one of the Wilayas[155]. • For improved performance and results attained, WFP should incorporate one Nutrition focal point for the anaemia and stunting reduction programme.

3. 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[156]. • 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[157].

7.5. 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[158].

Engage also health staff of private reproductive health services, midwifes and TBA to further promote the use of MNP.

[152] Tondeur M, Style S, Seal A, Grijalva-Eternod C, Kassim IAR, Dolan C. UNHCR Operational Guidance on the use of special nutritional products to reduce micronutrient deficiencies and malnutrition in refugee populations. UNHCR, Geneva, 2011. Available at: https://cms.emergency.unhcr.org/documents/11982/31888/UNHCR%2C+Operational+guidance+on+the+use+of+special+nutritional+products+to+reduce+micronutrient+deficiencies+and+malnutrition+in+refugee+situations%2C+2011/3e5f763b-c033-4064-ab5a-4a3942fb80af.

[153] Including information on BCC activities and programme performance (total beneficiaries at end of month, new admissions, re-admissions, total admissions, categories of discharges).

[154] Slow integration allows for close and supportive monitoring and on the job coaching. Integration could gradually expand to other Wilayas.

[155] Carrying out anthropometric measurements and haemoglobin testing during distribution contacts.

[156] E.g., Commodities locally produced like cheese/poultry could be given to households with anaemic PLW.

[157] 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.

[158] 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.

	• Develop a programme to promote a healthier life-style[159]. • 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.

7.6. WATER, SANITATION AND HYGIENE

1. Improve water infrastructure and hygiene practices.

Rationale:	Survey data indicate that about half of households do not meet UNHCR water provision standards and that about four out of five 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. •

7.7 POPULATIONAL ASSESSMENTS

1. Undertake further nutrition-related assessments.

Rationale:	There is a lack of reliable health information systems (HIS) data to monitor nutrition indicators in this setting. Furthermore, available HIS data is unlikely to provide representative data of all population groups given its selection bias.
Actions:	• Implement nutrition surveys every two years. Nutrition surveys should follow UNHCR SENS guidelines[160] 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).

[159] 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.

[160] UNHCR Standardised Expanded Nutrition Survey (SENS) guidelines. Available at: http://sens.unhcr.org/

VIII. ANNEXES

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Annex 1: Terms of reference

Nutrition Survey

Saharawi Refugee Camps, Tindouf, Algeria
2016

Terms of Reference

Background

Algeria has been hosting Saharawi 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, Saharawi refugees have been hosted for over 40 years in the south-west region of Tindouf, Algeria. Their situation is considered a protracted emergency.

A number of nutrition surveys have been undertaken over the years. **Table 1** summarises key findings for women and children for the last two nutrition surveys (2010 and 2012). 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 and 2012 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)

95% CI: 95% Confidence Intervals; GAM: Global Acute Malnutrition. Prevalence of children, aged 6-59 months, presenting a weight for height z-score <-2 z-scores and/or bilateral pitting oedema. SAM: Severe Acute Malnutrition. Prevalence of children, aged 6-59 months, presenting a weight for height z-score <-3 z-scores and/or bilateral pitting oedema. Stunting: Prevalence of children, aged 6-59 months, presenting a height for age z-score <-2 z-scores. Severe Anaemia: Prevalence of children, aged 6-59 months, presenting haemoglobin values <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 2012[161] reported a prevalence of anaemia in non-pregnant women of reproductive age (15-49 years) and children aged 6-59 months above the threshold of medium public health significance (see **Table 1**). In addition, exceedingly high levels of anaemia were reported among pregnant and lactating women of reproductive age (54.7 (95% CI 44.2 – 65.2) and 54.6 (95% CI 47.7 – 61.6), respectively). Moreover, the overall burden of anaemia was found to be different between each camp. Similarly, stunting in children aged 6-59 months is of medium public health significance. In addition, the 2010 Nutrition Survey reported a high prevalence of overweight (31.8%; 95% CI: 29.6 – 34.0) and obesity (21.9%; 95% CI: 19.6 – 24.2) among women of childbearing age.

Among the strategies to assess and improve the monitoring of nutrition-related issues in this refugee operation, the 2012 nutrition survey recommended the systematic implementation of nutrition surveys at least every two years.

[161] UNHCR and WFP. Nutrition Survey. Saharawi Refugee Camps, Tindouf, Algeria. Nov 2012

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 Saharawi refugee population. The results will be used to produce recommendations on actions to improve the nutritional status and health of the Saharawi 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[162] (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 autumn[163] 2016. 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 first in English to facilitate discussion of what information will be included. The final version will then be translated into Spanish for approval by the Saharawi health authorities. 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 deliver 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:** Following final reception of the digital capture of all the completed questionnaires at the end of the survey, the below listed datasets will be created for survey analysis. All dataset will be thoroughly clean and adequately labelled in English language.

[162] 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.

[163] 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 final reception of the digital capture of all the completed questionnaires at the end of the survey, 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 Saharawi health authorities. Only after the translation of the survey report is finalised, will dissemination of the survey results be carried out.

Annex 1 - Indicators

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: <125mm	MUAC	MUAC tape
	• Very low MUAC: <115mm		
	• 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) <230mm	MUAC	MUAC tape
	• Underweight: body mass index <18kg/m^2	Weight	Weight scale
	• Overweight: Body mass index ≥25 but <30g/m^2		
	• Obesity: Body mass index ≥30kg/m^2	Height	Stadiometer
	• Central obesity: waist circumference >80cm	Waist circumference	Tape
Household	***Food Security***		
	• Food Consumption Score	Questionnaire	Questionnaire
	• Household Diet Diversity Score		
	• Coping Strategies Index		
	Chronic disease		
	• Tobacco use in household	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 2: Sample size calculation

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

Sample size calculations were carried out using ENA for SMART 2011 software (version April 21st 2015)[164], following UNHCR Standardised Expanded Nutrition Surveys (SENS) Guidelines for Refugee Populations[165]. Calculations were based on prevalence data for Global Acute Malnutrition (GAM), stunting and anaemia reported in the past two 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 2012 nutrition survey, the values observed of the design effect for anthropometric indicators in children aged 6-59 months ranged between 1.00 and 1.71; while those for anaemia ranged between 0.93 and 2.15. For non-pregnant women of childbearing age the design effect ranged between 0.66 and 1.32 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 (Laayoune, 2010)	5.7 (3.6 – 8.7)	8	3.5	1.5	377*
GAM (Dakhla, 2010)	12.8 (9.0 – 17.8)	18	5.0	1.5	370
GAM (Awserd, 2012)	5.9 (4.2 – 7.6)	7	3.5	1.5	333
GAM (Laayoune, 2012)	10.5 (7.8 – 13.2)	14	4.5	1.5	373
Stunting (Awserd, 2010)	25.5 (20.9 – 30.8)	31	7.0	1.5	274
Stunting (Laayoune, 2010)	34.2 (28.3 – 40.7)	41	7.0	1.5	310
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
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
	Non-pregnant women of reproductive age (15 – 49 years)				
	Reported prevalence % (95% CI)	Prevalence used %	Precision %	Design effect	Calculated sample size
Anaemia (Smara, 2010)	36.0 (29.0 – 43.1)	46	7.5	2.0	369
Anaemia (Laayoune, 2010)	62.5 (55.7 – 69.3)	69	7.5	2.0	318
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*
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

95% CI: 95% Confidence Interval. GAM, Global Acute Malnutrition: Prevalence in children aged 6-59 months with weight-for-height z-score <-2 z-scores and/or bilateral pitting oedema. Stunting: Prevalence in children aged 6-59 months with 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 calculations were carried using ENA for SMART software (version April 21st 2015). [b] Nutrition survey carried out in Nov 2012. Only the highest and lowest prevalence values for each indicator were used for calculating sample size. * Highest sample size value.

[164] Available at www.nutrisurvey.net/ena/ena.html

[165] 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**).

A2.4. Number of households required for sampling

Household characteristics were obtained from the 2012 nutrition survey data (see **Table A2.3**) to allow calculating the required number of households.

Table A2.3. Household characteristics observed in the 2012 nutrition survey. All values are household numbers (rounded to two decimal points) unless otherwise specified.

Category	Awserd	Dakhla	Laayoune	Smara	Combined
Children aged 6-59 months	1.05	0.99	0.95	0.98	1.00
Non-pregnant women aged 15-49 years	1.16	1.77	1.28	1.31	1.38
Household refusal (%)	0.39	0.39	2.55	0.58	0.98

Based on the data obtained from the 2012 nutrition survey it was assumed, for this survey, an average household would have 0.95 children aged 6-59 months and 1.16 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.

	Sample required		Households	+ refusal ≈3%	Households per cluster needed: 30 clusters	Households per cluster needed: 35 clusters
Children 6-59 months	377	÷ 0.95 =	397	409	14	12
Women 15-49 years	383	÷ 1.16 =	331	341	12	10

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 10 to 14 households per cluster.

Annex 3: Cluster allocation

Cluster allocation Dakhla

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

Cluster allocation Laayoune

District	Quarter	Population	Cluster
Amgala	Quarter 1	1,478	1,2
	Quarter 2	1,478	3
	Quarter 3	1,478	4, 5
	Quarter 4	1,478	6
Dchera	Quarter 1	1,326	7,8
	Quarter 2	1,326	9
	Quarter 3	1,326	10, 11
	Quarter 4	1,326	12, 13
Daoura	Quarter 1	1,502	14
	Quarter 2	1,502	15, 16
	Quarter 3	1,502	17, 18
	Quarter 4	1,501	19
Hagouina	Quarter 1	1,414	20, 21
	Quarter 2	1,413	22
	Quarter 3	1,414	23
	Quarter 4	1,413	24, 25
Bucraa	Quarter 1	1,516	-
	Quarter 2	1,516	26, 27
	Quarter 3	1,516	28
	Quarter 4	1,517	29
Guelta	Quarter 1	1,514	30, 31
	Quarter 2	1,513	32, 33
	Quarter 3	1,514	34
	Quarter 4	1,513	35
Total	**24**	**34,995**	**35**

Cluster allocation Awserd

District	Quarter	Population	Cluster
Zug	Quarter 1	981	1, 2
	Quarter 2	981	3
	Quarter 3	981	4, 5
	Quarter 4	982	6
Miyek	Quarter 1	1,113	7, 8
	Quarter 2	1,113	9, 10
	Quarter 3	1,113	
	Quarter 4	1,114	11, 12
Biz-genduz	Quarter 1	1,078	13, 14
	Quarter 2	1,078	15
	Quarter 3	1,078	16, 17
	Quarter 4	1,078	18
Aguenit	Quarter 1	965	19
	Quarter 2	965	20
	Quarter 3	965	21
	Quarter 4	964	22
Tichla	Quarter 1	1,016	23, 24
	Quarter 2	1,017	25
	Quarter 3	1,017	26, 27
	Quarter 4	1,017	28
La Gouera	Quarter 1	1,263	29
	Quarter 2	1,263	30, 31
	Quarter 3	1,263	32, 33
	Quarter 4	1,263	34, 35
Total	**24**	**25,668**	**35**

Cluster allocation Smara

District	Quarter	Population	Cluster
Edjeira	Quarter 1	1,377	1, 2
	Quarter 2	1,378	-
	Quarter 3	1,378	3
	Quarter 4	1,378	4
Farsia	Quarter 1	1,453	5, 6
	Quarter 2	1,453	7, 8
	Quarter 3	1,453	9
	Quarter 4	1,453	10, 11
Mahbes	Quarter 1	1,114	12
	Quarter 2	1,114	
	Quarter 3	1,115	13
	Quarter 4	1,115	14, 15
B-Lehlu	Quarter 1	1,038	16
	Quarter 2	1,039	17
	Quarter 3	1,039	18
	Quarter 4	1,039	19
Hauza	Quarter 1	1,313	20, 21
	Quarter 2	1,313	22
	Quarter 3	1,314	23, 24
	Quarter 4	1,314	25
Tifariti	Quarter 1	1,203	26
	Quarter 2	1,203	27
	Quarter 3	1,203	28
	Quarter 4	1,204	29
Mheiriz	Quarter 1	1,278	30,31
	Quarter 2	1,279	32
	Quarter 3	1,279	33
	Quarter 4	1,279	34, 35
Total	**28**	**35,118**	**35**

Cluster allocation Boujdour*

Camp	District	Quarter	Population	Cluster
Boujdour	27 Febrero	Quarter 1	4,609	1,2,9, 11, 13
		Quarter 2		8, 12
		Quarter 3		3, 5, 10
		Quarter 4		4, 6, 7, 12
	Lemsid	Quarter 1	4,611	15
		Quarter 2		14, 16, 21, 24, 25
		Quarter 3		17, 18, 20, 21, 22
		Quarter 4		19, 23
	Agti	Quarter 1	3,904	28, 29, 32, 33, 34
		Quarter 2		26, 27, 30, 35
		Quarter 3		31
		Quarter 4		-
	Total	**28**	**13,124**	**35**

*First stage cluster sampling in Boujdour was done at Daira level because, though population figures available per barrio seemed to be very similar, updated GPS maps, visits to camp sites as well as interviews with stakeholders, community refugee authorities and refugees themselves did show a different picture, with some quarters/barrios highly density populated and others with quite less households in.

Annex 4. Cluster control sheet

Team No _____ Date ____/____/2016 Wilaya _____ Daira _____ Cluster _____
DD MM

To be completed by the team leader. Fill in for each of the households visited.

HH Nº	Children 0-59 months		Women 15-49 years		Food security questionnaire filled 1. Yes 2. No	WASH questionnaire filled 1. Yes 2. No	Results of 1st visit: 1.complete 2.partially 3.Refused 4.Absent	HH needs to be revisited? 1. Yes 2. No	HH revisited? 1. SI 2. No	Second visit outcome (if needed) 1.complete 2.partially 3.Refused 4.Absent	Comentarios
	Nº of eligible children	Nº surveyed children	Nº of eligible women	Nº surveyed women							
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

Annex 5: Calendar of Events _ Nutrition Survey carried out in October 2016*

* Similar calendar was updated to November 2016

Estaciones	Fiestas religiosas	Otros acontecimientos importantes	Mes y Año de Nacimiento	Edad (M)
2016	***FALLECIMIENTO PRESIDENTE MOHAMMED ADEL AZIZ***		**2016**	
Comienza Invierno (Inicio época lluvias)		Día de la Unidad Saharaui (12-Octubre)	Octubre 2016	0
Verano (mucho calor hasta 15 septiembre)		Comienzo de colegio (1ª semana Sept) Partida de estudiantes a Argel (15-30 Sept)	Septiembre 2016	1
Verano (mucho calor)		Regreso de niños de España (15-30 Agosto) Periodo de Universidad de verano en Argelia (Jóvenes)	Agosto 2016	2
Verano (mucho calor)	Fin Ramadán (7/07)	Id El Fatr (28 Julio) Congreso extraordinario	Julio 2016	3
Inicio de la época de calor (Verano)	Inicio Ramadán (8 Junio)	Caída de Wally Mustapha y fin de colegio (9 Junio) Salida de niños a España/vacaciones (20-25 Junio) Manifestación de Zeemla (marcha verde): 17 Junio	Junio 2016	4
Primavera		Comienzo de lucha/primera bala (10 Mayo) Conmemoración comienzo de lucha armada (20 Mayo) Fallece presidente Mohammed Adel Aziz (31 Mayo)	Mayo 2016	5
Primavera		Inicio de llegada de familias de España	Abril 2016	6
Comienzo de Primavera		Día de la Mujer (8 Marzo) Día del primer mártir, Bachir Lehlawi (8 Marzo) Llegada Secretario General Naciones Unidas (5 Marzo)	Marzo 2016	7
Fin del frío		Proclamación de la RASD (27 Febrero) Maratón (días antes de 27 Febrero)	Febrero 2016	8
Época de mucho frío		Día del pionero (28 Enero)	Enero 2016	9
2015	***INUNDACIONES Y DECLARACION DE ESTADO DE EMERGENCIA***		**2015**	
Invierno	Navidad	Llegada de familias de España (primera quincena) Congreso ordinario (15-24 diciembre)	Diciembre 2015	10
Invierno			Noviembre 2015	11
Comienza Invierno (Inicio época lluvias)		Día de la Unidad Saharaui (12-Octubre) Inundaciones-Emergencia	Octubre 2015	12
Verano (mucho calor hasta 15 septiembre)		Comienzo de colegio (1ª semana Sept) Partida de estudiantes a Argel (15-30 Sept)	Septiembre 2015	13
Verano (mucho calor)		Regreso de niños de España (15-30 Agosto) Periodo de Universidad de verano en Argelia (Jóvenes)	Agosto 2015	14
Verano (mucho calor)	Fin Ramadán (17/7)	Id El Fatr (18 Julio)	Julio 2015	15
Inicio de la época de calor (Verano)	Inicio Ramadán (18/6)	Caída de Wally Mustapha y fin de colegio (9 Junio) Manifestación de Zeemla (marcha verde): 17 Junio Salida de niños a España/vacaciones (20-25 Junio)	Junio 2015	16
Primavera		Comienzo de lucha/primera bala (10 Mayo) Conmemoración comienzo de lucha armada (20 Mayo)	Mayo 2015	17
Primavera		Inicio de llegada de familias de España	Abril 2015	18
Comienzo de Primavera		Día de la Mujer (8 Marzo) Día del primer mártir, Bachir Lehlawi (8 Marzo)	Marzo 2015	19
Fin del frío		Maratón (días antes de 27 Febrero) Proclamación de la RASD (27 Febrero)	Febrero 2015	20
Época de mucho frío		Día del pionero (28 Enero)	Enero 2015	21
2014	***GRAN LLUVIA DE GRANIZO EN EL AAYUN***		**2014**	
Invierno	Navidad	Llegada de familias de España (primera quincena)	Diciembre 2014	22
Invierno			Noviembre 2014	23
Comienza Invierno		Día de la Unidad Saharaui (12-Octubre)	Octubre 2014	24

(Inicio época lluvias)		Lluvia de granizo en El Ayun		
Verano (mucho calor hasta 15 septiembre)		Comienzo de colegio (1ª semana Sept) Partida de estudiantes a Argel (15-30 Sept) El Adha (24 Septiembre)	Septiembre 2014	25
Verano (mucho calor)		Regreso de niños de España (15-30 Agosto) Periodo de Universidad de verano en Argelia (Jóvenes)	Agosto 2014	26
Verano (mucho calor)	Fin Ramadán (27/7)	Id El Fatr (28 Julio)	Julio 2014	27
Inicio de la época de calor (Verano)	Inicio Ramadán (28 Junio)	Caída de Wally Mustapha y fin de colegio (9 Junio) Salida de niños a España/vacaciones (20-25 Junio) Manifestación de Zeemla (marcha verde): 17 Junio	Junio 2014	28
Estaciones	**Fiestas religiosas**	**Otros acontecimientos importantes**	**Mes y Año de Nacimiento**	**Edad (M)**
Primavera		Comienzo de lucha/primera bala (10 Mayo) Conmemoración comienzo de lucha armada (20 Mayo)	Mayo 2014	29
Primavera		Inicio de llegada de familias de España	Abril 2014	30
Comienzo de Primavera		Día de la Mujer (8 Marzo) Día del primer mártir, Bachir Lehlawi (8 Marzo)	Marzo 2014	31
Fin del frío		Proclamación de la RASD (27 Febrero) Maratón (días antes de 27 Febrero)	Febrero 2014	32
Época de mucho frío		Día del pionero (28 Enero)	Enero 2014	33
2013			**2013**	
Invierno	Navidad	Llegada de familias de España (primera quincena)	Diciembre 2013	34
Invierno			Noviembre 2013	35
Comienza Invierno (Inicio época lluvias)		Día de la Unidad Saharaui (12-Octubre)	Octubre 2013	36
Verano (mucho calor hasta 15 septiembre)		Comienzo de colegio (1ª semana Sept) Partida de estudiantes a Argel (15-30 Sept) El Adha (24 Septiembre)	Septiembre 2013	37
Verano (mucho calor)	Fin Ramadán (7 Agosto)	Regreso de niños de España (15-30 Agosto) Periodo de Universidad de verano en Argelia (Jóvenes) Id El Fatr (8 Agosto)	Agosto 2013	38
Verano (mucho calor)	Inicio Ramadán (8 Julio)		Julio 2013	39
Inicio de la época de calor (Verano)		Salida de niños a España/vacaciones (20-25 Junio) Manifestación de Zeemla (marcha verde): 17 Junio	Junio 2013	40
Primavera		Comienzo de lucha/primera bala (10 Mayo) Conmemoración comienzo de lucha armada (20 Mayo)	Mayo 2013	41
Primavera		Inicio de llegada de familias de España	Abril 2013	42
Comienzo de Primavera		Día de la Mujer (8 Marzo) Día del primer mártir, Bachir Lehlawi (8 Marzo)	Marzo 2013	43
Fin del frío		Proclamación de la RASD (27 Febrero) Maratón (días antes de 27 Febrero)	Febrero 2013	44
Época de mucho frío		Día del pionero (28 Enero)	Enero 2013	45
2012			**2012**	
Invierno	Navidad	Llegada de familias de España (primera quincena)	Diciembre 2012	46
Invierno			Noviembre 2012	47
Comienza Invierno (Inicio época lluvias)		Día de la Unidad Saharaui (12-Octubre)	Octubre 2012	48
Verano (mucho calor hasta 15 septiembre)		Comienzo de colegio (1ª semana Sept) Partida de estudiantes a Argel (15-30 Sept) El Adha (24 Septiembre)	Septiembre 2012	49
Verano (mucho calor)	Fin Ramadán (17/8 Agosto)	Regreso de niños de España (15-30 Agosto) Periodo de Universidad de verano en Argelia (Jóvenes) Id El Fatr (18 Agosto)	Agosto 2012	50
Verano (mucho calor)	Inicio Ramadán (18 Julio)		Julio 2012	51
Inicio de la época de calor (Verano)		Caída de Wally Mustapha y fin de colegio (9 Junio) Salida de niños a España/vacaciones (20-25 Junio) Manifestación de Zeemla (marcha verde): 17 Junio	Junio 2012	52

Primavera		Comienzo de lucha/primera bala (10 Mayo) Conmemoración comienzo de lucha armada (20 Mayo)	Mayo 2012	53
Primavera		Inicio de llegada de familias de España	Abril 2012	54
Comienzo de Primavera		Día de la Mujer (8 Marzo) Día del primer mártir, Bachir Lehlawi (8 Marzo)	Marzo 2012	55
Fin del frío		Proclamación de la RASD (27 Febrero) Maratón (días antes de 27 Febrero)	Febrero 2012	56
Época de mucho frío		Día del pionero (28 Enero)	Enero 2012	57
2011	***AÑO DE CONGRESO (ELECCIONES) DE POLISARIO***		**2011**	
Invierno	Navidad	Llegada de familias de España (primera quincena) Congreso Polisario (mediados de Diciembre)	Diciembre 2011	58
Invierno			Noviembre 2011	59
Comienza Invierno (Inicio época lluvias)		Día de la Unidad Saharaui (12-Octubre)	Octubre 2011	60

** Las zonas rosa oscuro marcan los niños que no entrarían en los estudios de los 6-59 meses.*

Annex 6. Questionnaires

Questionnaire for children under 5 years – Saharawi Refugee Camps 2016

Today's date: |__|__| / |__|__| /2016 **Day Month**	**Wilaya: |_____|**	**Daira: |_____|**
Barrio: |_____|	**Cluster number: |____|**	**Team number: |____|**
Household number: |____|	**Child number: |____|**	**Consent taken? Yes No**

Details of the Child

Q1.	Sex of Child	1 Male 2 Female
Q2.	Child's date of birth (***RECORD FROM AGE DOCUMENTATION OR RECALL. LEAVE BLANK IF NO VALID AGE DATA IS AVAILABLE)***	|__|__| / |__|__| / 201|__| Day / Month / Year
Q3.	Child's date of birth source of information	1 PISIS card 2 Memory recall
Q4.	Age of child in months ***(IF AGE DOCUMENTATION NOT AVAILABLE, ESTIMATE USING EVENT CALENDAR. IF AVAILABLE, RECORD THE AGE IN MONTHS USING THE TABLE AGE CALENDAR)***	|__|__| months ***If age<6months go to Q12***

Nutritional Status, Health and Anaemia Status – ONLY FOR CHILDREN AGED 6-59 MONTHS

Q5.	Child's weight in kilograms (±0.1kg)	|__|__| . |__| kg
Q6.	Child's length/height in cm (±0.1cm) ***MEASURE LENGTH IF CHILD IS <24 MONTHS (IF AGE UNKNOWN THEN <87 CM)***	|__|__|__| . |__| cm
Q7.	Does the child present oedema?	1 Yes 0 No
Q8.	Child's MUAC in cm	|__|__|. |__| cm.
Q9.	Child's haemoglobin (in g/dL, as measured by HemoCue)	|__|__|. |__| g/dL

		Yes	No	Don´t Know
Q10.	Is [NAME] currently being treated for?			
	Anaemia (taking iron drops)	1	0	88
	Moderate acute malnutrition: (taking Plumpy'Sup)	1	0	88
	Severe acute malnutrition: (taking Plumpy'Nut)	1	0	88

Q11.	Measles status and source of information ***(CHECK VACCINATION CARD)***	1 Yes, with card 2 Yes, memory recall 88 No or don´t know

Q12.	Has [NAME] had diarrhoea in the past 2 weeks? ***CASE DEFINITION: THREE OR MORE LOOSE OR LIQUID STOOLS DURING 24 HOURS***	1 Yes 0 No	***If "No" go to Q17.***
Q13.	When [NAME] had diarrhoea how much was s/he given to drink?	1 Less than usual 2 Same as usual 3 More than usual 88 Don´t know	
Q14.	When [NAME] had diarrhoea how much was s/he given to eat?	1 Less than usual 2 Same as usual 3 More than usual 88 Don´t know	
Q15.	Did you give Lamlah *(WHO ORS)* to [NAME] when s/he had diarrhoea?	1 Yes 0 No	
Q16.	Did you take [NAME] to the health centre when s/he had diarrhoea?	1 Yes 0 No	

		Yes	No
Q17.	*For the Enumerator:* Was the child referred?		
	Severe Anaemia ***(HAEMOGLOBIN < 7.0 G/DL)***	1	0
	Moderate acute malnutrition ***(BY MOYO CHART OR MUAC)***	1	0
	Severe acute malnutrition (SAM) ***(BY MOYO CHART, MUAC OR OEDEMA)***	1	0

V1.	If referred for SAM, was SAM verified?	1 Yes 0 No	**V2.** Name: **|_____|**	Signature: **|_____|**

Infant and Young Child Feeding Practices - ONLY CHILDREN UNDER 36 MONTHS

Q18.	Has [NAME] ever been breastfed? ***IF ANSWER IS "NO" OR "DON'T KNOW2 GO TO QUESTION 21***	1 0 88	Yes No Don't know
Q19.	How long after birth did you first put [NAME] to the breast?	1 2 3 88	Less than one hour Between 1-23 hours More than 24 hours Don´t know
Q20.	Was [NAME] breastfed yesterday during the day or at night?	1 0 88	Yes No Don't know

Now I would like to ask you about some particular liquids [NAME] may have received yesterday. I am interested whether [NAME] had the item even if it was combined with other foods.

ASK ABOUT EVERY ITEM. IF ITEM WAS GIVEN, CIRCLE "1". IF ITEM WAS NOT GIVEN, CIRCLE "0". IF CAREGIVER DOES NOT KNOW, CIRCLE "88".

	Q21. Did [NAME] have any of the following items yesterday during the day or at night?	Yes	No	Don't Know	**Q22.** How many times yesterday during the day or at night did the child consume these? (See items in **Q21**).
a.	Plain water?	1	0	88	
b.	Infant formula such as guigus?	1	0	88	b. Times |__|__|
c.	Milk such as tinned, powdered or fresh?	1	0	88	c. Times |__|__|
d.	Juice or juice drinks?	1	0	88	
e.	Clear broth?	1	0	88	
f.	Yoghurt?	1	0	88	f. Times |__|__|
g.	Thin porridge?	1	0	88	
h.	Tea, soft drinks?	1	0	88	
i.	Any other liquids? e.g. arka (made of sugar or dates, zrig (gofio shake)	1	0	88	

Now I would like to ask you about the types of foods that [NAME] ate yesterday, during the day or at night.

	Q23. Yesterday, during the day or at night did [NAME] eat any of the following items?	Yes	No	Don't know
a.	Bread, rice, pasta, soya blend, gofio, oat, barley, couscous, incha, or other food made from grains, including young children cereal formulas (blendina, vigor)	1	0	88
b.	Carrots, courgettes, squash, or sweet potatoes that are yellow or orange inside	1	0	88
c.	White potatoes, turnips, or any other food made from roots	1	0	88
d.	Any dark green leafy vegetables	1	0	88
e.	Melon, watermelon, tomato, peach, apricot	1	0	88
f.	Any other fruits or vegetables	1	0	88
g.	Liver, kidney, heart, or other organ meats	1	0	88
h.	Any meat such as camel, chicken, goat, or lamb, kachir or halal.	1	0	88
i.	Eggs	1	0	88
j.	Canned fish, brined mackerel, or canned tuna	1	0	88
k.	Any food made from beans, peas, or lentils	1	0	88
l.	Cheese, yoghurt, or other milk products	1	0	88
m.	Any oil, fats, butter, ludik (camel), edhen (goat) or foods made with any of these	1	0	88
n.	Sugary foods such as chocolates, sweets, candies, pastries, cakes or biscuits	1	0	88

	Q24. Yesterday, during the day or at night did [NAME] consume any of the following?	Yes	No	Don't know
a.	Guigus, Celia, Blendina, Vigor, Nursi	1	0	88
b.	Plumpy´Nut, Plumpy'Sup → *SHOW PICTURES*	1	0	88

Q25.	Did [NAME] eat any food (solid, semi-solid, or soft foods) yesterday during the day or at night? ***IF THE ANSWER IS 'YES', CHECK THAT YOU HAVE ANSWERED CORRECTLY Q23***	1 0 88	Yes No Don't know
Q26.	How many times did the child eat food (solid, semi-solid, or soft foods) other than liquids yesterday during the day or at night?	Times |__|__|	
Q27.	Did [NAME] drink anything from a bottle with a nipple yesterday during day or at night??	1 0 88	Yes No Don't know

Questionnaire for women aged 15-49 years – Saharawi Refugee Camps 2016

Today's date: |__|__| / |__|__| /2016 **Day Month**	**Wilaya: |_____|**	**Daira: |_____|**
Barrio: |_____|	**Cluster number: |_____|**	**Team number: |_____|**
Household number: |_____|	**Woman number: |_____|**	**Consent taken? Yes No**

Woman's Details

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

Woman's status

Q2.	Are you currently breastfeeding a child aged <6 months?	1 0	Yes No
Q3.	Are you currently pregnant? ***(IF "YES" TO Q2, ASK FOR THE PREGNANCY CARD)***	1 0 88	Yes No Don't know
Q4.	If **"Yes"** to **Q3**, what is the woman´s known last menstrual period ***(RECORD FROM PREGNANCY CARD. LEAVE BLANK IF NOT AVAILABLE)***	|__|__| / |__|__| / 2016 Day / Month	

PREGNANT AND LACTATING WOMEN (PLW) ONLY (Q2 = Yes or Q3 = Yes)

Q5.	Are you currently enrolled in the antenatal or postnatal care programme)?	1 0	Yes No	
Q6.	Are you currently receiving iron folate pills, drops or syrup?	1 0	Yes No	***If "No" go to Q8.***
Q7.	**If "Yes" to Q6,** did you take them yesterday, during the day or at night?	1 0	Yes No	
Q8.	Are you currently being treated for moderate acute malnutrition, receiving CSB plus + oil + sugar?	1 0	Yes No	***If "No" go to Q10.***
Q9.	**If "Yes" to Q8,** did you take it yesterday, during the day or at night?	1 0	Yes No	
Q10.	In the past 30 days, have you received *Chaila* from the dispensary?	1 0	Yes No	***If "No" go to Q13.***
Q11.	If **"Yes"** to **Q10**, in the past 7 days, have you taken *Chaila*?	1 0	Yes No	
Q12.	If "**yes**" to **Q10**, would you be interested to receive *Chaila* again?	1 0	Yes No	

Woman's Nutritional Status

Q13.	Woman's weight in kg ***(EXCLUDE PREGNANT AND LACTATING WOMEN, Q2 = Yes or Q3 = Yes)***	|__|__| **.** |__| kg
Q14.	Woman height in cm ***(EXCLUDE PREGNANT AND LACTATING WOMEN, Q2 = Yes or Q3 = Yes)***	|__|__|__| **.** |__| cm
Q15.	Woman's MUAC in cm	|__|__|__| **.** |__| cm
Q16.	Woman's waist circumference in cm ***(EXCLUDE PREGNANT AND LACTATING WOMEN, Q2 = Yes or Q3 = Yes)***	|__|__|__| **.** |__| cm
Q17.	Woman's Haemoglobin in g/dL ***(AS MEASURED BY HEMOCUE)***	|__|__|. |__| g/dL

Q18.	*For the Enumerator:* Was the woman referred?	Yes	No
	→ Severe anaemia ***(NON-PREGNANT WOMEN <8.0 G/L / PLW <7.0 G/L)***	1	0
	→ Moderate Acute Malnutrition ***(MUAC IN PLW <23.0CM)***	1	0

Woman's Dietary Diversity

Now I would like to ask you about the types of foods that you ate yesterday, during the day or at night.
I am interested in whether you consumed the item even if it was combined with other foods.
I am interested in knowing about meals, beverages and snacks eaten or drank inside or outside home.

Q19. Yesterday, during the day or at night did you eat any… (*of the following items)*?

READ THE LIST OF FOODS IN EACH GROUP (a-r). CIRCLE THE ANSWER:
- (1) : IF SHE ATE ONE OR MORE FOODS,
- (0) IF SHE ATE NONE,
- (8) IF SHE DOES NOT REMEMBER

	(REPEAT THE QUESTION FOR EACH FOOD GROUP)	Yes	No	Don't know
a.	Bread, rice, oat, barley, pasta, soya blend, gofio, couscous, incha, maize or other food made from grains	1	0	88
b.	White potatoes, turnips, or any other food made from roots	1	0	88
c.	Any food made from beans, peas, or lentils	1	0	88
d.	groundnuts, cashews, almonds, pistachios	1	0	88
e.	Cheese, yoghurt, or other milk products	1	0	88
f.	Liver, kidney, heart, afachay or other organ meats	1	0	88
g.	Any meat such as camel, chicken, goat, beef or lamb, kachir or halal	1	0	88
h.	Canned fish, brined mackerel, or canned tuna	1	0	88
i.	Eggs	1	0	88
j.	Moringa leaves, or any other dark green leafy vegetables	1	0	88
k.	Pumpkin, carrots or sweet potatoes that are yellow or orange inside	1	0	88
l.	Melon, watermelon, tomato, peach, apricot	1	0	88
m.	Onion, aubergine, lettuce, cabbage, green beans, green pepper, cucumber, beet.	1	0	88
n.	Banana, apple, orange, pear, grape, tangerine, dates, figs, strawberry, kiwi, or juices made from them	1	0	88
o.	Any oil, fats, butter, ludik (camel), edhen (goat) or foods made with any of these	1	0	88
p.	Sugary foods such as chocolates, sweets, candies, pastries, cakes or biscuits	1	0	88
q.	Condiments: pepper, salt, ginger, turmeric, taguia, kamuna, oregano, curry	1	0	88
r.	Tea or coffee	1	0	88
s.	Sugar-sweetened beverages	1	0	88
t.	Corn Soya Blend	1	0	88

Q20. Is there any other food item that you ate or drink yesterday that I did not mention to you? 1 Yes 0 No

Q21. If "Yes" to Q19, what other foods? *Please, write down other foods mentioned by respondent that are not in the list above*

I_____I I_____I

I_____I

Q22. On average, how many times a day would you drink tea on a typical day? |___|

Household Questionnaire – Saharawi Refugee camps 2016

Today's date: |__|__| / |__|__| /2016 **Day Month**	**Wilaya: |_____|**	**Daira: |_____|**
Barrio: |_____|	**Cluster number: |____|**	**Team number: |____|**
Household number: |____|		

Household dietary diversity score (HDDS)

I would like to ask you about the types of foods that you or anyone in your household ate yesterday, during the day and or at night.

***Household definition*: A group of people sleeping under the same roof and eating from the same pot.**

I am interested in whether you or anyone in your household had the item even if it was combined with other foods. I am interested in knowing about meals, beverages and snacks eaten or drank inside the home.

Q1.	**Yesterday, during the day or at night,** did you or anyone in your household eat… (the following foods)? ***READ THE LIST OF FOODS IN EACH FOOD GROUP AND DO NOT PROBE. CIRLCLE THE ANSWER*** ***(REPEAT THE QUESTION FOR EACH FOOD GROUP)***	
a.	Corn/maize, rice, wheat, sorghum, couscous, gofio, any other grains or foods made from these (e.g. bread, pasta, porridge, soya blend)	Yes (1) No (0)
b.	White potatoes, white yam, turnips	Yes (1) No (0)
c.	Pumpkin, carrot, squash, or sweet potato, tattasai *(red sweet pepper)*	Yes (1) No (0)
d.	Kuka, okra leaves, karkhashi, zogele, ugu, lalo, bitea leaves, amaranth leaves, cassava leaves, spinach, and any other wild dark green leaves.	Yes (1) No (0)
e.	Tomato, onion, eggplant, cabbage, lettuce, salad, green beans, okra, green pepper, green peas, cucumber	Yes (1) No (0)
f.	Ripe mango, apricot (fresh or dried), dried peach, and 100% fruit juice made from these	Yes (1) No (0)
g.	Bananas, pineapple, apple, water melon, orange, dates, fruit juice made from them	Yes (1) No (0)
h.	Liver, kidney, heart or other organ meats or blood-based foods	Yes (1) No (0)
i.	Beef, lamb, goat, bush meat, chicken, duck, other birds, insects (e.g. ants), halal, kachir	Yes (1) No (0)
j.	Eggs from chicken, duck or any other egg	Yes (1) No (0)
k.	Fresh or dried fish or shellfish: tilapia, cat fish. Canned fish, canned tuna, brined mackerel	Yes (1) No (0)
l.	Beans, dried peas, cow peas, soya beans, lentils, nuts, cashew nut, tiger nut,	Yes (1) No (0)
m.	Milk, infant formula, cheese, yogurt, soy milk.	Yes (1) No (0)
n.	Vegetable oil, groundnut oil, shea butter, benni seed oil.	Yes (1) No (0)
o.	Sugar, honey, sweetened soda or sweetened juice drinks, chocolate.	Yes (1) No (0)
p.	Black pepper, salt, curry, maggi, soy sauce, coffee, tea, ginger, tamarind, chilli powder	Yes (1) No (0)

Q2.	Is there any other food item that was eaten yesterday by anyone in your household and I did not mention to you?	1 0	Yes No

Q3. If "Yes" to Q2, what other foods? *Please, write down other foods mentioned by respondent that are not in the list above*

|_____|

|_____|

|_____|

|_____|

Food consumption score (FCS)

Q4. Group	During the last 7 days, for how many days did you or any one in your household eat any food of the following food groups? → *REPEAT THE QUESTION FOR EACH GROUP*	Number of days (0 – 7)
a.	Bread, rice, pasta, soya blend, gofio, couscous, insha, oats, barley, or any other food made from grains	|___|
b.	Potatoes, beetroot, turnip, or any other food made from roots	|___|
c.	Any food made from beans, peas, or lentils	|___|
d.	Any vegetables or green leaves	|___|
e.	Any fruit	|___|
f.	Any camel meat, chicken, goat, lamb, halal, kachil, brined mackerel, canned tuna, or eggs	|___|
g.	Any milk (fresh or powdered), cheese, yoghurt, laish, or any other milk products	|___|
h.	Any sugar or sugary foods such as chocolates, sweets, candies, cakes, biscuits, soft drinks	|___|
i.	Any oil, fats, butter, ludik (camel), edhen (goat), or foods made with any of these	|___|

Q5.	Was yesterday a celebration day?	1	Yes	
		0	No	

Reduced Coping Strategy index

Q6. In the last 7 days, how often has your household had to … *(do the following)?* ***(REPEAT FOR EACH QUESTION)***		Frequency (0-7) days
a.	Rely on less-preferred and less expensive foods?	|___|
b.	Borrow food?	|___|
c.	Rely on help from a friend or relative?	|___|
d.	Limit portion size at meal times?	|___|
e.	Restrict consumption by adults in order for small children to eat	|___|
f.	Reduce number of meals eaten in a day?	|___|

Non-communicable diseases

Q7.	How many people aged 25-64 years live in this household?	|___|
Q8.	How many of these *[number]* people currently smoke tobacco products, such as cigarettes, cigars, pipes?	|___|
Q9.	How many of these *[number]* people ever been told by a doctor or other health worker that they have raised blood sugar or diabetes?	|___|
Q10.	How many of these [*number]* people ever been told by a doctor or other health worker that they have raised cholesterol?	|___|
Q11.	How many of these *[number]* people ever been told by a doctor or other health worker that they have raised blood pressure?	|___|

WASH Questionnaire – Saharawi Refugee camps 2016

Today's date: |__|__| / |__|__| /2016 (Day Month) **Wilaya: |_____| Daira: |_____|**
Barrio: |_____| Cluster number: |____| Team number: |____|
Household number: |____|

Q1. How many people live in this household and slept here last night? |__|__|

Q2. What is the main source of drinking water for members of your household?
1 Tanker truck
2 Piped water (network)
3 Bottled water
4 Other **>>>>>>>** **Q3.** Specify:

Q4. Does your household use separate containers for storing drinking water and for storing water used for other purposes? 1 Yes 0 No

Q5. What is the material of the container tank where drinking water is stored?
1 Plastic
2 Metal
3 Concrete
4 Other

What is the capacity ***(IN TONNES)*** of the container/s used for storing water?

Q6. Container 1	**Q8. Container 2**
1 1.5 tonnes	1 1.5 tonnes
2 3.0 tonnes	2 3.0 tonnes
3 Other **>>** **Q7.** Specify: ***TONNES***	3 Other **>>** **Q9.** Specify: ***TONNES***

Q10. What is done in your household, regularly, to make sure the water is safe to drink?
1 Clean water container regularly
2 Boil the water
3 Nothing
4 Other **>>>>>>>** **Q11.** Specify:

Q12. How often do the household water containers get refilled?
1 Once every ten days
2 Once a week
3 Twice a week
4 Other **>>>>>>>** **Q13.** Specify:

Q14. Is the household satisfied with the water supply?
1 Yes
2 No
3 Partially
88 Don´t know

Q15. What kind of toilet facility does this household use?
1 Latrine with septic tank
2 Pit latrine
3 Use neighbour/relative latrine
4 Open defecation
5 Other **>>>>>>>** **Q16.** Specify:

Q17. Is there soap in the household? 1 Yes 0 No ***IF ANSWER IS NO, GO TO Q19***

Q18. Today or yesterday, was soap used for…?	Yes	No	Don't know
a. Washing children´s hands	1	0	88
b. Washing after defecation	1	0	88
c. Washing hands after cleaning children	1	0	88
d. Washing hands before feeding children	1	0	88
e. Washing hands before preparing food	1	0	88
f. Washing hands before eating	1	0	88

Q19. Does the household have a child/children aged less than three years? 1 Yes 0 No ***IF ANSWER IS NO, STOP HERE***

Q20. The last time ***(NAME OF YOUNGEST CHILD)*** passed stools, where did he/she defecate?
1 Latrine
2 Used potty
3 Used diapers
4 Outside, in the open
5 Other **>>>>>>>** **Q21.** Specify:

Q22. The last time ***(NAME OF YOUNGEST CHILD)*** passed stools, what was done to dispose of the stools?
1 Put/rinse into latrine
2 Thrown into garbage
3 Put/rinsed into drain or ditch
4 Left in the open
5 Don't know
6 Other **>>>>>>>** **Q23.** Specify:

Annex 7: Informed consent Form

Informed Consent Form

Today's date : |__|__| /|__|__| /2016 **Day Month**	**Wilaya: |_____|**	**Daira: |_____|**
Barrio: |_____|	**Cluster number: |____|**	**Team number: |____|**

Information about the survey

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

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

Are there any questions? Are you willing participate?

Household Number	Are you willing to participate?	Comments
1	YES |____| NO |____|	
2	YES |____| NO |____|	
3	YES |____| NO |____|	
4	YES |____| NO |____|	
5	YES |____| NO |____|	
6	YES |____| NO |____|	
7	YES |____| NO |____|	
8	YES |____| NO |____|	
9	YES |____| NO |____|	
10	YES |____| NO |____|	
11	YES |____| NO |____|	
12	YES |____| NO |____|	

Annex 8: Plausibility Reports

Plausibility check for: Awserd_final.as

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

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	Score
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	0 (1.0 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	0 (p=0.129)
Age ratio(6-29 vs 30-59)	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	4 (p=0.009)
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	0 (6)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	2 (10)
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 (1.00)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	0 (-0.03)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	0 (0.15)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	3 (p=0.002)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	9 %

The overall score of this survey is 9 %, this is excellent.

There were no duplicate entries detected.

Missing or wrong data:

WEIGHT: Line=148/ID=1091001
HEIGHT: Line=148/ID=1091001

Percentage of children with no exact birthday: 0 %

Age/Height out of range for WHZ:

MONTHS:
Line=133/ID=1081201: 60.39 mo
Line=595/ID=1340201: 60.12 mo

Anthropometric Indices likely to be in error (-3 to 3 for WHZ, -3 to 3 for HAZ, -3 to 3 for WAZ, from observed mean - chosen in Options panel - these values will be flagged and should be excluded from analysis for a nutrition survey in emergencies. For other surveys this might not be the best procedure e.g. when the percentage of overweight children has to be calculated):

Line=24/ID=1020702: HAZ (2.436), Age may be incorrect
Line=35/ID=1030401: HAZ (-4.708), WAZ (-4.071), Age may be incorrect
Line=46/ID=1031103: WHZ (5.303), WAZ (2.874), Weight may be incorrect
Line=73/ID=1051101: WAZ (2.822), Weight may be incorrect
Line=84/ID=1060601: WHZ (3.273), WAZ (2.269), Weight may be incorrect
Line=109/ID=1071001: WHZ (-3.741), Weight may be incorrect
Line=146/ID=1090901: HAZ (-7.299), WAZ (-4.343), Age may be incorrect
Line=179/ID=1110402: HAZ (3.497), Age may be incorrect
Line=193/ID=1120201: HAZ (-4.163), Height may be incorrect
Line=253/ID=1150501: HAZ (-4.172), Age may be incorrect
Line=286/ID=1170502: HAZ (-4.937), Height may be incorrect
Line=292/ID=1170802: HAZ (3.031), Height may be incorrect
Line=299/ID=1171004: HAZ (3.168), Height may be incorrect

```
Line=324/ID=1180901:  HAZ (3.519), Age may be incorrect
Line=382/ID=1210902:  HAZ (-4.621), Age may be incorrect
Line=384/ID=1211003:  HAZ (-4.995), Age may be incorrect
Line=387/ID=1220102:  WHZ (4.902), HAZ (-5.591), Height may be incorrect
Line=389/ID=1220203:  HAZ (6.617), Age may be incorrect
Line=390/ID=1220301:  HAZ (8.216), WAZ (3.481), Age may be incorrect
Line=401/ID=1220801:  HAZ (-4.183), Age may be incorrect
Line=426/ID=1231003:  HAZ (2.381), Age may be incorrect
Line=469/ID=1270201:  HAZ (2.070), Age may be incorrect
Line=473/ID=1270502:  HAZ (2.080), Age may be incorrect
Line=490/ID=1280402:  WHZ (3.330), Weight may be incorrect
Line=521/ID=1291002:  WAZ (-3.826), Weight may be incorrect
Line=559/ID=1310801:  WHZ (-3.454), Weight may be incorrect

Percentage of values flagged with SMART flags:WHZ:  1.0 %, HAZ:  3.0 %, WAZ:  1.1 %


Age distribution:

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

Age ratio of 6-29 months to 30-59 months: 0.69 (The value should be around 0.85).:
p-value = 0.009 (significant difference)

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

Age cat.     mo.        boys              girls             total     ratio boys/girls
-------------------------------------------------------------------------------------
6  to 17     12       73/77.3 (0.9)      60/68.4 (0.9)    133/145.7 (0.9)    1.22
18 to 29     12       63/75.3 (0.8)      60/66.7 (0.9)    123/142.1 (0.9)    1.05
30 to 41     12       74/73.0 (1.0)      64/64.7 (1.0)    138/137.7 (1.0)    1.16
42 to 53     12       72/71.9 (1.0)      59/63.7 (0.9)    131/135.5 (1.0)    1.22
54 to 59      6       51/35.5 (1.4)      52/31.5 (1.7)     103/67.0 (1.5)    0.98
-------------------------------------------------------------------------------------
6  to 59     54    333/314.0 (1.1)    295/314.0 (0.9)                       1.13
```

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

Overall sex ratio: p-value = 0.129 (boys and girls equally represented)
Overall age distribution: p-value = 0.000 (significant difference)
Overall age distribution for boys: p-value = 0.061 (as expected)
Overall age distribution for girls: p-value = 0.004 (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: 0.184

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: 6 (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.006 (significant difference)

Digit preference MUAC:

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

Digit preference score: 10 (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:	1.08	1.05	1.00
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	4.5%	4.5%	4.2%
calculated with current SD:	4.7%	4.5%	3.7%
calculated with a SD of 1:	3.6%	3.7%	3.7%
HAZ			
Standard Deviation SD:	1.30	1.19	1.04
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	20.2%	20.1%	19.3%
calculated with current SD:	25.0%	23.4%	20.4%
calculated with a SD of 1:	19.0%	19.4%	19.6%
WAZ			
Standard Deviation SD:	0.99	0.99	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= 0.000	p= 0.001	p= 0.362
HAZ	p= 0.000	p= 0.000	p= 0.336
WAZ	p= 0.000	p= 0.000	p= 0.049

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

Skewness

WHZ	0.33	0.14	-0.03
HAZ	0.78	0.08	-0.07
WAZ	0.15	0.15	0.03

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	1.93	1.17	0.15
HAZ	7.12	1.49	-0.07
WAZ	1.37	1.37	0.36

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=1.85 (p=0.002)
WHZ < -3: ID=0.97 (p=0.516)
Oedema: ID=0.97 (p=0.516)
GAM: ID=1.75 (p=0.004)
SAM: ID=0.91 (p=0.615)
HAZ < -2: ID=1.50 (p=0.030)
HAZ < -3: ID=1.03 (p=0.422)
WAZ < -2: ID=1.06 (p=0.368)
WAZ < -3: ID=1.82 (p=0.002)

Subjects with SMART flags are excluded from this analysis.

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

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

Time point	SD for WHZ 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.96 (n=35, f=0)	#######
02: 1.20 (n=34, f=1)	##################
03: 0.83 (n=35, f=0)	#
04: 1.00 (n=35, f=0)	########
05: 0.99 (n=35, f=0)	########
06: 1.00 (n=35, f=0)	########
07: 0.91 (n=35, f=0)	#####
08: 1.11 (n=35, f=1)	##############
09: 0.98 (n=34, f=0)	########
10: 1.12 (n=35, f=1)	##############
11: 1.23 (n=34, f=1)	##################
12: 1.09 (n=33, f=0)	############
13: 1.00 (n=32, f=0)	#########
14: 1.19 (n=29, f=0)	################
15: 1.06 (n=26, f=1)	###########
16: 0.94 (n=27, f=0)	######
17: 1.62 (n=24, f=1)	###################################
18: 0.70 (n=20, f=0)	
19: 1.59 (n=17, f=0)	OOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
20: 0.86 (n=13, f=0)	OOO
21: 0.81 (n=08, f=0)	
22: 0.73 (n=05, f=0)	
23: 0.64 (n=04, f=0)	
24: 1.64 (n=03, f=0)	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

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

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

Analysis by Team

Team	1	2	3	4	5
n =	120	125	136	121	128
Percentage of values flagged with SMART flags:					
WHZ:	1.7	2.4	1.5	1.7	0.0
HAZ:	2.5	8.8	2.2	1.7	0.8
WAZ:	0.8	1.6	1.5	3.4	0.8
Age ratio of 6-29 months to 30-59 months:					
	0.62	0.69	0.61	0.69	0.86
Sex ratio (male/female):					
	1.07	1.08	1.23	1.24	1.06
Digit preference Weight (%):					
.0 :	11	13	11	8	9
.1 :	6	9	7	10	10
.2 :	13	10	13	17	13
.3 :	9	10	5	7	10
.4 :	7	11	13	11	12
.5 :	6	8	8	13	9
.6 :	11	8	13	9	12
.7 :	14	8	9	4	9
.8 :	13	13	7	12	9
.9 :	11	10	13	9	8
DPS:	10	6	10	11	6
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)					
Digit preference Height (%):					
.0 :	8	10	7	6	13
.1 :	12	14	9	8	5
.2 :	12	9	16	11	14
.3 :	13	15	11	13	12
.4 :	11	13	15	10	13
.5 :	7	12	10	8	10
.6 :	11	10	14	11	6
.7 :	9	6	5	15	9
.8 :	12	6	9	9	13
.9 :	6	6	4	10	5
DPS:	8	11	13	8	11
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)					
Digit preference MUAC (%):					
.0 :	4	7	4	5	6
.1 :	14	14	4	8	13
.2 :	12	13	19	19	10
.3 :	16	11	16	15	13
.4 :	10	9	13	10	10
.5 :	4	3	7	10	5
.6 :	8	14	15	9	9
.7 :	15	6	7	7	16
.8 :	9	12	6	11	7
.9 :	8	10	9	7	10
DPS:	13	12	17	13	10
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)					
Standard deviation of WHZ:					
SD	1.09	1.12	1.09	1.13	0.90
Prevalence (< -2) observed:					
%	6.7	3.2	4.4	7.6	
Prevalence (< -2) calculated with current SD:					
%	6.9	3.7	5.1	7.2	
Prevalence (< -2) calculated with a SD of 1:					
%	5.3	2.2	3.8	4.9	
Standard deviation of HAZ:					
SD	1.20	1.82	1.08	1.23	1.06
observed:					
%	21.7	24.8	19.1	22.5	13.3
calculated with current SD:					
%	24.9	31.5	21.3	24.7	17.3
calculated with a SD of 1:					
%	20.7	19.0	19.5	20.0	16.0

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	12/14.4 (0.8)	11/13.5 (0.8)	23/27.8 (0.8)	1.09
18 to 29	12	11/14.0 (0.8)	12/13.1 (0.9)	23/27.1 (0.8)	0.92
30 to 41	12	12/13.6 (0.9)	8/12.7 (0.6)	20/26.3 (0.8)	1.50
42 to 53	12	19/13.4 (1.4)	12/12.5 (1.0)	31/25.9 (1.2)	1.58
54 to 59	6	8/6.6 (1.2)	15/6.2 (2.4)	23/12.8 (1.8)	0.53
6 to 59	54	62/60.0 (1.0)	58/60.0 (1.0)		1.07

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

Overall sex ratio: p-value = 0.715 (boys and girls equally represented)
Overall age distribution: p-value = 0.017 (significant difference)
Overall age distribution for boys: p-value = 0.422 (as expected)
Overall age distribution for girls: p-value = 0.005 (significant difference)
Overall sex/age distribution: p-value = 0.001 (significant difference)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	14/15.1 (0.9)	13/13.9 (0.9)	27/29.0 (0.9)	1.08
18 to 29	12	15/14.7 (1.0)	9/13.6 (0.7)	24/28.3 (0.8)	1.67
30 to 41	12	16/14.3 (1.1)	16/13.2 (1.2)	32/27.4 (1.2)	1.00
42 to 53	12	10/14.0 (0.7)	11/12.9 (0.8)	21/27.0 (0.8)	0.91
54 to 59	6	10/6.9 (1.4)	11/6.4 (1.7)	21/13.3 (1.6)	0.91
6 to 59	54	65/62.5 (1.0)	60/62.5 (1.0)		1.08

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

Overall sex ratio: p-value = 0.655 (boys and girls equally represented)
Overall age distribution: p-value = 0.122 (as expected)
Overall age distribution for boys: p-value = 0.591 (as expected)
Overall age distribution for girls: p-value = 0.214 (as expected)
Overall sex/age distribution: p-value = 0.069 (as expected)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	13/17.2 (0.8)	9/14.2 (0.6)	22/31.3 (0.7)	1.44
18 to 29	12	11/16.7 (0.7)	18/13.8 (1.3)	29/30.5 (0.9)	0.61
30 to 41	12	20/16.2 (1.2)	17/13.4 (1.3)	37/29.6 (1.3)	1.18
42 to 53	12	20/16.0 (1.3)	6/13.2 (0.5)	26/29.1 (0.9)	3.33
54 to 59	6	10/7.9 (1.3)	11/6.5 (1.7)	21/14.4 (1.5)	0.91
6 to 59	54	74/67.5 (1.1)	61/67.5 (0.9)		1.21

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

Overall sex ratio: p-value = 0.263 (boys and girls equally represented)
Overall age distribution: p-value = 0.090 (as expected)
Overall age distribution for boys: p-value = 0.245 (as expected)
Overall age distribution for girls: p-value = 0.025 (significant difference)
Overall sex/age distribution: p-value = 0.002 (significant difference)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	19/15.3 (1.2)	11/12.5 (0.9)	30/27.8 (1.1)	1.73
18 to 29	12	11/14.9 (0.7)	8/12.2 (0.7)	19/27.1 (0.7)	1.38
30 to 41	12	12/14.5 (0.8)	13/11.8 (1.1)	25/26.3 (1.0)	0.92
42 to 53	12	12/14.2 (0.8)	14/11.7 (1.2)	26/25.9 (1.0)	0.86
54 to 59	6	12/7.0 (1.7)	8/5.8 (1.4)	20/12.8 (1.6)	1.50
6 to 59	54	66/60.0 (1.1)	54/60.0 (0.9)		1.22

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

Overall sex ratio: p-value = 0.273 (boys and girls equally represented)
Overall age distribution: p-value = 0.152 (as expected)
Overall age distribution for boys: p-value = 0.186 (as expected)
Overall age distribution for girls: p-value = 0.542 (as expected)
Overall sex/age distribution: p-value = 0.029 (significant difference)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	15/15.3 (1.0)	16/14.4 (1.1)	31/29.7 (1.0)	0.94
18 to 29	12	15/14.9 (1.0)	13/14.0 (0.9)	28/29.0 (1.0)	1.15
30 to 41	12	14/14.5 (1.0)	10/13.6 (0.7)	24/28.1 (0.9)	1.40
42 to 53	12	11/14.2 (0.8)	16/13.4 (1.2)	27/27.6 (1.0)	0.69
54 to 59	6	11/7.0 (1.6)	7/6.6 (1.1)	18/13.7 (1.3)	1.57
6 to 59	54	66/64.0 (1.0)	62/64.0 (1.0)		1.06

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 = 0.723 (as expected)
Overall age distribution for boys: p-value = 0.561 (as expected)
Overall age distribution for girls: p-value = 0.783 (as expected)
Overall sex/age distribution: p-value = 0.299 (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: 0.30 (n=07, f=0)
02: 0.96 (n=07, f=0)  #######
03: 0.40 (n=07, f=0)
04: 0.78 (n=07, f=0)
05: 1.22 (n=07, f=0)  ##################
06: 0.53 (n=07, f=0)
07: 0.63 (n=07, f=0)
08: 0.95 (n=07, f=0)  ######
09: 1.07 (n=07, f=0)  ###########
10: 1.83 (n=07, f=1)  ##########################################
11: 0.96 (n=06, f=0)  #######
12: 1.14 (n=06, f=0)  ##############
13: 1.17 (n=06, f=0)  ################
14: 1.86 (n=05, f=0)  ##########################################
15: 1.61 (n=05, f=1)  ###################################
16: 1.04 (n=05, f=0)  ##########
17: 2.24 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
18: 0.61 (n=03, f=0)
19: 0.78 (n=03, f=0)
20: 1.02 (n=02, f=0)  ~~~~~~~~~~
21: 0.67 (n=02, f=0)
22: 0.28 (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: 0.51 (n=07, f=0)
02: 2.10 (n=06, f=1)  ########################################################
03: 0.84 (n=07, f=0)  ##
04: 1.17 (n=07, f=0)  ################
05: 0.82 (n=07, f=0)  #
06: 1.22 (n=07, f=0)  ##################
07: 1.21 (n=07, f=0)  #################
08: 1.28 (n=07, f=0)  ####################
09: 0.52 (n=07, f=0)
10: 0.75 (n=07, f=0)
11: 1.99 (n=07, f=1)  ###################################################
12: 1.23 (n=07, f=0)  ###################
13: 0.78 (n=06, f=0)
14: 0.84 (n=05, f=0)  ##
15: 0.68 (n=05, f=0)
16: 0.98 (n=05, f=0)  #######
17: 0.44 (n=04, f=0)
18: 0.01 (n=03, f=0)
19: 1.94 (n=03, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
20: 0.58 (n=03, f=0)
21: 0.26 (n=02, f=0)
22: 1.05 (n=02, f=0)  ~~~~~~~~~~
23: 1.00 (n=02, f=0)  ~~~~~~~~~
```

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

Team: 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: 0.99 (n=07, f=0)  ########
02: 0.60 (n=07, f=0)
03: 0.76 (n=07, f=0)
04: 1.01 (n=07, f=0)  #########
05: 1.25 (n=07, f=0)  ###################
06: 0.95 (n=07, f=0)  ######
07: 0.70 (n=07, f=0)
08: 1.38 (n=07, f=1)  ########################
09: 0.89 (n=07, f=0)  ####
10: 0.96 (n=07, f=0)  #######
11: 1.02 (n=07, f=0)  #########
12: 0.52 (n=07, f=0)
13: 0.84 (n=07, f=0)  ##
14: 0.69 (n=06, f=0)
15: 0.85 (n=06, f=0)  ##
16: 0.75 (n=06, f=0)
17: 2.56 (n=06, f=1)  ###################################################################
18: 0.70 (n=05, f=0)
19: 2.15 (n=04, f=0)  ##########################################################
20: 1.58 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
21: 0.90 (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: 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: 1.09 (n=07, f=0)  ############
02: 0.96 (n=07, f=0)  #######
03: 1.23 (n=07, f=0)  ##################
04: 1.20 (n=07, f=0)  ##################
05: 0.72 (n=07, f=0)
06: 1.27 (n=07, f=0)  ####################
07: 1.19 (n=07, f=0)  #################
08: 1.19 (n=07, f=0)  #################
09: 0.98 (n=06, f=0)  ########
10: 0.85 (n=07, f=0)  ##
11: 0.96 (n=07, f=0)  #######
12: 1.95 (n=06, f=0)  ################################################
13: 0.73 (n=06, f=0)
14: 1.13 (n=06, f=0)  ##############
15: 1.27 (n=04, f=0)  OOOOOOOOOOOOOOOOOO
16: 0.98 (n=05, f=0)  #######
17: 1.60 (n=05, f=0)  ################################
18: 1.26 (n=04, f=0)  OOOOOOOOOOOOOOOOOO
19: 0.73 (n=03, f=0)
20: 0.64 (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: 0.90 (n=07, f=0)  ####
02: 0.93 (n=07, f=0)  ######
03: 0.87 (n=07, f=0)  ###
04: 1.02 (n=07, f=0)  #########
05: 1.04 (n=07, f=0)  ##########
06: 0.50 (n=07, f=0)
07: 0.58 (n=07, f=0)
08: 0.64 (n=07, f=0)
09: 1.41 (n=07, f=0)  ##########################
10: 0.82 (n=07, f=0)  #
11: 0.88 (n=07, f=0)  ###
12: 0.45 (n=07, f=0)
13: 1.37 (n=07, f=0)  ########################
14: 1.11 (n=07, f=0)  #############
15: 0.96 (n=06, f=0)  #######
16: 0.78 (n=06, f=0)
17: 0.88 (n=06, f=0)  ###
18: 0.45 (n=05, f=0)
19: 0.94 (n=04, f=0)  OOOOOO
20: 0.50 (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: Boujdour_final.as

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

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	Score
Flagged data (% of out of range subjects)	Incl	%	0-2.5 0	>2.5-5.0 5	>5.0-7.5 10	>7.5 20	0 (0.8 %)
Overall Sex ratio (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	0 (p=0.149)
Age ratio(6-29 vs 30-59) (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	0 (p=0.697)
Dig pref score - weight	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	0 (5)
Dig pref score - height	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	2 (9)
Dig pref score - MUAC	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	2 (11)
Standard Dev WHZ	Excl	SD	<1.1 and	<1.15 and	<1.20 and	>=1.20 or	
.	Excl	SD	>0.9 0	>0.85 5	>0.80 10	<=0.80 20	0 (0.97)
Skewness WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	0 (0.06)
Kurtosis WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	0 (-0.03)
Poisson dist WHZ-2	Excl	p	>0.05 0	>0.01 1	>0.001 3	<=0.001 5	0 (p=0.478)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	4 %

The overall score of this survey is 4 %, this is excellent.

There were no duplicate entries detected.

Missing or wrong data:

WEIGHT: Line=98/ID=5091101, Line=210/ID=5200702, Line=257/ID=5250402
HEIGHT: Line=98/ID=5091101, Line=210/ID=5200702, Line=257/ID=5250402, Line=371/ID=5350201

Percentage of children with no exact birthday: 0 %

Age/Height out of range for WHZ:

MONTHS:
Line=348/ID=5321201: 61.90 mo

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=13/ID=5020302: HAZ (2.520), WAZ (2.711), Age may be incorrect
Line=32/ID=5031001: HAZ (-4.548), Age may be incorrect
Line=39/ID=5040401: HAZ (1.984), Height may be incorrect
Line=67/ID=5060602: WHZ (-5.074), Weight may be incorrect
Line=84/ID=5080201: HAZ (1.986), Age may be incorrect
Line=149/ID=5141001: WAZ (-3.771), Weight may be incorrect
Line=247/ID=5240701: HAZ (2.346), Age may be incorrect
Line=260/ID=5250802: WHZ (3.620), Weight may be incorrect
Line=334/ID=5311203: HAZ (-7.225), Height may be incorrect
Line=366/ID=5341001: WHZ (3.676), HAZ (-5.250), Height may be incorrect
Line=371/ID=5350201: WAZ (-5.063), Weight may be incorrect

Percentage of values flagged with SMART flags:WHZ: 0.8 %, HAZ: 1.9 %, WAZ: 0.8 %

Age distribution:

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

```
Month 8  : #########
Month 9  : #############
Month 10 : #############
Month 11 : #####
Month 12 : #########
Month 13 : ##########
Month 14 : ##########
Month 15 : ###
Month 16 : #######
Month 17 : #####
Month 18 : ####
Month 19 : ####
Month 20 : ########
Month 21 : #######
Month 22 : #####
Month 23 : ########
Month 24 : #####
Month 25 : #####
Month 26 : ####
Month 27 : #########
Month 28 : #########
Month 29 : ########
Month 30 : ####
Month 31 : ####
Month 32 : ##
Month 33 : #########
Month 34 : ####
Month 35 : #######
Month 36 : ####
Month 37 : #########
Month 38 : ###########
Month 39 : ########
Month 40 : ##########
Month 41 : ######
Month 42 : #########
Month 43 : ########
Month 44 : ####
Month 45 : #######
Month 46 : #######
Month 47 : ####
Month 48 : ###
Month 49 : #####
Month 50 : ##
Month 51 : #####
Month 52 : ####
Month 53 : ####
Month 54 : ####
Month 55 : ######
Month 56 : #####
Month 57 : ########
Month 58 : ###
Month 59 : ############################
Month 60 : ###############
Month 61 :
Month 62 : #

Age ratio of 6-29 months to 30-59 months: 0.82 (The value should be around 0.85).:
p-value = 0.697 (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      42/40.4 (1.0)      51/46.9 (1.1)      93/87.2 (1.1)    0.82
18 to 29     12      39/39.4 (1.0)      37/45.7 (0.8)      76/85.1 (0.9)    1.05
30 to 41     12      35/38.2 (0.9)      45/44.3 (1.0)      80/82.4 (1.0)    0.78
42 to 53     12      28/37.5 (0.7)      34/43.6 (0.8)      62/81.1 (0.8)    0.82
54 to 59      6      30/18.6 (1.6)      35/21.6 (1.6)      65/40.1 (1.6)    0.86
-------------------------------------------------------------------------------------
6  to 59     54    174/188.0 (0.9)    202/188.0 (1.1)                       0.86

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

Overall sex ratio: p-value = 0.149 (boys and girls equally represented)
Overall age distribution: p-value = 0.000 (significant difference)
Overall age distribution for boys: p-value = 0.044 (significant difference)
Overall age distribution for girls: p-value = 0.014 (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: 0.641

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: 9 (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.001 (significant difference)

Digit preference MUAC:

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

Digit preference score: 11 (0-7 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:	1.04	1.00	0.97
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	2.7%	2.4%	
calculated with current SD:	3.4%	2.9%	
calculated with a SD of 1:	2.9%	2.8%	
HAZ			
Standard Deviation SD:	1.09	1.05	0.96
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	14.2%	14.0%	
calculated with current SD:	18.5%	17.0%	
calculated with a SD of 1:	16.3%	15.9%	
WAZ			
Standard Deviation SD:	0.96	0.96	0.90
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:			
calculated with current SD:			
calculated with a SD of 1:			

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

WHZ	p= 0.000	p= 0.013	p= 0.192
HAZ	p= 0.000	p= 0.006	p= 0.552
WAZ	p= 0.001	p= 0.001	p= 0.188

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

Skewness			
WHZ	-0.01	0.28	0.06
HAZ	-0.51	-0.06	-0.08
WAZ	-0.16	-0.16	0.06

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 1.65 0.61 -0.03
HAZ 3.32 1.17 0.01
WAZ 1.51 1.51 0.26
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=0.99 (p=0.478)
Oedema: ID=2.00 (p=0.000)
GAM: ID=1.08 (p=0.344)
SAM: ID=2.00 (p=0.000)
HAZ < -2: ID=1.08 (p=0.341)
HAZ < -3: ID=1.08 (p=0.344)
WAZ < -2: ID=1.10 (p=0.322)
WAZ < -3: ID=0.97 (p=0.516)

Subjects with SMART flags are excluded from this analysis.

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

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

Time SD for WHZ
point 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.88 (n=35, f=0) ###
02: 0.76 (n=34, f=0)
03: 0.99 (n=34, f=0) ########
04: 1.06 (n=34, f=0) ###########
05: 0.88 (n=33, f=0) ###
06: 1.13 (n=31, f=0) ##############
07: 1.46 (n=31, f=2) ############################
08: 0.90 (n=29, f=0) ####
09: 1.01 (n=26, f=0) #########
10: 0.94 (n=22, f=0) ######
11: 1.04 (n=16, f=0) OOOOOOOOO
12: 1.16 (n=15, f=1) OOOOOOOOOOOOOO
13: 1.31 (n=12, f=0) OOOOOOOOOOOOOOOOOO
14: 0.92 (n=08, f=0) ~~~~~
15: 1.33 (n=05, f=0) ~~~~~~~~~~~~~~~~~~~~
16: 0.43 (n=03, f=0)
17: 0.15 (n=02, f=0)

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

Analysis by Team

Team	1	2	3	4	5
n =	77	69	75	103	53
Percentage of values flagged with SMART flags:					
WHZ:	1.3	1.5	0.0	4.0	8.0
HAZ:	1.3	1.4	2.7	3.9	6.0
WAZ:	0.0	1.4	0.0	4.0	5.9
Age ratio of 6-29 months to 30-59 months:					
	0.54	0.74	0.97	0.75	1.52
Sex ratio (male/female):					
	0.64	0.82	0.97	0.94	1.04
Digit preference Weight (%):					
.0 :	12	10	5	18	14
.1 :	10	3	7	14	8
.2 :	9	13	20	8	12
.3 :	13	14	16	6	2
.4 :	6	13	16	5	16
.5 :	6	12	5	11	10
.6 :	13	9	8	11	8
.7 :	18	6	7	9	6
.8 :	5	13	7	12	20

```
.9  :          6      7      9      8      6
DPS:           13     12     17     12     17
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
Digit preference Height (%):
.0  :          13     6      11     4      12
.1  :          17     12     7      11     2
.2  :          10     14     24     14     18
.3  :          6      22     11     12     4
.4  :          10     12     16     13     20
.5  :          10     14     4      8      2
.6  :          13     7      7      10     10
.7  :          8      3      8      12     10
.8  :          6      7      3      11     16
.9  :          5      3      11     7      6
DPS:           11     19     20     9      21
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
Digit preference MUAC (%):
.0  :          0      3      4      7      6
.1  :          12     9      7      12     4
.2  :          10     10     15     11     12
.3  :          17     23     16     8      10
.4  :          8      9      12     12     18
.5  :          3      6      8      5      12
.6  :          14     19     15     14     8
.7  :          12     3      9      11     10
.8  :          6      6      8      13     6
.9  :          18     13     7      9      14
DPS:           19     21     13     9      13
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
Standard deviation of WHZ:
SD             1.04   0.94   0.88   1.03   1.16
Prevalence (< -2) observed:
%              2.6                   4.0    2.0
Prevalence (< -2) calculated with current SD:
%              7.7                   2.7    3.1
Prevalence (< -2) calculated with a SD of 1:
%              7.0                   2.3    1.5
Standard deviation of HAZ:
SD             1.18   1.05   1.03   1.18   0.89
observed:
%              11.7   18.8   10.7   15.7
calculated with current SD:
%              18.0   18.5   12.9   21.5
calculated with a SD of 1:
%              14.0   17.3   12.3   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        8/7.0 (1.1)       6/10.9 (0.6)     14/17.9 (0.8)    1.33
18 to 29     12        5/6.8 (0.7)       8/10.6 (0.8)     13/17.4 (0.7)    0.63
30 to 41     12        4/6.6 (0.6)      12/10.3 (1.2)     16/16.9 (0.9)    0.33
42 to 53     12        2/6.5 (0.3)      10/10.1 (1.0)     12/16.6 (0.7)    0.20
54 to 59      6       11/3.2 (3.4)       11/5.0 (2.2)      22/8.2 (2.7)    1.00
-------------------------------------------------------------------------------------
6  to 59     54      30/38.5 (0.8)      47/38.5 (1.2)                      0.64

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 = 0.000 (significant difference)
Overall age distribution for boys: p-value = 0.000 (significant difference)
Overall age distribution for girls: p-value = 0.036 (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        6/7.0 (0.9)      10/8.8 (1.1)      16/15.8 (1.0)    0.60
18 to 29     12        4/6.8 (0.6)       9/8.6 (1.0)      13/15.4 (0.8)    0.44
30 to 41     12        7/6.6 (1.1)       6/8.3 (0.7)      13/14.9 (0.9)    1.17
42 to 53     12        5/6.5 (0.8)       7/8.2 (0.9)      12/14.7 (0.8)    0.71
54 to 59      6        8/3.2 (2.5)       6/4.1 (1.5)       14/7.3 (1.9)    1.33
-------------------------------------------------------------------------------------
6  to 59     54      30/34.0 (0.9)      38/34.0 (1.1)                      0.79

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

Overall sex ratio: p-value = 0.332 (boys and girls equally represented)
Overall age distribution: p-value = 0.118 (as expected)
Overall age distribution for boys: p-value = 0.066 (as expected)
Overall age distribution for girls: p-value = 0.747 (as expected)
Overall sex/age distribution: p-value = 0.028 (significant difference)

Team 3:
```

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	5/8.6 (0.6)	17/8.8 (1.9)	22/17.4 (1.3)	0.29
18 to 29	12	9/8.4 (1.1)	6/8.6 (0.7)	15/17.0 (0.9)	1.50
30 to 41	12	10/8.1 (1.2)	6/8.3 (0.7)	16/16.4 (1.0)	1.67
42 to 53	12	8/8.0 (1.0)	3/8.2 (0.4)	11/16.2 (0.7)	2.67
54 to 59	6	5/3.9 (1.3)	6/4.1 (1.5)	11/8.0 (1.4)	0.83
6 to 59	54	37/37.5 (1.0)	38/37.5 (1.0)		0.97

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

Overall sex ratio: p-value = 0.908 (boys and girls equally represented)
Overall age distribution: p-value = 0.375 (as expected)
Overall age distribution for boys: p-value = 0.687 (as expected)
Overall age distribution for girls: p-value = 0.010 (significant difference)
Overall sex/age distribution: p-value = 0.003 (significant difference)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	12/11.6 (1.0)	10/12.3 (0.8)	22/23.9 (0.9)	1.20
18 to 29	12	11/11.3 (1.0)	11/12.0 (0.9)	22/23.3 (0.9)	1.00
30 to 41	12	11/11.0 (1.0)	13/11.6 (1.1)	24/22.6 (1.1)	0.85
42 to 53	12	12/10.8 (1.1)	10/11.4 (0.9)	22/22.2 (1.0)	1.20
54 to 59	6	4/5.3 (0.7)	9/5.7 (1.6)	13/11.0 (1.2)	0.44
6 to 59	54	50/51.5 (1.0)	53/51.5 (1.0)		0.94

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 = 0.954 (as expected)
Overall age distribution for boys: p-value = 0.974 (as expected)
Overall age distribution for girls: p-value = 0.587 (as expected)
Overall sex/age distribution: p-value = 0.481 (as expected)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	11/6.3 (1.8)	8/6.0 (1.3)	19/12.3 (1.5)	1.38
18 to 29	12	10/6.1 (1.6)	3/5.9 (0.5)	13/12.0 (1.1)	3.33
30 to 41	12	3/5.9 (0.5)	8/5.7 (1.4)	11/11.6 (0.9)	0.38
42 to 53	12	1/5.8 (0.2)	4/5.6 (0.7)	5/11.4 (0.4)	0.25
54 to 59	6	2/2.9 (0.7)	3/2.8 (1.1)	5/5.7 (0.9)	0.67
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 = 0.113 (as expected)
Overall age distribution for boys: p-value = 0.019 (significant difference)
Overall age distribution for girls: p-value = 0.484 (as expected)
Overall sex/age distribution: p-value = 0.004 (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: 0.71 (n=07, f=0)
02: 0.95 (n=07, f=0)  ######
03: 0.70 (n=07, f=0)
04: 1.03 (n=07, f=0)  ##########
05: 1.27 (n=07, f=0)  ####################
06: 1.03 (n=07, f=0)  ##########
07: 2.11 (n=07, f=1)  ##########################################################
08: 0.63 (n=06, f=0)
09: 0.70 (n=06, f=0)
10: 0.56 (n=05, f=0)
11: 0.27 (n=04, f=0)
12: 0.72 (n=04, f=0)
13: 1.98 (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)

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: 0.82 (n=07, f=0)  #
02: 0.70 (n=07, f=0)
03: 1.08 (n=07, f=0)  ############
04: 1.24 (n=07, f=0)  ###################
05: 0.56 (n=07, f=0)
06: 1.37 (n=07, f=0)  ########################
07: 0.71 (n=06, f=0)
08: 0.49 (n=05, f=0)
09: 1.18 (n=05, f=0)  ################
10: 1.06 (n=04, f=0)  ###########
11: 0.03 (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: 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: 0.98 (n=07, f=0)  ########
02: 0.40 (n=07, f=0)
03: 0.84 (n=07, f=0)  ##
04: 0.34 (n=07, f=0)
05: 0.64 (n=07, f=0)
06: 0.91 (n=06, f=0)  #####
07: 1.18 (n=06, f=0)  ################
08: 1.20 (n=06, f=0)  #################
09: 1.19 (n=05, f=0)  ################
10: 0.88 (n=05, f=0)  ###
11: 1.07 (n=04, f=0)  OOOOOOOOOO
12: 0.18 (n=04, f=0)
13: 0.55 (n=03, f=0)

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

Team: 4

Time                                          SD for WHZ
point               0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.40 (n=07, f=0)
02: 0.64 (n=06, f=0)
03: 0.74 (n=07, f=0)
04: 0.95 (n=07, f=0)  ######
05: 1.11 (n=07, f=0)  #############
06: 0.98 (n=07, f=0)  ########
07: 0.85 (n=07, f=0)  ##
08: 0.83 (n=07, f=0)  #
09: 0.94 (n=06, f=0)  ######
10: 0.74 (n=07, f=0)
11: 1.48 (n=06, f=0)  ############################
12: 1.75 (n=05, f=1)  ########################################
13: 1.32 (n=06, f=0)  ######################
14: 0.91 (n=06, f=0)  #####
15: 1.49 (n=04, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOO
16: 0.43 (n=03, f=0)
17: 0.15 (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: 1.27 (n=07, f=0)  ###################
02: 0.82 (n=07, f=0)  #
03: 1.36 (n=06, f=0)  ########################
04: 1.22 (n=06, f=0)  ##################
05: 0.61 (n=05, f=0)
06: 1.23 (n=04, f=0)  OOOOOOOOOOOOOOOO
07: 1.63 (n=05, f=1)  ###################################
08: 0.93 (n=05, f=0)  #####
09: 1.00 (n=04, 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)
```

Plausibility check for: Dakhla_final.as

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

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	Score
Flagged data (% of out of range subjects)	Incl	%	0-2.5 0	>2.5-5.0 5	>5.0-7.5 10	>7.5 20	0 (1.7 %)
Overall Sex ratio (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	0 (p=0.377)
Age ratio(6-29 vs 30-59) (Significant chi square)	Incl	p	>0.1 0	>0.05 2	>0.001 4	<=0.001 10	10 (p=0.000)
Dig pref score - weight	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	0 (5)
Dig pref score - height	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	0 (7)
Dig pref score - MUAC	Incl	#	0-7 0	8-12 2	13-20 4	> 20 10	0 (6)
Standard Dev WHZ	Excl	SD	<1.1 and	<1.15 and	<1.20 and	>=1.20 or	
.	Excl	SD	>0.9 0	>0.85 5	>0.80 10	<=0.80 20	0 (0.98)
Skewness WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	1 (0.22)
Kurtosis WHZ	Excl	#	<±0.2 0	<±0.4 1	<±0.6 3	>=±0.6 5	1 (0.24)
Poisson dist WHZ-2	Excl	p	>0.05 0	>0.01 1	>0.001 3	<=0.001 5	1 (p=0.013)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	13 %

The overall score of this survey is 13 %, this is good.

There were no duplicate entries detected.

Percentage of children with no exact birthday: 0 %

Anthropometric Indices likely to be in error (-3 to 3 for WHZ, -3 to 3 for HAZ, -3 to 3 for WAZ, from observed mean - chosen in Options panel - these values will be flagged and should be excluded from analysis for a nutrition survey in emergencies. For other surveys this might not be the best procedure e.g. when the percentage of overweight children has to be calculated):

Line=28/ID=2030602: HAZ (5.479), WAZ (2.446), Age may be incorrect
Line=38/ID=2040101: HAZ (-4.273), Age may be incorrect
Line=52/ID=2041001: WHZ (3.489), Weight may be incorrect
Line=88/ID=2070502: HAZ (3.546), Age may be incorrect
Line=91/ID=2071001: WHZ (3.558), Weight may be incorrect
Line=109/ID=2090601: HAZ (-4.688), Age may be incorrect
Line=111/ID=2090702: HAZ (-5.271), Height may be incorrect
Line=154/ID=2130201: HAZ (-5.563), Age may be incorrect
Line=159/ID=2130601: HAZ (3.414), Age may be incorrect
Line=164/ID=2131201: WHZ (-3.918), Weight may be incorrect
Line=202/ID=2161002: HAZ (4.080), Age may be incorrect
Line=207/ID=2170202: HAZ (-5.507), Age may be incorrect
Line=237/ID=2181201: WHZ (-3.971), Weight may be incorrect
Line=278/ID=2220302: WHZ (3.846), HAZ (-6.644), Height may be incorrect
Line=282/ID=2220602: WHZ (-4.561), HAZ (4.708), Height may be incorrect
Line=299/ID=2231001: WHZ (-3.716), WAZ (-4.184), Weight may be incorrect
Line=309/ID=2240802: WHZ (-3.356), HAZ (-4.462), WAZ (-4.598)
Line=311/ID=2241102: HAZ (-4.532), Age may be incorrect
Line=429/ID=2330201: HAZ (-4.371), Age may be incorrect

Percentage of values flagged with SMART flags:WHZ: 1.7 %, HAZ: 3.0 %, WAZ: 0.6 %

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: 0.56 (The value should be around 0.85).:
p-value = 0.000 (significant difference)

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

Age cat.     mo.        boys              girls             total     ratio boys/girls
-------------------------------------------------------------------------------------
6  to 17     12      46/55.9 (0.8)      41/51.5 (0.8)     87/107.4 (0.8)    1.12
18 to 29     12      40/54.5 (0.7)      39/50.2 (0.8)     79/104.7 (0.8)    1.03
30 to 41     12      62/52.8 (1.2)      38/48.7 (0.8)    100/101.5 (1.0)    1.63
42 to 53     12      43/52.0 (0.8)      46/47.9 (1.0)      89/99.9 (0.9)    0.93
54 to 59      6      50/25.7 (1.9)      58/23.7 (2.4)     108/49.4 (2.2)    0.86
-------------------------------------------------------------------------------------
6  to 59     54    241/231.5 (1.0)    222/231.5 (1.0)                       1.09

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

Overall sex ratio: p-value = 0.377 (boys and girls equally represented)
Overall age distribution: p-value = 0.000 (significant difference)
Overall age distribution for boys: p-value = 0.000 (significant difference)
Overall age distribution for girls: p-value = 0.000 (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: 0.349
```

Digit preference Height:

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

Digit preference score: 7 (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.025 (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: 0.149

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:	1.09	1.09	0.98
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	4.8%	4.8%	
calculated with current SD:	5.5%	5.5%	
calculated with a SD of 1:	4.1%	4.1%	
HAZ			
Standard Deviation SD:	1.27	1.24	1.00
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	21.4%	21.2%	20.0%
calculated with current SD:	26.9%	26.2%	21.5%
calculated with a SD of 1:	21.8%	21.5%	21.4%
WAZ			
Standard Deviation SD:	0.96	0.96	0.92
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:			
calculated with current SD:			
calculated with a SD of 1:			

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

WHZ	p= 0.000	p= 0.000	p= 0.018
HAZ	p= 0.000	p= 0.000	p= 0.007
WAZ	p= 0.000	p= 0.000	p= 0.008

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

Skewness			
WHZ	0.07	0.07	0.22
HAZ	0.21	0.37	-0.30
WAZ	-0.34	-0.34	-0.26

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	1.62	1.62	0.24
HAZ	4.41	4.21	-0.12
WAZ	1.02	1.02	0.45

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=1.62 (p=0.013)
WHZ < -3: ID=1.00 (p=0.468)
GAM: ID=1.62 (p=0.013)
SAM: ID=1.00 (p=0.468)
HAZ < -2: ID=1.13 (p=0.279)
HAZ < -3: ID=1.01 (p=0.444)
WAZ < -2: ID=1.28 (p=0.126)
WAZ < -3: ID=1.31 (p=0.107)

Subjects with SMART flags are excluded from this analysis.

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

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

Time point	SD for WHZ 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.07 (n=35, f=0)	###########
02: 1.11 (n=35, f=0)	############
03: 0.98 (n=35, f=1)	#######
04: 0.89 (n=34, f=0)	####
05: 1.06 (n=33, f=0)	###########
06: 0.93 (n=33, f=0)	#####
07: 1.14 (n=33, f=1)	############
08: 1.19 (n=33, f=1)	################
09: 0.98 (n=31, f=0)	#######
10: 1.15 (n=29, f=0)	###############
11: 1.08 (n=26, f=1)	###########
12: 1.29 (n=24, f=1)	###################
13: 1.68 (n=19, f=2)	###################################
14: 0.76 (n=16, f=0)	
15: 1.35 (n=12, f=1)	OOOOOOOOOOOOOOOOOOOO
16: 0.81 (n=11, f=0)	
17: 1.17 (n=07, f=0)	~~~~~~~~~~~~~~~
18: 0.56 (n=05, f=0)	
19: 0.97 (n=04, f=0)	~~~~~~~
20: 0.81 (n=03, f=0)	
21: 2.26 (n=03, f=0)	~~~~~~
22: 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)

Analysis by Team

Team	1	2	3	4	5
n =	72	81	99	98	113
Percentage of values flagged with SMART flags:					
WHZ:	0.0	3.7	3.0	2.0	0.0
HAZ:	1.4	4.9	4.0	5.1	0.0
WAZ:	0.0	0.0	2.0	1.0	0.0
Age ratio of 6-29 months to 30-59 months:					
	0.44	0.47	0.80	0.44	0.64
Sex ratio (male/female):					
	1.32	0.69	1.30	1.13	1.09
Digit preference Weight (%):					
.0 :	15	7	18	8	12
.1 :	10	15	8	12	6
.2 :	15	7	10	11	9
.3 :	10	10	8	8	12
.4 :	4	7	12	11	12
.5 :	6	10	4	3	14
.6 :	6	16	7	10	9
.7 :	13	7	6	10	5
.8 :	11	9	14	16	11
.9 :	11	11	12	9	10

```
DPS:          12     10     13     11     9
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
Digit preference Height (%):
.0  :         15     9      17     6      7
.1  :         11     5      15     10     4
.2  :         17     16     14     9      15
.3  :         8      15     16     8      7
.4  :         14     16     7      10     15
.5  :         10     16     8      5      8
.6  :         8      11     8      12     12
.7  :         4      2      6      14     12
.8  :         8      7      4      9      16
.9  :         4      2      4      15     5
DPS:          14     18     16     10     14
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
Digit preference MUAC (%):
.0  :         7      15     9      7      10
.1  :         17     10     12     13     8
.2  :         17     7      16     10     17
.3  :         11     10     8      6      8
.4  :         10     7      11     7      8
.5  :         10     10     7      8      10
.6  :         7      12     10     12     9
.7  :         13     10     13     10     12
.8  :         4      7      3      10     12
.9  :         6      11     10     15     7
DPS:          14     7      11     9      9
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
Standard deviation of WHZ:
SD           0.87   1.26   1.25   1.04   0.92
Prevalence (< -2) observed:
%                   2.5    12.1    3.1
Prevalence (< -2) calculated with current SD:
%                   4.9    10.7    4.7
Prevalence (< -2) calculated with a SD of 1:
%                   1.9     6.0    4.1
Standard deviation of HAZ:
SD           1.17   1.51   1.38   1.35   0.88
observed:
%            16.7   21.0   28.3   24.5
calculated with current SD:
%            19.5   31.7   32.2   31.3
calculated with a SD of 1:
%            15.6   23.5   26.1   25.5


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         7/9.5 (0.7)       5/7.2 (0.7)      12/16.7 (0.7)    1.40
18 to 29     12         5/9.3 (0.5)       5/7.0 (0.7)      10/16.3 (0.6)    1.00
30 to 41     12        12/9.0 (1.3)       5/6.8 (0.7)      17/15.8 (1.1)    2.40
42 to 53     12         7/8.8 (0.8)       8/6.7 (1.2)      15/15.5 (1.0)    0.88
54 to 59      6        10/4.4 (2.3)       8/3.3 (2.4)       18/7.7 (2.3)    1.25
-------------------------------------------------------------------------------------
6  to 59     54      41/36.0 (1.1)      31/36.0 (0.9)                       1.32

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 = 0.001 (significant difference)
Overall age distribution for boys: p-value = 0.024 (significant difference)
Overall age distribution for girls: p-value = 0.071 (as expected)
Overall sex/age distribution: p-value = 0.000 (significant difference)

Team 2:

Age cat.     mo.        boys              girls             total     ratio boys/girls
-------------------------------------------------------------------------------------
6  to 17     12         9/7.7 (1.2)       3/11.1 (0.3)     12/18.8 (0.6)    3.00
18 to 29     12         7/7.5 (0.9)       7/10.9 (0.6)     14/18.3 (0.8)    1.00
30 to 41     12         6/7.2 (0.8)      14/10.5 (1.3)     20/17.8 (1.1)    0.43
42 to 53     12         2/7.1 (0.3)      12/10.4 (1.2)     14/17.5 (0.8)    0.17
54 to 59      6         9/3.5 (2.6)       12/5.1 (2.3)      21/8.6 (2.4)    0.75
-------------------------------------------------------------------------------------
6  to 59     54      33/40.5 (0.8)      48/40.5 (1.2)                       0.69

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

Overall sex ratio: p-value = 0.096 (boys and girls equally represented)
Overall age distribution: p-value = 0.000 (significant difference)
Overall age distribution for boys: p-value = 0.013 (significant difference)
Overall age distribution for girls: p-value = 0.001 (significant difference)
Overall sex/age distribution: p-value = 0.000 (significant difference)

Team 3:
```

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	10/13.0 (0.8)	10/10.0 (1.0)	20/23.0 (0.9)	1.00
18 to 29	12	11/12.7 (0.9)	13/9.7 (1.3)	24/22.4 (1.1)	0.85
30 to 41	12	16/12.3 (1.3)	2/9.4 (0.2)	18/21.7 (0.8)	8.00
42 to 53	12	6/12.1 (0.5)	10/9.3 (1.1)	16/21.4 (0.7)	0.60
54 to 59	6	13/6.0 (2.2)	8/4.6 (1.7)	21/10.6 (2.0)	1.63
6 to 59	54	56/49.5 (1.1)	43/49.5 (0.9)		1.30

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

Overall sex ratio: p-value = 0.191 (boys and girls equally represented)
Overall age distribution: p-value = 0.012 (significant difference)
Overall age distribution for boys: p-value = 0.010 (significant difference)
Overall age distribution for girls: p-value = 0.049 (significant difference)
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	9/12.1 (0.7)	8/10.7 (0.7)	17/22.7 (0.7)	1.13
18 to 29	12	7/11.8 (0.6)	6/10.4 (0.6)	13/22.2 (0.6)	1.17
30 to 41	12	14/11.4 (1.2)	7/10.1 (0.7)	21/21.5 (1.0)	2.00
42 to 53	12	13/11.2 (1.2)	7/9.9 (0.7)	20/21.1 (0.9)	1.86
54 to 59	6	9/5.5 (1.6)	18/4.9 (3.7)	27/10.5 (2.6)	0.50
6 to 59	54	52/49.0 (1.1)	46/49.0 (0.9)		1.13

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

Overall sex ratio: p-value = 0.544 (boys and girls equally represented)
Overall age distribution: p-value = 0.000 (significant difference)
Overall age distribution for boys: p-value = 0.221 (as expected)
Overall age distribution for girls: p-value = 0.000 (significant difference)
Overall sex/age distribution: p-value = 0.000 (significant difference)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	11/13.7 (0.8)	15/12.5 (1.2)	26/26.2 (1.0)	0.73
18 to 29	12	10/13.3 (0.7)	8/12.2 (0.7)	18/25.6 (0.7)	1.25
30 to 41	12	14/12.9 (1.1)	10/11.8 (0.8)	24/24.8 (1.0)	1.40
42 to 53	12	15/12.7 (1.2)	9/11.7 (0.8)	24/24.4 (1.0)	1.67
54 to 59	6	9/6.3 (1.4)	12/5.8 (2.1)	21/12.1 (1.7)	0.75
6 to 59	54	59/56.5 (1.0)	54/56.5 (1.0)		1.09

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

Overall sex ratio: p-value = 0.638 (boys and girls equally represented)
Overall age distribution: p-value = 0.064 (as expected)
Overall age distribution for boys: p-value = 0.555 (as expected)
Overall age distribution for girls: p-value = 0.048 (significant difference)
Overall sex/age distribution: p-value = 0.014 (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: 0.82 (n=07, f=0)  #
02: 0.72 (n=07, f=0)
03: 0.63 (n=07, f=0)
04: 0.64 (n=06, f=0)
05: 1.27 (n=06, f=0)  ####################
06: 0.76 (n=06, f=0)
07: 0.67 (n=06, f=0)
08: 1.13 (n=06, f=0)  ##############
09: 0.69 (n=06, f=0)
10: 1.05 (n=05, f=0)  ###########
11: 1.00 (n=02, f=0)  OOOOOOOO
12: 0.59 (n=02, f=0)
13: 0.31 (n=02, f=0)
14: 0.43 (n=02, f=0)
```

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

Team: 2

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

```
01: 0.97 (n=07, f=0)  #######
02: 1.07 (n=07, f=0)  ###########
03: 1.62 (n=07, f=1)  ##################################
04: 1.11 (n=07, f=0)  #############
05: 1.01 (n=06, f=0)  #########
06: 1.20 (n=06, f=0)  #################
07: 1.74 (n=06, f=1)  ########################################
08: 1.17 (n=06, f=0)  ###############
09: 0.79 (n=04, f=0)
10: 0.97 (n=04, f=0)  #######
11: 1.75 (n=04, f=1)  ######################################
12: 1.57 (n=04, f=0)  ################################
13: 2.18 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
14: 0.43 (n=02, f=0)
15: 1.87 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
16: 0.63 (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: 1.44 (n=07, f=0)  ############################
02: 1.04 (n=07, f=0)  ##########
03: 0.90 (n=07, f=0)  ####
04: 1.15 (n=07, f=0)  ###############
05: 1.37 (n=07, f=0)  ########################
06: 1.08 (n=07, f=0)  ############
07: 1.18 (n=07, f=0)  ################
08: 1.02 (n=07, f=0)  #########
09: 1.08 (n=07, f=0)  ############
10: 1.43 (n=07, f=0)  ############################
11: 0.95 (n=07, f=0)  ######
12: 1.89 (n=06, f=1)  ##############################################
13: 1.89 (n=05, f=2)  ##############################################
14: 0.44 (n=03, f=0)
15: 0.90 (n=02, f=0)  ~~~~
16: 0.10 (n=02, f=0)
17: 1.83 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

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

Team: 4

```
Time                                          SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.86 (n=07, f=0)  ##
02: 1.27 (n=07, f=0)  ####################
03: 0.52 (n=07, f=0)
04: 0.38 (n=07, f=0)
05: 0.93 (n=07, f=0)  #####
06: 0.86 (n=07, f=0)  ###
07: 1.18 (n=07, f=0)  ################
08: 1.37 (n=07, f=1)  ########################
09: 1.35 (n=07, f=0)  ########################
10: 0.99 (n=06, f=0)  ########
11: 0.64 (n=06, f=0)
12: 1.37 (n=05, f=0)  ########################
13: 0.26 (n=04, f=0)
14: 0.33 (n=04, f=0)
15: 3.05 (n=02, f=1)  OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
16: 1.08 (n=02, f=0)  OOOOOOOOOOO
```

(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: 1.16 (n=07, f=0)  ###############
02: 1.03 (n=07, f=0)  ##########
03: 0.41 (n=07, f=0)
04: 0.66 (n=07, f=0)
05: 0.99 (n=07, f=0)  ########
06: 0.94 (n=07, f=0)  ######
07: 0.66 (n=07, f=0)
08: 1.28 (n=07, f=0)  ####################
09: 0.65 (n=07, f=0)
10: 1.22 (n=07, f=0)  ##################
11: 0.86 (n=07, f=0)  ##
12: 0.78 (n=07, f=0)
13: 1.26 (n=06, f=0)  ###################
14: 1.33 (n=05, f=0)  ######################
```

```
15: 0.67 (n=05, f=0)
16: 0.55 (n=04, f=0)
17: 1.47 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOO
18: 0.85 (n=02, f=0)  ~~
```

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

Plausibility check for: Laayoune_final.as

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

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	Score
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	0 (1.3 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	0 (p=0.582)
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=0.905)
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 (8)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	2 (8)
Standard Dev WHZ	Excl	SD	<1.1 and	<1.15 and	<1.20 and	>=1.20 or	
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	0 (1.01)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	1 (-0.21)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	0 (-0.06)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	3 (p=0.006)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	8 %

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

There were no duplicate entries detected.

Missing or wrong data:

WEIGHT: Line=455/ID=3340401
HEIGHT: Line=455/ID=3340401

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=67/ID=3060901: HAZ (4.566), WAZ (2.735), Age may be incorrect
Line=79/ID=3080104: HAZ (3.592), Age may be incorrect
Line=90/ID=3080801: HAZ (2.927), Height may be incorrect
Line=115/ID=3100904: HAZ (-4.665), Age may be incorrect
Line=116/ID=3101001: HAZ (-5.684), WAZ (-4.140), Age may be incorrect
Line=135/ID=3120701: WHZ (3.378), WAZ (2.741), Weight may be incorrect
Line=199/ID=3161101: HAZ (4.708), WAZ (2.229), Age may be incorrect
Line=206/ID=3170501: WHZ (4.245), HAZ (-5.618), Height may be incorrect
Line=222/ID=3181101: WHZ (2.885), HAZ (-6.042), Height may be incorrect
Line=227/ID=3190702: HAZ (-6.063), Age may be incorrect
Line=249/ID=3210501: WHZ (4.301), Height may be incorrect
Line=258/ID=3211102: HAZ (9.538), WAZ (3.176), Age may be incorrect
Line=272/ID=3221001: HAZ (5.494), WAZ (2.542), Age may be incorrect
Line=347/ID=3271001: WHZ (2.974), HAZ (-6.534), Height may be incorrect
Line=399/ID=3310101: HAZ (-5.646), Age may be incorrect
Line=404/ID=3310402: WHZ (-4.625), Weight may be incorrect

Percentage of values flagged with SMART flags:WHZ: 1.3 %, HAZ: 2.7 %, WAZ: 1.3 %

Age distribution:

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

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

Age ratio of 6-29 months to 30-59 months: 0.86 (The value should be around 0.85).:
p-value = 0.905 (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      49/56.6 (0.9)      58/53.8 (1.1)    107/110.4 (1.0)    0.84
18 to 29     12      61/55.2 (1.1)      52/52.5 (1.0)    113/107.7 (1.0)    1.17
30 to 41     12      59/53.5 (1.1)      45/50.9 (0.9)    104/104.4 (1.0)    1.31
42 to 53     12      41/52.6 (0.8)      48/50.1 (1.0)     89/102.7 (0.9)    0.85
54 to 59      6      34/26.0 (1.3)      29/24.8 (1.2)      63/50.8 (1.2)    1.17
-------------------------------------------------------------------------------------
6  to 59     54    244/238.0 (1.0)    232/238.0 (1.0)                      1.05

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

Overall sex ratio: p-value = 0.582 (boys and girls equally represented)
Overall age distribution: p-value = 0.274 (as expected)
Overall age distribution for boys: p-value = 0.125 (as expected)
Overall age distribution for girls: p-value = 0.770 (as expected)
Overall sex/age distribution: p-value = 0.051 (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: 0.300

Digit preference Height:

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

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

Digit preference MUAC:

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

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

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

.	no exclusion	exclusion from reference mean (WHO flags)	exclusion from observed mean (SMART flags)
WHZ			
Standard Deviation SD:	1.10	1.10	1.01
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	6.7%	6.7%	6.6%
calculated with current SD:	5.9%	5.9%	4.8%
calculated with a SD of 1:	4.4%	4.4%	4.7%
HAZ			
Standard Deviation SD:	1.41	1.26	1.07
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	21.9%	21.4%	21.0%
calculated with current SD:	27.9%	25.4%	22.3%
calculated with a SD of 1:	20.4%	20.2%	20.8%
WAZ			
Standard Deviation SD:	1.04	1.04	0.97
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	12.4%	12.4%	
calculated with current SD:	13.4%	13.4%	
calculated with a SD of 1:	12.5%	12.5%	

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

WHZ	p= 0.000	p= 0.000	p= 0.075
HAZ	p= 0.000	p= 0.000	p= 0.910
WAZ	p= 0.000	p= 0.000	p= 0.012

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

Skewness			
WHZ	0.13	0.13	-0.21
HAZ	1.03	0.52	-0.04
WAZ	0.05	0.05	-0.29

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	1.47	1.47	-0.06
HAZ	9.59	3.86	-0.08

WAZ	1.07	1.07	0.16

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=1.71 (p=0.006)
WHZ < -3: ID=0.94 (p=0.566)
GAM: ID=1.71 (p=0.006)
SAM: ID=0.94 (p=0.566)
HAZ < -2: ID=1.40 (p=0.060)
HAZ < -3: ID=1.07 (p=0.360)
WAZ < -2: ID=1.03 (p=0.424)
WAZ < -3: ID=1.12 (p=0.286)

Subjects with SMART flags are excluded from this analysis.

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

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

```
Time                                          SD for WHZ
point                 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.87 (n=35, f=0)  ###
02: 1.04 (n=35, f=0)  ##########
03: 1.26 (n=35, f=1)  ####################
04: 0.80 (n=34, f=0)
05: 1.05 (n=35, f=0)  ##########
06: 1.49 (n=35, f=2)  ##############################
07: 1.31 (n=35, f=1)  ######################
08: 1.06 (n=34, f=1)  ###########
09: 1.07 (n=32, f=0)  ###########
10: 1.15 (n=29, f=0)  ################
11: 1.09 (n=28, f=0)  #############
12: 1.04 (n=25, f=0)  ##########
13: 0.86 (n=23, f=0)  ##
14: 1.31 (n=15, f=1)  OOOOOOOOOOOOOOOOOOOO
15: 1.02 (n=12, f=0)  OOOOOOOOO
16: 0.83 (n=10, f=0)  O
17: 0.87 (n=08, f=0)  ~~~
18: 0.99 (n=07, f=0)  ~~~~~~~~
19: 1.00 (n=04, f=0)  ~~~~~~~~
20: 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)

Analysis by Team

Team	1	2	3	4	5
n =	95	95	112	84	90
Percentage of values flagged with SMART flags:					
WHZ:	2.1	3.2	0.9	1.2	0.0
HAZ:	4.2	3.2	2.7	2.4	2.2
WAZ:	3.2	2.1	0.0	1.2	1.1
Age ratio of 6-29 months to 30-59 months:					
	1.07	0.98	0.70	0.62	1.05
Sex ratio (male/female):					
	1.07	1.11	1.04	1.27	0.84
Digit preference Weight (%):					
.0 :	8	12	9	13	9
.1 :	13	11	10	8	8
.2 :	15	9	13	7	10
.3 :	13	6	6	17	19
.4 :	6	13	20	12	10
.5 :	6	5	10	8	14
.6 :	7	11	8	8	8
.7 :	12	7	13	10	7
.8 :	16	14	8	8	6

```
.9  :          4      13      3      7      10
DPS:           13     9       15     10     13
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
Digit preference Height (%):
.0  :          1      1       10     6      1
.1  :          17     6       9      13     4
.2  :          14     12      13     11     9
.3  :          8      14      14     10     13
.4  :          16     14      5      13     22
.5  :          5      15      8      7      8
.6  :          13     9       12     12     7
.7  :          7      5       11     12     10
.8  :          11     6       6      4      18
.9  :          8      18      12     12     8
DPS:           15     16      9      10     20
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
Digit preference MUAC (%):
.0  :          4      5       7      10     10
.1  :          17     13      7      7      8
.2  :          16     11      14     15     14
.3  :          18     13      15     11     14
.4  :          3      15      13     12     12
.5  :          4      5       12     11     4
.6  :          6      15      4      4      7
.7  :          14     9       4      15     13
.8  :          11     7       6      7      14
.9  :          7      7       17     8      2
DPS:           18     11      15     12     14
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
Standard deviation of WHZ:
SD             1.14   1.12    1.12   1.08   0.93
Prevalence (< -2) observed:
%              8.4    2.1     8.0    12.0
Prevalence (< -2) calculated with current SD:
%              8.2    4.3     6.3    9.6
Prevalence (< -2) calculated with a SD of 1:
%              5.7    2.7     4.3    7.9
Standard deviation of HAZ:
SD             1.82   1.41    1.19   1.27   1.17
observed:
%              14.7   18.9    21.4   22.9   32.2
calculated with current SD:
%              24.7   28.2    26.7   25.2   34.0
calculated with a SD of 1:
%              10.6   20.8    22.9   19.8   31.6


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      12/11.4 (1.1)     15/10.7 (1.4)     27/22.0 (1.2)    0.80
18 to 29     12      11/11.1 (1.0)     11/10.4 (1.1)     22/21.5 (1.0)    1.00
30 to 41     12      11/10.7 (1.0)      8/10.1 (0.8)     19/20.8 (0.9)    1.38
42 to 53     12      11/10.6 (1.0)      7/9.9 (0.7)      18/20.5 (0.9)    1.57
54 to 59      6       4/5.2 (0.8)       5/4.9 (1.0)       9/10.1 (0.9)    0.80
-------------------------------------------------------------------------------------
6  to 59     54      49/47.5 (1.0)     46/47.5 (1.0)                      1.07

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

Overall sex ratio: p-value = 0.758 (boys and girls equally represented)
Overall age distribution: p-value = 0.787 (as expected)
Overall age distribution for boys: p-value = 0.986 (as expected)
Overall age distribution for girls: p-value = 0.544 (as expected)
Overall sex/age distribution: p-value = 0.487 (as expected)

Team 2:

Age cat.     mo.        boys              girls             total     ratio boys/girls
-------------------------------------------------------------------------------------
6  to 17     12       9/11.6 (0.8)      13/10.4 (1.2)     22/22.0 (1.0)    0.69
18 to 29     12      15/11.3 (1.3)      10/10.2 (1.0)     25/21.5 (1.2)    1.50
30 to 41     12      11/11.0 (1.0)       11/9.9 (1.1)     22/20.8 (1.1)    1.00
42 to 53     12       5/10.8 (0.5)       6/9.7 (0.6)      11/20.5 (0.5)    0.83
54 to 59      6       10/5.3 (1.9)       5/4.8 (1.0)      15/10.1 (1.5)    2.00
-------------------------------------------------------------------------------------
6  to 59     54      50/47.5 (1.1)     45/47.5 (0.9)                      1.11

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

Overall sex ratio: p-value = 0.608 (boys and girls equally represented)
Overall age distribution: p-value = 0.118 (as expected)
Overall age distribution for boys: p-value = 0.062 (as expected)
Overall age distribution for girls: p-value = 0.702 (as expected)
Overall sex/age distribution: p-value = 0.019 (significant difference)

Team 3:
```

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	8/13.2 (0.6)	15/12.8 (1.2)	23/26.0 (0.9)	0.53
18 to 29	12	13/12.9 (1.0)	10/12.4 (0.8)	23/25.3 (0.9)	1.30
30 to 41	12	17/12.5 (1.4)	13/12.1 (1.1)	30/24.6 (1.2)	1.31
42 to 53	12	10/12.3 (0.8)	16/11.9 (1.3)	26/24.2 (1.1)	0.63
54 to 59	6	9/6.1 (1.5)	1/5.9 (0.2)	10/12.0 (0.8)	9.00
6 to 59	54	57/56.0 (1.0)	55/56.0 (1.0)		1.04

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

Overall sex ratio: p-value = 0.850 (boys and girls equally represented)
Overall age distribution: p-value = 0.695 (as expected)
Overall age distribution for boys: p-value = 0.238 (as expected)
Overall age distribution for girls: p-value = 0.170 (as expected)
Overall sex/age distribution: p-value = 0.018 (significant difference)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	9/10.9 (0.8)	5/8.6 (0.6)	14/19.5 (0.7)	1.80
18 to 29	12	9/10.6 (0.8)	9/8.4 (1.1)	18/19.0 (0.9)	1.00
30 to 41	12	11/10.3 (1.1)	4/8.1 (0.5)	15/18.4 (0.8)	2.75
42 to 53	12	10/10.1 (1.0)	5/8.0 (0.6)	15/18.1 (0.8)	2.00
54 to 59	6	8/5.0 (1.6)	14/3.9 (3.5)	22/9.0 (2.5)	0.57
6 to 59	54	47/42.0 (1.1)	37/42.0 (0.9)		1.27

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

Overall sex ratio: p-value = 0.275 (boys and girls equally represented)
Overall age distribution: p-value = 0.000 (significant difference)
Overall age distribution for boys: p-value = 0.661 (as expected)
Overall age distribution for girls: p-value = 0.000 (significant difference)
Overall sex/age distribution: p-value = 0.000 (significant difference)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	11/9.5 (1.2)	10/11.4 (0.9)	21/20.9 (1.0)	1.10
18 to 29	12	13/9.3 (1.4)	12/11.1 (1.1)	25/20.4 (1.2)	1.08
30 to 41	12	9/9.0 (1.0)	9/10.7 (0.8)	18/19.7 (0.9)	1.00
42 to 53	12	5/8.8 (0.6)	14/10.6 (1.3)	19/19.4 (1.0)	0.36
54 to 59	6	3/4.4 (0.7)	4/5.2 (0.8)	7/9.6 (0.7)	0.75
6 to 59	54	41/45.0 (0.9)	49/45.0 (1.1)		0.84

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

Overall sex ratio: p-value = 0.399 (boys and girls equally represented)
Overall age distribution: p-value = 0.749 (as expected)
Overall age distribution for boys: p-value = 0.429 (as expected)
Overall age distribution for girls: p-value = 0.750 (as expected)
Overall sex/age distribution: p-value = 0.178 (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: 0.67 (n=07, f=0)
02: 1.01 (n=07, f=0)  #########
03: 1.77 (n=07, f=1)  ########################################
04: 0.82 (n=07, f=0)  #
05: 0.72 (n=07, f=0)
06: 1.93 (n=07, f=1)  ################################################
07: 1.19 (n=07, f=0)  ################
08: 0.89 (n=07, f=0)  ####
09: 1.27 (n=06, f=0)  ####################
10: 0.79 (n=06, f=0)
11: 1.28 (n=06, f=0)  ####################
12: 1.24 (n=06, f=0)  ###################
13: 0.45 (n=05, f=0)
14: 1.41 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOO
15: 0.78 (n=02, f=0)
16: 1.06 (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: 0.81 (n=07, f=0)
02: 1.09 (n=07, f=0)  ############
03: 0.98 (n=07, f=0)  ########
04: 0.90 (n=07, f=0)  ####
05: 1.00 (n=07, f=0)  ########
06: 1.41 (n=07, f=1)  ########################
07: 1.87 (n=07, f=1)  ###############################################
08: 0.60 (n=06, f=0)
09: 0.88 (n=06, f=0)  ###
10: 1.50 (n=05, f=0)  ##############################
11: 0.82 (n=05, f=0)  #
12: 0.71 (n=05, f=0)
13: 0.71 (n=05, f=0)
14: 1.49 (n=04, f=1)  ##############################
15: 1.06 (n=04, f=0)  ############
16: 0.50 (n=02, f=0)

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

Team: 3

Time                                                SD for WHZ
point                0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.77 (n=07, f=0)
02: 1.04 (n=07, f=0)  ##########
03: 1.00 (n=07, f=0)  ########
04: 0.81 (n=07, f=0)  #
05: 1.29 (n=07, f=0)  ###################
06: 1.03 (n=07, f=0)  ##########
07: 1.07 (n=07, f=0)  ############
08: 1.65 (n=07, f=1)  ###################################
09: 1.22 (n=06, f=0)  #################
10: 1.22 (n=06, f=0)  #################
11: 0.93 (n=06, f=0)  #####
12: 1.50 (n=06, f=0)  ##############################
13: 1.03 (n=06, f=0)  ##########
14: 0.85 (n=05, f=0)  ##
15: 0.81 (n=04, f=0)
16: 0.79 (n=04, f=0)
17: 0.77 (n=04, f=0)
18: 1.19 (n=04, f=0)  OOOOOOOOOOOOOOO
19: 0.30 (n=02, f=0)
20: 2.05 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

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

Team: 4

Time                                                SD for WHZ
point                0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.91 (n=07, f=0)  #####
02: 1.46 (n=07, f=0)  ############################
03: 1.52 (n=07, f=0)  ##############################
04: 0.46 (n=06, f=0)
05: 1.16 (n=07, f=0)  ###############
06: 1.27 (n=07, f=0)  ###################
07: 1.22 (n=07, f=0)  ##################
08: 0.74 (n=07, f=0)
09: 1.09 (n=07, f=0)  ############
10: 0.91 (n=06, f=0)  ####
11: 1.55 (n=06, f=0)  ################################
12: 0.67 (n=04, f=0)
13: 0.67 (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)

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: 0.72 (n=07, f=0)
02: 0.45 (n=07, f=0)
03: 0.78 (n=07, f=0)
04: 1.04 (n=07, f=0)  ##########
05: 1.05 (n=07, f=0)  ###########
06: 1.64 (n=07, f=0)  ###################################
07: 0.81 (n=07, f=0)  #
08: 1.19 (n=07, f=0)  ################
09: 0.88 (n=07, f=0)  ###
10: 0.89 (n=06, f=0)  ####
11: 0.40 (n=05, f=0)
```

```
12: 0.69 (n=04, f=0)
13: 0.99 (n=03, f=0)  OOOOOOOO
14: 0.33 (n=02, f=0)
15: 0.23 (n=02, f=0)
16: 1.29 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~
17: 0.57 (n=02, f=0)

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

Plausibility check for: Smara_final.as

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

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	Score
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	0 (0.5 %)
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	4 (p=0.005)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	0 (4)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	0 (6)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	2 (8)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>=1.20	
.			and	and	and	or	
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	0 (0.98)
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	0 (0.00)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	0 (p=0.997)
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=279/ID=4171201
HEIGHT: Line=279/ID=4171201

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=37/ID=4030202: HAZ (-4.856), Height may be incorrect
Line=127/ID=4090302: WHZ (-3.257), Weight may be incorrect
Line=135/ID=4090801: HAZ (3.526), Age may be incorrect
Line=185/ID=4121001: WHZ (-4.709), HAZ (7.368), Height may be incorrect
Line=191/ID=4121203: HAZ (2.004), Age may be incorrect
Line=206/ID=4130901: HAZ (3.002), Age may be incorrect
Line=284/ID=4180201: HAZ (2.412), Age may be incorrect
Line=317/ID=4191202: HAZ (-6.614), Height may be incorrect
Line=324/ID=4200402: HAZ (-4.250), Age may be incorrect
Line=332/ID=4200801: HAZ (2.352), Age may be incorrect
Line=339/ID=4201002: HAZ (-4.440), Age may be incorrect
Line=367/ID=4220103: HAZ (-4.414), WAZ (-3.955), Age may be incorrect
Line=378/ID=4220901: HAZ (3.423), Age may be incorrect
Line=464/ID=4260702: HAZ (-5.770), Age may be incorrect
Line=489/ID=4270901: WHZ (-3.360), Weight may be incorrect
Line=513/ID=4280503: HAZ (2.732), Age may be incorrect

Percentage of values flagged with SMART flags:WHZ: 0.5 %, HAZ: 2.2 %, 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: 0.68 (The value should be around 0.85).:
p-value = 0.005 (significant difference)

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

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	82/76.1 (1.1)	74/71.5 (1.0)	156/147.6 (1.1)	1.11
18 to 29	12	46/74.2 (0.6)	55/69.7 (0.8)	101/143.9 (0.7)	0.84
30 to 41	12	69/71.9 (1.0)	60/67.5 (0.9)	129/139.4 (0.9)	1.15
42 to 53	12	84/70.8 (1.2)	70/66.5 (1.1)	154/137.2 (1.1)	1.20
54 to 59	6	47/35.0 (1.3)	49/32.9 (1.5)	96/67.9 (1.4)	0.96
6 to 59	54	328/318.0 (1.0)	308/318.0 (1.0)		1.06

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 = 0.000 (significant difference)
Overall age distribution for boys: p-value = 0.001 (significant difference)
Overall age distribution for girls: p-value = 0.016 (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: 4 (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.456

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: 6 (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.007 (significant difference)

Digit preference MUAC:

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

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

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

.	no exclusion	exclusion from reference mean (WHO flags)	exclusion from observed mean (SMART flags)
WHZ			
Standard Deviation SD:	1.01	1.01	0.98
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	4.4%	4.4%	
calculated with current SD:	4.1%	4.1%	
calculated with a SD of 1:	4.0%	4.0%	
HAZ			
Standard Deviation SD:	1.21	1.14	1.02
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	17.6%	17.5%	17.1%
calculated with current SD:	23.1%	21.9%	19.7%
calculated with a SD of 1:	18.7%	18.8%	19.2%
WAZ			
Standard Deviation SD:	0.99	0.99	0.98
(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= 0.041	p= 0.041	p= 0.819
HAZ	p= 0.000	p= 0.000	p= 0.085
WAZ	p= 0.979	p= 0.979	p= 0.963

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

Skewness			
WHZ	-0.18	-0.18	0.00
HAZ	0.44	0.07	-0.13
WAZ	-0.01	-0.01	0.03

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	0.54	0.54	0.00
HAZ	5.17	1.56	0.05

WAZ 0.02 0.02 -0.06

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=0.46 (p=0.997)
WHZ < -3: ID=0.97 (p=0.516)
GAM: ID=0.46 (p=0.997)
SAM: ID=0.97 (p=0.516)
HAZ < -2: ID=1.10 (p=0.320)
HAZ < -3: ID=1.07 (p=0.352)
WAZ < -2: ID=1.21 (p=0.187)
WAZ < -3: ID=1.05 (p=0.386)

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: 1.17 (n=35, f=0)  ################
02: 0.85 (n=35, f=0)  ##
03: 0.82 (n=35, f=0)  #
04: 1.09 (n=35, f=0)  ############
05: 1.10 (n=35, f=1)  #############
06: 1.02 (n=35, f=0)  #########
07: 1.01 (n=35, f=0)  #########
08: 0.94 (n=35, f=0)  ######
09: 1.04 (n=35, f=0)  ##########
10: 0.92 (n=35, f=0)  #####
11: 0.80 (n=34, f=0)
12: 1.07 (n=32, f=0)  ############
13: 0.92 (n=31, f=1)  #####
14: 0.86 (n=28, f=0)  ##
15: 1.24 (n=27, f=1)  ###################
16: 0.87 (n=24, f=0)  ###
17: 0.85 (n=21, f=0)  ##
18: 1.17 (n=18, f=0)  OOOOOOOOOOOOOOOO
19: 0.92 (n=14, f=0)  OOOOO
20: 1.27 (n=13, f=0)  OOOOOOOOOOOOOOOOOOO
21: 1.05 (n=11, f=0)  OOOOOOOOOO
22: 1.11 (n=08, f=0)  ~~~~~~~~~~~~
23: 0.78 (n=08, f=0)
24: 0.99 (n=07, f=0)  ~~~~~~~~
25: 1.45 (n=03, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~
26: 0.59 (n=02, f=0)
27: 0.34 (n=02, f=0)
28: 1.76 (n=02, f=0)  ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

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

Analysis by Team

Team	1	2	3	4	5
n =	126	120	156	109	125
Percentage of values flagged with SMART flags:					
WHZ:	0.0	2.5	0.0	0.9	0.0
HAZ:	0.8	4.2	2.6	1.8	2.4
WAZ:	0.0	1.7	0.0	0.0	0.0
Age ratio of 6-29 months to 30-59 months:					
	0.56	0.69	0.61	0.70	0.89
Sex ratio (male/female):					
	1.47	0.90	1.00	1.32	0.81
Digit preference Weight (%):					
.0 :	12	12	12	13	10

```
.1  :          11      6       8       10      10
.2  :          13      6       12      12      11
.3  :          9       8       8       11      8
.4  :          10      12      7       6       13
.5  :          10      9       6       6       12
.6  :          10      14      10      13      10
.7  :          8       9       10      8       9
.8  :          10      14      13      12      9
.9  :          8       10      13      8       7
DPS:           5       10      8       8       6
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
Digit preference Height (%):
.0  :          10      8       11      6       13
.1  :          11      10      6       11      2
.2  :          12      13      21      5       10
.3  :          11      13      12      16      10
.4  :          13      10      12      13      11
.5  :          10      8       4       8       15
.6  :          10      13      12      17      7
.7  :          8       12      10      8       7
.8  :          5       5       6       10      21
.9  :          10      9       6       6       2
DPS:           8       8       15      14      18
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
Digit preference MUAC (%):
.0  :          3       3       6       15      4
.1  :          20      17      10      12      9
.2  :          11      6       12      21      16
.3  :          6       18      12      8       13
.4  :          12      6       13      5       11
.5  :          8       9       6       4       6
.6  :          12      14      10      15      13
.7  :          9       5       10      9       11
.8  :          6       8       12      5       12
.9  :          13      14      10      7       6
DPS:           15      18      8       18      12
Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
Standard deviation of WHZ:
SD             1.02    1.06    1.00    0.95    0.95
Prevalence (< -2) observed:
%              4.0     6.7
Prevalence (< -2) calculated with current SD:
%              4.7     4.8
Prevalence (< -2) calculated with a SD of 1:
%              4.4     3.8
Standard deviation of HAZ:
SD             1.09    1.37    1.15    1.28    1.15
observed:
%              20.6    16.8    16.7    15.6    18.4
calculated with current SD:
%              26.7    24.6    18.6    23.0    23.3
calculated with a SD of 1:
%              25.0    17.3    15.3    17.1    20.1


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      13/17.4 (0.7)       9/11.8 (0.8)      22/29.2 (0.8)    1.44
18 to 29     12      12/17.0 (0.7)      11/11.5 (1.0)      23/28.5 (0.8)    1.09
30 to 41     12      11/16.4 (0.7)       9/11.2 (0.8)      20/27.6 (0.7)    1.22
42 to 53     12      24/16.2 (1.5)      13/11.0 (1.2)      37/27.2 (1.4)    1.85
54 to 59      6       15/8.0 (1.9)        9/5.4 (1.7)      24/13.4 (1.8)    1.67
-------------------------------------------------------------------------------------
6  to 59     54      75/63.0 (1.2)      51/63.0 (0.8)                       1.47

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

Overall sex ratio: p-value = 0.033 (significant excess of boys)
Overall age distribution: p-value = 0.002 (significant difference)
Overall age distribution for boys: p-value = 0.007 (significant difference)
Overall age distribution for girls: p-value = 0.432 (as expected)
Overall sex/age distribution: p-value = 0.000 (significant difference)

Team 2:

Age cat.     mo.        boys              girls             total     ratio boys/girls
-------------------------------------------------------------------------------------
6  to 17     12      14/13.2 (1.1)      21/14.6 (1.4)      35/27.8 (1.3)    0.67
18 to 29     12       9/12.9 (0.7)       5/14.3 (0.4)      14/27.1 (0.5)    1.80
30 to 41     12      15/12.5 (1.2)      12/13.8 (0.9)      27/26.3 (1.0)    1.25
42 to 53     12      11/12.3 (0.9)      15/13.6 (1.1)      26/25.9 (1.0)    0.73
54 to 59      6        8/6.1 (1.3)       10/6.7 (1.5)      18/12.8 (1.4)    0.80
-------------------------------------------------------------------------------------
6  to 59     54      57/60.0 (0.9)      63/60.0 (1.0)                       0.90

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

Overall sex ratio: p-value = 0.584 (boys and girls equally represented)
Overall age distribution: p-value = 0.035 (significant difference)
Overall age distribution for boys: p-value = 0.651 (as expected)
Overall age distribution for girls: p-value = 0.029 (significant difference)
Overall sex/age distribution: p-value = 0.007 (significant difference)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	20/18.1 (1.1)	19/18.1 (1.0)	39/36.2 (1.1)	1.05
18 to 29	12	8/17.6 (0.5)	12/17.6 (0.7)	20/35.3 (0.6)	0.67
30 to 41	12	18/17.1 (1.1)	22/17.1 (1.3)	40/34.2 (1.2)	0.82
42 to 53	12	22/16.8 (1.3)	16/16.8 (1.0)	38/33.7 (1.1)	1.38
54 to 59	6	10/8.3 (1.2)	9/8.3 (1.1)	19/16.6 (1.1)	1.11
6 to 59	54	78/78.0 (1.0)	78/78.0 (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 = 0.069 (as expected)
Overall age distribution for boys: p-value = 0.114 (as expected)
Overall age distribution for girls: p-value = 0.501 (as expected)
Overall sex/age distribution: p-value = 0.029 (significant difference)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	16/14.4 (1.1)	12/10.9 (1.1)	28/25.3 (1.1)	1.33
18 to 29	12	10/14.0 (0.7)	7/10.6 (0.7)	17/24.7 (0.7)	1.43
30 to 41	12	14/13.6 (1.0)	7/10.3 (0.7)	21/23.9 (0.9)	2.00
42 to 53	12	13/13.4 (1.0)	9/10.1 (0.9)	22/23.5 (0.9)	1.44
54 to 59	6	9/6.6 (1.4)	12/5.0 (2.4)	21/11.6 (1.8)	0.75
6 to 59	54	62/54.5 (1.1)	47/54.5 (0.9)		1.32

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

Overall sex ratio: p-value = 0.151 (boys and girls equally represented)
Overall age distribution: p-value = 0.031 (significant difference)
Overall age distribution for boys: p-value = 0.696 (as expected)
Overall age distribution for girls: p-value = 0.016 (significant difference)
Overall sex/age distribution: p-value = 0.004 (significant difference)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	19/13.0 (1.5)	13/16.0 (0.8)	32/29.0 (1.1)	1.46
18 to 29	12	7/12.7 (0.6)	20/15.6 (1.3)	27/28.3 (1.0)	0.35
30 to 41	12	11/12.3 (0.9)	10/15.1 (0.7)	21/27.4 (0.8)	1.10
42 to 53	12	14/12.1 (1.2)	17/14.9 (1.1)	31/27.0 (1.1)	0.82
54 to 59	6	5/6.0 (0.8)	9/7.4 (1.2)	14/13.3 (1.0)	0.56
6 to 59	54	56/62.5 (0.9)	69/62.5 (1.1)		0.81

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

Overall sex ratio: p-value = 0.245 (boys and girls equally represented)
Overall age distribution: p-value = 0.645 (as expected)
Overall age distribution for boys: p-value = 0.206 (as expected)
Overall age distribution for girls: p-value = 0.379 (as expected)
Overall sex/age distribution: p-value = 0.024 (significant difference)

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

Team: 1

```
Time                                    SD for WHZ
point               0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 1.70 (n=07, f=0)  ########################################
02: 1.25 (n=07, f=0)  ###################
03: 0.65 (n=07, f=0)
04: 1.14 (n=07, f=0)  ##############
05: 0.54 (n=07, f=0)
06: 0.75 (n=07, f=0)
07: 1.13 (n=07, f=0)  ##############
08: 0.60 (n=07, f=0)
09: 1.04 (n=07, f=0)  ##########
10: 1.39 (n=07, f=0)  ########################
11: 0.77 (n=07, f=0)
12: 0.93 (n=06, f=0)  #####
13: 0.54 (n=06, f=0)
14: 1.21 (n=06, f=0)  #################
```

```
15: 0.65 (n=05, f=0)
16: 0.72 (n=04, f=0)
17: 0.72 (n=04, f=0)
18: 1.49 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOOOOOO
19: 0.21 (n=02, f=0)
20: 1.23 (n=02, f=0)  OOOOOOOOOOOOOOOOO
21: 0.42 (n=02, f=0)
22: 1.31 (n=02, f=0)  OOOOOOOOOOOOOOOOOOO
23: 1.35 (n=02, f=0)  OOOOOOOOOOOOOOOOOOOOO
```

(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: 0.73 (n=07, f=0)
02: 0.84 (n=07, f=0)  ##
03: 1.06 (n=07, f=0)  ###########
04: 0.89 (n=07, f=0)  ####
05: 0.76 (n=07, f=0)
06: 1.05 (n=07, f=0)  ###########
07: 1.17 (n=07, f=0)  ###############
08: 1.01 (n=07, f=0)  #########
09: 0.83 (n=07, f=0)  #
10: 0.73 (n=07, f=0)
11: 1.00 (n=06, f=0)  ########
12: 1.42 (n=06, f=0)  ##########################
13: 1.18 (n=06, f=1)  ################
14: 0.42 (n=05, f=0)
15: 2.32 (n=05, f=1)  ##################################################################
16: 1.14 (n=04, f=0)  ##############
17: 0.66 (n=04, f=0)
18: 1.24 (n=03, f=0)  OOOOOOOOOOOOOOOOO
19: 0.26 (n=03, f=0)
20: 0.93 (n=02, f=0)  OOOOO
21: 0.86 (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: 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: 1.40 (n=07, f=0)  ########################
02: 0.73 (n=07, f=0)
03: 0.84 (n=07, f=0)  ##
04: 0.94 (n=07, f=0)  ######
05: 1.70 (n=07, f=0)  ####################################
06: 1.29 (n=07, f=1)  ####################
07: 0.88 (n=07, f=0)  ###
08: 1.04 (n=07, f=0)  ##########
09: 0.75 (n=07, f=0)
10: 0.85 (n=07, f=0)  ##
11: 0.68 (n=07, f=0)
12: 0.98 (n=07, f=0)  ########
13: 0.50 (n=07, f=0)
14: 0.50 (n=07, f=0)
15: 0.87 (n=07, f=0)  ###
16: 1.09 (n=07, f=0)  ############
17: 0.99 (n=06, f=0)  ########
18: 0.84 (n=06, f=0)  ##
19: 1.16 (n=05, f=0)  ###############
20: 1.44 (n=05, f=0)  ############################
21: 0.64 (n=05, f=0)
22: 0.60 (n=04, f=0)
23: 0.86 (n=04, f=0)  OO
24: 1.18 (n=04, f=0)  OOOOOOOOOOOOOOO
25: 0.86 (n=02, f=0)  ~~~
```

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

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: 0.70 (n=07, f=0)
02: 0.67 (n=07, f=0)
03: 0.81 (n=07, f=0)  #
04: 1.09 (n=07, f=0)  ############
05: 1.14 (n=07, f=0)  ##############
06: 0.78 (n=07, f=0)
07: 1.17 (n=07, f=0)  ###############
08: 0.88 (n=07, f=0)  ###
```

```
09: 1.15 (n=07, f=0)  ###############
10: 0.79 (n=07, f=0)
11: 0.70 (n=07, f=0)
12: 1.18 (n=07, f=0)  ################
13: 1.01 (n=06, f=0)  #########
14: 1.16 (n=04, f=0)  OOOOOOOOOOOOOO
15: 0.80 (n=04, f=0)
16: 0.87 (n=03, f=0)  OOO
17: 0.33 (n=03, f=0)
18: 1.41 (n=03, f=0)  OOOOOOOOOOOOOOOOOOOOOOOO
```

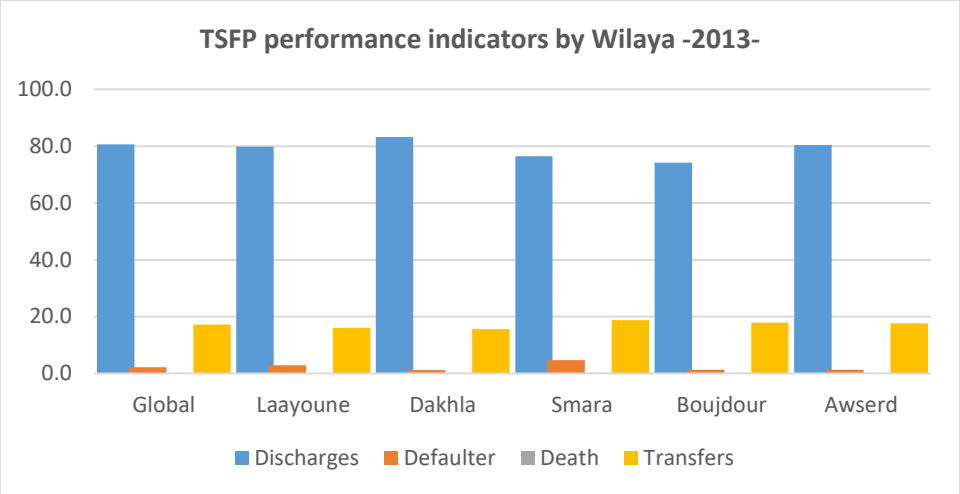
(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked "f" are the numbers of SMART flags found in the different time points)

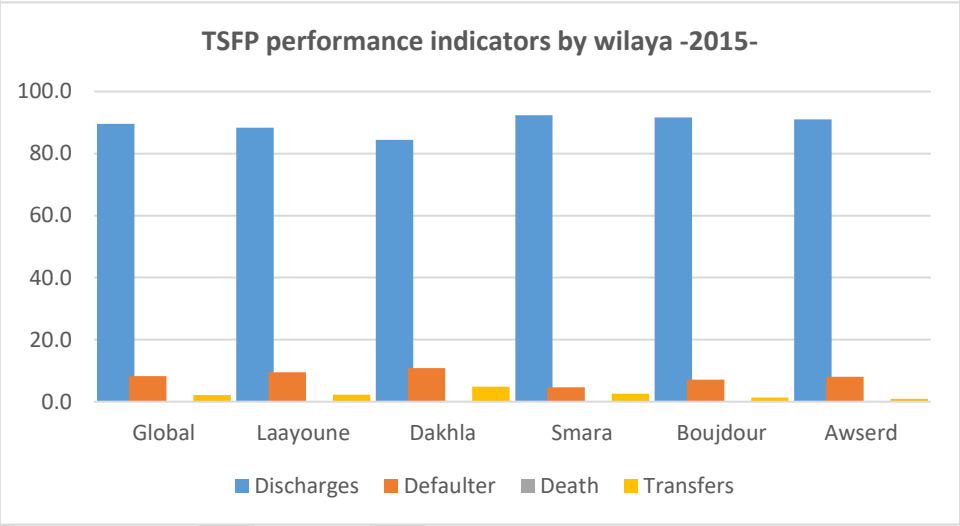
Team: 5

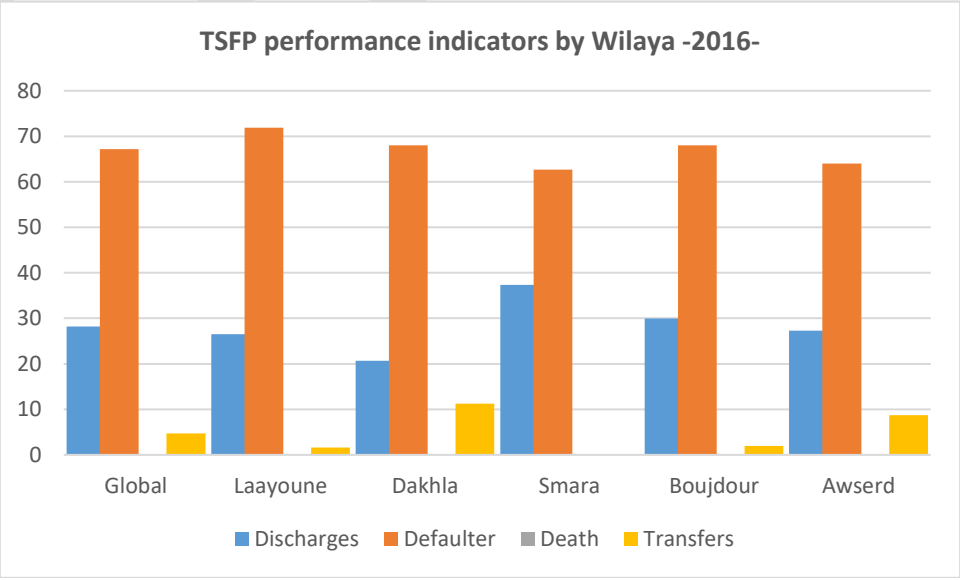
```
Time                                          SD for WHZ
point              0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
01: 0.75 (n=07, f=0)
02: 0.45 (n=07, f=0)
03: 0.85 (n=07, f=0)  ##
04: 1.04 (n=07, f=0)  ##########
05: 0.78 (n=07, f=0)
06: 1.17 (n=07, f=0)  ################
07: 0.69 (n=07, f=0)
08: 1.19 (n=07, f=0)  ################
09: 1.29 (n=07, f=0)  ####################
10: 0.68 (n=07, f=0)
11: 0.98 (n=07, f=0)  ########
12: 1.05 (n=06, f=0)  ###########
13: 0.99 (n=06, f=0)  ########
14: 0.92 (n=06, f=0)  #####
15: 0.85 (n=06, f=0)  ##
16: 0.74 (n=06, f=0)
17: 1.04 (n=04, f=0)  OOOOOOOOOO
18: 1.03 (n=03, f=0)  OOOOOOOOOO
19: 0.93 (n=03, f=0)  OOOOOO
20: 0.76 (n=03, f=0)
21: 1.63 (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)

Annex 9: TSFP Performance Indicators by Wilaya and year







Annex 10: Tables (A1 >--< A10) – Prevalence of malnutrition in children aged 6-59 months based on the 2006 WHO Growth Standards

Table A1. Prevalence of acute malnutrition in children aged 6-59 months, based on weight-for-height z-scores and/or oedema (WHO 2006 growth standards). Results are shown by Wilaya and sex

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
All	n	621	455	469	632	369	2,546
Prevalence of GAM	(n) %	(28) 4.5	(17) 3.7	(31) 6.6	(25) 4.0	(11) 3.0	(112) 4.7
(<-2 z-scores and/or oedema)	(95% C.I)	(2.7; 7.4)	(2.0; 6.8)	(4.2; 10.3)	(3.0; 5.1)	(1.7; 5.3)	(3.7; 5.8)
Prevalence of MAM	(n) %	(24) 3.9	(16) 3.5	(28) 6.0	(23) 3.6	(9) 2.4	(100) 4.2
(<-2 and ≥-3 z-scores, no oedema)	(95% C.I)	(2.3; 6.5)	(1.9; 6.5)	(3.7; 9.5)	(2.7; 4.9)	(1.3; 4.6)	(3.3; 5.2)
Prevalence of SAM	(n) %	(4) 0.6	(1) 0.2	(3) 0.6	(2) 0.3	(2) 0.5	(14) 0.5
(<-3 z-score and/or oedema	(95% C.I)	(0.2; 1.7)	(0.1; 1.3)	(0.2; 1.9)	(0.1; 1.3)	(0.1; 3.7)	(0.3; 0.9)
Oedema prevalence	(n) %	(2) 0.3	(0) 0.0	(0) 0.0	(0) 0.0	(2) 0.5	(4) 0.1
Boys	n	329	235	241	326	168	1,299
Prevalence of GAM	(n) %	(19) 5.8	(4) 1.7	(19) 7.9	(15) 4.6	(5) 3.0	(62) 5.3
(<-2 z-scores and/or oedema)	(95% C.I)	(3.2; 10.2)	(0.5; 5.4)	(5.1; 12.0)	(3.2; 6.7)	(1.3; 6.5)	(4.1; 6.8)
Prevalence of MAM	(n) %	(17) 5.2	(4) 1.7	(17) 7.1	(13) 4.0	(4) 2.4	(55) 4.7
(<-2 and ≥-3 z-scores, no oedema)	(95% C.I)	(2.7; 9.6)	(0.5; 5.4)	(4.4; 11.1)	(2.6; 6.0)	(0.9; 5.9)	(3.6; 6.2)
Prevalence of SAM	(n) %	(2) 0.6	(0) 0.0	(2) 0.8	(2) 0.6	(1) 0.6	(7) 0.6
(<-3 z-score and/or oedema	(95% C.I)	(0.2; 2.4)	N/A	(0.2; 3.2)	(0.2; 2.4)	(0.1; 4.0)	(0.3; 1.3)
Girls	n	292	220	228	306	201	1,247
Prevalence of GAM	(n) %	(9) 3.1	(13) 5.9	(12) 5.3	(10) 3.3	(6) 3.0	(50) 4.0
(<-2 z-scores and/or oedema)	(95% C.I)	(1.6; 5.7)	(3.3; 10.5)	(2.7; 10.1)	(1.8; 5.8)	(1.3; 6.8)	(2.9; 5.4)
Prevalence of MAM	(n) %	(7) 2.4	(12) 5.5	(11) 4.8	(10) 3.3	(5) 2.5	(45) 3.6
(<-2 and ≥-3 z-scores, no oedema)	(95% C.I)	(1.3; 4.5)	(3.0; 9.8)	(2.3; 9.7)	(1.8; 5.8)	(0.9; 6.5)	(2.6; 5.0)
Prevalence of SAM	(n) %	(2) 0.7	(1) 0.5	(1) 0.4	(0) 0.0	(1) 0.5	(5) 0.4
(<-3 z-score and/or oedema	(95% C.I)	(0.2; 2.6)	(0.1; 3.1)	(0.1; 3.1)	N/A	(0.1; 3.4)	(0.1; 0.9)

1. Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A2. Prevalence of acute malnutrition by age in children aged 6-59 months, based on weight-for-height z-scores and/or oedema (WHO 2006 growth standards). Weighted results (5 Wilayas).

Age	Total	SAM (<-3 z-scores and/or oedema)		MAM (≥-3 and <-2 z-scores)		GAM (≥-2 z-scores and/or oedema)		Oedema	
months	No.	No.	%	No.	%	No.	%	No.	%
6 - 17	570	3	0.6	25	5.0	28	5.6	1	0.2
18 - 29	487	3	0.4	11	2.2	14	2.7	1	0.1
30 - 41	544	1	0.1	17	2.8	18	2.9	1	0.1
42 - 53	516	3	0.6	24	4.6	27	5.2	1	0.2
54 - 59	429	2	0.7	23	6.6	25	7.3	0	0.0
Total	2,546	12	0.5	100	4.2	112	4.7	6	0.1

Table A3. Prevalence of low MUAC in children aged 6-59 months. Results are shown by Wilaya

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
All	n	627	463	476	635	372	2,573
Prevalence of MUAC <125mm and/or oedema	(n) %	(26) 4.1	(18) 3.9	(14) 2.9	(22) 3.5	(13) 3.5	(93) 3.5
	(95% C.I)	(2.8; 6.2)	(2.5; 6.1)	(1.7; 4.9)	(2.5; 4.8)	(1.9; 6.3)	(2.9; 4.3)
Prevalence of MUAC<125mm and ≥115mm, no oedema	(n) %	(23) 3.7	(15) 3.2	(13) 2.7	(19) 3.0	(10) 2.7	(80) 3.1
	(95% C.I)	(2.3; 5.7)	(1.9; 5.5)	(1.6; 4.5)	(2.1; 4.3)	(1.5; 4.9)	(2.5; 3.8)
Prevalence of MUAC <115mm and or oedema	(n) %	(3) 0.5	(3) 0.6	(1) 0.2	(3) 0.5	(3) 0.8	(10) 0.5
	(95% C.I)	(0.2; 1.5)	(0.2; 2.0)	(0.0; 1.5)	(0.2; 1.4)	(0.1; 5.4)	(0.2; 0.8)

1. Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A4. Prevalence of low MUAC in children aged 6-59 months, by age based on MUAC. Weighted results (5 Wilayas)

Age	Total	<115mm and or oedema		<125mm and ≥115mm		<125mm and/or oedema	
months	No.	No.	%	No.	%	No.	%
6 - 17	574	8	1.5	63	10.6	71	12.0
18 - 29	492	3	0.3	8	1.7	11	2.0
30 - 41	551	1	0.1	6	1.1	7	1.2
42 - 53	523	1	0.2	2	0.5	3	0.7
54 - 59	433	0	0.0	1	0.3	1	0.3
Total	2,573	13	3.1	80	0.5	93	3.5

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

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[2]
All	n	620	459	468	633	370	2,550
Prevalence of underweight	(n) %	(54) 8.7	(51) 11.1	(57) 12.2	(67) 10.6	(23) 6.2	(252) 10.3
(<-2 z-scores)	(95% C.I)	(6.7; 11.2)	(8.2; 14.9)	(9.5; 15.4)	(8.3; 13.4)	(4.0; 9.5)	(9.0; 11.6)
Prevalence of moderate underweight	(n) %	(38) 6.1	(34) 7.4	(40) 8.5	(47) 7.4	(16) 4.3	(175) 7.2
(<-2 and ≥-3 z-scores)	(95% C.I)	(4.4; 8.5)	(5.4; 10.1)	(6.3; 11.5)	(5.5; 9.9)	(2.7; 6.9)	(6.1; 8.4)
Prevalence of severe underweight	(n) %	(16) 2.6	(17) 3.7	(17) 3.6	(20) 3.2	(7) 1.9	(77) 3.1
(<-3 z-score)	(95% C.I)	(1.5; 4.3)	(2.1; 6.3)	(2.2; 5.9)	(2.1; 4.8)	(1.0; 3.6)	(2.4; 3.9)
Boys	n	326	240	241	326	169	1,302
Prevalence of underweight	(n) %	(30) 9.2	(31) 12.9	(32) 13.3	(39) 12.0	(7) 4.1	(139) 11.2
(<-2 z-scores)	(95% C.I)	(6.3; 13.3)	(9.4; 17.5)	(9.6; 18.1)	(8.4; 16.8)	(2.1; 8.0)	(9.3; 13.4)
Prevalence of moderate underweight	(n) %	(19) 5.8	(17) 7.1	(23) 9.5	(26) 8.0	(4) 2.4	(89) 7.4
(<-2 and ≥-3 z-scores)	(95% C.I)	(3.4; 9.9)	(4.9; 10.2)	(6.4; 14.0)	(5.2; 11.9)	(0.9; 6.0)	(5.9; 9.2)
Prevalence of severe underweight	(n) %	(11) 3.4	(14) 5.8	(9) 3.7	(13) 4.0	(3) 1.8	(50) 3.8
(<-3 z-score)	(95% C.I)	(1.8; 6.4)	(3.4; 9.9)	(2.0; 7.0)	(2.5; 6.4)	(0.6; 5.2)	(2.9; 5.1)
Girls	n	294	219	227	307	201	1,248
Prevalence of underweight	(n) %	(24) 8.2	(20) 9.1	(25) 11.0	(28) 9.1	(16) 8.0	(113) 9.3
(<-2 z-scores)	(95% C.I)	(5.8; 11.4)	(5.5; 14.8)	(7.5; 16.0)	(6.2; 13.2)	(5.0; 12.5)	(7.6; 11.2)
Prevalence of moderate underweight	(n) %	(19) 6.5	(17) 7.8	(17) 7.5	(21) 6.8	(12) 6.0	(86) 6.9
(<-2 and ≥-3 z-scores)	(95% C.I)	(4.1; 10.1)	(4.7; 12.5)	(4.8; 11.4)	(4.4; 10.4)	(3.6; 9.8)	(5.6; 8.6)
Prevalence of severe underweight	(n) %	(5) 1.7	(3) 1.4	(8) 3.5	(7) 2.3	(4) 2.0	(27) 2.3
(<-3 z-score)	(95% C.I)	(0.7; 3.9)	(0.4; 4.2)	(1.6; 7.7)	(1.0; 5.1)	(0.8; 5.0)	(1.5; 3.6)

1. 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, based on weight-for-age z-scores (WHO references). Weighted results (4 Wilayas).

Age	Total	Severe underweight (<-3 z-scores)		Moderate underweight (≥-3 and <-2 z-scores)		Underweight (<-2 z-scores)	
months	No.	No.	%	No.	%	No.	%
6 - 17	565	17	3.5	77	8.3	61	11.8
18 - 29	488	29	5.9	20	3.9	49	9.9
30 - 41	546	13	2.2	37	6.4	50	8.6
42 - 53	521	12	2.3	41	8.1	53	10.4
54 - 59	430	6	1.3	33	9.2	39	10.5
Total	2,550	77	3.1	175	7.2	252	10.3

Table A7. Prevalence of overweight in children aged 6-59 months, based on weight-for-height z-scores (WHO 2006 growth standards). Results are shown by Wilaya and sex

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
Prevalence of overweight (>2 z-scores)	n	621	455	469	632	369	2,546
All	(n) %	(9) 1.5	(9) 2.0	(4) 0.9	(9) 1.4	(5) 1.4	(36) 1.3
	(95% C.I)	(0.8; 2.8)	(1.1; 3.4)	(0.3; 2.2)	(0.8; 2.5)	(0.6; 3.1)	(1.0; 1.9)
Boys	(n) %	(6) 1.8	(5) 2.1	(2) 0.8	(6) 1.8	(3) 1.8	(22) 1.6
	(95% C.I)	(0.8; 4.3)	(0.9; 4.7)	(0.2; 3.2)	(0.9; 3.8)	(0.6; 5.4)	(1.0; 2.5)
Girls	(n) %	(3) 1.0	(4) 1.8	(2) 0.9	(3) 1.0	(2) 1.0	(14) 1.1
	(95% C.I)	(0.4; 3.0)	(0.8; 4.3)	(0.2; 3.5)	(0.3; 2.9)	(0.3; 3.8)	(0.6; 1.8)

1. 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, based on height-for-age z-scores and by sex (WHO 2006 growth standards). Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
All		608	449	462	621	367	2,507
Prevalence of stunting	(n) %	(117) 19.2	(90) 20.0	(97) 21.0	(106) 17.1	(50) 13.6	(485) 18.6
(<-2 z-scores)	(95% C.I)	(15.7; 23.4)	(16.2; 24.5)	(16.7; 26.1)	(14.0; 20.7)	(10.3; 17.8)	(16.8; 20.6)
Prevalence of moderate stunting	(n) %	(88) 14.5	(62) 13.8	(74) 16.0	(79) 12.7	(39) 10.6	(342) 13.9
(<-2 and ≥-3 z-scores)	(95% C.I)	(11.1; 18.6)	(10.8; 17.5)	(12.0; 21.1)	(10.3; 15.7)	(7.6; 14.6)	(12.3; 15.8)
Prevalence of severe stunting	(n) %	(29) 4.8	(28) 6.2	(23) 5.0	(27) 4.3	(11) 3.0	(118) 4.7
(<-3 z-score	(95% C.I)	(3.3; 6.8)	(4.2; 9.1)	(3.3; 7.5)	(2.9; 6.5)	(1.6; 5.4)	(3.8; 5.7)
Boys		317	232	242	320	167	1,278
Prevalence of stunting	(n) %	(71) 22.4	(49) 21.1	(60) 24.8	(63) 19.7	(21) 12.6	(264) 21.3
(<-2 z-scores)	(95% C.I)	(17.4; 28.3)	(16.2; 27.0)	(19.0; 31.6)	(15.4; 24.8)	(7.9; 19.5)	(18.7; 24.1)
Prevalence of moderate stunting	(n) %	(58) 18.3	(30) 12.9	(44) 18.2	(47) 14.7	(15) 9.0	(194) 15.9
(<-2 and ≥-3 z-scores)	(95% C.I)	(14.0; 23.6)	(9.4; 17.6)	(12.9; 24.9)	(11.3; 18.8)	(5.5; 14.4)	(13.7; 18.4)
Prevalence of severe stunting	(n) %	(13) 4.1	(19) 8.2	(16) 6.6	(16) 5.0	(6) 3.6	(70) 5.4
(<-3 z-score	(95% C.I)	(2.4; 6.9)	(5.2; 12.6)	(4.0; 10.7)	(2.9; 8.4)	(1.5; 8.3)	(4.2; 7.0)
Girls		291	217	220	301	200	1,229
Prevalence of stunting	(n) %	(46) 15.8	(41) 18.9	(37) 16.8	(43) 14.3	(28) 14.5	(196) 15.8
(<-2 z-scores)	(95% C.I)	(12.1; 20.3)	(13.7; 25.5)	(11.6; 23.8)	(10.6; 18.9)	(10.2; 20.2)	(13.5; 18.3)
Prevalence of moderate stunting	(n) %	(30) 10.3	(32) 14.7	(30) 13.6	(32) 10.6	(24) 12.0	(148) 11.8
(<-2 and≥[3]-3 z-scores)	(95% C.I)	(7.3; 14.4)	(10.3; 20.6)	(8.8; 20.4)	(7.8; 14.4)	(7.9; 17.8)	(9.9; 14.1)
Prevalence of severe stunting	(n) %	(16) 5.5	(9) 4.1	(7) 3.2	(11) 3.7	(5) 2.5	(48) 3.9
(<-3 z-score	(95% C.I)	(3.3; 9.1)	(2.1; 8.0)	(1.5; 6.8)	(2.0; 6.5)	(1.1; 5.6)	(2.9; 5.3)

1. 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 age, based on height-for-age z-scores (WHO 2006 growth standards). Weighted results (4 Wilayas)

Age	Total	Severe stunting (<-3 z-scores)		Moderate stunting (≥-3 and <-2 z-scores)		Stunting (<-2 z-scores)	
months	No.	No.	%	No.	%	No.	%
6 - 17	553	26	4.6	77	13.4	103	18.0
18 - 29	473	38	8.2	85	19.0	123	27.1
30 - 41	543	28	5.0	83	16.1	111	21.1
42 - 53	509	15	3.1	56	10.6	71	13.7
54 - 59	429	11	2.4	41	10.0	52	12.4
Total	2,507	118	4.7	342	13.9	460	18.6

Table A10. Mean z-score values (WHO 2006 growth standards) in children aged 6-59 months, design effects and included and excluded subjects

Indicator	Wilaya	Available	Mean z-scores ± S.D.	Design Effect (z-score < -2)	z-scores not available	z-scores out of range
Weight-for-Height	Awserd	619	-0.22±1.01	1.84	3	6
	Dakhla	455	-0.24±1.28	0.97	0	8
	Laayoune	469	-0.32±0.87	2.32	1	6
	Smara	632	-0.23±0.84	0.62	1	3
	Boujdour	367	-0.11±1.35	0.51	6	3
	Aggregated	2,542	-0.24±0.99	1.52	11	26
Weight-for-Age	Awserd	620	-0.77±0.94	0.97	1	7
	Dakhla	459	-0.84±1.20	0.77	0	4
	Laayoune	468	-0.87±0.83	1.31	1	7
	Smara	633	-0.78±0.84	1.51	1	2
	Boujdour	370	-0.62±1.26	0.60	3	3
	Aggregated	2,550	-0.79±0.95	1.22	6	23
Height-for-Age	Awserd	608	-1.14±1.05	1.45	1	19
	Dakhla	449	-1.21±1.31	0.73	0	14
	Laayoune	462	-1.18±0.92	2.14	1	13
	Smara	621	-1.13±0.88	1.72	1	14
	Boujdour	367	-1.00±1.37	0.58	4	5
	Aggregated	2,507	-1.14±1.03	1.60	7	65

Annex 11: Tables (A11-A12) – Prevalence of IYCF indicators

Table A11. Prevalence of selected Infant and Young Child Feeding Practices indicators. Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
Children aged <24 months	N	256	186	208	253	163	1,066
Children ever breastfed	(n) %	(237) 92.6	(183) 98.4	(183) 88.0	(235) 92.9	(156) 95.7	(994) 92.3
	95% CI	(88.1; 95.5)	(93.4; 99.6)	(80.8; 92.7)	(87.1; 96.2)	(90.0; 98.2)	(89.7; 94.3)
Early initiation of breastfeeding	(n) %	(166) 64.8	(97) 52.2	(118) 56.7	(123) 48.6	(82) 50.3	(586) 55.1
	95% CI	(51.7; 76.1)	(36.4; 67.4)	(43.4; 69.2)	(36.5; 60.9)	(35.8; 64.8)	(48.6; 61.4)
Age-appropriate breastfeeding	(n) %	(146) 57.0	(118) 63.4	(103) 49.5	(150) 59.3	(91) 55.8	(608) 56.3
	95% CI	(50.0; 63.8)	(55.6; 70.6)	(42.7; 56.4)	(51.4; 66.7)	(48.2; 63.2)	(52.7; 59.9)
Bottle-feeding	(n) %	(67) 26.3	(30) 16.1	(53) 25.5	(55) 21.7	(48) 29.6	(253) 23.8
	95% CI	(18.5; 35.9)	(10.9; 23.2)	(18.8; 33.6)	(15.1; 30.1)	(22.2; 38.3)	(20.2; 27.8)
Children aged 6-23 months	N	201	124	161	206	129	821
Minimum dietary diversity	(n) %	(72) 35.8	(27) 21.8	(48) 29.8	(76) 36.9	(40) 31.0	(263) 33.0
	95% CI	(25.7; 47.4)	(13.1; 33.9)	(20.5; 41.2)	(27.3; 47.6)	(20.2; 44.5)	(27.9; 38.5)
Minimum meal frequency	(n) %	(108) 53.7	(58) 46.8	(66) 41.0	(92) 44.7	(62) 48.1	(386) 46.3
	95% CI	(43.4; 63.7)	(36.3; 57.6)	(30.0; 53.0)	(33.1; 56.9)	(35.9; 60.4)	(40.6; 52.2)
Minimum acceptable diet	(n) %	(31) 15.4	(13) 10.5	(23) 14.3	(26) 12.6	(17) 13.2	(110) 13.6
	95% CI	(9.8; 23.4)	(5.0; 20.6)	(8.3; 23.5)	(7.0; 21.8)	(7.4; 22.5)	(10.3; 17.6)
Consumption of iron-rich or iron-fortified foods	(n) %	(64) 31.8	(28) 22.6	(45) 28.0	(61) 29.6	(38) 29.5	(236) 29.1
	95% CI	(24.5; 40.3)	(14.9; 32.8)	(19.6; 38.2)	(23.4; 36.7)	(20.3; 40.6)	(25.3; 33.2)

1. Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A12. Timing for breastfeeding initiation among children aged <24 months. Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
Children aged <24 months	N	256	186	208	253	163	1,066
<1 hour after birth	(n) %	(166) 64.8	(97) 52.2	(118) 56.7	(123) 48.6	(82) 50.3	(586) 55.1
	95% CI	(51.7; 76.1)	(36.4; 67.5)	(43.4; 69.2)	(36.5; 60.9)	(35.8; 64.8)	(48.6; 61.4)
1-23 hours after birth	(n) %	(26) 10.2	(61) 32.8	(37) 17.8	(62) 24.5	(34) 20.9	(220) 19.9
	95% CI	(5.7; 17.6)	(21.0; 47.3)	(11.0; 27.4)	(16.8; 34.3)	(13.8; 30.2)	(16.1; 24.3)
>24 hours after birth	(n) %	(45) 17.6	(25) 13.4	(23) 11.1	(41) 16.2	(37) 22.7	(171) 15.4
	95% CI	(8.9; 31.9)	(5.8; 28.1)	(6.6; 18.0)	(8.4; 29.0)	(11.8; 39.3)	(11.2; 20.8)
No breastfeeding	(n) %	(19) 7.4	(3) 1.6	(25) 12.0	(18) 7.1	(7) 4.3	(72) 7.7
	95% CI	(4.5; 11.9)	(0.4; 6.6)	(7.3; 19.2)	(3.8; 12.9)	(1.8; 10.0)	(5.7; 10.3)

1. Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Annex 12: Tables (A13 --- A17) – Prevalence of anaemia in children aged 6-59 months and women of childbearing age (15-49 years)

Table A13. Prevalence of anaemia in children aged 6-59 months. Results are shown by Wilaya and by age groups.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
All	n	625	461	476	632	370	2,564
Total Anaemia	(n) %	(258) 41.3	(221) 47.9	(203) 42.6	(209) 33.1	(109) 29.5	(1,000) 38.7
(Hb < 11.0 g/dL)	95% CI	(37.7; 45.0)	(41.9; 54.1)	(36.5; 49.0)	(28.9; 37.5)	(23.8; 35.8)	(36.3; 41.2)
Mild Anaemia	(n) %	(134) 21.4	(111) 24.1	(96) 20.2	(101) 16.0	(54) 14.6	(496) 19.1
(Hb 10.0-10.9 g/dL)	95% CI	(18.3; 24.9)	(19.4; 29.5)	(16.3; 34.7)	13.4; 19.0)	(10.7; 19.6)	(17.4; 20.9)
Moderate Anaemia	(n) %	(115) 18.4	(102) 22.1	(99) 20.8	(107) 16.9	(52) 14.1	(475) 18.6
(Hb 7.0-9.9 g/dL)	95% CI	(16.0; 21.1)	(17.5; 27.5)	(16.3; 26.2)	(13.8; 20.6)	(11.1; 17.6)	(16.8; 20.5)
Severe Anaemia	(n) %	(9) 1.4	(8) 1.7	(8) 1.7	(1) 0.2	(3) 0.8	(29) 1.1
(Hb <7.0 g/dL)	95% CI	(0.7; 3.0)	(0.9; 3.2)	(0.7; 4.2)	(0.0; 1.1)	(0.3; 2.5)	(0.7; 1.7)
Boys	n	330	240	244	325	169	1,308
Total Anaemia	(n) %	(145) 43.9	(128) 53.3	(113) 46.3	(113) 34.8	(55) 32.5	(554) 41.7
(Hb < 11.0 g/dL)	95% CI	(38.9; 49.1)	(47.0; 59.6)	(38.5; 54.3)	(29.5; 40.5)	(24.1; 42.3)	(38.6; 44.9)
Mild Anaemia	(n) %	(73) 22.1	(67) 27.9	(43) 17.6	(53) 16.3	(21) 12.4	(257) 19.0
(Hb 10.0-10.9 g/dL)	95% CI	(17.9; 27.0)	(21.2; 35.8)	(13.5; 22.7)	(13.1; 20.1)	(7.3; 20.3)	(17.0; 21.3)
Moderate Anaemia	(n) %	(67) 20.3	(54) 22.5	(66) 27.0	(59) 18.2	(31) 18.3	(277) 21.4
(Hb 7.0-9.9 g/dL)	95% CI	(17.0; 24.1)	(17.1; 29.0)	(20.6; 34.6)	(14.0; 23.2)	(13.4; 24.6)	(18.9; 24.1)
Severe Anaemia	(n) %	(5) 1.5	(7) 2.9	(4) 1.6	(1) 0.3	(3) 1.8	(20) 1.3
(Hb <7.0 g/dL)	95% CI	(0.5; 4.2)	(1.5; 5.6)	(0.5; 5.1)	(0.0; 2.1)	(0.6; 5.4)	(0.8; 2.2)
Girls	n	295	221	232	307	201	1,256
Total Anaemia	(n) %	(113) 38.3	(93) 42.1	(90) 38.8	(96) 31.3	(54) 26.9	(446) 35.5
(Hb < 11.0 g/dL)	95% CI	(33.5; 43.3)	(34.3; 50.3)	(32.4; 45.6)	(26.6; 36.4)	(20.2; 34.8)	(32.8; 38.4)
Mild Anaemia	(n) %	(61) 20.7	(44) 19.9	(53) 22.8	(48) 15.6	(33) 16.4	(137)19.1
(Hb 10.0-10.9 g/dL)	95% CI	(16.8; 25.2)	(14.7; 26.4)	(17.2; 29.7)	(12.0; 20.1)	(11.2; 23.5)	(16.8; 21.7)
Moderate Anaemia	(n) %	(48) 16.3	(48) 21.7	(33) 14.2	(48) 15.6	(21) 10.4	(99) 15.6
(Hb 7.0-9.9 g/dL)	95% CI	(12.2; 21.4)	(16.3; 28.3)	(10.0; 19.9)	(11.8; 20.4)	(6.4; 16.6)	(13.5; 18.1)
Severe Anaemia	(n) %	(4) 1.4	(1) 0.5	(4) 1.7	(0) 0.0	(0) 0.0	(4) 0.8
(Hb <7.0 g/dL)	95% CI	(0.4; 4.1)	(0.1; 3.3)	(0.5; 5.5)	N/A	N/A	(0.4; 1.8)

1. Aggregated prevalence results are weighted based on the estimated total population used for the cluster allocation.

Table A14. Mean values of haemoglobin in children aged 6-59 months

Wilaya	n	Mean values	95% CI	Design Effect (Hb < 11g/dL)
Awserd	625	11.1	11.0; 11.2	0.88
Dakhla	461	10.9	10.7; 11.1	1.04
Laayoune	476	11.0	10.8; 11.3	2.66
Smara	632	11.3	11.2; 11.5	1.84
Boujdour	370	11.5	11.3; 11.7	0.84
Aggregated[1]	2,564	11.2	11.1; 11.3	1.71

Table A15. Prevalence of anaemia in non-pregnant women of reproductive age (15-49 years) by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
Sample size		792	786	568	734	599	3,479
Total Anaemia	(n) %	(410) 51.8	(371) 47.2	(277) 48.8	(287) 39.1	(215) 35.9	(1,560) 45.2
(Hb < 12.0 g/dL)	95% CI	(46.1; 57.4)	(42.8; 51.7)	(43.5; 54.0)	(35.6; 42.8)	(30.5; 41.6)	(42.6; 47.4)
Mild Anaemia	(n) %	(155) 19.6	(156) 19.8	(85) 15.0	(111) 15.1	(92) 15.4	(599) 16.8
(Hb 11.0-11.9 g/dL)	95% CI	(15.5; 24.4)	(17.2; 22.8)	(11.9; 18.7)	(13.0; 17.5)	(12.4; 18.9)	(15.3; 18.4)
Moderate Anaemia	(n) %	(206) 26.0	(185) 23.5	(153) 26.9	(147) 20.0	(101) 16.9	(792) 23.2
(Hb 8.0-10.9 g/dL)	95% CI	(22.7; 29.6)	(19.6; 28.0)	(22.5; 31.9)	(17.2; 23.2)	(13.2; 21.4)	(21.5; 25.1)
Severe Anaemia	(n) %	(49) 6.2	(30) 3.8	(39) 6.9	(29) 4.0	(22) 3.7	(169) 5.1
(Hb <8.0 g/dL)	95% CI	(4.4; 8.6)	(2.6; 5.6)	(5.3; 8.8)	(2.9; 5.3)	(2.4; 5.6)	(4.4; 5.9)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A16. Prevalence of anaemia in pregnant & lactating women (15-49 years)

		Pregnant*	Lactating
	n	331	249
Total Anaemia	(n) %	(197) 59.8	(182) 72.0
(Hb < 11.0 g/dL)	95% CI	(54.3; 65.0)	(65.5; 77.7)
Mild Anaemia	(n) %	(68) 19.9	(40) 15.3
(Hb 10.0-10.9 g/dL)	95% CI	(16.0; 24.4)	(11.5; 20.1)
Moderate Anaemia	(n) %	(111) 34.1	(113) 45.0
(Hb 7.0-9.9 g/dL)	95% CI	(29.4; 39.1)	(38.5; 51.5)
Severe Anaemia	(n) %	(18) 5.8	(29) 11.7
(Hb <7.0 g/dL)	95% CI	(3.8; 9.0)	(7.9; 16.9)

* 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. See Annex xx for the survey questionnaires.

Table A17. Mean values of haemoglobin in women of childbearing age (15-49 years)

Wilaya	Sample size	Mean values	95% CI	Design Effect (Hb < 11g/dL)
Awserd	792	11.6	11.4; 11.9	2.74
Dakhla	786	11.9	11.7; 12.1	0.99
Laayoune	568	11.5	11.3; 11.8	2.30
Smara	734	12.0	11.9; 12.2	1.46
Boujdour	599	12.3	12.1; 12.5	1.12
Aggregated	3,479	11.8	11.7; 11.9	1.84
Lactating	331	10.4	10.1; 10.7	1.14
Pregnant	249	10.3	10.0; 10.5	1.03

Annex 13: Tables (A18-A19) Prevalence of underweight, overweight and obesity in non-pregnant non-lactating women of reproductive age (15-49 years)

Table A18. Prevalence of underweight, low MUAC, overweight and obesity in non-pregnant non-lactating women of reproductive age (15-49 years) by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
Body Mass Index							
Sample size	N	733	724	520	685	563	3,225
Underweight	(n) %	(29) 4.0	(35) 4.8	(16) 3.1	(24) 3.5	(12) 2.1	(116) 3.6
(BMI <18.5 kg/m^2)	95% CI	(2.6; 6.0)	(3.3; 7.0)	(2.0; 4.8)	(2.0; 6.1)	(1.2; 3.8)	(2.8; 4.5)
Overweight	(n) %	(262) 35.7	(236) 32.6	(192) 36.9	(255) 37.2	(222) 39.4	(1,167) 36.4
(BMI ≥25 but <30 kg/m^2)	95% CI	(32.6; 39.0)	(29.0; 36.4)	(32.7; 41.3)	(34.1; 40.5)	(35.7; 43.3)	(34.7; 38.1)
Obesity	(n) %	(216) 29.5	(239) 33.0	(138) 26.5	(219) 32.0	(203) 36.1	(1,015) 30.7
(BMI ≥30 kg/m^2)	95% CI	(25.4; 33.9)	(28.2; 38.2)	(23.2; 30.2)	(27.4; 36.9)	(30.8; 41.7)	(28.6; 32.8)
Overweight + Obesity	(n) %	(478) 65.2	(475) 65.6	(330) 63.5	(474) 69.2	(425) 75.5	(2,182) 67.0
(BMI ≥25 kg/m^2)	95% CI	(61.5; 68.7)	(61.0; 69.9)	(58.1; 68.5)	(64.9; 73.2)	(70.8; 79.6)	(64.9; 69.1)
MUAC							
Sample size	N	733	725	521	685	564	3,228
Low MUAC	(n) %	(33) 4.5	(35) 4.8	(26) 5.0	(30) 4.4	(6) 1.1	(130) 4.3
(MUAC <23cm)	95% CI	(3.1; 6.5)	(3.4; 6.8)	(3.3; 7.4)	(2.7; 7.0)	(0.5; 2.3)	(3.5; 5.3)

[1] Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A19. Prevalence of metabolic risk by central obesity in non-pregnant non-lactating women of reproductive age (15-49 years) by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
Sample size		733	724	518	684	563	3,222
No risk	(n) %	(155) 21.1	(132) 18.2	(119) 23.0	(128) 18.7	(71) 12.6	(605) 19.6
(WC <80 cm)	95% CI	(17.6; 25.2)	(15.6; 21.1)	(18.4; 28.2)	(15.2; 22.8)	(9.7; 16.3)	(17.8; 21.6)
Increased risk	(n) %	(132) 18.0	(133) 18.4	(104) 20.1	(144) 21.1	(91) 16.2	(604) 19.3
(WC ≥80 but <88 cm)	95% CI	(15.0; 21.5)	(14.7; 22.8)	(16.5; 24.2)	(17.7; 24.9)	(12.9; 20.0)	(17.6; 21.1)
Very increased risk	(n) %	(446) 60.8	(459) 63.4	(295) 56.9	(412) 60.2	(401) 71.2	(2,013) 61.1
(WC ≥88 cm)	95% CI	(55.6; 65.8)	(57.9; 68.6)	(50.6; 63.1)	(56.1; 64.2)	(65.6; 76.3)	(58.7; 63.5)

[1] Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Annex 14: (Tables A20---A23). Food security indicators. Analysis

Table A20. Household food consumption score prevalence. Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
	n	415	417	413	414	407	2,066
Acceptable	(n) %	(342) 82.4	(352) 84.4	(289) 70.0	(355) 85.7	(373) 91.6	(1,711) 81.1
FCS >42	95% CI	(73.9; 88.6)	(76.7; 89.9)	(59.7; 78.6)	(77.5; 91.3)	(86.7; 94.8)	(77.0; 84.5)
Borderline	(n) %	(72) 17.3	(63) 15.1	(117) 28.3	(59) 14.3	(34) 8.4	(345) 18.3
FCS 28.5 - 42	95% CI	(11.2; 25.9)	(9.9; 22.5)	(20.4; 37.9)	(8.7; 22.5)	(5.2; 13.3)	(15.0; 22.2)
Poor	(n) %	(1) 0.2	(2) 0.5	(7) 1.7	(0) 0.0	(0) 0.0	(10) 0.6
FCS 0-28	95% CI	(0.0; 1.7)	(0.1; 1.9)	(0.7; 4.1)	N/A	N/A	(0.3; 1.2)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A21. Household food security indicators mean values. Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
Household food consumption score (FCS)	n	415	417	413	414	407	2,066
(range 0 – 112)	mean	52.3	52.6	47.9	51.7	54.7	51.2
	95% CI	(50.1; 54.5)	(49.7; 55.5)	(45.9; 49.8)	(49.5; 53.8)	(52.6; 56.7)	(50.1; 52.2)
FCS-based dietary diversity score	n	415	417	413	414	407	2,066
(range 0 – 7)	mean	6.2	6.2	5.9	6.4	6.3	6.2
	95% CI	(6.1; 6.4)	(6.0; 6.3)	(5.8; 6.1)	(6.2; 6.5)	(6.2; 6.5)	(6.1; 6.3)
Household dietary diversity score	n	415	417	413	414	407	2,066
(range 0 – 12)	mean	7.3	7.1	7.2	7.2	7.4	7.2
	95% CI	(7; 7.5)	(6.8; 7.3)	(7.1; 7.4)	(6.9; 7.5)	(7.2; 7.5)	(7.1; 7.4)
Reduced coping strategies index	n	415	417	413	414	407	2,066
(range 0 – 56)	mean	7.4	3.1	10.5	9.5	4.7	8.0
	95% CI	(5.1; 9.7)	(2.7; 3.5)	(8.7; 12.3)	(8.0; 10.9)	(3.9; 5.4)	(7.2; 8.9)
Women dietary diversity score	n	872	834	649	811	661	3,827
(range 0 – 10)	mean	4.5	4.4	4.3	4.5	4.6	4.5
	95% CI	(4.4; 4.7)	(4.2; 4.6)	(4.1; 4.4)	(4.3; 4.7)	(4.4; 4.8)	(4.4; 4.5)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A22. Prevalence of minimum dietary diversity in women (MDD-W). Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
	n	872	834	649	811	661	3,827
MDD-W	(n) %	(425) 48.7	(334) 40.0	(239) 36.8	(356) 43.9	(322) 48.7	(1,676) 43.3
WDDS≥5	95% CI	(38.8; 58.8)	(30.6; 50.3)	(29.8; 44.4)	(35.0; 53.2)	(39.3; 58.2)	(39.0; 47.7)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.
WDDS: Women dietary diversity score (range 0-10).

Table A23. Proportion of households reporting using the following coping strategies over the past 7 days. Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
	n	415	417	413	414	407	2,066
Rely on less preferred and less expensive foods?	(n) %	(226) 54.5	(121) 29.0	(199) 48.2	(198) 47.8	(209) 51.4	(953) 47.4
	95% CI	(40.4; 67.8)	(18.7; 42.2)	(38.0; 58.5)	(35.9; 60.0)	(37.6; 64.9)	(41.6; 53.1)
Borrow food, or rely on help from a friend or relative?	(n) %	(344) 82.9	(312) 74.8	(348) 84.3	(348) 84.1	(323) 79.4	(1,675) 82.2
	95% CI	(74.3; 89.0)	(67.5; 81.0)	(77.8; 89.1)	(76.2; 89.7)	(72.6; 84.8)	(79.0; 85.1)
Limit portion size at mealtimes?	(n) %	(108) 26.0	(38) 9.1	(248) 60.1	(260) 62.8	(92) 22.6	(746) 43.6
	95% CI	(17.9; 36.3)	(5.5; 14.8)	(48.5; 70.6)	(50.1; 73.9)	(15.7; 31.5)	(38.5; 48.8)
Restrict consumption by adults in order for small children to eat?	(n) %	(79) 19.0	(34) 8.2	(166) 40.2	(195) 47.1	(43) 10.6	(517) 30.7
	95% CI	(11.5; 29.8)	(4.3; 14.9)	(31.2; 50.0)	(36.9; 57.5)	(5.9; 18.1)	(26.4; 35.4)
Reduce number of meals eaten in a day?	(n) %	(140) 33.7	(21) 5.0	(121) 51.3	(182) 44.0	(74) 18.2	(629) 36.4
	95% CI	(23.8; 45.3)	(2.4; 10.4)	(41.5; 61.0)	(32.2; 56.5)	(12.3; 26.1)	(31.5; 41.6)
No coping strategies reported	(n) %	(23) 5.5	(79) 18.9	(20) 4.8	(18) 4.4	(43) 10.6	(183) 7.2
	95% CI	(2.4; 12.4)	(13.7; 25.6)	(2.4; 9.7)	(1.8; 10.1)	(6.7; 16.4)	(5.5; 9.4)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Annex 15: Tables – Prevalence of non-communicable diseases

Table A24. Prevalence of non-communicable diseases and risk factors among adults aged 25-64 years. Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
Adults aged 25-64 years	N	1,556	1,604	1,294	1,540	1,525	7,519
Reported smoking	(n) %	(274) 17.2	(302) 19.0	(223) 17.2	(274) 17.9	(270) 18.6	(1,343) 17.8
	95% CI	(15.0; 19.4)	(16.8; 21.3)	(14.5; 19.9)	(15.7; 20.2)	(15.7; 21.6)	(16.6, 19.0)
Reported diabetes	(n) %	(114) 7.4	(71) 4.3	(80) 5.5	(97) 6.0	(83) 5.6	(445) 5.9
	95% CI	(5.2; 9.7)	(3.3; 5.4)	(3.5; 7.5)	(4.5; 7.4)	(4.5; 6.7)	(5.0; 6.8)
Reported raised cholesterol	(n) %	(14) 1.0	(10) 0.7	(26) 2.0	(13) 0.7	(12) 0.7	(75) 1.1
	95% CI	(0.2; 1.7)	(0.2; 1.2)	(0.8; 3.1)	(0.3; 1.2)	(0.2; 1.2)	(0.7; 1.5)
Reported raised blood pressure	(n) %	(108) 6.8	(107) 6.7	(75) 5.7	(120) 8.2	(83) 5.5	(493) 6.7
	95% CI	(5.3; 8.3)	(5.2; 8.3)	(3.3; 8.2)	(6.3; 10.1)	(4.5; 6.5)	(5.8; 7.7)
Households	n	415	417	413	414	407	2,066
With adults aged 25-64y who smokes	(n) %	(230) 55.4	(254) 60.9	(185) 44.8	(225) 54.3	(221) 54.3	(1,115) 52.7
	95% CI	(49.1; 61.6)	(55.9; 65.7)	(37.5; 52.3)	(47.7; 60.8)	(47.7; 60.8)	(49.5; 55.9)
With adults aged 25-64y with diabetes	(n) %	(111) 26.7	(69) 16.5	(70) 16.9	(90) 21.7	(79) 19.4	(419) 20.5
	95% CI	(20.7; 33.8)	(13.3; 20.4)	(12.1; 23.3)	(16.8; 27.7)	(16.0; 23.4)	(18.0; 23.3)
With adults aged 25-64y with high cholesterol	(n) %	(12) 2.9	(10) 2.4	(25) 6.1	(13) 3.1	(12) 2.9	(72) 3.8
	95% CI	(1.5; 5.6)	(1.2; 4.7)	(3.5; 10.4)	(1.7; 5.8)	(1.5; 5.7)	(2.8; 5.2)
With adults aged 25-64y with raised blood pressure	(n) %	(107) 25.8	(105) 25.2	(72) 17.4	(114) 27.5	(83) 20.4	(481) 23.3
	95% CI	(21.3; 30.9)	(20.4; 30.6)	(11.4; 25.7)	(21.4; 34.7)	(17.0; 24.2)	(20.4; 26.4)
With adults aged 25-64y with any reported NCDs	(n) %	(190) 45.8	(167) 40.0	(137) 33.2	(174) 42.0	(146) 35.9	(493) 39.4
	95% CI	(38.0; 53.8)	(34.8; 45.6)	(23.9; 43.9)	(34.8; 49.6)	(30.8; 41.3)	(35.5; 43.5)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Annex 16: Tables (A25--- A27). Prevalence of diarrhoea and feeding behaviours

Table A25. Prevalence of diarrhoea in children aged <5 years. Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
	N	680	524	516	686	407	2,812
Presented diarrhoea in the last 2-weeks	(n) %	(88) 12.9	(76) 14.5	(79) 15.3	(102) 14.9	(67) 16.5	(412) 14.6
	95% CI	(10.6; 15.7)	(10.8; 19.1)	(12.0; 19.4)	(12.0; 18.3)	(12.7; 21.1)	(13.1; 16.3)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A26. Prevalence of diarrhoea in children aged <5 years. Results are shown by age group.

		<6 months	6-17 months	18-29 months	30-41 months	42-53 months	54-59 months
Presented diarrhoea in the last 2-weeks	N	245	576	489	550	521	431
	(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 A27. Feeding behaviours following a diarrhoeal episode in children aged <5 years. (sample of 412 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) %	(156) 33.2	(193) 48.2	(63) 18.7	(0) 0.0
	95% CI	(28.3; 38.4)	(42.3; 54.1)	(14.6; 23.6)	N/A
…how much food was she/he given?	(n) %	(229) 54.6	(164) 40.5	(10) 3.0	(9) 1.9
	95% CI	(47.8; 61.2)	(34.2; 47.0)	(1.6; 5.8)	(0.9; 3.8)

Annex 17: Tables A28-A29. Coverage antenatal/postnatal care and related activities

Table A28. Point coverage enrolment of antenatal and postnatal care for pregnant & lactating women (PLW). Results are shown by Wilaya and women status.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
Point coverage of enrolment							
All PLW	N	130	107	120	114	95	566
	(n) %	(102) 78.5	(92) 86.0	(91) 75.8	(90) 78.9	(85) 89.5	(460) 79.6
	95% CI	(68.2; 86.1)	(75.7; 92.4)	(64.7; 84.3)	(69.0; 86.3)	(82.0; 94.1)	(74.9; 83.7)
Pregnant	N						325
	(n) %						(256) 77.2
	95% CI						(71.3; 82.2)
Lactating	N						241
	(n) %						(204) 83.1
	95% CI						(75.7; 88.6)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A29. Point coverage for receiving specific blanket antenatal care activities for pregnant & lactating women (PLW). Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
Receiving iron/folate pills, drops or syrup.							
All PLW	N	129	107	117	114	95	562
	(n) %	(31) 24.0	(19) 17.8	(31) 26.5	(31) 27.2	(23) 24.2	(135) 24.9
	95% CI	(18.1; 31.2)	(12.4; 24.7)	(17.5; 38.0)	(20.1; 35.7)	(14.7; 37.1)	(21.0; 29.4)
Pregnant	N						323
	(n) %						(97) 29.9
	95% CI						(24.7; 35.7)
Lactating	N						239
	(n) %						(38) 17.7
	95% CI						(12.9; 24.0)
Receiving Chaila (multiple micronutrients)							
All PLW	N	129	107	118	114	95	563
	(n) %	(34) 26.4	(25) 23.4	(26) 22.0	(31) 27.2	(17) 17.9	(133) 24.3
	95% CI	(17.4; 37.8)	(14.3; 35.7)	(13.1; 34.7)	(18.7; 37.8)	(11.3; 27.1)	(19.7; 29.5)
Pregnant	N						324
	(n) %						(87) 28.4
	95% CI						(22.2; 35.6)
Lactating	N						239
	(n) %						(46) 18.2
	95% CI						(13.4; 24.2)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Annex 18: Tables (A30--- A34). WASH analysis.

Table A30. Household indicators of water provision. Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
People living/sleeping in household last night	N	210	210	207	209	209	1,045
	mean	6.9	6.6	5.6	6.6	6.4	6.4
	95% CI	(6.6; 7.3)	(6.3; 6.9)	(5.3; 6.0)	(6.2; 7.1)	(6.0; 6.7)	(6.2; 6.6)
Household water storage capacity (litres)	N	210	209	206	208	208	1,041
	mean	3286	3055	2549	3313	3120	3041
	95% CI	(2941; 3630)	(2669; 3441)	(2232; 2865)	(2804; 3821)	(2777; 3463)	(2849; 3234)
Refill frequency of water containers (days)	N	209	205	206	208	208	1,036
	mean	22.9	8.9	23.9	25.7	22.3	22.2
	95% CI	(20.8; 24.9)	(7.0; 10.8)	(22.2; 25.7)	(24.2; 27.2)	(21.0; 23.6)	(21.4; 23.0)
Water provision (litres/person/day)	N	209	204	206	207	207	1,033
	mean	24.2	94.0	22.2	22.4	25.2	31.7
	95% CI	(20.9; 27.5)	(74.1; 114)	(18.5; 25.9)	(18.9; 25.9)	(21.9; 28.6)	(28.8; 34.6)
Meeting UNHCR water provision standards *(minimum of 20 litres/person/day))*	N	209	204	206	207	207	1,033
	(n) %	(110) 52.6	(180) 88.2	(83) 40.3	(93) 44.9	(126) 60.9	(592) 52.2
	95% CI	(42.8; 62.3)	(79.0; 93.7)	(31.9; 49.3)	(36.9; 53.2)	(49.5; 71.2)	(47.9; 56.4)
Meeting SPHERE water provision standards *(minimum of 15 litres/person/day))*	N	209	204	206	207	207	1,033
	(n) %	(149) 71.3	(187) 91.7	(122) 59.2	(133) 64.3	(151) 72.9	(742) 68.5
	95% CI	(61.6; 79.4)	(84.1; 95.8)	(51.0; 66.9)	(54.6; 72.9)	(61.4; 82.1)	(64.3; 72.5)
Household satisfied with water supply	N	210	210	207	209	208	1,044
	(n) %	(32) 15.2	(190) 90.5	(10) 4.8	(8) 3.8	(79) 38.0	(319) 20.8
	95% CI	(8.5; 25.7)	(82.7; 95.0)	(1.7; 13.3)	(1.8; 7.8)	(25.0; 52.9)	(18.0; 23.9)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A31. Household indicators of water infrastructure. Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
Main source of household drinking water	N	209	210	205	209	209	1,042
UNHCR tanker truck	(n) %	(29) 13.9	(64) 30.5	(204) 99.5	(124) 59.3	(208) 99.5	(629) 61.9
	95% CI	(6.5; 27.1)	(18.8; 45.3)	(96.5; 99.9)	(43.4; 73.5)	(96.6; 99.9)	(56.6; 66.9)
Piped water	(n) %	(180) 86.1	(146) 69.5	(1) 0.5	(85) 40.7	(1) 0.5	(413) 38.1
	95% CI	(72.9; 93.5)	(54.7; 81.2)	(0.1; 3.5)	(26.5; 56.6)	(0.1; 3.4)	(33.1; 43.4)
Material of the household main water container	N	210	210	206	209	209	1,044
Plastic	(n) %	(141) 67.1	(164) 78.1	(117) 56.8	(122) 58.4	(145) 69.4	(689) 63.4
	95% CI	(58.7; 74.6)	(70.7; 84.1)	(48.5; 64.7)	(50.8; 65.6)	(62.2; 75.7)	(59.6; 67)
Metal	(n) %	(69) 32.9	(45) 21.4	(84) 40.8	(83) 39.7	(63) 30.1	(344) 35.3
	95% CI	(25.4; 41.3)	(15.7; 28.5)	(33.4; 48.6)	(32.4; 47.6)	(23.9; 37.3)	(31.8; 39)
Concrete	(n) %	(0) 0.0	(0) 0.0	(4) 1.9	(3) 1.4	(1) 0.5	(8) 1.0
	95% CI	N/A	N/A	(0.6; 6.2)	(0.5; 4.3)	(0.1; 3.4)	(0.5; 2.2)
Household has more than one water container	N	210	209	206	208	208	1,041
	(n) %	(24) 11.4	(24) 11.5	(17) 8.3	(25) 12.0	(28) 13.5	(118) 10.9
	95% CI	(6.2; 20.0)	(5.8; 21.4)	(4.9; 13.5)	(5.8; 23.3)	(8.5; 20.8)	(8.1; 14.6)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A32. Household availability and use of soap. Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
	N	210	210	207	209	209	1,045
Presence of soap in household	(n) %	(206) 98.1	(208) 99.0	(202) 97.6	(206) 98.6	(206) 98.6	(1,028) 98.3
	95% CI	(95.2; 99.3)	(96.3; 99.8)	(93.5; 99.1)	(94.0; 99.7)	(95.7; 99.5)	(96.9; 99.0)
Yesterday, soap was used for:	N	206	208	202	206	206	1,028
Washing children's hands	(n) %	(175) 85.4	(165) 79.3	(162) 80.6	(171) 83.4	(141) 69.1	(814) 81.0
	95% CI	(79.2; 89.9)	(70.2; 86.2)	(75.2; 85.1)	(75.8; 89.0)	(61.2; 76.1)	(78.0; 83.7)
Washing after defecation	(n) %	(198) 96.1	(174) 83.7	(190) 94.1	(194) 94.2	(185) 90.2	(941) 92.8
	95% CI	(91.5; 98.3)	(73.1; 90.6)	(89.1; 96.8)	(88.8; 97.1)	(82.6; 94.8)	(90.5; 94.6)
Washing hands after cleaning children	mean	(175) 85.0	(161) 77.4	(163) 80.7	(171) 83.0	(138) 67.0	(808) 80.3
	95% CI	(78.7; 89.6)	(67.8; 84.8)	(75.3; 85.1)	(75.3; 88.7)	(59.3; 73.9)	(77.3; 83.1)
Washing hands before feeding children	(n) %	(175) 85.0	(164) 78.8	(163) 80.7	(171) 83.0	(137) 66.5	(810) 80.5
	95% CI	(78.7; 89.6)	(69.7; 85.8)	(75.3; 85.1)	(75.3; 88.7)	(58.7; 73.5)	(77.4; 83.2)
Washing hands before preparing food	(n) %	(206) 100	(208) 100	(202) 100	(204) 99.0	(205) 99.5	(1,025) 99.7
	95% CI	N/A	N/A	N/A	(96.2; 99.8)	(96.6; 99.9)	(98.9; 99.9)
Washing hands before eating	(n) %	(206) 100	(207) 100	(200) 99.0	(204) 99.0	(206) 100	(1,023) 99.4
	95% CI	N/A	N/A	(96.2; 99.8)	(96.2; 99.8)	N/A	(98.5; 99.8)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A33. Household toilet facilities. Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
Type of toilet the household use	N	210	210	205	209	209	1,043
Pit latrine with septic tank	(n) %	(1) 0.5	(6) 2.9	(15) 7.3	(1) 0.5	(0) 0.0	(23) 2.6
	95% CI	(0.1; 3.4)	(0.4; 18.3)	(3.6; 14.2)	(0.1; 3.4)	N/A	(1.4; 4.8
Pit latrine	(n) %	(209) 99.5	(201) 95.7	(194) 89.8	(206) 98.6	(205) 98.1	(1,005) 95.9
	95% CI	(99.9; 3.4)	(98.9; 18.3)	(93.9; 14.2)	(99.5; 3.4)	(99.3; 0.0)	(93.8; 97.3)
Use neighbour/relative latrine	mean	(0) 0.0	(1) 0.5	(6) 2.9	(1) 0.5	(4) 1.9	(12) 1.2
	95% CI	N/A	(0.1; 3.4)	(1.2; 7.0)	(0.1; 3.4)	(0.7; 4.9)	(0.6; 2.3)
Open defecation/other	(n) %	(0) 0.0	(2) 0.9	(0) 0.0	(1) 0.5	(0) 0.0	(810) 0.3
	95% CI	N/A	(0.2; 3.7)	N/A	(0.1; 3.4)	N/A	(0.1; 0.9)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Table A34. Household management of young children stools. Results are shown by Wilaya.

		Awserd	Dakhla	Laayoune	Smara	Boujdour	Aggregated[1]
	N	207	210	207	209	208	1,041
Household has children aged <3 years	(n) %	(153) 73.9	(123) 58.6	(132) 63.8	(149) 71.3	(116) 55.8	(673) 66.5
	95% CI	(66.3; 80.3)	(49.9; 66.7)	(56.3; 70.7)	(63.8; 77.8)	(48.8; 62.5)	(63.0; 69.8)
Where did the child last pass stools?	N	153	123	132	149	116	673
Latrine	(n) %	(33) 21.6	(22) 17.9	(23) 14.7	(28) 18.8	(16) 13.8	(122) 18.5
	95% CI	(13.7; 32.4)	(10.6; 28.6)	(11.3; 25.9)	(11.8; 28.7)	(8.5; 21.7)	(14.8; 22.9)
Potty	(n) %	(12) 7.8	(1) 0.8	(16) 12.1	(15) 10.1	(11) 9.5	(55) 9.1
	95% CI	(3.6; 16.1)	(0.1; 5.7)	(5.4; 25.1)	(4.5; 21.2)	(4.1; 20.3)	(5.9; 13.7)
Diapers	mean	(104) 68.0	(95) 77.2	(93) 70.5	(106) 71.1	(86) 74.1	(484) 71.2
	95% CI	(59.2; 75.7)	(67.1; 85.0)	(59.4; 79.6)	(60.8; 79.7)	(64.9; 81.6)	(66.4; 75.5)
Outside, in the open	(n) %	(3) 2.0	(5) 4.1	(0) 0.0	(0) 0.0	(3) 2.6	(11) 1.1
	95% CI	(0.7; 5.8)	(1.5; 10.7)	N/A	N/A	(0.6; 10.3)	(0.6; 2.2)
Where were the child's last stools disposed?	N	153	123	132	149	116	673
Put/rinse into latrine	(n) %	(47) 30.7	(29) 23.6	(36) 27.3	(41) 27.5	(29) 25.0	(182) 27.5
	95% CI	(23.3; 39.3)	(14.6; 35.7)	(18.7; 37.9)	(19.5; 37.3)	(17.7; 34.1)	(23.3; 32.2)
Thrown into garbage	(n) %	(106) 69.3	(93) 75.6	(95) 72.0	(108) 72.5	(86) 74.1	(488) 72.1
	95% CI	(60.7; 76.7)	(63.7; 84.6)	(61.6; 80.4)	(62.7; 80.5)	(65.0; 81.6)	(67.5; 76.3)
Put/rinsed into drain or ditch, or left in the open		(0) 0.0	(1) 0.9	(1) 0.8	(0) 0.0	(1) 0.9	(3) 0.4
		N/A	(0.1; 5.7)	(0.1; 5.2)	N/A	(0.1; 5.8)	(0.1; 1.3)

1. Aggregated prevalence results are weighted based on the estimated total population used for the estimation of the sample size.

Annex 19: Table A35 - Summary of survey methods 1997-2016

Table A35. Methods used in different surveys carried in the Saharawi refugee camps (1997 – 2016).

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	1609 (anthropometry) 949 (anaemia)	1689 (anthropometry) 1556 (anaemia)	CS. PPS.	2040	120	17	EPI method	SMART criteria (± 3 z-scores)
2012	2022 (anthropometry) 2009 (anaemia)	0 (anthropometry) 983 (anaemia)	CS. PPS.	2049	120	17	EPI method	SMART criteria (± 3 z-scores)
2016	2579 (anthropometry) 2564 (anaemia)	3225 (anthropometry) 3479 (anaemia)	CS. PPS.	2100	175	12	Modified EPI	SMART criteria (± 3 z-scores)

Annex 20: Tables (A36—A41) – Analysis of trends 1997-2016

Table A36. Global acute malnutrition prevalence in children aged 6-59 months (1997-2016)

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 : 6.3
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

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

Year	Global	Moderate	Severe	Mean WHZ	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

CI: 95% Confidence Intervals; Global stunting: Prevalence of children, aged 6-59 months, presenting a height for age z-score <-2 z-scores. Moderate stunting: Prevalence of children, aged 6-59 months, presenting a height for age z-score <-2 z-scores and >= -3 Z-scores. Severe stunting: Prevalence of children, aged 6-59 months, presenting a 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 WHO 2006 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 (1997-2016).

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

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) (1997-2016).

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

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) (1997-2016).

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

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 (2010-2016).

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)

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

Annex 21: Prevalence of tea consumption and relationship with variables for anaemia and obesity

Table A42. Prevalence of tea consumption among non-pregnant women of reproductive age (15-49 years) and its relationship with variables for anaemia and obesity.

Prevalence of tea consumption			
Category	Proportion (%)	95% CI	Sample
≤ once a day	14.1	(12.4; 16.1)	499
Twice a day	35.7	(33.5; 38.0)	1,280
Thrice a day	38.7	(36.2; 41.3)	1,364
≥ 4 times a day	11.4	(9.5; 13.7)	344

Change in Haemoglobin (g/dL) by tea consumption category *			
Category	Mean	95% CI	p-value
Twice a day	-0.16	(-0.41; 0.10)	0.2
Thrice a day	0.15	(-0.10; 0.40)	0.2
≥ 4 times a day	0.25	(-0.06; 0.56)	0.1

Anaemia risk by tea consumption category *			
Category	Odds ratio	95% CI	p-value
Twice a day	1.22	(0.97; 1.54)	0.09
Thrice a day	0.89	(0.70; 1.13)	0.3
≥ 4 times a day	0.81	(0.59; 1.10)	0.2

Change in BMI (kg/m2) by tea consumption category *			
Category	Mean	95% CI	p-value
Twice a day	0.94	(0.23; 1.66)	0.01
Thrice a day	1.17	(0.40; 1.94)	<0.01
≥ 4 times a day	2.02	(1.10; 2.94)	<0.01

Change in Waist Circumference (cm) by tea consumption category *			
Category	Mean	95% CI	p-value
Twice a day	2.43	(0.68; 4.18)	<0.01
Thrice a day	3.63	(1.74; 5.51)	<0.01
≥ 4 times a day	6.08	(3.80; 8.36)	<0.01

Obesity risk by tea consumption category *			
Category	Odds ratio	95% CI	p-value
Twice a day	1.42	(1.07; 1.87)	0.02
Thrice a day	1.56	(1.16; 2.09)	<0.01
≥ 4 times a day	1.93	(1.37; 2.72)	<0.01

* Comparisons are made against the first category of tea consumption, i.e. ≤once a day. The reference category will have a value of zero when assessing change or of one when assessing odds ratio.

Annex 22: Internal recommendations to WFP/UNHCR

Continue providing technical support to refugee representatives and partners on the management of nutrition programmes, specifically the targeted supplementary feeding programme for treatment of MAM and the Anaemia and Stunting Reduction programme.

WFP/UNHCR need to invest on efforts and human resources, 1) to improve programme implementation and monitoring of programme performance and, 2) to strengthen staff capacities within UN agencies, implementing partners and SHA´s staff.

- Revise and/or update the WFP/UNHCR MoU towards clear definition of each agency involvement and joint/individual responsibilities.
- Ensure adequate staffing, monitoring and support by WFP programme officers in order to reach objectives of TSFP and the Stunting and Anaemia Reduction Programme.
- Increase capacities of WFP staff on monitoring of TSFPs, the appropriate use of the different monitoring tools and reporting templates, and its rationale. WFP staff should be competent enough to train, coach and build capacities of partner staff.
- The assistance of a nutritionist with good CMAM experience is strongly recommended:
    - To jointly review and update with SHA and partners the actual implementation of the nutrition programmes in place (based on recommendations section),
    - To build/improve capacities among WFP staff,
    - To support the development, review and/or updating of the M&E system and tools to be put in place,
    - To coach and support on the preparation of appropriate monitoring plans and train the staff accordingly, including the analysis of performance indicators and others.