Nutrition and Mortality Survey in Low Land and Mountainous Ecological Zones of Lahj Governorate Yemen

UNICEF/RI Joint Survey in collaboration with MOPHP

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ABBREVIATIONS AND ACRONYMS

ARI	Acute Respiratory Infection
CDC	Centers for Disease Control and Prevention
CI	Confidence Interval
CLP	Community Livelihood Programme
CMAM	Community Management of Acute Malnutrition
CMR	Crude Mortality Rate
DEFF	Design Effect
ENA	Emergency Nutrition Assessment
EPI	Expanded Programme on Immunization
GAM	Global Acute Malnutrition
HAZ	Height-for-Age z-score
HH	Household
ICRC	International Committee of Red Crescent
IDP	Internally Displaced People
ITN	Insecticide Treated Net
MCH	Maternal and Child Health
MOPHP	Ministry of Public Health and Population
MUAC	Middle Upper Arm Circumference
N	Number
NGO	Non-governmental Organization
OTP	Outpatient Therapeutic Programme
PHC	Primary Health Care
PLW	Pregnant and Lactating Woman
PPS	Population Proportional to Size
RI	Relief International
RUTF	Ready-To-Use Therapeutic Food
SAM	Severe Acute Malnutrition
SD	Standard Deviation
SFP	Supplementary Feeding Programme
SMART	Standardized Monitoring and Assessment of Relief and Transition
TFC	Therapeutic Feeding Centre
TFP	Therapeutic Feeding Programme
TSFP	Targeted Supplementary Feeding Programme
U5MR	Under five Mortality Rate
UNICEF	United Nation Children's Fund
WAZ	Weight-for-Age z-score
WFP-CFSS	World Food Programme-Comprehensive Food Security Survey
WHO	World Health Organization
WHZ	Weight-for-Height z-score

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EXECUTIVE SUMMARY

In July 2012, UNICEF in collaboration with Relief International, and Health Office, Lahj governorate, conducted two nutrition assessments in the Lowland and Mountainous ecological zones of the 15 districts. This was in response to the need to determine the malnutrition levels and trends for the different ecological zones and to inform on the intervention responses for the governorate. The main objective of the surveys was to determine the level of wasting among children aged 6-59 months, analyze the possible factors contributing to malnutrition, morbidity, feeding practices, food security and mortality rate in the specific ecological zones of the governorate. A two-stage cluster sampling methodology using probability proportional to size, 40 and 36 cluster were selected for the Lowland and Mountainous surveys, respectively. Data collection continued from 30th June until 14th July of 2012 in two phases- Lowland zone in the 1st phase and Mountainous zone in the 2nd phase. A total of 1571 children (803 from Lowland and 768 from Mountainous zones) aged 6-59 months from 1504 households (799 from Lowland; and 705 from Mountainous zones) were assessed.

***Socio-demographics**:* The mean household size was 6.87 and 7.05 persons respectively in the Lowland and Mountainous assessments while the respective mean number of the under fives per household was 1.09 and 1.19.

Malnutrition: The global acute malnutrition (GAM) rate (weight for height <-2 Z score or oedema) was **23.0** (95% CI: 19.4-27.1) and severe acute malnutrition (weight for height <-3 or oedema) rate was **4.5** (95% CI: 2.9-7.0) among the Lowland ecological zone. A GAM rate of **14.3** (95% CI: 11.0-18.3) and SAM rate of **2.8** (95% CI: 1.7-4.5) with no oedema case reported among the Mountainous zones. The results indicate **critical** nutrition levels in Lowland and serious nutrition levels in Mountainous zone according to WHO classification. The confidence interval ranges do not overlap between the two studies, illustrating the presence of a statistically significant difference in the rates of acute malnutrition between the ecological zones. Chronic malnutrition or "stunting", indicating long term poor nutrition was at high levels in both areas- **35.1** (95% CI: 30.5-40.1) and **46.9** (95% CI: 42.2-51.7) in Lowland and Mountainous zones respectively. These results can be used as a rough baseline reference for Lahj governorate.

Mortality: The crude and under-five mortality rates were **0.18** (95% CI: 0.10-0.32) and **0.25** (95% CI: 0.06-0.99) respectively among the Lowland population; while in the Mountain the crude and under-five mortality rates recorded at **0.06** (95% CI: 0.02-0.20) and **0.13** (95% CI: 0.02-0.99) respectively. Both the crude and under-five rates fall below the emergency thresholds of *1/10,000/day* and *2/10,000/day* respectively according to SPHERE standards.

Although a direct comparison is not possible, the Lahj health office health indicator data showed a crude death rate (CMR) of 0.33/1000 indicating that these levels are comparable.

Morbidity: High morbidity rates (from common child illnesses) were reported in the two ecological zones. The incidences of reported diarrhea in Lowland and Mountainous populations (27.9% and 28.8% respectively) within two weeks prior to the assessment were high as was the incidences of ARI and fever in the two ecological zones. The Lowland populations in particular had a very high prevalence of ARI and Fever. These levels were consistent with the national level figures. Nearly all (95-98%) of the community populations surveyed sought treatment for illness outside of the home. The majority of people sought treatment in a hospital/clinic/health center; followed by private physicians.

Infant Feeding: Among children aged 6 to 24 months, only 68-70% were still being breastfed. Among children 6 to 23 months of age and still breastfeeding, more than half (56-57%) of children met the recommended minimum number of meals; while only 18-22% of non-breastfed children received the respective minimum number of meals for their age in the previous day.

Food security: Borrowing money to purchase food or purchase food in credit or mortgage is widely practiced. 29% in Mountain and 43% in lowland reduced meals size in the past 30 days; further almost one quarter of households in Lowland areas and 14% in Mountain reported having to go to bed hungry in the 4 weeks prior to the survey. 17-25% of households reportedly reduced the expenditure on education to save money to purchase food, over the 4 weeks prior to the survey. The result is indicative of household food insecurity, particularly in the Lowland ecological zone.

Water and Sanitation: In Mountain community, approximately two thirds of the population uses an improved source of drinking water. In Lowland, more than 83% population uses improved water, with a nearly one-third using piped water connected to home. Overall, few households treat water for drinking purposes. In Mountain community less than half of the population (41.7%) used improved toilet facility, whilst in Lowland, the proportion of households using improve facility increases approximately to 51%. Hand washing practices among the communities surveyed were highest before and after eating and after toilet use. Hand washing after disposing of children's feces and before feeding children is low. Use of soap for hand washing in general was good with 92-97% of population surveyed washed their hands with soap. About 16% people in the Lowland and 5% of the Mountainous community had been defecating in the open field. Among the Lowland communities, more than two thirds (75.5%) of the people wash their hands after eating, while 70.1% washed before eating and 61.3% after

toilet use. Among the Mountainous areas, 70.6% wash their hand before eating, 70.5% after eating and further 63.8% after using the toilet.

Programme coverage: The level of measles vaccination based on immunization card and mother's recall was in the range of 86-89% in the two survey areas. Approximately 70-73% of population in the Lowland and Mountain ecological zone had received vitamin A capsule in the past 6 months prior to the survey. These coverage figures of the current survey are lower than the 87% coverage reported in the last Vitamin A supplementation campaign in Lahj governorate which was conducted in March 2012. Only 25% of households had salt with adequate iodization.

Recommendations:

In conclusion, the level nutrition situation in Lahj governorate is categorized as ***critical*** in the Lowland zone and ***serious*** in the Mountainous zone. There is a need for a nutrition response to salvage the situation and prevent it from further deteriorating. Children are the most susceptible to such shocks and such a situation if not rescued will have a detrimental effect on their health and lives both in the short and long run. The following recommendations are proposed to compliment the efforts on the ground and to ensure that the nutritional requirements of the community are met.

- Convene a multi-sectoral meeting at governorate level to develop a joint action plan identifying responsible partners, and setting a time frame to act on the recommendations made for improving the nutrition situation.
- Expand and scale-up the current CMAM services to more health facilities to increase coverage and to reach more malnourished children.
- The CMAM service in the existing health facilities must also be strengthened through capacity building and as a preparation to enhance the capacity of managing severe malnourished children
- Strengthened the community mobilization efforts to improve early case finding and referral for OTP
- Deploy additional mobile health teams to strengthen and compliment the primary health care services delivered at static health facilities
- Appropriate targeting and continued distribution of existing food aid
- Blanket and targeted supplementary feeding in severely affected areas
- Improved coverage of vitamin A supplementation, multiple micronutrient supplements that includes iodine and better management of diarrhea and acute respiratory infections

- Better hygiene and sanitation practices/opportunities
- Establishing of nutrition surveillance and monitoring system and a follow-up survey after 6 months to assess the change in status of the populations and effect of health and nutrition interventions on malnutrition prevalence, morbidity and mortality
- Strengthen the support for ITN distribution and awareness raising campaigns
- Implement programmes that will promote self-sufficiency and household food security
- Promote salt iodization programmes

1. BACKGROUND

Location

Lahj governorate (Figure 1) is one of the twenty one governorates in Yemen, covering a total area of 13,046 km^2 which makes it the fifth largest governorate in Yemen by its total area. Lahj Governorate is located 320 km southwest of the Capital City of Sana'a and 30 km to the east of the City of Aden. Al-Houta is the capital city of Lahj and is considered a crossing point to and from many governorates. Al-Houta is also a favorite stopover for tourists, because of the presence of vital facilities, administrative centers and markets. Sultan Abdali Palace is considered to be the most prominent architectural landmark of Houta city. The condition of the road to Al-houta and the inter district roads are generally good.

Lahj governorate borders Abyan governorate in the East, Taiz governorate to the Southeast, Al-Baidha governorate to the Northwest and Aden governorate to the South. The governorate is subdivided into 15 districts (*muderiah*).

Figure 1: Map of Lahj governorate (*Map: OCHA Yemen*)

Demography

The total population of Lahj governorate is estimated to be 869,253[1] with a sex distribution of 50% (435028) females and 50% (434225) males. The average family size is estimated to be 7 persons per household. According to health office information, 793,964 (91%) of the total population live in the rural areas.

Topography

The topography of Lahj varies from high mountains reaching 2500m above sea level as part of As-Sarat mountainous range, to fertile valleys, such as Wadi Tuban, which is one of the most fertile Wadis in Yemen. The Mountainous Areas of Lahj are rich in natural resources for environmental tourism such as: The Forest of Irf-Maqatirah and areas in the mountains of Yafi'a, which grows some of the finest Yemeni coffee. The villages of Yafi'a also are characterized with their own architectural features, such as the reliance on stone and their high rise floors. Islamic landmarks in the governorate include the Al-Nour Mosque in Al-Mousat. There are still annual pilgrimages to various tombs in the different areas of Lahj Governorate to pay tribute to respected Islamic notables of the past.

Climate

The governorates climate varies according to the topography of the terrain. In the coastal plains the temperature can rise in the summer to 32^{o}C, where the mean temperature in the winter comes down to 20 ^{o}C. The coastal plains also witness rainfall in the winter and autumn. However, in the mountainous highlands, rainfall is witnessed in the spring and summer seasons.

Agriculture

The total cultivated area in the Governorate of Lahj is 60,000 feddans. The most popular wadis are Wadi Tuban, Wadi Wirzan, Wadi Yahr, Wadi Saba and Wadi Al-Rruja'a. Along the banks of Wadi Tiban, a number of recent dams were constructed. Since Wadi Tiban is characterized by a semi-tropical climate this fills the gardens of Lahj Governorate with vegetables, fruits, various types of grain and long fiber cotton and with the lovely scents of blossoms and flowers.

[1]*Source: the total population of the governorate in 2012 projected based on the 2005 census*

2. OBJECTIVES OF THE SURVEY

The main purpose of the survey was to assess the nutrition situation of the Lowland and Mountainous communities. The final outcome of the survey would be to make recommendations for the purposes of guiding the design and implementation of an appropriate response in *Lahj governorate.*

The specific objectives were as follows:

- Nutritional status
  - To determine the prevalence of global and severe acute malnutrition among children aged 6-59 months
  - To determine the prevalence of stunting and underweight among children aged 6-59 months
- Morbidity
  - To determine the prevalence of diarrhea, fever, acute respiratory infection (ARI) and suspected measles in the previous one month among children aged 6-59 months
- Mortality
  - To determine the retrospective crude and under-five mortality rate for the 3 months prior to the survey
- Infant and Young Child Feeding
  - To gain a better understanding of infant and young child feeding practices including the minimum meal frequency for children 6-24 months.
- Water and Sanitation
  - To estimate access to safe water among households
  - To determine the hygiene and sanitary practices among households
- Food Security
  - To understand the coping strategies of households at times of acute food shortage
- Programme Coverage
  - To estimate the proportion of households using to iodized salt
  - To estimate the proportion of children aged 9-59 months vaccinated against measles
  - To estimate the proportion of children aged 6-59 months who have received vitamin A supplementation within the 6 months time period prior to the survey

3. MATERIALS AND METHODS

3.1. Survey timing

Data were collected in the two survey areas during June and July 2012. Lowland community data collection was completed in 7 days between 30 June - 7 July 2012, and the Mountainous areas completed in 6 days between 8th and 14th July, 2012.

3.2. Survey design

Because of the perceived differences across the districts in the same governorate, it was agreed to assess the nutrition situation among two different population groups: "Lowland Community" to represent the population residing in Lowland households, and "Mountainous Community" that to represent the population living in Mountainous areas. Surveys included all the fifteen districts as sampling universe. Hence there were two separate cross-sectional surveys conducted, one representative of the Lowland community populations of 9 districts and the other survey representative of the Mountainous population residing in 10 districts.

Systematic random sampling using probability proportional to size (PPS) and SMART methodology was used to select the clusters for each survey. Households were the sampling unit in the clusters, with mothers and care takers' of children under 5 years as respondents.

3.3. Sample Size

Sample size for malnutrition and mortality is calculated separately as described below.

a) Sample size for Severe Acute Malnutrition (wasting)

The sample size calculation was performed with the assumption that the expected prevalence of acute malnutrition would be 15.1%, with 4% precision and a design effect of 2 (Table 1a).

Table 1a: Assumptions for calculating the anthropometry sample size

Zones (Stratum)	Estimated Acute Malnutrition Prevalence (%)[1]	Desired Precision (%)	Design Effect[2]	Average Household Size[3]	Under 5 year old (%)[4]	Non response household (%)[5]	**Sample Size (N)**
Mountain	15.1	4	2	7	15.8	5	709
Lowland	15.1	4	2	6.1	16	5	803

Considering the time needed to travel daily, taking the measurements and complete the forms, it was estimated that a team could visit 20 households per day. The total number of clusters to be surveyed is estimated by dividing the total number of households to be visited by each team per day, which gives a cluster of 36 in Low Land and 40 in Mountain Zones. The overall anthropometry sample size of the two Zones (stratum) is presented in Table 1b.

Table 1b: Estimated sample sizes and clusters for nutritional status (anthropometric measurements) by zones with 20 households to be surveyed per day.

S. No	Zones (stratum)	Estimated sample size	Households to be visited/ day/cluster	**Total cluster per survey**	Days to complete the survey for 6 teams[6]
1	Mountain	709	20	**36**	6
2	Lowland	803	20	**40**	7

b) Sample size for crude death rate

To calculate the sample size for estimating the death rate one needs to know the crude death rate/10,000 population/day. The estimated U5MR mortality rate from Yemen Family Health Survey[7] 2003 was 101.9/1000/year, which was divided in to three[8] and used as the estimate for calculating sample size for mortality (Table 2a).

[1] *WFP. CFSS, Yemen. May 2012*

[2] *An assumption was made that within the Zones (stratum) selected, the population are expected not to be equally affected and differences to be seen on the level of malnutrition between clusters due to differences in access to services and information, etc*

[3] *Calculated on basis of Central Statistics office data of population versus households*

[4] *Estimated on basis of MoPHP reports and immunization statistics*

[5] *Non-response rate of 5% was estimated to account for refusal, security-related inaccessibility or absence.*

[6] *This is an estimate that does not allow for delayed access due to weather or security conditions.*

[7] *Yemen Family Health Survey, 2003*

[8] *From earlier surveys conducted in various governorates, it was estimated that the level of CMR is one-third of the U5MR*

Table 2a: Assumptions for calculating the anthropometry Sample Size

Zones (Stratum)	Estimated Mortality Prevalence (%)	Desired Precision (%)	Design Effect[9]	Average Household Size	Recall Period (days)	Non response household (%)	**Sample Size (N)**
Mountain	0.9	0.4	1.5	7	90	5	**590**
Lowland	0.9	0.4	1.5	6.1	90	5	**677**

Considering that a maximum 20 households can be surveyed per day per team, the number of clusters is 30 in Mountain and 34 in Lowland Zones. The overall mortality sample size of the two Zones (stratum) is presented in Table 2b.

Table 2b: Estimated sample size for Mortality and clusters by Zones with 90 days recall period (DEFF of 1.5, CMR of 0.9/10000/day and precision of 0.4 with 20 households per cluster)

S. No	Zones (Stratum)	Estimated sample size	Households to be visited/ day/cluster	**Total cluster per survey**
1	Mountain	590	20	**30**
2	Lowland	677	20	**34**

Conclusion about sample size: As shown above in Table 1b and 2b, the total number of clusters to be visited in order to estimate the under-five nutritional status and CMR in the two Zones (stratum) differ slightly. SMART methodology recommends selecting the higher household number when the anthropometric and mortality sample sizes vary. In this case, the anthropometric sample size was used for the survey. This implies that although only 30 and 34 clusters are needed for the mortality data collection in Lowland and Mountain zones respectively, the actual number of clusters surveyed followed the anthropometric calculations, i.e., 36 and 40 clusters. Therefore, mortality data was collected in all households visited for anthropometric measurements.

[9] *An assumption was made that minor heterogeneity in the death within clusters*

3.4. Sampling methodology

a) Sampling universe

In Lahj governorate, districts are subdivided in to *sub-districts;* which are further divided into villages. The universe that the samples were drawn was based on the complete list of 'villages' in all the fifteen districts and the best available population estimates of the selected villages obtained from the central population office.

b) Cluster selection

Since it is difficult to obtain an updated sampling frame of under-five children or households at village level, village level population data was used for cluster assignment. A total of 40 cluster in Lowland and 36 in Mountainous zone were randomly selected by assigning probability proportional to population size (PPS) using ENA software (Annex I & II)

c) Household selection

The survey teams visited the selected cluster location and met village leaders. The team leader explained the purpose of the survey and survey procedures. After obtaining the initial permission of village leaders, participation from each household was requested.

After the cluster location was identified, the nutrition survey teams use the modified EPI method. In the centre of each cluster[10], the survey team chooses a direction by using the "spinning pencil method", whereby a pen is thrown into the air to decide the way of direction. The team leader walked to the boundary of the cluster following the direction of the pen. When the border was reached, a new direction was randomly selected by spinning pen again until it pointed into the body of the cluster.
Then, the team leader walked to the end of the selected direction counting all the available households (HHs[11]) and after obtaining initial consent from a household member marked the household with a board marker. The first house was selected by using a random table (Annex III). The second house was taken by proximity, when leaving the houses and continues until the required data was collected.

[10] *The centre of the cluster was determined with the assistance of a village chief /leader*
[11] *A household was defined as persons routinely sharing food from the same cooking pot and living in the same compound or physical location as this is considered one household in Lahj context. Members of a household may not necessarily be relatives by blood or marriage. A polygamous family living and eating together was considered to be one household*

Teams attempted to collect data from 20 households per cluster. All chosen households were selected to answer the household and mortality questions, whether or not they contained a child 6–59 months of age. If household members were not present during the survey, the team revisited the household at least three times in an effort to interview and measure eligible household members, unless security or logistical constraints prohibited the amount of time spent in a cluster. In situations where the members of a household had departed permanently or were not expected to return before the survey team had to leave the cluster, that particular household was skipped and not replaced. The minimum age of respondents for interview was 15 years old. When respondents could not provide accurate information, households were revisited and if accurate information could not be obtained, those questions were marked as missing in the questionnaire. All eligible children aged 6 to 59 months were measured in the cluster. If a child's age was unknown, it was estimated using a seasonal/local calendar. Absent children were followed up during the survey day. Children present the day of the survey, but who are not living in the household are not included in the survey.

3.5. Training and survey team composition

Six teams were trained for the survey and each team consisted of 4 members – two female measurers and one female interviewer and one male team leader were recruited, trained and subsequently participated in the data collection and conduct of the survey. Females collected information from the mothers/care takers' and conducted weight and height measurements of the children. Male members carried the instruments, arranged and helped in anthropometric measurements and conducted the sampling at each cluster. The training of team members (interviewers, measurers and team leaders) by the survey consultant and manager was conducted at Al-houta for 4 days.

More than half of the training sessions focused on anthropometric measurement and each surveyor had to practice both in the classroom and in the community before qualifying to join the team. Adequate attention was given in training on standardizing the instrument and keep record of the procedure and variation or error (if any). The team was trained on interview techniques, the format of questionnaires as well as on data recording and reviewing techniques. The team leaders were trained for editing the questionnaires in the field and in quality assurance techniques. The training also covered basic introduction to nutrition such as definition of malnutrition, causes, classification and UNICEF framework, explanation on the survey and its methodology, and practical training on the important data collection procedures, anthropometric measurement techniques, recognition of the signs and symptoms of malnutrition including nutritional oedema.

As a means to verify anthropometric skills of measurers, to detect differences among measurers and identify their possible causes, anthropometric standardization test was carried out during the third day of the training' as the main purpose is qualifying measurers and each female participant had to practice before qualifying to join the team. Ten children were measured once by the survey consultant and manager and each of the 18 female surveyors. Normally, each enumerator is supposed to measure 10 different children twice with a time interval between individual measures that means one child to be measured 38 times. However, after the children were measured 19 times (end of round one), the children were crying and refused to take the second round. Each surveyor had managed only a single measurement of each child. As a result it was not possible to calculate both precision and accuracy of each enumerator using ENA/SMART standardization exercise. However, the accuracy was analyzed based on single measurement. The weak team members were identified and the common mistakes made were identified and addressed. Extra training and support was given based on the scores attained by each surveyor during the standardization test.

Pre-testing of the questionnaire was done, in a village that is not part of the survey sample, in order to provide practical training for the survey members on how to identify selected households, how to fill questionnaire, complete interviewing households, demonstration of malnourished children and how to compile the data files. Data collection took place during June 30 to July 7 for the Lowland community during July 8 to 14, 2012 for the Mountain community.

3.6. Field supervision and quality assurance

The survey consultant who was also the manager was responsible for the supervision of the assessment teams and for the overall coordination of the nutrition survey activities. Constant supervision and monitoring of all field activities, editing, was emphasized. Concurrent crosscheck of the data collected by interviewers was performed by the survey consultant in a random sample of households.

The team leaders were responsible for strictly following the day-to-day activities of measurers and interviewers. Team leaders were reviewed all questionnaires every day before the teams leave a household so that any mistakes could be checked on the spot and necessary correction be made. Team leaders were responsible to verify the accuracy of the details before the teams leave a household, thus minimizing possibility of incomplete data (missing variables) and outliers. The survey consultant consulted team leaders for any erogenous or irregular data on a daily basis. Discussions were conducted in each day after the teams returned from field data collection.

Each weight scale was numbered and calibrated daily prior to data collection using a standard weight of 10 Kg to ensure the scale is sturdy, reliable and accurate. All the scales were accurate and no adjustment factors were required.

Data entry of the completed questionnaires was done by professional statisticians on a daily basis. Random check of the data entry of questionnaire (10%) was done by the survey consultant and manager using the Microsoft Excel programme, and consistency checks were run to detect and correct data entry errors including re-entry and systematic data checking.

Survey manuals were provided to the teams as part of the training, to ensure appropriate guidance in the survey implementation.

3.7. Data collection methods[12]

3.7.1. Anthropometric measurements

The following data was collected to all children aged between 6 and 59 months.

Age (in months) of the children is, in the first instance, established by *an official document* stating his data of birth (birth certificate, immunization card, etc). In th*is* case, the surveyors verify that the child is above 6 months and below 60 months and record th*e exact date of birth.* If the child does not have an official document mentioning his date of birth, the age of the child estimated in months with the help of *a local calendar of events* using religious, agricultural and seasonal events (Annex IV & V)

Gender: Male children are recorded as 'M' and female as 'F'.

Height/Length: Height and length of children was measured using height boards and recorded to the nearest 0.1cm. Children less than 87cm are measured lying down and those more than 87cm standing up. Before taking the height/length, caretakers were requested to take off shoes (if any). For children measured standing up, the measurers are trained to ensure that the child's head, shoulder blades, buttocks, calves and heels are touching the board and that they are looking straight ahead. Children measured lying down are placed in the middle of the board with the head touching the fixed end, the knees pressed down and the heels touching the movable base of the board.

[12] *In the absence of emergency nutrition assessment guideline for Yemen, anthropometric measurement techniques followed those outlined in the SMART methodology. Measuring Mortality, Nutritional Status, and Food Security in Crisis Situations. Version 1. April 2006.*

Weight was measured by using UNISCALES and recorded to the nearest 0.1kg. All children were measured without or with light clothing.

Oedema is diagnosed by applying normal thumb pressure to the anterior surface of both feet for three seconds. If an indentation remains after the pressure is removed, presence of edema is considered positive and a "Y" is entered on the data collection form. If the thumb imprint does not persist, or if the edema is not bilateral, the child is recorded as not having edema and an "N" is entered on the data collection form. The survey consultant has to check and verify all positive or questionable cases of edema.

Mid Upper Arm Circumference (MUAC) was measured on the left arm of all sampled 6-59 months old children following all the 10 steps for measuring MUAC as recommended in the Anthropometric Indicators Measurement Guide[13.] MUAC was recorded to the nearest 0.1cm.

Vaccination and Vitamin A supplementation coverage: Measles coverage was assessed among children 9-59 months by firstly checking the vaccination /MCH card. Where cards were not available, a verbal recall (yes, No or do not know) from the mother or caretaker was recorded. Polio immunization coverage was assessed among all among 6-59 months old children by firstly checking the vaccination/MCH card where possible and a verbal recall by mothers/care takers. Vitamin A supplementation coverage was asked by demonstrating the blue capsule and asking mothers whether their child had received this capsule in the six month period prior to the survey.

Morbidity: Retrospective morbidity information was collected on selected illness (diarrhea, fever, cough and suspected measles) within a 14 day recall period. Morbidity information relies on the mothers' perception and memory of the child/children's illness and is therefore considered to be very subjective.

Mosquito net: All the care takers' were asked if the child sleep under mosquito net the night prior to the survey.

Programme registration: All mothers were asked if the child currently registered at a nutrition center.

[13] *Anthropometric Indicators Measurement Guide. 2003 Revision. Bruce Cogill. Food and Nutrition Technical Assistance Project (FANTA). Academy for Educational Development*

3.7.2. Mortality Data

The SMART methodology was used to estimate mortality. Mortality was assessed in the entire population of the selected households (Annex VI). Mortality data was collected regardless of whether or not there were any children under five years in a household. Information was collected on all household members alive on the date of the interview, alive on the first day of the 90 day recall period, and individuals who were considered household members sometime between the first day of the recall and the interview. The current status was requested for each individual (alive, dead, or unknown). The cause of death was also recoded. Apart from considering the number of people currently in the households, those who were present at the beginning recall period, birth and deaths, the methods takes into account the number of people who joined or left the households during the recall period. The number of days was calculated from the beginning of the observation period to the midpoint of data collection, which varied between the two surveys.

3.7.3. Household Data

Information on household composition- total number of family members, under-five and under 6 month, head of household, marital status of head of household, source of household income and education level of caregiver was collected from each of the sampled households. Breastfeeding status and meal frequency for 6-24 months children collected through recall of the care takers'. Information on access to health services was assessed through recall of the care takers' using the household questionnaire. The information on main source of drinking water, water treatment practice, hand washing practice and type of toilet facility were all assessed through interviews with the mothers. Key information on food security situation was also gathered through household interview questionnaire (Annex VII)

3.8. Ethical considerations

All children that were diagnosed as severely or moderately malnourished based on Weight / Height, MUAC or with *oedema* were referred to the nearest OTP centre for treatment (*referral slips were provided to each team leaders to facilitate the process (*Annex VIII).

3.9. Data Analysis

For data entry, databases and entry screens were developed using Microsoft Excel. For data analysis, the data tables were converted to ENA software for SMART (version June 2011) for nutritional data analysis and spss version 16.0 for analysis of information on feeding practices,

vaccination coverage, morbidity and other households variables. A p-value <0.05 was considered to be statistically significant at 95% CI.

All data was entered on a daily basis. Checks were made using the plausibility function of the ENA software to ensure data collection quality daily. Data cleaning and editing of the data entered was done by the survey consultant before the analysis. Random check of the data entry of questionnaire (10%) was done by the survey consultant, and consistency checks were run to detect and correct data entry errors. The nutrition indices (z-scores) for Weight-for-Height (wasting), Height-for-Age (stunting) and Weight-for-Age (underweight) were generated and compared with WHO 2006 Growth Standards. Children/cases with extreme z-score values were flagged and investigated and appropriately excluded in the final analysis if deviating from the observed mean (SMART flags).

3.10. Survey limitation

- *Limited information at planning stages*: When compiling the sampling universe villages containing more than 200 households and selected in the cluster assignment had a small number of households than expected.
- *Lack of comparable data*: Because of the lack of comparable data (nutrition assessments using similar methodology, conducted in the same season and in the same *governorate*), it is difficult to assess the relative gravity of the current situation as opposed to the previous. It is hoped that in future, by repeating surveys in the same governorate, comparative baselines will be developed for trend analysis.
- *Information on other vulnerable groups*: Anthropometric data was not collected among other vulnerable groups such as pregnant and lactating women or the elderly. In light of the severity of the situation, the nutritional situation of other vulnerable groups should also have been captured for emergency response planning.
- *Recall bias*: There could be a potential recall bias on answering several questions. The results for the answers to questions like, morbidity could be influenced by inaccurate recall and response.
- *Children with no exact birthday*: Records of children's age were not available for verification in the nearly half of the surveyed the children (48% children in Lowland and 46% in Mountain with no exact birthday). Age estimation based on mother recall may not be accurate although a calendar of events was used to estimate the child's age.

4. RESULTS

Table 3 shows the sample details and household interview response rates for the survey. A total of 1,512 households were selected, of which 1,504 were interviewed, yielding a household response rate of 99.5%.

Table 3: Response rates and sample details for survey areas, Lahj governorate, July 2012

Ecological Zone	*Lowland*	*Mountainous*
Clusters in sample	40	36
Households sampled	803	709
Response rate	99.5	99.4
Number of Households	799	705
Number of Children (6-59 months)	803	768

4.1. Demographics and socio-economic characteristics

4.1.1. Household composition

Information about the composition of household by sex of the head of the household and size of the household is presented in Table 4. Among all the heads of households in Mountainous areas, 94.3% were male, while only 5.7% were female. This percentage decreases slightly for Lowland households with 92% male-headed and 7.8% female-headed.

Households with 10 to 14 members account for 15.3% of Mountainous households, compared with 14.3% of Lowland households. Similarly, the proportion of 15 or more member households is higher in Mountainous households (2.8%) than in Lowland households (2.0%).

The average household size in the Lowland and Mountain community are comparable at approximately 7 members per household. Lowland community had an average of 6.87 people per household and the Mountainous community had an average of 7.05 people per household. The mountainous community had the most number of children per household of the two surveys, including highest percentage of households under children under 6 months old. The average number of under-fives was 1.19 and 1.09 in Mountainous and Lowland areas, respectively.

Table 4: Percent distribution of households by sex of head of household and by household size, according to ecological zone, Lahj governorate, July 2012				
Ecological Zone	*Lowland*		*Mountainous*	
	%	*N*	*%*	*N*
Sex of household head				
Male	92.2	737	94.3	665
Female	7.8	62	5.7	40
Number of family members				
Less than 5	24.0	192	22.7	160
5-9	59.7	477	52.2	417
10-14	14.3	114	15.3	108
More than 15	2.0	16	2.8	20
Number of households	799		705	
Mean family size	6.87		7.05	
Mean number of under-fives	1.09		1.19	
Mean number of 6-59 months children	1.01		1.09	
Note: table is based on family members who are alive and living with the household on the date of the survey				

4.1.2. Characteristics of household head

The majority of household heads were married in both survey areas (95% in Mountain and 92% in Lowland). 5.9% In Lowland and 3.9 in Mountain were divorced, while 1.1% in Lowland and 2.0% in Mountain were single at the time of the survey.

A majority of the household heads were salaried. The proportion, however, significantly varied between Lowland and Mountainous locations (62.1% in Lowland as compared to 29.2% in Mountain). The main source amongst the Lowland remains monthly salary wage, yet the Mountainous areas show more diversity in source of income: remittance (25.8%) and causal work (23.5%).

Table 5: Percent distribution of household head by marital status and source of income, Lahj governorate, July 2012				
Ecological Zone	*Lowland*		*Mountainous*	
	%	*N*	*%*	*N*
Marital status				
Married	92.0	735	94.0	663
Widowed	5.9	47	3.9	27
Divorced	1.0	8	0.1	1
Single	1.1	9	2.0	14
Primary source of income				
Non-qat agricultural products	2.4	19	3.5	25
Livestock and livestock products	4.1	33	0.9	6
fishery	1.6	13	0.1	1
Trading	2.1	17	6.1	43
Temporary work (Casual work)	13.9	111	23.5	166
Monthly salary	62.1	496	29.2	206
Remittance (from friends and relatives)	4.5	36	25.8	182
Craftsmanship	4.4	35	5.4	38
Farming/sale/transport of qat	1.9	15	1.4	10
Social insurance	1.1	9	1.3	9
Other	1.9	15	2.7	19

4.1.3. Education level of child care givers

The overall education level of care givers was good in both survey locations (Table 6). In Mountain community, 29.1% had basic education, 19.7% secondary education and a further 20.1% had higher education. Less than a quarter (16.9%) was illiterate. Similarly in Lowland community, 24.2% had basic education, 23.5% secondary education and 19.8% had tertiary education. Nearly a quarter were illiterate and one tenth can read and write.

Table 6: Percent distribution of households by level of education of the caregivers' by ecological zones, Lahj governorate, July 2012				
Ecological Zone	*Lowland*		*Mountainous*	
	%	*N*	*%*	*N*
Level of education				
Illiterate	22.2	177	16.9	119
Can read and write	10.4	83	14.2	100
Basic education	24.2	193	29.1	205
Secondary education	23.5	188	19.7	139

Tertiary education (university, college, or institute)	19.8	158	20.1	142

4.2. Anthropometric results: children (based on WHO reference 2006)

The prevalence of malnutrition is given in z-scores which are internationally recognized to be the preferred method of reporting survey data.

4.2.1. Anthropometric data quality

A total of 9 children were not measured in chosen households due to various reasons (out of village in town, child sleeping and mother refused to wake child, child crying and mother refused). 3 children were excluded due to incoherence in the data (1 child was excluded because the height was not recorded, 2 children were excluded because their ages were out of range).

The survey collected data on the nutritional status of 1562 children between 6-59 months of age (799 in Lowland and 763 in Mountain areas). A total of 27 children (20 children in the Lowland sample and 7 children in the Mountian sample) were removed from the analysis because they were flagged by SMART based on extreme z-scores values (z-scores < -3 and > 3 SD). Therefore, the final analyses are based on data from 1559 children in ages 6-59 months (797 children in Lowland and 762 children in Mountain)

4.2.2. Age and sex distribution of the sample population

The age and sex distribution of the sample population in the two surveys is illustrated in Table 7 and Table 8. The boy to girl sex ratio was 1.0 in Lowland and 1.1 in Mountain, which is within the recommended range of 0.8-1.2 showing an unbiased selection of the study children. Similarly, the distribution of the sample children age groups did not also vary from the normal accepted percentage, which also shows that the sample was unbiased. The 6-29: 30-59 month ratio in Mountainous sample is 0.99 which indicates that the sample was unbiased. The ideal is 1.0. Slight bias was exhibited in the Lowland age distribution estimated at 0.91. It is within the acceptable range of 0.78-1.18 and was found to be acceptable.

Table 7: Age and sex distribution of the sample population, Lowland ecological zone (n=797)							
AGE GROUP (months)	Boys		Girls		Total		Ratio
	no.	%	no.	%	no.	%	Boy:girl
6-17	100	54.6	83	45.4	183	23.0	1.2
18-29	90	45.9	106	54.1	196	24.6	0.8
30-41	87	49.2	90	50.8	177	22.2	1.0
42-53	95	51.4	90	48.6	185	23.2	1.1
54-59	28	50.0	28	50.0	56	7.0	1.0
Total	400	50.2	397	49.8	797	100.0	1.0

Table 8: Age and sex distribution of the sample population, Mountainous ecological zone (n=762)							
AGE GROUP (months)	Boys		Girls		Total		Ratio
	no.	%	no.	%	no.	%	Boy:girl
6-17	109	50.2	108	49.8	217	28.5	1.0
18-29	82	50.6	80	49.4	162	21.3	1.0
30-41	92	53.8	79	46.2	171	22.4	1.2
42-53	83	55.3	67	44.7	150	19.7	1.2
54-59	29	46.8	33	53.2	62	8.1	0.9
Total	395	51.8	367	48.2	762	100.0	1.1

In addition, skewness and kurtosis test of weight-for-height (WHZ) data show distribution between -1 to 1 and standard deviation of 1.1 of WHZ which also unbiased distribution of the sample children. The overall plausability score of the two surveys was 7%, which is considered as good[14].

4.2.3. Acute Malnutrition

4.2.3.1. Acute Malnutrition rates by sex

The prevalence of acute malnutrition in the survey areas is presented in Table 9. Prevalence of global acute malnutrition (GAM) among Lowland households was found to be **23.0**% (with 95% CI 19.4-27.1%) and severe acute malnutrition (SAM) of **4.5**% (with 95% CI 2.9-7.0%). GAM among Mountainous households was found to be **14.3**% (with 95% CI 11.0-18.3%) and SAM of **2.8**% (with 95% CI 1.7-4.5%).

The global acute malnutrition rate among Lowland households was significantly higher than the Mountainous households (p=0.001)[15]. Although the severe acute malnutrition rates was higher among Lowland households, the difference was not significan (p=0.156). There were no

[14] *Refer Annex IX for plausability check results*
[15] *Comparison was made using Centers for Disease Control and Prevention (CDC) calculator for two surveys*

children with oedema in both in the Lowland and Mountainous ecological zones. Malnutrition was presented as marasmas /wasting only. There was highly significant difference in the prevalence by sex among the Lowland communities. It was found that the prevalence of acute malnutrition was higher among boys than girls in the Lowland communities (p=0.000). Similarly, the prevalence of malnutrition was found to be higher in boys than girls in Mountainous communities, but the difference was not found to be significant.

Table 9: Prevalence of Acute Malnutrition/Wasting (6-59 months) by survey area and by sex, with 95% confidence intervals

	Lowland (%)			*Mountain (%)*		
	All (n= 777)	Boys (n= 388)	Girls (n=389)	All (n= 755)	Boys (n= 392)	Girls (n= 363)
Global Acute Malnutrition (<-2 z-score and/or oedema)	**23.0** (19.4-27.1)	29.1 (23.9-34.9)	17.0 (13.6-21.0)	**14.3** (11.0-18.3)	16.1 (12.4-20.6)	12.4 (8.6-17.5)
Severe Acute Malnutrition (<-3 z-score and/or oedema)	**4.5** (2.9-7.0)	5.7 (3.5-9.1)	3.3 (1.6-6.7)	**2.8** (1.7-4.5)	4.3 (2.4-7.6)	1.1 (0.4-2.8)

4.2.3.2. Acute Malnutrition rates by age

From figure 2 & 3, malnutrition appears to be fairly evenly distributed throughout the sample. Normally, the prevalence of malnutrition tends to be higher in the younger age groups than in the older age groups because the transition from exclusive breastfeeding to the introduction of complementary foods is usually a very difficult for children as the diet is not adequate, and they are also more susceptible to disease (an indication of sub-optimal child care). This data, however, demonstrates that older children are also at higher risk of malnutrition. This could be evidence that younger and older children were severely affected probably because of serious food crisis than childcare and diseases. However, it was noted that more cases of severe acute malnutrition (WHZ<-3) were found among the youngest children with 16 cases (10 in Lowland and 6 in Mountain) aged between 6 and 17 months and 17 cases (9 in Lowland and 8 in Mountain) aged between 18 and 29 months. This is common as young children are highly susceptible to morbidity at this age as complementary and mixed foods are introduced in the diet.

Figure 2 Acute Malnutrition of Lowland by age

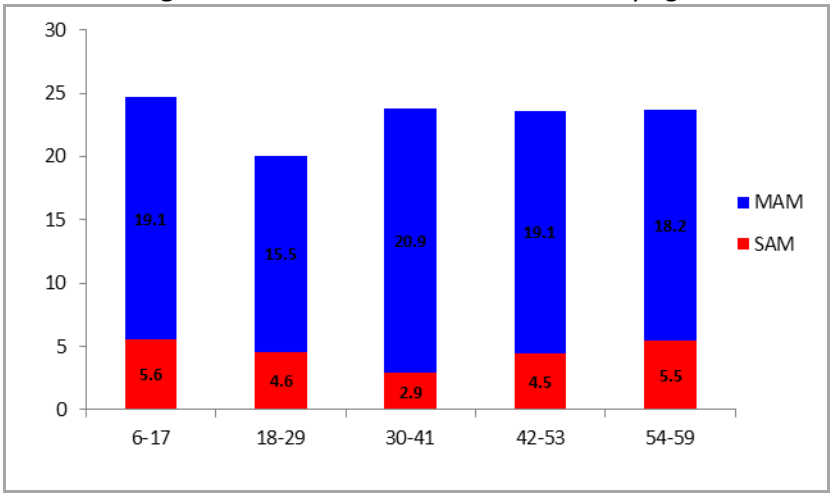
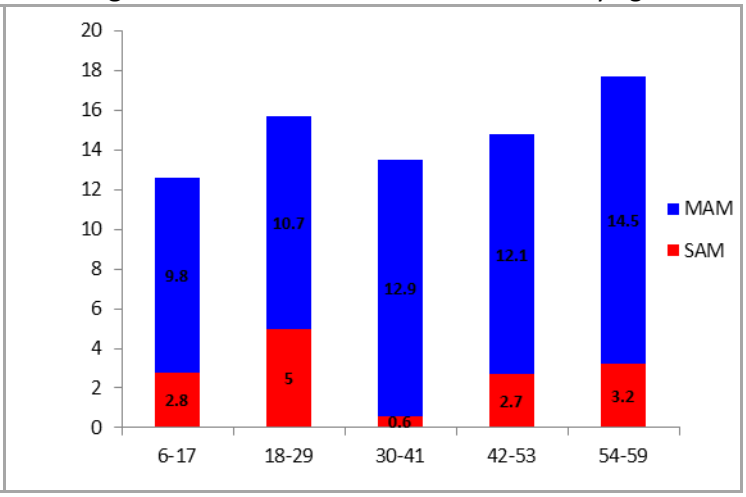


Figure 3 Acute Malnutrition of Mountain by age



4.2.4. Chronic Malnutrition

The stunting rate (HAZ) is a measure of chronic malnutrition while underweight (WAZ) rate measures both chronic and acute malnutrition. Both underweight and stunting rates rely on accurate age records. In this survey, accurate records of a child's age were not available for verification in almost half of the children (48% children in Lowland and 46% children in Mountain had no exact birthday). Age estimation based on mother recall may not be accurate although a calendar of events was used to estimate the child's age. Therefore, it should be noted that the stunting and underweight rates recorded in the survey might be subjected to mothers recall bias and care should be taken when interpreting the results. As shown in Table 10, the stunting rate was 35.1% in Lowland community and 46.9% in Mountainous children. The prevalence of global chronic malnutrition was not statistically different between boys and girls.

Table 10: Prevalence of Chronic Malnutrition/Stunting (6-59 months) by survey area and by sex, with 95% confidence intervals

	Lowland (%)			*Mountain (%)*		
	All n= 766	**Boys** n= 377	**Girls** n= 389	**All** n= 737	**Boys** n= 383	**Girls** n= 354
Global Chronic Malnutrition (H/A <-2 z-score)	**35.1** (30.5-40.1)	37.4 (31.7-43.5)	32.9 (27.1-39.3)	**46.9** (42.2-51.7)	49.6 (43.5-55.7)	44.1 (37.1-51.2)
Severe Chronic Malnutrition (H/A <-3 z-score)	**9.0** (6.4-12.4)	9.8 (6.9-13.7)	8.2 (5.4-12.4)	**14.2** (11.3-17.8)	16.2 (12.5-20.7)	12.1 (8.2-17.5 9)

As depicted on Figure 4 and 5, the level of stunting is lower for younger children and tends to increase from the age of 18 months onward. The age group with the highest prevalence was 30-41 (41.3%) in the Lowland and 54-59 (62.3%) in the Mountainous households.

Figure 4 Chronic Malnutrition of Lowland by age

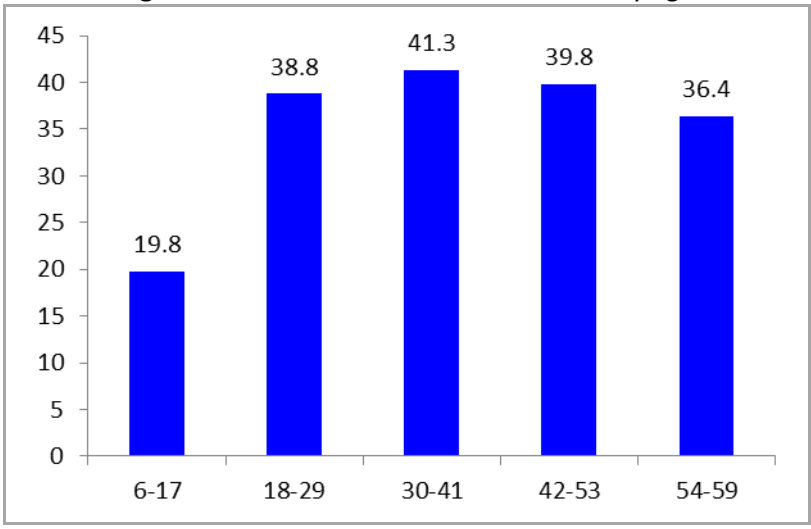
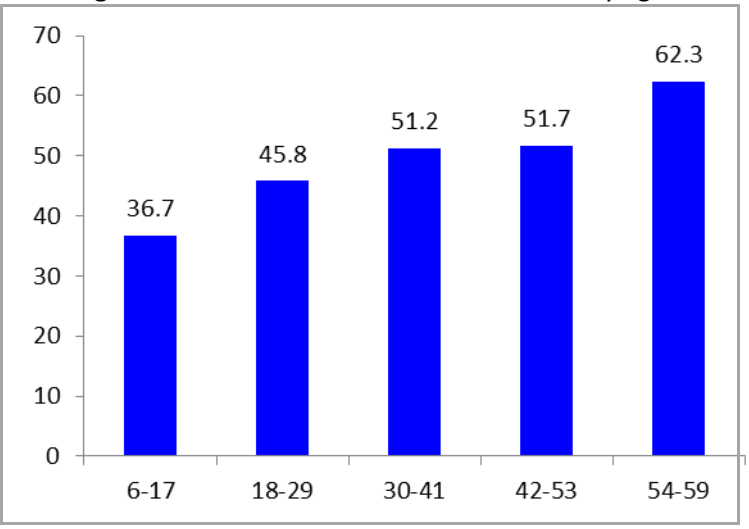


Figure 5 Chronic Malnutrition of Mountain by age



4.2.5. Underweight

Among children 6 to 59 months of age, 40% in Lowland households and 41% in Mountainous households were underweight (Table 11). There was little difference in the prevalence of underweight between boys and girls.

Table 11: Prevalence of Underweight months) by survey area and by sex, with 95% confidence intervals

	Lowland (%)			*Mountain (%)*		
	All n = 786	**Boys** n = 394	**Girls** n = 392	**All** n = 757	**Boys** n = 395	**Girls** n = 362
Underweight (W/A <-2 SD)	**40.2** (35.3-45.3)	44.7 (38.4-51.1)	35.7 (30.5-41.3)	**41.0** (35.6-46.5)	44.3 (37.9-50.9)	37.3 (30.3-44.9)
Severe Underweight (W/A<-3 SD)	9.7 (7.3-12.7)	11.9 (8.8-16.0)	7.4 % (4.9-11.0)	11.0 (8.1-14.6)	12.2 (8.7-16.8)	9.7 (6.7-13.8)

As illustrated on figure 6 and 7, the prevalence of underweight increases with age in both survey areas. Children 54-59 months of age showed the highest percentage of underweight with levels of 49.1% in Lowland and 62.9% in Mountainous areas. The difference in the level of underweight between the highest and lowest age group was 29% in Mountainous children and 14% among the Lowland children.

Figure 6 Underweight of Lowland by age

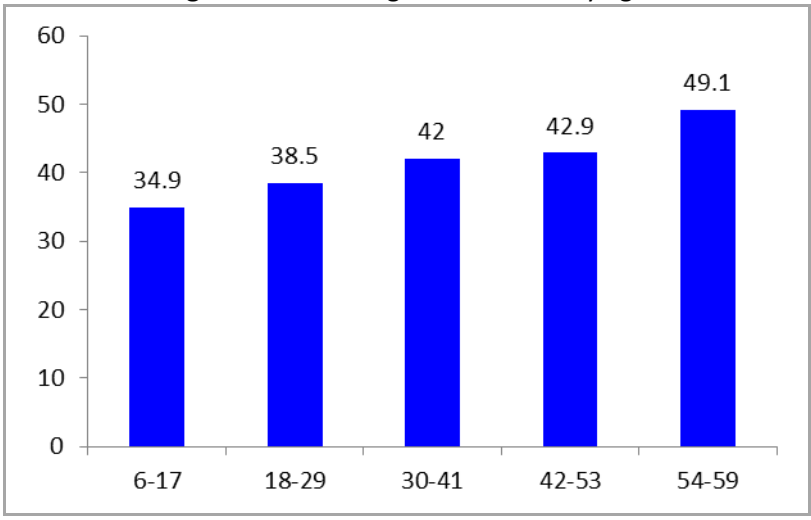
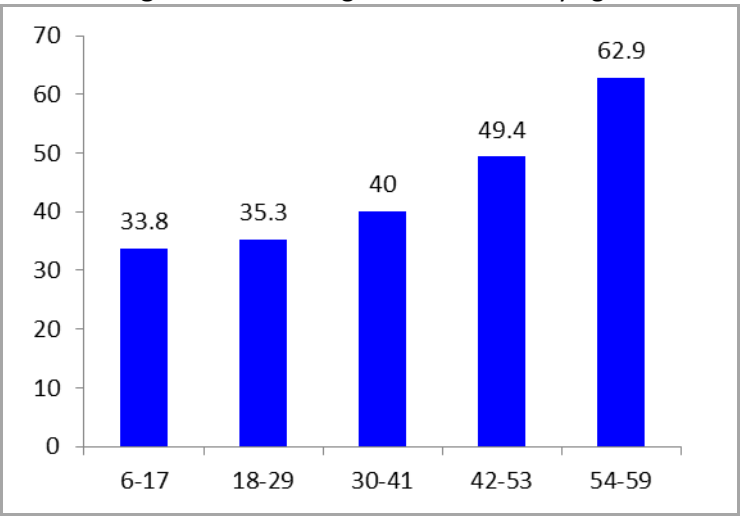


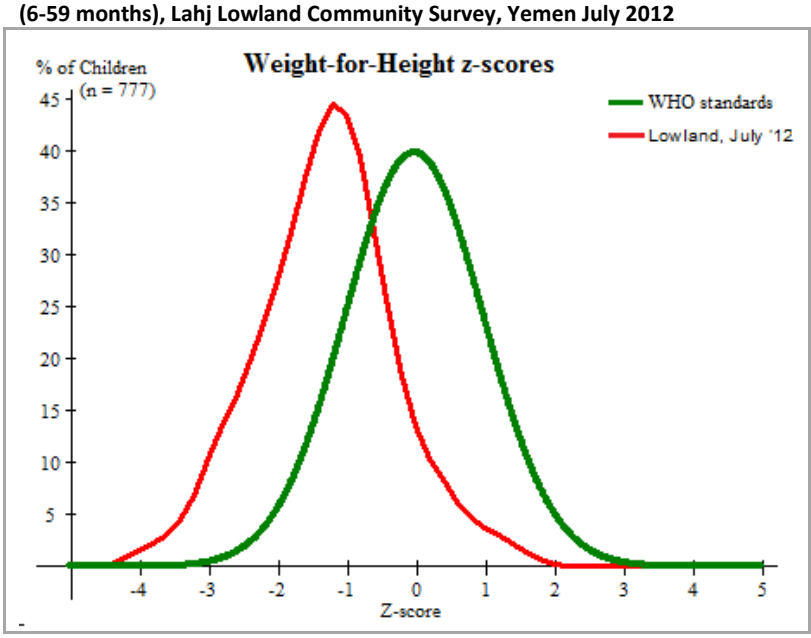
Figure 7 Underweight of Mountain by age



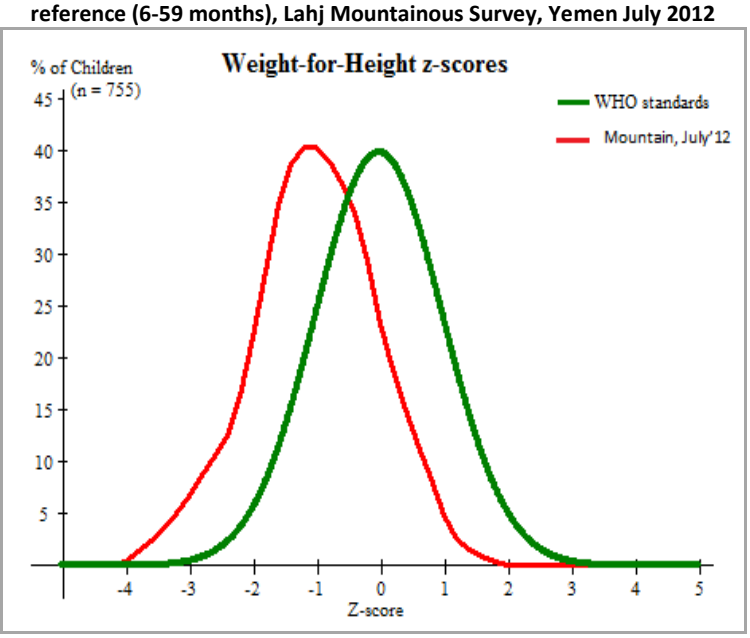
4.2.6. Distribution of anthropometry results compared to international reference

The distribution of malnutrition within the community populations sampled is very similar to one another. With reference to acute malnutrition, in Lowland community the sample population is shifted to the left by -1.29 z-scores when compared with the reference with a fairly even distribution. This indicates that the sample population is more malnourished than the reference population. The results are similar for Mountain community population with a skewing to the left of -1.03 z-scores.

Observed Z-score distributions (WHZ) compared to international reference (6-59 months), Lahj Lowland Community Survey, Yemen July 2012

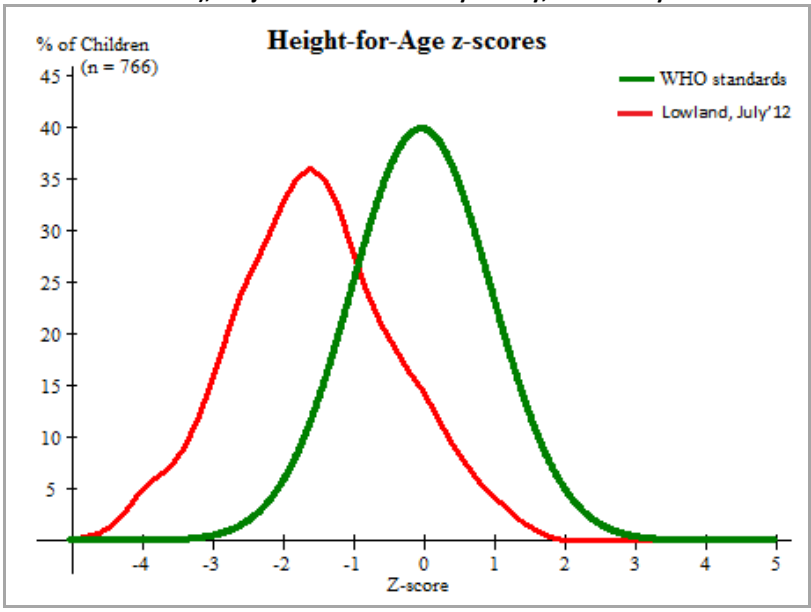


Observed Z-score distributions (WHZ) compared to international reference (6-59 months), Lahj Mountainous Survey, Yemen July 2012

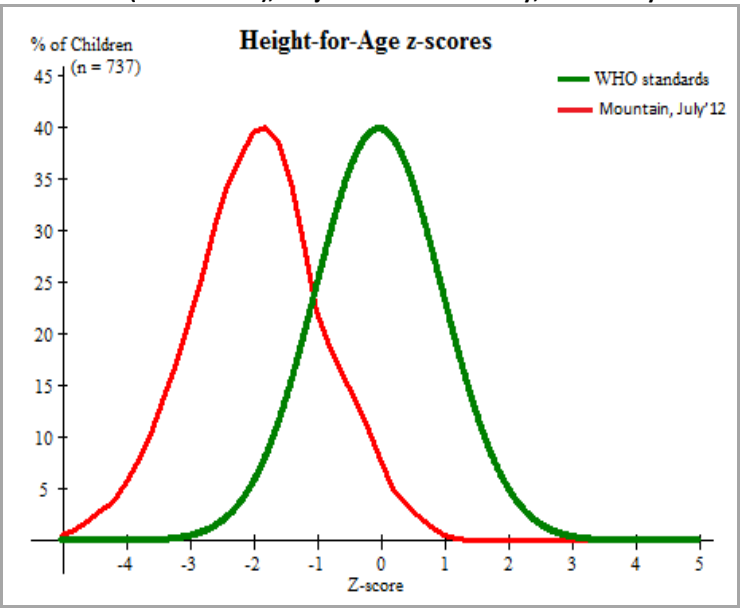


With reference chronic malnutrition, the population distributions for Lowland and Mountain are shifted to the left by -1.54 and -1.93 z-scores when compared with the reference population respectively. This indicates that both communities' populations are very stunted when compared with the reference population.

Observed Z-score distributions (HAZ) compared to international reference (6-59 months), Lahj Lowland Community Survey, Yemen July 2012

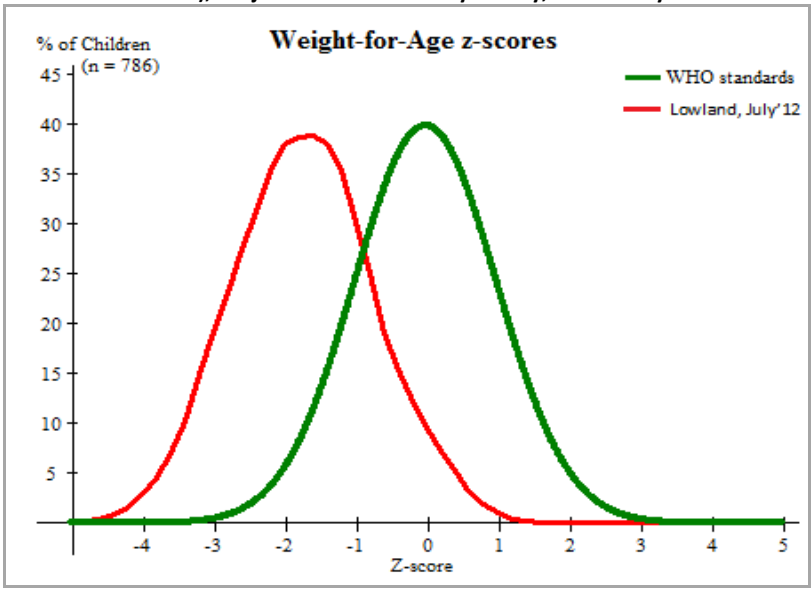


Observed Z-score distributions (HAZ) compared to international reference (6-59 months), Lahj Mountainous Survey, Yemen July 2012

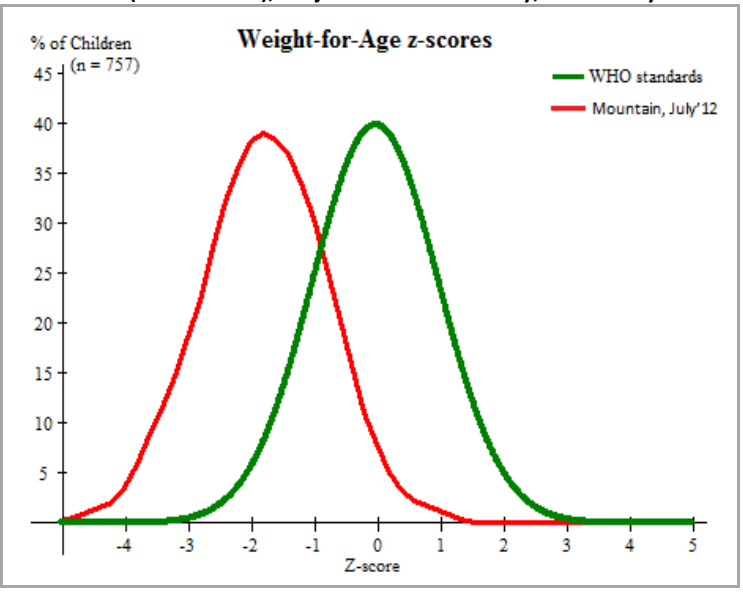


With reference to underweight, the Lowland sample population is shifted to the left by -1.73 z-scores when compared with the reference population with a fairly even distribution. The results are identical for the Mountain population with a skewing to the left of -1.78 z-scores. This indicates that the sample populations are more malnourished than the reference population.

Observed Z-score distributions (WAZ) compared to international reference (6-59 months), Lahj Lowland Community Survey, Yemen July 2012



Observed Z-score distributions (WAZ) compared to international reference (6-59 months), Lahj Mountainous Survey, Yemen July 2012



4.3. Mortality

A total of 12 deaths (9 in Lowland and 3 in Mountain) were recorded (Table 12). CMR (total deaths/10,000 people/day) was estimated at 0.18 (0.10-0.32) in Lowland communities and 0.06 (0.02-0.20) in Mountainous communities. The under five mortality rates (U5MR) (deaths in children under five/10,000 children under five / day) were 0.25 (0.06-0.99) and 0.13 (0.02-0.99) in Lowland and Mountainous communities, respectively. Both the CMR and the U5MR are below the emergency thresholds of 1.14/10,000/day and 2.33/10,000/day respectively[16].

The cause of death for the under-five children was reported to be difficulty in breathing (1 child) and unknown causes (2 children). None of the deaths were verified through medical examinations, but the causes of deaths were assessed using standard case definitions.

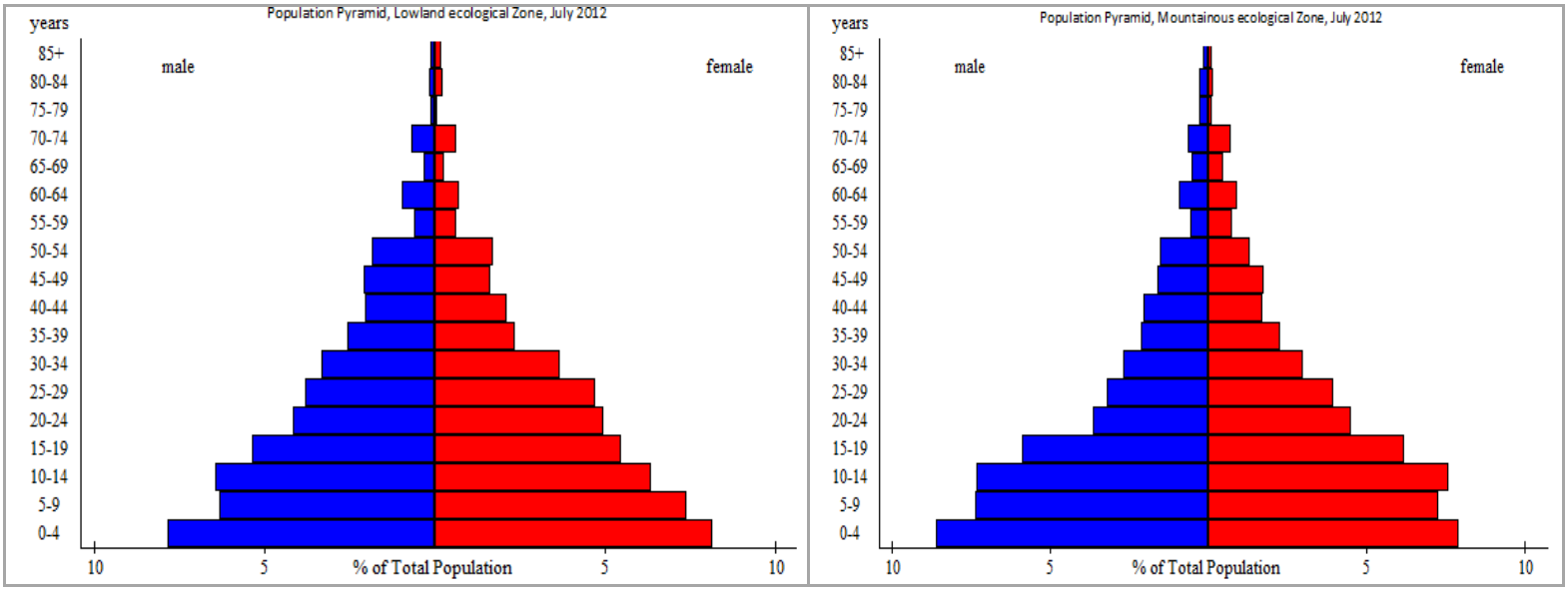
Table 12: Prevalence of Chronic Malnutrition/Stunting (6-59 months) by survey area and by sex, with 95% confidence intervals

	Total		*Under fives*	
	No. of reported deaths*	CMR per 10,000/day	No. of reported deaths*	U5MR per 10,000/day
Lowland	9	0.18 (0.10-0.32)	2	0.25 (0.06-0.99)
Mountain	3	0.06 (0.02-0.20)	1	0.13 (0.02-0.99)
*Within 3 month of the survey				

[16] *Emergency mortality thresholds by Sphere (2004)*

4.4. Population Pyramid

Mortality data was collected from 1504 households containing more than 10,000 family members (1,729 under 5 years). Among the families of the surveyed population 15.8% in Lowland and 16.2% in Mountainous areas were under five years old. The resulting population pyramid for each zone is shown below.



4.5. Feeding practices

4.5.1. Breastfeeding by age

As shown in Table 13, only 70% and 67.7% of children aged 6 to 24 months were still being breastfed in Lowland Zone and Mountainous Zone, respectively. The breast-feeding rate for children 6 to 11 months of age was 83.5% and 88.1% and this rate drops to 62.9% and 56.3% for children 12 to 24 months in Lowland and Mountain, respectively. The finding of the survey clearly suggested that continued breastfeeding up to 24 months of age is not well practiced in Lahj governorate.

Table 13: Percent distribution of children born in the two years preceding the survey and still breastfeeding, according to age, Lahj governorate, July 2012

	Lowland		*Mountainous*	
Ecological Zone	*N*	*%*	*N*	*%*
Age in Months				
6 - 11	86	83.5	104	88.1
12 - 23	122	62.9	112	56.3

Table 13: Percent distribution of children born in the two years preceding the survey and still breastfeeding, according to age, Lahj governorate, July 2012				
	Lowland		*Mountainous*	
Ecological Zone	*N*	*%*	*N*	*%*
Total	**208**	**70.0**	**216**	**67.7**
Note: Still breastfeeding status refers to a "24-hour" period (yesterday and last night)				

4.5.2. Minimum meal frequency of children

The minimum meal frequency for infants is a proxy indicator for energy intake from foods other than breast milk. It is defined as 2 times for breastfed children 6 to 8 months of age, 3 times for breastfed children aged 9 to 23 months and 4 times for non-breastfed children aged 6 to 23 months. The results are being reported separately for breastfed (Table 14a) and non-breastfed (Table 14b) children.

Table 14a: Percentage of *still breast feeding children*, 6 to 23 months old, who received the minimum* number of meals, Lahj governorate, July 2012				
	Lowland		*Mountainous*	
Ecological Zone	*%*	*N*	*%*	*N*
Age Group				
6-11	51.9	42	56	53.8
12-17	59.6	28	41	56.9
18-23	61.8	42	25	62.5
Total	**57.1**	**112**	**122**	**56.5**
*Minimum defined as 2 times for breastfed infants 6-8 months, 3 times for breastfed infants 9-23 months, 4 times for non-breastfed infants 6-23 months				

Among those children 6 to 23 months of age and still breastfeeding (Table 14a), 57.1% in Lowland and 56.5% in Mountain zones received the minimum number of meals. In both ecological zones, it was higher among the older children, with 61.8% and 62.5% of the 18 to 23 months old children in Lowland and Mountain, respectively received the minimum number of meals. 51.9% and 53.8% of children 6 to 11 month of age, and 59.6% and 56.9% of the 12 to 17 month olds in Lowland and Mountain respectively, received the minimum number of meals.

Table 14b: Percentage of *non breast feeding children*, 6 to 23 months old, who received the minimum* number of meals, Lahj governorate, July 2012				
Ecological Zone	*Lowland*		*Mountainous*	
	%	*N*	*%*	*N*
Age Group				
6-11	17.6	3	7.7	1
12-17	14.8	4	19	4
18-23	30.0	12	20	10
Total	**22.6**	**19**	**17.9**	**15**
*Minimum defined as 2 times for breastfed infants 6-8 months, 3 times for breastfed infants 9-23 months, 4 times for non-breastfed infants 6-23 months				

Among the children 6 to 23 months of age who were no longer breastfeeding (Table 14b), only 22.6% in Lowland and 17.9% in Mountain have received the minimum number of meals for their age in the previous day. This finding has serious implications on the lack of maternal knowledge in regards to appropriate child feeding practices. Overall, the finding clearly indicates a troublesome situation.

4.6. Morbidity and Health seeking behavior

4.6.1. Child Morbidity

High prevalence of common childhood diseases was recorded in both the Lowland and Mountainous Ecological zones (Table 15). Major diseases were cough, fever and diarrhoea related, of which ARI and Fever were the most prevalent illness reported in Lowland and Mountainous zones, respectively.

For diarrhea, there was no important difference among the survey areas. Nearly 29% of children in Mountainous zones had experienced diarrhea in the two weeks prior to the survey, while in the Lowland communities it was approximately 28%. The prevalence of ARI was higher among the Lowland populations than the lowland populations. Nearly half of children (48.5%) in Lowland had experienced ARI in the two weeks prior to the survey, while in the Mountain communities it was approximately one third. The prevalence of Fever was also very high in the Lowland population with over 42% of the children under 5 suffering in the two weeks prior to the survey. The prevalence of Fever in the Mountainous populations was approximately 37%. It should be noted that the morbidity data collected are subjective in the sense that they are based on the mother's perception of illness without validation by medical personnel.

Suspected measles[17] during the last month was 6.1% in Lowland Zone and 7.8% in Mountainous Zone.

Table 15: Morbidity among children 6-59 months, Lahj governorate, July 2012				
Ecological Zone	*Lowland*		*Mountainous*	
	%	*N*	*%*	*N*
Morbidity				
Experienced diarrhea during last 2 weeks	27.9	221	28.8	220
Experienced cough with difficulty breathing during last 2 weeks (ARI)	48.5	385	33.9	260
Any fever during last 2 weeks	42.8	339	37.3	286
Suspected measles within one month prior to assessment	6.1	48	7.8	60

4.6.2. Health care

The majority of the community populations surveyed seek for illness outside of the home (Table 16). In the Lowland zone 95.6% sought treatment outside of the home, while in Mountain it was higher at 97.7%. In the Lowland community the majority (78.5%) of people sought treatment in a public health facility (hospital/clinic/health center); in addition treatment in private clinics (13.6%) was common. Similarly in Mountain community the majority of people sought from a public health facility (78.9%); in addition treatment in private clinic (18.3%) was common. Only 2% do not seek for medical assistance during illness.

The main reasons given for seeking medical assistance outside either public facilities or private clinics are the high cost of the service, the physical distance to these services, and lack of transportation. However, the finding suggested that the health seeking practices as reported by the proportion of households seeking treatment from health facilities was generally encouraging.

[17] *The suspected measles is defined as having rash and fever in addition to at least one of: cough, sore throat, or conjunctivitis.*

Table 16: Health seeking behavior, Lahj governorate, July 2012				
Ecological Zone	*Lowland*		*Mountainous*	
	%	*N*	*%*	*N*
Where the health service is sought				
No medical help is sought	2.1	17	2.0	14
Sought advice or treatment for illness outside the home	95.6	764	97.7	689
Treatment sought:				
Public health facility (Hospital/clinic/health center)	78.5	627	78.9	556
Private clinic	13.6	109	18.3	129
Pharmacy	3.0	24	0.6	4
Others	0.5	4		
Sleeping under mosquito net				
Children slept under mosquito net last night	23.7	189	20.0	153

Only less than a quarter of children slept under a mosquito net the night before the survey. The percentage is slightly higher in Lowland Zone (23.7%) than Mountainous Zone (20.0%).

4.7. Food security

Table 17 presents a list of coping strategies used by surveyed households by ecological zones. The availability of credit from formal or informal moneylenders, community or family members was particularly important, as accessing credit can be an essential coping strategy for households whose sources of income are constrained and whose home production is insufficient to meet consumption needs. Table 17 shows that both the Lowland and Mountain communities had significant access to credit. Borrowing money to purchase food or purchase food in credit or mortgage is widely practiced (69.4% in Lowland and 67.8% in Mountain).

43% of households in Lowland ecological zones have reduced the size of meals because of scarcity of resources. The percentage of households reduced meals size was relatively lower for Mountainous population when compared to Lowland (28.8%).

More than one third of households in Lowland reportedly reduced the number of meals per day over the past 4 weeks. Further, almost one quarter of households in Lowland areas reported having to go to bed hungry in the 4 weeks prior to the survey. While in Mountainous zones, less than a quarter of the surveyed households reduced their consumption to less number of meals in a day and sleeping hungry is practiced by nearly 14% of households. 25.2% and 17.2% of households in Lowland and Mountain areas, respectively reduced the expenditure on education or food to save money to purchase food, over the 4 weeks prior to the survey.

The analysis of the information is indicative of the alarming rates of some degree of food insecurity in Lahj governorate, where the households in the Lowland ecological zones with the highest levels of household food insecurity.

Table 17: Household coping strategies, Lahj governorate, July 2012

Ecological Zone	*Lowland*		*Mountainous*	
	%	*N*	*%*	*N*
Coping strategies				
Reduce meal size	43.0	243	28.8	202
Reduce number of meals	36.0	287	22.0	155
Go to bed at night hungry	25.4	203	13.8	97
Credit and loan liability				
Credit/mortage or borrow money to buy food	69.4	554	67.8	478
Reduce expenditure on education to purchase food	25.2	201	17.2	121

4.8. Water, Sanitation and Hygiene

4.8.1. Household drinking water and safe water practices

Table 18 shows that among all households, the majority (72% in Mountain and 83% in Lowland) were using improved sources[18] of drinking water. Differences become apparent when comparing Lowland with Mountain communities by type of improved water sources. Among the Lowland communities, the majority (30%) had water piped into the dwelling, while 12% had it piped into the yard and 19.6% used open protected well source. Among the Mountainous areas, the majority (22%) were using covered rainwater collection tank, 16.7% water tanker and further 15.6% water piped into the house.

Overall, few households treat water for drinking purposes (5.5% in Mountain and 2.8% in Lowland). Of those households that do treat, most boil (51.3%) and few filter it through clean cloth (20.5%) in Mountainous areas, while In Lowland most filter the water through clean cloth (50.0%), with fewer households boiling the water (36.4%).

[18] *Improved drinking water source is defined as being one of the following: piped into dwelling, piped into yard, protected well, protected spring, rainwater collection or bottled water.*

Table 18: Percent distribution of households by source and treatment of water, according to ecological zones, Lahj governorate, July 2012				
	Lowland		*Mountainous*	
Ecological Zone	*%*	*N*	*%*	*N*
Water source				
Improved water source	83.1	664	71.9	507
Type of water source				
Piped water connected to home	26.9	215	15.6	110
Piped water connected to yard	12.8	102	3.4	24
Open, unprotected well	11.3	90	17.6	124
Open, protected well	19.6	157	10.1	71
Covered rainwater collection tank	0.3	2	22.0	155
Open rainwater collection tank	0.1	1	3.4	24
Water tanker	17.9	143	16.7	118
Bottled water (Hadda, Shamlan, Kawthar, etc)	5.6	45	1.3	9
Unprotected surface water (valley, running spring, etc)	1.9	15	6.8	48
Protected spring water	0.0	0	2.8	20
Other	3.6	29	0.3	2
Water treatment for drinking				
Yes	2.8	22	5.5	39
No	97.2	777	94.5	666
Type of water treatment				
Boil water before drinking	36.4	8	51.3	20
Use chlorine or Clorox	0	0	5.1	2
Filter through clean cloth	50.0	11	20.5	8
Use ceramic or sand filter or similar filter method	9.1	2	17.9	7
Other	4.5	1	5.1	2

4.8.2. Sanitation source and safe hygiene practices

Table 19 shows that there was a slight difference between Lowland households using an improved toilet facility[19] compared to Mountain households. In Mountain community less than half of the population (41.7%) used improved toilet facility, whilst in Lowland, the proportion of households using improve facility increases approximately to 51%. A high number of households were using an open pit or latrine without slab in Lowland areas (40.8%) as in Mountainous areas (45.0%). In Lowland areas, 16.4% of households were not using any facility; they reported using the open field.

[19] *Improved toilet is defined as being one of the following: flush to piped sewer system, flush to septic tank, flush to pit latrine or pit latrine with slab*

Hand washing practices among the communities surveyed was highest before and after eating and after defecation with little difference between Lowland and Mountain ecological zones. Among the Lowland communities, more than two thirds (75.5%) of the people wash their hands after eating, while 70.1% washed before eating and 61.3% after toilet use. Among the Mountainous areas, 70.6% wash their hand before eating, 70.5% after eating and further 63.8% after using the toilet. Use of soap for hand washing in general was good. Mountainous areas reported slightly higher use of soap to wash hands (97.2%) than Lowland areas (92.7%).

Table 19: Percent distribution of households by type of toilet/latrine facilities and hand washing practices, according to ecological zones, Lahj governorate, July 2012

	Lowland		*Mountainous*	
Ecological Zone	*%*	*N*	*%*	*N*
Toilet facility				
Improved toilet facility	41.7	333	50.6	357
Type of toilet facility				
Toilet - Flush/Pour flush	39.2	313	46.2	326
Toilet - uncovered pit	40.8	326	45.0	317
Toilet - simple dry covered pit	2.5	20	4.4	31
Outdoors in the open air (in fields, for example)	16.4	133	4.4	31
Other	0.9	7	0	0
When do you wash your hands				
After using the toilet	63.8	510	61.3	432
Before eating	70.6	564	70.1	494
After eating	70.5	563	75.5	532
Before cooking	51.2	409	53.1	374
Before feeding the child	15.5	124	15.5	109
After disposing of child's waste	18.1	145	17.2	121
After cleaning the livestock or poultry areas	17.8	142	20.4	144
Substance used to wash hand				
Soap	92.7	741	97.2	685
Ashes, dust, limestone powder, tree leaves	5.5	44	1.4	10

4.9. Programme coverage

4.9.1. Immunization

The availability of vaccination cards for registering each vaccination is very important for following up the child's health status and for accurately measuring the coverage by different vaccinations. The data showed that the percentage of children who had a health card that was seen by the interviewer does not indicate significant differences in the two ecological zones,

but it is noticeable that there is a higher rate of seen cards in the Mountain areas than in the lowland areas (57.1% compared to 52.2%). If measles vaccination (ever) by both mother's recall and by documentation (vaccination card) is considered the level of immunization among the two ecological zones is comparable (approximately 86% in Mountainous and 89% in Lowland). Similarly, approximately 86% and 84% of children in Lowland and Mountain were received third dose of Polio, respectively at the time of the survey.

The last Measles/Polio vaccination campaign in Lahj governorate was conducted around 5 months ago (March 2012) with a reported coverage of 97% measles and 99% Polio. Therefore the current survey findings for Measles and Polio presented were slightly low. However, while acknowledging factors such as missing children (vaccinated but not available during the survey) and mother recall bias (very few vaccination cards retained), the coverage estimate of 84 to 89 percent during the survey can be considered agreeable. Considering the challenges faced by any outreach campaign in this vast governorate, this information may give some indication of the success of the immunization programme in reaching out to all population subgroups in Lahj governorate.

Vitamin A supplementation coverage is lower than the measles coverage. Approximately 73.1% of population in the Low land ecological zone and 69.1% in the Mountain had received vitamin A capsule in the past 6 months prior to the survey. In general the Lowland populations had a marginally better coverage compared to the Mountain community. However, these coverage figures of the current survey are surprisingly lower than the 87% coverage reported in the last Vitamin A supplementation campaign in Lahj governorate which was conducted in March 2012. However, when comparing data from various sources, consideration should be given to differences in the sampling frame, design, sample size, representativeness of the sample, and selection methodology, as well as differences in the source of information, phrasing of questions, and reporting of data that could explain these differences.

The vitamin A supplementation coverage in both Lowland and Mountain areas is considerably lower than the Sphere Standards recommendation of 95% coverage. Therefore, effort needs to be made to improve the Vitamin A supplementation and strengthen the existing static health services. It is also suggested that mobile health teams, should be deployed to assist the outreach efforts and improve Vitamin A supplementation coverage.

Table 20: Percent distribution of children by vaccination and supplementation, Lahj governorate, July 2012				
	Lowland		*Mountainous*	
Ecological Zone	*N*	*%*	*N*	*%*
Immunization				
Children (9-59 months) immunised against measles[1]	661	89	612	86.3
Children who have ever received polio vaccine	686	86.1	637	83.5
Supplementation				
Children who received vitamin A supplementation in last 6 months	582	73.1	526	69.1
[1]Based on health cards and mothers' reports				

4.9.2. Nutrition Programme coverage information

The number of children enrolled in the nearby therapeutic feeding program was only 3.78% and 1.83% in Lowland and Mountainous zones, respectively. All the children suffering severe acute malnutrition were subsequently referred to the nearby health centre with OTP. Currently, there are no supplementary feeding programmes in Lahj governorate. The estimated coverage was estimated as 0 % of children currently enrolled in SFP ⁄ observed malnourished in need of SFP. This is seen as a gap in response needs.

UNICEF has been supporting the MOPH to deliver static and mobile OTP programmes in Lahj governorate since December 2008. So far there is one TFC in Alhouta general hospital and 24 OTP centres throughout the 15 districts. The therapeutic feeding programme in Lahj governorate was established at the end of 2008 with 16 OTP centres in 15 districts and scaled-up to 23 OTP and 1 TFC in October 2011. Two UNICEF mobile nutrition teams (each consisting of Doctor and Nurse) were deployed in Lahj governorate in September 2010 and February 2011. They have the responsibility to treat and manage SAM cases through mobile OTP services as well as delivering PHC. The third mobile team is expected to be deployed at the end of July 2012. The UNICEF mobile teams mainly targeting the IDP located within the local communities of Althouta, Tuban, Almilah, Almiseymer and Tourulbaha districts.

Save the Children provides PHC and Nutrition services to support outreach activities, using two Mobile Health Teams in Alhouta, Tuban, Almakatra, Kembeta. WHO provides PHC services in Alhouta and Tuban districts using two mobile teams. Lahj Health office, under CLP (Comprehensive Livelihood Programme), covers a wide range of interventions in parts of the governorate, from Reproductive Health and PHC services, to training of CHWs and TBAs using two mobile teams. EU, under Reproductive Health Population Programme, delivers RH services

(training, awareness creation) through outreach programme covering the whole 15 districts of Lahj governorate.

However, it is suggested that coverage and linkage between these interventions is weak. Efforts need to be made to link the nutrition intervention by sharing information. There is still a need to ensure that Mobile Health Teams providing PHC services are supported to identify, treat and manage severe acute malnutrition. In addition, community mobilization efforts need to be strengthened to improve early case finding and referral for OTP in the months ahead. Currently, no additional health or nutrition program is being implemented to support the health office static services in the governorate.

ICRC provided full assistance to the IDP (shelter, water, sanitation, health, nutrition services) since the beginning of the displacement until March 2012. Since the phase out of the ICRC programme, no new programmes have been started in Lahj to support IDPs.

Relief International, under Food For Peace programme, is supporting 8,000 vulnerable households in 4 districts (Alhota, Tuban, Tourulbaha and Almoqatra districts of Lahi governorate) providing direct support (Food basket per family per month is consist of 50kg wheat flour, 10kg rice and 5 litre cooking oil) to improve access to staple food commodities and awareness creation on Nutrition, Food Pyramid, Hand Washing, Breast Feeding/ Mother Feeding/ Child Feeding/ Teenager Feeding and Healthy Cooking Habits and so far 4000 families attended educational sessions by trained Community Mobilizer.

In July 2012 the first round of relief food distribution was took place in four districts reaching 8000 households. It will be interesting to monitor the impact of these interventions in the targeted districts and potentially scale up throughout the governorate as required.

4.9.3. Presence of iodized salt in household

Household salt iodization is low (Table 21). Among all households, less than a quarter (24.5%) had salt with the recommended level of iodization.

Table 21: Percent distribution of households with salt tested for level of iodization by ecological zones, Lahj governorate, July 2012				
Ecological Zone	*Iodine content of salt tested*			
	Not iodised	Inadequate (<15 ppm)	Adequate (>15 ppm)	The test was not made
Lowland	41.1	39.5	18.8	0.6
Mountainous	37.2	30.1	31.2	1.4
Total	**39.3**	**35.1**	**24.6**	**1.0**

5. DISCUSSION

5.1. Anthropometry

Anthropometric indicators used to measure child malnutrition include wasting, stunting, and underweight. These indicators compare the growth of the child being measured with the growth of a well-nourished and healthy, 'reference population' of children of the same age (WHO/NCHS). The WHO 2006 Growth Reference was used in the analysis and interpretation of the results. Nutritional status can be negatively impacted by illness/infection and dietary intake. Within the household, conditions such as food security, clean water, safe sanitation facilities, hygiene practices, maternal care practices and access to health services can have an impact overall on the nutrition situation.

Wasting, or thinness, is an indicator of acute (short-term) malnutrition. It is calculated by comparing the weight for height of a child with a reference population; a child is considered wasted if her/his weight-for-height z-score is below -2SD of the reference population. Wasting is usually the result of recent food insecurity or infection/illness, such as diarrhea. It is often used to assess the severity of an emergency situation, with severe wasting being highly correlated with mortality.

The level of global acute malnutrition (GAM) found in Lowland Zone is **23.0%,** which classifies as '**critical**' as per the WHO categorization of the severity of the situation, while in the Mountainous Zone, the GAM rate is **14.3%,** which is classified as '**serious**' according to the WHO categorization[20]. The GAM level among the Lowland households was significantly higher than the Mountainous households ($p<0.001$). Although the SAM level was also higher among the Lowland households, the difference was not significant ($p>0.05$). Pockets of high nutritional vulnerability were noted in both zones but higher significant in Mountainous Zone ($P=0.002$).

[20]According to WHO (2000), GAM rates of less than 5% are *acceptable*, GAM rates between 5 - 9.9% indicate the situation is *poor*, GAM rates between 10-14.9% are *serious*, while GAM rates of 15% and above are *critical*

The prevalence of acute malnutrition in Lowland ecological zone found in this survey is higher than the national level (15.7% GAM and 4.4% for SAM according to IFPRI estimations based on 2005-06 HBS data). Similarly, the levels of GAM and SAM in Lowland found in this survey are also higher than the rates found by the WFP-CFSS 2011 survey findings that are 15.1% and 4.0% for GAM and SAM respectively. The levels of acute malnutrition in the Mountainous Zone are lower than the national ones of 2005/06 and the 2011 WFP-CFSS survey, but it's worth noting that the level of acute malnutrition in the Mountainous zone is identical to the national one of 2003 (The national level of GAM of 2003 Family Health Survey is 14.3%). In regards to comparison of the levels of malnutrition, it's worth mentioning that due to methodological difference, any direct comparison between the national levels and the SMART has to be interpreted with caution. From the finding of this assessment, we can conclude that no progress has been made in the last 10 years in reducing the prevalence of wasting in Lahj governorate, may be it has worsened as the findings of this assessment indicate a prevalence rate of 23.0% in Lowland communities. This has several implications especially with regards to addressing nutritional problems and there is an urgent need for treatment and prevention of acute malnutrition to improve the overall situation of children.

The finding of this assessment revealed that the level of wasting among male children is significantly higher than female children (p=0.000). This clearly indicates that male children in Lahj governorate are more nutritionally disadvantages when compared with female children. This leads to an argument that child's sex preference that favors female children is practiced by care takers' in Lahj governorate. The difference may be attributed to unmeasured factors such as parental care-giving behaviors. In light of the fact that males are more likely to be wasted than females in Lahj governorate, sex-related differences in diet and child care requires further research.

According to WHO classification[21], the prevalence of chronic malnutrition (i.e., stunting) in Lowland community would be considered to be serious and in the Mountain community it would be considered serious. The prevalence of Global stunting and Severe stunting found in the Lowland (35.1% and 9.0%, respectively) is lower than the value reported for Lahg governorate (42.4% and 16.5%) in WFP-CFSS 2011 survey; while the Global stunting rate found for the Mountainous zones (46.9%) is higher than that of the WFP-CFSS and severe stunting was lower. Although the level of stunting in the Mountainous zones was higher than the Lowland zone, the difference was not statistically significant (p>0.05). Because stunting is a condition that develops over a long period, these high prevalences of stunting indicate that these

[21]*According to WHO (2000), stunting rates of less than 20% are acceptable, stunting rates between 20.0-29.9% indicate the situation is poor, stunting rates between 30.0-39.9 are serious, stunting rates of 40% and above indicates critical situation*

populations have had long-term nutritional problems. WHO (1998) has proposed that the goal for reducing stunting be: 'the prevalence of stunted children in any country (and with in specific subgroups) should be less than 20% by the year 2020....'. Yet, the problem of chronic malnutrition in Lahj governorate is worrisome. The stunting rates especially in Mountainous Zone clearly indicate the need for an integrated response to reduce the prevalence.

The prevalence of underweight in both zones is very high; well the WHO 'critical' levels thresholds of 30%. The underweight prevalence in Lahj governorate found in this survey is higher than the 34.9% which was found in the findings of the WFP-CFSS 2011 survey. No significant different is noted in underweight between the two zones. Weight-for-age is primarily a composite of height-for-age and weight-for-height, and these very high prevalence estimates likely indicate that these populations have had long-term nutrition problems.

5.2. Mortality

Both crude and under five mortality rates were well below emergency thresholds of 1.14/10,000/day and 2.33/10,000/day respectively. The low mortality rate may be a reflection of the high health seeking behaviors; it is also probable that these households suffered more child deaths but not reported. While the child mortality rate was low, it is difficult to comment on the cause of child mortality given that from the three under-five deaths, cause of death was reported as unknown for the two cases.

5.3. Morbidity and Health Care Practices

The prevalence of morbidity in the survey samples was high. Major diseases were cough, fever and diarrhoea related. The data show that 42.8% and 37.3% children in the Lowland and Mountainous zones, respectively were reported to have suffered from high fever during the two weeks prior to the survey, while those who suffered from cough is 48.5% in Lowland and 33.9% in Mountainous zone. The survey data also indicate that there were 27.9% and 28.8% of children in lowland and Mountain, respectively reported to have had diarrhea episode in the two weeks preceding the interview.

The finding of this survey is close with the 2003 Family Health Survey[22] except cough. In the Mountainous zone, cough morbidity prevalence found in this assessment (33.9%) is lower than the national prevalence of 42% while the prevalence in the Lowland is found in the survey (48.5%) is slightly higher than the national prevalence of 42%.

[22] *According to the 2003 Family Health Survey: the prevalence of fever, cough and diarrhea was 40%, 42% and 29.6%, respectively*

Analysis was made to test whether morbidity factors affect malnutrition. The analysis reveals that the proportion of wasted children in Lowland zones was slightly higher for children suffered from diarrhea within the two weeks before the survey, but the association was not statistically significant (X^2:3.441, p=0.064 Lowland). No significant association was observed between diarrhea and wasting in Mountainous zones (X^2:0.005, p=0.945). The only significant effect found for diarrhoea two weeks prior to the survey was on underweight in Lowland zone (X^2: 4.23, P=0.04). Significant association was found between the incidence of cough within the two weeks preceding the survey and all the three nutritional indices in Mountainous zone (WAZ-X^2:11.232, p=0.001; HAZ-X^2:5.627, p=0.018; WHZ-X^2:4.150, p=0.042). This clearly suggests that programmes aiming to address malnutrition in the Mountainous zone should consider the provision of appropriate and adequate health service to address the incidence of cough. On the contrary, no significant association was found between cough and all the three nutritional indices in the Lowland zone. The analysis also showed that the incidence of fever within the two weeks prior to the survey significantly associated with underweight in both zones (Lowland-X^2:4.756, p=0.029; Mountain-X^2:6.062, p=0.014). The prevalence of stunting was significantly high among those who had fever in the two weeks before the survey in the Mountainous zone (X^2: 3.874, p=0.049). Although high stunting observed in children with fever in the Lowland, the association was not statistically significant (X^2:1.018, p=0.313). No effect was observed for fever two weeks prior to the survey on the prevalence of GAM in both zones.

Health seeking practices as reported by mothers with sick children was encouraging, with a high proportion of mothers' sought treatment from public health facilities. This may be because the majority of the care gives have attended some level of schooling hence the supposition can be made that these populations had greater awareness on the importance of appropriate health care during illness. However, the limitation of some centres is their accessibility: as transportation costs are high, visiting a health care provider is time consuming and expensive as well; so some mothers practice treatment at home and resorting to other alternatives for curative services.

5.4. Feeding Practices

Only 70% and 67.7% of children aged 6 to 24 months were still being breastfed in Lowland Zone and Mountainous Zone, respectively. The breast-feeding rate for children 6 to 11 months of age was 83.5% and 88.1% and this rate drops to 62.9% and 56.3% for children 12 to 24 months in Lowland and Mountain, respectively. Continuation of the breastfeeding gradually declined with age and continued breastfeeding up to 24 months of age is a casue of concern in Lahj governorate. Accortding to the 2003 Family anf Health survey finding, most of the children in

Yemen (97%) are normally breast-fed for some time. In addition to that, adhering to the recommendation of continued breastfed until 24 months of age is important to help protect babies from dangerous illnesses.

A mother who has the appropriate knowledge about nutrition is better able to provide appropriate care to the child. If her knowledge is inadequate or wrong, it can lead to inappropriate child caring practices. The finding of this assessment led to the realization that low maternal knowledge on the importance of continued breastfeeding is one of the areas of concern that needs appropriate intervention as these factors have direct and indirect effect on the health and nutrition status of children and mothers. Therefore, it is important that mothers in Lahj governorate receive information on appropriate caring practices for the child, such as complementary and breastfeeding practices. In addition, the key areas that require due attention include the concept of continuation of breastfeeding during and after illness. However, in reference with the scale and severity of the nutritional problem in the surveyed area, the health and nutrition education activity alone is inadequate to address the issue of malnutrition in the area.

5.5. Water, Sanitation and Hygiene

The quality of the household drinking water source and the type of toilet facility the household uses is commonly used as a socio-economic status proxy. In addition, they are both useful for their relationship to health outcomes (diarrheal illness, etc). The time taken to collect drinking water is important in assessing the general welfare of the household. What a household does to treat drinking water, the method of waste disposal and hygiene practices are indicators of a household's knowledge and practices about appropriate and safe health behaviors.

Water and sanitation levels are high among both the Lowland and Mountainous communities sampled. Utilization of safe drinking water, as well as access to sufficient quantities of water, is high especially among the Lowland community.

Sanitation practices are also high with approximately 92-97% of respondents using soap when washing hands with a correspondingly high practice of washing hands before and after eating.

There was no correlation between poor hand washing practices and poor malnutrition rates found in Lowland. Similarly, there was no significant association between poor hand washing practices and poor malnutrition found in Mountainous zone except stunting and hand washing before meal.

In the mountain, significantly low proportion of stunting were found among children in households where caretakers reported practicing hand washing before meal (X^2:10.298, p=0.001). This result may suggest that children in households where caretakers not practicing hand washing before meal suffered from longer and repeated episodes of childhood illnesses including diarrhea which is detrimental to their long-term nutritional status. It is, therefore, important to share and act on information about the importance of hand washing using soap before meal.

The proportion of households defecating in the open field was also high, especially in Lowland zone suggesting the need for active campaign for behavioral change communication. Hygiene promotion is a key intervention contributing to health and eventually better nutrition well-being of the population

5.6. Education of caregivers

Education is one of the most important resources that enable women to provide appropriate care for their children, which is an important determinant of children's growth and development. Many studies show a decreased incidence of malnutrition among young children with an increase in the level of mothers' education. However, there was not significant association found between education level of care givers' and all the nutrition indices in Lahj survey.

5.7. Cross Cutting Issues (Gender)

Highly significant (p=0.000) gender disparity has been observed in the prevalence of acute malnutrition between boys and girls. The prevalence of acute malnutrition in Lowland zone was significantly higher among boys than girls. Therefore, sex-related parental care giving behavior needs further exploration.

6. CONCLUSION

Of the two ecological surveyed, Lowland presented a ***critical*** nutrition situation with GAM at **23.0%** and SAM estimated at **4.5%**. The Mountainous zone presented a ***serious*** nutrition situation with GAM and SAM estimates of **14.3%** and **2.8%**, respectively and in the presence of aggravating factors such as acute food insecurity, suboptimal vitamin A supplementation coverage, and childhood morbidity considered as high.

Many communities in both Mountain and Lowland ecological zones are extremely isolated and access to basic services for health, water and markets is extremely low. The malnutrition reported was found to be highly aggravated, suggesting that parts of the governorate are in very poor shape and need specific support immediately to firstly understand more fully the causes for this high malnutrition in children and secondly to suggest ways to address the situation, providing equitable health and nutrition support immediately in the worst affected areas. Teams' observation of the locality and household condition reported seeing several thin children and thin mothers in some parts of the villages. Considering the high prevalence of moderate cases, it is suggested that unless immediate intervention started to dramatically improve and salvage the situation, there would be a further deterioration and a rise in the level of severe malnutrition in the months ahead. This will subsequently cause further deterioration in the nutrition and health situation among the most vulnerable children, especially in the worst affected areas of the governorate.

7. RECOMMENDATIONS

Immediate recommendations

- Convene a multi-sectoral meeting at governorate level to develop a joint action plan identifying responsible partners, and setting a time frame to act on the recommendations made for improving the nutrition situation.
- Expand and scale-up the current CMAM services to more health facilities to increase coverage and to reach more malnourished children. Currently, only 25 OTP centres are functional within 25 health facilities among the 219 functional public health facilities in Lahj governorate which reveals the coverage is still very low. The CMAM service in the existing health facilities must also be strengthened through capacity building of the new health staffs on CMAM procedures, RUTF supply and stock management, data management and reporting, and refresh training to the already trained personnel
- Allocate budget for joint monitoring and supportive supervision field visit of the OTP and TFC sites at a three month interval with the aim of assessing the quality of patient care, outcomes of patients enrolled into the program and program ownership by the governorate and district government. The supportive supervision should also be seen as an opportunity to identify challenges, gaps and constraints of the programme implementation.
- Consider deploying additional mobile health teams to strengthen and compliment the primary health care services delivered at static health facilities. It is essential that all mobile health teams are trained and equipped to treat and manage severe acute malnutrition. Ensure that critically and seriously affected villages are added to the

current list of areas where mobile health teams are working. It is also suggested that NGO-supported health/nutrition teams should be encouraged given the high immediate need that currently exists in several districts in the governorate.

- Review the strategy for community outreach component of the CMAM programming in the governorate and strengthened the community mobilization efforts to improve early case finding and referral for OTP in the months ahead.
- Based on the anthropometric findings overall, there is a need for emergency relief distribution targeting vulnerable households with acute food shortage.
- The prevalence of malnutrition with the context of multiple aggravating factors warrants supplementary feeding. Provide supplementary food under a SFP targeting the most vulnerable in the community, pregnant and lactating women (PLW) and children under-five providing 2 months blanket supplementary feeding distribution (in Lowland) to prevent further malnutrition among the community, followed by 4 months targeted supplementary feeding for moderately malnourished PLW and under-five to cap a rise in moderate malnutrition and prevent an increase in severe acute malnutrition in children in the months ahead. It is suggested that the modalities of the TSFP will be mobile and linked to the mobile health teams PHC/TFP services.
- Establish a mobile targeted supplementary feeding programme to cap a rise in moderate malnutrition and prevent an increase in severe acute malnutrition. Immediate investigation is needed and an appropriate immediate response for the 11 villages listed where malnutrition rates were found to be very high (*Alebi, Alkhodad, Beeromer, ToorAlborook, and Mehwali* villages in Lowland ecological zone; *Al-arsh, Al-hada, Al-Shaiba, Al-Makhaira, Wadi Albeer and Al-Sha'bain* villages in Mountainous zone.
- As a preparedness measure, enhance capacity to manage severe acute malnutrition with medical complications by establishing TFCs in locations with high need.
- Improve the infant feeding practices with focus on preventing early cessation of breastfeeding, continuation of breastfeeding, re-lactation (for those ceased) and proper complementary feeding.
- In areas that are considered malaria endemic, strengthen the support for ITN distribution and awareness raising campaigns to promote effective utilization of bed nets.
- In villages where suspected measles cases were reported (Annex X), particularly *Barakan, Shalem, Othara* in Mountainous zone and *Alrakb* in Lowland zone, further investigation is needed to determine the existence of measles outbreak and the scale of the population at risk before a supplementary immunisation activity can be planned for.

Medium term

- As part of the effort to tackle the staggering level of acute and chronic malnutrition, there is a need for an integrated strategy to short term, medium term and longer term programmes addressing both the acute and chronic malnutrition. Therefore, an integrated health and nutrition package (Immunization, Micronutrient supplementation, IYCF, CMAM) complimented with programmes aimed at improving household food security, water and sanitation need to be implemented in Lahj governorate in a coordinated way to bring down malnutrition, particularly in the remote villages with little access to facilities and high levels of malnutrition,

- Closely monitor the food security situation and develop a contingency plan to provide prompt emergency relief as appropriate.
- Establish a nutrition surveillance system to monitor the situation to act as an early warning system and as a referral mechanism for malnourished children.
- Promote salt iodization programmes.
- Improve vaccination coverage by enhancing the governorate's mobile health service initiative and implement SPHERE standards with special focus to vitamin A supplementation as well.
- Improve management of ARI and Diarrhea in the communities with focus on preventive measures and possible curative responses.
- WASH campaign to promote safe hygiene and caring practices
- Improve already 'satisfactory' sanitation facilities and practices through health education and disciplined camp management.
- Implement programmes that will promote self-sufficiency and household food security. Food-for-training activities, food-for-work programmes, and agricultural rehabilitation are recommended as means of increasing employment opportunities and providing a mechanism by which households can increase their immediate access to food.
- A follow-up survey should be done after 6 months to assess the change in status of the populations and effect of health and nutrition interventions on malnutrition prevalence, morbidity and mortality
- Develop the capacity of a multi disciplinary team in Lahj governorate to execute future surveys, analyse and interpret nutrition, food security and health information and to plan appropriate timely emergency response for the districts in the governorate.

Longer term

- Scale up WASH projects to improve access to safe water and sanitary latrines
- Develop strategies and test innovative initiatives to diversify income generation

opportunities

- Support infrastructure development (roads, communication systems), especially in Mountainous zone
- Develop an integrated (Nutrition, Health, Food security) early warning system for each ecological zone in the governorate
- Health indicators - define thresholds for normal, alert, high risk, emergency
- Defined key FS indicators for each ecological zone and set thresholds biannually
- Further research is needed to understand why the level of acute malnutrition among boys is significantly higher than girls

ANNEXES

Annex I: Clusters Selected for Lahj Lowland Ecological Zone		
District	**Village**	**Cluster Number**
AlHwata	Aldubba	1
AlHwata	Alebi	2
AlHwata	Masawa	3
Tuban	Saber	4
Tuban	Amjerba	5
Tuban	Alwaht	6
Tuban	Alkhodad	7
Tuban	Alnoba	8
Tuban	Oberlasloom	9
Tuban	Beer Haidra	10
Tuban	Harran dyan	11
Tuban	Beeromer	12
Tuban	Alquraishi	13
Tuban	Hashed	14
Toor Albaha	Habeel Alsabt	15
Toor Albaha	Toor Ma'akem	16
Toor Albaha	Almokait	17
Toor Albaha	Alhwaida	18
Toor Albaha	AlMojailba	19
AlMadhareba Ras Alara	Alboroda	20
AlMadhareba Ras Alara	Howaireb	21
AlMadhareba Ras Alara	Ma'amer	22
AlMadhareba Ras Alara	Alraia	23
AlMadhareba Ras Alara	Almonaikem	24
AlMadhareba Ras Alara	Amatef	25
AlMusaimeer	Almusaimeer	26
AlMusaimeer	Alfosail	27
AlMusaimeer	Aldoraija	28
AlMelah	Alrakb	29
AlMelah	Althemra	30
Radfan	Alhabelin	31
Radfan	Alhamra	32
Radfan	Aljabha	33
Radfan	Albareda	34
Habeel Jabr	Alkharoof	35
Habeel Jabr	Rahwat Amria	36
Toor Albaha	Toor Alborook	37
Alkabaita	Alsehr	38
Alkabaita	Alsofaila	39
Alkabaita	Mehwali	40

Annex II: Clusters Selected for Lahj Mountain Ecological Zone		
District	**Village**	**Cluster No.**
Al-Had	Al-Farda	1
Al-Had	Al-koma'ala	2
Al-Had	Al-Majadeer	3
Al-Had	Shamsan	4
Al-Had	Barakan	5
Yafea	Al-Kern	6
Yafea	Al Ahmed	7
Yafea	Dhaisra	8
Yafea	Al-Kadem	9
Yafea	October	10
Yafea	Al-Dhahra	11
Yafea	Mankal	12
Al-Meflehi	othara	13
Al-Meflehi	Al-Malkaf	14
Al-Meflehi	Al-Maseel	15
Yafea	Marfad	16
Yahr	Dhalem	17
Yahr	Al-arsh	18
Yahr	aden Shopa	19
Halmeen	Habeel Al-raida	20
Halmeen	Asfal Shattan	21
Halmeen	Akabat ahmed	22
Al-Makatera	Al-Hiar	23
Al-Makatera	Al-Amook	24
Al-Makatera	Al-Kama Aloia	25
Al-Makatera	Al-hada	26
Al-Makatera	Al-seer	27
Habeel Jabr	Al-Shaiba	28
Radfan	Al-Abadia	29
Al-Melah	Lassat	30
Al-Kabaita	Al-Makhaira	31
Al-Kabaita	Al-A'ajool	32
Al-Kabaita	Al-Kdakeda	33
Al-Kabaita	Wadi Albeer	34
Al-Kabaita	Aykoa Al-Fahais	35
Al-Kabaita	Al-Sha'bain	36

Annex III: Random Number Table

172	337	568	471	34	147	190	565	414	490	669	626
280	756	648	550	178	768	573	142	504	323	315	659
735	295	769	451	699	4	465	797	95	80	176	381
144	683	180	722	50	677	3	387	339	801	104	554
311	515	313	758	195	680	121	710	757	761	520	197
562	338	46	524	429	367	549	370	31	244	285	601
148	647	720	276	206	68	29	200	642	379	242	150
436	327	501	586	587	595	443	298	372	742	149	89
334	245	417	281	704	211	427	495	257	390	686	221
744	278	508	217	795	755	182	413	333	208	561	506
498	538	738	728	399	479	536	205	301	266	283	174
207	103	152	256	641	19	774	269	602	26	596	709
535	86	650	480	743	663	156	14	540	141	575	165
133	533	450	682	473	268	212	181	47	135	448	610
558	691	28	362	55	407	353	331	378	79	17	658
734	633	254	628	324	424	214	127	557	386	226	467
351	118	637	5	679	196	151	397	405	675	544	355
420	406	640	40	784	542	329	203	199	61	638	408
570	164	693	163	98	360	308	239	499	23	251	672
291	497	462	286	670	56	455	794	157	388	700	525
712	439	20	66	651	358	723	263	724	357	249	449
433	289	531	472	717	421	309	13	618	63	681	290
580	778	137	72	401	377	664	609	319	803	741	476
59	432	532	160	571	676	412	701	796	560	516	136
107	630	347	27	18	604	24	617	243	307	404	620
487	671	130	502	261	325	112	541	335	170	25	125
517	466	665	188	84	629	201	345	799	235	37	74
445	657	128	468	267	303	435	461	447	452	314	503
227	494	101	229	430	232	694	344	608	695	491	167
246	241	522	739	96	732	383	764	483	363	611	603
2	306	727	264	453	798	485	559	537	566	11	698
49	614	57	599	218	299	316	15	198	760	32	528
105	297	442	543	191	591	62	168	762	8	253	716
660	398	346	684	392	713	44	771	527	785	790	607
7	223	507	371	102	403	438	10	434	731	336	341
481	592	510	486	92	78	318	441	530	791	534	209
446	343	234	162	193	789	376	73	482	340	292	143
589	440	454	714	514	489	703	600	612	624	754	330
240	215	668	270	48	210	293	352	800	518	553	740
745	250	705	16	274	300	123	192	279	171	183	639
736	463	115	428	65	87	692	546	184	213	645	169
1	320	770	262	305	458	622	131	375	631	132	53
271	459	342	122	780	615	574	582	288	719	753	477
721	783	393	99	636	726	781	284	259	750	786	350
54	394	475	69	154	779	385	576	422	60	488	590
748	737	389	470	690	569	30	787	258	38	77	6
788	93	219	763	707	792	41	139	416	456	90	418

Annex IV: Local calendar of events, Lahj Nutrition Survey, July 2012									
من تاريخFrom		حتى تاريخTo		Birthمواليد 2012	Birthمواليد 2011	Birthمواليد 2010	Birthمواليد 2009	Birthمواليد 2008	Birthمواليد 2007
Dayيوم	Monthشهر	Dayيوم	Monthشهر	العمر بالأشهر Age by Months	العمر بالأشهر Age by Months	العمر بالأشهر Age by Months	العمر بالأشهر Age by Months	العمر بالأشهر Age by Months	العمر بالأشهر Age by Months
1	1	31	1	6	18	30	42	54	
1	2	28	2	5	17	29	41	53	
1	3	31	3	4	16	28	40	52	
1	4	30	4	3	15	27	39	51	
1	5	31	5	2	14	26	38	50	
1	6	30	6	1	13	25	37	49	
1	7	31	7	اقل من شهر	12	24	36	48	
1	8	31	8		11	23	35	47	59
1	9	30	9		10	22	34	46	58
1	10	31	10		9	21	33	45	57
1	11	30	11		8	20	32	44	56
1	12	31	12		7	19	31	43	55

Annex V: Reference Table for Age Estimation, Lahj Nutrition Survey, July 2012

Year 2007

The date from			The date to			
Day	**Month**	**year**	**Day**	**Month**	**year**	**Age by months**
30	Aug	2007	30	July	2007	59
30	Sep	2007	30	Aug	2007	58
28	Oct	2007	30	Sep	2007	57
30	Nov	2007	28	Oct	2007	56
30	Dec	2007	30	Nov	2007	55

Year 2008

The date from			The date to			
Day	**Month**	**year**	**Day**	**Month**	**year**	**Age by months**
30	Jan	2008	30	Dec	2007	54
28	Feb	2008	30	Jan	2008	53
30	Mar	2008	28	Feb	2008	52
30	Apr	2008	30	Mar	2008	51
30	May	2008	30	Apr	2008	50
30	Jun	2008	30	May	2008	49
30	Jul	2008	30	Jun	2008	48
30	Aug	2008	30	Jul	2008	47
30	Sep	2008	30	Aug	2008	46
30	Oct	2008	30	Sep	2008	45
30	Nov	2008	30	Oct	2008	44
30	Dec	2008	30	Nov	2008	43

Year 2009

The date from			The date to			
Day	**Month**	**year**	**Day**	**Month**	**year**	**Age by months**
30	Jan	2009		Dec	2008	42
30	Feb	2009		Jan	2009	41
30	Mar	2009		Feb	2009	40
30	Apr	2009		Mar	2009	39
30	May	2009		Apr	2009	38
30	Jun	2009		May	2009	37
30	Jul	2009		Jun	2009	36
30	Aug	2009		Jul	2009	35
30	Sep	2009		Aug	2009	34
30	Oct	2009		Sep	2009	33
30	Nov	2009		Oct	2009	32
30	Dec	2009		Nov	2009	31

Year 2010

The date from			The date to			
Day	**Month**	**year**	**Day**	**Month**	**year**	**Age by months**
30	Jan	2010	30	Dec	2009	30
28	Feb	2010	30	Jan	2010	29
30	Mar	2010	28	Feb	2010	28
30	Apr	2010	30	Mar	2010	27
30	May	2010	30	Apr	2010	26
30	Jun	2010	30	May	2010	25
30	Jul	2010	30	Jun	2010	24
30	Aug	2010	30	Jul	2010	23
30	Sep	2010	30	Aug	2010	22
30	Oct	2010	30	Sep	2010	21
30	Nov	2010	30	Oct	2010	20
30	Dec	2010	30	Nov	2010	19

Year 2011

The date from			The date to			
Day	**Month**	**year**	**Day**	**Month**	**year**	**Age by months**
30	Jan	2011	30	Dec	2010	18
28	Feb	2011	30	Jan	2011	17
30	Mar	2011	28	Feb	2011	16
30	Apr	2011	30	Mar	2011	15
30	May	2011	30	Apr	2011	14
30	Jun	2011	30	May	2011	13
30	Jul	2011	30	Jun	2011	12
30	Aug	2011	30	Jul	2011	11
30	Sep	2011	30	Aug	2011	10
30	Oct	2011	30	Sep	2011	9
30	Nov	2011	30	Oct	2011	8
30	Dec	2011	30	Nov	2011	7

Year 2012

The date from			The date to			
Day	**Month**	**year**	**Day**	**Month**	**year**	**Age by months**
30	Jan	2011	30	Dec	2011	6
28	Feb	2011	30	Jan	2012	5
30	Mar	2011	30	Feb	2012	4
30	Apr	2011	30	Mar	2012	3
30	May	2012	30	Apr	2012	2
30	Jun	2012	30	May	2012	1

Annex VI: RETROSPECTIVE MORTALITY FORM

Survey Date: ____/____/2012 District surveyed: _____ Sub-district: _____
Village/neighborhood: _____ Cluster number: _____ Team number: _____
Survey zone (stratum): _____ Household questionnaire number: _____

No.	Name (optional)	Sex (M, F)	Age in years or date of birth	Joined within the 90 day period	Left within the 90 day period	Born within the 90 day period	Died within the 90 day period	Cause of death	Place of death
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									

Important: All individuals present in the household should be recorded, whether joining or leaving the household, and whether born or died within the 90 day period from commencement of the survey.

Symbols for causes of death	
1 = diarrheal disease	5 = malnutrition
2 = fever	6 = violence / impacts of conflicts
3 = measles	7 = other (specify)
4 = respiration disorders	
Symbols for places of death	
1 = at the current location	
2 = during emigration	
3 = at a different residence	
4 = other (specify)	

Annex VII: Household Questionnaire

Republic of Yemen
Ministry of Public Health and Population
Office of Public Health and Population, Lahj Governorate

Nutritional Status and Mortality Survey – Lahj Governorate – July 2012

Household Questionnaire (Form 1)

First: Explain to the residents of the household (adults) about the survey and inform them of the agency conducting the survey and survey staff (team members). Then request their verbal agreement to participate in the survey.

Consent	1.	Yes.		
	2.	No.		Go to the end.

Date of interview	day		month		year			
			Ø		2	Ø	1	2

District	Ozla (Sub-district)	Village or neighborhood
name	Name	name

Name of head of household	

Survey team number ……		**Name**	**Signature**
	Household and anthropometric data		
	Mortality data		
	Team leader		

Indicate which situation applies:		
1.	Absence of household upon first visit which necessitated a second visit	
2.	Absence of child upon first visit which necessitated a second visit *	

* If the child is not present, all data should be filled in except anthropometric measurements and edema which should be completed only if the child is present.

Note: The data inside the cover is for field and administrative use by the team members.

To be filled by the Team Leader (for data input purposes)

Repeated absence of the household even after the second visit (1=yes, 2=no)	
Consent (1=yes, 2=no)	

Team Number		

HouseholdQuestionnaire Number				

Date of Interview	day			Month			year			
				Ø			2	Ø	1	2

Is the region urban (1) or rural (2)?	

Village or neighborhood code number			Sub-district code number		
District code			Governorate code number	2	5
Survey zone (stratum) number			Cluster number		

Stratum number is (1) for Mountainous Zone and (2) for Lowland Zone

……

Desk work

	Name	day		month		Year				Signature
Data entry										
Review										
Other encoding										
Remarks: …… …… ……										

Q001: Household data (only those who are alive and living together continuously)

H001a	Number of household members (only those who are alive and living with the household on the date of the survey)	Quantity	

H001b	Number of children under five (only those who are alive and living with the household on the date of the survey)	Quantity	

H001c	Number of children under six months (only those who are alive and living with the household on the date of the survey)	Quantity	

Q002 – Q003: Head of household data

H002	Gender of the head of household			
	1.	Male		
	2.	Female		

H003	Social status of the head of household			
	1.	Married and living with partner		
	2.	Married and not living with partner for at least six months or more.		
	3.	Widow/widower		
	4.	Divorced		
	5.	Angered and separated		
	6.	Single		

Q004: Household caretaker data

H004	Education level of household caretaker			
	1.	Illiterate.		
	2.	Can read and write (literate).		
	3.	Basic education.		
	4.	Secondary education.		
	5.	Tertiary education (university, college, or institute).		

Q005: Household income source

H005	What is the **primary** source of income for the household?			
	1.	Non-qat agricultural products		
	2.	Livestock and livestock products		
	3.	fishery		
	4.	Trading		
	5.	Temporary work (Casual work)		
	6.	Monthly salary		
	7.	Remittance (from emigrants)		
	8.	Craftsmanship		
	9.	Farming/sale/transport of qat		
	1Ø.	Donation (from friends and relatives)		
	11.	Social insurance		
	12.	Other: specify -		

Q006 – Q012: Water, environmental sanitation, and hygiene data

H006	What is the main source of **<u>drinking water</u>** in your home? (choose one only)			
	1.	Piped water connected to home.		
	2.	Piped water connected to yard.		
	3.	Open, unprotected well.		
	4.	Open, protected well.		
	5.	Covered rainwater collection tank.		
	6.	Open rainwater collection tank.		
	7.	Water delivery truck.		
	8.	Bottled water (Hadda, Shamlan, Kawthar, etc.)		
	9.	Unprotected surface water (valley, running spring, etc.)		
	1Ø.	Protected spring water.		
	11.	Other: specify -		

H007a	Do you treat the water before drinking?			Go to
	1.	Yes		
	2.	No		→H008
	3.	Don’t know.		→H008

H007b	What is the**main** method used to treat **drinking water**? Choose only one.			
	1.	Boil water before drinking.		
	2.	Use chlorine or Clorox.		
	3.	Filter through clean cloth.		
	4.	Use ceramic or sand filter or similar filter method.		
	5.	Let water settle before drinking.		
	6.	Use of alum crystal to disinfect.		
	7.	Other.		

H008	**Note**: **Investigate** availability of storage for **drinking water**. Is the water container clean (no algae seen)?			
	1.	Yes.		
	2.	No.		

H009	What is used for defecation? Choose one of the following.**Verify** existence of facilities and practices.			
	1.	Toilet – equipped with flush mechanism to wash water down.		
	2.	Toilet – uncovered pit.		
	3.	Toilet – simple dry covered pit.		
	4.	Outdoors in the open air (in fields, for example).		
	5.	Other: specify -		

H010	When do you clean your hands with soap, ashes, dust, tree leaves, or any other material? Place a check mark for each answer said by the respondent. **Do not give the respondent any choices for the answer.**					
	a.	After using the toilet.	1.	Yes		
			2.	No		
	b.	Before eating.	1.	Yes		
			2.	No		
	c.	After eating.	1.	Yes		
			2.	No		
	d.	Before cooking.	1.	Yes		
			2.	No		
	e.	Before feeding the child.	1.	Yes		
			2.	No		
	f.	After disposing of child's waste.	1.	Yes		
			2.	No		
	g.	After cleaning the livestock or poultry areas.	1.	Yes		
			2.	No		
	h.	Any other answers: Specify -				

H011	Note: With regard to hand-washing, confirm the use of the following:					
	a.	Water.	1.	Yes		
			2.	No		
	b.	Soap.	1.	Yes		
			2.	No		
	c.	Ashes, dust, limestone powder, tree leaves.	1.	Yes		
			2.	No		

H012a	Where do you obtain health care if someone in the household gets sick?			Go to
	1.	No medical help is sought.		
	2.	Personal medicines.		
	3.	Traditional healer.		
	4.	Shaykh.		
	5.	Pharmacy.		
	6.	Private clinic.		→ C013
	7.	Public health facility.		→ C013

H012b	Why don't you seek health services at a health facility or clinic when someone gets sick?			
	1.	High cost.		
	2.	Facility is distant and transportation is not available.		
	3.	Not enough time.		
	4.	We do not have confidence in the nearby services.		
	5.	Other: specify -		

Q013 – Q017: The food security situation part (to be answered for the situation in the past 30 days)

H013	Over the past 30 days, did you or any HH member use to reduce the size of meals because of the scarcity of resources?			
	1.	Yes		
	2.	No		

H014	Over the past 30 days, did you or any HH member use to reduce the number of meals because of the scarcity of resources?			
	1.	Yes		
	2.	No		

H015	Over the past 30 days, did you or any HH member go the bed in night hungry because of not enough food?			
	1.	Yes		
	2.	No		

H016	Over the past 30 days, did the HH borrow food, borrow money to purchase food or purchase food in credit or mortgage?			
	1.	Yes		
	2.	No		

H017	Over the past 30 days, did the HH reduce the expenditure on education or food to save money to purchase food?			
	1.	Yes		

	2.	No		

Q018: Situation of salt iodization

H018	Use the rapid test reagent to check the iodization status of the salt HH was used yesterday?			
	1.	Not iodized.		
	2.	Below 15 ppm.		
	3.	15 ppm and above.		
	4.	The test was not made.		

Q019 – Q025: Nutritional and Immunization Status of Children ages 6-59 months within the household

		C019	C020a	C020b	C021	C022a
Child no.	Child's first name	Child's gender 1 = male 2 = female	Date of birth. If the date is recorded, skip C020b)	Age of child in months. If the child is older than 24 months, go to question C023.	For children 24 months or less. Is the child still breastfeeding? 1 = yes 2 = no	For children 24 months or less. How many times have you fed the child in the past 24 hours? Do not include number of times breastfed.
1.			day mo. Year			
2.			day mo. Year			
3.			day mo. Year			
4.			day mo. Year			
5.			day mo. year			
6.			day mo. year			
7.			day mo. year			

			C022b	C023	C024	C025
Child no. (as above)	Child's gender 1 = male 2 = female	Child's age (in months)	For children 24 months or less. How many times have you fed the child milk in the last 24 hours? Do not include number of times breastfed.	Has the child been given Vitamin A in the past six months? (Show sample.) 1 = yes 2 = no 3 = don't know	Has the child been given vaccinations for Pentavalent 3 and Polio 3? 1 = yes 2 = no	For children nine months and older. Has the child been immunized against measles (shot in left arm)? 1 = yes, shown on card 2 = yes, from memory 3 = don't know 4 = has not been immunized
1.						
2.						
3.						
4.						
5.						
6.						
7.						

Q026 – Q035: Anthropometric measurements and childhood diseases of children aged 6 – 59 years in the household

			C026	C027	C028	C029
Child no. (as above)	Child's gender 1 = male 2 = female	Child's age (in months)	Weight (kg) 88.8 = refused 99.9 = not present	Height (cm) 888.8 = refused 999.9 = not present	Bilateral edema (in both legs). 1 = yes 2 = no 8 = refused 9 = not present	Middle upper arm circumference (cm) 88.8 = refused 99.9 = not present
1.						
2.						
3.						
4.						
5.						
6.						
7.						

			C030	C031	C032	C033	C034	C035
Child no. (as above)	Child's gender 1 = male 2 = female	Child's age (in months)	Diarrhea within the past two weeks 1 = yes 2 = no	Cough or difficulty breathing in the past two weeks 1 = yes 2 = no	Fever in the past two weeks 1 = yes 2 = no	Symptoms similar to measles in past month (skin rash + fever + cough or throat infection or conjunctivitis) 1 = yes 2 = no	Did the child sleep under mosquito net last night? 1 = yes 2 = no	Is the child currently registered at a nutrition center? 1 = SFP 2 = TFC/SC 3 = OTP 4 = other 5 = not registered
1.								
2.								
3.								
4.								
5.								
6.								
7.								

Annex VIII: Referral Form for the Malnourished Children

مسح الحالة التغذوية للأطفال تحت سن الخامسة في محافظة حجة، ابريل – مايو 2012

استمارة إحالة طفل مصاب بسوء تغذية حاد وخيم

الأخوة/ المرفق الصحي : .....

نود إحاطتكم أن الطفل/ الطفلة : ..... كان/ كانت ضمن عينة المسح المشار إليه أعلاه ووجد أنه مصاب بسوء تغذية حاد من خلال القياسات التالية:

	سنتيمتر .	محيط ذراع الطفل بالسنتيمتر (ØØ. Ø)

	سنتيمتر .	طول / ارتفاع الطفل بالسنتيمتر (ØØØ. Ø)

وجود التوذم: (نعم / لا)

تاريخ القياس	يوم	شهر	سنـــــة
			2 Ø 1 1

يرجى تعاونكم معه/ معها

وتقبلوا تحيات فريق المسح

اسم المشرف الميداني .....

توقيعه

Lahj Lowland Ecological Zone: Overall Data Quality

Plausibility check for:
YEM_1207_LOWLAND_LAHJ_UNICEF_DAT.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	
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10		
(% of in-range subjects)			0	5	10	20	0	(2.4 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000		
(Significant chi square)			0	2	4	10	0	(p=0.915)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000		
(Significant chi square)			0	2	4	10	4	(p=0.015)
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20		
			0	2	4	10	0	(5)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20		
			0	2	4	10	2	(6)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20		
			0	2	6	20	0	(0.99)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0		
			0	1	3	5	0	(0.05)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0		
			0	1	3	5	0	(0.21)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000		
			0	1	3	5	1	(p=0.019)
Timing	Excl	Not determined yet						
			0	1	3	5		
OVERALL SCORE WHZ -			0-5	5-10	10-15	>15	7	%

At the moment the overall score of this survey is 7 %, this is good.

Lahj Mountain Ecological Zone: Overall Data Quality

Plausibility check for:
YEM_1207_MOUNTAIN_LAHJ_UNICEF_DAT.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	
Missing/Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-10	>10		
(% of in-range subjects)			0	5	10	20	0	(0.9 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<0.000		
(Significant chi square)			0	2	4	10	0	(p=0.310)
Overall Age distrib	Incl	p	>0.1	>0.05	>0.001	<0.000		
(Significant chi square)			0	2	4	10	4	(p=0.003)
Dig pref score - weight	Incl	#	0-5	5-10	10-20	> 20		
			0	2	4	10	0	(3)
Dig pref score - height	Incl	#	0-5	5-10	10-20	> 20		
			0	2	4	10	0	(5)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>1.20		
			0	2	6	20	0	(0.97)
Skewness WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0		
			0	1	3	5	0	(-0.17)
Kurtosis WHZ	Excl	#	<±1.0	<±2.0	<±3.0	>±3.0		
			0	1	3	5	0	(-0.10)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<0.000		
			0	1	3	5	3	(p=0.002)
Timing	Excl	Not determined yet						
			0	1	3	5		
OVERALL SCORE WHZ -			0-5	5-10	10-15	>15	7	%

At the moment the overall score of this survey is 7 %, this is good.

Annex X: Suspected measles cases reported						
Lowland ecological zone				*Mountainous ecological zone*		
District	**Village name**	**No. of cases reported**		**District**	**Village**	**No. of cases reported**
AlMelah	Alrakb	6		Al-Had	Barakan	13
AlMadhareba Ras Alara	Ma'amer	4		Yahr	Dhalem	5
Habeel Jabr	Rahwat Amria	4		Al-Meflehi	Othara	5
Toor Albaha	Toor Alborook	3		Al-Kabaita	Al-Makhaira	4
Tuban	Harran dyan	3		Al-Makatera	Al-Amook	3
Radfan	Albareda	3		Al-Kabaita	Al-Sha'bain	3
Alkabaita	Alsehr	3		Al-Melah	Lassat	3
Tuban	Saber	3		Halmeen	Habeel Al-raida	3
AlHwata	Aldubba	2		Yafea	Al-Kern	3
Toor Albaha	Almokait	2		Al-Melah	Lassat	2
AlMusaimeer	Alfosail	2		Yafea	Dhaisra	2
Tuban	Alnoba	2		Yafea	October	2
Alkabaita	Alsofaila	2		Yafea	Al-Dhahra	2
Tuban	Oberlasloom	1		Habeel Jabr	Al-Shaiba	2
Tuban	Amjerba	1		Yafea	Mankal	1
Tuban	Alkhodad	1		Al-Makatera	Al-seer	1
Toor Albaha	AlMojailba	1		Halmeen	Asfal Shattan	1
Toor Albaha	Habeel Alsabt	1		Al-Had	Al-Majadeer	1
Radfan	Alhamra	1		Yafea	Marfad	1
Tuban	Beer Haidra	1		Al-Kabaita	Al-A'ajool	1
AlMadhareba Ras Alara	Alboroda	1		Yahr	Al-arsh	1
Habeel Jabr	Alkharoof	1		Al-Kabaita	Al-Kdakeda	1