



Anthropometric and retrospective mortality survey
Children aged 6 to 59 months
Wajid Town and surroundings
Bakool – Somalia

27th October to 4th November 2007

Action Contre la Faim

Funded by:

ECHO

Acknowledgments

Action Contre la Faim wants to express its gratitude to all ACF Wajid departments to providing staff and logistic help; to the local authorities of Wajid and all villages in the survey for their help during the data collection; to FSAU and WHO which context analysis was used in this report.

We would like to congratulate all survey team for their conscious and hard work on the field:

1. Mohamud Nuuh Sheik Ibrahim - registrar
2. Adan Hurush Ali - measurer
3. Abdi Sharif Barre - measurer
4. Mowlid Ahmed Sheik - registrar
5. Abdulahi Ali Kheyre - measurer
6. Mohamed Ali Garabey - measurer
7. Abdulshakur Sheik Ahmed - registrar
8. Hassan Keerow Adan - measurer
9. Kawthar Abdelahi Ahmed - measurer
10. Amina Mohamed Hassan - registrar
11. Guti Kalamow Adan - measurer
12. Yuusuf Haji Mohamed - measurer
13. Gwenaëlle Garnier- supervisor
14. Elise Becart – supervisor
15. Ismael Mayow Isack- Supervisor

Abbreviations List

ACF	Action Contre la Faim
AMREF	African Medical & Research Foundation
C.I.	Confidence Interval
CHW	Community Health Workers
HH	Household
FSAU	Food Security Analysis Unit of FAO Somalia
FEWS	Famine Early Warning System
FAO	Food and Agriculture Organization
GAM	Global Acute Malnutrition
IDP	Internally Displaced Persons
IMC	International Medical Corps
KAP	Knowledge, Attitudes and Practices
MSF	Médecins Sans Frontières
NCHS	National Centre of Health Statistics
OTP	Out-patient Therapeutic Programme
PWA	Post-War Average
SAM	Severe Acute Malnutrition
SMART	Standardized Monitoring and assessment of relieve and transitions
SFC	Supplementary Feeding Centre
TFC	Therapeutic Feeding Centre
TFG	Transitional Federal Government
TBA	Traditional Birth Attendants
UIC	Union of Islamic Courts
UNICEF	United Nations Children Fund
WFH	Weight-for height
WFP	World Food Program
WHO	World Health Organisation
WVI	World Vision International

List of contents

ACKNOWLEDGMENTS	2
ABBREVIATIONS LIST	3
SUMMARY	6
INTRODUCTION	8
1. GEOGRAPHY AND POPULATION OF THE AREA	8
2. SECURITY SITUATION AND POPULATION MOVEMENTS	8
3. PUBLIC SECTOR.....	8
4. ECONOMIC AND FOOD SECURITY BACKGROUND	8
5. WATER SOURCES AND SANITATION LEVEL.....	9
6. ASSISTANCE RECEIVED	9
OBJECTIVES	11
METHODOLOGY	12
1. THE SURVEY POPULATION	12
2. THE SAMPLE SIZE.....	12
3. SAMPLING PROCEDURE.....	13
4. PARTICULAR CASES	13
5. DATA COLLECTED (SEE ANTHROPOMETRIC AND MORTALITY QUESTIONNAIRES IN <i>APPENDIX 4A & 4B</i>)...	14
5.1 <i>Children’s data</i>	14
5.2 <i>Mortality data</i>	15
6. TRAINING, SURVEY ORGANIZATION AND SUPERVISION	16
7. INDEXES	16
7.1 <i>Malnutrition rates</i>	16
7.2 <i>Mortality rates</i>	17
RESULTS	19
2. THE NUTRITIONAL SITUATION.....	20
2.1 <i>In Z-scores</i>	21
2.2 <i>In percentage of the median</i>	23
2.3 <i>MUAC classification (risk of mortality)</i>	24
3. MEASLES VACCINATION COVERAGE	25
4. CHILDREN’S MORBIDITY	25
5. FOOD INTRODUCTION DURING THE FIRST 6 MONTHS OF LIFE.....	25
6. ECONOMIC STATUS	26
7. MORTALITY RESULTS	26
DISCUSSION	28
CONCLUSION	30
RECOMMENDATIONS	31
APPENDICES	32
<i>Appendix 1: Map of the surveyed area</i>	32
<i>Appendix 2: The cluster selection</i>	33
<i>Appendix 3: EPI method of household’s selection</i>	34
<i>Appendix 4a: Anthropometric questionnaire</i>	36
<i>Appendix 4b: Mortality questionnaire</i>	37
<i>Appendix 5a: Calendar of event</i>	38
<i>Appendix 5b: Seasonal calendar in Bakool and Gedo regions, Somalia</i>	39
<i>Appendix 6: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and</i>	

by sex according to WHO reference population..... 40
Appendix 7: Prevalence of chronic malnutrition based on height –for age- z-scores and by sex
according to NHCS reference population..... 41

Summary

The present survey covers the area of Wajid Town and the surrounding villages in radius of 50 km. It includes Wajid district in Bakool region and parts of the neighbouring Gedo and Bay regions. The whole survey zone has been affected by regular failure during the rainy seasons and long lasted political instability led to several migrations of population. The total population included in the survey was estimated as of 48,695 inhabitants and the under-5 was calculated as 28%¹ of this figure. Since January 2006, ACF is involved in the regular follow-up of the nutritional situation. This survey is part of this monitoring process and took place from 27th October to 4th November 2007.

Methodology

Two-stage cluster sampling method was used. The first stage was the selection of 32 villages from an exhaustive list of the villages in the studied area. These villages represent the first stage selection unit: the cluster. Each cluster contains a minimum of 26 children and 22 households in order to gather statistically reliable estimates of the malnutrition and mortality rates with 95% of confidence. The clusters or the sampling sites, within the total population, were selected randomly according to the villages' size. The second sampling stage - the household's selection - was based on the EPI method. All children from 6 to 59 months (65 – 110 cm of height) in the selected households were included in the survey. Data were analysed with ENA for SMART software. Anthropometrics data were put in relation to the NCHS reference population.

Main findings

Prevalence of global and severe acute malnutrition in z-scores and/or oedema (6 – 59 months old, n=847)

GAM: **14.3 %** (10.6 – 18.0) (95% C.I.)

SAM: **0.8 %** (0.2 – 1.5) (95% C.I.)

Crude and under-5 mortality rates (deaths/10000/day)

CMR: **0.57** (0.25-0.90) (95% C.I.)

U5MR: **1.55** (0.47-2.63) (95% C.I.)

Measles vaccination rates (9 – 59 months old, n=820):

Vaccination confirmed by card: **16.6%** (13 – 20.2) (95% CI)

Vaccination according caretaker: **39.4%** (34.7 – 44.1) (95% CI)

No vaccination: **40.1%** (35.4 – 44.8) (95% CI)

Unknown: **3.9%** (2.0 – 5.8) (95% CI)

¹ Anthropometric and mortality survey, July 2006 and February 2007

Prevalence of illness, two weeks prior the survey (6 – 59 months old, n=845):

39.4 % (34.7 – 44.1 C.I.)

Status of 6 – 59 months old according to the type of the household (n=845):

Agro-pastoralist:	36.2% (31.6 – 40.8 C.I.)
Semi-pastoralist:	27.5% (23.2 – 31.8 CI)
Pastoralist:	0.9% (0.0 – 1.8 C.I.)
Business:	35.4% (30.8 – 40.0 CI)

Causes of malnutrition

The prevalence of malnutrition is quite stable and within the range of previous surveys in this region. During the time of the survey, the food security situation in the area did not worsen probably due to the remaining of food stock from Deyr 2006. The health status of children under five years was highly related to their nutritional status. Poor crop production during the last Gu' season did not worsen the nutrition and food security situation in this area. However, the nutrition situation remains very fragile and associates to some risk factors such as very random water availability, lack of access to health facilities, and poor crop production. If the rain continues to fail principally the Deyr 2007 then there might be a high risk of food shortage in the coming months.

Recommendations

- Carry on with the treatment of severe acute malnutrition,
- Reinforce the collaboration with the partners working in the area regarding treatment of moderately acute malnutrition and reference of acute malnourished children,
- Implement activities with community volunteers for screening children on a regular basis in order to get clear view of under 5 nutritional status, to facilitate referrals to the respective centres and to enhance sensitization on nutrition,
- Improve the measles vaccination coverage by launching a campaign ,
- Introduce other food security activities related to improvement of agricultural productivity and food storage,
- Continue with water point's rehabilitation/reconstruction and hygiene promotion.

Introduction

1. Geography and population of the area

The present survey covers the area of Wajid Town (3° 47' 60N and 43° 15' 0E; 369 m of altitude) and the surrounding villages in radius of 50 km. It includes Wajid district in Bakool region and parts of the neighbouring Gedo and Bay regions (see *Appendix 1*). The main population concentrations apart from Wajid itself are Ceel Bon, (Luuq district, Gedo region) and Burduhunle. The zone is mainly rural, with semi-arid to arid climate. Four distinct seasons characterize this climate: a long dry and hot Jilaal season from January to April; the long Gu rainy season from April to July; the cool and dry season of Hagay from August to October; and the short rains' season of Deyr from October to December. The whole area is mainly flat with a few higher plateaux (Som. *buur*).

The population is from the big group of Rahanweyne clan, sub-clan Merifle, mainly Hadama, Jiron, Harrin and Macalin Weyne. The total population included in the survey was estimated as of 48,695 inhabitants.

2. Security situation and population movements

There was no major security events happened locally over the past year despite the global political changes in Somalia. Since the Transitional Federal Government (TFG), supported by Ethiopian military troops, got into an open armed conflict with the Union of Islamic Courts (UIC) in Mogadishu, some families joined their relatives in Bakool, Bay and Gedo regions trying to flee the violence but still no massive movements were noticed in ACF area of intervention.

3. Public sector

The public sector in the zone is inexistent. The long years of political instability led to complete destruction and loss of all public structures. There are no secondary schools, public health services or transport infrastructure. The 'local authorities' (traditional district council) are in charge of the management of all public issues according to the local tradition and the Muslim religion.

4. Economic and food security background

The main economic groups living in the area are agro-pastoralist but there are also pastoralist and small business/free professions/casual workers. Hence, a tendency of getting more and more sedentary was observed over the last decade and increase of the agro-pastoralists in the zone. The area is currently classified as between chronically food insecure and acute food and livelihood crisis². The sorghum is the staple food and main source of income for agro-pastoralist livelihoods. The poor rainfall during the last Gu' season (from April to June 2007) has led to poor crop

² FSAU Food Security Situation Analysis: Post Gu' 07 projection July – December 2007, August 23, 2007.

production³. Moreover, the devaluation of the Somali Shilling and the high cereal prices have resulted in the decrease of the purchasing power of the households. Even though the 2006 Deyr season had above normal rainfalls (200 – 300 % of the Long Term Mean⁴) leading to an exceptional sorghum harvest reaching 398% of PWA in Bakool, 228% of PWA in Bay⁵, no relevant information have been collected to confirm that it resulted to temporary stabilisation of the overall situation.

In addition, the negative impact of the suspicion of cases of Rift Valley Fever in Somalia in February 2007⁶ as well as the ban of Gulf States towards the livestock importations from Somalia led to possible loss of livestock and trade restrictions.

5. Water sources and sanitation level

The low water availability is a constant problem in the area. The main water sources used by the population are rain water catchments and hand-dug wells getting salty during the dry season. During the period of the survey, population from the north part of Wajid moved to the south of Bakool region due to water scarcity. There is no sanitation organized at village level neither in Wajid.

6. Assistance received

Over the years, several NGO's and UN agencies were operating in the area and were providing relief assistance. Currently, in the health sector, World Vision International (WVI) runs one Out-Patient Department , one Mother & Child Health centre, one tuberculosis centre, one Volunteer Counselling and Testing centre and immunisation programme in Wajid. UNICEF and WHO mainly provide the drugs and vaccines. In the rural areas, WVI supports 30 health posts served by Community Health Workers (CHW) and Traditional Birth Attendant (TBA).

Gedo Health Consortium (GHC) runs one OPD in Ceel Bon. The centre is a part of whole programme aiming to assist in the development of a district health programme. The project covers Gedo region.

The nearest in-patient health structure in the area is the MSF – Belgium hospital in Huddur (Bakool region).

Regarding food security, WVI implements limited and sporadic activities including Home garden project (since 2000) and vegetable seed and agriculture tools distributions, nutrition training, vegetable production training, and water pump distributions for irrigation.

Action Contre la Faim (ACF) runs food security surveillance and market survey, 'cash for work' project (rehabilitation of water catchments), community kitchen gardens, seeds and tools distributions (two in 2006: May and September) and demonstration plots for farming activities.

³ FSAU Food Security and Nutrition: Special Brief-Focus on Risk Factors, October 12, 2007.

⁴ Famine Early Warning System, 2006.

⁵ FSAU Somalia Food Security and Nutrition brief – Focus on Deyr season, January 2007

⁶ <http://www.emro.who.int/somalia>, Situation Report N#18 from 5 February 2007

The main actor currently working in water and sanitation is ACF. The implemented activities are traditional wells rehabilitations, chlorination, digging kits distribution and hygiene promotion. ACF is in charge with a permanent water sources monitoring by regular check of the quality of the water and the capacity of the water sources in the zone.

In nutrition, WVI and International Medical Corp (IMC) run Supplementary Feeding Programmes and ACF is in charge with the severe acute malnutrition treatment. There are four supplementary feeding centres in the surveyed area; the three of them ran by WVI: in Wajid Town, Weeley and Alemow. Patients from areas around Burbasle go to the closest IMC SFC's which is in Sheick Abdale (Bakool region). The WVI and IMC SFC's are open once a month.

Since March 2006 ACF runs a 24-hour Therapeutic Feeding Centre (TFC) in Wajid Town and by July 2006 started running Out-patient Therapeutic Programme (OTP) up to 10 points in the surrounding villages, at the time of the nutritional survey 6 OTP points were running.

In all feeding centres, family protection rations are given to the families of malnourished children. Since January 2006 ACF is involved in the nutritional situation follow-up throughout regular nutritional surveys (see the table bellow).

Table 1: Malnutrition rates in Wajid and surrounding

Malnutrition rates	ACF/FSAU/UNICEF	ACF	ACF
	January 2006	July 2006	February 2007
Global Acute Malnutrition (in z-scores)	14.7% (12.5- 17.2 95% C.I.)	33.5% (27.6- 39.3 95% C.I.)	15.6% (12.4 – 18.8 95% C.I.)
Severe Acute Malnutrition (in z-scores)	2.2% (1.4- 3.5 95% C.I.)	5.4% (3.8- 7.1 95% C.I.)	1.1% (0.2- 2.0 95% C.I.)

Objectives

- To estimate the prevalence of global acute malnutrition among the 6-59 months children in the area of ACF intervention (Waaqid and surroundings).
- To estimate the crude and under-five mortality rates since the beginning of the Haggay season (beginning of July according to Gregorian calendar).
- To identify higher risk groups of malnutrition: gender, age, status.
- To estimate the previous two-week morbidity among children from 6 to 59 months old.
- To estimate measles vaccination coverage among children from 9 to 59 months old.
- To estimate the prevalence of complementary food⁷ introduction before 6 months of life in children from 6 to 24 months old.

⁷ Plain water and breast milk were not included in the list of complementary food.

Methodology

1. The survey population

The targeted population includes children under-5 years old and the households within Wajid Town and its surrounding villages in radius of 50 km.

The survey covers the areas of intervention of ACF Food security, Nutrition and partly Water and Sanitation programmes as well as the villages included in between. The population figures are based on the last nutrition survey and have been updated with the support of ACF field officers working in the respective areas. Two villages were excluded from the list of the villages: Uridan Weyne because of no road access; Ceel Bar because this is water point and not a village. For Wajid town, to estimate the number of the population per quarter inside those areas, a number of crosses proportional to their size have been attributed. This division was used for the cluster selection per quarter for Wajid Town. The estimations resume in a total of 48,695 inhabitants. The under-5 population is estimated to be 13,635 as of 28%⁸ from the total population.

2. The sample size

The SMART methodology and ENA software (last update October 2007) were used for the sample size determination and the selection of the clusters.

The sample for the anthropometric survey has been calculated assuming 16% of estimated global acute malnutrition prevalence (15.6% of GAM in February 2007) and taking into consideration the results of the surveys carried out in neighbouring areas in the same period of the year. The desired precision is $\pm 3\%$ (giving reasonable merges when the results are extrapolated to the total population) and the design effect is of 1.5 considering that the population is homogenous regarding their nutritional status⁹. Nutrisurvey generated the number of 6 to 59 months old children for the anthropometric part as of 826.

For the mortality, the expected crude rate was not higher than 1 death/10000/day as there were no any particular events of violence or epidemics happened within the last 3 months in the area. The precision in this case is ± 0.4 and the design effect was of 1.5 for the same reasons as mentioned above. Then, a minimum of 3762 individuals was required for the mortality questionnaire representing 690 households (based on 5.45 average members per household)¹⁰.

It has been estimated that each team could reasonably survey 26 children per day. For this reason it has been decided that each cluster for the anthropometry should be made of 26

⁸ Anthropometric and mortality survey, July 2006 and February 2007

⁹ The information collected in ACF Nutritional centres indicates no any noticeable difference between nomadic and settled population regarding their nutritional status.

¹⁰ ACF Nutrition and Mortality survey, February 2007.

children, which according to the sample size required 32 clusters in total. Thus, a total of 32 clusters were randomly selected by assigning probability proportional to population size. The average number of children per household found out during the last survey in February 2007 was 1.64. So, 504 households estimated to be enough to reach the total number of the anthropometric sample (giving 16 HH per cluster) but as number of HH required for the mortality was 690 or minimum 22 HH per cluster; this number has been retained for the mortality survey.

3. Sampling procedure

Two-stage cluster sampling method was used due to the lack of precise population figures. The first stage was the selection of 32 villages from the exhaustive list of the villages by district (see clusters assignment in *Appendix 2*). These villages represent the first stage selection unit: the cluster. The clusters or the sampling sites, within the total population were selected randomly in proportion to their size. According to Ena methodology, each possible selected village should have at least the number of households required to form a complete cluster. As a result, each village with a number of children less than 30 has been added to the population of the neighbouring area. If the cluster selected was representing two villages with one village smaller than the other, the first village to be visited for the cluster will be the smaller one.

During the sensitization before the survey, it was pointed out that one village selected (Haluulin) was empty; then it has been replaced by another one (Bulo Sharif) with approximately the same characteristics (population size, location).

The second sampling stage - the households' selection was based on the EPI method (*Appendix 3*). All children from 6 to 59 months old in the selected houses were included in the anthropometric survey. When the age was not known, the height cut-offs of 65 to 110 cm were used.

4. Particular cases

✓ Absent

- If the house visited is deserted, definitively, the team visits the nearest house following the EPI method.
- If the house visited is inhabited, but the people living are temporally absent (for some hours, they will come back before the end of the day), the team asks the neighbours if they know when they have planned to come back. The team had to revisit later on when the people were supposed to be present. If they were still absent, then the team asked the neighbours if they are able to fill in the mortality questionnaire.
- If the house visited is inhabited, the parents are present but the children temporally absent, the team go back when they are at home. If after two visits the children were still absent, the team tried to complete with the parents the questionnaire (age, sex) but the nutritional part stayed empty. In any case those children were not replaced.
- If the child has been admitted in the health centre/hospital/TFC the team goes there and measures the child in the health centre.

✓ Composition of the household:

People belongs to one household are people who are eating and sleeping together.

- If there is more than one household in the compound and everybody is eating together, the team had to choose randomly only one to be included in the survey. The team leader gave one number to each household (even the one who are not present and even the one who don't have any children aged 6-59 months) and selected randomly one. If the one chosen don't have any child, only the mortality questionnaire was filled.
- If there is more than one household in the house but they have separate meal, then they were considered as different family and all households have to be included in the survey.
- If several children are in the house visited and they belong all to the same family (one child belong to the family is a child who eat and sleep in the house since at least one month. The children who left the house for more than 1month were not included in the survey, so were not registered as absent.), the team included all the children corresponding to the criteria's of selection.
- If the team passes by a house where there is a child visiting the family (for less than 1month), he was not included in the survey.
- If several children from different families are in the house, they were included if they are living permanently (for more than one month) in this house (see criteria above).
- ✓ **Disable Child:**
 - The disable children were included in the survey, even if the anthropometric data were not possible to take. The other data were filled in.
- ✓ **If there are not enough children in the village**
 - If all the houses of the village have been visited (following the EPI methodology) and some children are missing to have a full cluster, the team was going to the nearest village. (if there are more than one nearest village, one was chosen randomly).
 - If the last house to be visited has more children aged 6-59months than the team need to complete the cluster, all the children aged 6-59 months from the family were measured.

The retrospective mortality survey was carried out in all the households randomly selected, regardless of whether any eligible children are found or not until reaching the number of households required.

5. Data collected (See anthropometric and mortality questionnaires in *Appendix 4a & 4b*)

5.1 Children's data

- **Age** (in months): any document relative to health was considered like immunisation card or road-to-health card. If there is no document with birthday available, then the

date of birth was asked to the head of the family for each child between 6 and 59 months with using the local seasonal and event calendar to estimate the child's age (see *Appendix 5a & 5b*). If the age was still not sure, only children with height between 65 cm and 110 cm were included in the survey.

- **Sex:** The sex of each child was recorded (M/F).
- **Height** (in cm): The measuring board was at least 130cm long and made of hardwood. The board was marked out in 0.1 cm graduations. The height was recorded to the nearest 0.1 cm. For the children less than 85 cm, the height was taken in a lying position while for the children measuring 85 cm up to 110 cm, the height was taken in standing position.
- **Weight** (in kg): Hanging scales 25 kg, type Salter, graduate by 100g, were used. The scales were checked for accuracy before and after, each day measurements, using the same known weights.
- **Oedema:** oedemas were assessed with a moderate thumb pressure applied on both feet during three seconds (the time to count “one thousand and one, one thousand and two, one thousand and three”). If a depression were printed on both feet, oedemas were recorded. (Y/N). Only bilateral oedema were recorded
- **MUAC (in mm):** the Middle Upper Arm Circumference was recorded to the nearest mm using MUAC measuring tapes. The MUAC of the left arm of all 6-59 months old children was taken.
- **Measles vaccination:** for children 9 to 59 months, the mother or caretaker was asked for vaccination card of the surveyed child. When no card was provided, the family was asked if the child had been immunised against measles or not.
Whenever vaccination is confirm by card, it was recorded as 1= Yes
If the caretaker was sure that the child has never been vaccinated for measles, it was recorded as 2= No.
If the mother of the family confirms that the child was vaccinated against measles but no vaccination card is available, it was recorded as 3= History.
If the caretaker does not know whether the child is immunised or not for measles, it was recorded as 4= Unknown.
- **Additional questions:**
 - Does the child have been sick the last 2 weeks? Y/N
 - Introduction to complementary food before 6 months old among children aged from 6 to 24 months.

5.2 Mortality data

In each family selected at random (even if there was no child under 5 years old), a retrospective mortality survey was carried out. The first date of the recall period was be corresponding to the 22nd of Sabuux (since the 22nd of July 2007 according to Gregorian calendar or since the beginning of the Haggay season).

The following questions were asked to the head of the family:

1. The status of the household

Definitions:

Agro-pastoralist: sedentary, moving for harvesting.

Semi-pastoralist: sedentary, moving for pasture.

Pastoralist: moving, do not cultivate, have cattle and camels.

Business: trade, other professions ...

2. The total number of people (of all ages) currently in the household
3. The number of under-5 currently in the household
4. The total number of births
5. The number of above-5 years deaths
6. The number of under-5 deaths

6. Training, survey organization and supervision

A sensitisation campaign and meetings with traditional and religious authorities were organized in order to inform the communities about the survey. Individual letters to the chairmen of the selected villages were sent with detailed information and the date of our visit.

Prior to the survey, a three days training on SMART methodology, anthropometric measurements, and standardization test were organised. After the training, a pilot survey in Wajid town was conducted to assess the good follow-up of the methodology and the anthropometric measurements as well.

Four teams of three persons were in charge with the data collection. Each team consisted in one registrar and two screeners. One supervisor per team was previewed for the entire time of the survey in order to guarantee high quality of the data collected and respect of the methodology. The supervisors were shifting between the teams every day and were staying for the length of the working day with the same team. The teams were accompanied by one representative from the village authorities. One cluster per day per team was carried out. The survey took place from 27th October to 4th November 2007 (8 days).

7. Indexes

7.1 Malnutrition rates

Acute malnutrition or wasting is defined by the Weight-for-Height (WFH) index and the presence of bilateral oedema. The WFH index of a measured child is calculated by taking into consideration the median weight of the NCHS reference population, for the same height.

Acute malnutrition is expressed either in Z-score or in the percentage of median. Z-Score expression always yields a greater prevalence of malnutrition than use of the percent of median criteria since it takes into account variation in the standard deviation of weight at different heights, making it more statistically valid. Nevertheless, the percentage of median is commonly used to identify children eligible for feeding programs. Therefore, both are reported.

Z-scores
Global Acute Malnutrition (GAM): < -2 Z-Scores Weight-for-Height (WFH) and/or oedema
Severe Acute Malnutrition (SAM): < -3 Z-Scores Weight-for-Height (WFH) and/or oedema
Percent of median
Global Acute Malnutrition (GAM): < 80% median Weight-for-Height (WFH) and/or oedema
Severe Acute Malnutrition (SAM): < 70% median Weight-for-Height (WFH) and/or oedema

MUAC is also considered as a pertinent indicator of malnutrition especially to identify under-5 at risk of mortality related to malnutrition. There is no internationally recognised threshold for the classification of malnutrition according to MUAC.

The cut-off points based on UNICEF recommendations, for all children more than 65cm, are the following ones:

MUAC (mm)	Nutritional status
135 MUAC	Normal
125 MUAC < 135	At risk of malnutrition
110 MUAC < 125	Moderate malnutrition
MUAC < 110	Severe malnutrition

ACF uses the cut-off of 110 MUAC < 120 mm to define moderate malnutrition and 120 MUAC < 135 to define 'at risk of malnutrition'.

7.2 Mortality rates

Data collected during the retrospective mortality survey, i.e. number of death in the past three months, allows the calculation of the mortality rate, which is an indicator of the health and sanitation situation prevailing in the surveyed area. The mortality rate for the entire population and for the under five years old is calculated automatically by Nutrisurvey software. The reference cut-offs for the mortality rates are:

- For children under five years old:

- Alert level: 0-5DR 2 deaths/10.000 children/day
- Emergency level: 0-5DR 4 deaths /10.000 children/day
- For the total population:
 - Alert level: CDR 1 death / 10.000 people /day
 - Emergency level: CDR 2 deaths / 10.000 people /day

Results

Data were analyzed using ENA for SMART (last update October 2007). Anthropometric data were put in relation with NCHS reference (1977). The main results in WHO 2005 standards are presented in *appendix 6*.

1. The survey population

A total of 7 children absent have been excluded after a second visit during the survey and 2 other as flags (1 for WHZ out of range and 1 for age missing). Therefore, a total of 847 children from 6 to 59 months were taking into account for the anthropometric survey analysis.

The sex ratio is of 1.1. The proportion of 6-29 months children in the total sample was 37.1% (n=314). The table below shows all the characteristics of the sample.

Table 2: Characteristics of the sample, Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

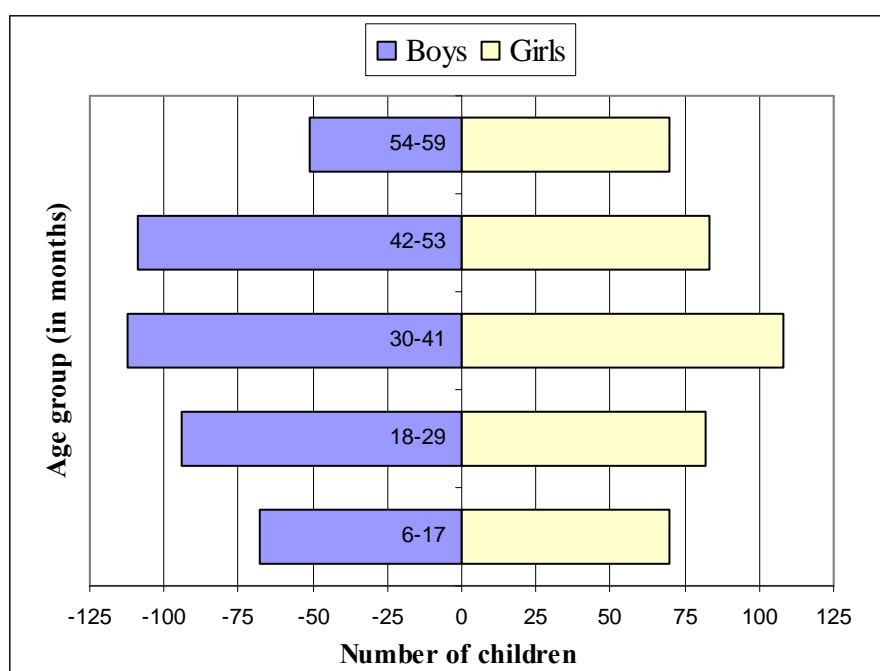
Nutritional anthropometric survey (children, 6-59 months)		
	<i>N</i>	<i>% (95% C.I.¹¹)</i>
Sample size	847	100
Children aged 6-29 months	314	37.1 (32.5 - 41.7)
Sex ratio (M/F)	1.1	-
Retrospective mortality survey (all household members)		
	<i>N</i>	<i>% (95% C.I.)</i>
Sample size (Number of households)	729	100
Sample size (Number of individuals)	3724	100
Children below 5 years of age (U5)	1109	29.8 (27.7- 31.9)
Average household size	5.1	-
Average number of U5 / household	1.5	-

¹¹ Confidence Interval

Table 3: Distribution of age and sex of sample, Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

Age group (in months)	Boys		Girls		Total		Ratio Boy/Girl
	No.	%	No.	%	No.	%	
6-17	68	49.3	70	50.7	138	16.3	1
18-29	94	53.4	82	46.6	176	20.8	1.1
30-41	112	50.9	108	49.1	220	26	1
42-53	109	56.8	83	43.2	192	22.7	1.3
54-59	51	42.1	70	57.9	121	14.3	0.7
Total	434	51.2	413	48.8	847	100	1.1

Figure 1: Population age and sex pyramid, Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007



2. The nutritional situation

The results are presented according to weight for height and MUAC criteria as detailed previously. A total of 847 children are included in this analysis.

2.1 In Z-scores

Table 4: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex (n=847), Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

	All n = 847	Boys n = 434	Girls n = 413
Global malnutrition (<-2 z-score and/or oedema)	(121) 14.3 % (10.6 - 18.0) (95% C.I.)	(75) 17.3 % (12.1 - 22.4) (95% C.I.)	(46) 11.1 % (7.6 - 14.7) (95% C.I.)
Moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(114) 13.5 % (10.1 - 16.8) (95% C.I.)	(72) 16.6 % (11.8 - 21.4) (95% C.I.)	(42) 10.2 % (6.9 - 13.5) (95% C.I.)
Severe malnutrition (<-3 z-score and/or oedema)	(7) 0.8 % (0.2 - 1.5) (95% C.I.)	(3) 0.7 % (-0.1 - 1.4) (95% C.I.)	(4) 1.0 % (0.0 - 1.9) (95% C.I.)

No oedema cases were reported (see Table 5). Male were 1.55 times more likely to have weight-for-height <-2 z-scores when compared with female. This difference was significant ($p < 0.05$)¹².

Table 5: Prevalence of acute malnutrition by age based on weight-for-height z-scores and/or oedema (n=847). Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

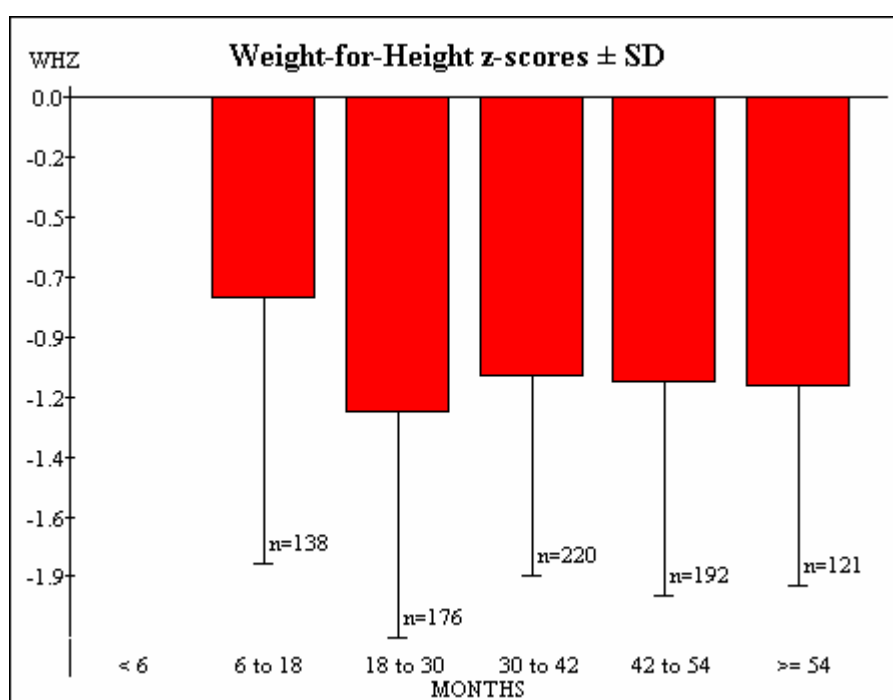
Age (in months)	Total no.	Severe wasting (<-3 z-score)		Moderate wasting (≥-3 and <-2 z-score)		Normal (≥-2 z score)		Oedema	
		No.	%	No.	%	No.	%	No.	%
6-17	138	1	0.7	14	10.1	123	89.1	0	0
18-29	176	4	2.3	29	16.5	143	81.3	0	0
30-41	220	0	0	25	11.4	195	88.6	0	0
42-53	192	1	0.5	29	15.1	162	84.4	0	0
54-59	121	1	0.8	17	14	103	85.1	0	0
Total	847	7	0.8	114	13.5	726	85.7	0	0

¹² Relative Risk = 1.55 (1.10 – 2.18, 95% C.I.), P-value = 0.01

Table 6: Distribution of acute malnutrition and oedema based on weight-for-height z-scores (n=847). Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

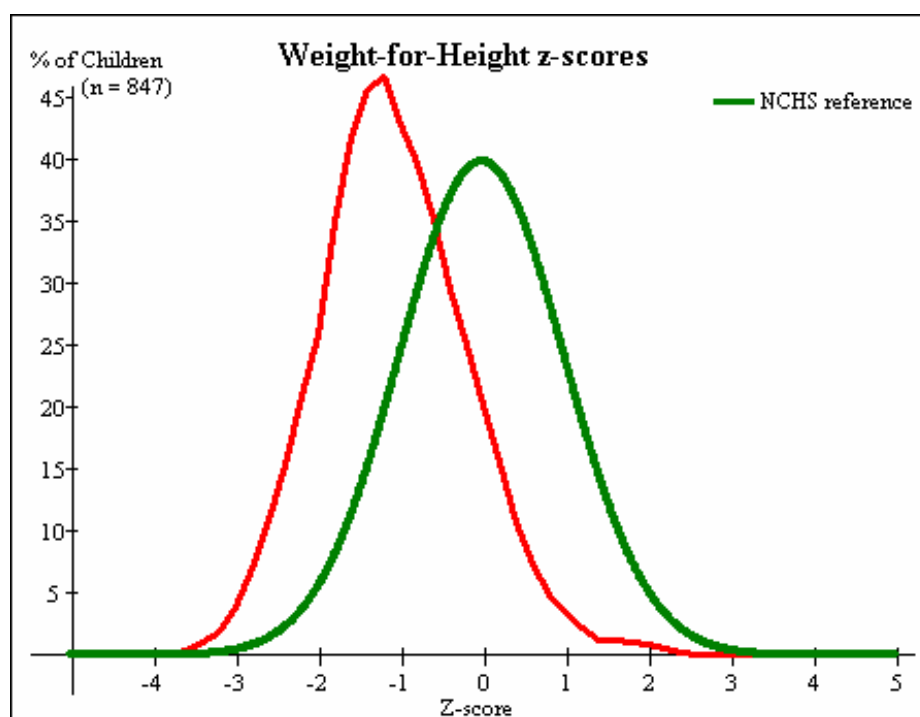
Presence of oedema	<-2 z-score	≥ -2 z-score
Oedema	Marasmic kwashiorkor 0 (0.0 %)	Kwashiorkor 0 (0.0 %)
No oedema	Marasmic 121 (14.3 %)	Normal 726 (85.7 %)

Figure 2: Prevalence of weight-for-height in z-score (± standard deviation) according to the age classes, n=847, Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007



There was no significant association between the nutritional status (in z-scores) and the age when 6 to 29 months old were compared with the 30 to 59 months old children.

Figure 3: Weight-for-height distribution (in z-scores) vs. NCHS reference population, Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007



Considering the entire population, the weight-for-height in z-scores distribution curve is shifted on left from the NCHS reference (Figure 3). The mean of weight-for-height was 1.08 and the standard deviation of ± 0.89 z-scores was within the accepted limits (0.8 to 1.2). The shape of the curve is skewed on right. It is probably due to the fact that there were more obese than extremely wasted children in the sample. No digit preference have been found for the weight measurement but for the height two digits (0 and 5) were not often observed compared to the others which might have led to some measurements errors.

2.2 In percentage of the median

The prevalence of GAM and SAM expressed in percentage of the median for the whole population and by age are presented in the tables below. Similar characteristics, as for the weight-for-height in z-scores, are observed.

Table 7: Prevalence of acute malnutrition based on the percentage of the median and/or oedema (n=847), Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

Sample size	n = 847
Prevalence of global acute malnutrition (<80% and/or oedema)	(64) 7.6 % [4.9 - 10.2 (95% C.I.)]
Prevalence of moderate acute malnutrition (<80% and 70%, no oedema)	(64) 7.6 % [4.9 - 10.2 (95% C.I.)]
Prevalence of severe acute malnutrition (<70% and/or oedema)	(0) 0.0 % [0.0 - 0.0 (95% C.I.)]

Table 8: Prevalence of malnutrition by age, based on weight-for-height percentage of the median and oedema. Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

Age (in months)	Total no.	Severe wasting (<70% median)		Moderate wasting (≥70% and <80% median)		Normal (≥80% median)		Oedema	
		No.	%	No.	%	No.	%	No	%
6-17	138	0	0	9	6.5	129	93.5	0	0
18-29	176	0	0	22	12.5	154	87.5	0	0
30-41	220	0	0	13	5.9	207	94.1	0	0
42-53	192	0	0	13	6.8	179	93.2	0	0
54-59	121	0	0	7	5.8	114	94.2	0	0
Total	847	0	0	64	7.6	783	92.4	0	0

2.3 MUAC classification (risk of mortality)

The MUAC for one child is missing, therefore a total of 846 children has been analysed.

Table 9: Distribution of the malnutrition according the mid-upper arm circumference criteria (n=846). Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

MUAC cut-off points		Children from 65 to 110 cm of height	
		No	% (95% C.I.)
Severe	<110 mm	6	0.7 (-0.1 - 1.5)
Moderate	110 and <125 mm	76	9.0 (6.3 - 11.7)
Global	<125 mm	82	9.7 (6.9 - 12.5)
At risk	125 and <135 mm	185	21.9 (18.0 - 25.8)
Normal	135 mm	579	68.4 (64.0 - 72.8)
Total		846	100

Using MUAC criteria (children from 65 to 110 cm of height), a total of 0.8% (n=6¹³) of the children are severely acute malnourished and at high risk of mortality and 9.0% of them are moderately acute malnourished.

¹³ Those children were representing weight-for-height <-3 z-scores.

3. Measles vaccination coverage

The measles vaccination coverage was about 55.8% (with card and confirmed by the caretakers) (see *Table 10*). It is important to emphasize that the measles vaccination coverage is still very low and decreased compared to the previous nutrition survey in February 2007 (63.7%).

Table 10: Measles vaccination coverage for 9-59 months (n=820), Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

Measles vaccination (children 9-59 months) n=820	N	%	95% CI
Vaccination confirmed by card	136	16.6%	(13.0 – 20.2)
Vaccination not confirmed by card	323	39.4%	(34.7 – 44.1)
No vaccination	329	40.1%	(35.4 – 44.8)
Unknown	32	3.9%	(2.0 – 5.8)
Total	820	100	-

4. Children's morbidity

Among the 847 surveyed children the caretakers of 845, children were asked if there was any health problem with their children over the last two weeks. There was no information collected about differential pathologies due to the lack of medical knowledge of the nutrition survey teams. It was found that 39.4% of the children experienced health problem the two weeks prior to the survey. The two-week cumulative illness was a risk factor of malnutrition. Those children were 1.67 times more likely to have weight-for-height <-2 z-scores when compared with the healthy ones. This difference was extremely significant¹⁴.

Table 11: Prevalence of reported illness in children in the two weeks prior to interview (n=845). Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

Morbidity (6-59 months children) n=845	N	%	95% CI
Prevalence of reported illness	333	39.4%	34.7 – 44.1

5. Food introduction during the first 6 months of life

Most of the children aged 6-24 (75.9%) were introduced to foods other than breast milk and water early in life between the time of birth and the sixth month of life (*Table 12*). No statistical relation has been reported between the nutritional status and the food introduction during the first 6 months of life among 6-24 months old children¹⁵.

¹⁴ Relative Risk 1.67 (1.20 – 2.32 95% C.I.), P-value = 0.002

¹⁵ Relative Risk 0.66 (0.29 – 1.52 95% C.I.), P-value = 0.316

Table 12: Proportion of children aged from 6 to 24 months old who have been introduced to food during the first 6 months of life, n=229, Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

Introduction of food during the first 6 months of life n=229	N	%	95% CI
Yes	173	75.5%	(67.6 - 83.4)
No	56	24.5%	(16.6 - 32.4)
Total	229	100	-

6. Economic status

The two main economic groups were agro-pastoralist (36.2%) and business (35.4%) followed by semi-pastoralist (27.5%).

Table 13: Economic status of the surveyed children (according to the caretakers), n=845, Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

Status (n=845)	N	%	95% CI
Agro-pastoralist	306	36.2%	(31.6 – 40.8)
Semi-pastoralist	232	27.5%	(23.2 – 31.8)
Pastoralist	8	0.9%	(0.0 – 1.8)
Business	299	35.4%	(30.8 – 40.0)
Total	845	100	-

7. Mortality results

A total of 729 households were surveyed for mortality indicator with a recall period of 90 days. The reported causes of death were for children, post natal death (5), tuberculosis (3), measles (1) and other pathologies as diarrhea and respiratory infection; however, the team didn't ask the details to the family as they were not medical staff.

The results generated by the Nutrisurvey software were as presented in the table below.

Table 14: Number of deaths in the population surveyed, in the 90 days prior to the survey, Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007.

Sample	Number of deaths	N° of population alive at the date of the survey	Mortality rate (deaths/10,000 people/day)
Children below 5 years	15	1109	1.55 [0.47-2.63 (95% C.I.)]
Total population	19	3724	0.57 [0.25-0.90 (95% C.I.)]

Discussion

1. Nutritional status

The anthropometric survey population was equally represented when considering both genders. The sex ratio of 1.1 was within the accepted limits (from 0.8 to 1.2). The sexes were relatively well distributed between the age groups with a little exception for the 42-53 and the 54-59 months age groups. The proportion of different age groups within the sample follows the normal age pyramid (see Results: Figure 1). However, there were noticeable misbalances within the 6-17 and the 30-41 months age groups; the first was underrepresented while the second was over represented¹⁶. It is most probably due to age determination problems.

The Global Acute Malnutrition (GAM) was of 14.3 % (10.5 – 18.1) which is slightly lower than the one of February 2007 (GAM 15.6% (12.4 - 18.8)). The nutritional situation is considered as serious (GAM <15%) compared to the last survey where it was critical. Nevertheless, the difference does not appear as significant¹⁷. Hence the nutritional situation appears as stable.

The Z-scores is said to be more statistically valid than the percentage of the median, and has become the standard index used in nutrition surveys. The results according the MUAC classification (GAM 9.7%) are likely more close to the results expressed in % of the median than to those expressed in z-scores.

2. Mortality rates

The total number of 3724 individuals surveyed was below the necessary minimum of 3762 requested to have reliable estimates of the crude mortality rate even though the sample size was reached the total number of households. During the design of the survey, the average household size was overestimated (5.45) compared to that one found for the actual survey (5.1). The crude and the under-5 mortality rates (CMR 0.57 deaths/10000/day and U5MR 1.55 deaths/10000/day) are below the alert levels¹⁸. Those results are close to February 2007 results.

¹⁶ WHO 'Normal' age distribution in developing countries is for children 0 to 4 years old: 22% are less than 1 year old; 21% are 1 year old; 20% are 2 years old; 19% are 3 years old; 18% are 4 years old.

¹⁷ Relative risk= 1.09 (0.87- 1.37 CI 95%), P-value = 0.455

¹⁸ SPHERE standard for U5MR – Alert level: 2/ 10,000 people/day and Emergency level: 4/10,000 people/day; CMR – Alert level: 1/ 10,000 people/ day; and Emergency level: 2/ 10,000 people/ day;

3. Causes of malnutrition

The morbidity in the last two weeks prior the survey declared by the caretakers was of 39.4 % and it was significantly related to the malnutrition. The health status of children was highly related to the nutritional status. However, the high crop production, abundant pasture and higher water availability due to very good rainfalls during the last Deyr season 2006 (October 06 to January 2007) have stabilized the food security at household level during the time of the survey. For instance, the food security assessment carried out at the same time than the nutrition survey highlighted that more than half of the sample had enough food to resist for at least two months. Thus, poor crop production during the last Gu' (April- June 07) season did not worsen the nutrition and food security situation in this area. On the other hand, the food security assessment emphasised that if the rain continues to fail principally the Deyr 2007 then there would be a high risk of food shortage in the coming months. For instance, the main source of food and income for nearly 75% of households comes from own production (either farming or livestock). Therefore, all those factors may deteriorate the nutritional status of the population in the coming months.

Several possible scenarios can be drawn in the following months which may have a direct impact on the nutritional situation:

- If the Deyr season fails and lasts shorter than usual it will affect the food stocks.
- If the devaluation of the Somali Shilling persists in the coming months, it will have an effect on the price on the food market and as a result, on the food accessibility.
- If the most vulnerable uses the sorghum harvest to pay their debts from the previous year instead of restocking, it will put them in the vicious circle of debt.

Conclusion

The prevalence of malnutrition is quite stable and within the range of previous surveys in this region though, even if it remains very fragile and associates to some risk factors such as very random water availability, lack of access to health facilities, poor crop production related to poor rain falls or poor cultivation practices, high market prices especially rice and wheat flour, and devaluation of Somali Shilling. Some of those underlying causes of malnutrition are difficult to be approached unless the overall political and administrative instability do not improve. However, relief intervention should target on health and nutrition services improvement, adapted food security projects and constant water availability. Special attention on the measles vaccination coverage is needed. The early warning system and the food security monitoring put in place will continue to play a facilitating role for better understanding of the overall situation.

Recommendations

- Carry on with the treatment of severe acute malnutrition,
- Reinforce the collaboration with the partners working in the area regarding treatment of moderately acute malnutrition and reference of acute malnourished children,
- Implement activities with community volunteers for screening children on a regular basis in order to get clear view of under 5 nutritional status, to facilitate referrals to the respective centres and to enhance sensitization on nutrition,
- Improve the measles vaccination coverage by launching a campaign ,
- Introduce other food security activities related to improvement of agricultural productivity and food storage,
- Continue with the water point's rehabilitation/reconstruction and hygiene promotion.

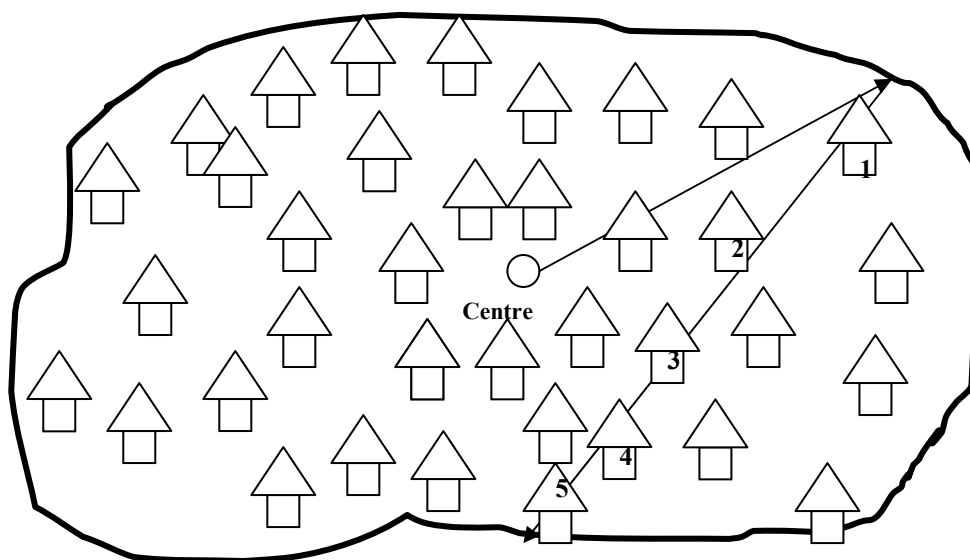
Appendix 2: The cluster selection. **Wajid and surroundings, Bakool/Gedo/Bay, Somalia – October 2007**

Geographical unit	Population size (under-5)	Assigned cluster	District
Afgoye*	95	1	BAKOL
Bakoulgaab*	93	2	BAKOL
Bula Eyle	76	3	BAKOL
Buurbasle	216	4	BAKOL
Burdunhule	480	5	BAKOL
Laf Maqada	116	6	GEDO
Nabur (Ceel Bon)	354	7	GEDO
Dhugsi	110	8	BAKOL
Fajer garowe*	136	9	BAKOL
Garsaley	47	10	BAKOL
Jiirey	108	11	BAKOL
Kulun Jarer	298	12	BAKOL
Shabeelow	55	13	BAKOL
Ubeerey*	103	14	BAKOL
Waajid Horseed	1371	15,16,17	BAKOL
Waajid Howl wadag	1885	18,19,20,21,22	BAKOL
Weeley	191	23	GEDO
Kurte	230	24	BAY
Adiin	108	25	GEDO
Bulo Katis (Ceel Bon)	285	26	GEDO
Tijeegiyare*	100	27	GEDO
Shidalow	132	28	GEDO
Gasalow (Ceel Bon)	108	29	GEDO
Gomore	140	30	GEDO
B. Sharif	103	31	GEDO
Urbeyle (Ceel Bon)	385	32	GEDO

* For villages with a number of children less than 30, it has been added the under-5 population of the closest village.

Appendix 3: EPI method of household's selection

1. With the help of the local chairman/imam, going to somewhere near the centre of the selected cluster area.
2. Choosing randomly a direction by spinning pencil or pen on the ground and noting the direction in which it points when it stops.



3. Walking in the direction indicated, to the edge of the village (as shown in the figure above).
4. At the edge of the village, the team spins the pen again until it points into the body of the village and walk along this second line counting each house on the way, to the edge of the village. If the houses are closely packed together, the teams count only the houses on their right side.
5. Using a random number list, selecting the first house to be visited by drawing a random number between one and the number of households counted when walking. For example, if the number of households counted is 5, as shown, the team leader selects a random number between one and 5. (Each team leader has a list of random numbers). If the number five is chosen, then the team goes to the fifth household counted along the walking line. This is the first house to be visited by the team.
6. Going to the first household: based on the number of children aged from 6-59 months living in the household, the team examines and completes the child questionnaire for *all* of them for the nutritional survey and completes the family questionnaire regarding the mortality survey.
7. The subsequent households are chosen by proximity. In a village where the houses are closely packed together, the next house is chosen on the right: by standing in the entrance of the compound, the ones on the right arm.

The team continues to go following this method until the required number of children to be measured and the number of household to be visited is reached.

8. If the border of the village is reached and if the required number of children is not achieved, another direction should be determined using the procedure mentioned above (from step 4.) The team leader has to be careful to not include twice the same household.

9. The same method is used for all the clusters.

Appendix 4a: Anthropometric questionnaire, Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

Date: _____ Team number: _____ Cluster number: _____ District/Village: _____

N	HH No.	Sex F=Female M=Male	Age in months	Weight (kg) 00.0	Height (cm) 000.0	Oedema Y=Yes N=No	MUAC (mm) 000	% W/H	Measles vaccination (Only for 9-59 m children) 1=Yes 2=No 3=History 4=Unknown	Does the child have been sick the last 2 weeks? Y=Yes; N=No	Did you introduce other food to your child before 6 months (Only for 6-24 m children) Y=Yes N=No
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

Appendix 4b: Mortality questionnaire, Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

Date: _____ Team number: _____ Cluster number: _____ District/Village: _____

HH number	Status 1=agro-pastoralist 2=semi-pastoralist 3=pastoralist 4=business	Total people in HH	Total under 5 in HH	No. of births since the last 3 months	Total deaths since the last 3 months	No. < 5 deaths since the last 3 months
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						

Appendix 5a: Calendar of events, Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

Month	Events	Year											
		2002		2003		2004		2005		2006		2007	
January	Beginning of Jiilal			Siditaal	57	Siditaal Safari park retreat	45	Siditaal	33	Siditaal; Drought in Bakol	21	Harin and Jiron conflict in Kurto	9
February	Mid of Jiilal			Arafo/Dulxaj	56	Arafo/Dulxaj	44	Arafo/Dulxaj; Sheikh Indhocaadde- Baidoa attack	32	Drought in Bakol; Starting fighting Sharia/warlord Mogadishu 2006	20	Last nutrition survey	8
March	End of Jiilal			Sako	55	Sako	43	Sako	31	Drought in Bakol; Opening of ACF TFC in Wajid	19		7
April	Beginning of Gu'			Safar	54	Safar	42	Safar	30		18		6
May	Mid of Gu'			Mawlid	53	Mawlid	41	Mawlid	29	Police Commander died	17		5
June	End of Gu'			Malmadoone/ Milihore	52	Malmadoone/ Milihore	40	Malmadoone/ Milihore	28		16		4
July	1st July: Independence day Beginning of Xagaa			Jamadul- Awal/Mili dhexe; Opening ACF Wajid	51	Jamadul-Awal; Mili dhexe	39	Jamadul-Awal; Mili dhexe	27		15		3
August	Mid of Xagaa			Jamadul-Akhir; Milidambe	50	Jamadul-Akhir; Milidambe	38	Jamadul-Akhir; Milidambe	26	Malweyn/Gadsan conflict not solved	14		2
September	End of Xagaa			Rajab/Shacbaan Hore	49	Rajab/Shacbaan Hore	37	Rajab/Shacbaan Hore	25		13		1
October	Beginning of Deyr			Shacbaan Dambe	48	Shacbaan Dambe	36	Shacbaan Dambe	24	Part of Ceel Bon burn; Floodings in Juba Valley	12	Nutrition survey	0- 1
November	Mid of Deyr	Soon (Ramadhan)	59	Soon (Ramadhan)	47	Soon (Ramadhan)	35	Soon (Ramadhan)	23	Floodings in Juba Valley; Hadama/Giron conflict Orgafan	11		
December	End of Deyr	Soonfur/ Furun	58	Soonfur/ Furun	46	Soonfur/ Furun	34	Soonfur/ Furun	22	End of Sharia Court regime; Floodings in Juba Valley	10		

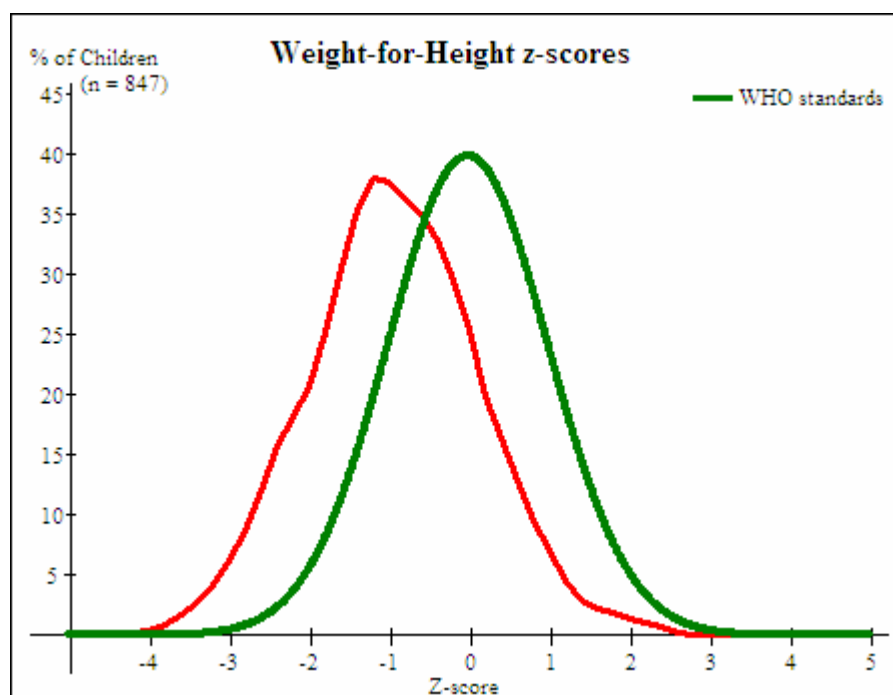
Appendix 5b: Seasonal calendar in Bakool and Gedo regions, Somalia. (Source: Bakool and Gedo Food security assessment, Action Contre la Faim, Somalia, August 2003)

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Season	hot and dry season			long rainy season			cold and dry season			short rainy season		
	Jilaal			Gu			Hagaay			Deyr		
Rainfall	Main dry season (long, hot and dry)			Main rainy season			Cool dry season			short rainy season		
Crops	sorghum harvest			planting of all crops		cow pea harvest	sorghum harvest			planting of all crops		cow pea harvest
Cereal prices	low				high		Low				high	
Lean period												

Appendix 6: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex according to WHO reference population (n = 847), Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

	All n = 847	Boys n = 434	Girls n = 413
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(138) 16.3 % (12.7 - 19.9) (95% C.I.)	(87) 20.0 % (14.9 - 25.2) (95% C.I.)	(51) 12.3 % (8.4 - 16.3) (95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and ≥-3 z-score, no oedema)	(120) 14.2 % (11.0 - 17.3) (95% C.I.)	(74) 17.1 % (12.7 - 21.4) (95% C.I.)	(46) 11.1 % (7.5 - 14.8) (95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(18) 2.1 % (1.1 - 3.2) (95% C.I.)	(13) 3.0 % (1.6 - 4.4) (95% C.I.)	(5) 1.2 % (0.2 - 2.2) (95% C.I.)

Mean: -0.94 ± 1.05 SD



Appendix 7: Prevalence of chronic malnutrition based on height –for age- z-scores and by sex according to NHCS reference population (n = 847), Wajid and surroundings, Bakool/Gedo/Bay, Somalia, October 2007

	All n = 847	Boys n = 434	Girls n = 413
Prevalence of stunting (<-2 z-score)	(273) 32.2 % (27.5 – 37) (95% C.I.)	(149) 34.3 % (28.4 – 40.3) (95% C.I.)	(124) 30 % (25 – 35) (95% C.I.)
Prevalence of moderate stunting (<-2 z-score and ≥-3 z-score)	(146) 17.2% (14.5 – 20.0) (95% C.I.)	(73) 16.8 % (13.3 - 20.3) (95% C.I.)	(73) 17.7 % (14 – 21.3) (95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(127) 15 % (11.2 – 18.8) (95% C.I.)	(76) 17.5 % (12.8 – 22.2) (95% C.I.)	(51) 12.3 % (8.3 – 16.4) (95% C.I.)

Mean: -1.48 ± 1.36 SD

