Nutrition Survey among U5 Children

Al Hodeidah Governorate, Yemen

December 2011

ACKNOWLEDGEMENTS

The Ministry of Public Health and Population would like to express its sincere thanks to UNICEF and its technical officers who contributed immensely to the findings and related recommendations. Special thanks to Prof. Abdul Wahed Al Serouri and Mr. Nagib Abdulbaqi for their continuous hard work on data verification, analysis and report writing. Thanks to Dr. Ali Jahaf, Dr. Agostino Munyiri, Dr. Wisam Al Timimi, and Dr. Rajia Sharhan for their thorough review and contributions.

Special thanks also go to the technical nutrition teams in MOPH&P - Nutrition Department, UNICEF, and Al Hodeidah Governorate Health Office and UNICEF Al Hodeidah Office.

Deep appreciation goes to the data collection teams, field supervisors, team leaders, enumerators, data entry team and all health workers who participated in this survey and made it such a successful effort.

Last but not least, we would like to thank all individuals – above all, the women and under-five girls and boys – and households and communities in Al Hodeidah governorate who made themselves available to this survey and provided insight into their lives.

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LIST OF ACRONYMS

ARI	Acute Respiratory Infection
CFSS	Comprehensive Food Security Survey
CI	Confidence Interval
CMAM	Community Management of Acute Malnutrition
CSO	Central Statistical Organization
DHS	Demographic Health Survey
ENA	Emergency Nutrition Assessment
FCS	Food Consumption Score
FGD	Focus Group Discussion
FHS	Family Health Survey
GAM	Global Acute Malnutrition
Hb	Haemoglobin
HAZ	Height for Age Z-scores
HBS	Household Budget Survey
IFPRI	International Food Policy Research Institute
IYCF	Infant and Young Child Feeding
MAM	Moderate Acute Malnutrition
MICS	Multiple Indicators Cluster Survey
MoPHP	Ministry of Public Health and Population
MoPIC	Ministry of Planning & International Cooperation
MUAC	Mid-Upper Arm Circumference
OTP	Out-patient Therapeutic Programme
SAM	Severe Acute Malnutrition
SD	Standard Deviation
SMART	Standardized Monitoring and Assessment of Relief and Transition
SOWC	The State of the World's Children
U5	Under-five
UNICEF	United Nations Children's Fund
WASH	Water Sanitation and Hygiene
WAZ	Weight for Age Z-scores
WHZ	Weight for Height Z-scores

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EXECUTIVE SUMMARY

In October 2011, MoPHP with the support of UNICEF conducted a nutrition survey amongst U5 children in Al Hodeidah Governorate, Yemen. The survey was prompted by the finding of high rates of malnutrition among host communities in neighboring Hajja Governorate and a survey conducted in July 2011. The survey objective was to determine the prevalence of malnutrition among under-five children, to evaluate these children's overall health status, and to identify some of the underlying causes of malnutrition.

The survey was a cross-sectional, two-stage cluster sample survey applying quantitative data collection techniques. A total of 3104 households were surveyed, and anthropometric measurements and health data were collected from 4668 children aged 0 - 59 months. Two other questionnaires were also administered: one on household characteristics and the other U5 child mortality.

FINDINGS

The findings show a GAM rate (based on WHO 2006 Growth Standards) of 31.7% [95% C.I 31.5 – 31.8] and SAM of 9.9% [95% CI 9.8– 10.0] which far exceeds the emergency threshold of 15%. Furthermore, the survey found underweight prevalence of 59.6% [95% CI 59.5-59.7] and stunting of 54.5% [95% CI 54.3-54.6]. The GAM and underweight prevalence is higher than the national average (15.0 %, 43.0% respectively), which may indicate increased vulnerability in the survey areas. Consistent with the findings of the last national Family Health Survey (FHS 2003), the prevalence of GAM in this survey was highest among males.

While acute malnutrition was highest in the coast/coastal and plains/valleys, it was lowest in the terraces/low mountains. Chronic malnutrition as shown by stunting was found to be highest in the terraces/low mountains and lowest in the coast/coastal zones. Consistent with the findings of the 2003 national FHS, malnutrition was found to be much more common in rural areas than in urban areas.

The prevalence of diarrhoea (as well as ARI and fever) was found to be significantly higher than the national figures, with nearly one in two children reported to have had diarrhoea in the two weeks preceding the survey. Diarrhoea was significantly associated with malnutrition.

The overall measles vaccination coverage was around 74.2%, with higher rates in urban and coast/coastal areas and lowest coverage in terraces/low mountains zone. Furthermore, the coverage is significantly higher in urban than rural areas. Vitamin A supplementation among children ≥ 9 months was found to be low, with only 32.6% of U5 children having received vitamin A supplementation during the six months preceding the survey. Figures were significantly higher among children living in coast and coastal zone compared to those

living in sandy plains and valleys, and among urban residents compared to rural residents.

Only 9.2% of the children surveyed were exclusively breastfed (with higher prevalence of malnutrition and morbidities among non-exclusive breastfed), and only approx. one third of those aged 6-23 months received appropriate complementary feeding/diversified food according to the seven food group *Minimum dietary diversity indicator*. Such food diversification significantly differs by agro-ecological zone: it was highest in the coast and coastal and lowest in terraces and low mountains zones. Similarly, it was also higher in urban than in rural areas. There was no gender difference in breastfeeding rates. Poor food diversification was found to be significantly associated with malnutrition. Furthermore, overall morbidity as well as diarrhoea in the two weeks preceding the survey was found to be significantly associated with poor food diversification.

With regard to food insecurity, approx. one in seven families had been forced to reduce the children's meal size; one in eight families had been forced to reduce the children's number of meals, and one in 12 children went to bed hungry during the preceding month. These three indicators were found to vary significantly by agro-ecological zone, with sandy plains and valleys having the highest food insecurity indicators and coast and coastal zones having the lowest. Furthermore, the three indicators were found to be significantly higher in rural areas. This lends support to previous findings that rural-urban inequalities are high in Yemen, with 40.1% of people in rural areas living under the national poverty line, compared to 20.7% in urban areas. Severe acute malnutrition, underweight and stunting were found to be higher among food insecure children, as measured by the three food insecurity indicators. Furthermore, food insecure children were found to be more prone to higher overall morbidity.

Around 50% of households have public/private pipeline network as the main source for drinking water and one third wells with pumps (owned by communities). The main source for drinking water differs significantly by agro-ecological zone; the public network is main source for plain and valleys, while springs and rain collections is the main source for terraces and low mountains. Similarly, the main source for drinking water differs between urban areas, where public network is the main source, and rural areas, where wells with pumps are the main source. Those using unimproved drinking water sources **(**i.e. unprotected wells, unprotected rain collections, unprotected springs) are at higher risk of stunting and underweight compared to those who have access to improved drinking water sources **(**i.e. networks, and bottled water).

Regarding sanitation, still more than one in five households is using open space for defecation. Occurrence differs significantly by agro-ecological zone, with the most frequent use of open space for defecation in the terraces and low mountains and the lowest in coast and coastal zones. Occurrence also differs between urban/rural residents. Using open space defecation was found to be associated with higher prevalence of acute malnutrition (33.0% vs. 27.7%, X^2 6.8, P <0.01 df 1), and higher overall morbidity (80.9% vs. 76.5%, X^2 5.6, P <0.05 df 1). Although the prevalence of diarrhoea is also higher among those use open space, this difference is slightly below the significant level.

More than two thirds of households throw garbage in open spaces. This, too, differs significantly by agro-ecological zone: the highest percentage of throwing garbage in open spaces was found in terraces and low

mountains, whereas the lowest percentage was found in coast/coastal zones. Similarly, throwing garbage in open spaces is also higher among rural residents. Throwing garbage in open spaces was found to be associated with higher prevalence of stunting and underweight, but not with acute malnutrition. It was also found to be significantly associated with fever, which may indicates environmental pollution with its possible negative impact on child health.

Finally, the under-five mortality rate was found to be in the acceptable range (i.e. <1.0/10,000/day). Diarrhoea was the leading cause of death, followed by fever and ARI.

RECOMMENDATIONS

The fact that the prevalence of acute malnutrition in Al Hodeidah governorate is high above the critical emergency threshold (≥15) indicates a need for an integrated response with both shorter term (to avert malnutrition-related death) and longer term mechanisms (to enhance nutrition in order to reduce incidence of malnutrition). Thus, the following recommendations should be considered:

1- Expand the Community-based Management of acute malnutrition to cover both severe and moderate acute malnutrition, through the establishment of OTPs in all operational health facilities, along with the establishment of outreach/mobile services and supplementary feeding Program (SFPs) for moderate malnutrition.
2- Strengthen and institutionalize capacity for routine nutrition surveillance activities into government and community structures.
3- In view of the high magnitude of moderate acute malnutrition, particularly in the 0-24 month age group, appropriate blanket feeding should be provided in order to prevent the deterioration of their nutritional status to SAM, as well as towards chronic malnutrition.
4- Due to the very low exclusive breastfeeding rate and the limited food diversity found in this survey, there is a need to launch innovative IYCF community-based approaches promoting breast feeding and reinforcing education for mothers; education should focus on how to feed the child, and the importance of proper complementary feeding for combating malnutrition and improving overall child health, which has been shown to be a problem in Al Hodeidah.
5- In view of high level of acute malnutrition, and as food insecurity has been found to be a problem, there may be a need to consider radical strategies like blanket supplementation rather than targeting in order to ensure food aid adequacy (content and quantity). It is also crucial to investigate feasible cost-effective means through long-term food security interventions. This should entail relevant inputs that reflect livelihood options (e.g. crop production, labor, fishing etc.) along with monitoring food access, prices, and market availability of essential commodities (rice, oil, vegetables and sugar).
6- Strengthen routine immunization (especially measles vaccination) and vitamin A supplementation, in order to reach the target of above 90% and 80% respectively. Furthermore, due to the wide gap that exists between measles vaccination coverage and vitamin A supplementation in spite of the concurrent

delivery policy, there is a need to advocate for enforcing such a policy through appropriate training, micro planning and supervision.

7- Given the important associations found between WASH, malnutrition and children's overall health, it may worth considering conducting a WASH-nutrition/health linkage study in order to obtain a better understanding of the underlying causes/associations, and to design optimal WASH interventions.

8- The nutrition, health and food security situation in Al Hodeidah should be monitored on a regular basis (e.g. bi-yearly) until rates of GAM are below the WHO ≥ 15% critical emergency threshold.

9- Hygiene promotion to improve hygiene practices: washing of hands at least at 3 critical times (that is before eating, after defecation and before preparing food).

10- Water safety: public network to be monitored for residual chlorine, household water storage to be monitored. Wherever necessary water safety must be promoted. This can be achieved through chlorination at different levels, and by promoting household purification techniques such as boiling, filtration, etc.

11- Proper disposal of faeces and garbage: faeces disposal is important, and especially so when it comes to infants and children. Humanitarian actors (new partners plus UNICEF) will be encouraged to address it in their project design (please note that in Hodeidah governorate, the WASH cluster does not have active and operating actors other than UNICEF).

1. Introduction

The Al Hodeidah governorate is located on the Red Sea coast, and also includes 112 islands (see annex 1). At 21,000sq km, it is Yemen's seventh largest governorate by area, and the second largest by population (2.15 million[1]). About two thirds of its population is rural.

Administratively, the governorate has 26 districts, 135 sub-districts and 2,304 villages. it Itis part of the Tehama coastal plains that lie between the mountains and the Red Sea. It is bordered by Saudi Arabia and the Gulf of Aden. The climate is sub-tropical with hot summers (40^0C) and moderate winters (24^0C).

The governorate has a huge potential for investments in agriculture, livestock and fisheries. It is considered among the most important agricultural locations in Yemen. The agriculture sector supports a wide range of production, including maize, cotton, barely, sesame, beans, tobacco, tomato, cucumber, watermelon, okra, palm, mango, banana, onion, musk, peppers, sweet potato, guava, lemon, limes, Arabian jasmine, and henna. Animal husbandry and fishing are also important economic activities and offer potential for growth. Cattle, sheep, goats and camels are widely reared, while fish and shrimps are caught from the sea. However, much produce is exported from the region and salaries are low, leaving little net benefit for its population.[2]

Despite such comparative advantages and the opportunities to support local livelihoods, poverty is widespread. About 32% of Hodeidah's population live below the national poverty line (36% in rural areas), and 11% live below the national food poverty line (13% in rural areas).[2]

The Tehama Development Authority and FAO have divided Al Hodeidah Governorate into four agro-ecological zones, based on rainfall, soil type, ecological characteristics, and the main livelihood activities observed there.[2] Table 1.1 shows the main characteristics of the four zones:[2]

[1] Central Statistical Organisation of Yemen. Population, Housing and Establishment. Census 2004 First Report. Yemen: CSO; 2007.
[2] MoPIC. Food Security Baseline Survey 2010. Governorate of Al Hodeidah. Central Statistical Organisation, Government of Yemen. March 2011

Table 1.1 Agro-ecological zones of Al Hodeidah governorate

Zone	***Name of the zone***	***Main characteristics***
I	Coast and coastal plain	• Strip of land, 150 km long and 10 – 20 km wide along the Red Sea • Annual rainfall between 10 and 200 mm • The soils are mainly poor to very poor, except the inner *waadis* (valleys) soils, and are not very favorable to agriculture • The main activities are fisheries and industry, and salt production; agriculture and livestock are secondary (pasture and arboriculture)
II	Plains and valleys	• Plain zone with average annual rainfall between 200 and 250 mm • Soil characteristics are more favorable to cereal and vegetable production • This zone is crossed by seven large valleys that provide surface and underground water for irrigated agriculture • The main activities of the population are agriculture (irrigation and rainfall) and animals breeding
III	Sandy plains and valleys	• This zone is similar to the above, but annual rainfall averages 250 to 400 mm • The valleys that cross the land play an important role in surface and underground water supply for agriculture and livestock • The main activities in this zone, beyond seasonal cereal and vegetable cropping, are cash crops such as tobacco, flowers, and fruits
IV	Terraces and low mountains	• Region of mountains with annual rainfall between 450 and 700 mm • The type of soils and the reinforcements allow development of terrace cultivation which is mainly of cash crops, such as coffee and *qat*. Also some animal and bee breeding.

1.1 RATIONALE FOR THE SURVEY

The findings from a recent Nutrition Survey[3] in Hajjah governorate, which borders on Al Hodeidah, show a GAM rate (Based on WHO 2006 Growth Standards) of 31.4% [95% C.I 29.0 – 33.7] and SAM 9.1% [95% C.I: 7.6-10.5], which far exceeds the WHO recommended emergency threshold, requiring immediate emergency interventions. By virtue of geographical proximity, there was need to determine the nutrition situation in Al Hodeidah.

One of the main recommendations of the Hajjah survey was that updates on nutritional status of U5 children in the different parts of the country be encouraged, in order to quickly identify and respond to evolving emergencies. The MoPHP therefore requested UNICEF to support a survey in Al Hodeidah governorate, to assess the current nutritional status of the U5 children.

1.2 SURVEY OBJECTIVES

1.2.1 General Objectives

- To establish the prevalence of malnutrition among U5 children in Al Hodeidah governorate and its health and IYCF determinants
- To identify appropriate interventions to correct malnutrition in affected populations

1.2.2 Specific Objectives

- To assess prevalence of underweight, wasting and stunting among U5 children in the four agro-ecological zones of Al Hodeidah governorate
- To identify health and nutrition underlying causes for malnutrition with a particular focus on IYC feeding practices for initiating corrective actions
- To assess the criticality level of U5 mortality

[3] UNICEF. Nutrition Survey among U5 Children and Women of Childbearing Age in Three Districts in Hajjah Governorate, Yemen. July 2011.

2. Methodology

The survey was designed mainly to determine the nutritional status and mortality in the age group of under-five. It also explored some nutritional status determinants such as feeding practices, morbidity, measles vaccination, coverage of intervention services (like vitamin A supplementation), and household water, sanitation, and hygiene situation.

A cross-sectional, two-stage cluster survey was conducted where Al Hodeidah governorate was divided in four agro-ecological zones (4 strata). The frame used is the projection of the CSO 2004 census.[4]

2.1 PREPARATORY STEPS

Preparation started with sampling; thereafter, draft questionnaires and forms were prepared and shared within a group representing MoPHP and UNICEF at both central and governorate level, and with the survey consultant. Questionnaires and forms were updated during training and after a pre-test survey.

2.2 SAMPLING

When nutrition status is the only parameter to be measured, the most commonly advised method is 30 × 30. This study has examined 30 children from 30 clusters in each of the four strata (agro-ecological zones) - 3600 children in total. This method assures equal values of *p*, *q*, design effect of not less than 2, confidence limits of not more than 5%, and rejection and absence of more than 15%.

The average number of under-five children in the household was not clear enough to determine the number of households in the sample. The projection provided by the CSO office in Al Hodeidah show that average under-five children ranged from 0.76 in stratum IV to 1.08 in strata I, II and III. However, the most accurate data collected through the EPI programme show that the average numbers are 1.27, 1.5, 1.51 and 1.39 in stratum I, II, III and IV respectively. As a result, it was decided that a number of 25 households in each cluster should be surveyed, and the average number of children in the household should be monitored on a daily basis. The daily monitoring showed an average number of under-five children in the household ranging between 1.38 – 1.82, with an average of 1.54. The total number of 3000 households was found to be sufficient as a basis for an under-five mortality estimate – which was added as a second main objective of this survey.

As mentioned above, Al Hodeidah was divided into four strata based on the agro-ecological division that is used by CSO for *Food Security Baseline Survey 2010*. These zones are:

1. Coast and coastal plain: includes districts of Al Luhaiah, Kamaran, Al Saleef, Al Munirah, Addrehmi, Al Kwaka, Al Hwak, Al Mena, Al Hali and, Al Tahita

[4] Central Statistical Organisation of Yemen. Population, Housing and Establishment. Census 2004 First Report. Yemen: CSO; 2007.

2. Plains and valleys: includes districts of Az Zuhrah, Az Zaydiyah, Ad Dahi, Al Mrawiah, and Zabeed

3. Sandy plains and valleys: includes districts of Al Qanawis, Al Mighlaf, Bajil, As Sukhna, Al Mansuriyah, Bait Al Faqeh, Hays and Al Jarahi.

4. Terraces and low mountains: includes districts of Al Hajjaylah, Bura, and Jabel Raas

All villages and communities/ uzla of each stratum have been listed with the numbers of households in separate sampling frames. Then PPS manner was followed for random selection of 30 clusters for each stratum with overall all 120 clusters in the 4 strata. Although all districts were included in the sampling frames, some districts with relatively small populations did not appear in the sample. Selected clusters of the 4 strata are shown in the annex 2.

The selection of household within enumeration areas (clusters) in the second stage was made following random systemic sampling (walking method) using appropriate household interval that is well-explained during the training and in the survey methodology technical guideline (see annex 3). All U5 children in the randomly selected household were assessed. Household characteristics and data on mortality were also collected.

2.3 THE DATA COLLECTION METHODS

The method of data collection followed is using separate household and U5 children mortality, and child questionnaires (see annex 4). For the variable measured please refer to subheading 2.7: Variables Measured.

2.4 TRAINING AND SUPERVISION

Training was conducted for all survey team members based on the duties of each. Enumerators, team leaders and field supervisors (see annex 5) were trained for five days on assessing nutritional status, questionnaires, approaching the community, data quality and common possible errors in surveys, maintaining the survey tools etc. Two separate sessions were given for anthropometry measurement and on how to identify the date of birth and ages of the child using the Hijri calendar with calendar of events (e.g. Big Eid: Greater Bairam, Small Eid: Lesser Bairam, Holy Ramadan: fasting month etc.) and Gregorian calendars.

Twenty-four enumerators were trained. Before conducting the pre-test survey, all equipment and enumerators' skills were double checked to ensure consistency of the anthropometrical measurement using ENA for SMART. Based on such evaluation of enumerators, four were excluded due to inadequate accuracy.

Prior to the start of the data collection phase, an orientation and sensitization session was arranged for community leaders gathered from survey sites. It included presentation of the survey objectives and the mission of the whole survey team, roles expected from leaders, as well as clarification about possible expectations among communities.

2. 5 PILOT TESTING AND REVISION OF THE SURVEY TOOLS

Before the commencement of the actual survey, tools and methods were pre-tested and revised. A one-day pre-test survey was conducted, that included steps of sampling and data collection methods. This helped to ensure that the interviewers understood the questions and were able to follow the interview/data collection procedures as outlined in the survey protocol and during training. It also helped in having feedback about to what extent interviewees understood questions. Based on the pre-test survey and standardization during the training, one team member was excluded for not reaching the required quality level. All members met the following day to review and discuss the findings of the pre-test, logistic issues, questionnaires, difficulties based on the pre-test survey etc. Based on this pre-test and discussions, questionnaires and forms were finalized.

2.6 FIELD WORK AND QUALITY CONTROL

Ten teams (each composed of two female enumerators and a team head), backed up by three experienced field technical supervisors (see annex 5), finalized the data collection phase between 22 October and 4 November 2011.

Due to cultural and social considerations, the anthropometric measurements were done by female members. Field questionnaires were reviewed on site by team heads with random selection check by field supervisors including for data accuracy and completeness, before departure from the household. For each severely acute malnourished child, a referral form was filled and signed by the team head.

Throughout the field work, rigorous quality control measures were adopted. The scales was checked daily with known weights before starting the field work. Team heads checked questionnaires at the end of each day, identified errors and made sure data collected was correct before signing off. Technical supervisors checked every tenth questionnaire, identified errors and returned them to team heads for discussion and follow-up. Each team head was requested to complete and submit the cluster report on a daily basis, together with the completed questionnaires. Each team head also completed and submitted the data quality sheet that included some anthropometrical readings that were immediately entered and analyzed using ENA for SMART software (e.g. for plausibility checks on digital preference). Each team was informed before the following day about the quality of the data collected the day before.

Every night, there was a meeting between the field supervisors and team heads as well as the data entry team, making it possible to review the work done on that day, discuss common errors, avoid recurrences, and to plan for the next day.

2.7 VARIABLES MEASURED

The following are the main variables that were collected (see Annex 4):

For Household[5]

1- Household size and numbers of under-five children segregated per gender

2- Drinking water sources and the treatment manner (if any)

3- Toilet type and garbage disposal

4- Urban or rural: definition in accordance with 2004 Census classification[6].

I- For child

1- Child age[7] and gender

2- Anthropometrical measurements including length/height (cm), weight (kg), MUAC (cm), and bilateral oedema.

3- Child morbidity/symptoms of diarrhoea, ARI and fever during the last two weeks, and suspected measles during the last three months of the survey for children ≥9 months of age

4- Breastfeeding status with focus on exclusive breastfeeding for under-six months[8]

5- Coping strategies related to child meals including reduced meal size, reduced number of meals, child going to bed hungry

6- Timely start with complementary feeding for children aged 6 to 9 months

7- Complementary feeding diversification of young child (6 –23 months).

8- The measles vaccination status.

9- Vitamin A supplementation during the last six months.

II- For under-five mortality

One sheet to count all alive and died under-five children. The sheet is designed to collect the following data for each child:

1- Gender.

2- Date of birth: either in Hijri or Gregorian[9]

[5] For the purpose of this survey the household is defined as a place in which inhabitants share one kitchen or hearth, and where minimum one under-five child lives or has died within one year of the survey date.

[6] Central Statistical Organisation of Yemen. Population, Housing and Establishment. Census 2004 First Report. Yemen: CSO; 2007.

[7] For convenience, one focus training session delivered to improve the quality about collection of date of birth. Since people in Yemen as a typical Islamic country uses Hijri calendar as well Islamic events (e.g. Big Eid: Greater Bairam, Small Eid: Lesser Bairam, Holy Ramadan: fasting month etc.) to document and memorize their own events, it was optional to fill the cells of the date birth question with the Hijri or Grigorian date. The data entry database were designed to convert Hijri dates to Gregorian and to auto calculate the age.

[8] WHO, UNICEF, USAID, AED, FANTA, UCDAVIS, IFPRI. Indicators for assessing infant and young child feeding practices. World Health Organization, Geneva. 2010

3- Whether the child is still alive or not

4- If dead, then the death date (either in Hijri or Gregorian[9]), or the age in months at death, or the time passed since death

5- The reason of death

2.8 DATA MANAGEMENT AND OFFICE WORK

Four staff members worked on numbering the questionnaires with unique numbers, supplying teams with blank questionnaires and forms, receiving completed questionnaires and entering the data into the database on a daily basis. Data entry took place in a previously prepared double auto-checked Excel format sheets, simultaneously with the data collection. Data was entered the day after it was collected in the field. This allowed for the data to be immediately available for cleaning and analysis. Potentially problematic entries were then double checked by the encoders by referring to the hard copy questionnaires. Data cleaning was carried out in MS Excel by sorting records to filter out extreme values and to check logical errors. Consistency checks were run to detect and correct data entry errors.

The first step of the data cleaning was the verification of the uniqueness of the numbers of the four questionnaires and the correctness of the logical relatedness between these questionnaires to assure smooth linking between variables from different data sheets during the tabulation work. Frequency distributions were then performed on all key indicators to examine frequency of responses as well as to check for missing values.

Interpretation of anthropometrical measures using WHO Child Growth Standards was made and introduced to the child data sheet to identify flagged records and recheck the entered data of birth date or age, height, weight and MUAC.

Finally, after the completion of field work and data entry, data was re-checked by the Consultant, as a randomly selected 5% of all questionnaires were tested for errors and inconsistencies related to missing entries and feasibility/outliers. The percentage of mistakes in all checked questionnaires did not exceed 1%.

2.9 DATA ANALYSIS

Before launching the analysis process, anthropometrical z-score calculated by Anthro program (Department of Nutrition, WHO, Geneva, Switzerland) and sample weights were incorporated into the final clean dataset. The final clean data set was imported into the SPSS program (version 18.0; SPSS, Chicago IL USA). Data analysis was conducted in both Anthro and SPSS. Anthro was used to calculate nutrition z-scores for children based on the anthropometric measurements, using WHO standards as the reference value. Children

[9] As in Footnote 7.

with extreme z-score values were flagged off from the anthropometric analysis as ≤ −5 and ≥ +5 for weight for height, ≤ −6 and ≥ +5 for weight for age, and ≤ −6 and ≥ +6 for height for age. These results were then fed back into the integrated SPSS database and analyzed along with all other variables, including those on child health, food security etc. Data from household questionnaires and mortality questionnaires were also analyzed using the SPSS program. Tables of child and household in the dataset were linked when it was necessary work with variables from the two tables.

Subsequently, the point estimate of each stratum was done independently unweighted, but for the combined (governorate) estimate, the unweighted estimate means ignorance of differences between the four strata in a population which lead to either over or under estimate at the governorate level. To avoid this with this stratified cluster survey, the estimated weights were considered for analysis of each strata.

A statistical weighted variable was added to the survey dataset to contain weights for each stratum. For appropriateness, two weighting methods are used. The first sample weighting method is to take the percentage of the households in each stratum (PD) divided by the percentage of those surveyed in each stratum (SD). The second sample weighting method, is to divide the number of households in the population by the number surveyed at each stratum level[10]. Weights used are shown in the table 2.1.

Table 2.1 The stratified sample weights used

Stratum No	**Stratum Name**	**Number of households in the frame (*N*)**	**Population distribution *(PD)***	**Number of households in the sample (*n*)**	**Survey distri-bution *(SD)***	***PD/ SD***	***N/n***
1	Coast and coastal plain	112503	32.2	787	25.4	1.27	143
2	Plains and valleys	93384	26.8	797	25.7	1.07	117
3	Sandy plains and valleys	125834	36.0	750	24.2	1.45	168
4	Terraces and low mountains	17359	5.0	770	24.8	0.20	23

Cross tabulations were performed to examine relationships between binary variables. Chi-square tests was then performed to observe significance of the relationships between key variables.

2.10 DEFINITIONS USED

2.10.1 Definitions used for nutrition status in U5 children

In this nutrition survey the three forms of malnutrition traditionally known as protein energy malnutrition are defined independently as shown in Table 2.2. The WHO 2006 reference was used for purposes of

[10] Sullivan KM. Sampling for Epidemiologists. http://www.thehnts.org/useruploads/files/sampling7n.pdf

comparison with other data and for interpreting and analyzing the results for acute malnutrition in the emergency context, given the widely accepted thresholds for analysis based on the 2006 WHO growth standards.

Table 2. 2 Cut-off points and terminology used in classifying acute and chronic malnutrition in under- 5 children based on 2006 WHO Growth Standards

Indicator	*Z Score*	*Oedema*
Weight for Height		
Global Acute Malnutrition (GAM/Wasted)	< -2 SD &/or oedema	Present
Moderate Acute Malnutrition (MAM)	<-2 to ≥-3 SD	Absent
Severe Acute Malnutrition (SAM)	< -3 SD &/or Oedema	Present
Height for Age		
Stunting	< -2 SD	
Moderately Stunted	< -2 and ≥-3 SD	
Severely Stunted	< -3 SD	
Weight for Age		
Underweight	< -2 SD	
Moderately Underweight	< -2 and ≥-3 SD	
Severely Underweight	< -3 SD	

As described in data analysis, children with extreme z-score values were flagged off from the anthropometric analysis. Table 2.3 reflect the results by the four strata as well as for the overall sample and gives the mean z-scores, design effect, and excluded subjects.

Table 2.3 Mean z-scores, design effects, excluded subjects and valid children's number by strata and for overall sample

Agro-ecological zones	Indicator	N	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range	Valid children's number
Coast and coastal	Weight-for-Height	1159	-1.54±1.34	2.00	11	14	1134
	Weight-for-Age	1159	-2.23±1.31	2.00	4	7	1148
	Height-for-Age	1159	-2.04±1.86	2.00	3	18	1138
Plain and valleys	Weight-for-Height	1229	-1.63±1.27	2.00	21	12	1196
	Weight-for-Age	1229	-2.34±1.19	2.00	14	3	1212
	Height-for-Age	1229	-2.13±1.62	2.00	15	11	1203
Sandy plains and valleys	Weight-for-Height	1181	-1.54±1.29	2.00	8	14	1159
	Weight-for-Age	1181	-2.34±1.24	2.00	7	6	1168
	Height-for-Age	1181	-2.21±1.63	2.00	7	17	1157
Terraces and low mountains	Weight-for-Height	1099	-1.15±1.27	2.00	6	5	1088
	Weight-for-Age	1099	-2.27±1.25	2.00	3	2	1094
	Height-for-Age	1099	-2.52±1.55	2.00	1	17	1081
Overall sample	Weight-for-Height	4668	-1.47±1.31	2.00	46	45	4577
	Weight-for-Age	4668	-2.30±1.25	2.00	28	18	4622
	Height-for-Age	4668	-2.22±1.68	2.00	26	63	4579

* Contains for WHZ and WAZ the children with oedema.

2.10.2. Definition of food diversification

Food diversification for the 6-23 months age group was assessed using the seven food group score for the *Minimum dietary diversity indicator* from FANTA 2007,[11] and was calculated as the proportion of children 6-23 months of age who receive food from four or more food groups during the previous day (Table 2.4). The seven food groups used for calculation of this indicator are:

1. Grain, roots, tubers
2. Legumes and nuts
3. Dairy products (milk, yogurt, cheese)
4. Flesh foods (meat, fish poultry and liver/organ meats)
5. Eggs
6. Vitamin-A rich fruits and vegetables
7. Other fruits and vegetables

[11] FANTA; Generating indicators of appropriate feeding of children 6 through 23 months from the KPC 2000+; by Mary Arimond and Marie T. Ruel, November, 2003

Table 2.4 Definition of food diversification through using the *Minimum dietary diversity indicator*

Food diversification group	*Minimum dietary diversity indicator cut points*
Poor	< 4
Good	≥4

2.11 U5 MORTALITY CALCULATION

The U5 Death Rate (DR) was calculated using the following formula[12].

$$0\text{–}5\ DR = \frac{\text{Number of deaths of children 0–5 years}}{\frac{\text{Population of children 0–5}}{10{,}000} \times \text{Time interval}} = \text{Death/10,000 day}$$

U5 mortality rates can be interpreted according to the following reference:

-Under-five mortality rates >= 2 deaths/10,000/day indicate a situation of alert

-Under five mortality rate >=4 deaths/10,000 children/day indicate an emergency

[12] Measuring Mortality, Nutritional Status, and Food Security in Crisis Situations: SMART METHODOLOGY. Version 1 April 2006.

3. Results

The overall characteristics of the sample population are shown in Table 3.1.

Table 3.1 Total sampled population by agro-ecological zone

Agro-ecological zones	Household % (n)	U5 Children % (n)
Coast and coastal	25.3 (787)	24.8 (1159)
Plain and valleys	25.7 (797)	26.3 (1229)
Sandy plains and valleys	24.2 (750)	25.3 (1181)
Terraces and low mountains	24.8 (770)	23.6 (1099)
Total	100 (3104)	100 (4668)

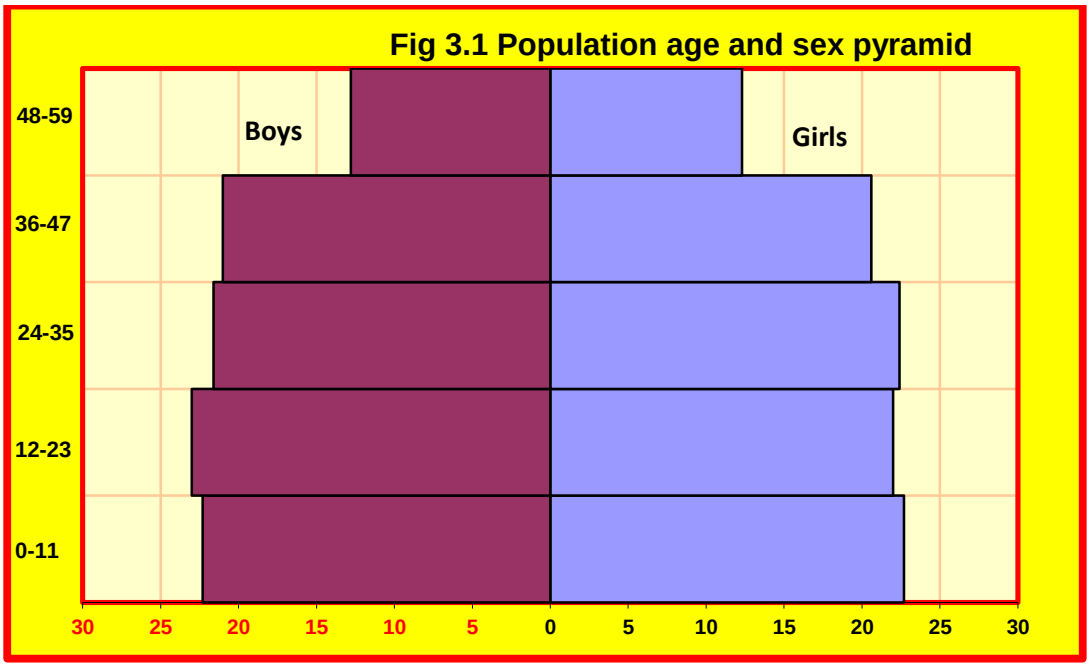
3.1 CHARACTERISTICS OF THE POPULATION SAMPLE GROUPS

The age distribution of the measured children is presented on the table 3.2 below. The sex ratio indicates that boys and girls were equally represented and there was no bias in terms of sampling girls or boys.

Table 3.2 Distribution of age and sex of sample

Age groups by months	***Boys***		***Girls***		***Total***		***Ratio***
	no.	***%***	***no.***	***%***	***no.***	***%***	***Boy : girl***
< 6	305	12.3	276	12.6	581	12.5	1.1
6-11	248	10.0	220	10.1	468	10.0	1.1
12-23	570	23.0	481	22.0	1051	22.5	1.2
24-35	521	21.6	489	22.4	1010	21.6	1.1
36-47	522	21.0	451	20.6	973	20.8	1.2
48-59	317	12.8	268	12.3	585	12.6	1.2
Total	**2483**	**53.2**	**2185**	**46.8**	**4668**	**100**	**1.1**

The U5 population age and sex pyramid shows that half of the samples are in age groups 12-35 months (Fig 3.1). Older children (48-59 months) were slightly less represented, accounting for 12.6 percent of all sampled children.



3.2 ANTHROPOMETRIC RESULTS

Valid anthropometric and health data was obtained from 4577 U5 children for WHZ, 4622 U5 children for WAZ, and 4579 U5 children for HAZ (see Table 2.3). Furthermore, it is important to notice that as the estimate weights were considered for analysis (see methodology section, table 2.1), the sample size "*n*" presented in the analysis tables is the weighted sample size, which is different from the actual sample size (see Table 2.3 for the actual numbers of children).

3.2.1 Acute malnutrition based on weight-for-height z-scores

The overall prevalence of global, moderate and severe acute malnutrition based on weight-for-height z-scores (and/or oedema) by agro-ecological zone is shown in table 3.3.

The overall prevalence of SAM, MAM and GAM (9.9%, 21.8%, and 31.7%) it differs significantly between zones. While SAM prevalence is highest in plain and valleys zone – at 10.3% – it is the lowest in the terraces and low mountains: 6.3% (X^2 18.7, P < 0.01, df 6). Similarly for GAM, prevalence is highest in plain and valleys zone: 34.3%, it is lowest in the terraces and low mountains: 20.7% (X^2 18.2, P < 0.0001, df 3).

Table 3.3 Prevalence of acute malnutrition based on weight-for-height z-scores and/or oedema (WHO 2006 Growth Standards) by agro-ecological zone

Indicator	All (n =4637)	Coast and coastal (n = 1440)	Plain and valleys (n = 1243)	Sandy plains and valleys (n = 1726)	Terraces and low mountains (n = 228)
Prevalence of global acute malnutrition (<-2 z-score and/or oedema) **	31.7% (1468) (95% C.I.: 31.5-31.8)	32.5% (468) (95% C.I.: 32.2-32.7)	34.3% (426) (95% C.I.: 34.0-34.5)	30.5% (528) (95% C.I.: 30.3-30.8)	20.7% (47) (95% C.I.: 20.1-21.2)
Prevalence of moderate acute malnutrition (<-2 z-score and >=-3 z-score, no oedema) *	21.8% (1012) (95% C.I.: 21.7-21.9)	22.4% (323) (95% C.I.: 22.2-22.6)	24.0% (298) (95% C.I.: 23.8-24.2)	20.7% (358) (95% C.I.: 20.5-20.9)	14.4% (33) (95% C.I.: 13.9-14.9)
Prevalence of severe acute malnutrition (<-3 z-score and/or oedema) *	9.9% (456) (95% C.I.: 9.8-10.0)	10.1% (145) (95% C.I: 9.9-102)	10.3% (128) (95% C.I.: 10.1-10.4)	9.8% (170) (95% C.I.: 9.7-10.0)	6.3% (14) (95% C.I: 5.9-6.6)

* Significance difference (P< 0.01) ** Significance difference (P< 0.0001)

There were only 7 (0.1%) cases with oedema, with 3 each in the coast/coastal and plain/valleys zones, one in sandy planes/valleys, and none in terraces and low mountains.

The prevalence of acute malnutrition by urban/rural resident is given in table 3.4. Both SAM and GAM are significantly higher in rural than urban areas: 10.1% vs. 9.1% and 32.8% vs. 28.7% (X^2 7.8, P < 0.05, df 2, X^2 7.7, P < 0.01, df) respectively.

Table 3. 4 Prevalence of acute malnutrition based on weight-for-height z-scores and/or oedema (WHO 2006 Growth Standards) by resident group

Indicator	Urban (n = 1349)	Rural (n = 3290)
Prevalence of global acute malnutrition (<-2 z-score and/or oedema) **	28.7% (387) (95% C.I.: 28.5-28.9)	32.8% (1081) (95% C.I.: 32.7-33.0)
Prevalence of moderate acute malnutrition (<-2 z-score and >=-3 z-score, no oedema) *	19.6% (264) (95% C.I.: 19.4-19.8)	22.7% (748) (95% C.I.: 22.6-22.9)
Prevalence of severe acute malnutrition (<-3 z-score and/or oedema) *	9.1% (123) (95% C.I.: 9.0-9.3)	10.1% (333) (95% C.I.: 10.0-10.2)

* Significance difference : P < 0.05 ** Significance difference : P < 0.01

The prevalence of acute malnutrition by gender is given in table 3.5. Both SAM and GAM prevalence are significantly higher among boys than girls 11.2% vs. 8.3% and 34.0% vs. 28.9 (X^2 17.0, P < 0.0001, df 2, X^2 13.9, P < 0.0001, df 1) respectively.

Table 3.5 Prevalence of acute malnutrition based on weight-for-height z-scores and/or oedema by gender

Indicator	Boys (n = 2481)	Girls (n = 2158)
Prevalence of global acute malnutrition (<-2 z-score and/or oedema)	34.0% (845) (95% C.I.: 33.9-34.2)	28.9% (624) (95% C.I.: 28.7-29.1)
Prevalence of moderate acute malnutrition (<-2 z-score and >=-3 z-score, no oedema)	22.8% (567) (95% C.I.: 22.7-23.0)	20.6% (445) (95% C.I.: 20.5-20.8)
Prevalence of severe acute malnutrition (<-3 z-score and/or oedema)	11.2% (278) (95% C.I.: 11.1-11.3)	8.3% (179) (95% C.I.: 8.2-8.4)

* Significance difference (P< 0.0001)

The breakdown of acute malnutrition by age based on weight-for-height z-scores and/or oedema is given in table 3.6. The difference between groups for SAM and GAM is highly significant (X^2 174.0, P < 0.0001, df 10, X^2 154.9, P < 0.0001, df 5 respectively) with the highest prevalence in under 2 years age group.

Table 3.6 Prevalence of acute malnutrition based on weight-for-height z-scores and/or oedema (WHO 2006 Growth Standards) by age group

		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Global malnutrition (<-2 z-score and/or oedema)	
Age (months)	***Total no.***	***No.***	***%***	***No.***	***%***	***No.***	***%***
< 6	535	69	12.9	92	17.2	161	30.1
6-11	443	76	17.2	138	31.2	214	48.4
12-23	1049	139	13.3	296	28.2	435	41.5
24-35	1022	73	7.1	192	18.8	265	25.9
36-47	993	60	6.0	181	18.2	241	24.2
48-59	599	40	6.7	113	18.9	153	25.6

* Significance difference (P< 0.0001)

3.2.2 Underweight prevalence based on weight-for-age z-scores

The overall prevalence of underweight based on weight-for-age z-scores by zone is are shown in table 3.7. Underweight is highest in plain and valleys: 62.6% and lowest in terraces and low mountains: 57.9% (X^2 14.7, P < 0.01, df 3).

Table 3.7 Prevalence of underweight based on weight-for-age z-scores (WHO 2006 Growth Standards) by agro-ecological zone

Indicator	All (n = 4688)	Coast and coastal (n = 1458)	Plain and valleys (n = 1260)	Sandy plains and valleys (n = 1740)	Terraces and low mountains (n = 230)
Prevalence of underweight (<-2 z-score) **	59.6% (2794) (95% C.I.: 59.5-59.7)	55.9% (814) (95% C.I.: 55.6-56.1)	62.6% (789) (95% C.I.: 62.4-62.9)	60.8% (1058) (95% C.I.: 60.6-61.0)	57.9% (133) (95% C.I.: 57.3-58.4)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score) *	32.9% (1544) (95% C.I.: 32.8-33.1)	30.7% (447) (95% C.I.: 30.4-30.9)	35.1% (442) (95% C.I.: 34.8-35.3)	33.5% (583) (95% C.I.: 33.3-33.7)	31.3% (72) (95% C.I.: 30.6-31.8)
Prevalence of severe underweight (<-3 z-score) *	26.7% (1250) (95% C.I.: 26.6-26.8)	25.2% (367) (95% C.I.: 25.0-25.4)	27.5% (347) (95% C.I.: 27.3-27.8)	27.3% (475) (95% C.I.: 27.1-27.5)	26.6% (61) (95% C.I: 26.1-27.2)

* Significance difference (P< 0.05) ** Significance difference (P< 0.01)

The prevalence of underweight by urban/rural resident is given in table 3.8. The prevalence of underweight is significantly higher in rural areas (61.7%) than in urban areas (54.4%) (X^2 21.2, P < 0.0001, df 1).

Table 3.8 Prevalence of underweight based on weight-for-age z-scores (WHO 2006 Growth Standards) by resident group

Indicator	Urban (n = 1359)	Rural (n = 3331)
Prevalence of underweight (<-2 z-score)	54.4% (740) (95% C.I.: 54.2-54.7)	61.7% (2055) (95% C.I.: 61.6-61.9)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	32.7% (445) (95% C.I.: 32.5-33.0)	33.0% (1099) (95% C.I.: 32.8-33.1)
Prevalence of severe underweight (<-3 z-score)	21.7% (295) (95% C.I.: 21.5-21.9)	28.7% (956) (95% C.I.: 28.6-28.9)

* Significance difference (P< 0.0001)

The breakdown of underweight by gender based on weight-for-age z-scores is given in table 3.9. Although the underweight is slightly higher in boys than girls, the difference is statistically insignificant.

Table 3.9 Prevalence of underweight based on weight-for-age z-scores (WHO 2006 Growth Standards) by gender

Indicator	Boys(n = 2503)	Girls(n = 2186)
Prevalence of underweight (<-2 z-score)	60.2% (1507) (95% C.I.: 60.0-60.4)	58.0% (1288) (95% C.I.: 58.7-59.1)

Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	33.2% (830) (95% C.I.: 33.0-33.3)	32.7% (714) (95% C.I.: 32.5-32.9)
Prevalence of severe underweight (<-3 z-score)	27.0% (677) (95% C.I.: 26.9-27.2)	26.3% (574) (95% C.I.: 26.1-26.4)

Table 3.10 gives the prevalence of underweight by age. Underweight significantly differs between age groups, with the highest prevalence among 6-11 months age group and lowest among < 6 months (65.2% vs. 44.1%, (X^2 77.8, P < 0.0001, df 5).

Table 3.10 Prevalence of underweight based on weight-for-age z-scores (WHO 2006 Growth Standards) by age group

		Severe underweight (<-3 z-score) *		**Moderate underweight (>= -3 and <-2 z-score) ***		**Underweight* malnutrition (<-2 z-score) ****	
Age (months)	***Total no.***	***No.***	***%***	***No.***	***%***	***No.***	***%***
< 6	547	96	17.6	145	26.5	241	44.1
6-11	451	154	34.1	140	31.0	294	65.1
12-23	1058	358	33.8	323	30.5	681	64.3
24-35	1027	278	27.1	333	32.4	611	59.5
36-47	999	230	23.0	347	34.7	577	57.7
48-59	606	135	22.3	255	42.1	390	64.4

* Significance difference (P< 0.0001)

3.2.3 Stunting Malnutrition based on height-for-age z-scores

The overall prevalence of stunting based on height-for-age z-scores by individual zone is shown in table 3.11. Stunting is highest in the terraces and low mountains (64.0%), and lowest in coast and coastal zones (48.9%) (X^2 33.1, P < 0.0001, df 3).

Table 3.11 Prevalence of stunting based on height-for-age z-scores (WHO 2006 Growth Standards) by agro-ecological zone

Indicator	**All (n=4649)**	**Coast and coastal (n = 1445)**	**Plain and valleys (n = 1252)**	**Sandy plains and valleys (n = 1725)**	**Terraces and low mountains (n = 227)**
Prevalence of stunting (<-2 z-score)	54.5% (2533) (95% C.I.: 54.3-54.6)	48.9% (706) (95% C.I.: 48.6-49.1)	55.0% (689) (95% C.I.: 54.8-55.3)	57.6% (993) (95% C.I.: 57.4-57.8)	64.0% (145) (95% C.I.: 63.4-64.6)
Prevalence of moderate stunting (<-2 z-score and >=-3	27.9% (1299) (95% C.I.:	24.9% (359) (95% C.I.:	28.3% (355) (95% C.I.:	30.1% (519) (95% C.I.:	29.0% (66) (95% C.I.:

z-score)	27.8-28.1)	24.7-25.1)	28.1-28.6)	29.9-30.3)	28.5-29.6)
Prevalence of severe stunting (<-3 z-score)	26.6% (1234) (95% C.I.: 26.4-26.7)	24.0% (347) (95% C.I.: 23.8-24.2)	26.7% (334) (95% C.I.: 26.7-26.9)	27.5% (474) (95% C.I.: 27.3-27.7)	35.0% (79) (95% C.I: 34.4-35.6)

* Significance difference (P< 0.0001)

The prevalence of stunting by urban/rural resident is given in table 3.12. The prevalence of underweight is significantly higher in rural areas (56.5%) than in urban areas (49.6%) (X^2 18.0, P < 0.0001, df 1).

Table 3.12 Prevalence of stunting based on height-for-age z-scores (WHO 2006 Growth Standards) by resident group

Indicator	Urban (n = 1346)	Rural (n = 3301)
Prevalence of stunting (<-2 z-score) **	49.6% (668) (95% C.I.: 49.4-49.9)	56.5% (1864) (95% C.I.: 56.3-56.6)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score) *	26.1% (351) (95% C.I.: 25.9-26.3)	28.7% (947) (95% C.I.: 28.5-28.8)
Prevalence of severe stunting (<-3 z-score) **	23.5% (317) (95% C.I.: 23.3-23.7)	27.8% (917) (95% C.I.: 27.6-27.9)

* Significance difference (P< 0.0001)

Table 3.13 gives the prevalence of stunting by gender. The prevalence of stunting is significantly higher in boys than girls: 56.4 vs. 52.4% (X^2 7.3, P < 0.01, df 1).

Table 3.13 Prevalence of stunting based on height-for-age z-scores (WHO 2006 Growth Standards) by gender

Indicator	Boys (n = 2474)	Girls (n = 2174)
Prevalence of stunting (<-2 z-score) **	56.4% (1394) (95% C.I.: 56.1-56.5)	52.4% (1139) (95% C.I.: 52.2-52.6)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score) *	28.6% (707) (95% C.I.: 28.4-28.7)	27.2% (592) (95% C.I.: 27.0-27.4)
Prevalence of severe stunting (<-3 z-score) *	27.8% (687) (95% C.I.: 27.6-27.9)	25.2% (547) (95% C.I.: 25.0-25.3)

* Significance difference (P< 0.05) ** Significance difference (P< 0.01)

The breakdown of stunting by age group based on weight-for-age z-scores is given in table 3.14. Stunting has been noticed to increase remarkably after the first year of age. Such difference between groups is highly significant (X^2 264.3, P < 0.0001, df 5).

Table 3.14 Prevalence of stunting based on height-for-age z-scores (WHO 2006 Growth Standards) by age group

		Severe stunting (<-3 z-score) *		Moderate stunting (>= -3 and <-2 z-score) *		Stunting malnutrition (<-2 z-score) **	
Age* (months)	***Total no.***	***No.***	***%***	***No.***	***%***	***No.***	***%***
< 6	542	50	9.2	81	14.9	131	24.1
6-11	448	88	19.6	119	26.6	207	46.2
12-23	1050	336	32.0	311	29.6	647	61.6
24-35	1023	341	33.3	283	27.7	624	61.0
36-47	986	251	25.5	311	31.5	562	57.0
48-59	600	168	28.0	194	32.3	362	60.3

* Significance difference (P< 0.0001)

3. 3 CHILDREN'S HEALTH

3. 3.1 Overall morbidity

Around three out of four children suffered from one or more of the three morbidities – i.e. diarrhoea, ARI, fever – in the two weeks preceding the survey. However, the overall morbidity did not significantly differ across the agro-ecological zones or by urban/rural resident.

3. 3.2 Symptoms breakdown

The overall prevalence of symptoms and individual zone prevalence is shown in table 3.15. While diarrhoea, fever (which was taken as a proxy for infection), and suspected measles significantly differ by zone (with the highest prevalence in terraces and low mountains), ARI did not.

Table 3.15 Symptom breakdown in the U5 children in the two weeks* preceding the survey, by agro-ecological zone

Indicator	All	Coast and coastal	Plain and valleys	Sandy plains and valleys	Terraces and low mountains	Significance level
Diarrhoea	45.4% (2148)	43.3% (636)	47.6% (607)	44.4% (781)	53.9% (124)	x^2: 12.7, P< 0.01, df 3
ARI	64.1% (3039)	62.3% (917)	64.7% (826)	64.9% (1141)	67.1% (155)	P >0.05
Fever	57.7% (2731)	55.6% (818)	56.9% (727)	58.5% (1027)	69.1% (159)	x^2: 15.8, P< 0.01, df 3
Suspected measles**	2.5% (99)	3.6% (46)	2.8% (30)	1.1% (16)	3.8% (7)	x^2: 20.9, P< 0.0001, df 3

* Except for suspected measles in the prior 3 months

****** Only for children ≥ 9 months of age

The symptom breakdown by urban/rural resident is given in table 3.16. Only fever (which was taken as a proxy for infection), and suspected measles are significantly higher in rural areas.

Table 3. 16 Symptom breakdown in the U5 children in the two weeks* preceding the survey, by resident group

Indicator	Urban	Rural	Significance level
Diarrhoea	47.2% (643)	44.6% (1505)	P >0.05
ARI	66.2 % (903)	63.3% (2136)	P >0.05
Fever	54.3% (740)	59.0 (1990)%	x^2: 9.0, P< 0.01, df 1
Suspected measles**	0.9% (11)	3.1% (88)	x^2: 16.5, P< 0.0001, df 1

* Except for suspected measles in the prior 3 months

****** Only for children ≥ 9 months of age

The prevalence of different symptoms by gender is given in table 3.17. Only ARI and suspected measles are significantly higher in boys than girls.

Table 3.17 Symptom breakdown in the U5 children in the two weeks* preceding the survey, by gender

Indicator	Boys	Girls	Significance level
Diarrhoea	45.9% (1158)	44.8% (1221)	P >0.05
ARI	65.5 % (1653)	62.6% (1386)	x^2: 4.1, P< 0.05, df 1
Fever	56.7% (1432)	58.7% (1298)	P >0.05
Suspected measles**	3.0% (63)	1.9% (36)	x^2: 4.4, P< 0.05, df 1

***** Except for measles in the prior 3 months

****** Only for children ≥ 9 months of age

Table 3.18 shows symptoms breakdown by age groups. All morbidities are highest among 6-23 months bracket.

Table 3.18 Symptom breakdown in the U5 children in the two weeks* preceding the survey, by age group

Indicator	< 6	6-11	12-23	24-35	36-47	48-59	Significance level
Diarrhoea	38.3% (217)	57.5% (261)	56.8% (610)	45.8% (471)	38.5% (385)	33.4% (204)	x^2: 149.8, P< 0.0001, df 5.

ARI	51.9% (294)	68.7% (312)	68.0% (730)	65.9% (678)	62.2% (624)	65.5% (401)	x^2: 51.7, P< 0.0001, df 5
Fever	49.7% (282)	68.3% (310)	64.5% (693)	58.1% (597)	52.7% (528)	52.4% (320)	x^2: 73.5, P< 0.0001, df 5
Suspected measles**		3.4% (10)	3.0% (32)	1.8% (19)	2.1% (21)	2.8% (17)	P >0.05

***** Except for measles in the prior 3 months

****** Only for children ≥ 9 months of age

3.3.3 Measles vaccination and vitamin A supplementation coverage

Table 3.19 shows that measles vaccination and vitamin A supplementation coverage by zone. Where the overall coverage is 74.2% and 32.6% respectively and the highest coverage in coast and coastal and low in terraces and low mountains.

Table 3.19 Measles vaccination and vitamin A supplementation coverage in children 9 - 59 months, by agro-ecological zone

Indicator	All	Coast and coastal	Plain and valleys	Sandy plains and valleys	Terraces and low mountains	Significance level
Measles vaccination	74.2 (2948)	76.4% (964)	72.1% (758)	74.6% (1101)	67.9% (125)	x^2: 9.4, P< 0.05, df 3.
Vitamin A supplementation	32.6 (1297)	39.4% (498)	32.4% (341)	26.9% (398)	32.6% (60)	x^2: 48.3, P< 0.0001, df 3.

The coverage is also is significantly higher in urban than rural areas (Table 3.20).

Table 3.20 Measles vaccination and vitamin A supplementation coverage in children 9 - 59 months, by resident group

Indicator	Urban	Rural	Significance level
Measles vaccination	79.2% (937)	72.5% (2052)	x^2: 20.0, P< 0.0001, df 1.
Vitamin A supplementation	42.7 % (506)	28.1% (794)	x^2: 81.6, P< 0.0001, df 1.

Table 3.21 shows that there is no gender difference in coverage with measles vaccination or Vitamin A supplementation.

Table 3. 21 Measles vaccination and vitamin A supplementation coverage in children 9 - 59 months, by gender

Indicator	Boys	Girls	Significance level
Measles vaccination	74.9% (1581)	73.3% (1367)	P >0.05
Vitamin A supplementation	33.4 % (705)	31.8% (592)	P >0.05

The breakdown of coverage with measles vaccination or vitamin A supplementation by age group is shown in table 3.22. While measles vaccination is progressively increasing with age, vitamin A supplementation is highest in the 9-23 months bracket.

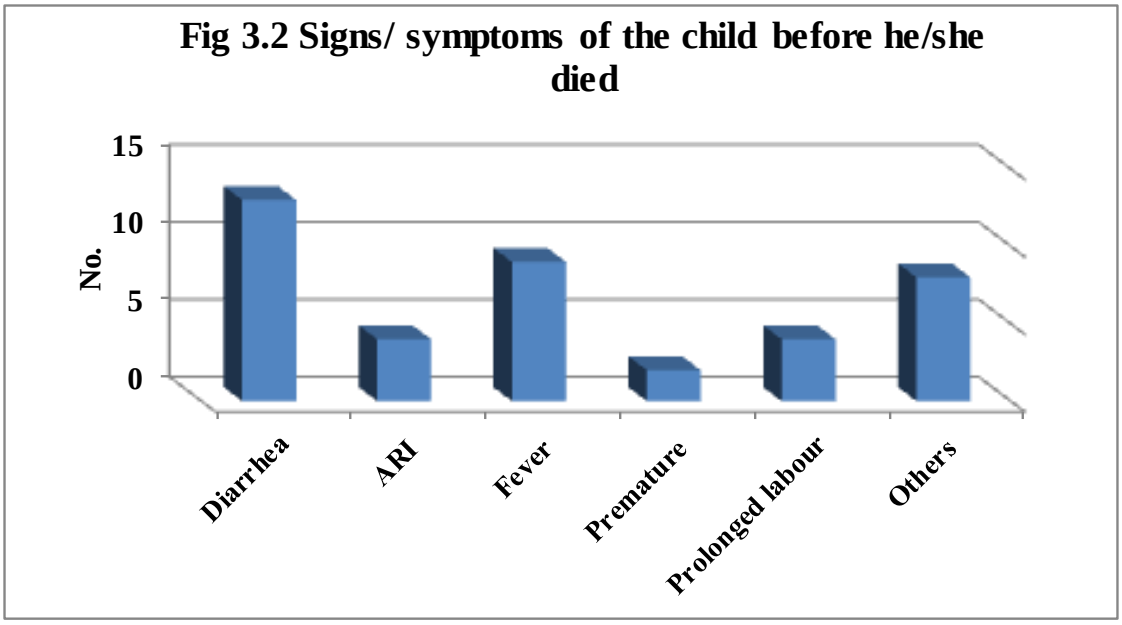
Table 3. 22 Measles vaccination and vitamin A supplementation coverage in children 9 - 59 months, by age group

Indicator	9-11 months	12-23 months	24-35 Months	36-47 Months	48-59 months	Significance level
Measles vaccination	59.7% (176)	69.4% (738)	74.0% (758)	78.3% (773)	83.4% (504)	x^2: 81.3, P< 0.0001, df 4.
Vitamin A supplementation	39.0% (115)	39.9% (425)	30.6% (313)	27.8% (274)	28.0% (169)	x^2: 49.5, P< 0.0001, df 4

3.4 UNDER-FIVE MORTALITY

A total of 36 deaths occurred during the recall period of one year. Therefore, the estimate for U5 mortality rate during the recall period was found to be in the acceptable/normal range ,i.e. less than 1.0 deaths/10,000/day.

Main signs and symptoms before death are shown in the fig 3.2. Diarrhoea was the leading cause of the death, followed by fever and ARI.



3.5 INFANT AND YOUNG CHILD FEEDING (IYCF) PRACTICES

3.5.1 Ever and still breast fed

More than 99.7 percent of U5 children had ever breastfed. 46% of U5 and 81.5% of under two are still on breastfeeding. The mean age when breastfeeding ends is 17.8 ± 8.8 months and median is 18.0 (rage 0-60 months).

3.5.2 Exclusive breastfeeding

Table 3.23 gives the overall and zones prevalence of exclusive breastfeeding in the below 6 months age group. Only 9.2% is on exclusive breastfeeding; it is highest (18.2%) in terraces and low mountains and lowest (4.1%) in coast and coastal zones (X^2 12.0, P < 0.01, df 3).

Table 3.23 Exclusive breastfeeding by agro-ecological zone

Indicator	All (n=567)	Coast and coastal (n = 148)	Plain and valleys (n = 166)	Sandy plains and valleys (n = 220)	Terraces and low mountains (n = 33)
Exclusive breastfeeding	9.2% (52)	4.1% (6)	7.2 % (12)	12.7% (28)	18.2% (6)

* Significance difference (P< 0.01)

No significant difference was found by urban/rural resident (8.5% vs. 9.6% respectively, P >05) nor between males/females (8.0% vs. 10.9% respectively, P >05).

3.5.3 Minimum dietary diversity/complementary feeding

The *Minimum dietary diversity* score was calculated as the proportion of children 6-23 months of age who received foods from four or more out of the seven food groups during the previous day (see 2.10.2 for definition). Table 3.24 gives Minimum dietary diversity score (complementary feeding) among children 6-23 months by agro-ecological zone. Only around one third of 6-23 months children are in proper diversified/ complementary feeding. This is highest in coast and coastal zone (40.7%) and lowest in terraces and low mountains zone (21.7%) (X^2 21.7, P < 0.0001, df 3).

Table 3.24 *Minimum dietary diversity* score (complementary feeding) among children 6-23 months by agro-ecological zone

Indicator	All (n=1330)	Coast and coastal (n = 420)	Plain and valleys (n = 320)	Sandy plains and valleys (n = 521)	Terraces and low mountains (n = 69)
Food diversification	32.3% (429)	40.7% (171)	28.1% (90)	29.4% (153)	21.7% (15)

* Significance difference (P< 0.0001)

Minimum dietary diversity score also significantly differ by urban/rural resident (Table 3.25)

Table 3.25 Minimum dietary diversity among children 6-23 months by resident group

Indicator	Urban (n = 389)	Rural (n = 942)
Food diversification	40.1% (156)	29.1 % (274)

* Significance difference (P< 0.0001)

However, there is no gender difference, as males to female prevalence is 29.8% vs. 31.7% (P >05).

3.6 FOOD INSECURITY/ FOOD INACCESSIBILITY

Food insecurity/inaccessibility was only assessed in this survey by three questions about reducing the size of the child's meal size, reducing the number of the child's meal, and whether the child went to bed hungry due to unavailability of food; all during the last month.

Table 3. 26 shows food insecurity/inaccessibility indicators during last month by agro-ecological zone. Plain/valleys and sandy plains and valleys show the highest percentage for the three indicators.

Table 3.26 Food insecurity/inaccessibility indicators during last month by agro-ecological zone

Indicator	All	Coast and coastal	Plain and valleys	Sandy plains and valleys	Terraces and low mountains	Significance level
Reducing the child's meal size	13.2% (548)	7.0% (93)	17.2% (190)	15.9% (244)	10.7% (21)	X^2 69.8, P < 0.0001, df 3
Reducing the child's meal number	11.7% (488)	5.3% (70)	14.5% (160)	15.7% (241)	8.6% (17)	X^2 85.9, P < 0.0001, df 3
The child went to bed hungry due to food unavailability	8.0% (331)	5.0% (66)	9.8% (108)	9.3% (142)	7.6% (15)	X^2 24.1, P < 0.0001, df 3

The food insecurity/inaccessibility indicators during last month by urban/rural resident are shown in table 3.27. Urban areas significantly have the highest percentages for all indicators.

Table 3.27 Food insecurity/inaccessibility indicators during last month by resident group

Indicator	Urban	Rural	Significance level
Reducing the child's meal size	7.2% (88)	15.7% (460)	X^2 54.0, P < 0.0001, df 1
Reducing the child's meal number	5.1% (62)	14.5% (426)	X^2 74.2, P < 0.0001, df 1
The child went to bed hungry due to food unavailability	5.4% (66)	9.0% (265)	X^2 15.5, P < 0.0001, df 1

Table 3.28 shows that there is only a gender differences in reducing the child's meal number.

Table 3.28 Food insecurity/inaccessibility indicators during last month by gender

Indicator	Boys	Girls	Significance level
Reducing the child's meal size	13.8% (305)	12.5% (243)	P > 0.5
Reducing the child's meal number	12.7% (282)	10.6% (206)	X^2 4.5, P < 0.05, df 1
The child went to bed hungry due to food unavailability	8.4% (186)	7.5% (145)	P > 0.5

The breakdown of food insecurity/inaccessibility indicators by age group is shown in table 3.29. Although the 6-23 months age group has the highest percent of all food insecurity/inaccessibility indicators, the difference is significant only for the category ‘reducing the child's meal size’.

Table 3.29 Food insecurity/inaccessibility indicators during last month by age group

Indicator	6-11	12-23	24-35	36-47	48-59	Significance level
Reducing the child's meal size	10.3% (46)	14.0% (150)	15.5% (160)	12.5% (125)	11.1% (68)	X^2: 11.5, P< 0.05, df 4
Reducing the child's meal number	9.6% (43)	12.2% (131)	13.3% (137)	11.1% (111)	10.9% (67)	P > 0.5
The child went to bed hungry due to food unavailability	6.0% (27)	9.1% (98)	8.3% (86)	7.7% (77)	7.0% (43)	P > 0.5

3.7 WATER, SANITATION, AND HYGIENE (WASH)

Table 3.30 shows the main source for drinking water by agro-ecological zone. There are significant differences between the zones. For instance, whereas the main source of drinking water for coast/coastal and plain/valleys zones is the public network, it is wells with pumps for sandy plains/valleys and springs/rain collections in terraces/low mountains (X^2 2090.0, P < 0.0001, df 24).

Table 3.30 Main source for drinking water by agro-ecological zone

Indicator	All (n=3095)	Coast and coastal (n=991)	Plain and valleys (n=799)	Sandy plains and valleys (n=1144)	Terraces and low mountains (n=161)
Public network	42.0% (1299)	51.0% (505)	53.6% (428)	31.0% (355)	6.8% (11)
Well with pump	33.7% (1042)	28.0% (278)	25.5% (204)	47.6% (545)	9.3% (15)
Private network	7.9% (243)	6.2% (61)	7.3% (58)	10.8% (124)	0.0% (0)
Traditional well (shallow open well)	6.7% (210)	3.7% (37)	5.1% (41)	7.8% (89)	26.7% (43)
Bottled water	4.3% (133)	9.8% (97)	0.6% (5)	2.2% (25)	3.7% (6)
Others (springs, rain collections etc.)	5.4% (168)	1.3% (13)	7.9% (63)	0.5% (6)	53.5% (86)

* Significance difference (P< 0.0001)

Similarly, table 3.31 shows that while the public network is the main source in urban areas, wells with pumps are the main source for rural areas (X^2 1220.5, P < 0.0001, df 8).

Table 3.31 Main source for drinking water for rural and urban resident group

Indicator	Urban (n=940)	Rural (n=2156)
Public network	79.0% (743)	25.8% (557)
Well with pump	4.6% (43)	46.3% (999)
Private network	0.6% (6)	11.0% (238)
Traditional well	0.4% (4)	9.6% (206)
Bottled water	12.9% (121)	0.6% (12)
Others (springs, rain collections etc.)	2.5% (23)	6.7% (144)

* Significance difference (P< 0.0001)

Only 38 households (0.8%) are treating water. Out of these, 34 are in rural areas especially in sandy plains and valleys; treating mainly through filtering via clothes.

Table 3.32 gives the type of sanitation by agro-ecological zone. Still more than one fifth is using open space for defecation with the highest percent (24.2%) in terraces/low mountains and lowest (17.9%) in coast/coastal zones (X^2 26.4, P < 0.01, df 9).

Table 3.32 Sanitation by agro-ecological zone

Indicator	All (n=3093)	Coast and coastal (n=990)	Plain and valleys (n=800)	Sandy plains and valleys (n=1143)	Terraces and low mountains (n=160)
Latrines inside house	75.8% (2345)	79.8% (791)	73.5% (588)	74.5% (852)	70.8% (114)
Latrines outside house	2.9% (91)	2.3% (23)	4.0% (32)	2.4% (28)	5.0% (8)
Open space	21.3% (658)	17.9% (176)	22.5% (180)	23.1% (263)	24.2% (39)

* Significance difference (P< 0.01)

Table 3.33 shows that sanitation also differs significantly by urban/rural resident; e.g. open space defecation is 29.9% vs. 1.6% repectively (X^2 367.6, P < 0.0001, df 3)

Table 3.33 Sanitation by urban and rural resident group

Indicator	Urban (n=940)	Rural (n=2156)
Latrines inside house	98.1% (922)	66.0% (1423)
Latrines outside house	0.3% (3)	4.1 (89)
Open space	1.6% (15)	29.9 (644)

* Significance difference (P< 0.0001)

Table 3.34 shows that nearly two thirds of the surveyed sample have no garbage disposal, and throw garbage in open space. This is highest (90.1%) in terraces/low mountains and lowest (54.1%) in in coast/coastal zones (X^2 280.7, P < 0.0001, df 12).

Table 3. 34 Garbage disposal by agro-ecological zone

Indicator	All (n=3095)	Coast and coastal (n=990)	Plain and valleys (n=800)	Sandy plains and valleys (n=1144)	Terraces and low mountains (n=161)
Public collection supported by government	11.6% (359)	20.6% (204)	11.8% (94)	5.3% (61)	0.0% (0)
Designated collection place	15.4% (476)	23.3% (231)	13.8 (110)	11.1% (127)	5.0% (8)
Incineration	3.8% (118)	1.9% (19)	6.0% (48)	3.8% (43)	5.0% (8)
Thrown in open space	69.2% (2142)	54.1% (536)	68.6% (548)	79.8% (913)	90.1% (145)

* Significance difference (P< 0.0001)

This also differs significantly by urban/rural resident, as shown in table 3.35, where 85.4% of the households in rural areas throw garbage in open space, compared to 32.0% in urban areas (X^2 1224.7, P < 0.0001, df 4).

Table 3. 35 Garbage disposal by urban and rural resident group

Indicator	Urban (n=940)	Rural (n=2155)
Public collection	36.1% (339)	0.9% (20)
Designated place	31.3% (294)	8.5% (182)
Incineration	0.6 (6)	5.2 (112)
Thrown in open space	32.0 (301)	85.4 (1841)

* Significance difference (P< 0.0001)

4. DISCUSSION

The survey covers 3104 households and 4668 U5 children, distributed evenly among four agro-ecological zones. The total Boys: Girls ratio was 1.1, therefore we can note that there was no gender bias in the selection and each gender had an equal chance of being included in the sample. However, and in spite of rigorous quality control measures and daily plausibility checks on digital preference, we have noticed lower representation (12.6%) of children aged 48 to 59 months. This observation is consistent with the previous survey in Hajjah governorate, where this age groups also constituted 12.6% of the whole sample, and in line with national census figures where this age group found to be only 16.0% compared to other U5 age groups that constitutes 20 to 22%[13]. Nevertheless, this lower representation of such age group demands special investigation.

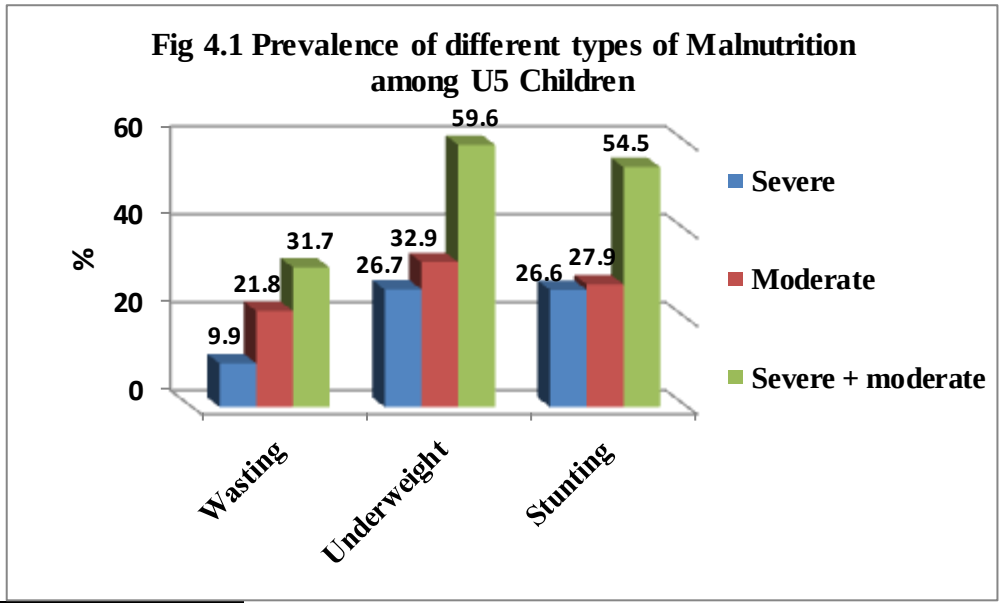
4.1 NUTRITIONAL STATUS OF U5 CHILDREN

4.1.1 Prevalence of malnutrition

Valid anthropometric data was obtained from U5 children after exclusion of children with extreme z-score values that flagged off from the anthropometric analysis (see table 2.3).

The survey found an overall GAM prevalence of 31.7% [95% C.I 31.5 – 31.8], which is significantly higher than the critical emergency threshold of ≥ 15 %[14]. Furthermore, the overall prevalence of SAM of 9.9% [95% CI 9.8 – 10.0] is far beyond the emergency threshold of 5%. For SAM

Fig 4.1 summarises of the prevalence of different types and degrees of malnutrition surveyed.



[13] Central Statistical Organisation of Yemen. Population, Housing and Establishment. Census 2004 First Report. Yemen: CSO; 2007.

[14] Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Committee. WHO Technical Report Series No. 854. Geneva: World Health Organization, 1995.

Table 4.1 gives the malnutrition rates found in this survey compared to the national figures from the previous national surveys,[15,16] International Food Policy Research Institute (IFPRI),[17] SOWC 2010[18] and the latest UNICEF nutritional survey conducted in Hajjah governorate.[19] Although the above surveys' methodologies are not always the same (e.g. while the DHS and FHS used the standard of the U.S. National Center for Health Statistics (NCHS) reference 1997 and the SOWC figures are from the reanalysis of the FHS according to WHO standards 2006, the Hajjah nutrition survey as well as the present survey used the WHO standards 2006), such comparison offers some insight into trends and how the situation has changed over time – between the previous surveys and the current.

The level of SAM found in this survey (9.9%) is more than three times the figures found in last 2003 national Family Health survey (3.0%) and more than twice the IFPRI estimations (4.4%)[17] and SOWC 2010[18] (3.9%), but very similar to figures from Hajjah nutrition survey (9.1%)[19]. Furthermore, the level of GAM found in this survey (31.7%) is more than three times the figures found in last national Family Health survey[16] (9.4%), higher than IFPRI estimations (21.1%)[17], and about twice the SOWC 2010[18] (15.0%),but very similar to figures from Hajjah nutrition survey (31.4%)[19]. Such similarity between the findings of this survey and Hajjah survey is not unexpected as the three districts surveyed in Hajjah are located on the same Tihama stripe and have very similar characteristics of population and land.

Although, the underweight prevalence found through this survey – 59.6% [95% CI 59.5-59.7] – is higher than figures from the SOWC 2010[18] (43.0%) and Hajjah nutrition survey (48.3%)[19], it is very similar to IFPRI estimations (57.9%)[17]. Nevertheless, such high prevalence of underweight – which might be the highest in the world – may call for more explanation on the variation from the national figure and may reflect a local trend for Al Hodeidah governorate (see 4.1.2). Furthermore, this indicates that the prevalence of underweight amongst under-5 children is far above the 2015 MDG target of 15%.

Finally, the stunting prevalence found through this survey –54.5% [95% CI 54.3-54.6] – is slightly lower than the IFPRI estimations (57.9%)[17] and SOWC 2010[18] (58.0%), but much higher than figures from Hajjah nutrition survey (43.6%)[19].

[15] Central Statistical Organization (CSO). Yemen Demographic and Maternal and Child Health Survey-II, 1997.

[16] Ministry of Public Health and Population. Central Statistical Organization, and League of Arab Sector. Yemen Family Health Survey, Principal Report; 2005.

[17] MoPIC and IFPRI. National Food Security Strategy Paper (NFSSP). Final Draft, February 2010

[18] THE STATE OF THE WORLD'S CHILDREN. UNICEF. 2010. www.unicef.org/.../ SOWC_Spec._ Ed._CRC_Main_Report_EN_090409.pdf

[19] UNICEF. Nutrition Survey among U5 Children and Women of Childbearing Age in Three Districts in Hajjah Governorate, Yemen. July, 2011

Table 4.1: Prevalence of malnutrition compared to previous surveys and SOWC 2010

Survey	Year	Wasting			Underweight			Stunting		
		Severe	*Moderate*	*GAM*	*Severe*	*Moderate*	*Severe to moderate*	*Severe*	*Moderate*	*Severe to moderate*
1. Demographic Health Survey[20]	1997	2.6	10.3	12.9	14.5	31.6	46.1	26.7	25.0	51.7
2. Family Health survey[21]	2003	3.0	9.4	12.4	15.2	30.4	45.6	30.9	22.2	53.1
3. IFPRI estimation based on 2005–06 HBS data[22]	2010	4.4	11.3	15.7	15.0	42.9	57.9	35.4	22.5	57.9
4. SOWC[23]	2010	3.9	11.1	15.0	19.0	24.0	43.0	37.1	20.9	58.0
4. Hajjah nutrition survey[24]	2011	9.1	22.3	31.4	20.3	28.0	48.3	22.8	20.8	43.6
5. This Survey	**2011**	**9.9**	**21.8**	**31.7**	**26.7**	**32.9**	**59.6**	**26.6**	**27.9**	**54.5**

4.1.2 Malnutrition prevalence in Al Hodeidah governorate

Al Hodeidah is one of the three governorates in Yemen where critical levels of wasting above 15% can be observed.[25] However, the acute malnutrition rate found in this survey (31.7%) is twice the prevalence found for Al Hodeidah by the Food Security Baseline Survey[26] and by the Comprehensive Food Security Survey (CFSS) [27], while it is slightly higher than the IFPRI estimation based on the 2005–2006 Household Budget Survey (HBS), which showed a prevalence of 26.0%.[28]

Similarly, the prevalence of underweight found by this survey is 59.6% – which might be the highest in the world – is still below the IFPRI finding of 63.4%. The HBS result of 2005/06 shows sharp disparities across governorates. The proportion of underweight under-5 children was highest in the governorates of Al-Dhaleah (71%), Amran (64.4%) and Al-Hodeidah (63.4%). The better performing-governorates were Al-Maharah (11.8%), Hajjah (20.8%) and Aden (23.4%)[29].

[20] Central Statistical Organization (CSO). Yemen Demographic and Maternal and Child Health Survey-II, 1997.

[21] Ministry of Public Health and Population. Central Statistical Organization, and League of Arab Sector. Yemen Family Health Survey, Principal Report; 2005.

[22] MoPIC and IFPRI. National Food Security Strategy Paper (NFSSP). Final Draft, February 2010

[23] The State of the World's Children. UNICEF. 2010. www.unicef.org/.../ SOWC_Spec._ Ed._CRC_Main_Report_EN_090409.pdf

[24] UNICEF. Nutrition Survey among U5 Children and Women of Childbearing Age in Three Districts in Hajjah Governorate, Yemen. July, 2011

[25]WFP. YEMEN: Secondary Data Analysis on Food Security and Vulnerability. August 2009

[26] MoPIC Food Security Baseline Survey 2010. Governorate of Al Hodeidah. Central Statistical Organisation, Government of Yemen. March 2011

[27] WFP. Comprehensive Food Security Survey, Yemen. March 2010

[28] MoPIC and IFPRI. National Food Security Strategy Paper (NFSSP). Final Draft, February 2010

[29] Al-Arhabi et al. The Second National Millennium Development Goals Report. Core Report Team. MoPIC and UNDP. Yemen report 2010

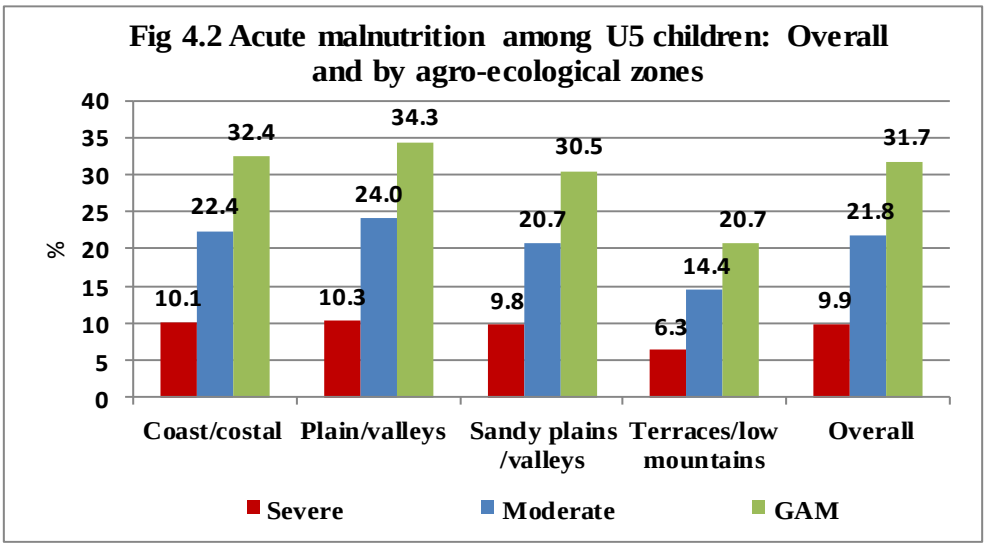
Regarding the stunting the prevalence found by this survey (54.5%), this is exactly the same as found by the IFPRI estimation for Al Hodeidah based on 2005–2006 HBS [30]

Although the above assessments' methodologies are not as inclusive as those used in the this survey – e.g. the Food Security Baseline Survey and the CFSS used only MUAC – such comparison does offer some insight into trends on the current situation.

4.1.2 Malnutrition prevalence by agro-ecological zone

Fig 4.2 gives the prevalence of acute malnutrition by agro-ecological zone. While the coast/coastal and plains/valleys have the highest prevalence, the terraces/low mountains have the lowest. This trend is consistent with findings from CFSS,[31] that show higher prevalence in Red Sea and Tihama coast areas, and lower prevalence in highlands. However, the zones' prevalence that was found in CFSS and which used MUAC classification, was much lower (21.9%, 8.4% respectively) than that found through this survey in the same zones (32.4% and 20.7% respectively).

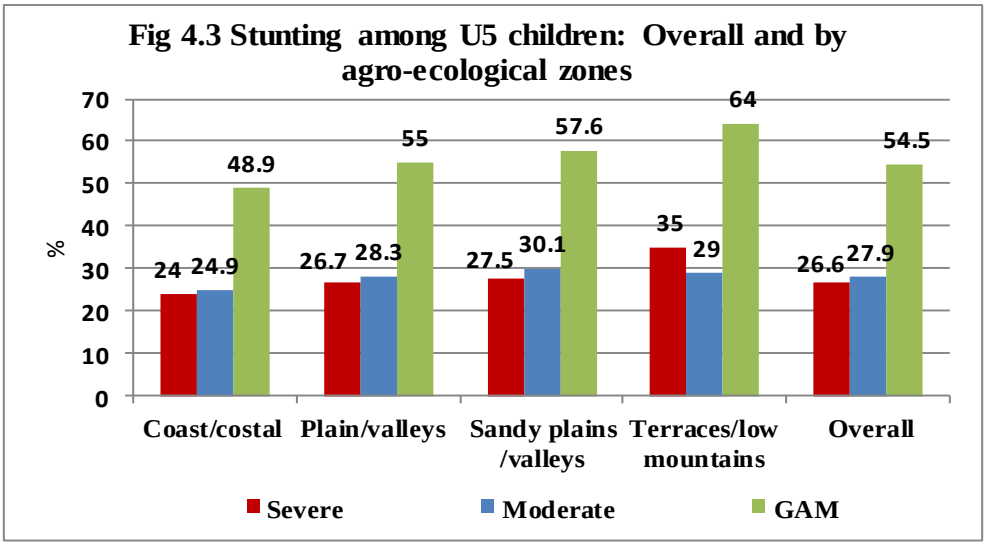
Fig 4.2 Acute malnutrition among U5 children: Overall and by agro-ecological zones



Paradoxically, chronic malnutrition as shown by stunting was found to be the highest in the terraces/low mountains and the lowest in the coast/coastal zones(Fig 4.3). The reasons behind such paradox are not obvious from this survey. However, as poverty, food insecurity and malnutrition are closely intertwined, changes in one is likely to impact the others, particularly in rural locations. CFSS shows that upper highland has the highest percentage of food insecurity, which may explain such high chronic malnutrition but not lower prevalence of acute malnutrition. The likelihood of a poor household being impacted by food insecurity and malnutrition as a result of its disadvantaged economic standing is significantly higher than for wealthier households (see 4.5 Food Insecurity/Inaccessibility). Furthermore, a high burden of diarrhoea found in the terraces/low mountains compared to coast/coastal zones (53.9% vs. 43.3% respectively) may play a role in high stunting prevalence in these areas. In a pooled analysis of data from nine studies in five countries (Bangladesh, Brazil, Ghana, Guinea-Bissau, and Peru), 25 percent of stunting was attributed to having five or more episodes of diarrhoea in the first 2 years (see 4.2.1 Symptoms breakdown). There was a

[30] MoPIC and IFPRI. National Food Security Strategy Paper (NFSSP). Final Draft, February 2010
[31] WFP. Comprehensive Food Security Survey, Yemen. March 2010

"dose-response" relationship between the cumulative burden of diarrhoea (e.g., proportion of days with diarrhoea) and the likelihood of being stunted at 24 months of age.[32]



Although table 4.2 points to such a relationship between the cumulative burden of diarrhoea and the likelihood of being stunted in terraces /low mountains, and between food insecurity and acute malnutrition and underweight in plain and valleys, further investigation of this relationship could be recommended.

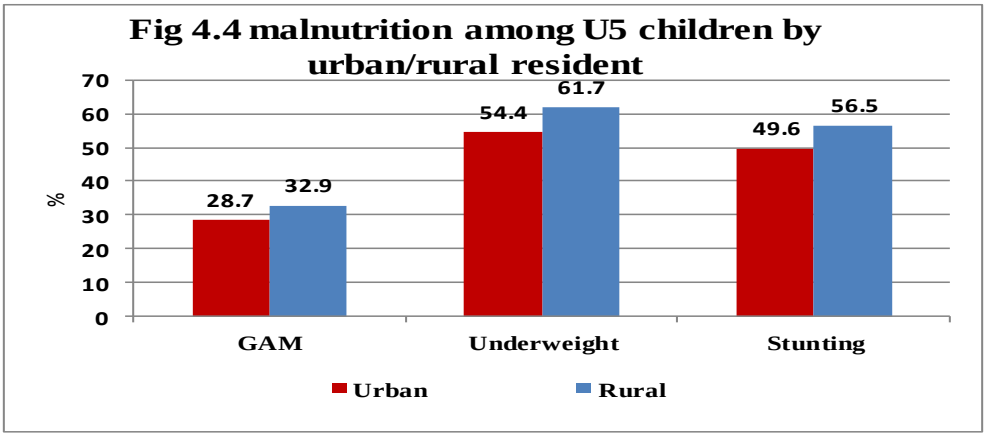
Table 4.2. Relationship between different types of malnutrition and diarrhoea and food insecurity

Terraces and low mountains	Sandy plains and valleys	Plain and valleys	Coast and coastal	Overall	Indicator
20.7 (20.1-21.2)	30.5 (30.3-30.8)	34.3 (34.0-34.5)	32.5 (32.2-32.7)	31.7 (31.5-31.8)	Global acute malnutrition rate – Weight for height <-2 Z score or presence of oedema with 95% CI
6.3 (5.9-6.6)	9.8 (9.7-10.0)	10.3 (10.1-10.4)	10.1 (9.9-102)	9.9 (9.8-10.0)	Severe acute malnutrition rate – Weight for height <-3 Z score or presence of oedema with 95% CI
57.9 (57.3-58.4)	60.8 (60.6-61.0)	62.6 (62.4-62.9)	55.8 (55.6-56.1)	59.6 (59.5-59.7)	Underweight rate – Weight for Age <-2 Z score with 95% CI
64.0 (63.4-64.6)	57.6 (57.4-57.8)	55.0 (54.8-55.3)	48.9 (48.6-49.1)	54.5 (54.3-54.6)	Stunting rate – Height for Age <-2 Z score with 95% CI
53.9	44.4	47.6	43.3	45.4	% of U5 children having diarrhoea two weeks prior to survey
10.7	15.9	17.2	7.0	13.2	% of children (6-59 months) whose meal size was reduced during the month prior the survey
8.6	15.7	14.5	5.3	11.7	% of children (6-59 months) whose number of meals was reduced during the month prior the survey
7.6	9.3	9.8	5.0	8.0	% of children (6-59 months) who went to bed hungry due to food unavailability

[32] Early child growth: how do nutrition and infection interact?. A&T Technical Brief . Issue 3, June 2011: 1-10

4.1.2 Malnutrition prevalence by urban/rural resident

Consistent with the findings of the last nutrition survey,[33] different types of malnutrition were found to be far more widespread among children living in rural areas than in urban areas (Fig 4.4). A similar finding also reported by Al Hodeidah Food Security Baseline Survey which found 16.0% of children under five in rural areas being moderately malnourished, against 11.3% in urban[34]. Furthermore, the CFSS also found the same differences between rural and urban areas, with rural areas having significantly higher percentage of acutely malnourished children (10.2%) than urban areas[35]. Similarly, the National Food Security Strategy Paper (NFSSP) quoted that 45.4% of urban U5 children are stunted compared to 62.1% in the rural areas[36].



Possible explanation for such higher malnutrition in rural area may be related to poorly balanced rural diet, and micronutrient deficiencies are higher in rural areas. Furthermore, the rural areas continue to be much more affected by food insecurity than the urban areas where the share of food-insecure people in the countryside is more than twice the share found in urban areas[37].

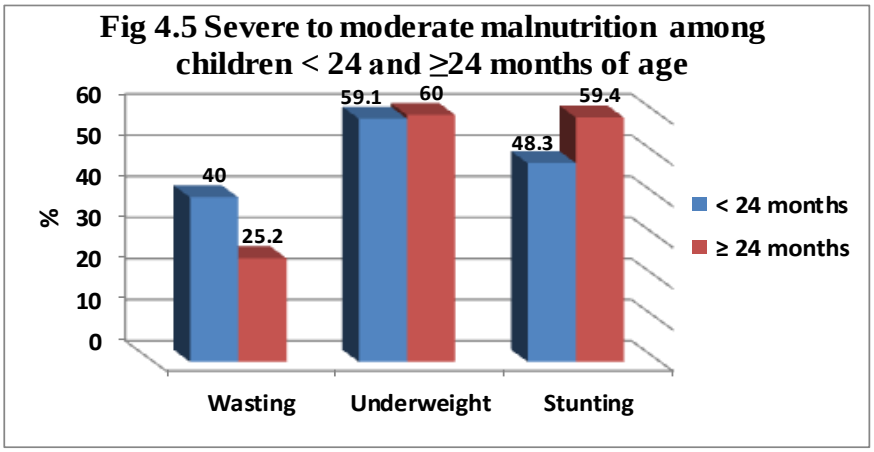
4.1.3 Malnutrition and child age

Prevalence of acute malnutrition by age group showed a significance difference where those being introduced complementary food (6-11 months) have the highest prevalence: 48.4%. Furthermore, Fig 4.5 shows that younger children <24 months of age have significantly higher prevalence of GAM compared to those above: 40.0%: 25.2% (X^2 115.5, P < 0.0001, df 1). This is also true for SAM which is significantly higher among those < 24 months: 14.1 vs. 6.6 % ($X^2$129.8, P < 0.0001, df 2). The difference is also significant for severe underweight 29.6% vs. 24.4 (X^2 24.1, P < 0.0001, df 2).

[33] Ministry of Public Health and Population. Central Statistical Organization, and League of Arab Sector. Yemen Family Health Survey, Principal Report; 2005.
[34] MoPIC Food Security Baseline Survey 2010. Governorate of Al Hodeidah. Central Statistical Organisation, Government of Yemen. March 2011

[35] WFP. Comprehensive Food Security Survey, Yemen. March 2010
[36] MoPIC and IFPRI. National Food Security Strategy Paper (NFSSP). Final Draft, February 2010
[37] MoPIC and IFPRI. National Food Security Strategy Paper (NFSSP). Final Draft, February 2010

Such differences - that have been also seen in previous Hajjah Nutrition Survey[38]- is pointing serious care issues that could influence the nutrition well-being of the population and most probably indicates inadequate IYCF practices (see 4.3.3: Food diversification and complementary feeding) and perhaps related to the high prevalence of diarrhoea among this age group found in this survey and by other researchers[39] (see 4.2 Childhood Morbidity).



However, such association is reversed for stunting where children ≥ 24 months have significantly higher prevalence of severe stunting: 29.2% vs. 23.2 (X^2 :56.7, P< 0.0001, df 2), as well as of severe to moderate stunting 59.4% vs. 48.3% (X^2: 56.2, P< 0.0001, df 1).

This trend of acute malnutrition among under-2 years children, which implies inadequate child care practices and calls for better IYCF practices, will end up in a chronic malnutrition in older age children if not properly tackled. The underlying causes of long term growth failure as demonstrated by high level of stunting could be attributed to the high wasting level below 24 months of age, with little catch-up of growth due to persistent diarrhoea and poor feeding habits (quantity and quality). [40]

4.1.4 Malnutrition by gender

By gender (Fig 4.6), the prevalence of wasting and stunting is significantly higher among boys (X^2 13.9, P < 0.0001, df 1, X^2 7.3, P < 0.01, df 1 respectively). This finding was also reported by the last national nutrition survey[41] and found in the recent nutritional survey that was conducted in Hajjah.[42] NFSSP also stated that

[38] UNICEF. Nutrition Survey among U5 Children and Women of Childbearing Age in Three Districts in Hajjah Governorate, Yemen. July, 2011

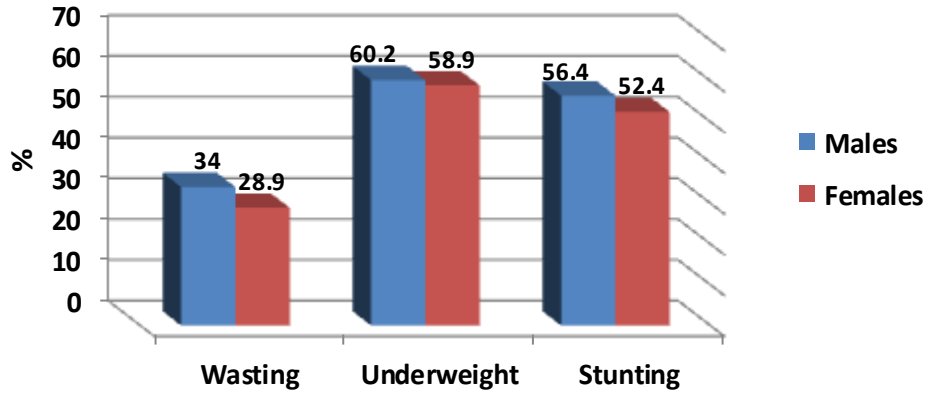
[39] Motarjemi Y., Kaferstein F., Moy G., Quevedo F. Contaminated weaning food: a major risk factor for diarrhoea and associated malnutrition. Bulletin of the World Health Organization, 71 (1): 79-92 (1993) .

[40] Early child growth: how do nutrition and infection interact? A&T Technical Brief . Issue 3, June 2011: 1-10

[41] Ministry of Public Health and Population. Central Statistical Organization, and League of Arab Sector. Yemen Family Health Survey, Principal Report; 2005.

malnutrition is generally more prevalent among boys than girls[43]. However, the Food Security Baseline Survey in Al Hodeidah stated that malnutrition affects boys more in rural areas while females in urban areas are more affected[44]. Nevertheless, such gender difference between urban and rural areas was not found statistically significant in this survey.

Fig 4.6 Severe to moderate malnutrition by gender



[42] UNICEF (2011). Nutrition Survey among U5 Children and Women of Childbearing Age in Three Districts in Hajjah Governorate, Yemen

[43] MoPIC and IFPRI. National Food Security Strategy Paper (NFSSP). Final Draft, February 2010

[44] MoPIC. Food Security Baseline Survey 2010. Governorate of Al Hodeidah. Central Statistical Organisation, Government of Yemen. March 2011

4.2 CHILDREN'S HEALTH

4.2.1 Overall morbidity

The relationship between disease and nutrition is well documented. During infection energy and other nutrients are diverted towards the immune response and away from growth. Repeated episodes of infection or persistent subclinical infection may put the child in a near-constant state of growth suppression.[45] This survey found that almost three quarters of the children in the assessment have been sick in the previous two weeks. Such high an overall morbidity differs neither between agro-ecological zones nor between urban/rural resident.

Nevertheless, such an overall morbidity is significantly associated with different types of malnutrition. In table 4.3 we see that malnourished children have higher prevalence of morbidity. However, the question whether this is a result or a cause is difficult to answer based on the cross-sectional design used in this survey, and may require a specific analytical or experimental design.

Table 4.3 Prevalence of overall morbidity in the two weeks preceding the survey by nutritional status

Indicator	Prevalence of overall morbidity			Significance level
	Severe (<-3 z-score)	Moderate (>= -3 and <-2 z-score)	Normal (> = -2 z score)	
Acute malnutrition based on weight-for-height z-scores (and/or oedema)	83.8% (382)	81.2% (822)	75.4% (2388)	X^2 26.1, P < 0.0001, df 2
Underweight based on weight-for-age z-scores	83.0% (1038)	77.3% (1192)	74.1% (1403)	X^2 34.8, P < 0.0001, df 2
Stunting based on height-for-age z-scores	81.5% (1003)	78.7% (1021)	74.5% (1575)	X^2 25.7, P < 0.0001, df 2

Furthermore, such an overall morbidity also found to be higher among children under 24 months of age. Since this group is suffer from higher burden of malnutrition (4. 4) this may highlights the strong link between overall morbidity and malnutrition.

Table 4.4 Prevalence of overall morbidity in the two weeks preceding the survey by age group

Indicator	< 24 months (n=2095)	≥ 24 months (n=2643)	Significant level
Overall morbidity	79.4% (1664)	75.9% (2005)	X^2 8.5, P < 0.01, df 1

[45] Early child growth: how do nutrition and infection interact?. A&T Technical Brief . Issue 3, June 2011: 1-10

More interestingly, overall morbidity has been found to be significantly associated with poor food diversification (see 4.3.3: Food diversification and complementary feeding) and food insecurity (see 4.5: Food insecurity/ inaccessibility).

4.2.1 Symptoms breakdown

Table 4.5 gives the prevalence of different morbidities during the two weeks preceding this survey compared to previous surveys. Overall the morbidities found in this survey are much higher than those found in previous surveys and similar to the figures from Hajjah nutrition survey except for much higher prevalence of ARI in this survey. Such very high morbidities' figures might be linked with the prevalence of malnutrition found in the current survey as well as in the Hajjah nutrition survey.[46]

Table 4.5 Prevalence of morbidities in the two weeks preceding the survey compared to previous surveys

Survey	Year	Diarrhoea	ARI	Fever
Family Health Survey[47]	2003	29.6%	42%	40
MICS[48]	2006	33.5	NA	NA
Hajjah nutrition survey[37]	2011	47.4%	43.1%	54.6
This survey	2011	45.4%	64.1 %	57.7%

The slightly lower prevalence of diarrhoea found in this survey and the higher prevalence of ARI and fever compared to Hajjah survey may be related to difference in timing of the two surveys. While Hajjah survey was conducted in summer where more diarrhoea is expected, this survey was conducted in winter where more ARI and fever -that could be also related to malaria- could be expected.

Diarrhoea significantly differs by the agro-ecological zones with the highest prevalence (53.9%) in terraces /low mountains and lowest in coast/coastal zones (X^2: 12.7, P< 0.01, df 3) but not by the urban/rural resident (47.2% vs. 44.6%, P>0.05). Although such high prevalence of diarrhoea in the terraces /low mountains may be inconsistent with the lowest prevalence of wasting in this zone however, it may designates an additional possible pathways that may interact conjointly with the diarrhoea or even play a more important role in developing acute malnutrition in this area.

Nevertheless, this terraces /low mountains zone has the highest prevalence of stunting (64.0%) which support what we have already mentioned (see 4.1.2) and found by other researchers about the cumulative

[46] UNICEF. Nutrition Survey among U5 Children and Women of Childbearing Age in Three Districts in Hajjah Governorate, Yemen. July, 2011

[47] Ministry of Public Health and Population. Central Statistical Organization, and League of Arab Sector. Yemen Family Health Survey, Principal Report; 2005.

[48] UNICEF. Multiple Indicator Cluster Surveys (MICS), 2006

burden of diarrhoea and the likelihood of being stunted[49]. This also could be supported by the finding of low stunting prevalence (48.9%) in coast/coastal zone that have lowest diarrhoea prevalence (43.3%).

Table 4.6 summarizes the association between diarrhoea and malnutrition and shows that diarrhoea is found to be significantly associated with all types of malnutrition. This confirms previous findings from Hajjah nutrition survey[50]. Repeated attacks of diarrhoea – that may be associated to poor environmental sanitation- found to be associated with tropical enteropathy with resultant poor nutrient absorption and considerable nutrient losses[51]. The resulting nutritional deficiency causes impaired immunity and increased vulnerability to more infection resulting in a vicious cycle of infection and malnutrition.

Table 4.6 Prevalence of diarrhoea in the two weeks preceding the survey by nutritional status

Indicator	Prevalence of diarrhoea			Significance level
	Severe (<-3 z-score)	Moderate (>= -3 and <-2 z-score)	Normal (> = -2 z score)	
Acute malnutrition based on weight-for-height z-scores (and/or oedema)	54.3% (248)	50.3% (509)	42.5% (1347)	X^2 35.1, P < 0.0001, df 2
Underweight based on weight-for-age z-scores	54.3% (248)	50.3% (509)	42.5% (1347)	X^2 35.1, P < 0.0001, df 2
Stunting based on height-for-age z-scores	51.3% (632)	45.6% (591)	42.2% (892)	X^2 25.7, P < 0.0001, df 2

As previously mentioned (4.1.3 Malnutrition and child age), diarrhoea was found to be significantly higher among children below <24 months (Fig 4.7): 51.9% vs. 40.22% (X^2: 65.4, P < 0.0001, df 2). The fact that this group also has significantly higher prevalence of wasting may indicate that a high burden of diarrhoea in the first two years of life is associated with a much higher risk of acute malnutrition.[5253]

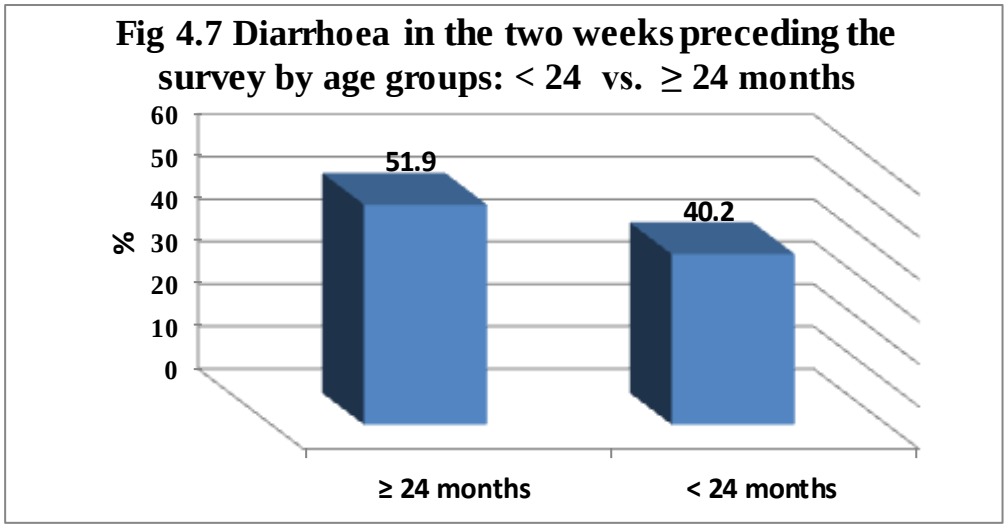
[49] Early child growth: how do nutrition and infection interact? A&T Technical Brief . Issue 3, June 2011: 1-10

[50] UNICEF. Nutrition Survey among U5 Children and Women of Childbearing Age in Three Districts in Hajjah Governorate, Yemen. July, 2011

[51] Jean H Humphrey. Child undernutrition, tropical enteropathy, toilets, and Handwashing. Lancet.com Vol 374 September 19, 2009:1032-35

[52] Early child growth: how do nutrition and infection interact?. A&T Technical Brief . Issue 3, June 2011: 1-10

[53] WHO Media centre. http://www.who.int/mediacentre/factsheets/fs330/en/index.html



Contrary to the Hajjah nutrition survey,[54] which found that diarrhoea is more common among boys, this survey found that diarrhoea does not differ by gender. As acute malnutrition is significantly higher among males, this supports what has already been mentioned – that in the surveyed area there may be an additional possible pathway interacting with the diarrhoea, or even playing a more important role in developing acute malnutrition.

Likewise, malnutrition and infection are intimately related. A malnourished child is more susceptible to disease, and a sick child is more likely to become malnourished. This survey found that significant association between both ARI and fever (which is a proxy for infection) with different types of malnutrition (Table 4.7, 4.8).

Table 4.7 Prevalence of ARI in the two weeks preceding the survey by nutritional status

Indicator	Prevalence of ARI			Significance level
	Severe (<-3 z-score)	Moderate (>= -3 and <-2 z-score)	Normal (> = -2 z score)	
Acute malnutrition based on weight-for-height z-scores (and/or oedema)	69.7% (318)	67.8% (686)	62.5% (1980)	X^2 15.8, P < 0.0001, df 2
Underweight based on weight-for-age z-scores	69.1% (864)	65.9% (1016)	59.8% (1134)	X^2 30.8, P < 0.0001, df 2
Stunting based on height-for-age z-scores	70.5% (868)	64.9% (843)	60.2% (1274)	X^2 36.1, P < 0.0001, df 2

[54] UNICEF. Nutrition Survey among U5 Children and Women of Childbearing Age in Three Districts in Hajjah Governorate, Yemen. July, 2011

Table 4.8 Prevalence of fever in the two weeks preceding the survey by nutritional status

Indicator	Prevalence of fever			
	Severe (<-3 z-score)	**Moderate (>= -3 and <-2 z-score)**	**Normal (> = -2 z score)**	**Significance level**
Acute malnutrition based on weight-for-height z-scores (and/or oedema)	70.2% (320)	62.5% (632)	54.2% (1716)	X^2 54.8, P < 0.0001, df 2
Underweight based on weight-for-age z-scores	66.4% (829)	57.3% (883)	52.2% (987)	X^2 62.3, P < 0.0001, df 2
Stunting based on height-for-age z-scores	62.8% (773)	59.0% (766)	53.7% (1134)	X^2 28.0, P < 0.0001, df 2

Whether such higher prevalence of ARI and fever among malnourished children is a result or a cause is difficult to ascertain through the cross-sectional design we have used, and needs to be investigated through analytical or experimental design.

4.2.2 Measles vaccination

Measles is an endemic disease in Yemen and many outbreaks occur every year.[55] Poor nutritional status and low vaccination coverage are among the important risk factors in Yemen; the same situation is found in the population surveyed.

The overall measles vaccination coverage is 74.2% with significant differences between agro-ecological zones. The highest coverage was found in sandy plains and valleys (76.6%) and lowest coverage (67.9%) in terraces/low mountains zone (X^2: 9.4, P< 0.05, df 3). Furthermore, there is also a significant difference between urban/rural resident in measles coverage: 79.2%vs. 75.5% % (X^2: 20.0, P< 0.0001, df 1). Such differences may be related to accessibility of services/health facilities, and may call for more outreach activities to ensure higher coverage as well as awareness campaigns to raise the demand. However, no gender difference was found.

Although the coverage found is in line with the national coverage of 73%,[56] it is still below the minimum target of 90% coverage which is necessary to prevent measles outbreaks. In fact, for 99 children (2.5%), the mothers have described symptoms during the past three months preceding the survey of what could be measles (i.e. fever, skin rash, running nose, conjunctivitis). The incidence of these suspected measles cases was higher in terraces and low mountains, where there is the lowest measles vaccination coverage: 3.8%, 67.9% respectively (x^2 : 20.9, P< 0.0001, df 3). Similarly, the sandy plains and valleys, which have the

[55] MoPHP (2009). Comprehensive Multi-Year Plan, 2006-2010. Expanded Program of Immunization.
[56] MoPHP (2010). National Health Strategy: 2010-2025

highest measles vaccination coverage (74.6%), have the lowest incidence of suspected measles cases (1.1%). Surprisingly, however, the coast and coastal zone which has the highest measles vaccination coverage still have high incidence of suspected measles (3.6%).

Furthermore, the incidence of suspected measles was significantly higher in rural than urban areas (3.1% vs. 0.9%, X^2:16.5, P< 0.0001, df), which relates well with significantly lower vaccination coverage in such areas (28.1% vs. 42.7%, X^2: 16.5, P< 0.0001, df 1). Finally, the suspected measles cases are significantly higher among males than females (3.0% vs. 1.9%, x^2 : 4.4, P< 0.05, df 1) in spite of insignificant gender difference in vaccination coverage (33.4% vs. 31.8%, P > 0.05).

Only about half of the measles vaccination coverage was confirmed through presence of vaccination card. This situation needs to be addressed through ensuring continuous availability of vaccination cards at both health facilities and during campaigns/outreaches, together with sensitization campaign to raise the awareness of parents on the importance of demanding/keeping such vaccination cards.

4.2.3 Vitamin A supplementation

WHO and UNICEF have recommended that children under 5 years of age should be supplemented twice a year with vitamin A. In addition to the results of Vitamin A deficiency (e.g. loss of vision, night blindness etc), vitamin A deficiency can also reduce body immunity and hence more susceptibility to infection and illness.

However, vitamin A supplementation among children ≥ 9 months was found to be low, with only 32.6% having received vitamin A supplementation during the six months preceding the survey. Furthermore, significantly higher figures were found among children living in coast and coastal zone compared to those living in sandy plains and valleys: 39.4% vs. 26.9% (X^2 : 48.3, P< 0.0001, df 3.). Similarly, vitamin A supplementation was significantly higher in urban than rural residents (42.7% vs., 28.1%, X^2: 81.6, P< 0.0001, df 1). Such differences may be also related to accessibility of service. This may call for more outreach activities to ensure higher coverage and reaching the unreached as well as awareness campaign to raise the demand.

Although no gender difference was found, vitamin A supplementation significantly differs by age group (X^2: 20.9, P< 0.0001, df 3). The highest supplementation was found for the age bracket 9-23 months, with nearly 40% of them being supplemented. The Al Hodeidah EPI coordinator mentioned that they routinely target only the children who visits health facilities for measles vaccination, and mostly this age group. Older age groups therefore, were found to have the lowest coverage (around 28%).

Although the national coverage has previously been found to be 35.6% (2003),[57], a higher coverage is expected by now. In fact, the Hajjah nutrition survey found that the vitamin A supplementation coverage is 61.6% among the host population. Nevertheless, such figure could not be compared to this survey figure as it is only limited to receiving vitamin A supplementation during last 6 months preceding the survey, which may explain the low figures in this survey. Nevertheless, all figures are still lower than the recommended figure of 80%.

Although the EPI strategy recommends concurrent supplementation of vitamin A with measles vaccination, there remains a wide gap between measles vaccination coverage and vitamin A supplementation in this survey. This could be partially explained by limiting the question to recieving vitamin A supplementation during the last 6 months preceding the survey. Furthermore, in some parts of the country – such as Al Hodeidah – vitamin A supplementation is linked to immunization services and is given when the child has contact with these services at ≥ 9 months. As explained by the Al Hodeidah EPI coordinator, vitamin A supplementation is mostly given to children between 9 and 24 months of age and mostly for those vaccinated against measles. No supply shortages occurred during the last six months. Even when limiting the analysis to children who received measles vaccine, vitamin A supplementation is still only 43%. Similarly, when analysis is limited to the EPI target age group, i.e. between 9 and 24 months, the coverage reaches 57.5%, which is still behind the 74.2% measles vaccination coverage. Such findings provide good basis for advocacy to push for measles and vitamin A concurrent delivery – which is already stated policy, but not always reflected in micro planning and implementation.

Differing from the Hajjah nutrition survey, where fever (as proxy for infection) is significantly lower among children receiving vitamin A supplementation, we did not find such protective value for receiving vitamin A on prevalence of different morbidities. Whether this is due to low coverage with supplementation or due to other factors we could not ascertain. The lack of association of vitamin A supplementation in this survey may be related to the high prevalence of diarrhoea, with loss of vitamin A through repeated bouts of diarrhoea and malabsorption. This may also explain lack of such association between diarrhoea and vitamin A in the Hajjah survey.

[57] Ministry of Public Health and Population. Central Statistical Organization, and League of Arab Sector. Yemen Family Health Survey, Principal Report; 2005.

4.3 UNDER-FIVE MORTALITY

A proxy indication of mortality was taken retrospectively to provide some idea on the health situation of the U5 children. The mortality assessment was done concurrently with the nutrition survey, in which a 30 x 30 cluster sampling methodology was used. The selection of clusters and households was the same as for nutrition survey. At least 30 households were randomly selected in each cluster, and the mortality questionnaire administered to a responsible member of that household. All households with and with no under-five child at the time of the survey were included in the survey. SMART methodology[58] was used for calculation of U5 mortality.

With a total of 36 deaths occurring during the recall period of one year, the estimated under -ive mortality rate was found to be in the acceptable/normal range, i.e. less than 1.0 deaths/10,000/ day. Previous findings from a recent survey that was conducted by MSF shows U5MR = 1,4 / 10.000 / day.[59] However, that survey was conducted in a camp setting of internally displaced population. Although Hodeidah governorate is different in this respect and is not considered as a famine/emergency area, the unexpected low mortality rates reported in this survey does not relate well to the findings of an acute malnutrition rate that is above the emergency threshold. Whether this is related to some peculiarities that differentiate the acute malnutrition in the survey which does not lead to high mortality, or due to other unknown reason behind such low mortality that is found, we are not certain. The fact that some studies found rates of severe forms of acute malnutrition manifested by oedema is associated with high mortality rate,[60] and that the prevalence of oedema in our survey is far below 1% – which also found in previous studies[61] from Yemen – may give some explanation, but this needs further investigation. Furthermore, there is may be a need for a stand-alone mortality survey that could also look to crude mortality.

Regarding the main signs and symptoms before death, we found that diarrhoea is the leading cause of the death followed by fever and ARI. This also concurs with the child morbidities found in this survey (see 4.2: Children's Health).

[58] Measuring Mortality, Nutritional Status, and Food Security in Crisis Situations: SMART METHODOLOGY. Version 1 April 2006.
[59] MSF Nutrition Assessment Al Mazraq camps 1,2,3 and Al Gofel area, July 2010.

60 Preliminary Report of First round of District Nutrition and Mortality Surveys in Malawi. September 2002. www.who.int/disasters/repo/8415.doc

[61] Robert R. Franklin, Lusumba N. Dikassa & William E. Bertrand. The impact of oedema on anthropometric measurements in nutritional surveys: a case study from Zaire. Bulletin of the World Health Organization, 62 (1): 145-150(1984)

4.3 INFANT AND YOUNG CHILD FEEDING (IYCF) PRACTICES

Infant and young child feeding practices directly affect the health and nutritional status of the children under 2 years of age.[62] Inadequate breastfeeding practices are a major cause of malnutrition among young children in particular.[63] Furthermore, malnutrition has been found to be associated with inadequate breastfeeding and feeding practices, with consequent high prevalence of diarrhoeal diseases[64]. Protecting, promoting and supporting lactating women to breastfeed their children from 0 to 24 months of age is therefore highly recommended. There is also a need to educate the mothers on how to introduce solid food to the children according to their age.

4.3.1 Ever breastfed

More than 99.7 percent of U5 children had ever breastfed, which matches the national figure of 97%.[65] Furthermore, 81.5% of the under-two children were found to be still breastfed, which is slightly higher than the previously found rate of 62%.[65] The mean age when the children stop being breastfed is 17.8 ± 8.8 months and median is 18.0 (rage 0-60 months).

4.3.2 Exclusive breastfeeding

A good practice in IYCF is that breastfeeding should continue on demand for the first six months of life, without giving any other food or fluid, even water. However, this survey found that among children below six months, less than one in ten children was found to be on exclusive breastfeeding, which is slightly lower than the already very low national figure of 11.5%.[66] 89.5% of mothers give other liquids to their babies under six months of age. This practice may lead to infection and precipitation of malnutrition during their early life.

Exclusive breastfeeding significantly varies by agro-ecological zone, with the highest percent in terraces and low mountains and the lowest in the coast/coastal zone: 18.2% vs. 4.1% (X^2 12.0, P < 0.01, df 3). However, exclusive breastfeeding varies neither by urban/rural resident nor by gender.

Table 4.9 shows that although the prevalence of all types of malnutrition was found to be higher among non-exclusive breastfed children, this may be due to a small number of children in the exclusive breastfeeding bracket; the differences were statistically insignificant.

[62] USAID's Investment in IYCF: Linkages Achievements and Results. http://www.linkagesproject.org/media/publications/final_usaid_linkages.pdf

[63] MoPIC and IFPRI. National Food Security Strategy Paper (NFSSP). Final Draft, February 2010

[64] WFP. Yemen: Secondary Data Analysis on Food Security and Vulnerability. August 2009

[65] Ministry of Public Health and Population. Central Statistical Organization, and League of Arab Sector. Yemen Family Health Survey, Principal Report; 2005.

[66] UNICEF. Multiple Indicator Cluster Surveys (MICS), 2006

Table 4.9 Malnutrition by exclusive breastfeeding

Indicator	Exclusive breastfeeding	
	Yes	No
Prevalence of global acute malnutrition (<-2 z-score and/or oedema)	19.6% (9)	31.1% (152)
Prevalence of underweight (<-2 z-score)	34.0% (16)	45.0% (225)
Prevalence of stunting (<-2 z-score)	17.0% (8)	24.7% (122)

Likewise, the prevalence of overall morbidity, diarrhoea, ARI and fever in the two weeks preceding the survey was found to be slightly higher among non-exclusive breastfed children (table 4.10). However, such differences were statistically insignificant; they may be due to small number of children in the exclusive breastfeeding bracket.

Table 4.10 Morbidities in the two weeks preceding the survey by exclusive breastfeeding

Indicator	Exclusive breastfeeding	
	Yes	No
Overall morbidity	67.9% (36)	68.5% (352)
Diarrhoea	41.5% (22)	37.9% (195)
ARI	56.6% (30)	51.5% (265)
Fever	45.2% (24)	50.2% (258)

4.3.3 Food diversification and complementary feeding

The food basket and proper complementary feeding for children 6-23 months of age was found to be very limited. Children are not fed frequently and dietary diversity and nutritional quality is not assured. Children do not get essential nutrients for healthy growth and development; this may include foods such as milk, meat, fruit, vegetables etc. This survey found that about only one in three of the 6-23 months children are on proper complimentary feeding/diversified food, i.e. they received foods from four or more food groups during the previous day according to the Minimum dietary diversity score (see 2.10.2. Definition of food diversification).

Complimentary feeding/food diversification significantly differs by agro-ecological zone, being highest in the coast and coastal and lowest in terraces and low mountains zones: 40.7% vs. 21.7% respectively (X^2 21.7, P < 0.0001, df 3). Similarly, it is also highest in urban than rural areas: 40.1% vs. 29.1% respectively (X^2 15.3, P < 0.0001, df 1), which is consistent with the NFSSP finding that the average rural diet is poorly balanced over food groups and is lacking in considerable quantities of vegetables and fruit.[67] However, no gender difference was found.

More importantly, overall morbidity as well as diarrhoea in the two weeks preceding the survey was found to be significantly associated with poor food diversification (table 4.11). Children 6-23 months of age on properly diversified complementary feeding were found to have some protection against high prevalence of overall morbidity as well as diarrhoea.

[67] MoPIC and IFPRI. National Food Security Strategy Paper (NFSSP). Final Draft, February 2010

Table 4.11 Morbidities among children 6-23 months of age in the two weeks preceding the survey by Minimum dietary diversity score

Indicator	Food diversification		Significance level
	Yes	No	
Overall morbidity	79.5% (342)	84.9% (827)	X^2 6.2, P < 0.05, df 1
Diarrhoea	52.9% (228)	58.6% (570)	X^2 3.9, P < 0.05, df 1
ARI	65.9% (284)	68.8% (670)	P > 0.05
Fever	62.7% (270)	67.3% (655)	P > 0.05

Furthermore, table 4.12 shows that poor food diversification was found to be significantly associated with different types of malnutrition. Such an important association, together with the finding of the association of food diversification with morbidities, points to the importance of launching innovative IYCF[68] community-based approaches in the surveyed area aimed at reducing the high prevalence of malnutrition in infant and young children as well as improving the overall children health status.

Table 4.12 Malnutrition among children 6-23 months of age by Minimum dietary diversity score

Indicator	Minimum dietary diversity		Significance level
	Yes	No	
Prevalence of global acute malnutrition (<-2 z-score and/or oedema)	39.9% (169)	46.4% (439)	X^2 5.1, P < 0.05, df 1
Prevalence of underweight (<-2 z-score)	62.2% (267)	67.5% (647)	X^2 3.9, P < 0.05, df 1
Prevalence of stunting (<-2 z-score)	53.4% (228)	59.6% (566)	X^2 4.6, P < 0.05, df 1

Such findings on IYC feeding practices may explain part of the high malnutrition rates found in the surveyed area, and reinforce the need for education of mothers on the proper IYCF feeding practices.

[68] USAID. Innovative community-based approaches from our partners. Infant and Young Child Nutrition Project. http://www.iycn.org/community-based.php

4.5 FOOD INSECURITY/INACCESSIBILITY

Inadequate consumption is a primary cause of chronic and acute malnutrition. Additionally, high rates of poverty and low purchasing power for food negatively impacts nutritional status. As the food security situation worsens, households tend to eat fewer meals, reduce the size of meals or go to bed hungry.[69] Therefore, household food consumption and food sources provide important measures of food security. Nevertheless, as this is a nutritional and not food security survey, we used only three questions as proxy for food insecurity/inaccessibility. Mothers were asked about whether during the last 30 days they had been forced to reduce the size of the child's meals, forced to reduce the child's number of meals, and whether the child had gone to bed hungry due to lack of food. As a family usually takes such steps only as a last resort, these questions could give a good insight into household food security.

This survey shows that around one in seven families was forced to reduce the child's meal size, one in eight was forced to reduce the child's meal number, and one in 12 children went to bed hungry during the last month. These three indicators were found to be differ significantly by agro-ecological zone, with sandy plains and valleys having the highest food insecurity indicators and coast and coastal zones having the lowest. This is consistent with NFSSP findings.[70] Furthermore, the three indicators were found to be significantly higher in rural areas, which supports previous findings that rural-urban inequalities are high in Yemen and that the number of food insecure people is more than five times higher in rural areas than in urban areas[70]. The only significant gender difference was found in reducing the child's meal number, where 12.7% of families forced to reduce their boys meal number compared to 10.6% among girls (X^2 4.5, P < 0.05, df 1). Likewise, reducing the child's meal size was the only significant indicator that differed by age group: 15.5% of the 24-35 months age bracket had had their meals reduced, compared to only 10.3% of the 9-11 months age bracket (X^2: 11.5, P< 0.05, df 4).

Table 4.13 shows significantly higher prevalence of underweight and stunting among food insecure children, as indicated by reduction of the child's meal size. Even though GAM was not significantly associated with this indicator, SAM prevalence was 12.2% among those who forced to reduce the child's meal size compared to 8.9% among those who did not (X^2 6.0, P < 0.05, df 2).

Table 4.13 Malnutrition by insecurity/inaccessibility: forced to reduce the child's meal size

	Forced to reduce the child's meal size		Significance level
Indicator	**Yes**	**No**	
Prevalence of global acute malnutrition (<-2 z-score and/or oedema)	34.4% (186)	31.3% (1113)	X^2 2.1, P = 0.08, df 1
Prevalence of underweight (<-2 z-score)	66.4% (359)	60.9% (2187)	X^2 5.9, P < 0.01, df 1
Prevalence of stunting (<-2 z-score)	64.3% (342)	57.7% (2053)	X^2 8.6, P < 0.01, df 1

[69]WFP. YEMEN: Secondary Data Analysis on Food Security and Vulnerability. August 2009

[70] MoPIC and IFPRI. National Food Security Strategy Paper (NFSSP). Final Draft, February 2010

Furthermore, reducing the child's number of meals was found to be significantly associated with all degrees of stunting (Table 4.14).

Table 4.14 Malnutrition by food insecurity/inaccessibility: forced to reduce the child's number of meals

Indicator	Forced to reduce the child's number of meals		Significance level
	Yes	No	
Prevalence of stunting (<-2 z-score)	63.8% (303)	57.9% (2093)	X^2 8.6, P < 0.01, df 1
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	31.6% (150)	29.4% (1062)	X^2 6.3, P < 0.05, df 2
Prevalence of severe stunting (<-3 z-score)	32.2% (153)	28.5% (1031)	

Similarly, going to bed hungry was found to be significantly associated with all degrees of stunting (table 4.15)

Table 4.15 Malnutrition by insecurity/inaccessibility: going to bed hungry due to food unavailability

	Went to bed hungry		Significance level
Indicator	**Yes**	**No**	
Prevalence of stunting (<-2 z-score)	64.9% (211)	58.0% (2185)	X^2 5.7, P < 0.05, df 1
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	35.7% (116)	29.1% (1096)	X^2 7.9, P < 0.05, df 2
Prevalence of severe stunting (<-3 z-score)	29.2% (95)	28.9% (1089)	

These findings may indicate that the food insecurity proxy indicators used in this survey are more sensitive to chronic food insecurity than to acute food insecurity, and hence it was associated with stunting which is a manifestation of chronic hunger. These findings are consistent with CFSS[71] and NFSSP[72] that found food insecurity and malnutrition are closely intertwined, with changes in one likely to impact the other, particularly in rural locations.

Similarly, food insecure children were found to be more prone to higher an overall morbidity (table 4.16), diarrhoea (table 4.17), ARI (table 4.18), and fever (table 4.19). These findings may provide an additional explanatory pathway for how food insecurity and malnutrition interact by decreasing the immunity of child and hence making him more susceptible to infection and initiate a vicious cycle of infection and malnutrition.[73]

Such important findings point to the extreme importance of prioritizing food security interventions in the surveyed areas, if child malnutrition and child health problems are to be defeated.

[71] WFP. Comprehensive Food Security Survey, Yemen. March 2010

[72] MoPIC and IFPRI. National Food Security Strategy Paper (NFSSP). Final Draft, February 2010

[73] Early child growth: how do nutrition and infection interact? A&T Technical Brief . Issue 3, June 2011: 1-10

Table 4.16 Overall morbidity in the two weeks preceding the survey, by different food insecurity/inaccessibility indicators

Indicator	Yes	No	Significance level
Decrease the child's meal size during last month	88.7% (487)	77.1% (2783)	X^2 38.1, P < 0.0001, df 1
Decrease the child's number of meals during last month	89.1% (435)	77.3% (2834)	X^2 36.2, P < 0.0001, df 1
The child went to bed hungry due to food unavailability	90.3% (299)	77.6% (2970)	X^2 29.3, P < 0.0001, df 1

Table 4.17 Diarrhoea in the two weeks preceding the survey, by different food insecurity/inaccessibility indicators

Indicator	Yes	No	Significance level
Decrease the child's meal size during last month	53.5% (293)	45.2% (1932)	X^2 12.9, P < 0.0001, df 1
Decrease the child's number of meals during last month	54.9% (268)	45.2% (1657)	X^2 13.2, P < 0.0001, df 1
The child went to bed hungry due to food unavailability	55.9% (185)	45.5% (1740)	X^2 29.3, P < 0.0001, df 1

Table 4.18 ARI in the two weeks preceding the survey by different food insecurity/inaccessibility indicators

Indicator	Yes	No	Significance level
Decrease the child's meal size during last month	79.7% (437)	63.7% (2300)	X^2 54.2, P < 0.0001, df 1
Decrease the child's number of meals during last month	81.4% (397)	63.8% (2340)	X^2 59.2, P < 0.0001, df 1
The child went to bed hungry due to food unavailability	81.6% (270)	64.5% (2467)	X^2 39.6, P < 0.0001, df 1

Table 4.19 Fever in the two weeks preceding the survey by different food insecurity/inaccessibility indicators

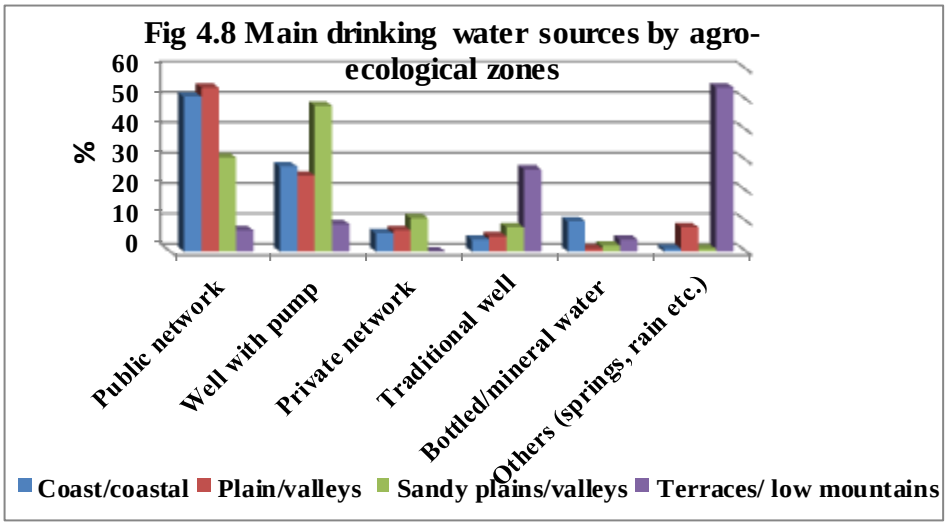
Indicator	Yes	No	Significance level
Decrease the child's meal size during last month	69.7% (382)	57.1% (2058)	X^2 31.4, P < 0.0001, df 1
Decrease the child's number of meals during last month	70.1% (342)	57.2% (2097)	X^2 29.6, P < 0.0001, df 1
The child went to bed hungry due to food unavailability	74.0%(245)	57.4% (2195)	X^2 34.7, P < 0.0001, df 1

4.6 WATER, SANITATION, AND HYGIENE (WASH)

WASH is one of the lifesaving programs that aim at reducing mortality and morbidity. Distribution of adequate, safe water and appropriate hygienic practices will reduces prevalence of waterborne diseases such as diarrhoea, and hence can reduce malnutrition. Lack of access to proper sanitation also affects children's health. Children living in poor sanitary conditions ingest high concentrations of faecal bacteria, which colonise the small intestine and induce tropical enteropathy which reduces nutrient absorption and leads to growth faltering.[74]

According to survey responses (Fig 4.8), around 50% of households have public/private network as the main source for drinking water. Wells with pumps are the second main source for drinking water (33.7%). These findings are consistent with findings from Al Hodeidah Food Security Baseline Survey,[75] where 53.7% of households get their drinking water through diverse networks (public 33.0%; cooperatives 13.0%; and private 7.7%) and nearly one third (32.2%) of households get their drinking water from wells equipped with pumps.

The main source for drinking water differs significantly by agro-ecological zone (fig 4.6). The public network is main source for plain and valleys (53.6%), while springs and rain collections is the main source for terraces and low mountains (53.5%) (X^2 2090.0, P < 0.0001, df 24). Similarly the main source for drinking water differs between urban/rural residents, where public network is the main source in urban areas (79.0%), while wells with pumps are the main source for rural areas (46.3%) (X^2 1220.5, P < 0.0001, df 8). These findings also coincide with the Al Hodeidah Food Security Baseline Survey,[75] which found a higher percentage of urban households that use the public network supply for their drinking water (81.2%), while very few rural households (0.41%) access the public network.



[74] Jean H Humphrey. Child undernutrition, tropical enteropathy, toilets, and handwashing. Lancet.com, Vol 374, September 19, 2009:1032-35

[75] MoPIC Food Security Baseline Survey 2010. Governorate of Al Hodeidah. Central Statistical Organisation, Government of Yemen. March 2011

Water treatment was found to be rare practice, with only 38 households (0.8%) treating water. Among them 34 were in rural areas (mainly – 19 – in sandy plains and valleys) and the majority (19) are treating water by filtering through clothes. Therefore, there is a need to raise awareness among community about the importance of treating drinking water, as this could have a positive impact on reducing diarrhoea and hence malnutrition.

When water source is divided into two groups – access to improved drinking water source (including different types of networks, and bottled water) and unimproved drinking water sources (including wells, rain collection, springs etc.) – those using unimproved drinking water sources are at higher risk of stunting and underweight, but not of acute malnutrition (table 4.20).

Table 4.20 Malnutrition by water sources

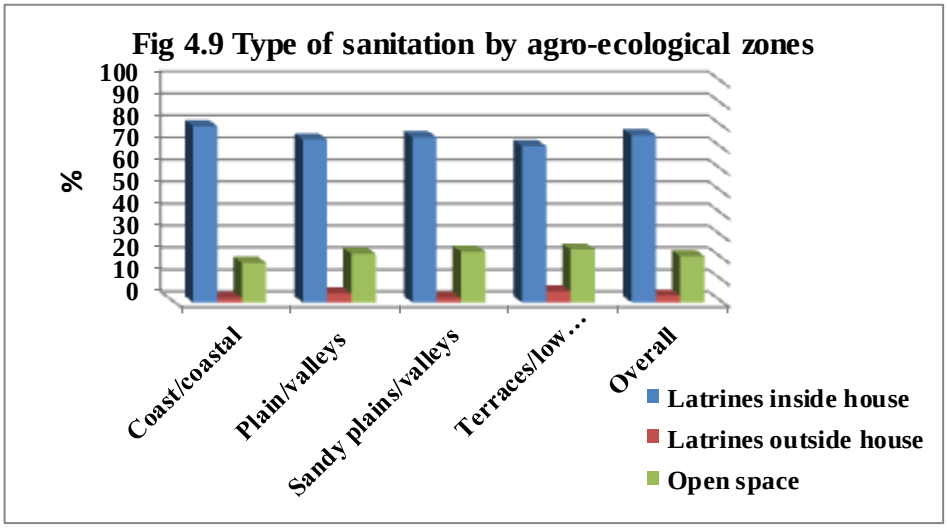
Indicator	Improved water source	Unimproved water source	Significance level
Prevalence of global acute malnutrition (<-2 z-score and/or oedema)	28.2% (468)	29.6% (411)	P > 0.05
Prevalence of underweight (<-2 z-score)	52.1% (864)	56.7% (791)	X^2 6.6, P < 0.01, df 1
Prevalence of stunting (<-2 z-score)	55.9% (932)	59.8% (842)	X^2 4.7, P < 0.05, df 1

Although a "dose-response" relationship found between the cumulative burden of diarrhoea (e.g., proportion of days with diarrhoea) and the likelihood of being stunted at 24 months of age,[76] we do not find a significant association between improved drinking water sources and diarrhoea.

Regarding sanitation, still more than one in five households is using open space for defecation. This is lower than the proportion found by the Al Hodeidah Food Security Baseline Survey (ca. one third of the population)[77]. This differs significantly between agro-ecological zones (fig 4.9). The use of open space for defecation was found to be highest in the terraces and low mountains, and lowest in coast and coastal zones: 24.2% vs. 17.9% (X^2 26.4, P < 0.01, df 9). The proportion also differs between urban/rural residents; using open space for defecation is much less in urban compared to areas: 1.6% vs. 29.9% (X^2 367.6, P < 0.0001, df 3). These findings are consistent with findings from the Al Hodeidah Food Security Baseline Survey,[77] which found the proportion of the population who use an open space for defecation is 2% of urban, and 43.5% of rural households.

[76] Early child growth: how do nutrition and infection interact? A&T Technical Brief. Issue 3, June 2011: 1-10

[77] MoPIC. Food Security Baseline Survey 2010. Governorate of Al Hodeidah. Central Statistical Organisation, Government of Yemen. March 2011



Using open space was found to be associated with higher prevalence of acute malnutrition (table 4.21). Although children living in poor sanitary conditions ingest high concentrations of faecal bacteria that leads to tropical enteropathy and malnutrition,[78] defecation in open space may also be associated with other household characteristics (e.g. socio-economic status, food insecurity, rural residency etc.), which may play a more important role in developing malnutrition than open space defecation.

Table 4.21 Acute malnutrition by using defecation practices

Indicator	Open space	Latrines	Significance level
Prevalence of global acute malnutrition (<-2 z-score and/or oedema)	33.0% (211)	27.7% (667)	X^2 6.8, P < 0.01, df 1
Prevalence of moderate acute malnutrition (<-2 z-score and >=-3 z-score, no oedema)	24.2% (155)	19.5% (470)	X^2 7.7, P < 0.05, df 2
Prevalence of severe acute malnutrition (<-3 z-score and/or oedema)	8.8% (56)	8.2% (197)	

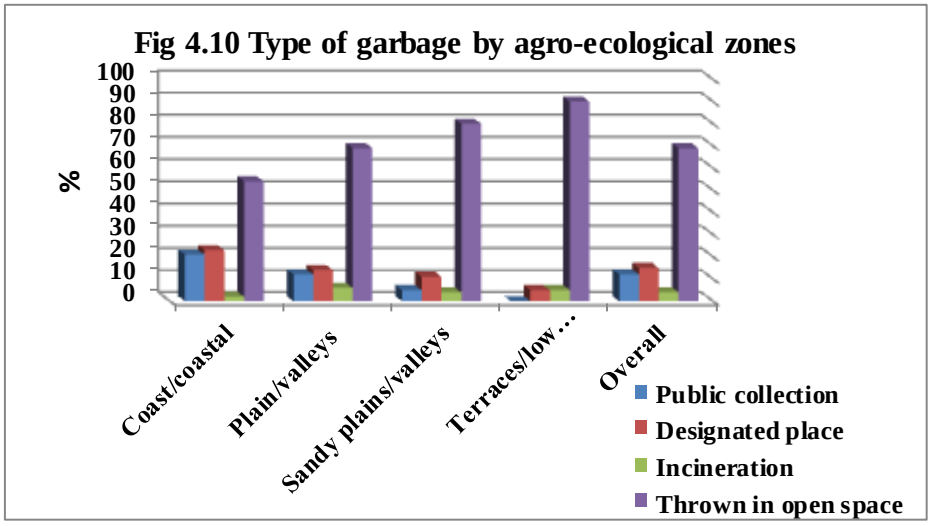
Recently, tropical enteropathy caused by faecal bacteria ingested in large quantities by young children living in conditions of poor sanitation and hygiene was proposed as the primary causal pathway for child undernutrition. This survey found that overall morbidity and diarrhoea in the two weeks preceding the survey are significantly associated with using open space for defecation (table 4.22). Therefore, provision of toilets and promotion of handwashing after faecal contact could reduce or prevent tropical enteropathy and its adverse effects on growth.[78]

[78] Jean H Humphrey. Child undernutrition, tropical enteropathy, toilets, and handwashing. Lancet.com Vol 374 September 19, 2009:1032-35

Table 4.22 Overall morbidity and diarrhoea in the two weeks preceding the survey by defecation practices

Indicator	Open space	Latrines	Significance level
Overall morbidity	80.9% (532)	76.5% (1863)	X^2 5.6, P <0.05, df 1
Diarrhoea	45.1% (296)	41.0% (999)	X^2 3.4, P =0.07, df 1

Concerning garbage disposal, more than two thirds of households throw garbage in open space. This finding is consistent with findings from the Al Hodeidah Food Security Baseline Survey, which found that 55.0% of the households dispose their waste in an open space.[79] This differs significantly by agro-ecological zone (fig 4.10), where the highest percent of throwing garbage in open space was found to be in terraces and low mountains and lowest in coast and coastal zones: 90.1% vs. 54.1% (X^2 280.7, P < 0.0001, df 12). Similarly throwing garbage in open space also differs between urban/rural residents: 32.0% vs. 85.4% (X^2 X^2 1224.7, P < 0.0001, df 4). This coincides also with the Al Hodeidah Food Security Baseline Survey, which found that throwing garbage in open space is more frequent among rural households (68.9%) than in urban areas, where 15.9% of the households do so.[79]



Throwing garbage in open space was found to be associated with higher prevalence of stunting and underweight but not with acute malnutrition (table 4.23). Whether this is one consequence of living in poor sanitary conditions that could make children ingest high concentrations of faecal bacteria leading to tropical enteropathy and malnutrition,[80] or confounded by other more influencing factors that could lead to malnutrition (e.g. socio-economic characteristics, food insecurity, rural residency etc) still needs more investigation.

[79] MoPIC Food Security Baseline Survey 2010. Governorate of Al Hodeidah. Central Statistical Organisation, Government of Yemen. March 2011

[80] Jean H Humphrey. Child undernutrition, tropical enteropathy, toilets, and handwashing. Lancet.com Vol 374 September 19, 2009:1032-35

Table 4.23 Malnutrition by garbage disposal

Indicator	Throwing garbage in open space	Throwing garbage in designated areas	Significance level
Prevalence of global acute malnutrition (<-2 z-score and/or oedema)	29.0% (610)	28..4% (269)	P > 0.05
Prevalence of underweight (<-2 z-score)	60.3% (1283)	51.9% (491)	X^2 18.8, P < 0.0001, df 1
Prevalence of stunting (<-2 z-score)	56.9% (1202)	48.1% (453)	X^2 20.1, P < 0.0001, df 1

Interestingly, throwing garbage in open space found to be significantly associated only with fever (table 4.24). This could be part of the environmental pollution with its possible negative impact on child health.[81]

Table 4.24 Fever in the two weeks preceding the survey, by garbage disposal

Indicator	Throwing garbage in open space	Throwing garbage in designated areas	Significance level
Fever	60.7% (1299)	49.1% (467)	X^2 36.7, P <0.0001, df 1

[81] UNEP. Environmental Pollution and Impacts on Public Health. http://www.unep.org/urban_environment

5. SUMMARY TABLE OF KEY FINDINGS

Terraces and low mountains	Sandy plains and valleys	Plain and valleys	Coast and coastal	Overall	Indicator
770	750	797	787	3104	Total number of study households
1099	1181	1229	1159	4668	Number of U5 children surveyed
20.7 (20.1-21.2)	30.5 (30.3-30.8)	34.3 (34.0-34.5)	32.5 (32.2-32.7)	31.7 (31.5-31.8)	Global acute malnutrition rate – Weight for height <-2 Z score or presence of oedema with 95% CI
6.3 (5.9-6.6)	9.8 (9.7-10.0)	10.3 (10.1-10.4)	10.1 (9.9-102)	9.9 (9.8-10.0)	Severe acute malnutrition rate – Weight for height <-3 Z score or presence of oedema with 95% CI
57.9 (57.3-58.4)	60.8 (60.6-61.0)	62.6 (62.4-62.9)	55.8 (55.6-56.1)	59.6 (59.5-59.7)	Underweight rate – Weight for Age <-2 Z score with 95% CI
64.0 (63.4-64.6)	57.6 (57.4-57.8)	55.0 (54.8-55.3)	48.9 (48.6-49.1)	54.5 (54.3-54.6)	Stunting rate – Height for Age <-2 Z score with 95% CI
53.9	44.4	47.6	43.3	45.4	% of U5 children having diarrhoea two weeks prior to survey
67.1	64.9	64.7	62.3	64.1	% of U5 children having ARI two weeks prior to survey
69.1	58.5	56.9	55.6	57.7	% of U5 children having fever two weeks prior to survey
3.8	1.1	2.8	3.6	2.5	% of children (9-59 months) suspected measles three months prior to survey

Terraces and low mountains	Sandy plains and valleys	Plain and valleys	Coast and coastal	Overall	Indicator
67.9	74.6	72.1	76.4	74.2	% Children (9-59 months) immunized against measles (by card & recall)
32.6	26.9	32.4	39.4	32.6	% of children (9-59 months) received vitamin A supplementation in the past 6 months
18.2	12.7	7.2	4.1	9.2	% of children (0-6 months) on exclusive breastfeeding
21.7	29.4	28.1	40.7	32.3	% of children (6-23 months) on diversified food
10.7	15.9	17.2	7.0	13.2	% of children (6-59 months) their meal's size was reduced during the month prior the survey
8.6	15.7	14.5	5.3	11.7	% of children (6-59 months) their meal's numbers were reduced during the month prior the survey
7.6	9.3	9.8	5.0	8.0	% of children (6-59 months) went to bed hungry due to food unavailability
6.8	41.8	60.9	57.2	49.9	% of household on public/private water network
24.2	23.1	22.5	17.9	21.3	% of household using open space for defecation
90.1	79.8	68.6	54.1	69.2	% of household throwing garbage in open space

6. RECOMMENDATIONS

The fact that the prevalence of acute malnutrition found in Al Hodeidah governorate is high above the critical emergency threshold (≥15) indicates a need for an integrated response with both shorter term (to avert malnutrition-related death) and longer term mechanisms (to enhance nutrition and reduce incidence of malnutrition). The following recommendations should be considered by different parties, i.e. government (e.g. MoPHP and its governorate and district health offices, district local authorities/local councils) as well as by donor community:

1- **Response**

a. Expand the Community-based Management of Acute Malnutrition to include management of both severe and moderate acute malnutrition through the establishment of OTPs in all operational health facilities, along with setting up outreach/ mobile services and SFPs (to treat moderately malnourished children MAM).

b. There is a demand to strengthen the capacity to screen for malnutrition both at health facility and community level. Health facilities' staff as well as community volunteers should be sensitized on how to identify moderate and severe acute malnutrition. Health workers should also be informed and trained on appropriate management of acute malnutrition, including standardization of protocols on referrals, treatment and the use of therapeutic foods.

c. With the high magnitude of moderate acute malnutrition, particularly in the under 24 months age group, emergency nutrition programmes should focus primarily on this age group through the provision of appropriate blanket food supplementation as well as the promotion of appropriate IYCF, CMAM, health and WASH practices at household level, so as to address the main underlying causes of malnutrition and the needs of this specific age group.

d. As malnutrition was found to be closely related to morbidities (including diarrhoea, fever, and ARI) there is a need to pay special attention to the underlying health causes of malnutrition. Furthermore, there is a need for improving access to health facilities for treatment.

e. Given that the coverage of measles vaccination and vitamin A supplementation was found to be far below the target, and in view of reported measles cases and known positive impact of vitamin A supplementation on morbidity, local health systems such as fixed health facilities, outreach/ mobile services, campaigns etc. should be supported to expand routine immunizations and supplementation of vitamin A coverage.

f. With a wide gap between measles vaccination coverage and vitamin A supplementation in spite of the concurrent delivery policy, there is a need to advocate for enforcing such policy through appropriate micro planning and implementation.

g. Due to the very low exclusive breastfeeding rate and the limited food diversity found in this survey, there is a need to launch innovative IYCF community-based approaches in the surveyed area for compacting the high malnutrition in infant and young children as well as improving overall child health .

h. In view of the low coverage of health services (sites for OTPs) and the need for prevention of SAM cases, and as food insecurity has been found to be a problem and linked to malnutrition, there may be a need to consider radical strategies like blanket supplementation rather than specific targeting in order to ensure food aid adequacy (content and quantity).

2- **Follow-up**

a. The nutrition, health and food security situation in Al Hodeidah should be monitored on a regular basis (e.g. bi-yearly) until rates of GAM decrease to below the WHO ≥ 15% critical emergency threshold.
b. The nutritional status of children should be monitored more frequently by means of national and sub-national nutrition surveys (e.g. DHS). Updates on nutritional status of U5 children in the survey area, as well as in other parts of the country, should be encouraged in order to quickly identify and respond to evolving emergencies.
c. Further investigation is recommended into underlying factors related to malnutrition, the age/sex specific causes of acute malnutrition, IYCF, WASH practices, etc.
d. In view of important associations between WASH and malnutrition, it may worth considering conducting a WASH-nutrition/health linkage study for increased understanding of the underlying causes/associations, and in order to design appropriate WASH interventions.
e. It is crucial to investigate feasible cost-effective means through long-term food security interventions. This should entail relevant inputs that reflect livelihood options (e.g. crop production, labor, fishing etc) along with monitoring food access, prices, and market availability of essential commodities (rice, oil, vegetables and sugar).

7. ANNEXES

ANNEX 1

Map of the survey area

ANNEX 2

Assignment of clusters

1- Coast and coastal strata:

District	Ozla	Enumeration area
Al Luhaiah	Rob AlSham	AlAbasiah
	AlZa'lia Rob AlSama'li	Mahal Soroor
	Rob AlMaqrani AlZa'alia'	Dair AllMahnab
	AlBajia	AlArma
	Rob AlDos	AlDarsiah
Al Muneerah	Rob AlQaham	Ibn Abbas
	Rob AlQaham	Mahal Zawiah
Al Duraihemi	AlManafera	AlKanbahia
	AlMaghalesa	AlJareha
Al Khokha	AlKhokha	AlKhokha
	Dawbala	Aqda
Al Hawak	AlHawak	AlDohmia
	AlHawak	AlHawaq AlSofla
	AlHawak	Gholail
	AlHawak	AlSabalia
	AlHawak	AlRabsa
Al Meena	AlMeena	AlQala AlHai AlTegari
	AlMeena	Alzabaria AlJanobia
	AlMeena	AlTurk
Al Hali	AlHali	AlBaidha AlShamalia
	AlHali	AlSalakhana AlGharbia
	AlHali	AlSalakhana AlSharqia
	AlHali	AlShuhada AlJanobia
	AlHali	AlDakhl AlMahdood - B
	AlHali	Arwa AlHakeemi
Al Tohaita	AlTohaita	AlTohaita
	AlTohaita	AlSowaiq
	AlMaghras	AlMagras
	AlMateena	AlJablia
	AlQarashia AlSufla – AlTohaita	AlMadman

2- Plains and valleys strata:

District	*Ozla*	*Enumeration area*
Al Zuhra	AlZuhra Rob AlWadi	Mahal Qarnain
	AlZuhra Rob AlWadi	Alrafee
	AlFaraneta	Dair Ali Hasan
	Rob AlSham	Dair Abkar
	Rob AlSham	Kudf Abdullah
	AlRob AlSharqi	AlMalaq
	AlRob AlSharqi	Kudf Bani Adhabi
Al Zaidiah	AlZaidiah	AlZaidiah
	AlZaidiah	Dair AlWjeeh
	AlHashabera	Dair Al-Bahri
	AlAtawiah	Dair Ali

	AlAtawiah	AlHareeqiah
District	***Ozla***	***Enumeration area***
Al Dahi	AlJarabeh AlSufla	AlDahi
	AlJarabeh AlSufla	AlGarfa
	AlJarabeh AlOlia	AlKadan
Al Marawea'a	Almarawea'a	Almarawea'a
	Almarawea'a	AlSharaqieah
	AlQutaie	AlQutaie
	AlRaqaba	AlAnaqees
	AlQatamela	AlDawenia
	AlFalafela	AlGhuwaidia
Zabeed	Zabeed	Zabeed
	Zabeed	Mahwa AlRoa'a
	AlTaraiba	AlTaraiba
	AlQarashia AlSufla – Zabeed	AlMadania
	AlMahat	Alrefaie
	AlQarashia	Basat
	Belad AlSalama	Mahaw Alboyahel
	AlZaraiba	AlEtr
	Mahal AlMubarak	Abkar AlHaj

3- Sandy plains and valleys strata:

District	***Ozla***	***Enumeration area***
Al Qanawes	Kashareb	Dair Salem
	Bani Mahdi	AlDawoodiah
	AlMahadela	AlNashad AlGharbi
Al Meghlaf	Bani Mahamad-Meghlaf	AlMinwab
	Bani AlBarah	Mahal AlReeh
Bajil	Bajil	Bajil AlMustashfa
	Bajil	Bajil Dair Altaam
	AlJamadi	Dair AlSohail
	AlKhalfia	AlAshraf
	AlKhalfia	AlOrj
	AlDhamer	AlHaid
Al Sokhna	AlRamia AlSufla	Beyot AlBodha
	AlRamia AlOlia	AlMahalatain
Al Mansoriah	AlManasera	AlMansora
	AlManasera	Mahalat AlManasera
Bait Al faqeeh	Bait Alfaqeeh	Bait Alfaqeeh AlSaleefain
	Bait Alfaqeeh	Bait Alfaqeeh AlMahazera
	AlTaraf AlYamani	AlHusainia
	AlTaraf AlYamani	Alsulaikiah
	AlTaraf AlYamani	AlMadhrab
	AlTaraf AlYamani	AlHasania
	AlTaraf AlShami	AlMahabeeb
	AlTaraf AlShami	AlJanadiah
	Bani Mohamad-Bait AlFaqeeh	Mahwa AlAzab
Hais	Hais	Hais
	Bob AlHadhrami	AlJamadi
Al Jarrahi	AlMoasela	AlJarrahi
	AlMoasela	Mahwa AlMashra
	AlMoasela	AlBaroodi
	AlRakab	AlAghyooth

4- Terraces and low mountains:

District	*Ozla*	*Enumeration area*
Al Hajjaila	AlQeta'a AlOlia	AlHajjaila
	AlQeta'a AlOlia	Al-Walaj
	AlQeta'a AlSufla	Abal
	AlQeta'a AlSufla	Samhar
Bora'	Belad AlSharq	Maboora
	Belad AlSharq	Abr Saa'd
	AlKhuZaee	AlDar
	AlKhuZaee	AlDari
	AlMostah AlSharqia	Namra
	AlMostah AlGarbia	AlGhailain
	AlMostah AlGarbia	Jadeedah
	Bani Sulaiman	AlKhadhra
	Bani Sulaiman	Antra
	Bani Sulaiman	Sanab
	Bani Baqi	Akamat Bani Baqi
	Belad AlTarf	Al-Maqfa'
	Belad AlTarf	AlNiaba
Jabal Ras	AlMareer	AlMareer
	Khunna	AlQuba'a
	Al-Qahra	AlHesnain
	AlAshaeir	AlKudf
	AlAshaeir	Osaiq
	Mataweefa Olia	Hameedha
	Dabas	AlHoot
	Dabas	AlMentasha
	Dabas	AlTurba Alsufla
	AlKhan	AlZalein
	Bani Hatem	AlGhowail
	AlMagareen	AlHadhan
	AlNadafa	AlHaisi

ANNEX 3

Survey methodology technical guideline

الدليل الإرشادي للمسح

1- تحديد تاريخ زيارة العنقود

في العادة فإن تاريخ الزيارة للعنقود يجب ان يتم اختيارها بمساعدة السلطات المحلية من اجل تفادي انشغال الناس في التسوق، أوفي أى مناسبات محلية، أو أيام توزيع الغذاء، أو حملات التطعيم، او أي اوقات يحتمل ان يكون الناس بعيدين عن منازلهم. في المناطق الزراعية هناك إحتمال أن تكون النساء في معظم النهار في المزارع أو الحقول.

الأطفال الأصحاء هم الأكثر مرافقة للكبار في السوق أو في الحقول، وهم الأقل أقل احتمالا من التواجد في المنزل من الأطفال المرضى أو الذين يعانون سوء التغذية. نتائج الدراسة ستكون خاطئة إذا أعتمدت العينة على الأطفال الموجودين فقط في المنزل. حيثما كان ممكنا ، فإن فريق المسح ينبغي أن يصل إلى الموقع في وقت مبكر جدا من الصباح.

2- التحضير للمغادرة نحو موقع الدراسة

تأكد من وجود كل المواد اللازمة وجميع أعضاء الفريق قبل المغادرة.

1. الحصول على خطابات رسمية من الجهات ذات العلاقة لتسهيل إجراء المسح موجهة إلى المشائخ وعقال القرى تطلب التصريح بالزيارات الى المساكن المختارة مع أسرها. يجب ان تحتوى هذه الرسائل توضيح عن اهداف المسح.
2. تأكد من ان جميع اعضاء الفريق في السيارة، وكل منهم يحمل بطاقته التعريفية والهاتف الخلوى.
3. التاكد من أن جميع مستلزمات المسح موجودة (الاستمارات، وكافة المقاييس، ونماذج التقارير، واستمارات الإحالة، والأوراق الملونة، والأقلام، والدباسة، والدبابيس، والظروف، واقلام العلامة، ... الخ)
4. تاكد بأن هاتفك الخلوي مشحون ويعمل بشكل جيد.
5. تاكد من توفر ماء وأغذية خفيفة للفريق.

3- مقابلة قادة المجتمعات والسلطات المحلية

من الضروري للغاية اللقاء مع قادة المجتمع المحلي والسلطات المحلية قبل بدء جمع البيانات. هذا ينبغي أن يتم على الفور بمجرد وصول الفريق الى القرية. اللقاء يجب ان يغطي النقاط الاتية:

- تقديم فريق المسح إلى قادة المجتمع المحلي.
- الشرح للمجتمع أهداف المسح وإجراءاته: هذه سوف تشمل شرحا حول كيفية اختيار قريتهم عشوائيا وان اختيار الأسر منهجيا، وليس له علاقه بالمعونة الغذائية.
- تأكد من أن قادة المجتمع فهموا هدف المسح، إذا لم يفهم الساكنين أهداف المسح فإنهم قد لا يكونوا متعاونين مع الفريق.
- احصل على معلومات على العدد الاجمالي للاسر والمنازل في القرية، وعن حدود القرية.

- تأكد من عدم وجود مشاكل قد تؤثر على أمن الفريق.
- أوضح اهمية نتائج هذه الدراسة، وناقش الجوانب الممكنة للتوقعات، والبرامج المحتمل تنفيذها. يجب عدم وضع وعود قد لا تتحقق.

4- اختيارالمنازل

1- بداية يجب على المشرف أن يتأكد أن عاقل القرية يدرك تماما العمل الذي يتم من أجل سحب العينة ويمكن جعله يشارك في ذلك.

2- قم مع عاقل القرية بتحديد حدود القرية ثم حدد مركز القرية وتوجه مع العاقل والفريق إلى المركز.

3- قم بتحديد الفترة البيتية كالتالي:

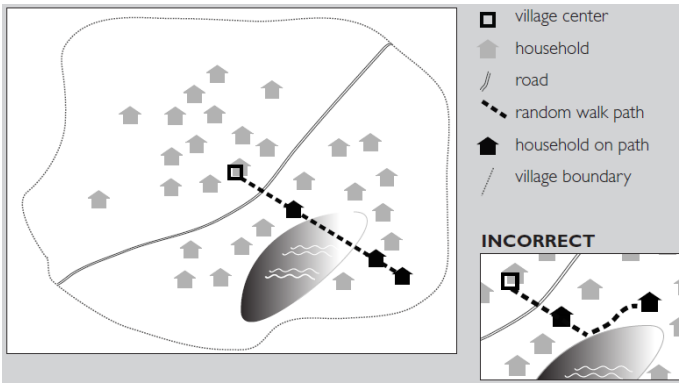
- أطلب من العاقل أن يبين لك عدد المساكن في القرية ثم قم بقسمة عدد المساكن على 30 للحصول على الفترة البيتية. إذا كان عدد المساكن في القرية هو 70 فإن الفترة البيتية هي 2.
- عند حساب الفترة البيتية فإنه يجب تقريب العدد إلى الأدنى.
- في حالة عدم المعرفة لعدد المساكم فيتم إعتماد الرقم الذي زود به الفريق في قائمة العناقيد.

4- عند مركز القرية، خذ قلما وارمه إلى الأعلى ثم لاحظ إتجاه رأس القلم عندما يسقط على الأ رض. من الأفضل أن تطلب من عاقل القرية القيام بهذا العمل.

5- قم مع الفريق بالمشي مع الفريق عاقل القرية في إتجاه رأس القلم وبشكل مستقيم حتى تصل إلى حدود القرية.

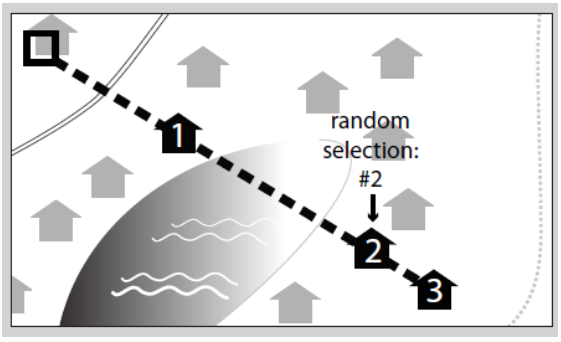
6- في هذا الخط المستقيم قم بترقيم كل المساكن التي تقع في طريقك ودون اسم صاحب البيت أو المقيم فيه لسهولة الرجوع إلى المسكن الذي سيقع في العينة.

7- تكتب أرقام المساكن التي سجلت في قصاصات وتلف، وعشوائيا أطلب من عاقل القرية أن يختار إحداهن.



8- الورقة التي أختارها العاقل تحمل رقم أول مسكن في العينة، والذي يجب أن يبدأ به الفريق.

9- المنزل التالي هو المنزل رقم 3 الذي يقع على يمينك عندما تجعل الباب الأمامي للمنزل الأول في مواجهتك (هذا في حالة كانت الفترة البيتية هي 2). وهكذا في كل مرة يتم إضافة الفترة البيتية لتحديد المسكن التالي.



10- إذا وصلت إلى حدود القرية ومازلت بحاجة لعدد أخر من المساكن فقم بالدوران 90 درجة إلى اليسار ثم ابدأ بالمسكن الأقرب، ثم كرر الخطوات السابقة باختيار المسكن الأيمن لهذا المسكن.

11- إذا وجدت أن هناك صعوبة في إختيار مساكن جديدة فعليك التوجه مرة أخرى إلى مركز القرية ثم قم برمي القلم وتكرار الخطوات السابقة.

إذا كان العدد الاجمالي للمساكن هو 30 أو اقل فيجب أخذ كل المساكن، واستكمال العدد من أقرب قرية. القرية.

إذا كان العدد الاجمالي للمساكن أكثر من 250 فانه يتوجب على المشرف تجزأة العنقود بالتشاور إلى جزئين متساويين بالتشاور مع عاقل القرية.

1- قم مع عاقل القرية برسم كروكي لخارطة القرية ثم تقسيمها إلى جزأين يتسويان تقريبا في الحجم السكاني، وتحديد حدود لكل قسم.

2- خذ قصاصتين من الورق واكتب على الأولى رقم (1) والثانية الرقم (2) ولفهما وارك أحدهما يختار عشوائياً إحدى القصاصات.

3- الرقم الذي سيتم اختياره هو رقم الجزء الذي سيتم التعامل معه كعنقود.

لايوجد بدائل (عدم الاستبدال)

كل منزل وقع في العينة لا يجوز استبداله مهما كانت الاسباب، حتى لو رفض القاطنين فيه التجاوب أو المشاركة أو كان أهله غائبين في ذلك اليوم أو كان المسكن في موقع يصعب الوصول إليه. السكان المحليين سيحاولون توجيه الفريق لمنازل معينة وتجاهل منازل أخرى لذا لا يجب الاستجابة لهم.

المساكن المهجورة أو الفارغة لا تدخل بالعد وينبغي تجاهلها

ينبغي على المشرف التحرى عن أسباب فراغ هذا المنزل، وفيما إذا كان القاطنين سيعودون قبل مغادرة الفريق للقرية. إذا كان أهل المسكن سيعودون فعلى الفريق العودة إلى المسكن قبل مغادرة المسكن ويحسب ضمن عينة المسح. أما إذا كان فارغا فيحب تجاوزه وعدم حسابه في العينة.

المساكن غير المؤهلة لا تدخل بالعد وينبغي تجاهلها

المسكن غير المؤهل هو الذي به أسرة لاينطبق عليها تعريف الاسرة المتفق عليه هذا المسح وهو: الأسرة المعيشية التي يشترك أفرادها في مطبخ واحد شريطة أن يوجد بها طفل واحد على الأقل بعمر يقل عن خمسة سنوات، أو كان بها طفل بعمر يقل عن 5 سنوات توفى خلال عام من تاريخ المسح.

5- إختيار الأطفال لإجراء القياسات الانثربومترية وبقية استبيان الطفل

جميع الاطفال في الأسرة بعمر اقل من 5 سنوات يجب أن تشملهم العينة حتى لو كان هناك توائم أو أطفال معاقين.

6- الغائبين من الأطفال

إذا كان الطفل غائب عند الزيارة، فإنه يجب العودة قبل مغادرة موقع المسح وأخذ قياسه واستكمال الاستبيان. إن إغفال الأطفال الغائبين يعني إغفال الأطفال الأحسن حالاً وهذا يؤثر على جودة المسح.

7- الطفل في المستشفى

إذا كان الطفل قد تم ادخاله مستشفى، فانه يتوجب على فريق المسح التوجه إلى المستشفى وقياسه هناك.

8- الحالات التي تحتاج إحالة

يجب إحالة الطفل الذي يعاني من سوء تغذية حاد وخيم بحسب المعايير التي تم الإتفاق عليها في التدريب.

9- تعزيز دقة البيانات التي تم جمعها

مع نهاية كل يوم يجب على رئيس الفريق

- ترتيب جميع الاستبيانات وتعبئة الإستمارة الخاصة بفحص جودة الفرق وتسليمها لمدخلي البيانات حيث سيتم إدخالها في الكمبيوتر فورا.
- مراجعة استمارات حصر العينة المسلمة له من الباحثات من واقع الاستبيانات المعباة وعمل إجمالياته.
- عمل تقرير العنقود وتسليمه للمشرف الميداني.

في صباح اليوم التالي وقبل تحرك الفرق سيكون هناك جلسة قصيرة لتوضيح جودة عمل اليوم السابق لكل فريق

إرشادات بالنسبة للمدينة

- نظرا لكبر الحارات فإنه يجب تقسيمها إلى أجزاء (أرباع أو أنصاف) بحيث يحتوى الجزء بين 200 و 250 مبنى تقريبا، ويتم ترقيم الأجزء ويسحب الجزء الذي سيتم المسح فيه (العنقود) بالقرعة.
- في كل عنقود في المدينة يتم سحب 30 عمارة أو مبنى عشوائياً.
- كل شقة في عمارة تمثل اسرة يجب قياس كل الأطفال الأقل من 5 سنوات فيها وتعبئة كل الإستبانات.
- في كل عمارة مسحوبة يتم التحري عن الشقق المؤهلة (نفس تعريف المسكن المؤهل) وترقيمها في قصاصات ورقية ثم سحب أحدها بالقرعة.

ANNEX 4

Questionnaires

1- Household questionnaire

الجمهورية اليمنية
وزارة الصحة العامة والسكان
مكتب الصحة العامة والسكان بمحافظة الحديدة

مسح الحالة التغذوية للأطفال تحت سن الخامسة في محافظة الحديدة – أكتوبر 2011

استبيان الأسرة (نموذج 1)

أولاً. يتم الشرح للساكنين في المسكن (البالغين منهم) عن المسح والتعريف بالجهة القائمة عليه والأشخاص العاملين فيه (أعضاء الفريق)، ثم بعد ذلك الحصول على الموافقة الشفهية منهم.

		نعم	.1	الموافقة
انتقل إلى النهاية		لا	.2	

	تاريخ المقابلة	ي ي	ش ش	س س س س
				1 1 Ø 2

القرية أو الحي	العزلة	المديرية
الاسم	الاسم	الاسم

	اسم رب الأسرة:

التوقيع	الاسم	ملئ الاستبيان من قبل

التوقيع	الاسم	راجع الاستبيان
		رئيس الفريق

بين فيما إذا كان هناك:

	غياب كل من في المنزل حتى بعد الزيارة الثانية	.1

يملئ من قبل رئيس الفريق (تستخدم لإدخال البيانات)

	الغياب حتى بعد الزيارة الثانية (1 نعم ، 2 لا)
	الموافقة (1 نعم ، 2 لا)

		رقم الفريق

				رقم استبيان الأسرة

س س س س		ش ش		ي ي		تاريخ المقابلة
2	Ø	1	1			

	هل المنطقة حضرية (1) أم ريفية (2)

		رمز العزلة				رمز القرية أو الحي
1	8	رمز المحافظة				رمز المديرية
		رقم العنقود				رقم محور المسح

سجل المسافة بين مكان المسح (العنقود) واقرب مرفق صحي

نوع المرفق			**وذلك:**			**مقاسة بالـ:**			**يبعد المرفق مسافة**
	وحدة صحية	1		مشياً على الأقدام	1		الدقائق	1	
	مركز صحي	2		ركوبا بالسيارة	2		الساعات	2	.....
	مستشفى	3		أو بالحمار	3		الكيلومترات	3	

العمل المكتبي

التوقيع				**السنة**				**الشهر**		**اليوم**		**الاسم**	
													إدخال البيانات
													المراجعة

الملاحظات
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س 001: بيانات عن الأسرة (الأحياء فقط والذين يعيشون بشكل دائم معا)

	العدد		
H001a	عدد الأفراد الذكور في الأسرة (الأحياء فقط الذين يعيشون مع الأسرة)		
H001b	عدد الأفراد الإناث في الأسرة (الأحياء فقط الذين يعيشون مع الأسرة)		
H001c	عدد الأطفال الذكور أقل من 5 سنوات (الأحياء فقط الذين يعيشون مع الأسرة)		
H001d	عدد الأطفال الإناث أقل من 5 سنوات (الأحياء فقط الذين يعيشون مع الأسرة)		

س 002 – س 005: بيانات عن الماء والإصحاح البيئي في المسكن

إنتقل إلى	ماهو المصدر الرئيسي لمياه الشرب في المسكن (خيار واحد فقط)			
		شبكة عمومية.	.1	H002
		وايتات.	.2	
		شبكة خاصة.	.3	
		بئر بمضخة.	.4	
		بئر تقليدية.	.5	
		غيل/ نبع.	.6	
		سد.	.7	
		برك/ جمع مياه الأمطار	.8	
		مياه دبب صحية (كوثر)/ قوارير معدني	.9	
		أخرى:	.10	

إنتقل إلى	هل تقومون بمعالجة الماء قبل الشرب؟			
		نعم	.1	H003a
H004 ←		لا	.2	
H004 ←		لا أعرف	.3	

	ماهي طريقة المعالجة الرئيسية المستخدمة (خيار واحد فقط)			H003b
	الغلي والتبريد قبل الشرب	.1		
	استخدام الكلور أو الكلوركس	.2		
	الترشيح بقماش	.3		
	استخدام مرشح سيراميك أو رمل أو ماشابه	.4		
	ترقيد الماء قبل الشرب	.5		
	استخدام الشب (شب الفؤاد)	.6		
	أخرى:	.7		

	مانوع الإصحاح الرئيسي المستخدم حاليا في المسكن (خيار واحد فقط)			H004
	حمام داخل المسكن	.1		
	حمام خارج المسكن	.2		
	العراء	.3		
	أخرى:	.4		

	ماكيفية التخلص الرئيسية من النفايات (خيار واحد فقط)			H005
	خدمة عمومية لجمع النفايات	.1		
	وضعها في مكان مخصص	.2		
	رميها في مكان مكشوف	.3		
	الحرق	.4		
	أخرى:	.5		

خاص بالوفيات

يملئ من قبل رئيس الفريق (تستخدم لإدخال البيانات)

رقم الفريق		

رقم استبيان الأسرة				

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2 Ø 1 1			

رمز العزلة		رمز القرية أو الحي
رمز المحافظة		رمز المديرية
رقم العنقود		رقم محورالمسح

العمل المكتبي

	التوقيع	السنة				الشهر		اليوم		الاسم	
إدخال البيانات											
المراجعة											

الملاحظات

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	M01	M02	M03	M04a	M04b	M04c	M05
رتبي الولادات الحية بحسب الأقدمية خلال الخمس السنوات الأخيرة (سواء كانوا حاليا احياء أو متوفين خلال سنة من الآن)	النوع 1- ذكر 2- أنثى	تاريخ الولادة (ميلادي أو هجري)	مازال على قيد الحياة 1- نعم 2- لا انتقل للنهاية	أجب عن سؤال وحد فقط من هذه الأسئلة الثلاثة تاريخ الوفاة (ميلادي أو هجري)	العمر عند الوفاة (بالأشهر)	قبل كم كانت الوفاة	سبب الوفاة
		يوم شهر سنة		يوم شهر سنة	شهر	شهر	
		يوم شهر سنة		يوم شهر سنة	شهر	شهر	
		يوم شهر سنة		يوم شهر سنة	شهر	شهر	
		يوم شهر سنة		يوم شهر سنة	شهر	شهر	
		يوم شهر سنة		يوم شهر سنة	شهر	شهر	
		يوم شهر سنة		يوم شهر سنة	شهر	شهر	

2- Child questionnaire

الجمهورية اليمنية
وزارة الصحة العامة والسكان
مكتب الصحة العامة والسكان بمحافظة الحديدة

مسح الحالة التغذوية للأطفال تحت سن الخامسة في محافظة الحديدة – أكتوبر 2011

استبيان الطفل (نموذج 2)

	س س س س	ش ش	ي ي	تاريخ المقابلة
	2 Ø 1 1			

القرية أو الحي	العزلة	المديرية

					رقم استبيان الأسرة (يرجى العودة لاستبيان الأسرة وتسجيل الرقم في راس الصفحة الأولى)

اسم الطفل:	
اسم الأم:	

التوقيع	الاسم	ملئ الاستبيان من قبل
		انثروبومتري
		بقية الاستبيان

التوقيع	الاسم	راجع الاستبيان
		رئيس الفريق

بين فيما إذا كان هناك:		
	غياب الطفل حتى بعد الزيارة الثانية	.1
	الطفل يرقد في مستشفى (يجب الوصول إلى الطفل واستكمال كل بيانات الاستبيان)	.2

يملئ من قبل رئيس الفريق (تستخدم لإدخال البيانات)

	غياب الطفل حتى بعد الزيارة الثانية (1 نعم ، 2 لا)

		رقم الفريق

				رقم استبيان الأسرة
				رقم استبيان الطفل

تاريخ المقابلة	ي	ي		ش	ش		س	س	س	س
							1	1	Ø	2

رمز العزلة			رمز القرية أو الحي
رمز المحافظة			رمز المديرية
رقم العنقود			رقم محور المسح

العمل المكتبي

التوقيع	**السنة**				**الشهر**		**اليوم**		**الاسم**	
										إدخال البيانات
										المراجعة

الملاحظات

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C001 – C007: القياسات الانثروبومترية (الجسمانية) (كل الأعمار)

C001a	تاريخ ولادة الطفل (بالميلادي أو الهجري)	**يوم**	**شهر**	**سنـــــة**
		☐☐	☐☐	☐☐☐☐

إنتقل إلى
C002

C001b	عمر الطفل بالأشهر (الرجاء عدم استخدام هذا السؤال إلا عند الضرورة القصوى وفي حالة استخدامه فإنه يرجى التحرى لأقرب نصف شهر)	**الأشهر** ☐☐.☐

C002	جنس الطفل		
	.1	ذكر	
	.2	أنثى	

C003a	طول / ارتفاع الطفل بالسنتيمتر (ØØØ. Ø)	**سنتيمتر** ☐☐☐.☐

C003b	وضعية قياس ارتفاع الطفل		
	.1	واقف	
	.2	مستلقي	

C004a	وزن الطفل بالكيلو جرام (ØØ. ØØ)	**كيلوجرام** ☐☐.☐☐

C004b	رقم الميزان المستخدم	**الرقم** ☐☐

C005	محيط ذراع الطفل بالسنتيمتر (ØØ. Ø). (للأطفال الأكبر من شهرين ونصف)	**سنتيمتر** ☐☐.☐

C006	هل يعاني الطفل من أي إعاقة حركية (قد تؤثر على قياس الطول) - بالملاحظة		
	.1	نعم	
	.2	لا	

C007	وجود التوذم؟ اضغطي لـ 3 ثواني على كلتا القدمين و انظري إن كان هناك توذم في كلتيهما؟		
	.1	نعم	
	.2	لا	

C008 – C011: صحة الطفل (كل الأعمار)

	هل عانى (اسم الطفل) من الإسهال خلال الإسبوعين السابقين؟			
	نعم		.1	**C008**
	لا		.2	
	لا تعرف		.3	

	هل عانى (اسم الطفل) من سعال أو رشح (زكام) أو إلتهاب في اللوزتين أو الحلق، أو ألم في الأذن أو خروج قيح منها خلال الإسبوعين السابقين؟			
	نعم		.1	**C009**
	لا		.2	
	لا تعرف		.3	

	هل عانى (اسم الطفل) من الحمى خلال الإسبوعين السابقين؟			
	نعم		.1	**C010**
	لا		.2	
	لا تعرف		.3	

C011 – C013: حالة الرضاعة (كل الأعمار)

إنتقل إلى				
	هل سبق وأن رضع الطفل من ثدي أمه؟			
	نعم		.1	**C011**
← فلتر 1	لا		.2	
← فلتر 1	لا تعرف		.3	

إنتقل إلى				
	هل مازال يرضع من ثدي أمه حاليا؟			
← فلتر 1	نعم		.1	**C012**
	لا		.2	
← فلتر 1	لا تعرف		.3	

	الأشهر	عمر الطفل بالأشهر عندما توقف عن رضاع الثدي؟ (يرجى التحرى لأقرب نصف شهر) – سجلي القيمة (9 .99) في حالة عدم المعرفة.	**C013**
	.		

إنتقل إلى		
	الطفل عمره 6 أشهر فأكثر	**فلتر 1**
← C016		

C014 – C015: نوع الرضاعة للأطفال تحت 6 أشهر

إنتقل إلى					
	هل رضع الطفل من ثدي أمه خلال الـ 24 ساعة الماضية؟ أحيانا لاتكون هناك رضاعة مباشرة لكن لبن الأم يستخرج من الثدي ويعطى للطفل بطريقة أخرى.				C014a
	نعم		.1		
C016 ←	لا		.2		
C016 ←	لا تعرف		.3		

		كم عدد المرات التي رضع فيها الطفل خلال الـ 24 ساعة الماضية؟ أو عدد المرات التي أعطى فيها الطفل لبن الأم بطريقة أخرى؟ سجلي (99) في حالة عدم المعرفة	C014b

	هل أعطى الطفل خلال الـ 24 ساعة الماضية أي من المواد أدناه، أكتب عدد المرات أمام المواد التي تناولها وفي حالة عدم التناول، سجل الإجابة (ØØ)؟			C015
	ماء	a		
	حليب رضع أو حليب معلب أو بودرة	b		
	حليب ماشية	c		
	عصائر	d		
	مرق	e		
	عصيدة سائلة	f		
	شاي أو قهوة	g		
	أية مشروبات أو أغدية أخرى	h		

إنتقل إلى		
النهاية ←	الطفل عمره أقل من 6 أشهر.	فلتر 2

C016 – C018: الوصول إلى الغذاء (الإجابة على هذه الإسئلة يجب أن تكون وفقا للحالة خلال الـ 30 يوم الماضية) (يعبأ للأطفال بعمر 6 أشهر فأكثر)

	هل حدث أن لجأت الأسرة إلى تصغير حجم وجبات الطفل في اليوم بسبب شحة الموارد؟			**C016**
		نعم	.1	
		لا	.2	

	هل حدث أن لجأت الأسرة إلى تقليل عدد وجبات الطفل في اليوم بسبب شحة الموارد؟			**C017**
		نعم	.1	
		لا	.2	

	هل حدث أن ذهب الطفل إلى النوم في الليل وهو جائع بسبب عدم كفاية الغذاء؟			**C018**
		نعم	.1	
		لا	.2	

إنتقل إلى	الطفل عمره أكثر من 24 شهرا	**فلتر 3**
← فلتر 4		

C019: إطعام الطفل (يعبأ للأطفال بعمر 6 أشهر حتى أقل من 24 شهر)

	هل تناول الطفل أمس أيا من المجموعات الغذائية أدناه. إبدئي بسؤال اليوم من الوقت الذي استيقظ فيه الطفل صباح أمس وحتى نومه في المساء. إتركي الأم تتذكروعندما تنتهي قم بذكر المواد من الجدول					
		.1 نعم	عصيدة أو خبز أو أرز أو مكرونة أو اي غذاء مصنوع من الحبوب.	a		
		.2 لا				
		.3 لاتعرف	بطاطا بيضاء أو أية أغذية درنية أخرى.			
		.1 نعم	أي أغذية مصنوعة من الفول أو الفاصوليا أو البازيليا أو العدس أو الفول السوداني أو أي بقوليات أخرى.	b		
		.2 لا				
		.3 لاتعرف				
		.1 نعم	الحليب أو الجبن أو الزبادي أو الحقين أو الأيسكريم أو الثريب (الثرابة).	c		
		.2 لا				
		.3 لاتعرف				
		.1 نعم	كبد أو كلى أو قلب أو أحشاء أخرى.	d		**C019**
		.2 لا	أي لحوم بقر أو غنم أو ماعز أو دواجن.			
		.3 لاتعرف	اسماك طازجة أو مجففة أو معلبة.			
		.1 نعم	بيض	E		
		.2 لا				
		.3 لاتعرف				
		.1 نعم	يقطين أو جزر أو دبا أو بطاطا حلوة جوفها أصفر أو برتقالي.	F		
		.2 لا	أي خضراوات ورقية داكنة الخضرة.			
		.3 لاتعرف	مانجو أو باباي ناضجة.			
		.1 نعم	أي فواكه أو خضراوات أخرى.	G		
		.2 لا				
		.3 لاتعرف				

إنتقل إلى	الطفل عمره 9 أشهر فأكثر	**فلتر 4**
C021 ←		

C020: الإطعام التكميلي الوقتي (فقط يعبأ للأطفال من عمر 6 إلى 9 أشهر)

	هل مازال الطفل مستمر في الرضاعة الطبيعية؟			
		.1	نعم	**C020a**
		.2	لا	

إنتقل إلى	هل بدأ بتناول أغذية شبه صلبة كالزوم مثلا؟			C020b
		نعم	.1	
← النهاية		لا	.2	

	الأشهر	عمر الطفل بالأشهر عندما بدأ تناول أغذية شبه صلبة؟ (يرجى التحرى لأقرب نصف شهر) – سجلي القيمة (9 .99) في حالة عدم المعرفة.	C020c
← النهاية	.		

C021: الحصبة ولقاح الحصبة (يعبأ لجميع الاطفال بعمر 9 اشهر فأكثر)

	هل عانى (اسم الطفل) من الحصبة خلال الثلاثة الأشهر السابقة؟ (حمى + طفح جلدي عام ينقل			C021
		نعم	.1	
		لا	.2	
		لا تعرف	.3	

	أطلبي من الأم أن تريك بطاقة تحصين الطفل إن كانت محتفظة بها هل تم تطعيم الطفل ضد الحصبة (حقنة في عضلة اليد اليسرى تعطى للطفل عند سن 9 أشهر و 18 شهر، أو خلال الحملة الأخيرة التي تمت في ديسمبر 2009)؟			C022
		نعم من خلال البطاقة	.1	
		نعم بالتذكر	.2	
		لا	.3	
		الأم لاتعرف	.4	

C023: التزويد بفيتامين (أ) (يعبأ لجميع الاطفال بعمر 9 اشهر فأكثر)

	هل أعطي الطفل جرعة من فيتامين (أ) مثل هذه خلال الستة أشهر الأخيرة؟ أظهري للأم عينات الكبسولات؟			C023
		نعم	.1	
		لا	.2	

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ANNEX 5

Nutrition Survey Team
I. Enumerators
1. Amna Al Montaser
2. Asma Ahmed
3. Aswan Al Homaiqani
4. Dhekra Al Noaimi
5. Eman Abo Al Ghaith
6. Eman Al Shameeri
7. Faizah Mohammed
8. Fatima Zaid
9. Foraija Aiesh
10. Hana AlAreeqi
11. Hanan Al Zbeedi
12. Hanan Muqbel
13. Ibtisam Ali
14. Itimad Salem
15. Muna Hebah
16. Ne'ama Ayyash
17. Rania Shaks
18. Samar Hanboush
19. Sohaila Ibraheem
20. Zainah Salim
II. Data entry and management
1. Hadrami Hadrami
2. Anees AlQubati
3. Zeyad Abdullah
4. AbdulWahed Mohammed
III. Team leaders
1. Waleed Abdulmalik
2. Aref Awfan
3. Dr. Ali Shoaib
4. Dr. Baha AlSelwi
5. Dr. Managi Gebriel
6. Fareed AlQadasi
7. Abdullah Khadem
8. Abdulfattah AlQubati
9. Omar Kamarani
10. Fareed AlQadasi
VI. Field supervisors
1. Dr. Abdulbaset AlDobaie
2. Faisal Qamhan
3. Mansour Alqadasi
4. Dr. Rasha Ardi