SMART NUTRITION SURVEYS
in drought-affected municipalities of HUILA and CUNENE Provinces
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Technical Rapid Response Team

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LIST OF ACRONYMS

ADRA	Acção para o Desenvolvimento Rural e Ambiente
BNA	Bottle Neck Analysis
BSF	Blanket Supplementary Feeding
CI	Confidence Interval
cGAM	Combined Global Acute Malnutrition
CDR	Crude Death Rate
cSAM	Combined Severe Acute Malnutrition
EBF	Exclusive Breastfeeding
ENA	Emergency Nutrition Assessment
GAM	Global Acute Malnutrition
GMP	Growth Monitoring Programme
HFA	Height-for-Age
IIMS	Inquérito de Indicadores Múltiplos e de Saúde
IMAM	Integrated Management of Acute Malnutition
INE	National Institute of Statistics
IPC	Integrated Food Security Phase Classification
IYCF	Infant and Young Child Feeding
MAM	Moderate Acute Malnutrition
MICS	Multiple Indicator Cluster and Health Survey
MOH	Ministry of Health
MUAC	Middle Upper Arm Circumference
M&E	Monitoring and Evaluation
PIN	People in Need
RGPH	General Census of Population Housing
RRT	Rapid Response Team
SAM	Severe Acute Malnutrition
SMART	Standardized Monitoring and Assessment for Relief and Transition
U5DR	Under Five Death Rate
UNICEF	United Nations Children´s Fund
WFA	Weight-for-Age
WFH	Weigh-for-Height
WHO	World Health Organization
WV	World Vision

EXECUTIVE SUMMARY

The nutrition situation in Angola is categorised as serious with wide changes from province to province due to the large geographical size of the country and diverse agro-ecological zones. The Southern provinces of Angola are experiencing a long-term drought since 2018. The situation has further deteriorated in 2019, as drought conditions continue to be exacerbated by well below average, erratic rainfall, particularly in the hardest hit southern provinces of Cunene, Huila and Namibe, which are considered as the most critically affected and deteriorating as result of drought.

The only available representative nutrition data comes from the Multiple-Indicator Cluster and Health Survey (MICS) 2015/16, that showed acute malnutrition rates near the national average with 4.6% Global Acute Malnutrition (GAM) prevalence by WFH and 0.5% Severe Acute Malnutrition (SAM) prevalence by WFH for Huila Province. By contrast, the Province of Cunene showed the highest rates among all other provinces in the country, with GAM and SAM prevalence by WFH of 10.5% and 3.6%.

With the overall objective of mapping current nutritional status among children aged 6-59 months in the most drought affected municipalities of Huila (5 municipalities out of 14) and Cunene (5 municipalities out of 6) Provinces, two SMART nutrition and mortality surveys were implemented in December 2019, coinciding with the middle of the lean season (October to January). The SMART methodology was used for both, anthropometry and retrospective mortality. The overall objective of the surveys was mapping current nutritional status among children aged 6-59 months in both survey areas. Findings are intended to support improvements in nutrition programming as required and to advocate for adequate funding support.

A cross-sectional two-stage cluster sampling design was employed to undertake the surveys, with 57 clusters randomly selected for each survey in the respective provinces using probability proportional to size. Cluster allocation was based on the results and mapping of the Angolan General Census of Population Housing (RGPH) carried out by the National Institute of Statistics in 2014, and using the census sections (cessões censitárias) as primary sampling units in the first stage. In the second stage, 12 households were selected randomly from within each cluster, following simple random sampling. A total of 1,704 children aged 6-59 months (888 in Huila and 816 in Cunene) from 1,315 households (637 in Huila and 678 in Cunene) were sampled for anthropometric measurements. Retrospective mortality was collected in all same households. The surveys were carried out in the middle of the lean season (October-January)

The prevalence of GAM by WFH in the surveyed municipalities of Huila and Cunene was 10.8% and 10.6%, with SAM rates of 2.1% and 1.1% respectively. While the results are similar to those reported by the MICS in 2015/16 for the entire province of Cunene, the nutrition situation in Huila surveyed municipalities has significantly deteriorated. In both survey areas, the severity of the nutrition situation is considered *High* according to the up to date 2018 WHO classification. Younger children (6-23 months) were significantly more wasted than the older ones (24-59 months), with GAM rates as high as 14.4% (Huila surveyed municipalities) and 15.0% (Cunene surveyed municipalities), which is of major concern. MUAC analysis showed a lower GAM prevalence (8.2% in Huila and 6.9% in Cunene) than the GAM prevalence per WFH. Nonetheless, MUAC results still fall under the “Alert/Serious” category based on the Integrated Food Security Phase (IPC) classification.

It is worth highlighting that, considering all GAM cases found among surveyed children together (i.e. those identified only through WFH, those identified only with MUAC, the oedema cases, and the cases that are identified by both indicators), results in a combined GAM prevalence (cGAM) of 13.6% and 12.9%, with combined SAM (cSAM) rates of 3.0% and 1.7% in Huila and Cunene surveyed municipalities, respectively. Combined GAM and SAM are not categorised to be used in any way to classify the severity of the nutrition situation, however they are quite important to inform the overall burden of acute malnutrition and, consequently, for planning purposes to estimate caseload.

The prevalence of stunting among children aged 6-59 months in the surveyed municipalities of Huila and Cunene was 49.9% and 37.2%, with prevalence of severe stunting at 19.3% and 12.2% respectively. The severity of stunting in both survey areas is *Very High* as defined by the 2018 WHO classification. In the actual scenario, with half of the children being stunted in Huila and more than one third in Cunene surveyed municipalities, and with GAM rates of 10% -and above for the younger children-, it becomes evident that many children will be wasted and stunted at the same time. For these children, the risk of death is amplified to levels comparable to children with the most severe form of wasting.

Measles vaccination coverage was as low as 20.9% and 53.3% in Huila and Cunene surveyed municipalities, and even when adding those children for which the mother stated “don´t know” measles coverage was still far below the international standard of 95% target set by WHO to prevent outbreaks (43.9% in Huila and 61.2% in Cunene). This is alarmingly low and worrying, and especially so considering the measles-malnutrition vicious cycle and the outbreaks of measles occurred recently in some provinces in Angola.

Although breastfeeding is common, exclusive breastfeeding remains low, with 41.3% and 58.6% of infants less than 6 months of age exclusively breastfed among the municipalities surveyed in Huila and Cunene, respectively. For each survey area, more than 60% of surveyed children consumed two or fewer meals the previous day indicating that children are not getting enough nutrients as required, and this was statistically associated with heightened risk of acute malnutrition in Huila.

Last IPC conducted in July 2019 in Huila, Cunene, and Cuando Cubango estimated that about 421,127 families were acutely food insecure, and this figure would rise to about 561,840 by February 2020 if the scenario continues. As of December, drought conditions persist and food insecurity is expected to worsen, as many households have already lost the possibility to cultivate during the recent past main planting season in October 2019.

The results of key indicators are summarised in **Table 1** below:

Table 1: Summary of key indicators in surveyed municipalities of Huila and Cunene

Anthropometry – Children aged 6-59 months based on WHO 2006 standards				
Indicator	**Huila***		**Cunene****	
	%	**95% CI**	**%**	**95% CI**
GAM (WFH <-2 z-score and/or oedema)	10.8%	(8.8-13.2)	10.6%	(8.2-13.6)
SAM (WFH <-3 z-score and/or oedema)	2.1%	(1.4-3.1)	1.1%	(0.6-2.2)
MUAC-based GAM (MUAC<125mm and/or oedema)	8.2%	(6.3-10.6)	6.9%	(4.8-9.8)
MUAC-based SAM (MUAC<115mm and/or oedema)	2.1%	(1.4-3.3)	1.2%	(0.6-2.4)
Combined GAM (WFH<-2 &/or MUAC < 125 and/or oedema)	13.6%	(11.5-16.0)	12.9%	(10.9-15.6)
Combined SAM (WFH<-3 &/or MUAC < 115 and/or oedema)	3.0%	(2.1-4.3)	1.7%	(1.0-2.9)
Stunting (HFA <-2 z-score)	49.4%	(46.2-52.6)	37.2%	(33.3-41.4)
Severe Stunting (HFA <-3 z-score)	19.3%	(16.6-22.3)	12.2%	(9.8-15.2)
Underweight (WFA <-2 z-score)	30.8%	(27.1-34.6)	27.8%	(23.8-32.0)
Severe underweight (WFA <-3 z-score)	9.8%	(8.0-12.0)	7.8%	(5.4-11.1)
Retrospective mortality				
CDR (deaths/10,000 people/day)	0.41	(0.24-0.70)	0.33	(0.18-0.58)
U5DR (deaths/10,000 children U5/day)	0.78	(0.36-1.67)	0.41	(0.09-1.83)

Measles vaccination coverage (children 9-59 months)	20.9%	(18.3-23.8)	53.3%	(49.8-56.7)
Proportion of children 9-59 months consuming two or less meals	62.4%	(59.1-65.6)	66.0%	(62.6-69.2)
Exclusive breastfeeding among infants 0-5 months	41.3%	(31.9-51.1)	58.6%	(48.2-68.4)

**5 out of 14 municipalities: Matala, Quipungo, Chibia, Humpata and Gambos.*
***5 out of 6 municipalities: Cahama, Cuanhama, Curoca, Cuvelai and Ombadja.*

The overall findings in both survey areas confirmed serious levels of Malnutrition , which are now further aggravated by the increased food insecurity and loss of livelihoods coupled with the critical lack of water, the failure to implement proper IYCF and caring practices, as well as the difficulties to access health care. This highlights the need for immediate support through an integrated strategic response to prevent further deterioration of the nutritional situation as well as to support food needs and livelihoods of most vulnerable households. Specific *recommendations* are outlined below:

Continue implementing the ongoing IMAM services and invest in efforts to improve performance and coverage.

- Strengthen the skilled work force available, as well as the capacities of MoH staff in charge of Integrated Management of Malnutrition (IMAM) services through the provision of on-going technical support, on the job mentoring and regular joint supportive supervisory visits. Though priority is to be given to SAM treatment, efforts should be also invested to decreasing development of SAM cases through the integration of MAM treatment as part of IMAM services.
- Consider the set-up of mobile clinics to increase access to IMAM services to cater for those areas with long distances to health facilities.
- Strengthen and scale-up active case finding of MAM/SAM and referral of cases through MUAC screening at community level, as well as the follow-up of identified cases referred, and evaluate the feasibility to expand the participation of other actors –mothers, educators in kindergartens- in active case finding to increase coverage.
- Strengthen the capacities of health staff involved in child health services to improve the identification of cases of acute malnutrition through weight-for-height and referral.

Prevent deterioration of acute malnutrition in vulnerable individuals and households.

- Strengthen efforts to implement Blanket Supplementary Feeding for children 6-23 months for at least 3-5 months, and have its continuation assessed based on evolution of the nutritional situation.
- Considering the strong relation between morbidity and malnutrition priority should be also placed on disease prevention. Improvements in coverage of measles vaccination is urgently required.
- Evaluate household vulnerability of children following SAM treatment discharge, and link the identified vulnerable households with food security activities in the community.
- Efforts should be ramped up to ensure that households have access to safe water.

Prioritise and improve Infant and Young Child Feeding Practices through IYCF programming.

- Integrate IYCF interventions into IMAM services by the provision of designated staff and harmonised IYCF package.
- Strengthen the human resource capacity to promote and support IYCF during any contact between health services and mothers throughout pregnancy and the first two years of child´s life.

- Develop or strengthen IYCF community-based activities through community peer-to-peer support groups.
- Undertake formative research to assess barriers and enhancers that influence IYCF practices. Findings should inform the IYCF Behaviour Change Communication intervention.

Integrate nutrition sensitive programming in all food security interventions.

- Develop and strengthen linkages between actors in the Nutrition sector and actors implementing livelihood programmes.
- Strengthen livelihood activities and targeting prioritization with the view of improved nutrition goals.

Close monitoring of nutrition situation evolution and further research.

- Develop a nutrition surveillance system to monitor the situation over time to detect trends with the aim of adapting nutritional strategies and interventions to the changed situation.
- Conduct a follow up nutrition survey in September-October 2020.
- Further research is required to understand differences on malnutrition by gender.

Programming for stunting prevention interventions will require a more comprehensive multi-sectoral and long-term approach (that would continue afterwards outside the emergency context).

INTRODUCTION

The nutrition situation in Angola is categorised as serious with wide changes from province to province due to the large geographical size of the country and the diverse agro-ecological zones. A persistent nutrition crisis caused by cyclic drought/ flooding phenomena has affected the southern provinces of Angola over recent years. Specifically, the 2018/19 rainfall season received their lowest seasonal rainfall totals since at least 1981. Rains have been delayed and erratic, resulting in reduced area with crops planted, poor germination and wilting of crops. The drought has also caused loss of livestock, diminished the availability of water for human consumption and livestock watering, and affected the movement of cattle in search of pasture. The country's cereal deficit is approximately 1.2 million metric tons, making Angola one of the countries with the highest cereal import requirements in Southern Africa in 2019/2020.[1]

According to the Integrated Food Security Phase Classification (IPC) conducted in July 2019 in the provinces of Cuando Cubango, Cunene and Huila, it was estimated that about 421,127 families were acutely food insecure, further projecting that about 561,840 families will face the same situation by February 2020 if the scenario continues -with 50% of communes classified as experiencing crisis levels of food insecurity-.[2]

The situation further deteriorated in November 2019, due to drought conditions that continued to be exacerbated by below-average, erratic rainfall and inadequate humanitarian response to address the most urgent needs, particularly in the hardest hit southern provinces of Cunene, Huila, Namibe and Cuando Cubango. These first three provinces are the focus of the Government Drought Recovery Framework 2018-2022 and are considered as the most affected by drought.[3]

The latest official data on malnutrition prevalence estimates (**Table 2**) from the MICS carried out by the Ministry of Health (MoH) in 2015-2016[4] reported that 37.6% of children 6-59 months in Angola were stunted, 4.9% were wasted (by WFH), and 19.0% were underweight. The province of Cunene showed the highest rates of acute malnutrition with a SAM prevalence by WFH of 3.6% and a GAM prevalence by WFH of 10.5%. The province of Huila reported 0.5% and 4.6%, for SAM and GAM by WFH. Nation-wide Infant and Young Child Feeding (IYCF) indicators such as early initiation of breastfeeding (48%), exclusive breastfeeding (38%) and anaemia (65% of children 6 to 59 months) were also suboptimal.

[1] https://www.humanitarianresponse.info/en/operations/angola
[2] Ministério da Agricultura e Florestas, Gabinete de Segurança Alimentar. Sumário da situação de Insegurança Alimentar Aguda IPC 2019/20. Agosto, 2019.
[3] Memorando da situação actual da seca na provincia do Cunene (January 2019). Memorando sobre a situação da seca na provincia da Huíla (January 2019).
[4] Governo de Angola e Instituto Nacional de Estatística. Inquérito de Indicadores Múltiplos e de Saúde (IIMS) 2015/2016.

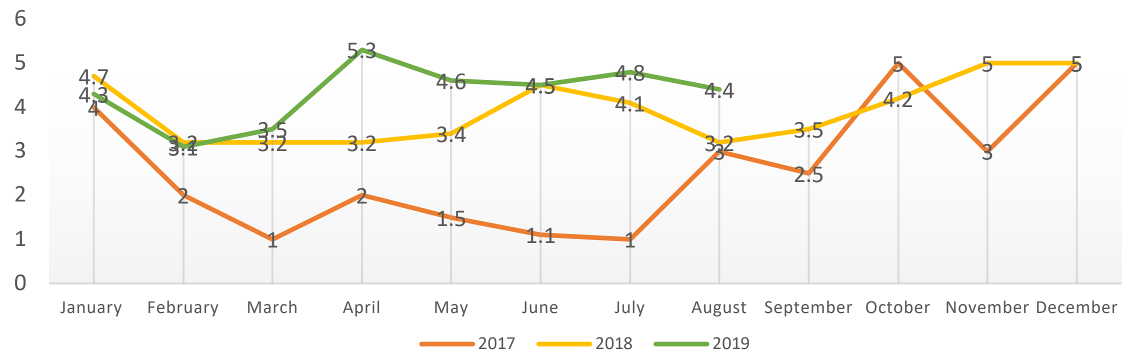
Table 2: Malnutrition prevalence estimates from MICS 2015/16

Area	Acute malnutrition* (WFH z-scores)		Chronic malnutrition** (HFA z-scores)		Underweight*** (WFA z-scores)	
	GAM	**SAM**	**Stunting**	**Severe stunting**	**Underweight**	**Severe underweight**
Huila	4.6%	0.5%	43.6%	21.7%	27.8%	9.8%
Cunene	10.5%	3.6%	39.3%	17.0%	30.8%	9.3%
Angola	4.9%	1.0%	37.6%	15.2%	19.0%	5.6%

**GAM: WFH <-2 z-score and/or oedema; SAM: WFH <-3 z-score and/or oedema*
***Stunting: HFA<-2 z-scores; Severe stunting: HFA<-3 z-scores*
****Underweight: WFA<-2 z-scores; Severe underweight: WFA<-3 z-scores*

Since the last MICS (2015/16), no other official surveys have been implemented, but data from active screenings by Community Health Workers (CHW) and passive screenings in health centres and hospitals using MUAC tape, as reported officially in the provinces of Huila and Cunene, have suggested a deterioration of the nutrition situation, with SAM rates of 4.4% and GAM of 11.6%. Although these data are to be taken with caution, the trend observed in **Figure 1** below show that the situation has deteriorated in 2019 when compared to previous years, mainly with respect to 2017. This nutrition deterioration has resulted in an increased number of children with life-threatening SAM, as revealed by the admission data[5] to Integrated Management of Acute Malnutrition (IMAM) services (45% increase from January to August 2019 as compared to the same period in 2017).

Figure 1. Trend Analysis for Proxy-SAM Prevalence in Huila and Cunene (based on active screening by CHW & pasive screening in health units), 2017-2019



The IMAM national protocols in Angola have been recently updated in May 2019, and staff trained accordingly during a one-week theoretical training. UNICEF is also providing technical support to scale up IMAM through procurement and delivery of essential nutrition supplies to 28 inpatient facilities and 210 outpatient treatment programmes. Interventions include conducting cascade training.

However, the IMAM program has had a history of challenges affecting the quality of service delivery. These include, -though are not restricted to-: limited community mobilization system, uncoordinated and ineffective supply chain management, sub-optimal quality of IMAM services offered, limited volunteer engagement/support for outreach services, lack of adequate patient´s follow up system, dual but not consistent Monitoring and Evaluation (M&E) systems, and insufficient allocation of funding as well as a weak enabling environment for IMAM implementation. As a consequence, program outcomes remain poor.[6]

[5] Based on administrative data from Ministry of Health.
[6] Alvarez, JL; November 2019.Cunene SAM program. Bottleneck analysis (BNA) final report.

The Ministry of Health in partnership with the United Nations Children's Fund (UNICEF), World Health Organization (WHO) and other United Nation agencies and development partners (World Vision –WV-, People in Need -PIN- and the Acção para o Desenvolvimento Rural e Ambiente -ADRA-) responded promptly to the provincial governments in support of the drought emergency response. Government with partners continue supporting IMAM, rehabilitating water sources, rebuilding agricultural and livestock production capacity and strengthening resilience, however current humanitarian response remains insufficient to address the most urgent needs.

In order to generate more evidence and mobilize resources for increased investment in an integrated response to the impacts of drought, up-to-date and reliable data on the prevalence of acute and chronic malnutrition in the most affected provinces was required. Thus, two SMART surveys in the drought-affected municipalities of Huila and Cunene Provinces were implemented in December 2019.

OBJECTIVES

The overall objective of the two surveys was to assess the nutritional status among children aged 6-59 months as well as retrospective mortality for the entire population and children under five separately – for the survey areas of Cunene and Huila Provinces-, in order to contribute to the evidence base for improved management of the nutritional situation, as well as to advocate for adequate funding support.

Specific objectives

- To estimate the prevalence of acute malnutrition among children aged 6-59 months;
- To estimate the prevalence of chronic malnutrition and underweight among children aged 6-59 months;
- To estimate the prevalence of obesity among children aged 6-59 months;
- To estimate the crude (CDR) and under five death rate (U5DR);
- To estimate the number of meals consumed by children 6-59 months within the previous day to data collection;
- To estimate coverage of measles vaccination among children 9-59 months;
- To estimate the prevalence of exclusive breastfeeding among infants 0-5 months.

SURVEY DESIGN AND METHODOLOGY

Study design

The survey is a cross-sectional household survey using a two-stage cluster sampling based on the Standardized Monitoring and Assessment of Relief and Transitions (SMART) methodology. The primary sampling unit was the “cessão censitaria” and the basic sampling unit was the household.

A household questionnaire contained three components (anthropometry, exclusive breastfeeding practices, and mortality). The target population for the anthropometric component was children aged 6-59 months, for the breastfeeding component children aged 0-5 months, while all households were targeted for the retrospective mortality assessment (regardless if there were children under five or not). Questions were addressed to the child´s primary caregiver.

1. Target population and geographic area

Due to time and resource restrictions, the geographical focus of the surveyed areas was restricted to the most severely affected municipalities by the drought in South Angola, i.e., specific municipalities of Cunene and Huila Provinces. One survey was conducted within each province including both, rural and urban areas. The municipalities included were:

- Huila (5 municipalities in the south out of 14 municipalities): Matala, Quipungo, Chibia, Humpata and Gambos.
- Cunene (all municipalities except Namacunde): municipalities of Cahama, Cuanhama, Curoca, Cuvelai and Ombadja.

2. Sample size calculation

Sample size for each survey area were calculated to estimate the prevalence of GAM by WFH and the Crude Death rate (CDR) using the ENA for SMART software July 9th, 2015 version. For anthropometry, a total of **736 children aged 6-59 months in 684 households** was calculated (**Table 3**), and for mortality a total of 4,586 persons in **591 households** (**Table 4**). Calculations were based on the parameters summarised in the **Tables 3 and 4** below.

Table 3: Anthropometric sample size calculations

Parameter	Survey area		Rationale/Source
	Huila	Cunene	
Estimated GAM prevalence	12%	12%	Based on results from community MUAC screening data available
Desired precision $\pm$	3.0%	3.0%	As recommended in SMART methodology, indicating that for 15% prevalence a precision of $\pm$ 3% is sufficient
Design effect	1.5	1.5	Based on SMART guidance
% children 0-59 months	15.5%	15.4%	Data available in last national Census (2014)
Average household size	8.0	8.0	Data available in last national Census (2014)
Percent of non-response households	3.0%	3.0%	Percent of non-response households in MICS 2015/16 was around 1%
Sample size (children)	**736**	**736**	
Sample size (households)	**680**	**684**	

Table 4. Mortality sample size calculations

Parameter	Survey area		Rationale/Source
	Huila	Cunene	
Death rate	0.5	0.5	Assuming no major epidemic or increase in mortality
Desired precision	0.3	0.3	As recommended in SMART methodology for the selected CDR
Design effect	1.5	1.5	As above
Recall period	76	76	Day of the National Hero: 17th September 2019[7]
Average household size	8.0	8.0	Data available in last national Census (2014)
Percent of non-response households	3.0%	3.0%	As above
Sample size (persons)	4586	4586	
Sample size (households)	**591**	**591**	

During planning, sample size calculation for anthropometry and mortality yielded two different household samples and therefore the survey used the larger of the two samples (**684**

[7] It was the only date that could serve as a good date for recall since not much in the calendar for both provinces in previous months.

households) for both mortality and anthropometric surveys as recommended by the SMART survey guidelines.

3. Sampling procedures: selecting clusters, households and children

3.1. First stage sampling: cluster selection

In determining the number of clusters to be included for both surveys, importance was given to ensuring high quality of data collection. In this regard, the number of households that can be completed in a day by a survey team was first determined, and the time spent by a survey team for the following activities were considered: 1) travel from home-base to survey area and back and preliminary activities like paying courtesy call to municipality authorities, and briefing the guiding person that would accompany teams during the actual working day; and 2) time spent during actual data collection. This included briefing of local chief executive (soba) / assistants and households on the survey objectives, methodology and how households in the cluster would be selected, getting household consent, interviewing and measuring target population, lunch break and other procedures done such as preparing/completing/updating the list of households, random selection of households, and locating households afterwards.

After accounting for all the above, and given the long distances and the fact that each cluster should be completed in one day, it was decided that each team would be able to complete 12 households per day. The total number of households in the sample (per survey area) was then divided by the number of households to be completed in one day so as to determine the number of clusters to be included in the survey. Based on this calculation 57 clusters (684/12 households per day) were selected to be included in each survey area.

The whole process of cluster selection was carried out jointly with the National Institute of Statistics (INE) using SPSS. INE uses SPSS to select and extract sampling from the national census, and this software –that includes a population proportional algorithm- was also used for cluster selection as Angola does in any other sampling selection for other surveys supported and supervised by INE. The full script of the procedures done in SPSS can be seen in *Annex 1* and follows the same steps as ENA for SMART to select clusters in a simple random procedure proportional to population size**.**

In the first stage cluster sampling, 57 clusters -along with 6 reserve clusters- with probability proportional to population size were selected within each survey area. The exercise was based on the results and mapping of the Angolan General Census of Population and Housing[8] (RGPH), carried out by INE in 2014. The Census is organized in census sections (cessões censitárias) that either are full communities (aldeias in rural areas), or bairros/sections of bairros (most frequently in urban areas, though some larger communities are also divided in bairros/sections). Thus, primary sampling units (clusters) corresponded to the census sections.

- Since RGPH is divided into rural and urban areas[9], this first step cluster sampling included the selection based on two levels (rural and urban) proportional to population within each survey area. This was to ensure that rural and urban were well represented according to their weight within each survey.
- Following the above, the number of clusters was divided proportionally to the population into rural and urban clusters -18.2% of the population in Huila is urban and 27.6% in Cunene-. Thus, 10 clusters were selected from the urban census sections in Huila (and 47 from the

[8] Recensamento Geral da População e Habitação

[9] The census consists of two separate databases, one with the urban census sections and one with the rural census sections.

rural census), and 16 urban clusters in Cunene (41 rural).[10] In addition, 6 reserve clusters were also assigned for each survey area, to be used in case of need[11].

For each of the selected cessões *censitárias*, the INE provided a map with coordinates and main features, and maps were printed for use by teams (see in *Annex 2* the list of assigned clusters).

3.2. Second stage sampling: household selection

Simple random sampling was used to select the 12 households per cluster to be surveyed.

For both surveys, before the teams arrived in the assigned clusters, respective municipality authorities and the local chief executive (soba) or contact person was informed in advance by the survey mobilizer, both in person and with formal letters signed by MoH representatives at provincial level to ensure acceptance of survey´s activities. Survey mobilizer informed about the survey objectives and methods, the procedure of selecting the area and households, as well as requested the contact person to ensure that an updated list of households would be available on the assigned survey day. When the team arrived at the cluster for data collection, the Team Leader checked the household list and inquired if any of the households listed moved out or were temporarily out or absent. When lists were not available, the household heads in the assigned cluster were listed with the support of the soba or the secretary. Once the complete list of household heads was updated (or was generated), the team used random numbers to select the households from the household list.

The basic sampling unit (i.e., the household) was defined as follows: *person or group of people, family members or not, living together under one roof, eating from the same pot, and recognizing the authority of a person who is the head of household.* In polygamous families with several structures within the same compound but with different wives having their own cooking pots, the structures were considered as separate households and listed separately. In cases where there was no eligible child, the household remained as part of the sample in that cluster (no replacement of households) and it was recorded on the household control sheet as having no eligible children. If a respondent or an entire household was absent during the time of household visit, the teams left a message and re-visited later to collect data for the missing child/household, and no substitution of households was done. If a child was in a hospital, and this was located in a 20 km radius, the team would visit the child at the end of the working day. Lastly, if a household refused to participate, it was considered a refusal and was not replaced with another household. Detailed records on outcomes for all surveyed households within each cluster were thoroughly kept in the cluster control sheet *(Annex 3)*.

Survey tools: Research instruments and data collected

Three structured questionnaires were used to provide information on the relevant indicators. They were prepared in English/Spanish, translated into Portuguese and administered in the local dialect (different dialects were present). All questionnaires were refined during the training and pre-tested before the survey (a copy of the questionnaires are available in *Annex 4*). Data was collected using the SurveyCTO v2.60.8 mobile data collection platform on smartphones. Reference questionnaires used and areas covered were:

[10] We stratified and first looked at how many of those 57 clusters should be urban and how many should be rural for each of the two surveys, always following PPS. To illustrate this, the example for the survey in Huila is detailed here: Since 18.2% of the population is urban in Huila that means that 57*18.2/100=10.3. 10 clusters should be urban and 47 should be rural in Huila. Then we selected 10 clusters from the urban census list and 47 from the rural census list. Same procedure was followed for the survey in Cunene area.

[11] Following SMART criteria, reserve clusters should only be used if 10% or more of original clusters are impossible to reach during the survey, or if proportion of children 6-59 reached is less than 80% of planned sample size.

Anthropometric questionnaire for children aged 6-59 months: the survey used the SMART template available within the ENA for SMART package. Information collected on age, sex, anthropometric measurements, oedema, measles vaccination and number of meals consumed the day prior to data collection.

- ***Age*** in children was estimated from the date of birth obtained from the health card or another official document. In the absence of these documents, a local calendar of events was used to estimate age in months *(Annex 5)*.
- ***Gender / Sex:*** Recorded as 'm' for male and 'f' for female.
- ***Weight*** was obtained using an electronic digital scale (SECA) 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 5kg weight before the start of the survey and daily during the survey. Children that could not stand-alone were weighed carried by their caregiver using the mother/child function. Children were weighed without clothes and immediately dressed before other measurements were taken.
- ***Height*** and ***length*** were taken using a wooden UNICEF child height board 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.
- ***Bilateral pitting oedema*** was determined by the application of moderate thumb pressure for three seconds on both feet. If a shallow imprint remained in both feet oedema was recorded as present. Confirmation was requested by survey supervisors.
- ***MUAC*** was measured using a MUAC tape on the left arm of children aged 6-59 months. MUAC measurement was recorded to the nearest mm.
- ***Measles vaccination*** *in children 9-59 months***:** Measles vaccination was assessed by checking for confirmation of the measles vaccine on health card.
- ***Number of meals consumed the day prior to data collection****:* number of solid, semi-solid or soft meals; breastfeeding was not considered a meal.

Breastfeeding practices questionnaire for infants 0-5 months: Adapted from the MICS survey carried out in 2015 in Angola[12]. Information contained questions on breastfeeding status and liquids and/or other foods consumed within the previous 24 hours.

Mortality questionnaire: the survey used the SMART template available within the ENA package. Retrospective mortality data were collected in all the visited households, including those with no children under five. A recall period of 76 days was used (the recall period ran from 17th September 2019: the National day of the Hero). Information was collected on: 1) total number of people in the household including age and sex for each of them; 2) number of people who left the household within the recall period; 3) number of people joined the household within the recall period, 5) number of births in the household within the recall period, 6) number of deaths within the recalls period, and 7) number of pregnant women at the start of the recall period.

Training of survey teams

The background of the staff composing the teams were nurses and nutrition personnel of the Ministry of Health (from the central, provincial and municipality levels), staff from the Angolan Civil Protection Services, community health workers and other nutrition program personnel from WV, and two nutritionist from UNICEF.

Survey teams were trained in a 5-day SMART methodology training led by two technical advisors from the Technical Rapid Response Team (RRT). In total, 44 persons attended the training; 35

[12] Inquérito de Indicadores Multiplos de Saúde. IIMS (2015-2016). Governo de Angola e Instituto Nacional de Estatística.

enumerators[13], 4 supervisors, 2 survey mobilisers[14] and 3 coordinators –the fourth coordinator was one of the trainers as well as the survey manager -. Assignment of the different positions within the survey teams were made at the end of the second day of the training, as team leaders and supervisors were to be trained on mobile data collection.

The topics covered during the training focused on the following: Malnutrition and its causes, purpose and objectives of the survey, sampling methodology, anthropometric measurements 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, referral for malnourished children, quality check after completion of questionnaires, and field procedures. Sessions were theoretical and practical. Almost an entire day was devoted to data collection with smartphones targeted to the team leaders and supervisors. At the same time, the participants selected as enumerators practiced and improved their technique with children, as well as with the local calendar of events.

On the 4th day of the training, a standardization test was conducted to assess the precision and accuracy of anthropometric measurements taking among surveyors. A one-day piloting exercise was performed in a community that had not been selected as part of the sampling clusters in order introduce the teams to the fieldwork and to evaluate if tools were well adapted to the survey.

A surveyor manual with detailed instructions was provided to support fieldwork.

Survey teams, field data collection, supervision, and quality control checks

The surveys were conducted by five teams in each survey area. Each team was comprised of three members: team leader in charge, among other tasks, of interviewing households and filling in the questionnaire in the smartphone, and two enumerators (measurer and assistant). The supervisory survey team included two supervisors (1 from WV and 1 from MoH) and two coordinators by survey area within each province (1 from UNICEF and 1 from the MoH).

Data collection took place concurrently in the surveyed areas of Huila and Cunene, and lasted for a total of twelve days[15]. One rest day (Sunday) was included within this period for the teams to prevent fatigue due to the prolonged data collection period, the long working days, and to ensure quality.

Each team was able to complete one cluster per day (12 households). Before proceeding with the survey in the selected household, survey teams explained the purpose of the survey and issues of confidentiality and obtained verbal consent.

Heavy rains within the first days of data collection prevented the teams from following the original cluster planning dates, as some of the assigned clusters were no longer accessible. After adjusting the data collection schedule, all the 57 clusters could be surveyed in Cunene area, while in Huila three clusters remained inaccessible throughout the data collection period due to a collapsed bridge. Ultimately it was not feasible to reach the community through any other available means (including boat and motorbike).

[13]Out of them, 31 persons were aimed to configure the survey teams (either as measurers or team leaders), and four -part of MoH staff- participated to build their capacities as agreed with MoH, and thus only accompanied the survey teams during the day of data collection within their respective municipalities.

[14] Mobilisers, also relevant MoH staff, participated in the training during the day that survey methodology and procedures were discussed.

[15]Overall, data collection was carried out from 3rd to 16th December 2019. For Huila, data was completed in 11 days (3rd to 14th December), while in Cunene 12 days were required (3rd to 16th December – in addition, the teams in Cunene could not work one day due to the heavy rains that caused one car to get stuck for more than 12 hours, and the team, as well as all the other cars/team members that went to support, had to overnight without possibility to move and could come back only by next day).

Within each survey area, teams were closely supervised during their fieldwork throughout the whole survey period by two supervisors and the coordinators, including close supportive supervision by the survey manager. Cluster planning schedule was organized in a way to enable all the teams being closely supervised daily during the first days of data collection[16]. Overall in Huila survey, supervisors and coordinators (four in total) had assigned one team each day, and one of them would join the fifth team once ensured the team that was joined early in the morning was running data collection smoothly. For the survey in Cunene and after the first days of data collection, each supervisor had assigned two teams on rotating basis[17], and the survey manager would supervise the fifth team, always on rotating basis. Daily quality checks of anthropometric measurements informed which teams were in need of closer supervision to start with. To note that, occasionally and in the very last days of data collection, one of the teams had to carry on data collection without supervision due to the long distances in between clusters and the great difficulties to reach them. About half of the data collection days, the teams had to overnight out of the base-town because of the long distances to be covered.

Each questionnaire was reviewed by the team leader after completion and before leaving the household (check for missing data in any field or any inconsistency). Questionnaires developed on SurveyCTO also had conditions coded/alerts to prevent data entry mistakes/inconsistencies. As smartphones were used for data collection instead of tablets, questionnaire review by team leaders was not very user-friendly due to the smaller screen. Thus, to ensure consistency among anthropometric data collected, teams were also registering the household number, name, age, weight, height and MUAC of every surveyed child in the "Cluster form for review of anthropometric measurements" *(Annex 8)*; thus, the measurements of each child were checked before leaving the household as well as cross-checked with the data entered in the mobile phone. When data was not matching or any incoherence was detected (e.g. a child of 7 months with a recorded height of 80 cm) the child measurements were taken once again and updated accordingly in the mobile phone and the "cluster form for review of anthropometric measurements".

After a day's work in the field, a troubleshooting session followed to sort out particular situations or clarifications if any, was conducted by the supervisors and/or the coordinators. Daily administered questionnaires were cross-checked by supervisors to ensure quality of data gathered, then validated and submitted on daily basis (or every other day when network was not available in the area). A UNICEF focal point at central level was in charge of uploading data to the configured server where they were retrieved, then exported to excel format and sent to the survey manager. Using ENA for SMART software, regular plausibility checks were produced by the survey manager to enable managing near real-time the quality of the data collected in the field, thus informing supervisors daily for team´s morning feedback before proceeding to the field, to ensure continuous improvements as data collection progressed. When it was not possible to carry out daily plausibility checks, the "Cluster form for review of anthropometric measurements" (received directly or via whatsApp) helped substantially to monitor data quality and provide daily feedback to the teams.

The use of the Cluster control sheet and the Cluster form for review of anthropometric measurements, regular plausibility checks, thorough enumerator training, pilot testing prior to data collection exercise, and close supervision during the actual survey for consistency and completeness of the questionnaires ensured that the collected data was of good quality. During the training and every day during data collection, emphasis was placed on accuracy and precision in taking measurements and using the calendar of events, as well as the appropriate administration of the questionnaires to the respondents in the local language.

[16] The clusters completed the first 2 days where in the base-town or nearby.
[17] One of the coordinators could not continue after the first week due to an unforeseen priority.

Data entry and analysis

All data files were cleaned before analysis. Analysis for both anthropometry and mortality was performed using ENA for SMART (July 9th, 2015 version), and Epi Info version 7.1. was used to carry out statistical tests and further anthropometric analysis, as well as analyse other indicators (data on exclusive breastfeeding, measles vaccination and number meals consumed by children within the day preceding the data collection day). Anthropometric indices were computed in ENA for SMART and results reported with the exclusion of SMART flags. SMART Plausibility Reports were generated to check quality of the anthropometric data (see *Annexes 7 and 8).*

Case definitions for Nutritional Anthropometric Indicators

The ENA for SMART software calculates the Z-scores for weight-for-height (WFH), height-for-age (HFA) and weight-for-age (WFA). Using Z-scores in reference to the WHO Child Growth Standards, the following cut-offs (**Table 5**) were used to determine the prevalence of wasting, stunting and underweight.

Table 5: Cut-off point used to determine prevalence of wasting, stunting and underweight (WHO 2006).

Cut-off points for definition of Global, Moderate, and Severe Acute Malnutrition using WFH z-score	
Global	< -2 and/or bilateral oedema
Moderate	< -2 SD and ≥ -3 SD, no oedema
Severe	< -3 SD and/or bilateral oedema
Cut-off points for definition of Stunting using HFA z-score	
Stunting	<-2 SD
Moderate stunting	< -2 SD and ≥ -3 SD
Severe stunting	< -3 SD
Cut-off points for definition of Stunting using WFA z-score	
Underweight	< -2 SD
Moderate underweight	< -2 SD and ≥ -3 SD
Severe underweight	< -3 SD
Cut-off points for definition of Acute Malnutrition defined by MUAC, Children 6-59 months	
Global	<125 mm and/or oedema
Moderate	<125 mm and ≥115 mm
Severe	<115 mm and/or oedema

The WHO thresholds to assess the severity of nutrition situation have been recently updated in 2018. The up-to-date WHO Classification by prevalence ranges among children under 5 years[18] is presented in table 6 below.

Table 6: Prevalence thresholds categories for wasting, stunting and overweight in children under 5 years

Labels / Severity	**Global Acute Malnutrition (WFH)**	**Stunting (HFA)**	**Overweight (WFH)**
Very low	<2.5%	<2.5%	<2.5%
Low	≥ 2.5% - <5%	≥ 2.5% - <10%	≥ 2.5% - <5%
Medium	≥ 5% - <10%	≥ 2.5% - <20%	≥ 5% - <10%
High	≥ 10% - <15%	≥ 2.5% - <30%	≥ 10% - <15%
Very high	≥15%	≥30%	≥15%

[18] Onis M, Borghi E, Arimong M, Webb P, et al (2018). Prevalence thresholds for wasting, overweight and stunting in children under 5 years. Public Health Nutrition p 1-5.

The prevalence of GAM as identified by MUAC has been categorised in terms of severity by the Integrated Food Security Phase Classification (PC).[19] Categories are presented in table 7 below.

Table 7: IPC categories of severity of acute malnutrition by MUAC

Severity	GAM by MUAC <125mm and/or oedema
Extremely critical	≥17%
Critical	11.0 to 16.9%
Alert-Serious	6.0 to 10.9%
Acceptable	<6%

Limitations

Documentation indicating exact dates of birth for children 6-59 was low, especially in Huila survey area, where only 35% of all children had an official date of birth as per the health card or other official document (among children in Cunene area, 70% had accurate date of birth) . In case an official document was not present for a selected child, teams used the calendar of events to estimate age. Thus, recall bias could have occurred because of the difficulty of caretakers to remember events around the birth of the child combined with difficulties of some teams to accurately use the calendar of events. Teams encountered some caretakers (notably grandmothers) that did not even remember the year in which the child was born, but only ensured the age of the child. This likely reduced the quality of age data in the Huila survey.

In general, the SMART methodology is not adapted for IYCF indicators. For exclusive breastfeeding, the sample size was based on anthropometry and was too low; therefore, confidence interval is too large to draw strong conclusions for both surveys.

Reporting on number of meals includes always a risk of over or under-reporting. Questions were asked in a way to minimize under or over-reporting.

[19] IPC 2016. Addendum to the IPC technical manual version 2.0. Tools and procedures for classification of acute malnutrition.

RESULTS

Description of survey sample

Table 8 summarizes the number of households surveyed in each of the two survey areas as well as total number of children. Number of households completed in Huila is slightly lower because three clusters could not be surveyed due to lack of access. Since the coverage SMART criteria[20] were met (95.8% clusters were completed, and total number of children surveyed was higher than the target of 736, reaching 120.6%), there was no need to use the reserve clusters. Non-response rate was 1.7% and 0.9% in Huila and Cunene survey areas, respectively.

Average household size was 5.9 persons in Huila and 6.9 persons in Cunene. Average number of children under five per household were 1.6 and 1.4 in Huila and Cunene survey areas, respectively. Among all surveyed children, infants aged 0-5 months represented 10.9% (Huila) and 10.8% (Cunene) of the total sample.

Table 8: Surveyed household and children, per target group

Area surveyed	Households					Target groups	
	Planned sample*	Surveyed sample	Agreed	Refused	Absent	Children 6-59 months**	Children < 6 months
Huila	684	648	637 (98.3%)	0 (0.0%)	11 (1.7%)	888 (120.6%)	109
Cunene	684	684	678 (99.1%)	3 (0.4%)	3 (0.4%)	816 (110.9%)	99

*The planned number of households was calculated as 12 households per cluster (57 in total per survey).
**Total number of children 6-59 months surveyed and % of planned sample achieved (planned sample of 736 per survey).

The proportion of households living in urban areas was 18.7% (119/637) in Huila and 27.7% (188/678) in Cunene survey areas.

1. Distribution of children aged 6-59 months

The age and sex distribution of children aged 6-59 months is summarized in **Table 9**. The ratio of boys to girls was 1.0 and 1.1 for Huila and Cunene survey areas respectively. To note that the representation of girls in the older age category in Cunene area was lower than expected (ratio boys to girls of 1.6). Here, a number of children (n=11) were absent during the day of the survey as they had been sent on holidays to spend the Christmas period, usually the older children. A potential hypothesis behind the under-representation of girls in the older group might be that they are privileged compared to boys during holiday´s period (something that remains to be further explored).

For both surveys, there is under-representation of the older age category. This may be the result of the combination of: 1) difficulty for mothers/caretakers to give accurate age for older children coupled with difficulties of the teams in using the calendar of events, and 2) grandmothers frequently did not remember any event around the age of the child, not even the year in which the child was born.

[20] Following SMART criteria, the minimum of 90% of the clusters and more than 80% of children´s planned sample size.

Table 9: Distribution of sampled children 6-59 months by age, gender and survey area

Age (mo)	HUILA							CUNENE						
	Boys		Girls		Total		Ratio	Boys		Girls		Total		Ratio
	N	%	N	%	N	%	Boy:girl	N	%	N	%	N	%	Boy:girl
6-17	124	54.1	105	45.9	229	25.8	1.2	86	47.8	94	52.2	180	22.1	0.9
18-29	92	42.4	125	57.6	217	24.4	0.7	101	48.1	109	51.9	210	25.7	0.9
30-41	103	48.4	110	51.6	213	24.0	0.9	105	53.6	91	46.4	196	24.0	1.2
42-53	90	52.6	81	47.4	171	19.3	1.1	84	51.9	78	48.1	162	19.9	1.1
54-59	32	55.2	26	44.8	58	6.5	1.2	42	61.8	26	38.2	68	8.3	1.6
Total	441	49.7	447	50.3	888	100.0	1.0	418	51.2	398	48.8	816	100.0	1.1

Nutritional status of children aged 6-59 months

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.

ENA for SMART Plausibility Check presents different analyses of the child sample and anthropometric data. **Table 10** below summarizes specific quality indicators as well as the overall quality score, all of which are used to evaluate the survey´s quality. Complete plausibility reports for each survey are presented in *Annex 7 and 8.*

Table 10: Plausibility report results for anthropometric data

Quality indicator	Huila	Cunene
Overall quality score (%)*	4	5
Age ratio of 6-29/30-59 months (significant chi square –p-)**	0.011	0.289
Sex ratio (significant chi square-p-)***	0.840	0.484
Digit preference score for Weight****	3	4
Digit preference score for Height****	6	5
Digit preference score for MUAC****	4	4

**Overall Quality Score (0-9 excellent, 10-14 Good, 15-24 acceptable and > 25 problematic).*
*** Age ratio 6-29/30-59 – significant chi square (p)-: (>0.1 excellent, >0.05 good, >0.001 acceptable, ≤0.001 problematic).*
**** Sex ratio –significant chi square (p)-: (>0.1 excellent, >0.05 good, >0.001 acceptable, ≤0.001 problematic).*
*****Digit Preference Score (0-7 excellent, 8-12 Good, 13-20 Acceptable and > 20 problematic).*

Plausibility reports rated surveys as *excellent*, and indicators of representativeness and digit preference both met the SMART methodology requirements. Although the age ratio slightly deviated from the expected 0.85 (1.01 in Huila and 0.92 in Cunene), due to slight under-representation of the older groups of children **(Table 9),** the chi square results for scoring quality as indicated in the plausibility report are under acceptable levels as shown in table above.

Total number of children surveyed was 888 and 816 in Huila and Cunene survey areas respectively. However, for a few children measurements of weight and/or height could not be taken, either because of physical impairment (6 children), or because the digital scale shifted to pounds and the team thought that it was not working well[21] (3 children).

The analysis of nutritional indicators (WFH – acute malnutrition-; HFA –stunting-; WFA – underweight-) presented below was carried out after excluding SMART flags (-3 to 3 z-scores based on the observed mean of the surveyed population). **Table 11** presents the final sample for each of the nutritional indicators. For MUAC analysis, no data was excluded.

The proportion of children with an exact date of birth (date of birth´s official document available) was 35% in Huila and 70% in Cunene survey areas. Despite thorough use of calendar of events

[21] Fortunately, this happened in the last household of the cluster for that day. It was not possible to replace the digital scale, due to lack of network and very long distances in between clusters.

by teams, they encountered some difficulties in ascertaining accurate age. The majority of SMART flags for HFA and WFA were due to age discrepancies. Still, HFA standard deviation remains within the acceptable range of 0.8 – 1.2, and results can be considered representative.

Table 11: Mean z-scores, Design Effects and excluded subjects

Indicator	Huila					
	Flags excluded	**n**	**Mean z-scores ± SD**	**Design Effect (z-score < -2)**	**z-scores not available***	**z-scores out of range (flags)**
Weight-for-Height	SMART	868	-0.63±1.08	1.00	5	15
Weight-for-Age	SMART	878	-1.52±1.10	1.46	2	8
Height-for-Age	SMART	854	-1.95±1.18	1.00	3	31
Cunene						
Weight-for-Height	SMART	804	-0.76±1.00	1.55	4	8
Weight-for-Age	SMART	808	-1.42±1.05	1.82	3	5
Height-for-Age	SMART	787	-1.66±1.13	1.39	2	27

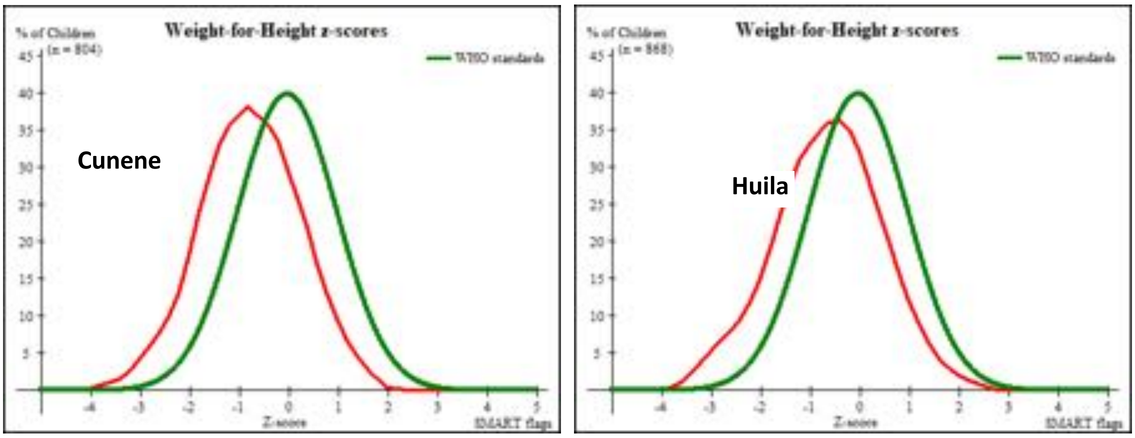
**Oedema cases (2) are not counted for WFH*

1. Acute Malnutrition in children aged 6-59 months

Figure 2 represents the distribution of WFH z-scores (red curve) compared with the WHO (2006) international reference population (green curve) for each survey area. Both curves are shifted to the left, with mean +SD of WFH of -0.63+1.08 and -0.76+1.00 for Huila and Cunene survey area respectively, illustrating a poorer nutrition status than that of the reference population.

The design effect for WFH in Huila survey area was 1.0, suggesting homogeneity among clusters. However, the design effect for WFH in Cunene area was 1.55, which suggest some inter cluster variations that would imply some heterogeneity of the population. For the Cunene survey, the Poisson distribution was statistically significant and the index of dispersion (ID) suggested that there were pockets of malnutrition (ID higher than 1 and p<0.05). This might be explained by the actual surveyed area covered, including rural and urban context, when population characteristics and vulnerabilities might be quite different.

Figure 2: Distribution of WFH z-scores for children 6-59 months, by survey area



The prevalence of GAM by WFH was similar in both surveys, with 10.8% (8.8 – 13.2 95% CI) in Huila and 10.6% (8.2% - 13.6% 95% CI) in Cunene. Prevalence of SAM was 2.1% (1.4 – 3.1 95% CI) and 1.1% (0.6 – 2.2 95% CI) in Huila and Cunene survey areas, respectively (**Table 12**). Only two children presented with bilateral pitting oedema in Huila (0.2%), and there were no cases found in Cunene among the surveyed children. The severity of the situation is classified as *High* in both survey areas based on WHO thresholds (2018).

GAM prevalence by WFH in both survey areas were higher in boys than in girls. Nonetheless, the difference was not statistically significant in Huila, while in Cunene statistical test would suggest that boys are more vulnerable to acute malnutrition than girls (p value 0.007).

Table 12: Prevalence of acute malnutrition based on WFH z-scores (&/or oedema) by sex and by survey area

	HUILA								
	All (870)			Boys (429)			Girls (441)		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
GAM	94	10.8	(8.8-13.2)	51	11.9	(9.2-15.3)	43	9.8	(6.9-13.7)
MAM	76	8.7	(7.0-10.8)	43	10.0	(7.4-13.4)	33	7.5	(5.3-10.5)
SAM	18	2.1	(1.4-3.1)	8	1.9	(1.0-3.5)	10	2.3	(1.3-4.0)
The prevalence of oedema is 0.2%									
	CUNENE								
	All (804)			**Boys (410)**			**Girls (394)**		
	n	**%**	**95% CI**	**n**	**%**	**95% CI**	**n**	**%**	**95% CI**
GAM	85	10.6	(8.2-13.6)	54	13.2	(9.3-18.3)	31	7.9	(5.7-10.8)
MAM	76	9.5	(7.3-12.1)	47	11.5	(8.2-15.9)	29	7.4	(5.2-10.3)
SAM	9	1.1	(0.6-2.2)	7	1.7	(0.9-3.4)	2	0.5	(0.1-2.0)
The prevalence of oedema is 0.0%									

Table 13 shows the prevalence of acute malnutrition by WFH disaggregated by two age groups, 6-23 and 24 to 59 months (for further details on prevalence for the 5 age groups see *annex 9*). In both survey areas, statistical analysis revealed that children aged 6-23 months were more likely to be acutely malnourished than those aged 24-59 months (p value 0.005 in Huila and 0.002 in Cunene).

Table 13: Prevalence of acute malnutrition of children 6-23 months and children 24-59 months by survey area, based on WFH z-scores (&/or oedema)

	HUILA (n=870)					
	Children 6-23 months (n=319)			Children 24-59 months (n=551)		
	n	%	95% CI	n	%	95% CI
GAM	46	14.4	(11.0-18.7)	48	8.7	(6.6-11.3)
MAM	36	11.3	(8.3-15.2)	40	7.2	(5.4-9.7)
SAM	10	3.1	(1.7-5.7)	8	1.5	(0.7-2.8)
	CUNENE (804)					
	Children 6-23 months (n=273)			**Children 24-59 months (n=531)**		
	n	**%**	**95% CI**	**n**	**%**	**95% CI**
GAM	41	15.0	(11.0-19.8)	44	8.3	(6.2-10.9)
MAM	34	12.5	(8.8-17.0)	42	7.9	(5.9-10.5)
SAM	7	2.6	(1.0-5.2)	2	0.4	(0.1-1.4)

Estimates of acute malnutrition were also assessed using MUAC values. MUAC is particularly sensitive to acute weight loss, as it reflects the peripheral wasting of muscle and subcutaneous adipose tissue. The MUAC is a useful tool for rapidly identifying children at a higher risk of mortality at the community level. According to MUAC analysis presented in **Table 14**, 8.2% (6.3 – 10.6 95% CI) children aged 6-59 months were acutely malnourished (MUAC < 125mm) in the Huila survey, and 6.9% (4.8 – 9.8 95% CI) in Cunene. In addition, 2.1% children in Huila and 1.2% in Cunene were found at high risk of mortality (MUAC <115mm). There were no significant differences between boys and girls.

Table 14: Prevalence of acute malnutrition based on MUAC cut off's (&/or oedema) by sex and survey area

	HUILA								
	All (n=888)			**Boys (n=441)**			**Girls (n=441)**		
	n	**%**	**95% CI**	**n**	**%**	**95% CI**	**n**	**%**	**95% CI**
GAM	73	8.2	(6.3-10.6)	41	9.3	(6.6-12.9)	32	7.2	(4.9-10.3)
MAM	54	6.1	(4.6-8.1)	34	7.7	(5.5-10.8)	20	4.5	(2.9-6.9)
SAM	19	2.1	(1.4-3.3)	7	1.6	(0.7-3.5)	12	2.7	(1.5-4.7)
	CUNENE								
	All (n=816)			**Boys (n=418)**			**Girls (n=398)**		
	n	**%**	**95% CI**	**n**	**%**	**95% CI**	**n**	**%**	**95% CI**
GAM	56	6.9	(4.8-9.8)	26	6.2	(3.7-10.2)	30	7.5	(5.2-10.8)
MAM	46	5.6	(3.9-8.1)	21	5.0	(3.1-8.1)	25	6.3	(4.0-9.7)
SAM	10	1.2	(0.6-2.4)	5	1.2	(0.4-3.3)	5	1.3	(0.5-2.9)

As expected, disaggregation of MUAC into two age groups (children aged 6-23 months and 24-59 months) shows a significantly higher prevalence of acute malnutrition through MUAC for the younger group (**Table 15**), with p value <0.001 in Huila as well as in Cunene surveyed areas. Further details on MUAC prevalence by age group are presented in *annex 9*.

Table 15: Prevalence of acute malnutrition of children 6-23 months and children 24-59 months by survey area, based on MUAC cut-offs &/or oedema

	HUILA (n=888)					
	Children 6-23 months (n=329)			**Children 24-59 months (n=554)**		
	n	**%**	**95% CI**	**n**	**%**	**95% CI**
GAM	51	15.5	(12.0-19.8)	22	3.9	(2.6-5.9)
SAM	16	4.9	(3.0-7.8)	3	0.5	(0.2-1.6)
	CUNENE (816)					
	Children 6-23 months (n=280)			**Children 24-59 months (n=536)**		
	n	**%**	**95% CI**	**n**	**%**	**95% CI**
GAM	44	15.7	(11.7-20.5)	12	2.2	(1.3-3.9)
SAM	10	3.6	(1.7-6.5)	0	0.0	-

The IMAM protocol in Angola includes MUAC, WFH and oedema as independent criteria for case detection and enrolment for treatment of acute malnutrition. In order to represent the prevalence of acute malnutrition among children aged 6-59 months more accurately, **Table 16** below presents the combined prevalence of GAM by WFH z-scores (<-2 z-scores), MUAC (<125 mm) and/or nutritional oedema. This aggregated indicator is called combined GAM (cGAM); for its calculation, children with either WFH z-score or MUAC missing were excluded from the dataset. In Huila survey, cGAM prevalence was 13.6% (11.5 – 16.0 95% CI), and in Cunene survey 12.9% (10.9% - 15.6% 95% CI). Combined Severe Acute Malnutrition (cSAM) was 3.0% and 1.7% in the survey areas of Huila and Cunene respectively. Combined GAM and SAM are quite important to represent more accurately the burden of acute malnutrition among children aged 6-59 months in each surveyed area.

Table 16: Prevalence of acute malnutrition based on weight-for-height z-scores &/or oedema or MUAC cut off's, by survey area

	HUILA (n=870)			**CUNENE (n=804)**		
	n	**%**	**95% CI**	**n**	**%**	**95% CI**
cGAM (WFH<-2 &/or MUAC < 125 &/or oedema)	118	13.6	(11.5-16.0)	104	12.9	(10.9-15.6)
cMAM (WFH<-2 &/or MUAC < 125 & ≥115)	92	10.6	(8.7-12.8)	90	12.1	(9.2-13.6)
cSAM (WFH<-3 &/or MUAC < 115 &/or oedema)	26	3.0	(2.1-4.3)	14	1.7	(1.0-2.9)

Table 17 depicts the summary table for all the indicators of acute malnutrition presented above, namely WFH z-scores, MUAC, and cGAM. Overall, among the surveyed children aged 6-59 months more GAM cases are identified through WFH z-scores (n=179) than through MUAC (n=129), while considering cGAM, there are a total of 222 cases of GAM. Among all GAM cases, only 31.9% and 31.7% of them were identified according to both indicators in Huila and Cunene survey areas, respectively.

Table 17: Prevalence of acute malnutrition by WFH z-scores, MUAC, and cGAM (and/or oedema) by survey area

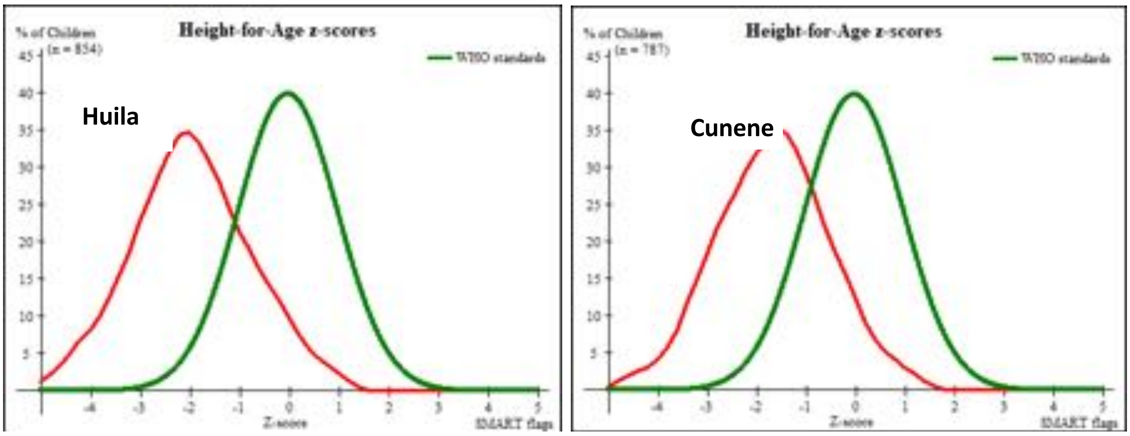
	HUILA								
	GAM			MAM			SAM		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
WFH z-scores	94	10.8	(8.8-13.2)	76	8.7	(7.0-10.8)	10	3.1	(1.7-5.7)
MUAC	73	8.2	(6.3-10.6)	54	6.1	(4.6-8.1)	19	2.1	(1.4-3.3)
cGAM	118	13.6	(11.5-16.0)	92	10.6	(8.7-12.8)	26	3.0	(2.1-4.3)
	CUNENE								
	GAM			**MAM**			**SAM**		
	n	**%**	**95% CI**	**n**	**%**	**95% CI**	**n**	**%**	**95% CI**
WFH z-scores	85	10.6	(8.2-13.6)	76	9.5	(7.3-12.1)	9	1.1	(0.6-2.2)
MUAC	56	6.9	(4.8-9.8)	46	5.6	(3.9-8.1)	10	1.2	(0.6-2.4)
cGAM	104	12.9	(10.9-15.6)	90	12.1	(9.2-13.6)	14	1.7	(1.0-2.9)

2. Stunting in children aged 6-59 months

The window of opportunity of a child´s first 1,000 days is the period from procreation, through pregnancy, birth, and infancy until a child is two years old. This period is of extreme importance for preventing stunting and its consequences.

As shown in **Figure 3**, the z-scores in the current study (red curve) were displaced to the left of the 2006 WHO reference population, indicating a high prevalence of stunting.

Figure 3: Distribution of HFA z-scores for children 6-59 months by survey area



The prevalence of stunting was 49.4% (46.2 – 52.6 95% CI) in Huila survey, and 37.2% (33.3 – 41.4 95% CI) in Cunene survey (**Table 18**), and 19.3% (16.6 - 22.3 95% CI) and 12.2% (9.8 – 15.2 95% CI) were severely stunted, respectively. Boys were found to have a significantly higher prevalence of stunting than girls (p value of 0.004 in Huila, and 0.005 in Cunene). According to 2018 WHO thresholds[22], the prevalence of stunting is classified as *Very high* in both survey areas.

[22] Very low (HFA<2.5%), Low (HFA≥2.5% and <10%), Medium (HFA≥10% and <20%), High (HFA≥20% and <30%), Very high (HFA≥30%).

Table 18: Prevalence of stunting based on height-for-age z-scores by sex and survey area

	HUILA								
	All (n=854)			Boys (n=429)			Girls (n=425)		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
Stunting	422	49.4	(46.2-52.6)	236	55.0	(50.4-59.5)	186	43.8	(38.7-49.0)
Moderate stunting	257	30.1	(27.3-33.1)	124	28.9	(25.4-32.7)	133	31.3	(26.8-36.2)
Severe stunting	165	19.3	(16.6-22.3)	112	26.1	(22.1-30.6)	53	12.5	(9.2-16.7)
	CUNENE								
	All (n=787)			Boys (n=402)			Girls (n=385)		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
Stunting	293	37.2	(33.3-41.4)	167	41.5	(36.4-46.9)	126	32.7	(28.0-37.8)
Moderate stunting	197	25.0	(21.8-28.6)	103	25.6	(21.4-30.3)	94	24.4	(20.1-29.3)
Severe stunting	96	12.2	(9.8-15.2)	64	15.9	(12.9-19.5)	32	8.3	(5.5-12.3)

There was no significant difference on prevalence of stunting between the younger (6-23 months) and older group of children (24-59 months) in Huila survey (**Table 19**; p value 0.149), while in Cunene survey the stunting prevalence was significantly higher among children aged 6-23 months (p 0.001). For further details on age categories see *annex 9*.

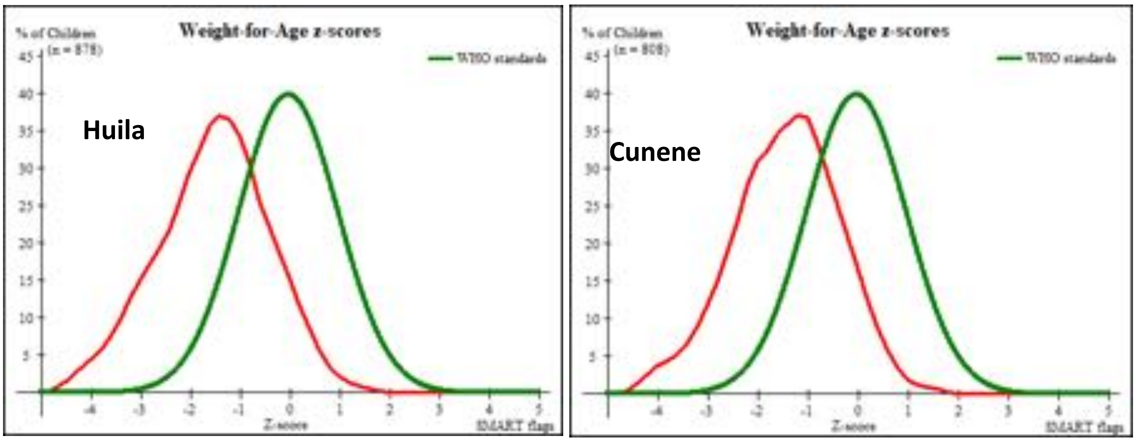
Table 19: Prevalence of stunting of children 6-23 months and children 24-59 months by survey area, based on height-for-age z-scores

	HUILA (n=854)					
	Children 6-23 months (n=313)			Children 24-59 months (n=541)		
	n	%	95% CI	n	%	95% CI
Stunting	162	51.8	(46.2-57.2)	260	48.1	(43.9-52.3)
Severe stunting	67	21.4	(17.2-26.3)	98	18.1	(15.1-21.6)
	CUNENE (n=789)					
	Children 6-23 months (n=269)			Children 30-59 months (n=518)		
	n	%	95% CI	n	%	95% CI
Stunting	120	44.6	(38.6-50.8)	173	33.4	(29.5-37.6)
Severe stunting	38	14.1	(10.2-18.9)	58	11.2	(8.8-14.2)

3. Underweight and overweight in children aged 6-59 months

The curves presented in Figure 4 are both shifted to the left of the 2006 WHO reference population, illustrating a high prevalence of underweight

Figure 3: Distribution of WFA z-score for children 6-59 months



The prevalence of underweight was quite similar in both survey areas (**Table 20**), with 30.8% (27.1 – 34.6 95% CI) in Huila and 27.8% (23.8 – 32.3) in Cunene. Regarding severity, 9.8% (8.0 – 12.0 95% CI) and 7.8% (5.4 – 11.1 95% CI) of children 6-59 months were severely underweight in Huila and Cunene areas respectively. Boys had a significantly higher prevalence of underweight than girls (statistical significance was stronger in Huila –p 0.005- than in Cunene – p 0.014-).

Table 20: Prevalence of underweight based on weight-for-age z-scores by sex and by survey area

	HUILA								
	All (n=878)			Boys (n=437)			Girls (n=441)		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
Underweight	270	30.8	(27.1-34.6)	152	34.8	(30.1-39.7)	118	26.8	(22.3-31.7)
Moderate Underweight	184	21.0	(18.0-24.2)	92	21.1	(17.1-25.6)	92	20.9	(17.4-24.8)
Severe Underweight	86	9.8	(8.0-12.0)	60	13.7	(10.7-17.5)	26	5.9	(3.9-8.8)
	CUNENE								
	All (n=808)			**Boys (n=412)**			**Girls (n=396)**		
	n	**%**	**95% CI**	**n**	**%**	**95% CI**	**n**	**%**	**95% CI**
Underweight	225	27.8	(23.8-32.3)	129	31.3	(26.1-37.1)	96	24.2	(19.3-30.0)
Moderate Underweight	162	20.0	(16.9-23.6)	88	21.4	(17.7-25.5)	74	18.7	(14.3-24.1)
Severe Underweight	63	7.8	(5.4-11.1)	41	10.0	(6.4-15.1)	22	5.6	(3.5-8.7)

There were significant differences in the underweight prevalence (**Table 21**) among children aged 6-23 months versus children aged 24-59 months in both survey areas (p 0.013 in Huila and 0.017 in Cunene). See *annex 9* for further details of underweight by age groups.

Table 21: Prevalence of underweight of children 6-23 months and children 24-59 months by survey area, based on weight-for-age

	HUILA (n=878)					
	Children 6-23 months (n=323)			Children 24-59 months (n=555)		
	n	%	95% CI	n	%	95% CI
Underweight	114	35.3	(30.3-40.7)	156	28.1	(24.5-32.0)
Severe Underweight	43	13.3	(10.0-17.5)	43	7.8	(5.8-10.3)
	CUNENE (808					
	Children 6-23 months (n=276)			**Children 24-59 months (n=532)**		
	n	**%**	**95% CI**	**n**	**%**	**95% CI**
Underweight	90	32.6	(27.1-38.5)	135	25.4	(22.0-29.1)
Severe Underweight	37	13.4	(9.6-18.0)	26	4.9	(3.5-7.3)

Regarding overweight (WFH≥ 2 z-scores) for children 6-59 months, 7 cases or 0.8% (0.4 – 1.7 95% CI) were found in the households sampled in Huila survey area. There were no cases of overweight among the surveyed children in Cunene area.

Retrospective mortality results

Mortality rates were calculated with a recall period of 84 and 85 days for all households surveyed (those with and without children) in Huila and Cunene survey areas, respectively. Thirteen deaths were reported in each survey, of which six where children below five years old in Huila and three in Cunene. The respective CDRs were 0.41 deaths/10.000 persons/day and 0.33 deaths/10.000/day in Huila and Cunene survey areas (**Table 22**). The U5DR was 0.78 deaths/10.000 children U5/day in Huila and 0.41 deaths/10.000 children U5/day in Cunene.

Table 22: CDR and U5DR by survey area covered within each survey area

	Recall period (Days)*	N total population	N total children	CDR		U5DR	
				Nº deaths	Death/10000/day	Nº deaths	Death/10000/day
Huila	84	3786	922	13	**0.41** (0.24-0.70 95% CI)	6	**0.78** (0.36-1.67 95% CI)
Cunene	85	4667	861	13	**0.33** (0.18-0.58 95% CI)	3	**0.41** (0.09-1.83 95% CI)

**Recall period calculated between September 17th. 2019 (Day of the National Hero) and the mid-data collection day.*

According to the Sphere Standards (2018), the current CDR and U5DR do not indicate a critical mortality situation in the surveyed areas[23].

Measles vaccination results

Table 23 below shows the measles vaccination coverage among all surveyed children aged 9-59 months. The source of information initially planned to confirm vaccination status was either child´s health card or mother´s recall (i.e., "yes, without card"). However, during the training and after discussion with the Head of Nutrition, the option "yes, without card" was finally discarded as stand-alone option (and it was included within the option "don´t know"): all argued that the latter was a non-realistic option because the vaccination scheme had recently been updated and the location of the vaccine could not be clearly identified. Thus, the child was considered vaccinated only when confirmed with the vaccination card.

In Huila survey, only 20.9% (18.3 – 23.8 95% CI) children aged 9-59 months were confirmed as vaccinated against measles. The coverage in Cunene survey was 53.3% (49.8 – 56.7 95% CI). When considering those children for which the mother reported "don´t know" (to account for potential underestimation by only relying on confirmation of measles vaccine with card) measles vaccination coverage was 43.9% in Huila and 61.2% in Cunene survey areas.

Table 23: Measles vaccination coverage for children aged 9-59 months by survey area

	Children 9-59 mo	With card			Don´t know*			No**		
		n	%	95% CI	n	%	95% CI	n	%	95% CI
Huila	840	176	20.9	18.3-23.8	193	23.0	20.4-26.1	471	56.1	52.6-59.3
Cunene	796	424	53.3	49.8-56.7	63	7.9	6.2-10.0	309	38.8	35.5-42.2

**Two possibilities were included here: 1) There is no vaccination card available and mother is unsure about what are the vaccine/s the child received; 2) Mother says yes but there is no vaccination card available.*
*** Two possibilities included here: 1) There is vaccination card and measles vaccination is not recorded as given; 2) No vaccination card available and mother reports that the child did not receive the vaccine.*

Reported number of meals consumed

As a proxy of food security within households, all mothers/caretakers of surveyed children were asked about the number of meals the child had consumed the day prior to data collection (number of solid, semi-solid or soft rations; breastfeeding was not included here). About one third (36.3% in Huila and 33.9% in Cunene areas) consumed three or more meals, while 63.7% and 66.0% in Huila and Cunene survey areas consumed two or less meals the day before the survey (**Table 24**). When considering only children aged 9-59 months **(Table 25)** results remained quite similar.

[23] Sphere Standards for emergency thresholds: CDR >1/10,000/day; U5CDR >2/10,000/day. Source available at https://spherestandards.org/wp-content/uploads/Sphere-Handbook-2018-EN.pdf

Table 24: Reported number of meals consumed by surveyed children 6-59 months the day prior to data collection, by survey area

Nº of meals	HUILA (n=888)		CUNENE (n=816)	
	n	%	n	%
0-1	102	11.5	73	8.9
2	464	52.2	466	57.1
3	293	33.0	239	29.3
4-6	29	3.3	38	4.7

Table 25: Reported number of meals consumed by children 9-59 months the day prior to data collection, by survey area

Nº of meals	HUILA (n=840)			CUNENE (n=796)		
	n	%	95% CI	n	%	95% CI
0-2	524	62.4	(59.1 – 65.6)	525	66.0	(62.6 – 69.2)
3-6	316	37.6	(34.4 – 40.9)	271	34.0	(30.8 – 37.4)

To test if there are statistical differences in prevalence of acute malnutrition, we have grouped our sample of children in two subsets (children consuming two or less meals versus those consuming three or more meals). Children aged 6-8 months were excluded from the analysis as per the recommended number of meals among this age group (two meals in addition to breastfeeding). In **Table 26** below, it can be observed that GAM prevalence by WFH increases as the number of meals decreases in both survey areas. The prevalence of GAM in Huila survey was significantly greater among children consuming less than three meals (p 0.001). The same trend was evident in Cunene survey but the difference was not statistically significant (p 0.138); in Cunene, a higher risk to acute malnutrition only appeared significant when only one meal was consumed (p 0.009).

Table 26: GAM prevalence based on WFH z-scores and/or oedema by number of meals consumed the day prior to data collection and survey area

Nº of meals	HUILA				CUNENE			
	Total N	n	GAM %	CI	Total N	n	GAM %	CI
0-2	512	69	13.5	(10.8-16.7)	515	59	11.5	(9.0-14.5)
≥3	311	21	6.8	(4.5-10.1)	269	24	8.9	(5.8-13.0)

Exclusive Breastfeeding

Exclusive breastfeeding (EBF) refers to the proportion of infants 0–5 months of age, which are fed exclusively with breast milk. Specifically, it is defined as no other food or drink, not even water, except breast milk for the first 6 months of life, but allows the infant to receive small quantities of ORS, drops and syrups (vitamins, minerals and medicines).

While it is not possible to provide conclusive information on EBF because of the small sample size for this age group, the SMART surveys suggest that the reported proportion of infants aged 0-5 months who were exclusively breastfed during the 24 hours preceding the study was 41.3% (31.9 – 51.1 95% CI) and 58.6% (48.2 – 68.4 95% CI) in Huila and Cunene survey areas, respectively (**Table 27**).

Table 27: Proportion of EBF infants by survey area covered within each province

	Total children < 6 mo	Nº children < 6mo EBF	% EBF	CI
Huila	109	45	41.3	(31.9-51.1)
Cunene	99	58	58.6	(48.2-68.4)

DISCUSSION

The SMART nutrition and mortality survey conducted in 5 municipalities of Huila[24] found the **prevalence of GAM per WFH among children aged 6-59 months at 10.8%** (8.8–13.2) **and of SAM at 2.1%** (1.4-3.1). For **Cunene surveyed municipalities**[25]**, the prevalence of GAM per WFH was 10.6%** (8.2-13.6) **and 1.1% for SAM** (0.6-2.2); only two cases of oedema were found in Huila and none in Cunene. **The severity of the nutrition situation, without considering all other aggravating factors, is classified as *High* based on 2018 WHO malnutrition thresholds**[26]. The results found in the surveyed municipalities of Huila are well above those reported for the whole province by the MICS conducted in 2015/16 (4.6% for GAM and 0.5% for SAM), while in the municipalities surveyed in Cunene GAM rates are approximately similar than the ones reported for the province and SAM rates are lower (10.5% for GAM and 3.5% for SAM). Of note is that during the MICS data collection period (October 2015 to March 2016) Southern Angola, and notably Cunene, was heavily affected by the drought-related impacts of El Niño.[27]

The plausibility analysis from Cunene dataset suggested that there are pockets of malnutrition, indicating higher vulnerability in some areas than the whole sampling frame. This might likely be explained by the actual survey geographical coverage, including urban and rural context[28], when population characteristics might well be different, as it was suggested by anecdotal reports from the survey teams reporting that, overall, conditions and vulnerabilities were quite different, and that children in the rural areas were more affected than those in the more urban areas. However, our two surveys were not designed to stratify or further disaggregate the findings into rural and urban areas, and therefore the findings provide a reliable picture of the nutrition situation of the population living in the surveyed municipalities in its whole.

GAM by WFH was higher among boys (11.9% in Huila and 13.2% in Cunene) than girls (9.8% in Huila and 7.9% in Cunene). While in Huila area this was not statistically significant, findings in Cunene area suggest a higher vulnerability to acute malnutrition for boys compared to girls (p 0.007), a finding that needs to be further investigated.

In both survey areas, **younger children (6-23 months) were significantly more wasted** (**14.4%** [11.0-18.7] in Huila and **15.0%** [11.0%-19.8] in Cunene) **than older children** (**8.7%** [6.6–11.3] in Huila and **8.8%** [6.2–10.9] in Cunene). Although WHO thresholds are not directly applicable for this smaller sub-group, the nutrition situation among the younger group is of major concern, with GAM per WFH prevalence at or near to the 15% *"Very High"* threshold. The significant difference between both age groups (p value of 0.005 in Huila and 0.002 in Cunene) would suggest that acute malnutrition is a major persistent problem[29] in both survey areas, which is now further aggravated by increased food insecurity coupled with the critical lack water, the failure to implement proper IYCF and caring practices, as well as the difficulties in access to health care.

MUAC analysis showed a lower GAM prevalence (8.2% [6.3-10.6] in Huila and 6.9% [4.8-9.8] in Cunene) than the GAM prevalence per WFH described above. Nonetheless, MUAC results still fall under the "Alert/Serious" category based on the Integrated Food Security Phase classification.[30] Among the surveyed children, more GAM cases are identified through WFH that MUAC; however, it is worth mentioning that only 31.9% (Huila survey area) and 31.7% (Cunene

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[24] 5 out of 14 municipalities: Matala, Quipungo, Chibia, Humpata and Gambos.
[25] 4 out 5 municipalities: Cahama, Cuanhama, Curoca, Cuvelai and Ombadja.
[26] GAM rate between 10.0% to 15.0%.
[27] https://lao.unfpa.org/sites/default/files/pub-pdf/1st%20RC%20Situation%20Report_EN_ang_OCHA.pdf
[28] It was assumed that both, rural and urban context were equally affected by the impacts of drought.
[29] During periods of extreme acute food insecurity the distribution of wasting across age groups changes as an increased proportion of older children become wasted. This is explained because wasting under two years of age may result from many causes , including a higher incidence of infectious diseases, failure of lactation and weaning, whereas wasting above two years is more likely to be a result of acute food shortages and reduced food intake.
[30] http://www.ipcinfo.org/fileadmin/user_upload/ipcinfo/docs/IPC_Acute_Malnutrition_Addendum2016.pdf

survey area) of all GAM cases are identified by both indicators. Discrepancies of prevalence by WFH versus MUAC are well established, as each of them have the potential to identify a different group of children –with MUAC predominantly selecting younger and small children-. This suggest that, while MUAC is clearly the best available tool for screening and referral of GAM cases, other means to improve case detection and referral should be promoted. In this line, strengthening capacities among the health staff involved in Growth Monitoring and Promotion (GMP) routine services in Angola, as well as further promotion of services among the population, has the potential to contribute to increased GAM coverage by capturing children that would remain un-identified otherwise, through better identification and referral to IMAM services.

The IMAM protocols in Angola include both, MUAC and WFH, as independent criteria for case detection and enrolment for treatment. Considering all GAM cases found among surveyed children together (i.e. those identified only through WFH, those identified only with MUAC, the oedema cases, and the cases that are identified by both indicators), would give a combined GAM prevalence (cGAM) of 13.6% (11.5-16.0) and 12.9% (10.9-15.6), with cSAM rates of 3.0% (2.1-4.3) and 1.7% (1.0-2.9) in Huila and Cunene survey areas respectively. WHO recommends that, to improve planning, the same criteria used for admission into programmes should be used for estimating caseload (WHO and UNICEF, 2009).[31] Thus, combined GAM and SAM data are crucial to inform the overall burden of acute malnutrition and estimating caseload for better planning of the resources to meet the needs.

Chronic malnutrition or stunting, as indicated by low height for age, has an impact on children's health and their chance of survival, contributing to over one million childhood deaths worldwide.[32] The main causes of stunting include intrauterine growth retardation, inadequate nutrition to support the rapid growth of infants and young children and developing frequent infections during early life. In our SMART surveys, the **prevalence of stunting among children aged 6-59 months in the surveyed municipalities in Huila was 49.4%** (46.2–52.6)**, and 19.3%** (16.6- 22.3) **children were severely stunted**. In **Cunene surveyed municipalities, prevalence of stunting was 37.2%** (33.3–41.4)**, with 12.2%** (9.8–15.2) **accounting for those with severe stunting**. These survey results are very close to MICS 2015/16 levels for children 0-59 months (43.6% and 39.3% for the entire province of Huila and Cunene, respectively). Based on the 2018 WHO classification, **prevalence of stunting in both survey areas is well above the 30% *"Very high"* threshold.** Prevalence of stunting was greater among children 6-23 months in both survey areas, although the difference with children 24-59 months was only statistically significant in Cunene (p value 0.001). Nonetheless, the persistent high prevalence of stunting in the older group (49.1% in Huila and 33.4% in Cunene) would suggest that many stunted children in either survey area have lost their window of opportunity. For both survey areas, boys were more vulnerable to stunting than girls (p 0.004 in Huila and 0.005 in Cunene).

While children with SAM have the highest risk of mortality[33], children with chronic malnutrition have also increased their risk of mortality between 2 and 5 times compared to non-stunted children[34], and have diminished their physical growth and intellectual development so that they are less productive than non-stunted children, with the consequent impacts on broader economic development[35]. With half of the children being stunted in Huila and more than one third in Cunene surveyed municipalities, and with GAM rates at 10.6%-10.8% -and above for the younger children-, it becomes evident that many children will be wasted and stunted at the

[31] WHO, UNICEF 2009. WHO child growth standards and the identification of severe acute malnutrition in infants and children: A joint statement by the World Health Organization and the United Nations Children´s Fund.

[32] UNICEF Global Report, 2014.

[33] 12 times more than a non-wasted non-stunted child.

[34] Olofin, I., et al. (2013). Associations of suboptimal growth with all-cause and cause-specific mortality in children under five years: A pooled analysis of ten prospective studies. *PLoS ONE*, 8(5): 64636.

[35] Kathryn G. Dewey and Khadija Begum (2011). Long-term consequences of stunting in early life. Maternal and child Nutrition, **7** (Suppl. 3), pp. 5–18.

same time (concurrently), and these children have a multiplicative increased mortality risk[36], reflecting the need to also prioritize stunting prevention interventions.

The **prevalence of underweight among children aged 6-59 months was quite similar in both survey areas, with 30.8% in Huila** (27.1-34.6), **and 27.8%** (23.8–32.3) **in Cunene.** Prevalence of **c**hildren severely underweight was also similar (9.8% [8.0-12.0] in Huila and 7.8% [5.4-11.1]). This is classified as "***High"*** **according to WHO classification.** Boys were more vulnerable to underweight than girls (p value of 0.005 in Huila and 0.014 in Cunene).

UNDERLYING CAUSES OF MALNUTRITION

It is well established that ***morbidity*** is one of the two mayor underlying causes of child malnutrition. Any disease can increase the risk of weight loss through increased energy consumption and decreased appetite. Diarrhoea additionally reduces the absorption of nutrients and can result in rapid weight loss and acute malnutrition in the short time. For the present SMART surveys, time constraints prevented the inclusion of questions to investigate morbidity among the studied population, neither was it possible to add time for carrying out detailed secondary data collection to understand actual morbidity trends. During fieldwork, community leaders, health staff and caretakers in some clusters reported an increase in cases of diarrhoea among children under five. Poor hygiene and sanitation due to limited water availability was also witnessed during data collection.

Measles vaccination coverage is an important indicator regarding the outreach of essential health services and provides information about the strength of the vaccination programmes. Among the surveyed children aged 9-59 months, coverage (confirmed by card) was as low as 20.9% and 53.3% in Huila and Cunene areas respectively, and even when adding those children for which the mother stated "don´t know" measles coverage was still far[37] below the international standard of 95% target set by WHO to prevent outbreaks. This is alarmingly low and worrying, and especially so considering the measles-malnutrition vicious cycle and the outbreaks of measles occurred recently in some provinces in Angola (Lunda Sul, Moxico and Lunda Norte).[38]

Infant and Young Child Feeding Practices**:** While it is not possible to provide conclusive information on the Exclusive Breastfeeding (EBF) practices because of the small sample size for this age group, the SMART surveys suggest that, 41.3% (31.9-51.1) and 58.6% (48.2-68.4) of infants less than 6 months of age were exclusively breastfed in Huila and Cunene survey areas, respectively. This is above the national average reported by MICS 2015/2016 (38%). Nonetheless, it is worth highlighting that, in the best of the cases, only about one of every two children under six months would have been exclusively breastfed. Therefore, the introduction of other liquids (and/or breastmilk substitutes or foods) represent a significant risk of contamination and development of water borne diseases, particularly in an environment where water quantity and quality, hygiene and sanitation remain very poor. Though the SMART surveys did not specifically enquired about other IYCF practices, secondary data suggest that they are also poor. Nation-wide results from MICS 2015/16 found that, overall, timely initiation of

[36] Myatt M, Khara T, Schoenbuchner S, Pietzsch S, Dolan C, Lelijveld N, et al. (2017). Children who are both wasted and stunted (WaSt) are also underweight and have a high risk of death. Action Against Hunger Research for Nutrition; Paris2017.

[37] It would be 43.9% and 61.2% in Huila and Cunene survey areas. Measles coverage results (confirmed either by card or mother´s recall) found in the MICCS 2015/16 was 50.4% for Huila and 60.5% for Cunene province.

[38] UNICEF Angola Humanitarian Situation Report_July 2019

breastfeeding was low (48.3%), only 32% achieved the minimum dietary diversity[39], 32.8% achieved the minimum meal frequency[40], and only 12.7% achieved an acceptable diet[41].

The fact that more than 60% of the surveyed children consumed two or fewer meals in the day preceding the survey (**Table 24**) is an indication that children are not getting enough nutrients as is required by their needs for their growth and development. *The less number of meals, the more the risk to become malnourished.* From the findings of the survey in Huila area, consuming two or less meals was statistically associated with heightened risk of acute malnutrition (p 0.001); the same trend was evident in Cunene area but the difference was not statistically significant, where only appeared significant when only one meal was consumed (p 0.009).

Though there are no recent ***food security*** studies available, the Vulnerability Food Security and Nutrition Assessment carried out in 2018[42] reported that dietary diversity was poor for as much as 77.2% of households studied in Cunene, and more than half (55.5%) of the households had a Food Consumption Score (FCS) rated as poor or borderline. Huila had also poor food security indicators though to a less extent (44.8% households with poor dietary diversity and 28.7% with poor/borderline FCS).

Findings from the last IPC conducted in July 2019[43], indicated very poor agricultural production (even null in some municipalities) and loss of livestock due to excess mortality -resulting in lack of food reserves-, scarcity of water for human consumption and livestock watering, loss of assets, and displacement of people and animals in search of pasture. Pest and animal disease attacks in some areas contributed also to decrease household stocks and sources of income. Food shortages have led to a sharp rise in prices in major local markets, limiting people's access to food. In addition, the advanced state of degradation of secondary and tertiary roads has made it difficult to access staples in the worst affected locations. All the aforementioned have importantly affected livelihoods, posing the population at greatest risk of nutrition status deterioration.[44]

The SMART surveys were conducted during the lean season/hunger gap (October-January) where highest prevalence of acute malnutrition would be expected in a given year. Following annual seasonal patterns acute malnutrition would be expected to decrease by February 2020 from its traditional highest peak (**Figure 4**) in the event of a "normal" year, as a result of household food availability increasing due to incoming harvest and market prices for staple foods dropping slightly. But this might not be the case as many households have already lost the possibility to cultivate during the main planting season (October)[45]. Thus, the situation will likely deteriorate in the coming months unless adequately addressed.

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

[40] *:* 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).

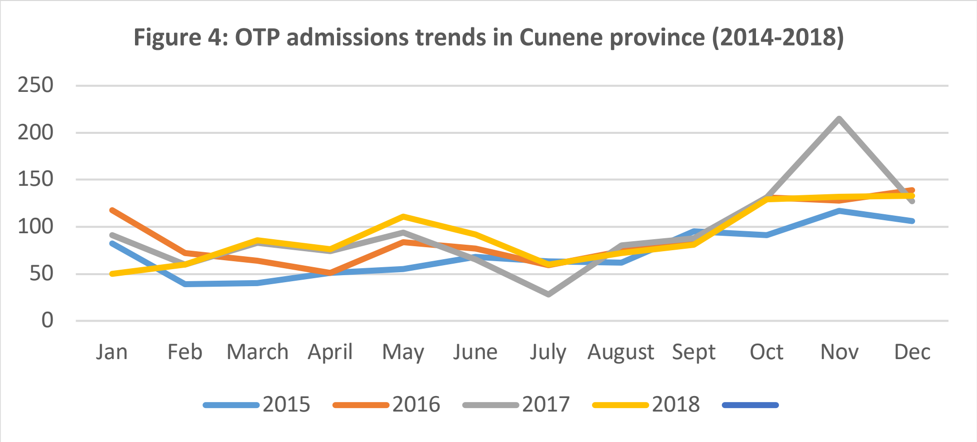
[41] Proportion of children 6–23 months of age who receive a minimum acceptable diet (apart from breast milk). This indicator combines minimum meal frequency and minimum dietary diversity indicators

[42] Avaliação da Vulnerabilidade e da Segurança Alimentar e Nutricional (Benguela, Cué, Cunene, Huila e Namibe). Mayo-Julhio 2018. Ministerio da Agricultura e Florestas. Gabinete de Segurança Aimentar. República de Angola.

[43] Ministério da Agricultura e Florestas, Gabinete de Segurança Alimentar. Sumário da situação de Insegurança Alimentar Aguda IPC 2019/20. Agosto, 2019.

[44] IPC assessement estimates 561,840 people would be facing difficulties in accessing food or would be able to meet only minimum food needs through crisis and emergency strategies by February 2020, and be further exacerbated if no intervention occurs timely.

[45] Usual harvesting time in January.



Source: World Vision Cunene

In summary, the results show serious levels of malnutrition among children aged 6-59 months in the surveyed areas of Huila and Cunene. Although the mortality rates are below emergency levels, acute malnutrition rates classify the severity of the situation as *High*, and the very high GAM rates at or near to 15% for the younger children (6-23 months) are of major concern. The population in our two samples was a mixture of livelihoods and social classes, and acute malnutrition in more vulnerable subpopulation are likely to be higher. Immediate support and close monitoring is needed as the malnutrition rates will likely increase due to the underlying causes in the coming period. The results also indicate that children are suffering from long-term nutritional deprivation, with an alarmingly high proportion of stunted children. In the current scenario, many children would be suffering from both forms of malnutrition concurrently. The heightened mortality risk associated with concurrent wasting and stunting highlights the need to also prioritize stunting prevention interventions.

With the aforesaid, the need for an integrated strategic response is deemed necessary to effectively prevent deterioration of the nutritional situation as well as to support food needs and livelihoods of most vulnerable households, through a combined nutrition, health, livelihood and WASH intervention.

RECOMMENDATIONS

Continue implementing the ongoing IMAM services and invest in efforts to improve performance and coverage.

- Strengthen the skilled work force available, as well as the capacities of MoH staff in charge of IMAM services through the provision of on-going technical support, on the job mentoring and regular joint supportive supervisory visits.
- Though priority is to be given to SAM treatment, efforts should be also invested to decreasing development of SAM cases through the integration of MAM treatment as part of IMAM services; this in turn would also allow for the needed follow-up support of recovered SAM cases to prevent a relapse.
- Consider the set-up of mobiles clinics to increase access to IMAM services to cater for those areas with long distances to health facilities.
- Strengthen and scale-up active case finding of MAM/SAM and referral of cases through MUAC screening at community level, as well as the follow-up of identified cases referred. Bottlenecks highlighted in the recent BNA are to be strongly considered.
- Strengthen efforts to increase community awareness on IMAM services, and evaluate the feasibility to expand the participation of other actors in active case finding to increase coverage. Mothers, carers, and educators in kindergartens could be trained to undertake monthly MUAC measurements to children to detect acute malnutrition.
- Strengthen the capacities of health staff involved in child health services to improve the identification of cases of acute malnutrition through weight-for-height and referral to IMAM services.

Prevent deterioration of acute malnutrition in vulnerable individuals and households: 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.

- Strengthen efforts to implement Blanket Supplementary Feeding (BSF) for children 6-23 months for at least 3-5 months, and have its continuation assessed based on evolution of the nutritional situation. Awareness and sensitization for proper use of supplementary foods for the target group should be included as part of the program. BSF should be also combined with other nutrition/health related activities as vitamin A distribution, deworming, and nutritional screening for surveillance and referral of cases to IMAM services.
- Considering the strong relation between morbidity and malnutrition priority should be also placed on disease prevention. Improvements in coverage of measles vaccination is seen as urgently necessary.
- Evaluate household vulnerability[46] of children following SAM treatment discharge. Linkage of identified vulnerable households should be made with food assistance/livelihood activities in the community.
- Efforts should be ramped up to ensure that households have access to safe water.

Prioritise and improve Infant and Young Child Feeding Practices through IYCF programming: of all proven preventive health and nutrition interventions, IYCF has the single greatest potential impact on child survival.

- Integrate IYCF interventions into IMAM services[47] by the provision of designated staff and harmonised IYCF package.

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[46] Household vulnerability can be assessed through the development of simple "ranking household vulnerability" tool.
[47] IYCF best practices are known to increase likelihood of recovery and reduce likelihood of relapse following discharge.

- Strengthen the human resource capacity to promote and support IYCF during any contact between health services and mothers throughout pregnancy and the first two years of child´s life[48].
- Develop or strengthen IYCF community-based activities through community peer-to-peer support groups (e.g. mother-to-mother support groups). These activities should include other family members who traditionally influence IYCF practices of mothers, e.g. husbands and mothers-in-law.
- Undertake formative research as a priority to assess barriers and enhancers that influence IYCF practices in Huila and Cunene. Findings should inform the IYCF Behaviour Change Communication intervention, appropriate key messages as well as the priority target groups.
- In the medium term, design a media/communication campaign for IYCF awareness.

Integrate nutrition sensitive programming in all food security interventions. The current response plan of the food security sector includes, among others, the provision of support to herders to mitigate livestock losses, support for urgent restoration of agricultural production for smallholder / subsistence farmers, food assistance to the most food insecure households and initiatives to increasing resilience to future threats.

- Develop and strengthen linkages between actors in the Nutrition sector and actors implementing livelihood programmes.
- Strengthen livelihood activities with the view of improved nutrition goals[49].
- Mainstream nutrition education and hygiene promotion in livelihood interventions, with particular emphasis on IYCF.
- Targeting of beneficiaries should prioritize: 1) households with children less than two years, and 2) households with pregnant lactating women.

Close monitoring of nutrition situation evolution and further research

- Develop a nutrition surveillance system to monitor the situation over time to detect trends with the aim of adapting nutritional strategies and interventions to the changed situation.
- Conduct a follow up nutrition survey in September-October 2020. Survey design should account for urban/rural contexts.
- Further research is required to understand cultural traditions/social norms/others behind the significant differences on malnutrition by gender.

Programming for stunting prevention interventions will require a more comprehensive multi-sectoral and long-term approach (that would continue afterwards outside the emergency context).

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

[49] Implement and advocate for livelihood interventions that address the needs of vulnerable groups, with the aim to diversify their food production and/or income, thus enabling them access to a more diversified diet

ANNEXES

1. Random selection of clusters using SPSS / National Institute of Statistics
2. Assignment of clusters
3. Cluster control form
4. Questionnaires
5. Local calendars of events
6. Cluster form for review of anthropometric measurements
7. Plausibility report Huila survey area
8. Plausibility report Cunene survey area
9. Tables of acute malnutrition (WFH, MUAC), stunting (HFA) and underweight (WFA) by age group and survey area

Annex 1: Seleção de conglomerados a partir do censo no SPSS

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 /COMPRESSED.
SORT CASES BY MN_C (A).
SORT CASES BY MN_C (D).
SORT CASES BY Estrato (A).
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 /COMPRESSED.
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EXECUTE.
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 /COMPRESSED.
FILTER OFF.
USE ALL.
SELECT IF (Prov_Mc = 1611  | Prov_Mc = 161 | Prov_Mc = 167 | Prov_Mc = 165 | Prov_Mc =
163 | Prov_Mc=1517 | Prov_Mc = 1515 | Prov_Mc = 155 | Prov_Mc = 1527 | Prov_Mc =
1525).
EXECUTE.
FREQUENCIES VARIABLES=MN_NOME
  /ORDER=ANALYSIS.
NEW FILE.
DATASET NAME DataSet2 WINDOW=FRONT.
DATASET ACTIVATE DataSet2.
DATASET CLOSE DataSet1.
GET
  FILE='W:\Inquérito Nutricional SMART Cunene Huila\DPA_Geral_Huila_Cunene.sav'.
DATASET CLOSE DataSet2.
SORT CASES BY PR_C (A).
```

SORT CASES BY Prov_Mc (A).

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EXECUTE.

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/ORDER=ANALYSIS.

Frequencies

Notes

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Comments

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Missing Value Handling Definition of Missing User-defined missing values are treated as missing.

Cases Used Statistics are based on all cases with valid data.

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Elapsed Time 00 00:00:00,000

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Missing 0

MN_NOME

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	Gambos (ex-Chiange)	228	6,2	6,2	18,8

Humpata 280 7,6 7,6 26,4

Kahama 126 3,4 3,4 29,8

Kuroca (ex.Oncocua) 88 2,4 2,4 32,2

Kuvelai 116 3,1 3,1 35,3

Kwanhama 826 22,4 22,4 57,7

Matala 559 15,1 15,1 72,8

Ombadja (ex. Cuamato) 642 17,4 17,4 90,2

Quipungo 363 9,8 9,8 100,0

Total 3695 100,0100,0

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Crosstabs

Notes

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N of Rows in Working Data File 3692

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Elapsed Time 00 00:00:00,000

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W:\Inquérito Nutricional SMART Cunene Huila\DPA_Geral_Huila_Cunene.sav

Case Processing Summary

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	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
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PR_C * COD_AREA Crosstabulation

Count

		COD_AREA		
		1	2	Total
PR_C	Huíla	25676	115490	141166
	Cunene	42003	110235	152238
Total		67679	225725	293404

>Warning # 3211

>On at least one case, the value of the weight variable was zero, negative, or

>missing. Such cases are invisible to statistical procedures and graphs which

>need positively weighted cases, but remain on the file and are processed by

>non-statistical facilities such as LIST and SAVE.

* Sampling Wizard.

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Complex Samples: Plan

Notes

Output Created 22-Nov-2019 10:45:05

Comments

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Warnings

This procedure ignores the weight variable.

This procedure does not check the consistency of the working data file with the plan file. We recommend looking at the output table or the plan file to check consistency before performing selection or analysis.

Summary

		Stage 1		
Design Variables	Stratification	1	Estrato	
	Cluster	1	GEOCOD_SEC	
Sample Information	Selection Method		PPS sampling without replacement	
	Measure of Size		Obtained from variable HBF	
	Number of Units Sampled		Obtained from matrix specification	
	Variables Created or Modified	Stagewise Inclusion (Selection) Probability	InclusionProbability_1_	
		Stagewise Cumulative Sample Weight	SampleWeightCumulative_1_	
Analysis Information	Estimator Assumption		Unequal probability sampling without replacement (using joint inclusion probabilities)	
	Inclusion Probability		Obtained from variable InclusionProbability_1_	

Plan File: W:\Inquérito Nutricional SMART Cunene Huila\Plano.csplan

Weight Variable: SampleWeight_Final_

Matrix Specification Details

Stage 1

Estrato	Number of Units Sampled
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152	47
161	16
162	41

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/PRINT SELECTION.

Complex Samples: Selection

Notes

Output Created 22-Nov-2019 10:45:06

Comments

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Split File <none>

N of Rows in Working Data File 3695

Plan File W:\Inquérito Nutricional SMART Cunene Huila\Plano.csplan

Random Number Seed 915072739

Missing Value Handling Definition of Missing User-defined missing values among the strata and cluster variables are treated as invalid.

Cases Used Cases with valid values on all stratification, cluster, and measure variables are used in the selection process.

Syntax CSSELECT

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Elapsed Time 00 00:00:00,358

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Joint Inclusion Probabilities File W:\Inquérito Nutricional SMART Cunene Huila\Plano.sav

W:\Inquérito Nutricional SMART Cunene Huila\DPA_Geral_Huila_Cunene.sav

Warnings

This procedure ignores the weight variable.

	Summary for Stage 1				
	Number of Units Sampled		Proportion of Units Sampled		
	Requested	Actual	Requested	Actual	
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	161	16	16	3,9%	3,9%
	162	41	41	3,0%	3,0%

Plan File: W:\Inquérito Nutricional SMART Cunene Huila\Plano.csplan

Annex 2: Assignment of clusters

CUNENE province_ List of clusters

Cluster ID	Municipio	Comuna	Comunidade/Barrio	Nº SECCAO	Total HH
1	Kahama	Kahama	Ompupa	001	65
2	Kahama	Kahama	Jangada	003	98
3	Kahama	Kahama	Ediva Sede	001	114
4	Kahama	Otchinjau	Muhama	001	93
5	Kahama	Otchinjau	Mbuaya Tchivonga	001	120
6	Kuroca (ex.Oncocua)	Chitado	Hangube	001	100
7	Kuvelai	Omunda (Mupa)	Oshivemba	001	135
8	Kwanhama	Ondjiva	Naipalala I	024	112
9	Kwanhama	Ondjiva	Naipalala II	002	106
10	Kwanhama	Ondjiva	Naipalala II	014	115
11	Kwanhama	Ondjiva	Naipalala II	016	173
12	Kwanhama	Ondjiva	Naipalala II	018	83
13	Kwanhama	Ondjiva	Pioneiro Zeca I	002	135
14	Kwanhama	Ondjiva	Kafito	014	136
15	Kwanhama	Ondjiva	Kakuluvale	011	119
16	Kwanhama	Ondjiva	Cachila II	003	111
17	Kwanhama	Ondjiva	Omulola	002	82
18	Kwanhama	Môngua	Onhanga	008	94
19	Kwanhama	Môngua	Eko- 2	004	70
20	Kwanhama	Môngua	Ombuba II	010	79
21	Kwanhama	Môngua	Esclova	003	100
22	Kwanhama	Môngua	Okaholo	016	92
23	Kwanhama	Môngua	Ohamavele	008	99
24	Kwanhama	Môngua	Engali 2	008	76
25	Kwanhama	Môngua	Engali 2	010	88
26	Kwanhama	Môngua	Omoolo 1	008	91
27	Kwanhama	Môngua	Omuholo 2	019	86
28	Kwanhama	Môngua	Otchamutilima	003	78
29	Kwanhama	Môngua	Okahenge	001	81
30	Kwanhama	Evale	Okamulo	003	77
31	Kwanhama	Evale	Ohakuve	001	98
32	Kwanhama	Evale	Okatika	001	102
33	Kwanhama	Cafima - Nehone	Onhaluheke	001	78
34	Kwanhama	Cafima - Nehone	Okapindi II	001	105
35	Kwanhama	Cafima - Nehone	Nehoni II	001	80
36	Kwanhama	Cafima - Nehone	Donkwav	001	83
37	Ombadja (ex. Cuamato)	Xangongo	Rei Mandume	003	106
38	Ombadja (ex. Cuamato)	Xangongo	Agostinho Neto	011	82
39	Ombadja (ex. Cuamato)	Xangongo	Deolinda Rodrigues	011	115
40	Ombadja (ex. Cuamato)	Xangongo	Simone Mukune	008	107
41	Ombadja (ex. Cuamato)	Humbe	T chinduly	004	97

42	Ombadja (ex. Cuamato)	Ombala-yo-Mungu	Omayuku	001	70
43	Ombadja (ex. Cuamato)	Ombala-yo-Mungu	Omayuku	003	84
44	Ombadja (ex. Cuamato)	Ombala-yo-Mungu	Oiwawati	002	71
45	Ombadja (ex. Cuamato)	Ombala-yo-Mungu	Onashalama	003	87
46	Ombadja (ex. Cuamato)	Ombala-yo-Mungu	Onashalama	004	90
47	Ombadja (ex. Cuamato)	Ombala-yo-Mungu	M. Womutano	001	85
48	Ombadja (ex. Cuamato)	Ombala-yo-Mungu	Okaliambada	001	96
49	Ombadja (ex. Cuamato)	Humbe	Mahengue	002	105
50	Ombadja (ex. Cuamato)	Humbe	Mahengue	003	104
51	Ombadja (ex. Cuamato)	Humbe	Nenguediva	001	68
52	Ombadja (ex. Cuamato)	Humbe	Calei	001	105
53	Ombadja (ex. Cuamato)	Mucope/Mucoma	Kamuhole	004	88
54	Ombadja (ex. Cuamato)	Mucope/Mucoma	Tchitokota	003	73
55	Ombadja (ex. Cuamato)	Naulila	Oshietetekela	004	75
56	Ombadja (ex. Cuamato)	Naulila	Mahengue	001	109
57	Ombadja (ex. Cuamato)	Naulila	Osiko (Osito)	001	150
RC1	Kwanhama	Ondjiva	Kakuluvale	009	102
RC2	Ombadja (ex. Cuamato)	Xangongo	Simone Mukune	003	138
RC3	Kwanhama	Ondjiva	Oifidi	002	87
RC4	Ombadja (ex. Cuamato)	Humbe	Mucuma	002	116
RC5	Ombadja (ex. Cuamato)	Naulila	Oshovele	003	67
RC6	Kahama	Otchinjau	Canhemei - Sede	003	109

HUILA province_ List of clusters

Cluster ID	Municipio	Comuna	Comunidade/Barrio	Nº SECCAO	Total HH
58	Chibia	Chibia	Hale	001	30
59	Chibia	Chibia	Santa Filomena	001	82
60	Chibia	Chibia	Mukua	001	22
61	Chibia	Chibia	Maheque	003	86
62	Chibia	Capunda Cavilongo	Tchitonta	001	45
63	Chibia	Capunda Cavilongo	Nongalafa	001	99
64	Chibia	Capunda Cavilongo	Cangolo Nangodjo	001	33
65	Chibia	Capunda Cavilongo	Canguele	002	74
66	Chibia	Jau	Tchina Cuhumbe	001	22
67	Chibia	Quihita	Malonga	001	100
68	Chibia	Quihita	Nombunda	001	92
69	Chibia	Quihita	Mulungo	001	39
70	Chibia	Quihita	Mpumpa	001	90
71	Chibia	Quihita	Tchiculuvale	001	33
72	Chibia	Quihita	Nkhondo	001	92
73	Gambos (ex-Chiange)	Chimbemba	Tchinhime	001	39
74	Humpata	Humpata	Suvo I	001	129
75	Humpata	Humpata	Tchimbulu	002	70
76	Humpata	Humpata	Tchindingue	002	60
77	Humpata	Humpata	Tchindingue	004	67
78	Humpata	Palanca	Tchima	001	62
79	Humpata	Palanca	Tchicuete	001	60
80	Humpata	Palanca	Huntende	005	76
81	Humpata	Neves	Mapale	001	80
82	Humpata	Neves	Lupanga	001	60
83	Humpata	Neves	Tchingombe	001	95
84	Matala	Matala	Matala Sede	004	100
85	Matala	Matala	Comandante Cowboy	008	87
86	Matala	Matala	Comandante Cowboy	012	109
87	Matala	Matala	Cahululu	004	88
88	Matala	Matala	11 de Novembro	014	115
89	Matala	Matala	Muquequete - II	002	120
90	Matala	Matala	Povoação da Castanhera da Pena	001	96
91	Matala	Matala	Muvale	011	117
92	Matala	Matala	Colonato	006	108
93	Matala	Matala	Canogundo	003	102
94	Matala	Matala	Calumbiro	025	101
95	Matala	Matala	Tchicuele	001	48
96	Matala	Mulondo	Capund=	001	41
97	Matala	Mulondo	Lupa	002	93
98	Matala	Mulondo	Chilumbi	001	56
99	Matala	Capelongo	Kalondopi	001	65

100	Matala	Capelongo	Maculungongo	001	73
101	Matala	Capelongo	Ndjandjo	002	69
102	Matala	Micosse	Mevoyela	004	113
103	Matala	Micosse	Socongo Baixo	001	52
104	Quipungo	Quipungo	Capato	003	89
105	Quipungo	Quipungo	Nkanga Nohanga	001	67
106	Quipungo	Cainda	Khondo Kalola	003	61
107	Quipungo	Chicungo	Chicungo	001	98
108	Quipungo	Tchiconco	Njovo Njovo	003	99
109	Quipungo	Tchiconco	Tchia	002	103
110	Quipungo	Ombo	Nonbunda - I	001	45
111	Quipungo	Ombo	Kondo Nougalafa	001	61
112	Quipungo	Ombo	Kanguinda	001	60
113	Quipungo	Ombo	Bembo - B	001	68
114	Quipungo	Ombo	Tchavindilica	001	115
RC1	Matala	Matala	Comandante Cowboy	021	108
RC2	Matala	Capelongo	Sede	005	84
RC3	Chibia	Chibia	Beyela	001	93
RC4	Quipungo	Cainda	Kanjangombua	001	100
RC5	Gambos (ex-Chiange)	Gambos	Wambango	001	66
RC6	Humpata	Humpata	Tchindingue	008	62

Annex 3: Cluster control form

FICHA DE CONTROL DE CONGLOMERADO

Nº equipa ____ Data ___/___/2019 Provincia __________ Municipalidade __________ Comuna __________ Comunidade __________
DD MM

Nº de conglomerado ______ Nome de lider de equipa ______________

Este formulário será preenchido pelo lider da equipe. Preencha para cada domicilio visitada

Nº de domicilio	Niños 0-59 meses				Questionário de Mortalidade preenchido SIM/ NÃO	Resultado da 1ª visita: 1 complete 2 parcialmente 3 Eles recusan 4 Ausente	A casa precisa ser visitada novamente SIM/NÃO	A casa foi visitada novamente SIM/NÃO	Resultado 2ª visita (se necessário) 1 complete 2 parcialmente 3 Eles recusan 4 Ausente	Hora de saida de domicilio*	Observações
	Nº crianças no domicilio	Nº crianças 6-59 meses	Nº crianças 0-5 meses	Nº crianças entrevistadas							
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

*A hora de saida do domicilio = hora que salva o questionário no Smartphone. Caso necesario voltar ao domicilio porque a criança esta ausente, identificar o domicilio verificando a hora de saida do mesmo.

Annex 4: Questionnaires

INQUERITO NUTRICIONAL SMART – ANGOLA- Dezembro 2019

Data da pesquisa (dd/mm/AAAA)	Número de conglomerado	Número da Equipa
|__|__|/|__|__|/|__|__|__|__|	|__|__|	|__|

Provincia: __________ Municipio: __________ ; Comuna: __________ ; Aldeia: __________ Lider da equipa: __________

Antropometria crianças de 6 a 59 meses

	1	2	3	4	5	6	7	8	9	10	
Nº criança	Nº domicilio	Sexo F =Feminino M=masculino	Data nascimento* (DD/MM/AAAA)	Idade** (meses)	Peso (kg) (00.0)	Altura (cm) (000.0)	Edema bilateral (S/N)	PB (mm) (000)	Quantas vezes [NOME] comeu ontem?***	Vacinação contra sarampo 1=Sim, com cartão 2= Não 3= Não sabe	Observaçoes
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											

*A data exata do nascimento deve ser obtida apenas de uma documentação de idade que mostre dia, mês e ano de nascimento. Só é gravado se a documentação oficial da idade estiver disponível. Deixe em branco **se não houver documentação oficial sobre a idade**

** Se não houver documentação sobre a idade, estime a idade usando o calendário de eventos local. Se houver documentação oficial sobre a idade, registre a idade em meses a partir da data de nascimento.

***As vezes que a mãe a amamentou não é incluida como ração. Aqui estamos solicitando o número de refeições sólidas, semi-sólidas ou macias.

QUESTIONÁRIO DE MORTALIDADE
Provincia de Cunene e Huila, ANGOLA – Dezembro 2019-

DATA DA ENTREVISTA (DD/MM/AAAA): ________________ **Provincia:** ________________

MUNICIPALIDADE:	COMUNA:	ALDEIA:
NOME DE ENCUESTADOR:		
Nº CONGLOMERADO. [ ]	Nº EQUIPA [ ]	Nº DOMICILIO[1] [ ]

01	02	03	04	05	06	07	08	
No.	Nome	Sexo M=masc F=feme	Idade (anos)	Ingressou no domicilio:	Ele saiu de domicilio:	Ele nasceu no domicilio:	Ele morreu no domicilio:	
				..No Dia do Heroi Nacional -17 Setembro 2019- ou depois				
				ESCREVA 'S' para SIM. Deixe EM BRANCO se NÃO				
a) Liste todas os membros que **atualmente moram** neste domicilio								
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
b) Liste todos os membros que **deixaram el domicilio** (emigrantes) **desde o Dia do Heroi Nacional (17 de setembro de 2019)**								
1					S			
2					S			
3					S			
4					S			
5					S			
c) Liste todos os membros da familia que morreram **desde o Dia do Heroi Nacional (17 de setembro de 2019)**								
1							S	
2							S	
3							S	
4							S	
5							S	

Alguém na casa estava grávida no Dia do Hiroi Nacional? Não [ ] Sim [ ] Se sim, quantas?______

[1] Definimos o domicilio como uma pessoa ou grupo de pessoas, familiares ou não, que vivem juntas sob um mesmo teto e reconhecem a autoridade de uma pessoa, que é o chefe de familia.

QUESTIONÁRIO PARA CRIANÇAS COM MENOS DE 6 MESES

–Provincias de Huila e Cunene; Angola–; Dezembro 2019

Data da pesquisa	Número conglomerado	Número do domicílio	Número da equipa
___/___/ 2019 Dia Mes	___	___	___

Provincia: _________ **; Municipalidade:**____________ **; Comuna:** __________ **Aldeia:** ___________

Nome de inquiridor: ______________

Faça todos os esforços para falar com a mãe. Se ela não estiver disponível, fale com o cuidador principal responsável pela alimentação da criança.

Existem crianças na família que tenham menos de 6 meses? Se SIM, identifique a mãe / cuidador principal e continue: Qual é o nome da criança? ____________________

1	**Data de nascimento:** A data exata do nascimento deve ser obtida apenas de uma documentação de idade que mostre dia, mês e ano de nascimento. Só é gravado se a documentação oficial da idade estiver disponível. Deixe em branco se não houver documentação oficial sobre a idade. *Se a criança completou 6 meses, NÃO inclua a criança.*	___/___/ 2019 Dia / Mes		
2	**Idade da criança em meses:** *Se a documentação oficial não estiver disponível, faça uma estimativa usando o calendário local de eventos.*	___ meses		
3	**Sexo da criança**	1. Masculino 2. Femenino		
		SIM	**NÃO**	**NÃO SEI**
4	*[NAME]* **foi amamentada ontem durante o dia ou à noite?**			
5	**Agora gostaria de perguntar-lhe sobre os líquidos e alimentos que o(a)** *[NAME]* **consumiu ontem durante o dia ou durante a noite. Gostaria de saber se a criança consumiu o tipo de líquido o alimento que vou mencionar mesmo que tenha sido combinado com outros líquidos.**			
		SIM	**NÃO**	**NÃO SEI**
A	Agua comum ?			
B	Sumo, refresco ou quissangua ?			
C	Caldo?			
D	Leite en pó, liquid ou fresco?			
E	Leite (formula) infantil ?			
F	Algum outro liquido?			
G	Logurte ?			
H	Alguma papa infantil, por exemplo Cerelac?			
I	Pão, arroz, esparguete, milho, trigo, massambala, ou outras comidas preparadas com cereais ou legumes?			
J	Alguma comida preparada com cenoura, batata doce, mandioca, inhame ou outras comidas preparadas com tubérculos ?			
L	Alguma fruta ou comida preparada com verdura?			
M	Alguma comida preparada com carne, pescado, ou ovos ?			
O	Algum outro alimento sólido, semi-sólido, ou brando ?			

Annex 5: Local calendars of events

Calendário de eventos - Pesquisa realizada em Dezembro de 2019
CUNENE

Estação do ano	Feriados religiosos	Outros eventos importantes	Mês e Ano de Nascimento	Idade (M)
2019	*ELEIÇÃO DE ADALBERTO COSTA JÚNIOR À PRESIDÊNCIA DA UNITA*		2019	
Época de chuvas	Natal (24 Dez)		Dezembro 2019	0
Raras chuvas		Término da época de Efiko Dia da Independência (11 de Novembro)	Novembro 2019	1
Início das chuvas (muito calor)		Término da época de Nonhandi (Fruta silvestre)	Outubro 2019	2
Início do Verão (12 de Setembro)		Dia do Herói Nacional (17 de Setembro)	Setembro 2019	3
Fim do frio (2 de Agosto)		Início da época de caça a animais Início da época de Efiko	Agosto 2019	4
Época de frio		Início da colheita de Nonhandi (Fruta silvestre)	Julho 2019	5
Época de frio		7º Congresso extraordinário do MPLA (15 de Junho)	Junho 2019	6
Início do frio (28 de Maio)		Início da época de circuncisão (Maio a Junho)	Maio 2019	7
Verão	Páscoa (21 Abril)	Comemorações do Dia da Paz (4 de Abril)	Abril 2019	8
Verão		Dia da Mulher (8 de março)	Março 2019	9
Verão		Comemorações início da luta armada (4 de Fevereiro) Início do ano lectivo (1ª semana de Fev) Início da colheita do Nome (Fruto silvestre)	Fevereiro 2019	10
Verão	Ano Novo (1 Jan)	Dia do Massacre da Baixa de Cassanje (4 de Janeiro)	Janeiro 2019	11
2018	*Incluir um evento único que ocorreu neste ano (eleições etc.)*		2018	
Época de chuvas	Natal (24 Dez)		Dezembro 2018	12
Início das chuvas		Término da época de Efiko Dia da Independência (11 de Novembro)	Novembro 2018	13
Época de muito calor		Término da época de Nonhandi (Fruta silvestre)	Outubro 2018	14
Início do Verão (12 de Setembro)		Dia do Herói Nacional (17 de Setembro)	Setembro 2018	15
Fim do frio (2 de Agosto)		Início da época de caça Início da época de Efiko	Agosto 2018	16
Época de frio		Início da colheita de Nonhandi (Fruta silvestre)	Julho 2018	17
Época de frio		Copa do Mundo de Futebol na Rússia (14 de Junho) Pouca colheita de Massango	Junho 2018	18
Início do frio (28 de Maio)		Início da época de circuncisão (Maio a Junho)	Maio 2018	19
Verão	Páscoa (1 Abril)	Início da colheita do Milho Comemorações do Dia da Paz (4 de Abril)	Abril 2018	20
Verão		Dia da Mulher (8 de março)	Março 2018	21
Verão		Comemorações início da luta armada (4 de Fevereiro) Início do ano lectivo (1ª semana de Fev)	Fevereiro 2018	22
Verão	Ano novo (1 Janeiro)	Dia do Massacre da Baixa de Cassanje (4 de Janeiro)	Janeiro 2018	23
2017	*ELEIÇÃO DE JOÃO LOURENÇO À PRESIDÊNCIA DE ANGOLA*		2017	
Época de chuvas	Natal (24 Dez)		Dezembro 2017	24
Início das chuvas		Término da época de Efiko Dia da Independência (11 de Novembro)	Novembro 2017	25
Época de muito calor		Término da época de Nonhandi (Fruta silvestre)	Outubro 2017	26
Início do Verão (12 de Setembro)		Dia do Herói Nacional (17 de Setembro)	Setembro 2017	27
Fim do frio (2 de Agosto)		Eleição para Presidente de Angola (23 de Agosto)	Agosto 2017	28
Época de frio		Mbanza kongo património da humanidade (8 de Julho)	Julho 2017	29
Época de frio		Início da colheita de Massango	Junho 2017	30
Início do frio (28 de Maio)		Início da época de circuncisão (Maio a Junho)	Maio 2017	31
Verão	Páscoa (16 Abril)	Início da colheita do Milho Comemorações do Dia da Paz (4 de Abril)	Abril 2017	32
Verão		Dia da Mulher (8 de março)	Março 2017	33

Verão		Comemorações início da luta armada (4 de Fevereiro) Início do ano lectivo (1ª semana de Fev)	Fevereiro 2017	34
Verão	Ano novo (1 Janeiro)		Janeiro 2017	35
2016	***MORTE DO GOVERNADOR DO CUNENE ANTONIO DIDALEWA***		**2016**	
Época de chuvas	Natal (24 Dez)		Dezembro 2016	36
Início das chuvas		Dia da Independência (11 de Novembro)	Novembro 2016	37
Época de muito calor			Outubro 2016	38
Início do Verão (12 de Setembro)		Tomada de posse Novo Governador Kundi Paihama Dia do Herói Nacional (17 de Setembro)	Setembro 2016	39
Fim do frio (2 de Agosto)		Morte de Antonio Didalewa (31 de Agosto)	Agosto 2016	40
Época de frio		Início da colheita de Nonhandi (Fruta silvestre)	Julho 2016	41
Época de frio		Início da colheita de Massango	Junho 2016	42
Início do frio (28 de Maio)		Início da época de circuncisão (Maio a Junho)	Maio 2016	43
Verão		Início da colheita do Milho Comemorações do Dia da Paz (4 de Abril)	Abril 2016	44
Verão	Páscoa (27 Março)	Dia da Mulher (8 de março)	Março 2016	45
Verão		Comemorações início da luta armada (4 de Fevereiro) Início do ano lectivo (1ª semana de Fev) Início da colheita do Nome (Fruto silvestre)	Fevereiro 2016	46
Verão	Ano novo (1 Janeiro)	Dia do Massacre da Baixa de Cassanje (4 de Janeiro)	Janeiro 2016	47
2015	***INQUÉRITO DE INDICADORES MÚLTIPLOS E DE SAÚDE (IIMS 2015-16)***		**2015**	
Época de chuvas	Natal (24 Dez)		Dezembro 2015	48
Início das chuvas		Término da época de Efiko Dia da Independência (11 de Novembro)	Novembro 2015	49
Época de muito calor		Término da época de Nonhandi (Fruta silvestre)	Outubro 2015	50
Início do Verão (12 de Setembro)		Dia do Herói Nacional (17 de Setembro)	Setembro 2015	51
Fim do frio (2 de Agosto)		Início da época de caça Início da época de Efiko	Agosto 2015	52
Época de frio		Início da colheita de Nonhandi (Fruta silvestre)	Julho 2015	53
Época de frio		Início da colheita de Massango	Junho 2015	54
Início do frio (28 de Maio)		Início da época de circuncisão (Maio a Junho)	Maio 2015	55
Verão	Páscoa (5 Abril)	Início da colheita do Milho Comemorações do Dia da Paz (4 de Abril)	Abril 2015	56
Verão		Dia da Mulher (8 de março)	Março 2015	57
Verão		Comemorações início da luta armada (4 de Fevereiro) Início do ano lectivo (1ª semana de Fev) Início da colheita do Nome (Fruto silvestre)	Fevereiro 2015	58
Verão	Ano novo (1 Janeiro)	Dia do Massacre da Baixa de Cassanje (4 de Janeiro)	Janeiro 2015	59
2014	***COPA DO MUNDO DE FUTEBOL NO BRASIL***		**2014**	
Época de chuvas	Natal (24 Dez)		Dezembro 2014	60

Calendário de eventos - Pesquisa realizada em Dezembro de 2019
HUÍLA

Estação do ano	Feriados religiosos	Outros eventos importantes	Mês e Ano de Nascimento	Idade (M)
2019	**ELEIÇÃO DE ADALBERTO COSTA JÚNIOR À PRESIDÊNCIA DA UNITA ANO DO IVA**		**2019**	
Época de chuvas	Natal (24 Dez)	Término da época de Efiko Início da colheita da manga	Dezembro 2019	0
Raras chuvas Época colheita da batata rena na chibia Início da colheita da pera de natal		Dia da Independência (11 de Novembro) Dia dos Finados (2 de Novembro)	Novembro 2019	1
Início das chuvas (muito calor) Término da época de Nonhandi		Dia do município da matala Dia do município da Chibia	Outubro 2019	2
Início do Verão (12 de Setembro) Época de debulhar o massango Época da batata rena na matala		Dia do Herói Nacional (17 de Setembro) Dia da mama muxima do toco	Setembro 2019	3
Fim do frio (2 de Agosto) Época de debulhar o milho	Festas da nossa Sra. Do Monte	Início da época de caça a animais Início da época de Efiko	Agosto 2019	4
Época de frio		Início da colheita de Nonhandi e maboque Tempo de festejo das chuvas	Julho 2019	5
Época de frio	7º Congresso extraordinário do MPLA (15 de Junho) Início das macas		Junho 2019	6
Início do frio (28 de Maio)		Início da época de circuncisão (Maio/Junho)	Maio 2019	7
Verão	Páscoa (21 Abril)	Comemorações do Dia da Paz (4 de Abril) Época de preparar adobe	Abril 2019	8
Verão / Colheita do pepino Colheita da maçaroca		Dia da Mulher (8 de março)	Março 2019	9
Verão Início da colheita do Nombe		Comemoraçao início da luta armada (4 Fev) Início do ano lectivo (1ª semana Fev) Carnaval	Fevereiro 2019	10
Verão / Fim da época da manga Fim da época da pera de natal	Ano Novo (1 Jan)	Dia do Massacre da Baixa de Cassanje (4 de Janeiro)	Janeiro 2019	11
2018	Incluir um evento único que ocorreu neste ano (eleições etc.)		**2018**	
Época de chuvas	Natal (24 Dez)	Término da época de Efiko Início da colheita da manga	Dezembro 2018	12
Raras chuvas Época colheita da batata rena na chibia Início da colheita da pera de natal		Dia da Independência (11 de Novembro) Dia dos Finados (2 de Novembro)	Novembro 2018	13
Início das chuvas (muito calor) Término da época de Nonhandi		Dia do município da matala Dia do município da Chibia	Outubro 2018	14
Início do Verão (12 de Setembro) Época de debulhar o massango Época da batata rena na matala		Dia do Herói Nacional (17 de Setembro) Dia da mama muxima do toco	Setembro 2018	15
Fim do frio (2 de Agosto) Época de debulhar o milho	Festas da nossa Sra. Do Monte	Início da época de caça a animais Início da época de Efiko	Agosto 2018	16
Época de frio		Início da colheita de Nonhandi e maboque Tempo de festejo das chuvas	Julho 2018	17
Época de frio	Copa do Mundo de Futebol na Russia (14 de Junho) Início das macas		Junho 2018	18
Início do frio (28 de Maio)		Início da época de circuncisão (Maio/Junho)	Maio 2018	19
Verão	Páscoa (21 Abril)	Comemorações do Dia da Paz (4 de Abril) Época de preparar adobe	Abril 2018	20
Verão / Colheita do pepino Colheita da maçaroca		Dia da Mulher (8 de março)	Março 2018	21
Verão Início da colheita do Nombe		Comemoraçao início da luta armada (4 Fev) Início do ano lectivo (1ª semana de Fev	Fevereiro 2018	22
Verão / Fim da época da manga Fim da época da pera de natal	Ano Novo (1 Jan)	Dia do Massacre da Baixa de Cassanje (4 de Janeiro)	Janeiro 2018	23
2017	**ELEIÇÃO DE JOÃO LOURENÇO À PRESIDÊNCIA DE ANGOLA**		**2017**	

Época de chuvas	Natal (24 Dez)	Término da época de Efiko Início da colheita da manga	Dezembro 2017	24
Raras chuvas Época colheita da batata rena na chibia Início da colheita da pera de natal		Dia da Independência (11 de Novembro) Dia dos Finados (2 de Novembro)	Novembro 2017	25
Início das chuvas (muito calor) Término da época de Nonhandi		Dia do município da matala Dia do município da Chibia	Outubro 2017	26
Início do Verão (12 de Setembro) Época de debulhar o massango Época de batata rena na matala		Dia do Herói Nacional (17 de Setembro) Dia da mama muxima do toco	Setembro 2017	27
Fim do frio (2 de Agosto) Época de debulhar o milho	Festas da nossa Sra. Do Monte	Início da época de caça a animais Início da época de Efiko	Agosto 2017	28
Época de frio		Início da colheita de Nonhandi e maboque Tempo de festejo das chuvas	Julho 2017	29
Época de frio / colheita de Massango		Início das nacas	Junho 2017	30
Início do frio (28 de Maio)		Início da época de circuncisão (Maio/Junho)	Maio 2017	31
Verão	Páscoa (21 Abril)	Comemorações do Dia da Paz (4 de Abril) Época de preparar adobe	Abril 2017	32
Verão / Colheita do pepino Colheita da maçaroca		Dia da Mulher (8 de março)	Março 2017	33
Verão Início da colheita do Nombe		Comemoração início da luta armada (4 Fev) Início do ano lectivo (1ª semana de Fev) Carnaval	Fevereiro 2017	34
Verão / Fim da época da manga Fim da época da pera de natal	Ano Novo (1 Jan)	Dia do Massacre da Baixa de Cassanje (4 de Janeiro)	Janeiro 2017	35
2016	*MORTE DO GOVERNADOR DO CUNENE ANTONIO DIDALEWA*		**2016**	
Época de chuvas	Natal (24 Dez)	Término da época de Efiko Início da colheita da manga	Dezembro 2016	36
Raras chuvas Época colheita da batata rena na chibia Início da colheita da pera de natal		Dia da Independência (11 de Novembro) Dia dos Finados (2 de Novembro)	Novembro 2016	37
Início das chuvas (muito calor) Término da época de Nonhandi		Dia do município da matala Dia do município da Chibia	Outubro 2016	38
Início do Verão (12 de Setembro) Época de debulhar o massango Época de batata rena na matala		Dia do Herói Nacional (17 de Setembro) Dia da mama muxima do toco	Setembro 2016	39
Fim do frio (2 de Agosto) Época de debulhar o milho	Festas da nossa Sra. Do Monte	Início da época de caça a animais Início da época de Efiko	Agosto 2016	40
Época de frio		Início da colheita de Nonhandi e maboque Tempo de festejo das chuvas	Julho 2016	41
Época de frio		Início da colheita de Massango	Junho 2016	42
Início do frio (28 de Maio)		Início da época de circuncisão (Maio/Junho)	Maio 2016	43
Verão		Comemorações do Dia da Paz (4 de Abril) Época de preparar adobe	Abril 2016	44
Verão / Colheita do pepino Colheita da maçaroca	Páscoa (27 Março)	Dia da Mulher (8 de março)	Março 2016	45
Verão Início da colheita do Nombe (Fruto silvestre)		Comemoração início da luta armada (4 Fev) Início do ano lectivo (1ª semana de Fev) Carnaval	Fevereiro 2016	46
Verão / Fim da época da manga Fim da época da pera de natal	Ano novo (1 Janeiro)	Dia do Massacre da Baixa de Cassanje (4 de Janeiro)	Janeiro 2016	47
2015	*INQUÉRITO DE INDICADORES MÚLTIPLOS E DE SAÚDE (IIMS 2015-16)*		**2015**	
Época de chuvas	Natal (24 Dez)	Término da época de Efiko Início da colheita da manga	Dezembro 2015	48
Raras chuvas Época colheita da batata rena na chibia Início da colheita da pera de natal		Dia da Independência (11 de Novembro) Dia dos Finados (2 de Novembro)	Novembro 2015	49
Início das chuvas (muito calor) Término da época de Nonhandi		Dia do município da matala Dia do município da Chibia	Outubro 2015	50
Início do Verão (12 de Setembro) Época de debulhar o massango Época de batata rena na matala		Dia do Herói Nacional (17 de Setembro) Dia da mama muxima do toco	Setembro 2015	51
Fim do frio (2 de Agosto) Época de debulhar o milho	Festas da nossa Sra. Do Monte	Início da época de caça a animais Início da época de Efiko	Agosto 2015	52
Época de frio		Início da colheita de Nonhandi e maboque Tempo de festejo das chuvas	Julho 2015	53
Época de frio		Início da colheita de Massango	Junho 2015	54
Início do frio (28 de Maio)		Início da época de circuncisão (Maio/Junho)	Maio 2015	55
Verão		Comemorações do Dia da Paz (4 de Abril) Época de preparar adobe	Abril 2015	56
Verão / Colheita do pepino Colheita da maçaroca	Páscoa (27 Março)	Dia da Mulher (8 de março)	Março 2015	57
Verão /Início da colheita do Nombe (Fruto silvestre)		Comemoração início da luta armada (4 Fev) Início do ano lectivo (1ª semana de Fev) Carnaval	Fevereiro 2015	58
Verão / Fim da época da manga Fim da época da pera de natal	Ano novo (1 Janeiro)	Dia do Massacre da Baixa de Cassanje (4 de Janeiro)	Janeiro 2015	59
2014	*COPA DO MUNDO DE FUTEBOL NO BRASIL*		**2014**	
Época de chuvas	Natal (24 Dez)		Dezembro 2014	60

Folha de revisão de medidas antropométricas –crianças de 6 a 59 meses-

Data: _______________ **Equipa:** __________ **Chefe de equipa:** ______________________

Provincia: ____________ **Municipio:** ______________ **Comuna:** _______________ **Comunidade:** ____________________

Nº domicilio	**Nºcriança**	**Nome**	**Idade** (meses)	**Peso** (kg) (00.0)	**Altura** (cm) (000.0)	**PB** (**mm**) (000)

Annex 7: Plausibility report CUNENE survey area

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=0.484)
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=0.289)
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** (5)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (4)
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** (-0.09)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (-0.18)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**5** (p=0.000)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**5** %

The overall score of this survey is 5 %, this is excellent.

There were no duplicate entries detected.

Missing or wrong data:

WEIGHT: Line=382/ID=, Line=436/ID=, Line=437/ID=
HEIGHT: Line=157/ID=, Line=382/ID=

Percentage of children with no exact birthday: 30 %

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=: HAZ (2.953), Age may be incorrect
Line=51/ID=: HAZ (-5.236), WAZ (-4.441), Age may be incorrect
Line=53/ID=: HAZ (1.434), Age may be incorrect
Line=63/ID=: **WHZ (-4.367)**, Weight may be incorrect
Line=158/ID=: HAZ (1.551), Age may be incorrect
Line=164/ID=: HAZ (11.050), WAZ (3.734), Age may be incorrect
Line=173/ID=: **WHZ (2.484)**, Weight may be incorrect
Line=188/ID=: HAZ (-4.685), Height may be incorrect
Line=191/ID=: **WHZ (-3.955)**, Weight may be incorrect
Line=200/ID=: HAZ (-4.744), Height may be incorrect
Line=210/ID=: HAZ (3.130), Age may be incorrect
Line=220/ID=: HAZ (1.401), Age may be incorrect
Line=276/ID=: **WHZ (-4.011)**, Height may be incorrect
Line=290/ID=: HAZ (1.637), Age may be incorrect
Line=360/ID=: HAZ (-5.524), WAZ (-4.479), Age may be incorrect
Line=431/ID=: **WHZ (-4.069)**, Weight may be incorrect
Line=437/ID=: HAZ (-5.177), Height may be incorrect
Line=447/ID=: HAZ (-5.333), WAZ (-4.437), Age may be incorrect
Line=452/ID=: HAZ (-6.359), Age may be incorrect
Line=453/ID=: HAZ (-5.009), Age may be incorrect
Line=461/ID=: HAZ (-4.901), Age may be incorrect
Line=481/ID=: HAZ (2.754), Age may be incorrect
Line=482/ID=: **WHZ (2.272)**, Height may be incorrect
Line=516/ID=: HAZ (-4.921), Age may be incorrect
Line=575/ID=: HAZ (1.728), Age may be incorrect
Line=659/ID=: HAZ (1.858), Height may be incorrect
Line=668/ID=: HAZ (2.193), Height may be incorrect
Line=689/ID=: HAZ (1.916), Age may be incorrect
Line=695/ID=: HAZ (-4.891), Age may be incorrect
Line=696/ID=: **WHZ (2.305)**, Weight may be incorrect
Line=709/ID=: HAZ (1.751), Age may be incorrect
Line=710/ID=: WAZ (-4.999), Age may be incorrect
Line=746/ID=: **WHZ (-4.685)**, Weight may be incorrect
Line=756/ID=: HAZ (3.632), Age may be incorrect
Line=802/ID=: HAZ (1.942), Age may be incorrect
Line=813/ID=: HAZ (1.401), Age may be incorrect

Percentage of values flagged with SMART flags:WHZ: 1.0 %, HAZ: 3.3 %, 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: 0.92 (The value should be around 0.85).: p-value = 0.289 (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	86/97.0 (0.9)	94/92.3 (1.0)	180/189.3 (1.0)	0.91
18 to 29	12	101/94.6 (1.1)	109/90.0 (1.2)	210/184.6 (1.1)	0.93
30 to 41	12	105/91.6 (1.1)	91/87.3 (1.0)	196/178.9 (1.1)	1.15
42 to 53	12	84/90.2 (0.9)	78/85.9 (0.9)	162/176.1 (0.9)	1.08
54 to 59	6	42/44.6 (0.9)	26/42.5 (0.6)	68/87.1 (0.8)	1.62
6 to 59	54	418/408.0 (1.0)	398/408.0 (1.0)		1.05

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

Overall sex ratio: p-value = 0.484 (boys and girls equally represented)
Overall age distribution: p-value = 0.028 (significant difference)
Overall age distribution for boys: p-value = 0.379 (as expected)
Overall age distribution for girls: p-value = 0.023 (significant difference)
Overall sex/age distribution: p-value = 0.003 (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: 0.233

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: **5** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.049 (significant difference)

Digit preference MUAC:

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

Digit preference score: **4** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.123

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

```
.                                   no exclusion     exclusion from     exclusion from
.                                                    reference mean      observed mean
.                                                     (WHO flags)        (SMART flags)
WHZ
Standard Deviation SD:                   1.05            1.05          1.00
(The SD should be between 0.8 and 1.2)
Prevalence (< -2)
observed:                               11.1%           11.1%
calculated with current SD:             12.1%           12.1%
calculated with a SD of 1:              11.0%           11.0%

HAZ
Standard Deviation SD:                   1.36            1.28             1.13
(The SD should be between 0.8 and 1.2)
Prevalence (< -2)
observed:                               37.3%           37.3%            37.2%
calculated with current SD:             39.0%           38.6%            38.0%
calculated with a SD of 1:              35.2%           35.5%            36.5%

WAZ
Standard Deviation SD:                   1.08            1.08             1.05
(The SD should be between 0.8 and 1.2)
Prevalence (< -2)
observed:                               28.2%           28.2%            27.8%
calculated with current SD:             30.0%           30.0%            29.1%
calculated with a SD of 1:              28.5%           28.5%            28.1%

Results for Shapiro-Wilk test for normally (Gaussian) distributed data:
WHZ                                   p= 0.098        p= 0.098         p= 0.367
HAZ                                   p= 0.000        p= 0.000         p= 0.306
WAZ                                   p= 0.001        p= 0.001         p= 0.018
(If p < 0.05 then the data are not normally distributed. If p > 0.05 you can consider the data
normally distributed)

Skewness
WHZ                                     -0.17           -0.17            -0.09
HAZ                                      1.09            0.21             0.00
WAZ                                     -0.14           -0.14            -0.19
If the value is:
-below minus 0.4 there is a relative excess of wasted/stunted/underweight subjects in the
sample
```

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

Kurtosis

WHZ	0.35	0.35	-0.18
HAZ	9.42	0.90	-0.18
WAZ	0.51	0.51	-0.11

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=1.89 (p=0.000)
WHZ < -3: ID=1.08 (p=0.323)
GAM: ID=1.89 (p=0.000)
SAM: ID=1.08 (p=0.323)
HAZ < -2: ID=1.43 (p=0.022)
HAZ < -3: ID=1.45 (p=0.017)
WAZ < -2: ID=2.05 (p=0.000)
WAZ < -3: ID=2.47 (p=0.000)

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.

omparison it can be helpful to copy/paste part of this report into Excel)

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

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	Score
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	**0** (1.7 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.840)
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=0.011)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (3)
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	**0** (4)
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** (1.08)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (-0.09)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (-0.14)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**0** (p=0.366)
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:

HEIGHT: Line=142/ID=, Line=354/ID=, Line=458/ID=

Percentage of children with no exact birthday: 65 %

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=8/ID=: HAZ (-4.937), Age may be incorrect
Line=42/ID=: **WHZ (-3.670)**, Weight may be incorrect
Line=58/ID=: HAZ (-6.672), Height may be incorrect
Line=105/ID=: **WHZ (-4.050)**, Height may be incorrect
Line=107/ID=: HAZ (-5.448), WAZ (-4.559), Age may be incorrect
Line=115/ID=: HAZ (3.062), Age may be incorrect
Line=116/ID=: HAZ (2.656), Age may be incorrect
Line=129/ID=: HAZ (1.968), Age may be incorrect
Line=139/ID=: HAZ (1.546), Age may be incorrect
Line=153/ID=: **WHZ (7.001)**, HAZ (-7.706), Height may be incorrect
Line=157/ID=: HAZ (1.213), Age may be incorrect
Line=182/ID=: HAZ (-5.052), Age may be incorrect
Line=195/ID=: HAZ (-5.155), Age may be incorrect
Line=202/ID=: **WHZ (2.521)**, HAZ (-4.975), Height may be incorrect
Line=204/ID=: HAZ (-5.032), Age may be incorrect
Line=208/ID=: HAZ (1.193), Height may be incorrect
Line=210/ID=: HAZ (-5.682), Height may be incorrect
Line=214/ID=: **WHZ (-3.781)**, Weight may be incorrect
Line=279/ID=: **WHZ (-4.413)**, Weight may be incorrect
Line=286/ID=: **WHZ (-3.687)**, Weight may be incorrect
Line=298/ID=: HAZ (-5.981), Age may be incorrect
Line=302/ID=: **WHZ (-4.891)**, WAZ (-4.928), Weight may be incorrect
Line=303/ID=: **WHZ (-4.673)**, WAZ (-4.603), Weight may be incorrect
Line=304/ID=: HAZ (-5.175), Age may be incorrect
Line=350/ID=: HAZ (2.363), WAZ (1.891), Age may be incorrect
Line=351/ID=: **WHZ (-5.140)**, HAZ (1.114), Height may be incorrect
Line=386/ID=: HAZ (1.706), Age may be incorrect
Line=454/ID=: HAZ (2.221), Height may be incorrect
Line=460/ID=: HAZ (2.360), Height may be incorrect
Line=470/ID=: HAZ (2.699), Age may be incorrect
Line=496/ID=: HAZ (1.706), Age may be incorrect
Line=526/ID=: **WHZ (3.423)**, Weight may be incorrect
Line=544/ID=: HAZ (1.448), WAZ (1.829), Age may be incorrect
Line=556/ID=: HAZ (-5.949), Age may be incorrect
Line=716/ID=: **WHZ (-5.036)**, WAZ (-4.895), Weight may be incorrect
Line=745/ID=: **WHZ (-3.668)**, Weight may be incorrect
Line=762/ID=: HAZ (2.227), Age may be incorrect
Line=763/ID=: **WHZ (-5.110)**, HAZ (-5.261), WAZ (-5.796)
Line=774/ID=: HAZ (1.252), Age may be incorrect
Line=789/ID=: HAZ (1.168), Age may be incorrect
Line=824/ID=: HAZ (2.111), Age may be incorrect
Line=860/ID=: **WHZ (5.259)**, WAZ (4.300), Weight may be incorrect

Percentage of values flagged with SMART flags:WHZ: 1.7 %, HAZ: 3.5 %, WAZ: 0.9 %

Age distribution:

Month 6 : #######

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

Month 58 : ##############
Month 59 : ###########
Month 60 : #

Age ratio of 6-29 months to 30-59 months: 1.01 (The value should be around 0.85).:
p-value = 0.011 (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	124/102.3 (1.2)	105/103.7 (1.0)	229/206.0 (1.1)	1.18
18 to 29	12	92/99.8 (0.9)	125/101.1 (1.2)	217/200.9 (1.1)	0.74
30 to 41	12	103/96.7 (1.1)	110/98.0 (1.1)	213/194.7 (1.1)	0.94
42 to 53	12	90/95.2 (0.9)	81/96.5 (0.8)	171/191.6 (0.9)	1.11
54 to 59	6	32/47.1 (0.7)	26/47.7 (0.5)	58/94.8 (0.6)	1.23
6 to 59	54	441/444.0 (1.0)	447/444.0 (1.0)		0.99

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

Overall sex ratio: p-value = 0.840 (boys and girls equally represented)
Overall age distribution: p-value = 0.000 (significant difference)
Overall age distribution for boys: p-value = 0.030 (significant difference)
Overall age distribution for girls: p-value = 0.001 (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: **3** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.375

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: 0.000 (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: **4** (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.136

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:	1.21	1.14	1.08
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	11.7%	11.4%	10.6%
calculated with current SD:	13.2%	11.8%	10.2%
calculated with a SD of 1:	8.9%	8.9%	8.6%
HAZ			
Standard Deviation SD:	1.36	1.34	1.18
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	49.2%	49.0%	49.4%
calculated with current SD:	47.8%	47.4%	48.3%
calculated with a SD of 1:	47.1%	46.6%	48.0%
WAZ			
Standard Deviation SD:	1.15	1.15	1.10
(The SD should be between 0.8 and 1.2)			
Prevalence (< -2)			
observed:	31.0%	31.0%	30.8%
calculated with current SD:	34.1%	34.1%	33.2%
calculated with a SD of 1:	31.9%	31.9%	31.7%

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

WHZ	p= 0.000	p= 0.022	p= 0.167
HAZ	p= 0.000	p= 0.000	p= 0.032
WAZ	p= 0.001	p= 0.001	p= 0.006

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

Skewness

WHZ	0.08	-0.21	-0.09
HAZ	0.16	0.28	0.09
WAZ	-0.09	-0.09	-0.17

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	2.81	0.42	-0.14
HAZ	0.99	0.69	-0.24
WAZ	0.67	0.67	-0.23

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=1.05 (p=0.366)
WHZ < -3: ID=0.84 (p=0.783)
Oedema: ID=0.98 (p=0.513)
GAM: ID=1.13 (p=0.238)
SAM: ID=0.79 (p=0.861)
HAZ < -2: ID=1.29 (p=0.073)
HAZ < -3: ID=1.33 (p=0.056)
WAZ < -2: ID=1.27 (p=0.091)
WAZ < -3: ID=1.10 (p=0.283)

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

Annex 9: Tables of Prevalence of acute malnutrition (WFH, MUAC), stunting (HFA) and underweight (WFA) by age and survey area

Prevalence of acute malnutrition based on weight-for-height z-scores and/or oedema, by age and survey area

HUILA (n=870)									
Age (mo)	**Total n**	**Severe Wasting* n**	**%**	**Moderate wasting** n**	**%**	**Normal*** n**	**%**	**Oedema n**	**%**
6-17	223	4	**1.8**	27	**12.1**	192	**86.1**	0	0.0
18-29	212	6	**2.8**	22	**10.4**	183	**86.3**	1	0.5
30-41	211	4	**1.9**	12	**5.7**	194	**91.9**	1	0.5
42-53	166	2	**1.2**	10	**6.0**	154	**92.8**	0	0.0
54-59	58	0	**0.0**	5	**8.6**	53	**91.4**	0	0.0
Total	870	16	**1.8**	76	**8.7**	776	**89.2**	2	0.2
CUNENE (812)									
Age (mo)	**Total n**	**Severe Wasting n**	**%**	**Moderate wasting n**	**%**	**Normal n**	**%**	**Oedema n**	**%**
6-17	173	5	**2.9**	23	**13.3**	145	**83.8**	0	0.0
18-29	209	2	**1.0**	17	**8.1**	190	**90.9**	0	0.0
30-41	194	1	**0.5**	14	**7.2**	179	**92.3**	0	0.0
42-53	161	0	**0.0**	16	**9.9**	145	**90.1**	0	0.0
54-59	67	1	**1.5**	6	**9.0**	60	**89.6**	0	0.0
Total	804	9	**1.1**	76	**9.5**	719	**89.4**	0	0.0

**Severe wasting (<-3 z-score); **Moderate wasting (>-3 & <-2 z-score); ***Normal (>-2 z-score)*

Prevalence of acute malnutrition by age and survey area, based on MUAC cut-offs and/or oedema

HUILA (N=888)									
Age (mo)	**Total n**	**Severe Wasting* n**	**%**	**Moderate wasting** n**	**%**	**Normal*** n**	**%**	**Oedema n**	**%**
6-17	229	13	**5.7**	27	**11.8**	189	**82.5**	0	0.0
18-29	217	4	**1.8**	14	**6.5**	199	**91.7**	1	0.5
30-41	213	0	**0.0**	7	**3.3**	206	**96.7**	1	0.5
42-53	171	0	**0.0**	4	**2.3**	167	**97.7**	0	0.0
54-59	58	0	**0.0**	2	**3.4**	56	**96.6**	0	0.0
Total	888	17	**1.9**	54	**6.1**	817	**92.0**	2	0.2
CUNENE (N=816)									
Age (mo)	**Total n**	**Severe Wasting n**	**%**	**Moderate wasting n**	**%**	**Normal n**	**%**	**Oedema n**	**%**
6-17	180	9	**5.0**	28	**15.6**	143	**79.4**	0	0.0
18-29	210	1	**0.5**	11	**5.2**	198	**94.3**	0	0.0
30-41	196	0	**0.0**	6	**3.1**	190	**96.9**	0	0.0
42-53	162	0	**0.0**	1	**0.6**	161	**99.4**	0	0.0
54-59	68	0	**0.0**	0	**0.0**	68	**100.0**	0	0.0
Total	816	10	**1.2**	46	**5.6**	760	**93.1**	0	0.0

**Severe wasting (MUAC <115); **Moderate wasting (MUAC >115 & <125); ***Normal (MUAC >125)*

Prevalence of stunting -based on height-for-age cut-offs- by age and survey area

HUILA							
Age (mo)	**Total**	**Severe stunting***		**Moderate stunting****		**Normal*****	
	n	**n**	**%**	**n**	**%**	**n**	**%**
6-17	220	42	**19.1**	65	**29.5**	113	51.4
18-29	204	45	**22.1**	72	**35.3**	87	42.6
30-41	207	56	**27.1**	56	**27.1**	95	45.9
42-53	165	17	**10.3**	47	**28.5**	101	61.2
54-59	58	5	**8.6**	17	**29.3**	36	62.1
Total	854	165	**19.3**	257	**30.1**	432	50.6
CUNENE							
Age (mo)	**Total**	**Severe stunting**		**Moderate stunting**		**Normal**	
	n	**n**	**%**	**n**	**%**	**n**	**%**
6-17	174	15	**8.6**	52	**29.9**	107	61.5
18-29	198	38	**19.2**	54	**27.3**	106	53.5
30-41	187	25	**13.4**	46	**24.6**	116	62.0
42-53	161	15	**9.3**	30	**18.6**	116	72.0
54-59	67	3	**4.5**	15	**22.4**	49	73.1
Total	787	96	**12.2**	197	**25.0**	494	62.8

**Severe stunting (HFA <-3z-score); **Moderate stunting (HFA WFA<-2 z-score & ≥-3z-score); ***Normal*

Prevalence of Underweight -based on weight-for-age cut-offs- by age and survey area

HUILA									
Age (mo)	**Total n**	**Severe underweight***		**Moderate underweight****		**Normal*****		**Oedema**	
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
6-17	226	24	10.6	55	24.3	147	65.0	0	0.0
18-29	213	30	14.1	39	18.3	144	67.6	1	0.5
30-41	211	24	11.4	40	19.0	147	69.7	1	0.5
42-53	170	7	4.1	37	21.8	126	74.1	0	0.0
54-59	58	1	1.7	13	22.4	44	75.9	0	0.0
Total	878	86	9.8	184	21.0	608	69.2	2	0.2
CUNENE									
Age (mo)	**Total n**	**Severe underweight**		**Moderate underweight**		**Normal**		**Oedema**	
		n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
6-17	177	24	13.6	35	19.8	118	66.7	0	0.0
18-29	208	17	8.2	40	19.2	151	72.6	0	0.0
30-41	194	12	6.2	45	23.2	137	70.6	0	0.0
42-53	162	6	3.7	31	19.1	125	77.2	0	0.0
54-59	67	4	6.0	11	16.4	52	77.6	0	0.0
Total	808	63	7.8	162	20.0	583	72.2	0	0.0

**Severe underweight (WFA <-3z-score); **Moderate underweight (WFA WFA<-2 z-score & ≥-3z-score); ***Normal (WFA≥-2 z-score)*