Nutrition and Mortality Survey using the SMART Methodology

Kelafo Woreda, Shebelle Zone, in the Somali Region, Ethiopia

April 2018

Implementation Partners: RENCU/DPPB, and technical support provided by Tech RRT, seconded to UNICEF Ethiopia

Technical Rapid Response Team

USAID FROM THE AMERICAN PEOPLE

ACKNOWLEDGEMENTS

The Kelafo Nutrition and Mortality Survey using the SMART Methodology would not have been possible without the implementing partners, including; Somali Regional Emergency Nutrition Coordination Unit (RENCU), Disaster Prevention and Preparedness Bureau (DPPB) and technical support provided by the Technical Rapid Response Team (Tech-RRT), seconded to the United Nations Children's Fund (UNICEF). Funding for the survey was provided by UNICEF Ethiopia.

The contributions to this survey and report made by the Tech-RRT Assessment Advisor are made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of the Tech RRT, UNICEF, ENCU and DPPB and do not necessarily reflect the views of USAID or the United States Government.

Grateful and sincere acknowledgements are extended to the mentioned above organizations and individuals who contributed to the successful implementation of the survey and the completion of this report.

To the Shebele zone and Kalefo woreda government officials who gave permission for the survey to take place and provided support throughout the training and data collection.

To the kebele leaders that provided household information for the sampling frame and the sub-kebele leaders that graciously helped the teams out at each cluster.

To the individual household respondents for their wholehearted cooperation to join the survey and allowing their children to be weighed and measured.

And last but not least, to the supervisors, team leaders and measurers for braving the circumstances, for driving and trekking for hours to reach clusters, who without their teamwork, commitment and dedication to locate and reach sampled households, collected data would not have been possible and a big thank you to the lone data entry person for her dedicated work.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

The present survey was conducted in the rural woreda of Kelafo, Shebelle zone, in the Somali region of Ethiopia from April 4-9, 2018. Shabelle Zone is located in the southern and southeastern part of the region and country. Kelafo woreda is located approximately 90km south east of the urban town Gode. Kelafo woreda includes 15 kebeles made up of 180+ sub-kebeles and the estimated population is 154 000.

Main Survey Objectives

The overall objective of the survey was to provide updated information on the nutrition situation among children 6-59 months of age and pregnant and lactating women, the retrospective mortality rate of the population, along with some underlying factors (health and morbidity, IYCF, WASH) that may contribute to the prevalence of malnutrition found in Kelafo woreda.

Survey Methodology

The survey used the Standardized Monitoring and Assessment of Relief and Transitions (SMART) methodology and was a cross-sectional survey following a two-stage cluster sampling method. A sampling frame was created that included the number of households in all sub-kebeles (rural) and villages (Kelafo town) in Kelafo woreda. Clusters were randomly selected based on probability proportional to size (PPS) using ENA for SMART software (July 9, 2015). At the cluster level, households were randomly selected using systematic random sampling based on an updated cluster list created in each cluster by the team and sub-kebele/village leader.

Summary of key survey results

Parameters (Indicators)	N	n	Result
Anthropometry (6-59 months)			
Overall GAM (WHZ <-2 z-score and/or oedema) WHO 2006	427	68	15.9% (11.9-20.9)
Overall GAM (WHZ <-3 z-score and/or oedema) WHO 2006	427	12	2.8% (1.7-4.7)
Total stunting (HAZ <-2 z-score and/or oedema) WHO 2006	419	128	23.9% (SD of 1)
Total stunting (HAZ <-3 z-score and/or oedema) WHO 2006	419	58	4.4% (SD of 1)
Pregnant and lactating women MUAC less than 230mm	200	48	24% (18.3-30.5)
Nutrition Treatment Programs			
Prevalence of children enrolled in treatment program	430	33	7.7%
Prevalence of children enrolled in a treatment program with MUAC <120mm	22	7	31.8%
Mortality			
Crude mortality rate/10 000/day	2188	13	0.47 (0.26-0.83)
Under 5 mortality rate/10 000/day	506	7	1.09 (0.55-2.14)
Average household size	2188	388	5.6
Percent of children under 5			24.2%
IYCF (0-23 months)			
Early initiation of breastfeeding	148	80	57%
Exclusive breastfeeding under 6 months	41	21	51%
Continued breastfeeding at 1 year	38	32	84%
Introduction of solid, semi-solid or soft foods	13	2	15%
Minimum dietary diversity	107	28	26%
Minimum meal frequency	98	25	26%
Minimum acceptable diet	106	13	13%

Child Morbidity (6-59 months)			
Prevalence of children sick two weeks prior to the survey	467	99	21.2%
Diarrhea	467	37	7.9% (5.8-10.7)
Malaria	467	4	0.9% (0.3-2.18)
ARI	467	21	4.5% (3.0-6.8)
Fever	467	37	7.9% (5.8-10.7)
Prevalence of caretakers that sought treatment at a health facility	91	84	92.3% (84.8-96.9)
Vaccination and Vitamin A supplementation (6-59 months)			
Penta 3rd dose (card and recall)	483	313	64.8%
Vitamin A (card and recall)	483	355	73.5%
Measles (card and recall)	483	345	71.4%
WASH			
Prevalence of households using an unimproved water source facility	376	335	89.1%
Prevalence of primary water source less than 30min from household	383	245	63.8% (58.9-68..5)
Prevalence of respondents that wash hands in 3 of 5 situations	383	128	33.4% (28.9-38.3)
Prevalence of respondents that used soap and water to wash hands	383	259	67.6% (62.8-72.1)
Prevalence of households that had a proper hand washing facility	383	27	7.1% (4.9-10.1)
Prevalence of households that had a functioning toilet facility in compound	383	216	56.5% (51.5-61.4)
Prevalence of households that had a waste disposal pit in compound	383	66	18.9% (15.1-23.3)
Sub-kebele leader food relief/distribution questionnaire			
Prevalence of kebeles that have never received relief food	30	19	63.3%
Prevalence of kebeles that have received PNSP in the past 3 months	30	29	96.7%

Recommendations

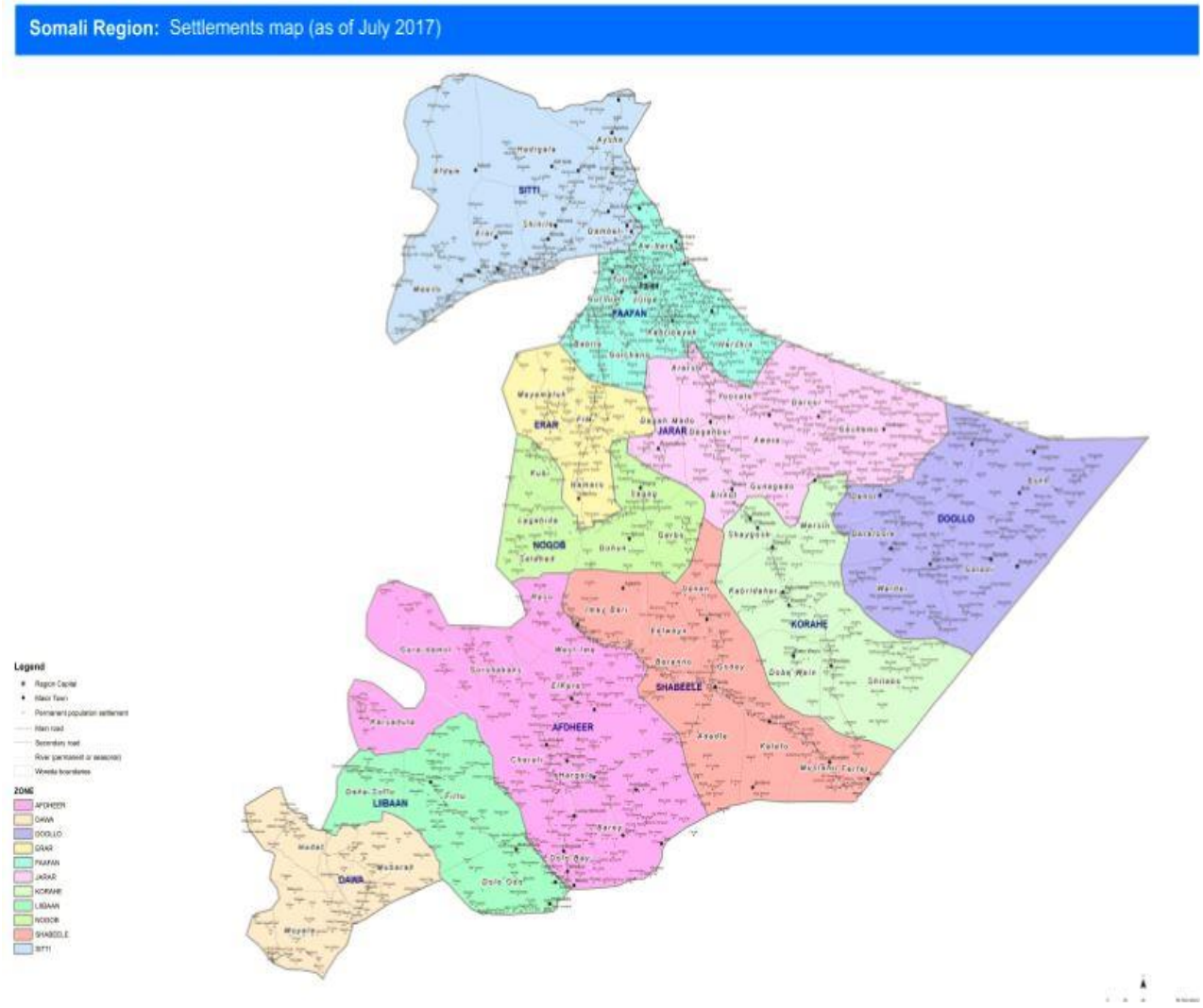
- Improve community mobilization to increase the screening coverage and enrollment to CMAM services of 6-59 month children and pregnant and lactating women. A survey can be conducted (does not have to be representative) first to identify how to increase screening turnouts and enrollment into treatment programs for individuals that have been screened and meet the criteria to enter a treatment program.
- The RHB in conjunction with partners should ensure that mobile clinics are continued and cover under served and hard to reach areas beyond health facilities with essential drugs.
- The RHB needs to improve the Vitamin A supplementation coverage in Kelafo woreda
- An integrated C4D (community for development) intervention approach on key health issues (health, nutrition, WASH), context specific approach and IYCF counselling training of health professionals at the community and facility level.
- Expand the TSFP to the PLW who have not been covered by the program.
- Establish and expand the Productive Safety Net Program (PSNP) program for PLW with MUAC <23cm and mothers with SAM children currently or previously admitted in the CMAM program
- Community Led Total Sanitation and hygiene (CLTSH) should be promoted across all the kebeles in Kelafo in order to address WASH gaps identified. Currently they are piloting some kebeles (woreda health office). Should be rolled out to whole woreda.
- Advocate to government senior management (Water Bureau) as a top agenda priority to improve water quality at town/ kebele level by constructing river intakes at strategic places throughout Kelafo. From here reservoirs and pipeline network can be developed (public water point) for the communities to access safe water.

1. INTRODUCTION

1.1 Kelafo woreda background and demography

Shabelle Zone is 1 of 11 zones in the Somali Regional State, which is located in the southern and southeastern part of the region and country. Shabelle zone has 10 rural woredas and one urban town, Gode. Kelafo woreda, where the survey data collection took place from April 4-9, 2018[1], is located approximately 90km south east of Gode. From Gode, Kelafo is accessible by vehicle using two different routes located on the north and south side of the Shebelle River. During the dry season it takes approximately 2.5-3.5 hours to reach Kelafo from Gode and approximately 5-8 hours during the rainy season. Throughout the rainy season one or both routes may not be accessible. When the Shebelle River is high it is also possible to reach Kelafo from Gode via boat.

Figure 1: Somali regional map with zones



[1] Throughout this report all dates will be expressed using the Gregorian calendar as opposed to the Ethiopian calendar unless noted otherwise.

Kelafo woreda includes 15 kebeles made up of 187 sub-kebeles/villages (*see Annex A*). Sub-kebele is the term used to describe the geographical unit that is one smaller than a kebele. Sub-kebele is the term used for all rural areas of Kelafo with the exception of Kelafo town where the term village is used. Throughout this report the geographical unit sub-kebele will also include village. The current population of Kelafo is approximately 154 000[2]. Below is a Kelafo woreda population profile that is not up to date.

Table 1: Kelafo woreda population profile (n.d)

Kalafo Woreda Profile		
No.	Name OF kebelle	Total Population
1	Hilo-Ba,ad	9785
2	Addis Katama	9511
3	Dariko	7210
4	Bargun	5622
5	Boholo-Awis	6015
6	Jaaq-Dhawr	4633
7	Gan	4037
8	Dabakatur	5512
9	Buurgabo	5824
10	LuQ-Dere	4575
11	Burdedi	3815
12	AF-dub	11,202
13	Niiri	7995
14	Omerdoon	10,033
15	Allaw-Igarsii	7917
		103,686

The climate of Kelafo varies from hot tropical to warm temperate and has two rainy seasons in the spring and autumn (locally known as 'Gu', and 'Dayr' rains). The Gu rains typically start around April 11 or 12 and continue until the end of June. It is characteristic during the Gu rains to experience hard rains followed by a gap of days with light or no rain. The Dayr rains usually start October 12-15 and continue until the end of December or early January and are usually more continuous than the Gu rains. In 2017, the Gu rains were one month shorter than normal as they started on April 15th and stopped at the end of May[3]. The Gu rains in 2018 started on the night of April 4th.

Before 2011, the vast majority of the population in Kelafo was pastoralist. Due to several factors, such as low education, limited healthcare, animals dying due to disease and drought etc, government efforts were made to provide resources to change to an agri-pastoral livelihood. Since 2011, there has been a drastic population shift of people moving to settlements near the Shebelle River. Individual families

[2] 154 000 population figure currently used by Woreda officials for planning. No up to date document could be obtained that noted Kelafo population including the population of each kebele

[3] Key Informant Interview. April 2018. Respondent Amir Shafi, Credit and Saving Officer, Agriculture Office, Kelafo

were provided 1 hectare of land for farming. Cooperatives were established (10HH=1 cooperative) and 1 water pump per cooperative along with hand tools and development materials were provided. Schools, health posts and farm health care (rehabilitation) were also established. The population of Kelafo is now likely over 95% agri-pastoral meaning that families live in a year round permanent compound and raise livestock (varying amounts) and grow crops. Only 5 sub-kebeles remain pastoralist. In these areas the government transports water[4].

The most predominate livestock found in Kelafo are cattle, goats and donkeys. Cattle are sold for approximately 45000-50000 birr female/ 7000 male birr and 800-900 birr female/ 1300 birr male for a goat. Cow and goat milk is used for personal consumption and extra is sold (1L of milk 30 birr). In April 2018, at the time of the survey, crops were in the process of being harvested. The crops included maize, sesame, onions, beans and sorghum. It is expected to be a good harvest in 2018 because more farmers had planted seeds and additional irrigation support was provided[5]. This, however, could be influenced by the amount of flooding.

1.2 Food programs in Kelafo

The Emergency Relief Program (ERP), which is a general food distribution, takes place in 6 sub-kebeles including; Godere, Washako, Faftabuya, Hargoduda, Budle and Kelafo town 01 and is separate from the government supported Pastoral Safety Net Program (PSNP). The food is supplied by the World Food Program (WFP) and is implemented by WFP and the Kelafo Woreda Disaster Provision Preparedness Office (WDPPO). Each month these sub-kebeles receive relief for 9000 people (1500 households). The food provided are oil (0.48L/person), sorghum (15kg/person) and beans (1.5kg/person) and all individuals receive food, regardless of age. On two occasions prior to June 2017, pregnant and lactating women (PLW) in sub-woredas included in the program were also provided Corn, Soya, Blend Plus (CSB plus) porridge but this not been provided since.

The selection process to decide which sub-kebeles are included in the ERP program is decided by a needs assessment committee made up of WFP, UNICEF, OCHA, SAVE, DPPB, and Woreda officials. Included in this process are interviews with individuals living in Kelafo woreda. The needs assessment committee meets every 6 months with the last meeting taking place in November 2017. At this meeting it was decided to include a coupon component to the program which could be exchanged for cash but this has not yet been implemented[6].

The Pastoral Safety Net Program (PSNP) is a program that provides assistance to food insecure areas. There are currently 21 sites included in the program (15 Kebele centers, 5 sub kebeles) and 60 013 beneficiaries. Each PSNP site can include several sub-kebeles in the catchment area. The PSNP program has two components. The unconditional component, which makes up 15-20% of the program, includes vulnerable populations such as the disabled, elderly and PLW. These individuals are provided 190 birr monthly. The only stipulation for the unconditional component is that it is paid out to a maximum of 5 people per household. Pregnant and lactating women are temporarily included in the unconditional component of the program. In the past, PLW could be included after 5 months but they are now included after proof of pregnancy is provided and can stay in the program up to 10 months after their child is born.

[4] Key Informant Interview. April 2018. Respondent Kadar Yussef, Head of Livestock Bureau, Kelafo.
[5] Key Informant Interview. April 2018. Respondent Kadar Yussef, Head of Livestock Bureau, Kelafo.
[6] Key Informant Interview. April 2018. Respondent Muhad Mohamed Badal, early warning and response expert, WDPPO.

The main component of the PSNP program is the public work conditional which makes up approximately 80% of the program. Each year a community action plan is created that is made up of several projects to complete such as community roads, bush clearing, soil digging to prevent erosion, schools, other construction etc. Each recipient is required to work 5 days per month. Up until one year ago the payment was 48 birr per day (48birr x 5days/month=240birr). The program has now changed and the payment is 38 birr per day (38birr x 5days/month=190birr) and a top up of 0.48L of oil and 1.5kg of beans per person every month.

The selection process to select the sites that are included in the PSNP program is decided by the Woreda Food Security Task Force. The sites are selected every 5 years and the current sites were selected approximately 2.5 years ago[7].

1.3 Therapeutic nutrition programs in Kelafo

Save the Children is the only Non-Government Organization (NGO) providing therapeutic nutrition support in Kelafo including a Targeted Supplementary Feeding Program (TSFP), Outpatient Therapeutic Program (OTP), Stabilization Center (SC) program as well as a Mobile Health and Nutrition Team (MHNT).

The TSFP program is separated into 2 sections, pregnant and lactating women and children 6-59 months. Mass screenings are performed monthly to identify individuals that are referred into a program. The mass screenings take place at monthly meeting points where health extension worker take MUAC measurements with government staff present. Children with a MUAC, 110-120mm (moderately malnourished), or PLW with a MUAC less than 230mm are referred to the TSFP program. Each child in the TSFP program is provided 6kg of CSB ++ porridge and PLW are given 7.5kg per month.

Children with a MUAC less than 110mm (severely malnourished), without complications, are referred to the OTP program and children with a MUAC less than 110 mm, with complications, are referred to an inpatient Stabilization Center program. The OTP program is implemented from health posts and health facilities. Children in the OTP program are provided Plumpy Nut ®, which is Ready to Use Therapeutic Food (RUTF). For example, children in the program that are 7-9.9kg are provided 21 sachets of Plumpy Nut® which will last 1 week (3 sachets per day). Each week the caregiver of the child is instructed to bring back the empty sachets and is then provided with more sachets for the next week until the child increased in weight and is then admitted into the TSFP program.

The TSFP and OTP programs operate in 30 sites which include 26 health posts and 4 health centers. Both programs operate in all 15 kebeles in Kelafo. There are also 3 stabilization centers strategically located in Musadone, Kelafo, and Afdud. In addition to the aforementioned sites, Save the Children is implementing a Mobile Health and Nutrition Team (MHNT). The MHNT operates in 12 hard to reach sub-kebeles and is made up of 2 teams that each work at 6 sites. The teams rotate locations daily; therefore, a team is at each of the 12 sites one day per week. The MHNT provides medication, EPI immunization, RUTF and other outpatient nutrition support[8].

[7] Key Informant Interview. April 2018. Respondent Mohamed Mahdi Bile, Technical Assistant, Public Works Kelafo.
[8] Key Informant Interview. April 2018. Respondent Rasamal Bun. Stabilization Center Nurse. Save the Children, Kelafo.

1.4 Acute malnutrition in Kelafo

Prior to the current survey, there was not any recent representative data available pertaining to the prevalence of nutrition indicators in Kelafo woreda. The most recent survey took place in Kelafo in Dec 28, 2014-Jan 7, 2015, as part of the Biannual Seasonal Nutrition Survey conducted by the Regional DDP/ RENCU Bureaus. The prevalence of GAM was 21.7% (17.6-26.4).

More recent available data is from non-representative MUAC screening and admissions. The Screening Report of 62 EOS Woredas July-August 2017[9] included 14049 under 5 children from Kelafo. A total of 49% (6884) of children had a MUAC less than 120mm. This result cannot be interpreted as exhaustive as it is highly likely that not all under 5 children in Kelafo were included in the screening. However, it can be concluded from the children that were screened, nearly half had a MUAC less than 120mm, and a massive number of children, 6884, required nutritional intervention.

Data from the Ethiopian Somali Regional State ENCU (RENCU) in table 2 illustrates the 2017 admissions trend in Kelafo.

Table 2: 2017 Admission trend of children with SAM (OTP + SC) in Kelafo woreda (RENCU)

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
2017	273	331	461	504	330	615	551	775	557	793	628	433

The above survey, MUAC screening, and admissions data indicates that acute malnutrition is prevalent in Kelafo. Since the Biannual Seasonal Nutrition Survey conducted in December 2014-January 2015 there has been a severe drought throughout the Somali region, including Kelafo, which can further negatively affect the nutrition status of the population. The objectives of the programs mentioned above that have been implemented in Kelafo by the government, UN, and an NGO are to prevent or treat various types of malnutrition. The present survey was conducted to determine the current nutrition status of children 6-59 months and PLW, retrospective mortality rate, and known factors that contribute to malnutrition, in Kelafo woreda.

2. SURVEY OBJECTIVES

2.1 Main Objectives

The overall objective of the Kelafo SMART survey was to provide updated information on the nutrition situation among children 6-59 months of age, the retrospective mortality rate of the population, along with some underlying factors that may contribute to the prevalence of malnutrition found in Kelafo woreda.

2.2 Specific Objectives

1. To estimate the prevalence of global and severe acute malnutrition among children aged 6 – 59 months.
2. To estimate the prevalence of global and severe chronic malnutrition among children aged 6 – 59 months.
3. To estimate the proxy prevalence of acute malnutrition in pregnant and lactating women
4. To determine retrospective crude mortality rate (CMR) and under 5 mortality rate (U5MR)

[9] No author. Screening Report of 62 EOS Woredas. July-August 2017

5. To estimate the prevalence of morbidity of children 6-59 months two weeks prior to commencement of survey
6. To estimate the percentage of children (6-59 months) that received 3rd dose of Penta vaccine, measles vaccination, and vitamin A supplementation in the last 6 months.
7. To determine the percentage of children included in the survey that are malnourished and not included in either a TRP, OTP or SFP appropriate program.
8. To determine the percentage of children born in the last 12 months who were put to the breast within one hour of birth.
9. To determine the percentage of infants less than 6 months of age who received only breast milk during the previous day and night.
10. To determine the percentage of infants aged 6 to 8 months of age who received solid, semi-solid or soft foods during the previous day or night.
11. To determine the percentage of children 6 to 23 months of age who received foods from ≥ 4 food groups the previous day or night
12. To determine the percentage of children 12-15 months of age who received breast mild during the previous day or night.
13. To determine the percentage of households that uses an optimal main source of drinking water.
14. To determine the percentage of households that can currently retrieve water in an acceptable amount of time
15. To determine the percentage of households that treat water to be safe to drink using an acceptable method.
16. To determine the percentage of respondents who wash their hands at least 3 of the recommended key times for handwashing
17. To determine the percentage of respondents who wash their hands with soap
18. To determine the percentage of respondents that have a hand wash facility in their compound
19. To determine the percentage of respondents that have a functioning toilet facility in their compound
20. To determine the percentage of respondents that have a waste disposal pit in their compound

3. METHODOLOGY

3.1 Sample size anthropometry

The following assumptions (based on the given context) were used to calculate the sample size of number of children, which were then converted into number of households to include in the survey. All calculations were made using the most recent version of ENA for SMART software (July 9, 2015).

Table 3: Sample size anthropometry

Parameters for Anthropometry	Value	Assumptions based on context
		1. Bi-annual Seasonal Nutrition Surveys conducted in Ethiopia by regional DPP Bureaus/RENCU until July 2015. Somali Region, Kelafo (Dec 28, 2014- Jan 7 2015, SDPPB) GAM 21.7% (17.6-26.4) 2. Ethiopia DHS 2016. Somali Region 22.7% point prevalence (no C.I's) 3. SAVE End line Nut and Mortality Survey Final Report, Gode, May 2016: GAM 17.6% (14.2-21.4). Gode is the capital of Shebelle Zone and is approx. 2.5 hours from Kelafo. This survey is referenced because it is in the same Zone as Kelafo and is the most recent SMART survey in the zone that could be accessed. Based

Estimated Prevalence of GAM (%)	23	on existing information it is highly likely that the GAM prevalence in Kelafo is higher than in Gode. 4. Screening Report of 62 EOS Woredas July-August 2017: Kalafo MUAC screening included 14049 under 5 children. A total of 49% of children (6884) had a MUAC less than 120mm. 5. RENCU SAM (OTP + SC) children admission trend 2017 indicates that Kelafo has the highest SAM cases in the Zone from Sept-Dec 2017. This is a trend that has continued for a long time. Based on the information above and the current drought context it is likely that the GAM prevalence has not improved since the Dec 2015-Jan 2016 Bi-Annual Seasonal Nutrition Surveys and the 2016 Ethiopia DHS; therefore, est GAM of 23% was decided
± Desired precision	5.2	1. Guidelines for Emergency Nutrition Surveys in Ethiopia (Sept, 2008) suggests a range of desired precision of ± % 5 to 7.5 for Est GAM of between 20%-30%. A precision of 5.2 will still be a high enough level of precision to base programmatic decisions.
Design Effect (DEFF)	1.5	There is not a lot of information available for DEFF for GAM in the zone. 1. The SAVE End line Nut and Mortality Survey Final Report, Gode, May 2016 found a WHZ DEFF of 1.04. Based on several discussions with individuals familiar with Gode and Kelafo it was determined that Kelafo likely has a higher DEFF then Gode due to the higher levels of GAM noted by admissions in agricultural areas along the Shebele river compared to the pastoral areas. In addition, due to the lack of information pertaining to WHZ DEFF 1.5 is the SMART Global recommendation for baseline surveys (areas where there is not a lot of known information pertaining to DEFF)
Children to be included	**411**	
Average HH Size	6.6	1. Government Conversion Factors All Regions (No Date). Somalia Region 6.6 2. Kalafo Woreda Atlas Map Ethiopian Somali Regional State Bureau of Finance & Economic Dev't (no date). This document states average HH size is 5.99 but only lists 10 woredas (pop 92 692) indicating that this document is at least a few years old. After discussions with the team it was decided to use 6.6 average HH size.
% Children under-5	15	1. Government Conversion Factors All Regions (No Date). Somalia Region 10.1% 2. Screening Report of 62 EOS Woredas July-August 2017: Kelafo had an under 5 population of approximately 14.2% After discussion with individuals that are working in Kelafo it was noted that the % of children under 5 would likely be at least 15% and that Kelafo almost certainly has a much higher % of U5 population than the Somali region on average (10.1%) Based of the above information 15% was decided.

% Non-response Households	10%	After discussion with individuals with knowledge about Kelafo a relatively high non-response % was selected because in some clusters there may be a chance of high levels of absent households and also people may refuse to take part in the survey.
Households to be included	**512**	

3.2 Sample size mortality

The sample size for the retrospective mortality survey was determined using ENA for SMART software (version July 9th, 2015). The following assumptions based on the given context were made to obtain the population and number of household to be included in the survey.

Table 4: Sample size mortality

Parameters for Mortality	Value	Assumptions based on context
Estimated prevalence (CMR)	0.6	There is not a lot of available information for mortality rates in Kelafo using deaths/10 000/day 1. Bi-annual Seasonal Nutrition Surveys conducted in Ethiopia by regional DPP Bureaus/RENCU until July 2015. Somali Region, Kelafo (July 29-Aug 6, 2015, RENCU) CMR 0.46 (0.27-0.77) 2. The SAVE End line Nut and Mortality Survey Final Report, Gode Woreda (May,2016) found a CMR of 0.23 (0.09-0.58) and an under 5 CMR of 0.33 (0.08-1.34). Based on the ongoing drought since this report along with the available health and nutrition information from Kelafo and Gode it is highly likely that the CMR in Kelafo is higher than Gode. 2. CMR of 0.41 is the assumed baseline for Sub-Sahara Africa and the Emergency thresholds is 0.8 (Sphere 2011) Based on the above information 0.6 was selected as this number is higher than the 2015 Bi-annual Seasonal Nutrition Survey and the SAVE 2016 Gode survey, as well as higher than the normal Sub-Sahara baseline due to the ongoing drought.
± Desired precision	0.3	1. Guidelines for Emergency Nutrition Surveys in Ethiopia (Sept, 2008) National Guidelines recommendations. 2. Global SMART Guidelines which states that 0.3 precision is sufficient for est prev CMR from 0.3 up to 1 death/10 000/ day
Design Effect (DEFF)	1.3	Information could not be found regarding DEFF related to CMR in Kelafo or the region. After discussions it was determined that unlike the Anthropometry Survey sample size, there is no justification to increase the mortality DEFF up to 1.5; therefore, 1.3 was used and is still likely to be a conservative estimate (increasing sample size a little bit more than needed)

Recall period in days	127	Mowlid Nov 30, 2017 was chosen as the Recall period event. Mowlid was chosen because there was no other well-known event closer to approximately 90 days that the survey population would all be familiar with. Note that the recall period took place in the dry season with the exception of the rains which occurred at the start of the data collection. Nov 2017 (1 day), Dec 2017 (31 days), Jan 2018 (31 days), Feb 218 (28 days), March 2018 (31 days), April data collection April 2-10; therefore mid-point of data collection April 5 (April 5 days) 1+31+31+28+31+5=127 days
Population to be included	**2854**	
Average HH Size	6.6	1. Government Conversion Factors All Regions (No Date). Somalia Region 6.6 2. Kalafo Woreda Atlas Map Ethiopian Somali Regional State Bureas of Finance & Economic Dev't (no date). This document states average HH size is 5.99 but only lists 10 woredas (pop 92 692) indicating that this document is at least a few years old. After discussions with the team it was decided to use 6.6 average HH size.
% Non-response Households	10%	After discussion with individuals with knowledge about Kelafo a relatively high non-response % was selected because in some clusters there may be a chance of high levels of absent households and also people may refuse to take part in the survey.
Households to be included	**480**	

3.3 Survey sample Size

It was determined that the number of 6-59 month children required for the Anthropometry survey was 411, which included 512 households. A total of 480 households were required for the retrospective mortality survey in order to reach a population of 2854. The Anthropometry sample required the highest number of households and was therefore used for both because the household sample size for each survey was not significantly different.

3.4 Number of households per day, number of clusters, and total days of data collection

The number of households to be completed per day was determined based on the following approximate assumptions.

1. Total length of workday: Leave 8am return 5pm (9 hours, 540min)
2. Travel time: average 30 min to get to cluster and 30 min return (60min)
3. Time spent introductions, households selection, village leader interviews (60min)
4. Average time for breaks (60 min)
5. Average time per HH + time to get from one HH to another (30 min)

540 min – 60 min – 60 min – 60 min = 360 working minutes per day (5.75h)

The above gives an average 5.75h (360 min) of working time in each cluster. If on average teams spend 25 min in each HH and 5 min traveling from one HH to another, each team could comfortably reach **12** HH per day (360 min / 30 min = 12). One day in each cluster was assumed.

The total number of households in the sample was then divided by the number of households to be completed in one day to determine the number of clusters to be included in the survey.

512 HH/ 12 HH per day = 43 clusters

Based on this calculation 43 clusters were planned to be included in the survey. The results of the survey included 33 clusters *(see section 5.1).*

During the planning phase of the survey the total number of days for data collection was determined by the following calculations:

12 HH/ team/ day x 6 teams = 72 HH/ day
512 HH (sample size) / 72 HH per day = 7.1 days (8 days)

Data collection was planned to be 8 days (9 days with 1 day rest) but due to several rains which resulted in reduced access to some clusters, along with the increased safety risks to the team the data collection was cut short and included only 6 days *(see section 5.1)*

3.5 Sampling strategy

A two-stage cluster sampling methodology was implemented.

3.5.1 First stage sampling

The first stage of sampling was the selection of clusters. Kelafo consists of 15 kebeles. The next smallest geographical unit is the sub-kebele (rural areas) or village (urban area). For the purpose of developing the sampling frame the term sub-kebele also included village and was the primary sampling unit used for the survey.

On March 14-15, 2018 an updated sampling frame was created in Kelafo. During this time the supervisors and the survey manager split up and went to each of the 15 kebeles and met with each kebele leader. The kebele leader provided each of the survey staff with the names of all of the sub-kebeles in their kebele along with the number of households. The number of households in each sub-kebele was more commonly available and was therefore used in the sampling frame as opposed to population. On occasion, the kebele leader did not have the number of households for each sub-kebele immediately available but provided the information within 48 hours. ENA for SMART software (July 9, 2015) was used to randomly select the 43 clusters *(see table 46)*.

3.5.2 Second stage sampling

The second stage of sampling was the selection of 12 households for each cluster. Each team randomly selected the households upon arrival at the cluster. Each day when a team arrived at a cluster (sub-kebele) they met with the sub-kebele leader and walked around the sub-kebele and created a household list. In clusters that had a large number of households, segmentation using probability proportional to size (PPS) was applied to randomly select a segment which would become the cluster. Systematic random sampling was the method used for randomly selecting households from the list. The

sub-kebele leader was also asked to assist the team by using a random number table to randomly select the first household (HH1 to the sampling interval).

When entering a randomly selected household, if there were not any eligible children to be included in the survey, the household sections of the survey (mortality, wash) were still completed. If households or eligible children were absent a note was made on the cluster control form and all efforts were made to return to the house at the end of the day. Abandoned households (no one living in the dwelling/compound) were not included in household lists.

Household definition

The household definition for the survey was based on feedback from sub kebele leaders when information for the survey sampling frame was being collected March 14-15, 2018. It should be noted that in Kelafo the vast majority of the population live in compounds that include several relatively small huts (some used for sleeping). It is common to have one kitchen/cooking area but the compound may include multiple households that cook for their own families (do not share the food cooked with other families).

Household definition: People who are currently living in the same compound (dwelling if no compound) and eat from the same cooking pot. Note that it is possible for multiple HH's to share the same kitchen in a compound but do not share the food cooked.

In table 5 below are household examples based on observations in Kelafo and feedback from Kebele leaders and Kelafo based survey staff

Table 5: Examples of different household scenarios found in Kelafo

Example	Scenario	Number of HH based on survey definition
1	Example 1: In one compound there is a husband and wife (1 dwelling) and their two children (1 dwelling) and one kitchen.	1 household
2	Example 2: In one compound there is husband and wife (1 dwelling), their two children (1 dwelling) and the wife's elderly parents. The wife cooks for all 6 people.	1 household
3	Example 3: In one compound there is husband and wife (1 dwelling), their 3 children (1 dwelling), and the wife's parents. The wife cooks only for her family of 4. The grandmother usually cooks for herself and the grandfather.	2 household
4	Example 4: There is a husband who has multiple wives that live in separate compounds. In this compound there is the husband and wife and infant child (1 dwelling) and 3 children that live in another dwelling and one kitchen.	1 household

3.6 Survey team

Survey manager

The Survey Manager was from the Technical Rapid Response Team (Tech RRT), seconded to UNICEF. Responsibilities included overseeing all phases of the survey from planning to final report.

Supervisors

During the planning phase of the survey it was the intention to include 3 supervisors from Somali Regional Departments including RENCU/DPPB and RHB. This number increased to 5 during the sampling frame exercise which took place in Kelafo and was supposed to increase to 6 for the enumerator training and data collection. Three supervisors took part in the enumerator training with a fourth taking part in the final three days (including standardization test and field test). The fourth supervisor left after the third day of data collection; therefore, 3 supervisors (2 RENCU/DPPB, 1 RHB) took part in all phases of the survey (excluding report writing).

The activities which the supervisors took part in included; assisting with planning, taking part in the enumerator training, overseeing assigned teams throughout data collection and provided limited oversight of data entry. In addition, the supervisors took part in a 3.5 day Supervisor/Survey Manager training which took place before the enumerator training (1.5 day) and after data collection (2 days).

Teams

The original plan was to include 6 teams for the survey consisting of 3 people (1 team leader, 2 measurers). Each team would also recruit a local guide at each sub-kebele (cluster). Due to staff drop outs along with the imminent rains it was decided to have 7 teams consisting of 2 people (more teams=less time for data collection). Each team included 1 team leader and 1 lead measurer (all lead measurers completed the standardization test). The team leader acted as an assistant measurer. In addition, each team recruited a local guide and starting on day 2 of data collection, whenever possible, a local porter was also added to each team to help carry equipment.

Team leaders

Due to increasing the number of teams from 6 to 7, the survey included 7 team leaders. During the planning phase it was agreed that 5 NGO's would contribute a team leader to the survey and the sixth team leader would be selected from the Kelafo staff. Unfortunately, 3 of the 5 NGO's did not participate in the survey and 1 of the 2 that did participate dropped out after the second day of training. Three additional staff members were then added to the team on the first day of training with one dropping out at the end of the third day. By the time the field test took place (last day of training), all 7 team leaders were in place; including 4 Kelafo government staff, 1 NGO staff and 2 Gode Health College lecturers.

The responsibilities of the team leaders included; household selection to maintain a representative sample, implementation of questionnaire (team leader was the only person that filled out questionnaires), assisted with anthropometric measurements and overall day to day operations of the team.

Measurers

The original plan for the survey was to have 2 measurers for each of the 6 teams (12 total). Due to the changes described above the survey included 1 lead measurer per team (7 total). The team leaders assisted the lead measurers with measurements. The 7 lead measurers were from Kelafo government staff (DPPO, Health Office, Education Office) with the exception of 1 staff member that was a student from Kelafo.

The responsibilities of the measurers were to take the anthropometric measurements (edema, height, weight, MUAC) of all 6-59 month children, ensure proper care of the anthropometric equipment and assist the team leader when appropriate.

Data entry personnel

During the planning phase of the survey it was the intention to include 3 data entry people from the regional DPPB. Two data entry people attended parts of the enumerator training and 1 left before the start of data collection; therefore, the survey included 1 data entry person. Throughout data collection the data entry of anthropometry information was prioritized so that daily ENA for SMART plausibility checks could be performed and daily feedback provided to the teams.

Throughout data collection and for an additional day after the data entry person along with the survey manager entered data. The method used was 2 people using 1 computer. One person would state the number (and verify by looking at the screen) and the other would enter the data. It was agreed by the data entry person and the survey manager that the data would be entered into ENA for SMART (anthropometry, mortality-by individual) and excel for all other sections of the questionnaire.

Approximately 50% of all the survey data was entered this way. The remaining data was entered and verified by the survey manager after data collection (approximately 4 additional days). All anthropometry flags and mortality deaths were double checked against the filled out questionnaires and all other data was verified by visual inspection of ENA for SMART data entry sheets (anthropometry, mortality), excel sheets (all other sections of the questionnaire) along with double checking against filled out questionnaires when appropriate.

The data entry person attended the post data collection Supervisor/Survey Manager training session on data entry. As part of the session the supervisors and data entry person were trained how to use Epi Info 7.2 to create data entry templates. This skill can be applied as an option for data entry for subsequent surveys. Epi Info 7.2 was not used in the current survey for data entry because the sections of the questionnaire were relatively short compared to other surveys that can have 15-20 page questionnaires. Based on feedback from data entry personnel from previous surveys it was noted that Epi Info 7.2 data entry template is much faster and more user friendly for longer questionnaires or if the data entry staff are much more comfortable using a mouse for drop down options to enter data.

3.7 Enumerator training

The enumerator training was facilitated by the survey manager. The training took place over 6 days from March 26-April 3 and the content of the training was in accordance to the Ethiopia Nutrition Guideline (2008)[10]. The original plan was to have the entire 6 day training in Gode but was then decided to move the second half of the training to Kelafo. The main topics covered in the first 3 days of the training were anthropometric measurements, questionnaire, and household selection (maintaining a representative sample). The first 3 days were predominately theoretical with some practical sessions. The main focus of the final 3 days of the training in Kelafo was practical sessions which included standardization test, segmentation, development and practicing using event calendar, field test, finalizing translation of questionnaire and daily plan of randomly selected clusters.

[10] EWD of MoARD. Guidelines for emergency nutrition surveys in Ethiopia. 2008

3.8 Survey tool (questionnaire)

The survey questionnaire was developed over several meetings which took place before the start of the enumerator training and included the survey manager, supervisors and other colleagues which had expertise in specific section(s) included in the questionnaire. The survey questionnaire consisted of 7 sections including; anthropometry; health/morbidity; infant youth child feeding (IYCF), pregnant and lactating women (PLW) MUAC; retrospective mortality; water, sanitation, and hygiene (WASH); and a sub-kebele leader food relief/distribution questionnaire.

The anthropometry and health/morbidity sections were administered at every randomly selected household with children 6-59 months and the IYCF section was administered at households which included children 0-23 months; therefore children 6-23 months were included in the anthropometry, health/morbidity, and IYCF sections. Mid Upper Arm Circumference (MUAC) was also taken at randomly selected households which included PLW. The retrospective mortality and WASH sections were administered at all randomly selected households. In addition, for each of the randomly selected clusters the team leader conducted a short sub-kebele leader food relief/distribution interview.

The common language spoken in Kelafo is Somali. As a result, all sections of the questionnaire, with the exception of the short sub-kebele leader food relief/distribution questionnaire, were translated into Somali. The translation of the questionnaire started before the beginning of the enumerator training and continued throughout. The supervisors along with some of the team leaders created the translated draft of the questionnaire and implemented back translation, meaning that the questionnaire was translated to Somali and then verbally translated back to English to ensure that the meanings were the same. If differences were found they were then discussed and further drafts were created. The draft translated questionnaire was then introduced to all of the team and further small changes were made pertaining to slight differences in the Somali language used in Kelafo. This draft was used for mock interview exercises with the team leaders. The draft translated questionnaire was then used for the field test and small changes were made before the final questionnaire was printed for the start of data collection.

3.9 Anthropometry parameter definitions

In selected households, all children 6-59 months were included in the anthropometric survey. For each child, the following information was collected:

Age (in months)

Age in months was determined for all children 6-59 months using an event calendar. In Kelafo, it is not common to have reputable documents, such as birth certificates, vaccination cards, etc that include accurate birth dates (day/month/year). In addition, knowing the exact birthday of individuals is not culturally significant in Kelafo. As a result, event calendars were used to determine the number of months of a child. A significant amount of time was spent throughout the enumerator training to develop an event calendar which included the 5 years previous in months using both the Ethiopian calendar and Gregorian calendar with multiple significant events *(see annex H).* The importance of using the event calendar was emphasized throughout the training and team leaders performed multiple practical exercises using the event calendar throughout the training, including the field test before the start of data collection.

Sex
This was recorded as either male (1) or female (2).

Weight (in kg)
Children were weighed to the nearest 0.1kg by using new UNICEF Salter scales. Two individuals would hold a stick and a scale was hung from it. Children were placed in a basin to be measured.

It was the intention to use SECA ® digital scales for the survey but on the first day of the training some scales were not consistently working properly; therefore, it was decided to use Salter scales which were on hand as a backup. It is recommended for future surveys to use SECA ® digital scales for taking weight measurements.

Height (in cm)
New UNICEF standard measuring boards were used to measure bare headed and barefoot children. The precision of the measurement was 1 mm. Children less than 2 years of age were measured lying down (length) and those equal to or above 2 years of age were measured standing up (height).

Mid-Upper Arm Circumference (MUAC)
MUAC was used as an indicator of mortality risk for acute malnutrition and was measured to the nearest 1mm for all children with an indicated age of 6-59 months, using UNICEF MUAC tapes. The MUAC of PLW in all randomly selected households was also taken using WFP adult MUAC tapes. Teams were provided multiple MUAC tapes throughout data collection to ensure that all measurements were taken with tapes that were in pristine condition.

Bilateral pitting oedema
Only children with bilateral pitting oedema (applying normal thumb pressure for at least 3 seconds to both feet) were to be recorded as having nutritional oedema.

3.10 Field supervision

Survey manager
The survey manager met with the entire staff each morning of data collection and provided entire staff feedback on a daily basis. On most evenings the survey manager met with each individual team, including supervisors, and provided feedback from the previous day. If it was not possible to meet a team at night, feedback was provided the following morning. ENA for SMART plausibility checks were implemented on day 2,3,4 of data collection and was part of feedback provided to teams. Other feedback provided to teams pertained to visually inspecting filled out questionnaires and correcting small mistakes.

Due to the threat of rains halting the survey, along with clusters becoming less accessible, the decision was made on the fourth day of data collection that some teams would be allowed to stay overnight in a cluster and then continue on the following day to a nearby cluster to continue work. This reduced travel time and increased the likelihood that they would be able to reach the cluster. Unfortunately, due to torrential rain which occurred on the first night of data collection, the Kelafo cell phone tower was knocked over and there was not any cell phone communication available for the duration of the survey. As a result, the survey manager could not communicate with teams in the field but individual team meetings were held with each team staying overnight before they left to provide feedback in order to improve the quality of data being collected.

Supervisors

The supervisors accompanied the teams in the field on day 1,2,3,6 of data collection. Their responsibility was to ensure that the team they were supervising was maintaining a representative sample (household selection), interviews were conducted properly, accurate measurements of children were taken and to provide feedback to team leaders and the survey manager when required. For the first 3 days of data collection all 4 supervisors were in the field. After the third day of data collection 1 supervisor left the survey. On the sixth (last) day of data collection 1 supervisor took over as team leader for team 4 due to poor quality of anthropometry results which had been collected previously.

3.11 Ethical considerations

Before every interview, verbal permission of the household respondent was sought by the team leader. If the respondent declined to take part in the survey the interview was not conducted. Referral forms were provided to the teams in order to refer malnourished children and PLW to the nearest health facility for treatment.

4. RESULTS

All survey results include 33 clusters with the exception of the Anthropometry results, which include 29 clusters *(see section 5.2)*. ENA for SMART version (July 9, 2015), Epi Info version 7.2 and Microsoft Excel were used to analyze survey results.

4.1 Survey completeness and demographic data

Table 6: Survey completeness

Clusters		Household		Children (6-59 months)	
Planned	43	Planned	512	Planned	411
Surveyed	33*	Surveyed	388	Surveyed	427**
% Surveyed	77%	% Surveyed	76%	% Surveyed	104%

*Of the 43 selected clusters planned, 33 clusters (77%) were surveyed. Due to poor quality measurement results from one team an additional 4 clusters were excluded for only the anthropometry analysis; therefore, the anthropometry results included 29 clusters (67.4%). All other results include 33 clusters.

**The 427 (WHO standards 2006)/ 433 (NCHS growth reference 1977) children included in the anthropometry results (WHZ and/or edema) are from 29 clusters.

Based on the 33 clusters included in the survey, a total of 388 households out of a possible 396 were surveyed (12hh/cluster x 33 clusters = 396hh). As a result, the non-response (absent or refusal) rate was 2%.

Table 7: Demographic outcomes

Population		Average HH size	% of children < 5
Planned	2854		
Surveyed	2188	5.6	24.2%
% Surveyed	77%		

A total of 2854 individuals were planned to be included in the retrospective mortality section and the survey achieved 77% of this figure due to 10 of the planned clusters not being included in the survey.

The average household size based on the 33 clusters included was 5.6 and percentage of children under 5 years was 24.2%. Also, from the 388 households included in the survey, 270 households had at least 1 child less than 5 years.

4.2 Anthropometry

Four of the 33 clusters were not included in the Anthropometry results; therefore, the following anthropometry results include 29 clusters *(see section 5.1, 5.2)*. Results for all 33 clusters can be found in annex D. The full plausibility check for results with 29 clusters and 33 clusters can be found in annex E, F.

Anthropometry results in this section are expressed in WHO 2006 standards and NCHS 1977 growth reference in separate tables. Exclusion of z-scores from Observed mean SMART flags (WHZ -3 to 3; HAZ -3 to 3; WAZ -3 to 3) has been applied.

Table 8: Ethiopia classification of malnutrition levels[11]

Indicators	Stage of Alert
Global acute malnutrition prevalence >20% And/or Severe acute malnutrition prevalence >=5%	Critical
Global acute malnutrition prevalence 15-19% And Aggravating factors	
Global acute malnutrition prevalence 15-19%	Serious
Global acute malnutrition prevalence 10-14% And Aggravating factors	
Global acute malnutrition prevalence 10-14%	Poor
Global acute malnutrition prevalence 5-9% And Aggravating factors	
Global acute malnutrition prevalence 2-9%	Typical for a chronically malnourished population

Table 9: Distribution of age and sex of sample

	Boys		Girls		Total		Ratio
AGE (mo)	**no.**	**%**	**no.**	**%**	**no.**	**%**	**Boy:girl**
6-17	40	45.5	48	54.5	88	19.7	0.8
18-29	66	55.5	53	44.5	119	26.6	1.2
30-41	54	47.4	60	52.6	114	25.5	0.9
42-53	43	47.3	48	52.7	91	20.4	0.9
54-59	16	45.7	19	54.3	35	7.8	0.8
Total	219	49.0	228	51.0	447	100.0	1.0

[11] EWD of MoARD. Guidelines for emergency nutrition surveys in Ethiopia. 2008

A total of 447 children 6-59 months (219 boys, 228 girls) were included for analysis. The sex ratio was 1.0 (p=0.670); therefore, boys and girls were represented equally. The age ratio (6-29 months vs 30-59 months) was excellent based on ENA for SMART plausibility classification (p=0.748).

Table 10: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex ***(based on WHO Standards 2006)***

	All n = 427	**Boys n = 207**	**Girls n = 220**
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(68) 15.9 % (11.9 - 20.9 95% C.I.)	(41) 19.8 % (14.9 - 25.8 95% C.I.)	(27) 12.3 % (7.2 - 20.0 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(56) 13.1 % (9.4 - 18.0 95% C.I.)	(33) 15.9 % (11.4 - 21.8 95% C.I.)	(23) 10.5 % (5.9 - 17.8 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(12) 2.8 % (1.7 - 4.7 95% C.I.)	(8) 3.9 % (2.1 - 6.9 95% C.I.)	(4) 1.8 % (0.7 - 4.7 95% C.I.)

The prevalence of oedema is 0.2 %

GAM prevalence was 15.9% (11.9-20.9%) comprising of MAM 13.1% (9.4-18.0) and SAM 2.8% (1.7-4.7). There was no significant difference of GAM between sexes (p=0.073). One case of oedema was identified.

Table 11: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex ***(based on NCHS growth reference 1977)***

	All n = 433	**Boys n = 212**	**Girls n = 221**
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(60) 13.9 % (10.5 - 18.1 95% C.I.)	(35) 16.5 % (12.2 - 22.0 95% C.I.)	(25) 11.3 % (7.0 - 17.8 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(55) 12.7 % (9.4 - 16.9 95% C.I.)	(32) 15.1 % (11.1 - 20.2 95% C.I.)	(23) 10.4 % (6.2 - 17.0 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(5) 1.2 % (0.4 - 3.1 95% C.I.)	(3) 1.4 % (0.3 - 5.9 95% C.I.)	(2) 0.9 % (0.2 - 3.7 95% C.I.)

The prevalence of oedema is 0.2 %

Table 12: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema ***(based on WHO Standards 2006)***

		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	83	7	8.4	16	19.3	59	71.1	1	1.2
18-29	110	1	0.9	14	12.7	95	86.4	0	0.0
30-41	111	2	1.8	12	10.8	97	87.4	0	0.0
42-53	88	1	1.1	10	11.4	77	87.5	0	0.0
54-59	35	0	0.0	4	11.4	31	88.6	0	0.0
Total	427	11	2.6	56	13.1	359	84.1	1	0.2

Table 13: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema ***(based on NCHS growth reference 1977)***

		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	84	1	1.2	17	20.2	65	77.4	1	1.2
18-29	113	1	0.9	14	12.4	98	86.7	0	0.0
30-41	113	1	0.9	14	12.4	98	86.7	0	0.0
42-53	88	1	1.1	9	10.2	78	88.6	0	0.0
54-59	35	0	0.0	1	2.9	34	97.1	0	0.0
Total	433	4	0.9	55	12.7	373	86.1	1	0.2

Table 14: Prevalence of acute malnutrition based on ***global MUAC thresholds*** **(and/or oedema) and by sex**

	All n = 454	**Boys n = 219**	**Girls n = 228**
Prevalence of global malnutrition (< 125 mm and/or oedema)	(45) 9.9 % (7.2 - 13.4 95% C.I.)	(23) 10.5 % (6.7 - 16.1 95% C.I.)	(21) 9.2 % (6.3 - 13.2 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(31) 6.8 % (5.0 - 9.3 95% C.I.)	(17) 7.8 % (5.1 - 11.7 95% C.I.)	(14) 6.1 % (3.8 - 9.7 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(14) 3.1 % (1.8 - 5.3 95% C.I.)	(6) 2.7 % (1.1 - 6.7 95% C.I.)	(7) 3.1 % (1.6 - 5.9 95% C.I.)

Using MUAC as an indicator for acute malnutrition, GAM prevalence was 9.9% (7.2 -13.4) comprising of 6.8% (5.0-9.3) MAM and 3.1% SAM (1.8-5.3).

Table 15: Prevalence of acute malnutrition based on *Ethiopia Emergency Nutrition Survey Guideline (2008)* MUAC cut off's (and/or oedema) and by sex

	All n = 454	Boys n = 219	Girls n = 228
Prevalence of global malnutrition (< 120 mm and/or oedema)	(25) 5.5 % (3.6 - 8.2 95% C.I.)	(11) 5.0 % (2.8 - 8.9 95% C.I.)	(13) 5.7 % (3.4 - 9.3 95% C.I.)
Prevalence of moderate malnutrition (< 120 mm and >= 110 mm, no oedema)	(20) 4.4 % (3.0 - 6.5 95% C.I.)	(7) 3.2 % (1.6 - 6.3 95% C.I.)	(13) 5.7 % (3.4 - 9.3 95% C.I.)
Prevalence of severe malnutrition (< 110 mm and/or oedema)	(5) 1.1 % (0.5 - 2.6 95% C.I.)	(4) 1.8 % (0.7 - 4.9 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)

Table 16: Prevalence of acute malnutrition by age, based on *global MUAC thresholds* and/or oedema

		Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	91	7	7.7	21	23.1	63	69.2	1	1.1
18-29	121	6	5.0	7	5.8	108	89.3	0	0.0
30-41	116	1	0.9	3	2.6	112	96.6	0	0.0
42-53	91	0	0.0	0	0.0	91	100.0	0	0.0
54-59	35	0	0.0	0	0.0	35	100.0	0	0.0
Total	454	14	3.1	31	6.8	409	90.1	1	0.2

Table 17: Prevalence of acute malnutrition by age, based on *Ethiopia Emergency Nutrition Survey Guideline (2008)* MUAC cut off's and/or oedema

		Severe wasting (< 110 mm)		Moderate wasting (>= 110 mm and < 120 mm)		Normal (> = 120 mm)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	91	1	1.1	15	16.5	75	82.4	1	1.1
18-29	121	2	1.7	6	5.0	113	93.4	0	0.0
30-41	116	1	0.9	0	0.0	115	99.1	0	0.0
42-53	91	0	0.0	0	0.0	91	100.0	0	0.0
54-59	35	0	0.0	0	0.0	35	100.0	0	0.0
Total	454	4	0.9	21	4.6	429	94.5	1	0.2

Table 18: Prevalence of stunting based on height-for-age z-scores and by sex ***(based on WHO standards 2006)***

	All n = 419	Boys n = 204	Girls n = 215
Prevalence of stunting (<-2 z-score)	(128) 30.5 % (25.6 - 36.0 95% C.I.)	(75) 36.8 % (28.2 - 46.3 95% C.I.)	(53) 24.7 % (18.7 - 31.7 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(70) 16.7 % (12.8 - 21.5 95% C.I.)	(37) 18.1 % (13.2 - 24.5 95% C.I.)	(33) 15.3 % (10.4 - 22.1 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(58) 13.8 % (10.7 - 17.7 95% C.I.)	(38) 18.6 % (12.7 - 26.5 95% C.I.)	(20) 9.3 % (6.1 - 13.8 95% C.I.)

Prevalence of total stunting was 30.5% (25.6-36) comprising of moderate stunting 16.7% (12.8-21.5) and severe stunting 13.8% (10.7-17.7). However, as a standard deviation of ±1.41 was found (over 1.2 threshold) the actual prevalence of total stunting is likely to be closer to **23.9%** and severe stunting closer to **4.4%** (using SD of 1).

Based on the observed total stunting prevalence for boys 36.8% (28.2-46.3) and girls 24.7% (18.7-31.7) it was found that boys are significantly more stunted than girls (p=0.032).

Table 19: Prevalence of stunting based on height-for-age z-scores and by sex ***(based on NCHS growth reference 1977)***

	All n = 422	Boys n = 206	Girls n = 216
Prevalence of stunting (<-2 z-score)	(118) 28.0 % (23.3 - 33.2 95% C.I.)	(69) 33.5 % (25.6 - 42.4 95% C.I.)	(49) 22.7 % (17.3 - 29.1 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(79) 18.7 % (14.5 - 23.9 95% C.I.)	(49) 23.8 % (17.9 - 30.9 95% C.I.)	(30) 13.9 % (8.9 - 21.0 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(39) 9.2 % (7.2 - 11.9 95% C.I.)	(20) 9.7 % (6.2 - 14.9 95% C.I.)	(19) 8.8 % (5.9 - 13.0 95% C.I.)

A standard deviation of ±1.39 was found (over 1.2 threshold). The actual prevalence of total stunting is likely to be closer to **17.6%** and severe stunting closer to **2.7%** (using SD of 1). Based on the observed total stunting prevalence for boys 33.5% (25.6-42.4) and girls 22.7% (17.3-29.1) it was found that boys are significantly more stunted than girls (p=0.037).

Table 20: Prevalence of stunting by age based on height-for-age z-scores ***(based on WHO standards 2006)***

		Severe stunting (<-3 z-score)		Moderate stunting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
Age	**Total**	**No.**	**%**	**No.**	**%**	**No.**	**%**

(mo)	no.						
6-17	84	13	15.5	11	13.1	60	71.4
18-29	104	20	19.2	20	19.2	64	61.5
30-41	108	15	13.9	16	14.8	77	71.3
42-53	89	9	10.1	18	20.2	62	69.7
54-59	34	1	2.9	5	14.7	28	82.4
Total	419	58	13.8	70	16.7	291	69.5

Table 21: Prevalence of stunting by age based on height-for-age z-scores ***(based on NCHS growth reference 1977)***

		Severe stunting (<-3 z-score)		**Moderate stunting (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	85	8	9.4	14	16.5	63	74.1
18-29	107	11	10.3	26	24.3	70	65.4
30-41	108	11	10.2	16	14.8	81	75.0
42-53	89	8	9.0	18	20.2	63	70.8
54-59	33	1	3.0	5	15.2	27	81.8
Total	422	39	9.2	79	18.7	304	72.0

Table 22: Prevalence of underweight based on weight-for-age z-scores by sex ***(based on WHO standards 2006)***

	All n = 434	**Boys n = 211**	**Girls n = 223**
Prevalence of underweight (<-2 z-score)	(97) 22.4 % (18.2 - 27.2 95% C.I.)	(55) 26.1 % (19.3 - 34.2 95% C.I.)	(42) 18.8 % (14.1 - 24.8 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(60) 13.8 % (10.8 - 17.5 95% C.I.)	(33) 15.6 % (10.2 - 23.3 95% C.I.)	(27) 12.1 % (8.5 - 16.9 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(37) 8.5 % (6.0 - 12.0 95% C.I.)	(22) 10.4 % (6.7 - 15.8 95% C.I.)	(15) 6.7 % (3.9 - 11.4 95% C.I.)

Prevalence of total underweight was 22.4% (18.2-27.2) comprising of moderate underweight 13.8% (10.8-17.5) and severe underweight 8.5% (6.0-12.0). There was no significant difference of underweight found between sexes.

Table 23: Prevalence of underweight based on weight-for-age z-scores by sex ***(based on NCHS growth reference 1977)***

	All n = 433	**Boys** n = 209	**Girls** n = 224
Prevalence of underweight (<-2 z-score)	(132) 30.5 % (25.9 - 35.5 95% C.I.)	(67) 32.1 % (24.7 - 40.5 95% C.I.)	(65) 29.0 % (23.3 - 35.4 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(92) 21.2 % (18.1 - 24.8 95% C.I.)	(47) 22.5 % (16.9 - 29.3 95% C.I.)	(45) 20.1 % (16.0 - 24.9 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(40) 9.2 % (6.6 - 12.7 95% C.I.)	(20) 9.6 % (5.7 - 15.6 95% C.I.)	(20) 8.9 % (5.9 - 13.3 95% C.I.)

Table 24: Prevalence of underweight by age, based on weight-for-age z-scores ***(based on WHO standards 2006)***

		Severe underweight (<-3 z-score)		**Moderate underweight (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**		**Oedema**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	86	10	11.6	18	20.9	58	67.4	1	1.2
18-29	110	11	10.0	12	10.9	87	79.1	0	0.0
30-41	114	11	9.6	14	12.3	89	78.1	0	0.0
42-53	89	4	4.5	14	15.7	71	79.8	0	0.0
54-59	35	1	2.9	2	5.7	32	91.4	0	0.0
Total	434	37	8.5	60	13.8	337	77.6	1	0.2

Table 25: Prevalence of underweight by age, based on weight-for-age z-scores ***(based on NCHS growth reference 1977)***

		Severe underweight (<-3 z-score)		**Moderate underweight (>= -3 and <-2 z-score)**		**Normal (> = -2 z score)**		**Oedema**	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-17	87	10	11.5	28	32.2	49	56.3	1	1.1
18-29	111	14	12.6	24	21.6	73	65.8	0	0.0
30-41	112	11	9.8	16	14.3	85	75.9	0	0.0
42-53	89	4	4.5	22	24.7	63	70.8	0	0.0
54-59	34	1	2.9	2	5.9	31	91.2	0	0.0
Total	433	40	9.2	92	21.2	301	69.5	1	0.2

Table 26: Prevalence of overweight based on weight for height cut off's and by sex (no oedema) ***(based on WHO Standards 2006)***

	All n = 427	Boys n = 207	Girls n = 220
Prevalence of overweight (WHZ > 2)	(1) 0.2 % (0.0 - 1.8 95% C.I.)	(1) 0.5 % (0.1 - 3.5 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)
Prevalence of severe overweight (WHZ > 3)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)

One overweight child was present using the WHO 2006 growth standards. No children were found to be overweight using the NCHS 1977 growth reference.

Table 27: Mean z-scores, design effects and excluded subjects ***(based on WHO Standards 2006)***

Indicator	n	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	426	-0.80±1.10	1.50	11	17
Weight-for-Age	434	-1.19±1.16	1.21	10	10
Height-for-Age	419	-1.29±1.41	1.27	7	28

* contains for WHZ and WAZ the children with edema.

All of the mean z-scores for acute malnutrition (WHZ, -0.80), underweight (WAZ, -1.19), and stunting (HAZ, -1.29) were negative indicating undernutrition. The standard deviation for WHZ (±1.10) and WAZ (±1.16) were within the acceptable range of 0.8-1.2 as indicated by the ENA for SMART plausibility check. The standard deviation for HAZ was ±1.41 which is considered problematic based on ENA for SMART plausibility check classification. The design effect of all three indicators was 1.5 or less indicating a relatively homogenous population with only slight variation between clusters[12].

Table 28: Mean z-scores, design effects and excluded subjects ***(based on NCHS growth reference 1977)***

Indicator	n	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	432	-0.93±0.96	1.19	11	11
Weight-for-Age	433	-1.42±1.11	1.15	10	11
Height-for-Age	422	-1.07±1.39	1.23	7	25

* contains for WHZ and WAZ the children with edema.

[12] EWD of MoARD. Guidelines for emergency nutrition surveys in Ethiopia. 2008.

4.3 Plausibility check

Table 29: ENA for SMART plausibility check of Kelafo SMART survey including the 29 clusters used for the anthropometry results.

Plausibility check for: KELAFO_SMART_DPPB_UNICEF_ANTHRO_29CLUSTER_APRIL2018_FINAL.xlsx.as

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

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	**5** (3.8 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.670)
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=0.748)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (5)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (9)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (7)
Standard Dev WHZ	Excl	SD	<1.1 and	<1.15 and	<1.20 and	>=1.20 or	
.							
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	**5** (1.10)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**0** (-0.05)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**1** (-0.30)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**1** (p=0.014)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**14** %

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

The overall plausibility report score for the survey is 14, which is 'good' based on ENA for SMART classification. All statistical tests were considered 'excellent' or 'good'. If the standard deviation of the

WHZ (1.10) was 0.01 less (better), 5 points for standard deviation would not have been deducted and the overall score would have been 9 'excellent'.

Deductions occurred in the following statistical tests (all classified as 'good'):

Flagged data: 3.8% of data was flagged indicating large measurement mistakes. Flagged data was not included in the analysis. 3.8% of flagged data is classified as 'good' (2.5%-5% flagged).

Digital Preference Score- height: The last digits of .1 and .2 were more prominent than the remaining eight digits. The DPS for height was considered 'good'.

Standard deviation WHZ: SD indicates small measurement errors. As stated above, the SD for the WHZ was 1.10 which is just outside the range to be classified as excellent (>0.9 to <1.10).

Kurtosis WHZ: Kurtosis looks at the relative size of the body versus the tales of a distribution curve. The kurtosis in the present survey was negative -0.30 indicating that the body of the curve is larger and the tails are smaller than expected compared to a normal distribution. One point was deducted for kurtosis but is still considered 'good'.

Poisson distribution WHZ -2: The Poisson distribution examines the level of heterogeneity of the population in terms of wasting. The p value in the present survey was p=0.014 (classified as 'good') indicating that that there were a little bit of pockets of malnutrition found.

4.4 Nutrition treatment programs

Table 30: Prevalence of 6-59 month children enrolled in a TFP/OTP or SFP program at the time of data collection

Treatment Program	N-Yes	% of total children
TFP only	19	4.4%
SFP only	10	2.3%
Both TFP and SFP	4	1.0%
None	397	92.3%
Total	430	100%

A total of 33 children (7.7%) were enrolled in a TFP, SFP, or both TFP and SFP program including 12 children less than 2 years in the TFP program and 4 children less than 2 years in the SFP program. No children under 2 years were in both the TFP and SFP programs. There were 23 children (6-59 months) with the Treatment Program question left blank on the questionnaire which was a mistake by the team leaders.

Table 31: Prevalence of 6-59 month children enrolled in any treatment program based on enrollment parameters

Enrollment for Treatment Parameters	Number of children in any Treatment Program based on parameter	% of children in any Treatment Program based on parameter
Global threshold: MUAC < 120mm (22 children)	7	31.8%
Ethiopia threshold: MUAC < 125 mm (42 children)	8	19%
WHO reference: WHZ < -2 (63 children	7	11.1%

*The 23 children with the Treatment Program question left blank (mistake by interviews) were not included in the analysis. WHO 2006 standards and SMART flags were applied.

A total of 7 of the 22 children (31.8%) measured with a MUAC less than 120mm were enrolled in a treatment program and from the 42 children with a MUAC less than 125mm, 8 (19%) were enrolled. In addition, 7 (11.1%) of the 63 children with a WHZ less than -2 were included in a treatment program. The remaining children enrolled in a treatment program had a MUAC greater than 125mm and/or a WHZ greater than -2.

4.5 Pregnant and lactating women

Table 32: Prevalence of MUAC less than 230mm of pregnant and lactating women

PLW	Number of PLW	Percent
Prevalence of MUAC less than 230mm	48	24% (18.3-30.5)
Prevalence of MUAC 230mm or greater	152	76% (69.5-81.7)
Total	200	100%

A total of 200 PLW were included of which 24% (18.3-30.5) had a MUAC less than 230mm.

4.6 Mortality

The mortality section included 388 households.

Table 33: Ethiopia thresholds for mortality[13]

Total Population	0-5 years	Indication
CMR <1.14/10 000/day	U5MR <2.3/10 000/ day	Non-Emergency threshold
CMR ≥1.14/10000/day	U5MR ≥2.3/10 000/day	Emergency threshold

The crude mortality rate found was 0.47 (0.26-0.83) and the under 5 mortality rate was 1.09 (0.55-2.14).

Table 34: Crude and under 5 mortality rate

	Deaths/10 000/day	95% C.I
Crude Mortality Rate	0.47	0.26-0.83
Male	0.58	0.26-1.28
Female	0.36	0.15-0.84
Under 5 Mortality Rate	1.09	0.55-2.14

There was no significance difference of mortality rate found between sexes.

4.7 IYCF

A total of 148 children, 0-23 months, were included in the IYCF analysis.

[13] EWD of MoARD. Guidelines for emergency nutrition surveys in Ethiopia. 2008

Table 35: Prevalence of IYCF indicators for children 0-23 months

Indicator	N	%
Early initiation of breastfeeding (148 children) Proportion of children born in the last 24 months who were put to the breast within one hour of birth	80	57%
Exclusive breastfeeding under 6 months (41 children) Proportion of infants 0-5 months of age who are fed exclusively with breast milk	21	51%
Continued breastfeeding at 1 year (38 children) Proportion of children 12-15 months of age who are fed breast milk	32	84%
Introduction of solid, semi-solid or soft foods (13 children) Proportion of infants 6-8 months of age who receive solid, semi solid or soft foods	2	15%
Minimum dietary diversity (107 children) Proportion of children 6-23 months of age who receive foods from 4 or more food groups	28	26%
Minimum meal frequency (98 children) Proportion of breastfed and non-breastfed children 6-23 months of age who receive solid,semi-solid, or soft foods (but also including milk feeds for non-breastfed children the minimum number of times or more	25	26%
Minimum acceptable diet (106 children) Proportion of children 6-23 months of age who receive a minimum acceptable diet (apart from breast milk)	13	13%

Three of the 7 indicators including; exclusive breastfeeding under 6 months; continued breastfeeding at 1 year; and introduction of solid, semi-solid or soft food (complementary feeding), had small samples sizes due to the parameters of the indicator. Exclusive breastfeeding only included children 0-5 months and continuing breastfeeding at 1 year and complementary feeding included children 12-15 months and 6-8 months respectively.

4.8 Health and morbidity

Health and morbidity information was collected for all children 6-59 months included in the survey.

Table 36: Prevalence of reported illness in children 6-59 months in the two weeks prior to the survey

Illness	N	% of total children
No illness	368	78.8 (74.9-82.3)
Diarrhea	37	7.9% (5.8-10.7)
Malaria	4	0.9% (0.3-2.18)
ARI	21	4.5% (3.0-6.8)
Measles	0	0
Fever	37	7.9% (5.8-10.7)
Total children	467	100%

A total of 99 children, 21.2%, had a reported illness in the 2 weeks prior to the survey. Diarrhea, 7.9% (5.8-10.7), and fever, 7.9% (5.8-10.7), were the most common illnesses.

Table 37: Prevalence of health seeking behavior for children that were ill in the two weeks prior to the survey

Type of treatment location	N	% of total children with reported illness
Did not seek treatment	6	6.6% (2.5-13.8)
Health facility	84	92.3% (84.8-96.9)
Both traditional healer and health facility	1	1.1% (0.03-6)
Traditional healer	0	0
Mobile clinic	0	0
Total	91	100%

From the children that had a reported illness in the past 2 weeks 92.3% (84.8-96.9) sought treatment at a health facility. Four of the caregivers did not seek treatment due to the health facility being too far and 2 caregivers could likely not afford any treatment so did they did not seek treatment.

Table 38: Coverage of penta (3rd dose), measles, and Vitamin A in last 6 months, in 6-59 month children

Indicator	Number of Children- Yes	Percent
Penta 3rd dose (483 children)		
By card	66	13.7% (10.9-17)
By recall	247	51.1% (46.7-55.6)
Card and recall	313	64.8%
Vitamin A (483 children)		
By card	59	12.2% (9.6-15.4)
By recall	296	61.3% (56.9-65.5)
Card and recall	355	73.5%
Measles (483 children)		
By card	66	13.7% (10.9-17.0)
By recall	279	57.7% (53.3-62.1)
Card and recall	345	71.4%

A total of 64.8% of children 6-59 months had received a third dose of Penta, 73.5% had received Vitamin A supplementation, and 71.4% had received a measles vaccination.

4.9 WASH

A total of 384 households were included in the WASH analysis.

Table 39: Prevalence of households using an improved water source as the main source of water

Classification of Source	Source	N-households	% of HH
Improved facility	piped water	17	4.5% (2.8-7.1)
	protected well	12	3.2% (1.8-5.5)
	hand pump protected well	12	3.2% (1.8-5.5)
	protected spring	0	0
	Total Improved facility	**41**	**10.9%**
Unimproved facility	unprotected well	24	6.4% (4.3-9.3)
	unprotected spring	0	0

	river	311	82.7% (78.6-86.2)
	Total unimproved facility	**335**	**89.1%**
Total Improved and unimproved		**376**	

A total of 335 households (89.1%) used an unimproved water source as their primary source of water; including 82.7% (78.6-86) that used the river.

Table 40: Length of time to collect water

Time to collect water (round trip)	N- households	% of HH's
Less than 30 min	245	63.8% (58.9-68.5)
30 min up to 1h	54	14.1% (10.9-17.9)
1h to 2h	48	12.6% (9.6-16.2)
Greater than 2h	36	9.5% (6.8-12.7)
Total	383	100%

A total of 63.8% (58.9-68.5) of households took 30 minutes or less for a round trip to collect water.

Table 41: Prevalence of various types of water treatment of households

Treatment Option (382 HH's)	N-Yes	% of HH's
No treatment	22	5.8% (3.8-8.6)
Boiling	12	3.1% (1.8-5.4)
Filtering with cloth	3	0.8% (0.3-2.3)
Letting water settle	26	6.8% (4.7-9.8)
Chlorination (Aqua tabs)	191	50% (45.0-55)
Chlorination (PUR)	205	53.7% (48.6-58.6)
Other option	6	1.6% (0.7-3.4)

*respondent could select multiple options if applicable

The preferred method of treating water was chlorination with 50% (45.0-55) of households that used Aqua tabs and/or 53.7% (48.6-58.6) used PUR. All other treatment options were used by less than 7% of households.

Table 42: Prevalence of situation(s) when respondents wash hands

When respondent wash hands (383 HH's)	N-respondents	% of Respondents
Never wash hands	2	0.5% (0.1-1.9)
After defecating	188	49.1% (44.1-54)
After cleaning child feces	99	25.9% (21.7-30.5)
Before cooking	212	55.4% (50.4-60.3)
Before eating	251	65.5% (60.6-70.1)
Before breastfeeding	38	9.9% (7.3-13.3)
Other	2	0.5% (0.1-1.8)
Respondents who wash hands is 3 or more situations listed above	**128**	**33.4% (28.9-38.3)**

* Respondents could select multiple options if applicable.

The most frequent times when respondents washed their hands were before eating 65.5% (60.6-70.1), before cooking 55.4% (50.4-60.3) and after defecating 49.1% (44.1-54). A total of 33.4% (28.9-38.3) of respondents washed their hands at least 3 of the 5 recommended times.

Table 43: Prevalence of substance(s) that respondents use to wash hands

Substance used to wash hands (383 HH's)	N-respondents	% of Respondents
Nothing	1	0.3% (0.05-1.5)
Water only	49	12.8% (9.8-16.5)
Water and soap	259	67.6% (62.8-72.1)
Water and ash	116	30.3% (25.9-35.1)
Water and vegetation	0	0

*Respondents could select multiple options if applicable.

The most frequent substances that respondents used to wash hands were soap and water 67.6% (62.8-72.1) and/or water and ash 30.3% (25.9-35.1). A total of 12.8% (9.8-16.5) of respondents used only water to wash their hands.

Table 44: Prevalence of households with hand washing facility, functioning toilet facility, waste disposal pit

Item (383 HH's)	N-households	% of households
Hand washing facility	27	7.1% (4.9-10.1)
Functioning toilet facility in compound	216	56.5% (51.5-61.4)
Waste disposal pit in compound	66	18.9% (15.1-23.3)

A total of 92.9% of households did not have a hand washing facility on their compound, 43.5% did not have a functioning toilet and 81.1% of households did not have a proper waste disposal pit in their compound.

4.10 Sub-kebele leader cluster interviews

At each cluster the team leader implemented a short questionnaire (4 questions) and the sub-kebele (cluster) leader was the respondent. Interviews took place at 30 of the 33 clusters.

1. When was the last time this kebele, including your sub kebele received relief food (NOT including PSNP)?

Table 45: Length of time since kebele received relief food not including PSNP

Response	N-sub kebeles	% of sub-kebeles
Never received based on respondent recollection	19	63.3%
Less than 1 year	4	13.3%
Between 1-5 years	4	13.3%
More than 5 years	3	10%
Total	30	100%

A total of 19 (63.3%) of sub-kebele leaders stated that the kebele in which their sub-keebele is located has never received food relief based on their recollection. The 11 remaining sub-kebele leaders had received food relief ranging from a couple of weeks ago to 8 years previous.

2. In the last 3 months how many food distributions of relief food has this kebele, including your sub kebele received?

Three of the kebeles had received relief food distributions in the past 3 months. One kebele received a relief distribution 1 time in the past 3 months, 1 kebele received 2 times, and 1 kebele received 3 times.

3. What type of food was received?

From the sub-kebeles that did receive relief food distributions the type of food varied. Examples of types of food and quantities per person included; beans 1.5kg, red kidney beans 15kg, maize 10-15kg, sorgum 15kg, lentils (atar), porridge 7.5kg, Oil 0.48ml-1L.

4. Other than relief food, what other support has this kebele, including your sub kebele received in the past 3 months?

A total of 29 (96.7%) of the sub-kebele leaders reported that the kebele in which they lived had received PSNP (cash and food) within the past 3 months. The most common distribution foods were beans and oil along with wheat, maize, and sorghum. Ten sub-kebele leaders (33%) also stated that CSB porridge was also provided by Save the Children as part of the TSFP program.

5. Survey Limitations

5.1 Survey completeness for all sections excluding anthropometry and mortality

When the sampling frame was being created in Kelafo on March 14-15, 2018, after consultation with government officials and local staff, it was determined that all areas of Kelafo were accessible by vehicle and no areas posed a conflict/security risk. As a result, all sub-kebeles in Kelafo were included in the sampling frame. After the 43 clusters were selected a data collection plan was created to reach all clusters including the pastoralist sub-kebele, Godere, located 4.5 hours from Kelafo town where the team was based. Over half of the clusters were a 45-90 minute drive from Kelafo town.

On the first and second night of data collection there were torrential rains which severely limited access to certain clusters and additional light rain occurred intermittently on two other days as well. As a result of the heavy rains which were also taking place in the highlands, the Shabelle River continuously rose in Kelafo and caused severe flooding in the early morning of day 6 of data collection. Two of the survey teams had stayed overnight in th6ese flood effected areas. On the 5th night of data collection the vehicle of one team also got stuck 8km outside of Kelafo town and had one team member walk back to seek assistance (there was no cellphone service in Kelafo after day 1 of data collection). In addition, several times throughout data collection teams got stuck on the way to clusters or had to turn back because the road was inaccessible. Several of the clusters were attempted to be reached on multiple days. At the end of day 6 of data collection the roads to access the remaining 10 clusters were inaccessible and would have required a minimum of 2-3 days to dry (assuming there was no more rain). Due to the safety risk to the survey staff and the real possibility of the one remaining road from Kelafo to Gode becoming inaccessible, the decision was made by the survey manager to stop the survey after the 6th day of data collection.

The option of implementing all of the 5 ENA for SMART randomly selected Reserve Clusters (RC's) was also explored part way through data collection. The RC's were not implemented because only 1 RC cluster was accessible. It was also not known at the time if the inaccessible original clusters (non RC) would become accessible later on in the data collection.

As a result of the aforementioned events, the survey included 33 of the planned 43 clusters (77%). The survey results included 33 clusters for all sections with the exception of anthropometry which included 29. Four clusters (from the same team) for anthropometry were not included in the results because the data quality was very poor. The team had completed 2 clusters in the first 3 days (1 day could not access cluster) of data collection. There were issues with anthropometry data quality and feedback was provided. On day 4 the team stayed overnight and submitted the data for 2 additional clusters but unfortunately the data quality for anthropometry was still very poor. On the last day of data collection a supervisor took over as team leader and the data for that cluster was included in the analysis.

For a survey using the SMART methodology to achieve high quality results, a representative sample must be obtained. This is achieved by randomly selecting clusters (Stage 1) and randomly selecting households (Stage 2). In addition, at the household level interviews must be conducted properly and accurate measurements must be taken. For the present survey, there were no significant issues with household selection, implementing questionnaires, or obtaining quality measurements with the exception of 4 clusters from one team which were not included in the analysis *(see annex E).*

The areas of potential concern are the number of clusters included in the survey, how the missing clusters affected the representativeness of the survey results, as well as the number of children included in the anthropometry section and population included in the mortality section, both compared to the planned sample sizes. The number of households included in the anthropometry and mortality sections results is not relevant because households are only used as a means to obtain the planned number of children (anthropometry) and population (mortality) in the survey based on the anthropometry and mortality sample size calculations.

The Ethiopian Nutrition Guideline (2008)[14] states that each survey should have at least 30 clusters and fewer than 26 clusters can yield unreliable results and should not be intended[15]. This is similar to the Global SMART guidance which states 25 clusters are considered a minimum, but normally nutrition surveys include at least 30 or more clusters. Therefore, in most situations, please consider 30 clusters as a default[16]. These recommendations can be further illustrated in figure 2 below.

[14] EWD of MoARD. Guidelines for emergency nutrition surveys in Ethiopia. 2008
[15] ENCU/EWRD/MOARD. Guidelines for Emergency Nutrition Surveys in Ethiopia (2008), pg. 27
[16] Global SMART. Sampling methods and sample size calculation for the SMART methodology (2012), pg.24

Figure 2: Global SMART survey manager training slide[17]

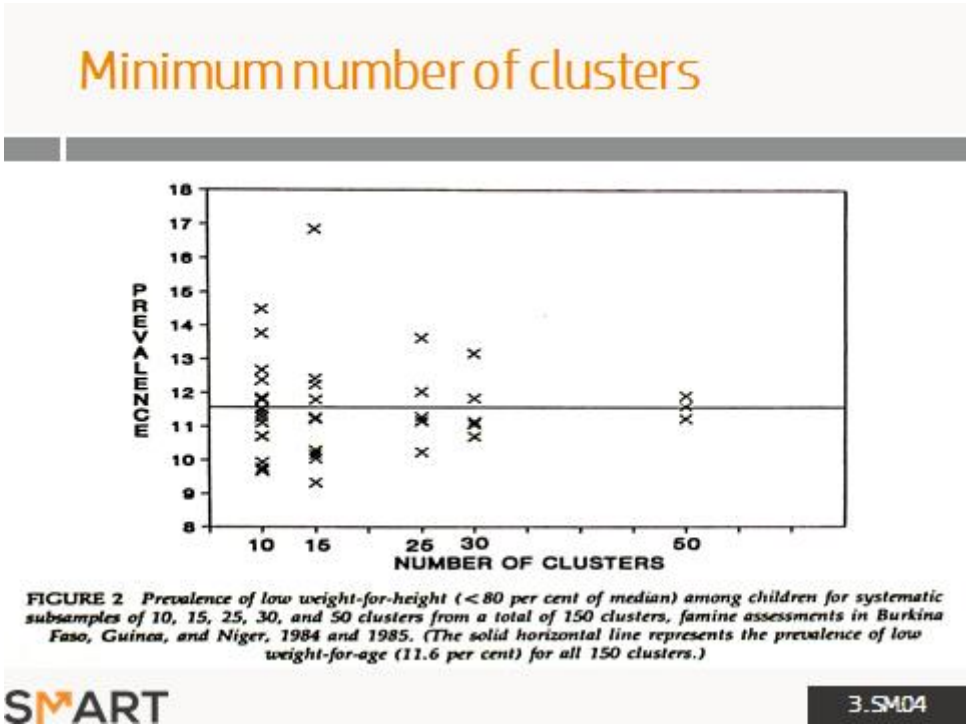
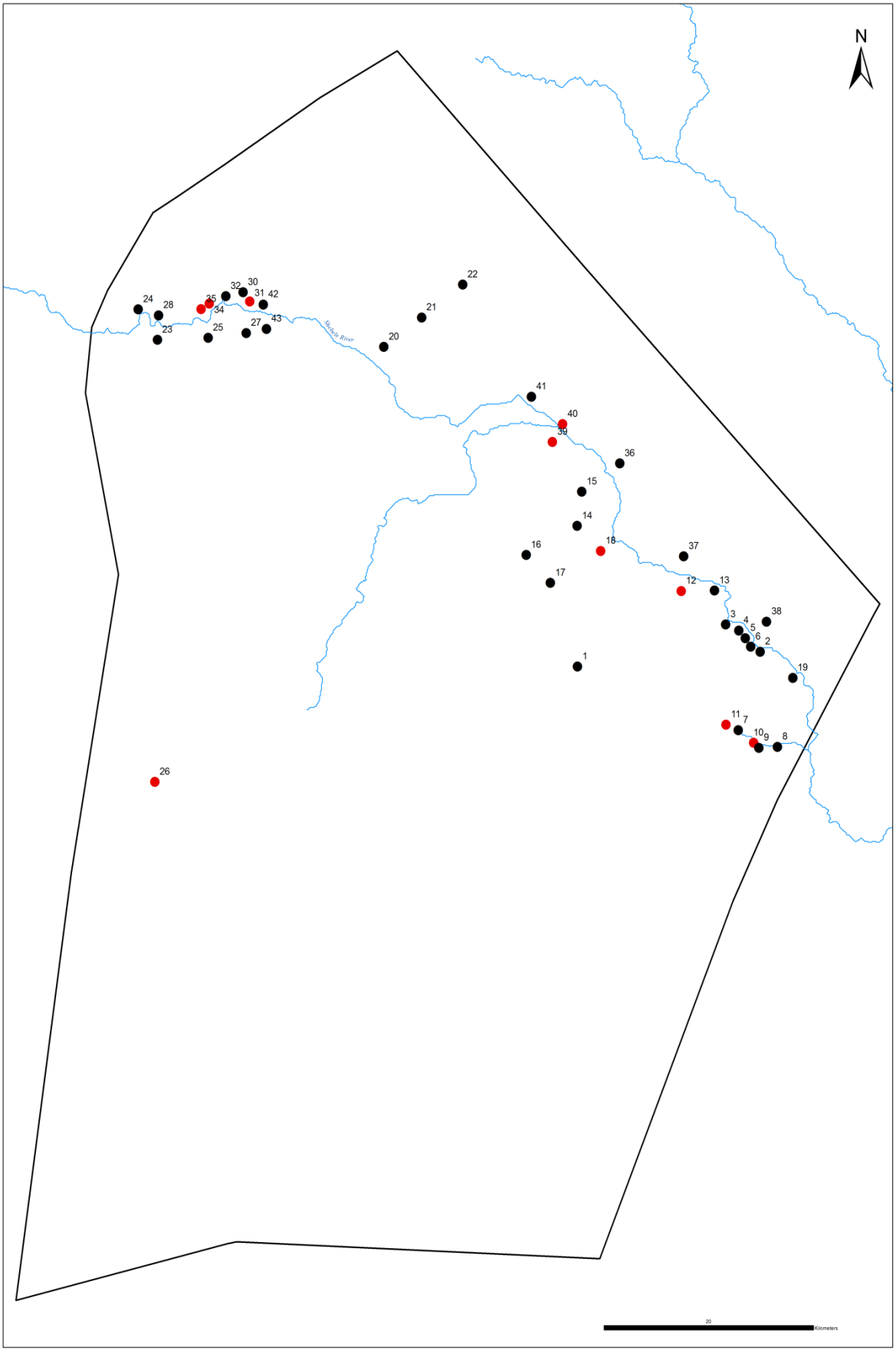


Figure 2 illustrates that when a survey includes less than 25 clusters the validity of the results and their representativeness is seriously threatened. A study conducted by Binkin et al. (1992) had 150 clusters and included segments of 10, 15, 25, 30 and 50 clusters. The results found that selecting 50 clusters does not yield to very different estimates from those given by 30 clusters. Conversely, if there are less than 25 clusters the results are not robust and may be very different from the estimate obtained[18]. The present survey included 33 clusters, with the exception of the anthropometry section which included 29 clusters for analysis; therefore, based on the information stated above the present survey included a sufficient number of clusters.

The potential concern in the present survey pertaining to clusters is not the number of clusters included in the survey but whether or not the clusters that were missed affected the representativeness of the survey. The map below in figure 3 shows the 43 clusters planned for the survey. The 33 clusters included in the survey are 'black' and the 10 clusters not included are 'red'.

[17] ACF Canada SMART. Global SMART survey manager training slide section 3.SM.04 sample size calculation
[18] Binkin N et al. (1992). Rapid nutrition surveys: How many clusters are enough? Disasters 16(2). 97-103.

Figure 3: Map of Kelafo survey clusters



It is apparent when viewing the map that the 10 clusters not included in the survey (red) were spread throughout Kelafo as opposed to being condensed in one area of the woreda. This occurred because the rain affected different areas throughout data collection. For example, some areas that were further away from Kelafo town (home base) could be reached whereas others 3-10km from Kelafo could not be reached via vehicle, foot, or even donkey.

Table 46 illustrates the 43 randomly selected clusters planned for the survey, including the 33 clusters that were accessible (white), 10 clusters that were not accessible (yellow), and the 4 clusters that were not included in the anthropometry results (blue).

Table 46: Clusters planned for the Kelafo SMART survey

Kebele	Kebele	Sub Kebele	Number of HH	Cluster
1	Kab-hanle	Anole	300	1
1	Kab-hanle	Control	200	2
1	Kab-hanle	Gol'usbo	89	3
1	Kab-hanle	Rebo	280	4
1	Kab-hanle	Sigamalud	185	5
1	Kab-hanle	Shirqol	70	6
1	Kab-hanle	Har-ad	310	7
1	Kab-hanle	Ada'imaandona	270	8
1	Kab-hanle	Shubo	360	9
2	Niiri	Mahad-igagoysay	80	10
2	Niiri	Dhur-dere	315	11
2	Niiri	Buunley	38	12
2	Niiri	Kabub	45	13
3	Afdub	Aware	115	14
3	Afdub	Gutow	230	15
3	Afdub	Joofle	21	16
3	Afdub	Da'are	18	17
3	Afdub	Tun-dhow	260	18
3	Afdub	Sanka-kudufo	180	19
4	Helo' ba'ad	Village-4	243	20
5	Adi-katama	Village-1	127	21
5	Adi-katama	Village-5	280	22
6	Jakdawr	Jakdawr	456	23
7	Gan	Gan	701	24
8	Boholaways	Boholaways	538	25
8	Boholaways	Godere	600	26
8	Boholaways	Raydab	350	27
9	Dabakatur	Dabakatur	400	28
10	Alow Igarsii	Alow igarsii	1316	29,30
10	Alow Igarsii	Kodahlay	688	31
10	Alow Igarsii	Balanbale	815	32,33
10	Alow Igarsii	Musadon	723	34
10	Alow Igarsii	Hilo-weyn	603	35
11	Burgago	Burgabo	413	36
12	Luqdhere	Bedale	99	37
13	Burdhedi	Kunaso	400	38
14	Dariqo	Libaaxle	554	39
14	Dariqo	Kurtumalu	684	40
14	Dariqo	Dariiqo	490	41
14	Dariqo	Kalamaan	642	42
15	Bargun	Baarguun	450	43

Based on the ENA for SMART random selection of the clusters, all 15 kebeles were represented in the 43 clusters. Despite the fact that 10 clusters could not be accessed during data collection the remaining 33 clusters still included all 15 kebeles. As a result, it is highly likely that the 33 clusters included is representative of Kelafo woreda. This would not have been possible if the clusters not included were condensed in the same area of Kelafo and multiple kebeles were not represented.

5.2 Survey Completeness for anthropometry and mortality sections, and demography

On the last day of data collection the survey manager had conversations with local staff. The objective of the conversations was to determine what the nutrition and mortality situation was likely to be compared to a nearby cluster that was included in the survey in the same kebele and/or the kebele as a whole. Was the situation likely to be similar, better or worse? For all 10 clusters the staff stated that it was likely to be similar. The same conversations also took place after it was decided at the end of data collection that the anthropometry data of 4 clusters would not be included in the analysis. Staff stated that the nutrition situation was likely to be similar; however, two of the clusters (sub-kebeles), Gan and Dabakatur, located in kebeles with the same name were the only clusters selected in each of these kebeles. The survey manager asked the staff to compare these two clusters to bordering kebeles and the staff stated that the nutrition situation was likely to be similar. In addition, the survey took place at the start of the rainy season; therefore, the effects of the rain on nutrition status would not have had an impact on survey results.

Despite the anthropometry results only including 29 clusters the number of 6-59 month children included in the survey, 427 (104%), exceeded the planned number of children, 411. This was achieved because the survey planning significantly underestimated the percentage of children under 5 years. The estimated percentage of children under 5years used for planning was 15% but the results indicated 24.2%. The observed 24.2% children under 5 was a bit higher than expected but anecdotal evidence provided by local Kelafo staff during planning suggested that the percentage of children under 5 was likely to be at least 20%. When planning the conservative number of 15% was used because there was not any official document available that indicated a percentage of children under 5 over 14.1%.

In the retrospective mortality survey 77% (2188) of the planned population, 2854, was obtained. This was the result of including 33 clusters as opposed to the planned 43. If the 10 missing clusters were included in the survey the projected population would have been approximately 2860 (100.2%) using the observed average household size, 5.6. The observed household size, 5.6, was lower than the estimated 6.6 used for the retrospective mortality sample size planning. However, this result is not that unexpected as there was very limited data available for Kelafo. The data that was available had an average household size of 5.99[19] but did not include a date; therefore, the Somali region government average household size of 6.6[20] was used.

Based on the information above it is highly likely that the results obtained in the survey are representative of Kelafo woreda. However, since a significant number of clusters were not included in the survey it is recommended to use the higher end of confidence intervals for all results used for programmatic decisions. This will ensure that program capacity is sufficient to meet the needs. Specifically pertaining to anthropometry, although it is highly unlikely that the two kebeles not included in the survey (Gan and Dabaktur) would have had a significant impact on the results of nutrition

[19] Bureau of Finance and Economic Development. Kalafo Woreda Atlas Map Ethiopian Somali Regional State (n.d)
[20] Ethiopia Government. Conversion Factors All Regions, Kelafo (n.d)

indicators, the anthropometry results can be interpreted to represent Kelafo Woreda excluding Gan and Dabaktur kebeles.

6. Discussion

6.1 Nutrition status and treatment

All discussion is based on WHO 2006 reference standards unless stated otherwise.

6.1.1 Acute malnutrition

The prevalence of GAM found in this survey 15.9% (11.9-20.9%) including 2.8% SAM (1.7-4.7), borders between the 'Serious' and 'Critical' classification using the Ethiopia Emergency Nutrition Guideline (2008)[21] emergency classification of malnutrition levels *(see table 8)*. The point prevalence of 15.9% is considered 'Serious' based on the classification (15-19%) but with the additional aggravating factors that are present in Kelafo the classification of 'critical' can be applied (GAM 15-19% and aggravating factors) . Using the NCHS growth reference 1977 the prevalence of GAM 13.9% (10.5-18.1), including 1.2% SAM (0.4-3.1) can be classified as 'Serious' (GAM 10-14% and aggravating factors).

There are not recent representative surveys available to compare the current results in Kelafo Woreda. At the Somali regional level the 2016 Ethiopia Demographic Health Survey (EDHS)[22] reported a GAM prevalence of 22.7% (no C.I) and the Bi-annual Seasonal Nutrition Survey (2015)[23] found a GAM of 21.7% (17.6-26.4) in Kelafo. The GAM prevalence in the current survey 15.9% (11.9-20.9%) is lower than these two surveys but several factors need to be considered such as regional level versus woreda level, time passed from previous surveys and season of data collection, impactful food relief and nutrition interventions available in Kelafo etc.

Using MUAC (<125mm International Cut-offs) as an indicator for acute malnutrition, GAM prevalence was 9.9% (7.2 -13.4) including 3.1% SAM (1.8-5.3) and is classified as 'Poor'. When applying the Ethiopia Nutrition Guideline (2008)[24] MUAC thresholds (<120mm) the GAM prevalence was 5.5% (2.6-8.2) including 1.1% SAM and is also classified as 'Poor' (5-9% and aggravating factors). When comparing the prevalence of GAM based on WHZ and/or edema, 15.9% (11.9-20.9%), and MUAC 9.9% (7.2-13.4) the WHZ and/or edema prevalence is higher. This result is common throughout Ethiopia.

MUAC measurements were also taken for all pregnant and lactating women present at the interview in all randomly selected households. A total of 24% (18.3-30.5) had a MUAC less than 230mm which is the threshold used in Ethiopia to determine whether or not a PLW is acutely malnourished.

6.1.2 Stunting

Prevalence of total stunting was likely to have been around 23.9%, including severe stunting 4.4%, using a standard deviation of 1. The observed level (survey results) of total stunting 30.5% (25.6-36%) and severe stunting 13.8% (10.7-17.7%) are likely overestimated due to the standard deviation being over the acceptable level of 1.2 (±1.41 observed); therefore, it is recommended to use 23.9% for programming purposes. Event calendars were used as a necessity during data collection to determine the age of children in months and are likely the cause of a standard deviation over 1.2. Although there

[21] EWD of MoARD. Guidelines for emergency nutrition surveys in Ethiopia. 2008
[22] CSA, DHS. Ethiopia demographic health survey. 2016.
[23] RDPPB, RENCU. Bi-annual seasonal nutrition surveys. Somali region, Kelafo. Dec 28,2014-Jan 7, 2015.
[24] EWD of MoARD. Guidelines for emergency nutrition surveys in Ethiopia. 2008

was a significant amount of time spent on creating and practicing using the event calendar there were likely several small measurement (in months) mistakes made throughout data collection. Applying the prevalence of 23.9%, the level of total stunting is considered 'Medium' based on WHO classification[25].

Like the global acute malnutrition (GAM) results, there are not any recent available representative surveys in Kelafo woreda to compare for stunting. The EDHS (2016)[26] reported a stunting prevalence of 27.4% (no C.I.) in the Somali region which is in the same classification of 'Medium' as the current survey.

The observed stunting results also revealed that boys were significantly more stunted than girls. The 2016 EDHS also found a higher prevalence of total stunting in boys, 41.3% compared to girls, 35.3% but the confidence intervals are not available in the EDHS (2016). It is likely that the difference was not significant. The cause of boys being significantly more stunted in Kelafao is not known and should be further explored.

6.1.3 Nutritional treatment programs

Only 31.8% of children with a MUAC less than 120mm and 19% of children with a MUAC less than 125mm were currently enrolled in a treatment program (TFP, SFP or both). In addition, only 11.1% of children with a WHZ less than -2 (WHO 2006 standards) were in a treatment program.

Save the Children is the only Non-Government Organization (NGO) providing therapeutic nutrition support in Kelafo including a Targeted Supplementary Feeding Program (TSFP), Outpatient Therapeutic Program (OTP), Stabilization Center (SC) program as well as a Mobile Health and Nutrition Team (MHNT). The TSFP and OTP programs operate in 30 sites which include 26 health posts and 4 health centers and are in all 15 kebeles in Kelafo. There are also 3 stabilization centers strategically located in Musadone, Kelafo, and Afdud and a MHNT team that operates 1 day per week in 12 hard to reach sub-kebeles. Mass MUAC screening takes place monthly at meeting points for children under five and PLW where community volunteers take MUAC measurements with government staff present *(see section 1.3)*[27].

It is apparent based on the above information that a significant number of children that meet the criteria to be admitted into a treatment program are not currently enrolled. The reason(s) why these children have not been admitted must be addressed. The most likely reasons could be that the mass screenings do not include all the children in the catchment area or that the caretakers of children that have received a referral for their child do not take them for treatment. For both of these scenarios advocacy activities must be implemented that increase the number of MUAC screening and enrollment into a treatment program of children that have been referred. Another reason could be that the monthly screening locations could be too far away for some people. Pregnant and lactating women can also be applied to these scenarios. It is recommended to conduct a survey in Kelafo to determine how to increase the number of children and PLW's at monthly screenings and to increase enrollment into a treatment program for individuals that have been referred.

6.2 Mortality

The crude mortality rate (CMR) for the present survey was 0.47 (0.26-0.83) deaths per 10 000/ day and the under 5 mortality rate was 1.09 (0.55-2.14). Both the CMR and under 5 mortality rate are

[25] WHO. Classification for assessing severity of malnutrition by prevalence ranges among children under 5 years of age. 2018. http://www.who.int/nutgrowthdb/about/introduction/en/index5.html

[26] CSA, DHS. Ethiopia demographic health survey. 2016

[27] Key Informant Interview. April 2018. Respondent Rasamal Bun. Stabilization Center Nurse. Save the Children, Kelafo.

considered 'Non-Emergency' based on the Ethiopia Emergency Nutrition Guidelines (2008)[28]. The CMR result is very similar to the Bi-annual Seasonal Nutrition Survey (2015)[29] survey which reported a CMR of 0.46 (0.27-0.77) in Kelafo woreda.

6.3 IYCF[30]

Three of the 7 indicators including; exclusive breastfeeding less than 6 months; introduction of solid, semi-solid or soft food between 6-8 months (complementary feeding), and continued breastfeeding at 1 year had small samples sizes due to the parameters of the indicator as well as the survey sample size was calculated using children 6-59 months as opposed to children 0-23 as is the case for IYCF only surveys. Analysis for exclusive breastfeeding only included 41 children 0-5 months, introduction of solid, semi-solid or soft food included 13 children 6-8 months, and continued breastfeeding at 1 year included 38 children 12-15 months. Therefore, the results from these indicators should be used only as a proxy and further information is needed to make programmatic decisions.

Of the 7 IYCF indicators included in the current survey 3 were also included in the 2016 EDHS[31] and can be compared. The prevalence of exclusive breastfeeding was 51% which is similar to the result, 58%, in the 2016 EDHS. Continued breastfeeding at 1 year was 84%. This result is comparable to the 2016 EDHS result, 91%, but the 2016 EDHS parameter for this indicator inluded children 12-17 months as opposed to children 12-15 used in the present survey. A total of 13% of children 6-23 months achieved a minimum acceptable diet in the current survey which is nearly double the result, 7%, found in the 2016 EDHS.

From the 4 other IYCF indicators included in the survey, only 1 had a prevalence over 50%, which was early initiation to breastfeeding (57%). The remaining indicators all had prevalence less than 30% including; introduction of solid, semi solid or soft foods (15%), minimum dietary diversity (26%) and minimum meal frequency (26%) *(see table 35).*

6.4 Health and morbidity

All of the routine immunizations (measles, 3rd dose penta) and supplementation (vitamin A) indicators included in the survey were more than 15% below the recommended minimum coverage. The coverage of vitamin A supplementation in the past 6 months, 73.5% (card and recall), was found to be below the minimum 95% Sphere Standards[32] recommendation. The measles vaccination indicator included all children 6-59 months as opposed to the normal 9-59 months because measles outbreaks had recently taken place in the Somali region. The coverage of measles vaccination, 71.4% (card and recall), was also lower than the minimum 95% Sphere Standards[33]. The measles coverage in the present survey, 71.4%, was however higher than the 48.1% coverage in the 2016 EDHS[34] Somali region (included children 12-23 months). The Penta 3rd dose coverage, 64.8% (card and recall), was also lower than the current goal of a

[28] EWD of MoARD. Guidelines for emergency nutrition surveys in Ethiopia. 2008
[29] RDPPB, RENCU. Bi-annual seasonal nutrition surveys. Somali region, Kelafo. Dec 28,2014-Jan 7, 2015.
[30] See document for indicator definitions. WHO. Indicators for assessing infant and young child feeding practices: part 2. 2008.
[31] CSA, DHS. Ethiopia demographic health survey. 2016
[32] The Sphere Project. Essential health services child health standard 1: prevention of vaccine preventable diseases. http://www.spherehandbook.org/en/essential-health-services-child-health-standard-1-prevention-of-vaccine-preventable-diseases/
[33] The Sphere Project. Essential health services child health standard 1: prevention of vaccine preventable diseases. http://www.spherehandbook.org/en/essential-health-services-child-health-standard-1-prevention-of-vaccine-preventable-diseases/
[34] CSA, DHS. Ethiopia demographic health survey. 2016

minimum 80% coverage in all woredas by 2020[35] but was higher than the 2016 EDHS Somali region 36.3% coverage (included children 12-23 months).

The morbidity indicators included in the survey are subjective because they are based on the respondents (usually mother) perception of illness and were not verified by medical personnel. A total of 78.8% (74.9-82.3) of 6-59 month children included in the survey did not have an illness in the 2 weeks prior to the interview. From the children that did have an illness 92.3% (84.8-96.9) sought treatment at a health facility. The most common illnesses were diarrhea, 7.9% (5.8-10.7) and fever 7.9% (5.8-10). All other morbidities were under 5% including ARI 4.5% (3.0-6.8), malaria 0.9% (0.3-2.18) and no cases of measles were identified.

6.5 WASH

A total of 89.1% of households used an unimproved water source for their primary source of water including 82.7% (78.6-86.2) that used a river. A round trip to collect water was less than 30 minutes for 63.8% (58.9-68.5) of respondents. This indicator can likely be compared to the Sphere standard that recommends that the maximum distance from any household to the nearest water point is 500m[36]. Approximately 50% of respondents used chlorination (Aqua tabs or PUR) and 3.1% (1.8-5.4) boiled water as a means to treat water. Other less effective methods included filtering water, 0.8% (0.3-2.3), letting water settle, 6.8% (4.7-9.8), or no treatment. It is apparent that most of the households surveyed obtained their water from the river (unimproved water source) and nearly half of the households did not treat their water using a recommended method.

Only 7.1% (4.9-10.1) of households had a handwashing facility, a modest 56.5% (51.5-61.4) had a functioning toilet in their compound and 18.9% (15.1-23.3) had a proper waste disposal pit in their compound. Pertaining to hand washing practices, only 33.4% (28.9-38.3) of respondents reported washing their hands after 3 of 5 five recommended situations to wash hands and 67.6% (62.8-72.1) of respondents washed their hands using soap and water. Based on the results above it is apparent that the survey population is at an increased risk of contracting water borne and/or other illness.

7. CONCLUSIONS

Based on the Ethiopia Nutrition Guideline (2008)[37] classifications, the acute malnutrition results, 15.9% (11.9-20.9) using WHO Standards (2006), for Kelafo woreda (excluding Gan and Dabaktur kebeles) is considered 'critical-with aggravating factors'. When applying the NCHS growth reference (1977) the acute malnutrition results, 13.9% (10.5-18.1), is considered 'serious- with aggravating factors'. Only 31.8% of children with a MUAC less than 120mm (current screening protocol) included in the survey were in a treatment program indicating that the screening process to increase enrollment of malnourished children into treatment programs needs to be improved. The level of malnourished pregnant and lactating women with a MUAC less than 230mm, 24% (18.3-30.5), was also high. The crude mortality rate, 0.47 (0.26-0.83) and under 5 mortality rate, 1.09 (0.55-2.14), are considered 'Non-Emergency'[38].

[35] Table 28: Monitoring and evaluation framework for cMYP for immunization (2016-2020).
[36] The Sphere Project. Water supply standard 1: Access and water quantity.
http://www.spherehandbook.org/en/water-supply-standard-1-access-and-water-quantity/
[37] EWD of MoARD. Guidelines for emergency nutrition surveys in Ethiopia. 2008
[38] EWD of MoARD. Guidelines for emergency nutrition surveys in Ethiopia. 2008

Due to the ongoing high levels of acute malnutrition, inadequate IYCF and WASH practices, and below recommended coverage of immunizations and vitamin A supplementation, calls for immediate action to improve the situation in Kelafo woreda and avoid any further increases in prevalence is strongly advised. Sustained assistance and support from all stakeholders will be vital to achieving this aim.

8. RECOMMENDATIONS

- Improve community mobilization to increase the screening coverage and enrollment to CMAM services of 6-59 month children and pregnant and lactating women. A survey can be conducted (does not have to be representative) first to identify how to increase screening turnouts and enrollment into treatment programs for individuals that have been screened and meet the criteria to enter a treatment program.
- The CMAM program in Kelafo should be continued and improves the coverage and the quality of the program
- The RHB in conjunction with partners should ensure that mobile clinics are continued and cover under served and hard to reach areas beyond health facilities with essential drugs.
- The RHB needs to improve the Vitamin A supplementation coverage in Kelafo woreda
- An integrated C4D (community for development) intervention approach on key health issues (health, nutrition, WASH), context specific approach and IYCF counselling training of health professionals at the community and facility level.
- Expand the TSFP to the PLW who have not been covered by the program.
- Establish and expand the Productive Safety Net Program (PSNP) program for PLW with MUAC <23cm and mothers with SAM children currently or previously admitted in the CMAM program
- Community Led Total Sanitation and hygiene (CLTSH) should be promoted across all the kebeles in Kelafo in order to address WASH gaps identified. Currently they are piloting some kebeles (woreda health office). Should be rolled out to whole woreda.
- Advocate to government senior management (Water Bureau) as a top agenda priority to improve water quality at town/ kebele level by constructing river intakes at strategic places throughout Kelafo. From here reservoirs and pipeline network can be developed (public water point) for the communities to access safe water.

9. LIST OF ANNEXES (zip file)

Kelafo Annex, April 2018.zip

Annex A: List of sampling frame and selected clusters, 5 pages

Annex B: Survey questionnaire (English)

- Annex B1: Anthropometry, health and morbidity, 1pg
- Annex B2: IYCF, 4 pages
- Annex B3: Retrospective mortality, 1 page
- Annex B4: Pregnant and lactating women, 1 page
- Annex B5: WASH, 1 page
- Annex B6: Sub-kebele leader questionnaire, 1 page

Annex C: Survey questionnaire (Somali)

- Annex C1: Anthropometry, health and morbidity, 1page
- Annex C2: IYCF, 4 pages
- Annex C3: Retrospective mortality, 1 page
- Annex C4: Pregnant and lactating women, 1 page
- Annex C5: WASH, 1 page

Annex D: Anthropometry results for 33 clusters (WHO 2006 standards), 5 pages

Annex E: Complete plausibility check 29 clusters used for results and discussion, 13 pages

Annex F: Complete plausibility check 33 clusters NOT used for results and discussion, 14 pages

Annex G: Standardization test results (New report), 3 pages

Annex H: Event calendar (English-Somali), 2 pages

Total number of pages in Annexes: 59 pages