ACTION AGAINST HUNGER
ACTION CONTRE LA FAIM

SMART NUTRITION SURVEY

NUWAKOT DISTRICT, NEPAL
MAY 2016

Cover image: Manisha Katwal

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- The Survey Team

THE SURVEY TEAM

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ABBREVIATIONS AND ACRONYMS

ACF	Action Contre la Faim
ARI	Acute Respiratory Infection
BCG	Bacillus Calmette-Guerin
CI	Confidence interval
CB-IMNCI	Community Based Integrated Management of Newborn and Childhood Illness
DLSA	District Lead Support Agency
D(P)HO	District (Public) Health Office
DPT	Diphtheria, Pertussis and Tetanus
EHCS	Essential Health Care Services
ENA	Emergency Nutrition Assessment
EPI	Expanded Program on Immunization
EQ	Earthquake
FCHVs	Female Community Health Volunteers
FSL	Food Security and Livelihood
GAM	Global Acute Malnutrition
GDP	Gross Domestic Product
HAZ	Height for Age Z-Score
HH	Household
HP	Health Post
IEC	Information, education and communication
IYCF	Infant and Young Child Feeding
MAM	Moderate Acute Malnutrition
MICS	Multiple Indicators Cluster Survey
MoH	Ministry of Health
MUAC	Mid Upper Arm Circumference
NCHS	National Centre for Health Statistics
NDHS	National Demographic and Health Survey
NMICS	Nepal Multiple Indicators Cluster Survey
NUTEC	Nutrition Technical Committee

OPV	Oral Polio Vaccine
ORS	Oral Rehydration Solution
OTC	Outpatient Therapeutic Care
PHCC	Primary Health Care Centres
PPS	Probability Proportionate to Size
RUTF	Ready to Use Therapeutic Food
SAM	Severe Acute Malnutrition
SD	Standard Deviation
SMART	Standardised Monitoring and Assessment of Relief and Transition
VDC	Village Development Committee
UN	United Nations
U5	Under five
WASH	Water, Sanitation and Hygiene
WAZ	Weight for Age Z-Score
WHO	World Health Organization
WHZ	Weight for Height Z-Score
WFH	Weight for Height

EXECUTIVE SUMMARY

The nutrition survey was conducted in Nuwakot district located in the central hill of Nepal.

According to the most recent data available from Nepal Demographic and Health Survey (NDHS) 2011, the central hill sub region has a Global Acute Malnutrition (GAM) prevalence of 15%. However, Nepal Multiple Indicator Cluster Survey (NMICS) conducted in 2014 has given quite a different estimate with a prevalence of acute malnutrition of central hill sub region as 5.9% and Severe Acute Malnutrition (SAM) of 2.1%. Thereis a lack of district specific information on the nutritional status of the population. Action Against Hunger has been working in the district for the management of SAM from after the major earthquake in May 2015.

The objective of the survey was to evaluate the nutritional situation of children aged 6-59 months in Nuwakot district and to define and identify a baseline for thenutrition indicators for future programming.

The survey was conducted in Nuwakot district 26 May - 05 June 2016. The SMART methodology was used for all the components of the survey from the preparation phase to report writing. Almost all the enumerators who took part in the survey were previously trained in anthropometry. A four days Enumerator's training included a standardization test and a field test.

The surveyed population selected by cluster sampling method were children from 6-59 months old for the anthropometric nutrition component. The sample size for each component was calculated with Emergency Nutrition Assessment (ENA) software (July 2015).The survey was conducted in 45 clusters each consisting of 28 households (HHs). Data collected were on age, height, weight, presence of nutritional oedema and Mid Upper Arm Circumference (MUAC) for the anthropometric nutritional component. A local event calendar was used to assess the age of the child where no birth certificate was available. Questionnaire was translated in Nepali and back translated to English. The questionnaire was administered in Nepali.

According to classification of WHO 2000, the prevalence rate in Nuwakot district is at poor level [(i.e. 7.1% GAM (4.8-10.4 95% C.I.) and 1.8% SAM with a confidence interval (0.9-3.6 95% C.I.) and that the situation is in need of continued provision of treatment and prevention of acute malnutrition. Among the acutely malnourished children, 42.9% were stunted and 82.1% children were underweight. Also, the district was classified as highly EQ affected district as a result of which most of the health system has been damaged and the district is in the process of recovery. Thus, this aggravating factor should be kept in mind as it can lead to further deterioration of the nutrition situation in the district.

The problem of chronic malnutrition and underweight in Nuwakot is at high level of severity 38.2% (32.9-43.9 95% C.I.) and 29.3% (24.0-35.2 95% C.I.) respectively. The trend calls for combined nutrition sensitive interventions targeting maternal nutrition, improved IYCF practices, promotion of good sanitation practices and access to safe water, healthy practices and appropriate use of health care services as well as strengthening household food security.

The recommendations that can be drawn from the assessment are as follows:

- Continue the implementation of therapeutic feeding program for severely malnourished children through the health facilities/OTC centres.
- Nutrition sensitive interventions i.e. combined interventions from different sectors that would lead to a reduction in chronic and moderate acute malnutrition
- Undernutrition is very much linked to lean season, harvest, postharvest in this part of Asia hence the importance of looking at percentages at different times during the year, if possible and also the evolution throughout the years.
- Conduct barrier analysis for SAM treatment coverage to identify key barriers to further reinforce the case detection & referral mechanism.
- Reinforce Growth Monitoring & Promotion activities in health facilities focusing on identifying growth failure and promotion of age appropriate IYCF practices
- Integrate the growth monitoring and promotion activities with CB-IMNCI program in health facilities for children less than two years old
- Design and implement behavior change interventions focusing on essential nutrition actions (with particular focus on IYCF)
- Conduct assessment of locally available foods to develop context specific IEC materials for IYCF practices for children aged 6-23 months

BACKGROUND

2.1 INTRODUCTION

Nepal, officially the Federal Democratic Republic of Nepal, is a developing country located in South Asia with an area of 147,181 square kilometers (56,827 sq. meter) and a population of approximately 27 million[1]. Nepal is the world's 93rd largest country by area[2] and the 41st most populous country. It is a landlocked country located along the Himalayas and bordered to the north by China and to the south, east, and west by India. Kathmandu is the nation's capital city and largest metropolis.

Nepal is administratively divided into 5 development regions (Eastern, Central, Western, Mid-Western and Far-Western Development region), 3 ecological regions (Terai, Hill and Mountains), 14 zones and 75 districts. On September 20, 2015, a new constitution was announced by President Ram Baran Yadav in the Constituent Assembly. The Constituent Assembly was transformed into a legislative parliament. The new constitution established Nepal as a federal democratic country by making seven unnamed states/provinces.

Nepal is ranked 145th of 187 countries on the Human Development Index in 2014 with low income economy. Despite these challenges, Nepal has been making steady progress, with the government making a commitment to graduate the nation from least developed country status by 2022.[3,4] Changing demographic picture has affected socio-economic characteristics of Nepalese society and, vis-à-vis continuous youth emigration to overseas since decades have changed demographic indicators (age sex structure, fertility and mortality pattern of the population, etc.) of Nepal. Apparently, increasing volume of net remittance has supported Nepalese economy. The demographic structure and family composition has been analyzed in the National Annual Household survey. The national average family size was found to be 4.5 with a significant difference of size among poor and rich. The poorer the family, the bigger the family size. Sex ratio of Nepal population is 89 males against every 100 females which are more skewed for the age group of 24-29 years (55 males against every 100 females). Approximately 27% of the families in Nepal are led by women. The proportion of working age group (15-59 years) is higher in Nepal (57.5%). However, higher proportion of population below 15 years (34%) including 8.5% older population (≥ 60 years) led to higher dependency ratio. The dependency ratio is very high in the national context i.e. 74% (in urban setting 53.6% and in rural setting 78.9%[5].)

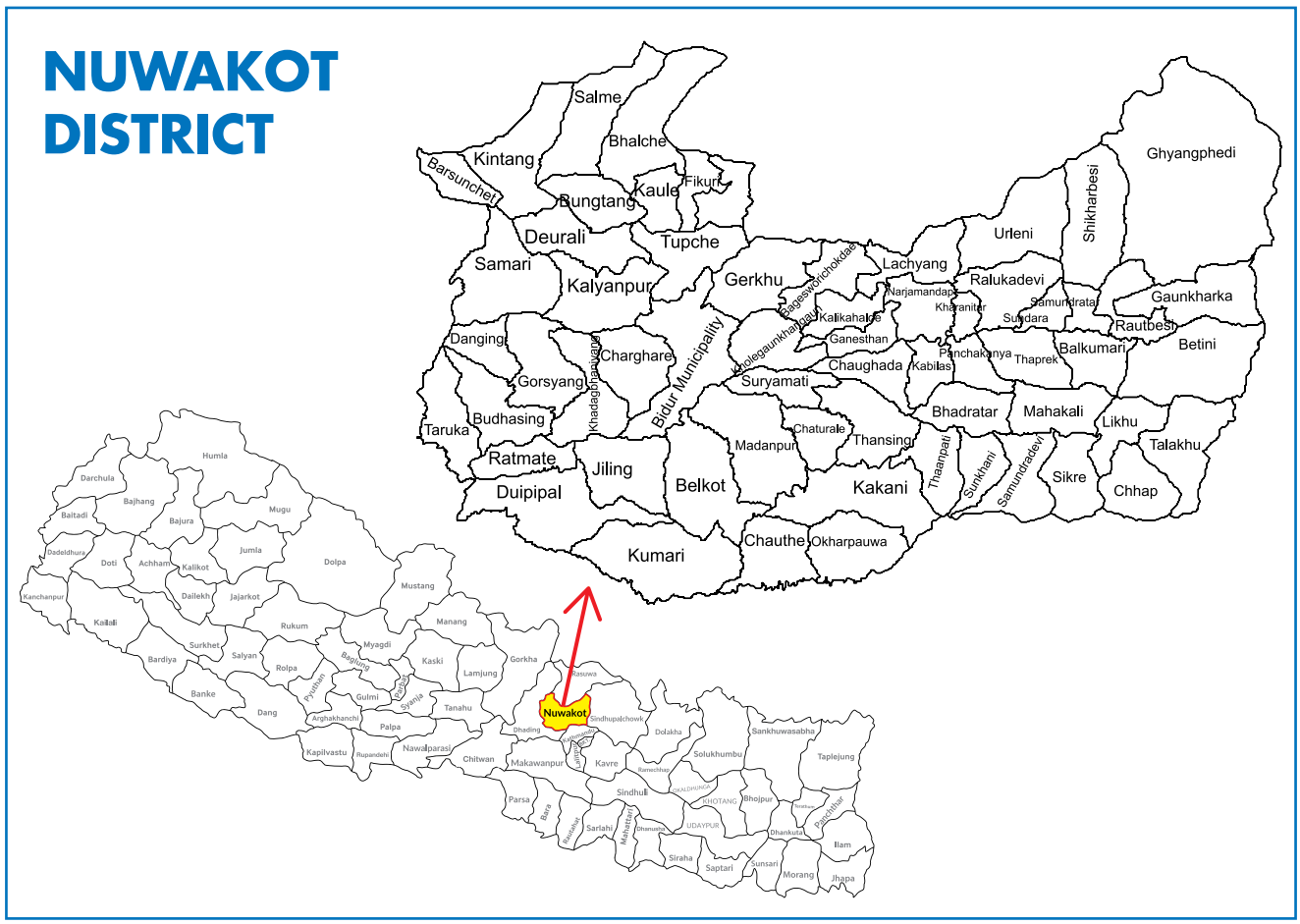
In 2010, agriculture accounted for 36.1%, services comprised 48.5%, and industry 15.4% of Nepal's GDP.[6] While agriculture and industry are contracting, the contribution by the service sector is increasing.[7]

Agriculture employs 76% of the workforce, services 18% and manufacturing and craft-based industry 6%. Agricultural produce – mostly grown in the Terai region bordering India – includes tea, rice, corn, wheat, sugarcane, root crops, milk, and water buffalo meat. Industry mainly involves the processing of agricultural produce, including jute, sugarcane, tobacco, and grain. Its workforce of about 10 million suffers from a severe shortage of skilled labor. Nepal's economic growth continues to be adversely affected by the political uncertainty. Nevertheless, real GDP growth was estimated to increase to almost 5 percent for 2011–2012. This is an improvement from the 3.5 percent GDP growth in 2010–2011 and would

be the second-highest growth rate in the post-conflict era.[8] Sources of growth include agriculture, construction, financial and other services. The contribution of growth by consumption fueled by remittances has declined since 2010/2011. While remittance growth slowed to 11 percent (in Nepali Rupee terms) in 2010/2011, it has since increased to 37 percent. Remittances are estimated to be equivalent to 25–30 percent of GDP. Inflation has been reduced to a three-year low of 7 percent. However, the inflation rate has been significantly increased and continued following the earthquake in 2015.

Nuwakot district, situated in central hill region, is one of the seventy-five districts of Nepal. The hill region abuts the mountains and varies from 800 to 4,000 meters (2,625 to 13,123 ft.) in altitude with progression from subtropical climates below 1,200 meters (3,937 ft.) to alpine climates above 3,600 meters (11,811 ft.).

Population density is high in valleys but notably less above 2,000 meters (6,562 ft.) and very low above 2,500 meters (8,202 ft.) where snow occasionally falls in winter. The name, Nuwakot, is made up of two words 'nawa' and 'kort'. Nawa means nine in Nepali and 'kort' means sacred religious site at the top of hill. The district accordingly has nine hills over which various deities are said to dwell thus overseeing and protecting Nuwakot. This has led Nuwakot often being called "City of nine hills". The district, with Bidur as its district headquarters, covers an area of 1,121 km² and had a population of 277,471 in 2011. The district has approximately 26,978 children less than five years old[10]. Nuwakot district is well known for religious, historical and tourism. Many places are of religious, historical importance: Nuwakot 7 storey old Palace, Nuwakot Palace and Bhairabi Temple are the most famous historical places of the district. Geopolitically, the district is administratively divided into 3 Electoral constituencies which consist of 13 former Illakas



with 61 VDCs and one municipality namely Bidur. Nuwakot is a hilly district of Nepal. It is located on the North-West of Kathmandu district. Although the district is located at the border of Kathmandu valley, many parts/VDCs of the district are still inaccessible by road.

Different ethnic castes (group) are found in Nuwakot. Majorities are Tamang (42.8%) and followed by Brahman/Chhetri (31.5%), Newar (7.4%), Rai (3.6%) and others (14.6%).There are altogether 499 educational institutions with 303 primary and pre pre-primary schools, 70 are lower secondary schools, 60 are secondary schools and 47 are higher secondary schools and 19universities. Literacy rate of the district is 59.8% whereas female literacy rate is 52.4% and male literacy rate is 68%.

The Human Poverty Index Value for Nuwakot district is 35.7[10]. Major occupation in the district is agriculture.It has 1,12,100 (Ha) total lands out of which 35,995 (Ha) is forest land, 45,242 (Ha) cultivated land, 2405 (Ha) is non-cultivated land, 1352 (Ha) is snow land. Major agriculture production of this district is cereal crops (Paddy, Maize and millet). Paddy production, fruit and vegetable are the main agricultural production in this district for the domestic use and exporting to other districts, particularly in Kathmandu[9].

At the district level, the DPHO is responsible for implementing essential health care services (EHCS) and monitor activities and outputs of District Hospitals, Primary Health Care Centres (PHCCs), Health Posts (HPs). The public service delivery outlets in the district include 1 government hospital, 3 PHCC, 64 HPs, 28 birthing centers, 5 rural health clinics, 4 urban health clinics, and 162 primary health care outreach clinics and 223 EPI outreach facilities in the district. Each level above HP is a referral point in a network from Health Post (HP) to primary health care center (PHCC), to district, to zonal sub-regional and regional hospitals. The district has established 11 outpatient therapeutic care centers for provision of treatment to severely acutely malnourished children with support from UNICEF[i] . Only 30% of the children aged below 5 years are reached through growth monitoring in Nepal[10].

The coverage for BCG, DPT-HepB-Hib3 and OPV 3 vaccination is more than 80% for children below 1 year[11]. National neonatal mortality rate of 23/1000 live births, infant mortality rate of 33/1000 live births and under five mortality rate of 38 was reported in 2014.[12]Incidence of ARI cases was 551/1000 out of which 20.8% were identified with pneumonia, diarrheal incidence was 404/1000 among them 0.15% of them were severe dehydrated (Annual Report 2014/15). According to NDHS, global acute malnutrition rate is 11.3% with 3.2% of severe acute malnutrition in Nepal. Underweight and stunting rates were 30.1% and 37.4% at national level. Although there were no assessment at district level to evaluate nutrition situation, regional level under-nutrition rates for central hill region were as follows - global acute malnutrition rate (5.9%), severe acute malnutrition (2.1%), underweight (16.7%) and stunting (27.7%). Almost 1 child out of every fourth live birth was born with low birth weight in central hill region[12]. The NMICS 2014 also states that the children aged 6-23 months (both breastfed and non-breastfed) in central hilly region had minimum dietary diversity (46.4%), minimum meal frequency (75%) and minimum acceptable diet (38.6%)

On April 25 and 12 May two back-to-back major earthquakes struck Nepal causing severe destruction in 31 districts with 14 most affected out of the 75 districts in the country. A total of 8,891 people were confirmed dead, more than 6,00,000 houses destroyed, 2,88,255 houses and 691 historical monuments damaged. Together with the Government of Nepal, the affected communities themselves, thousands of volunteers, over 450 humanitarian agencies responded to deliver critical life-saving aid. In Nepal, the devastation caused by the earthquakes and the disruption in trade in the second half of 2015

[i] Treatment of SAM is delivered by Government health staff and all capacity building and technical support is provided by Action Contre La Faim | Action Against Hunger and UNICEF in the district.

hurt economic investment and activity hard. The GDP growth for 2015 is projected to have been 2.5%, as opposed to 4.4% in 2014 (UN Resident Coordinator's Annual Report 2015). Due to the earthquake it was estimated that 7,00,000 people will fall under poverty line in 2015-2016 which is equivalent to 2.5-3.5% of total population[13].

Nuwakot is one of those most earthquake affected districts among 14 districts. Action Against Hunger was selected as District Lead Support Agency (DLSA) by the National Nutrition Cluster in Nuwakot and started its intervention from 24 May 2015 including WASH, Nutrition and Health services for the affected population. Despite the severely affected the recovery need assessed in the district was not met till date. Overall, food security and livelihood situation deteriorated following the earthquake in Nepal including Nuwakot district. In a post-earthquake joint assessment, it was identified that participation of working aged population in income generating activities was very low (43.4%) in comparison to other district. Overall, an estimated 78.9% of households reported holding debt at the time of the assessment, with high outstanding debt loads across the board. On average, debt loans were reported to exceed average monthly incomes by a ratio of 24:1, indicating a high propensity for debt accumulation. The majority of lost or damaged assets, as a result of the earthquake, were reportedly tools and infrastructure associated with agricultural livelihoods, which is reflected in lower expectations of agricultural production and higher debt levels. The infrastructure and assets which were reported to have incurred the most damage include livestock sheds (reported by 30.8%), produce storage facilities (21.7%), sickles (17.8%), spades (17.5%), doko baskets (16.7%) and other agricultural tools (12.8%). Access to basic sanitation infrastructure was poor. Overall, more than one in ten (12.6%) households had no access to latrines, indicating a high rate of open defecation[14].

The repeated earthquakes and aftershocks since 25 April 2015 have had a major public health consequences, with a total 1,085 health facilities (402 completely and 683 partially damaged). The majority of the damaged facilities are the primary health care centres, village health posts and birthing centres (WHO Health Bulletin, 26 May 2015). Numerous joint assessments were conducted following the earthquake to assess livelihood, food security and other aspects and at least one anthropometric assessment was planned by the national nutrition cluster in most affected 14 districts by partner agencies. Therefore, to explore district specific undernutrition situation Action Against Hunger conducted the SMART survey in May-June 2016.

2.2 OBJECTIVES OF THE SURVEY

General objective:
To evaluate the current nutritional situation of children aged 6-59 months in Nuwakot district, Nepal.

Specific objectives:
1. To estimate the current prevalence of global acute malnutrition among children aged 6-59 months in Nuwakot district
2. To measure the current prevalence of underweight and stunting among children aged 6-59 months in Nuwakot district
3. To identify and define baseline of nutrition indicators (wasting, stunting and underweight) for future programme planning in the district.
4. To develop recommendations for future nutrition programming in the district.

METHODOLOGY

The survey was conducted during May 2016 following standard SMART methodology. The survey followed two-staged cluster sampling strategy for sampling. Survey data collection took place during 26 May to 05 June 2016 including one reserve day for re-visits. The sample universe was all children aged 6-59months living in Nuwakot district. Therefore, at the first stage, ward or segment of ward was defined as cluster since ward is the smallest administrative unit in the district. At second stage, household was defined as the basic sampling unit for the survey. All eligible children present in the selected households were included and measured for anthropometry.

3.1 SAMPLE SIZE

The Emergency Nutrition Assessment (ENA) for SMART, version 2011 (updated 09 July 2015) was used to calculate the sample size. The estimated sample size was 423 children. In the absence of recent data on global acute malnutrition rate in the district an assumption of probable GAM rate was drawn. The sub-regional malnutrition rate of 5.9% was considered as base and consultation was done with field team to factor the probable deterioration of the nutrition situation due to the livelihood & security and economic losses after the earthquake. Finally, a GAM rate of 7% was used along with other assumptions and parameters to estimate the sample size (Table 1). Since the household was considered as the basic

Table 1: Sampling parameters used to estimate the sample size

Parameters for Anthropometry	Value	Assumptions based on context
Estimated prevalence of GAM (%)	7 %	Estimation was done considering the sub-regional rate of 5.9%[ii] as base and anticipating deterioration of the global acute malnutrition rate due to the effects of earthquake i.e. livelihood damages, economic losses etc.
± Desired precision	3 %	
Design Effect	1.4	Considering different ethnic groups who may have differences in cultures, traditions and practices we consider 1.4 as design effect. It is assumed that design effect of 1.4 will be enough to factor the differences.
Children to be included	423	
Average HH Size	4.9[iii]	
% Children under-5	7.9%[iv]	
% Non-response Households	3 %[v]	Usually refusal rate is lower in Nuwakot district. Families are cooperative to development works.
Households to be included	1,253	

[ii] Sub-regional global acute malnutrition rate for Central Hill areas, NMICS report 2014, UNICEF
[iii] Source: Nepal Census 2011
[iv] Source: HMIS, DoHS
[v] Source: Nepal Census 2011

sampling unit, the number of households required to reach 423 children was calculated using the available proportion of U5 year old children, non-response rate and average HH size. A total of 1,253 households were estimated to be visited in order to attain the 423 children to be surveyed.

3.2 SAMPLING PROCEDURES: SELECTING CLUSTERS

Ward is the smallest administrative unit in Nuwakot district with a range of 22-1,630 population in rural VDCs. While the population in the Bidur municipality was with the range of 552 – 4,969 population. Therefore, a ward was defined as cluster.

3.2.1 ESTIMATION OF THE NUMBER OF REQUIRED CLUSTERS

To estimate the required number of clusters, estimated number of households that can be visited by one team in a day was calculated. It was estimated that a total of 28 HHs can be visited and surveyed in a day by each team. Therefore, total number of households estimated as sample was divided by 28 to estimate the total number of required clusters which was 45. Table below provides detailed information on the estimation of households

Table 2: Estimation of households by each team per day

Activity	Estimated time (minutes)
Total time for field work per day	660
Travel time to field site and return	90
Daily briefings/feedback	30
Lunch and tea breaks	80
Walking time between households	6
Time to complete survey[vi]	10
Total time available/day	460
Total time to walk between households & complete survey	16
Number of households/ team/day	28.8≈28 HH[vii]
Number of cluster required	1,253/28=44.75 ≈ 45[viii]

3.2.2 SELECTION OF CLUSTERS

Clusters were selected using ENA for SMART 2011 (version updated on 09 July 2015). All 560 wards from Nuwakot district with their total population was entered into ENA to select 45 clusters including 5 reserve clusters. ENA uses probability proportional to size method to select clusters which provides equal chances to each child for selection in the survey factoring in the size of the wards. The final clusters list with total population is given in Appendix 2.

The geographical distribution of households in hills are scattered in high altitude (>1,000m) and quite close, densely distributed in the valley. It was observed pre-hand to the sampling that even lower or moderately lower number of households (100-300 HHs) was distantly distributed through 2-4 hills (range of height 400-2,500 m). This type of distant distribution of HHs through all hills made data collection. On the other hand, in Bidur municipality the households were so dense and wards are large that 200-300 HHs are distributed within 3 to 4 streets. Therefore, for operational feasibility and completion, it was decided that:

- all selected clusters with households >150 from all rural VDCs will be further segmented
- all selected clusters from Bidur municipality areas with HH >250 will be further segmented into smaller parts.

Only equal segmentation techniques were used. The entire cluster had HHs list, and segmented into equal parts to select the final segment. All 5 selected clusters of Bidur municipality with HH >250 were segmented into equal parts and simple

[vi] Average HH survey time was considered as 10 minutes because not all HH will have eligible children and will not need 15 minutes. We anticipate that only less than half of the HH would need 15 each and half of the HH would need 2-3 minutes for checking if they have U5 children or not.
[vii] Round down according to the sampling guidance provided in SMART sampling paper 2012
[viii] Rounded up following SMART methodology sampling guidance

random sampling was used to select the final segment (cluster) for second stage sampling.

3.2.3 RESERVE CLUSTERS

Altogether 5 reserve clusters were selected in addition to 45 clusters. Reserve clusters were meant to be visited only if survey team could not complete equal or more than 90% of the sample size i.e. 423 children. In any of above mentioned scenario, survey teams will visit all 5 reserve clusters. However, it was not required to visit the reserve clusters as survey teams could reach all clusters and met the required sample size.

3.3 SAMPLING PROCEDURES: SELECTING HOUSEHOLDS AND CHILDREN

As described above, households in rural hilly areas are very scattered and distantly distributed. The density of households in urban settings is higher and also not systematically organized through streets in the municipality. In addition, there was list of households available for both the rural and urban clusters which were updated after earthquake in April 2015. Due to these, following household selection strategies were applied for both rural and urban settings as described below.

3.3.1 SELECTION OF HOUSEHOLDS AND CHILDREN IN RURAL SETTING

A total of 40 clusters were selected from rural areas and it was possible to obtain and generate household list for all of these clusters. All the secondary household lists were further cross checked by survey teams. The survey teams visited those clusters and consulted with the VDC representatives, ward representatives, local leaders and FCHVs to update and validate the list. Finally, the validated list of households was entered in ENA to select 28 households following simple random sampling technique. No selected household was replaced but information regarding the status of the household was recorded in the cluster control form. All eligible children present in the selected households were measured and information was recorded in the questionnaire after taking written/verbal consent from the guardians. In case of absent children, information was recorded into the cluster control form with remark if revisit needed or when child was not available during the data collection period.

3.3.2 SELECTION OF HOUSEHOLDS AND CHILDREN IN URBAN SETTING

There were 5 clusters selected from Bidur municipality. The HH lists were available for all of these clusters. The number of households in urban settings is higher and also not systematically organized through the streets. Therefore, simple random sampling technique was used to select 28 households from the selected segment (cluster). In case when the selected household members are not present in the households; information was recorded in the cluster control form but not replaced with other households. All eligible children present in the selected households were measured and information was recorded in the questionnaire after taking written/verbal consent from the guardians. In case of absent children, information was recorded into the cluster control form with remark if revisit needed or child was not available during the data collection period.

3.4 DEFINITIONS AND INCLUSION CRITERIA

Household: In this survey, a household was defined as a group of people who live together and share a common cooking pot.

- Polygamous families were counted as one household as long as they were living together and sharing a common cooking pot.
- Polygamous families or any other families living in the same house but not sharing a common cooking pot were counted as separate house hold in the household list.
- Household with only institutional population i.e. students, employees living together without family members were not counted and excluded from selection.

Children: All children in the selected households aged from 6-59 months were included in the survey. Where possible, age was validated with a recorded birth date on the immunization card or birth registration card or any other valid documents. If the birth date was not available and the exact age was not recalled by the caretaker, a local calendar of events (see appendix 3) for the last five years was used to help find the most accurate age for the child. If an accurate age was not able to be determined, an estimation of age based on height was done using a wooden stick marked with 65 cm and 110 cm.[ix] Children measuring between 65 cm and 110 cm were assumed to be in the target age group and were included in the sample.

3.5 ANTHROPOMETRIC INDICATORS AND MEASUREMENTS

Sex
Sex was recorded as male or female.

Weight
Children were weighed with/without clothes. If a child was measured with cloths then 'y' and if without cloths then 'n' was recorded in the questionnaire. Weight was measured to the nearest 100 grams using SECA scale[x]. Scales were checked for accuracy before and after each day's measurements using standard weight (2 kg). Scales were placed on a flat surface and calibrated to zero before each measurement. For younger children who cannot stand alone and those children who did not cooperate indirect weighing technique was used to measure the weight of the children. In indirect weighing technique, mothers/caretakers weight was taken first in SECA scale followed by them holding the baby to get the exact weight of the baby.

Height
Children's height was measured to the nearest 0.1 cm. Children aged less than 24 months were measured lying down on a horizontal measuring board. Children aged 24 months or more were measured standing up. If this protocol could not be followed (i.e. disabled or sick child aged 24 or more months but unable to stand), the child was measured in the alternative manner with a note in the questionnaire.

Oedema
Children were assessed for oedema by a field team member applying a three second moderate thumb pressure to the anterior surface of both feet. If, after the pressure was released, a depression remained on each foot, the child was recorded as having oedema.

Mid Upper Arm Circumference (MUAC)
MUAC was measured at the mid-point of the left upper arm and measured in millimetres.

3.6 QUESTIONNAIRE, TRAINING AND SUPERVISION

3.6.1 QUESTIONNAIRE

Standard anthropometric measurement template was developed for each cluster to record children's anthropometric measurement. Variable was added for measuring with or without cloths to factor and standardize the analysis. The english version of the questionnaire was translated and back translated before field testing. The final questionnaire is given in Appendix 5. The cluster control form and informed consent is also attached in the Appendix 6 and 7 respectively.

3.6.2 TRAINING

Four day long training was conducted during 19 to 22 May 2016 for a total of 19 participants. Out of total, 10 participants in the training were previously trained in anthropometry. The training was facilitated by 3 trained SMART Survey Managers from Action Against Hunger. The training was facilitated in local language for appropriate learning of knowledge among the participants. A total of 19 trainees, 18 potential

[ix] In precise SMART methodology, if age cannot be determined through records or a calendar of events, it should be left as blank in the database.
[x] UNICEF recommended SECA Weight Scale. Capacity: 2-150 Kg. Precision: 0.1kg

candidates were selected as survey team members. Standard enumerator training package was adapted according to the objective of the survey excluding the mortality sections and followed throughout the training sessions. Training agenda is attached with the report in Appendix 8.

The training included standardization test which involved pairs of enumerators taking two sets of anthropometric measurements on 10 different children, with a time interval between measurements of each child. The pair and individual results are compared to each other, the entire group and measurements taken by an expert measurer. The aim was to identify the strengths and weaknesses of each enumerator in taking accurate and precise measurements, and to provide feedback. The full procedure was done in 4th day of the training. Based on the standardization test result, six teams comprising of 3 members were formed to ensure all teams have an even spread of strong (individually good/acceptable) and weaker (who was poor/rejected) members. Those enumerators, who were poor or rejected for measurements, was given only measurer assistant roles to support measurer in the measurement.

The field test was conducted in Bidur municipality with each team measuring atleast three children. The test was carefully supervised which provided an opportunity to correct any errors and clarify any issues prior to the initiation of the survey.

3.6.3 SURVEY TEAMS AND SUPERVISION

Survey data collection team included 18 staff, 3 staff in each team totalling 6 teams. Within each team roles and responsibilities was clearly defined as team leader, measurer and measurer assistant.

Overall survey supervision and monitoring team included 2 SMART survey managers and 1 Programme Officer from ACF-Nuwakot who had also received Survey Manager Training. Each team was ensured with at least one survey supervisor in each alternate day to ensure that appropriate & standardized measurement techniques are being applied during measurement. Survey Managers monitored each team in alternative days as well and had regular communication with team leaders to ensure that all technical aspects regarding HH selection, measurement and appropriate decision making is in place throughout the survey. Head of Nutrition and Health Department: Action Against Hunger also monitored/supervised the survey during the data collection.

3.7 DATA ENTRY AND ANALYSIS

Each evening all anthropometric data was entered by the Managers and plausibility check was run to identify quality of the data, possible errors and debriefing was done to the survey teams based on the results generated.

Anthropometric data was entered and analysed using the ENA for SMART software (version updated 09 July 2015) by the trained survey managers with support from the Programme Officer. Weight of 5 different types of light pants with t-shirt was measured and an average weight of 100 gm was defined to be deducted from those children who were measured with cloths on.

At the end of each day plausibility report was generated and reviewed by the Survey Managers. The plausibility report is presented in Appendix 1. The overall quality of the data was assessed across 9 categories: 1) missing/flagged data, 2) sex ratio, 3) age distribution, 4) digit preference for height, 5) digit preference for weight, 6) standard deviation (WHZ), 7) skewness, 8) kurtosis (WHZ), and 9) Poisson distribution (WHZ<-2). Assessment was made overall and for individual teams.

Apart from the daily spot checking of data entry, all data was re-checked upon completion of data entry and before running the final analysis. Undernutrition rates were estimated using WHO 2006 growth reference data and presented in the result section. However, NCHS results are given in Appendix 4.

SMART flags were set to exclude outliers from the anthropometric analysis. Boundaries for exclusion were set at +/- 3 standard deviations from the observed Weight for Height Z-Score mean. The daily plausibility report review enabled re-checking of data entry for any children with a SMART flag.

3.7.1 NUTRITION INDICES AND CLASSIFICATIONS

Table 3: : Nutritional indices and its definition used for analysis of anthropometry (children aged 6-59m)

Indicator		Definition/criteria
Acute Malnutrition	Global Acute Malnutrition	WHZ<-2 and /or Oedema
	Moderate Acute Malnutrition	WHZ<-2 and ≥-3
	Severe Acute Malnutrition	WHZ<-3 and/or oedema
Stunting	Total Stunting	HAZ<-2
	Moderate stunting	HAZ<-2 and ≥-3
	Severe stunting	HAZ<-3
Underweight	Total Under weight	WAZ<-2
	Moderate Under weight	WAZ<-2 and ≥-3
	Severe Under weight	WAZ<-3
Acute Malnutrition by MUAC	Global Acute Malnutrition	<12.5 cm and /or oedema
	Moderate Acute Malnutrition	≥11.5 cm and <12.5 cm
	Severe Acute Malnutrition	<11.5 cm and/or oedema

Table 4: Classification of severity of malnutrition in community, based on the prevalence of wasting and mean weight-for-height Z-score, for children under 5 years of age

Classification of severity	Prevalence of GAM (% <-2SD)	Mean weight for height Z-score
Acceptable	< 5%	> -0.40
Poor	5-9%	-0.40 to 0.69
Serious	10-14%	-0.70 to -0.99
Critical	≥ 15%	≤ -1.00

Table 5: Classification of underweight and stunting prevalence according to the public health significance for children under 5 years of age

Severity level	Low height-for-age (stunting)	Low weight-for-age (underweight)
Low	< 20%	< 10%
Medium	20-29%	10-19%
High	30-39%	20-29%
Very High	≥ 40%	≥ 30%

RESULTS

The survey data collection was completed during 26 May to 05 June 2016. During the survey a total of 400 children were found which is 94.6% of the total sample children. Although no household refused to participate in the survey, there were 3 households found absent/empty during the data collection.

4.1 ANTHROPOMETRIC RESULT (BASED ON WHO STANDARD 2006)

Data on a total of 400 children was entered into ENA and 396 children's anthropometry was analysed in the survey.

Missing data: Height, weight and oedema could not be measured/checked for one child and age information was not available for four children. Therefore, there was a child whose WHZ and HAZ was not available.

One child was flagged for weight for height indicator (outside +/- 3SD from the observed mean) and excluded from the analysis. Altogether 2 children were flagged for weight for age and 8 children were flagged for height for age.

Although 97% of the sample children had date of birth available in reference to the health card/birth registration card, it was observed that the recorded age of children in the health card/birth registration card was actually reduced from the true age. Mothers were providing a different date of birth for their children as true date birth. Although the recorded date was taken into consideration which might have an impact on the result for stunting and underweight including flags.

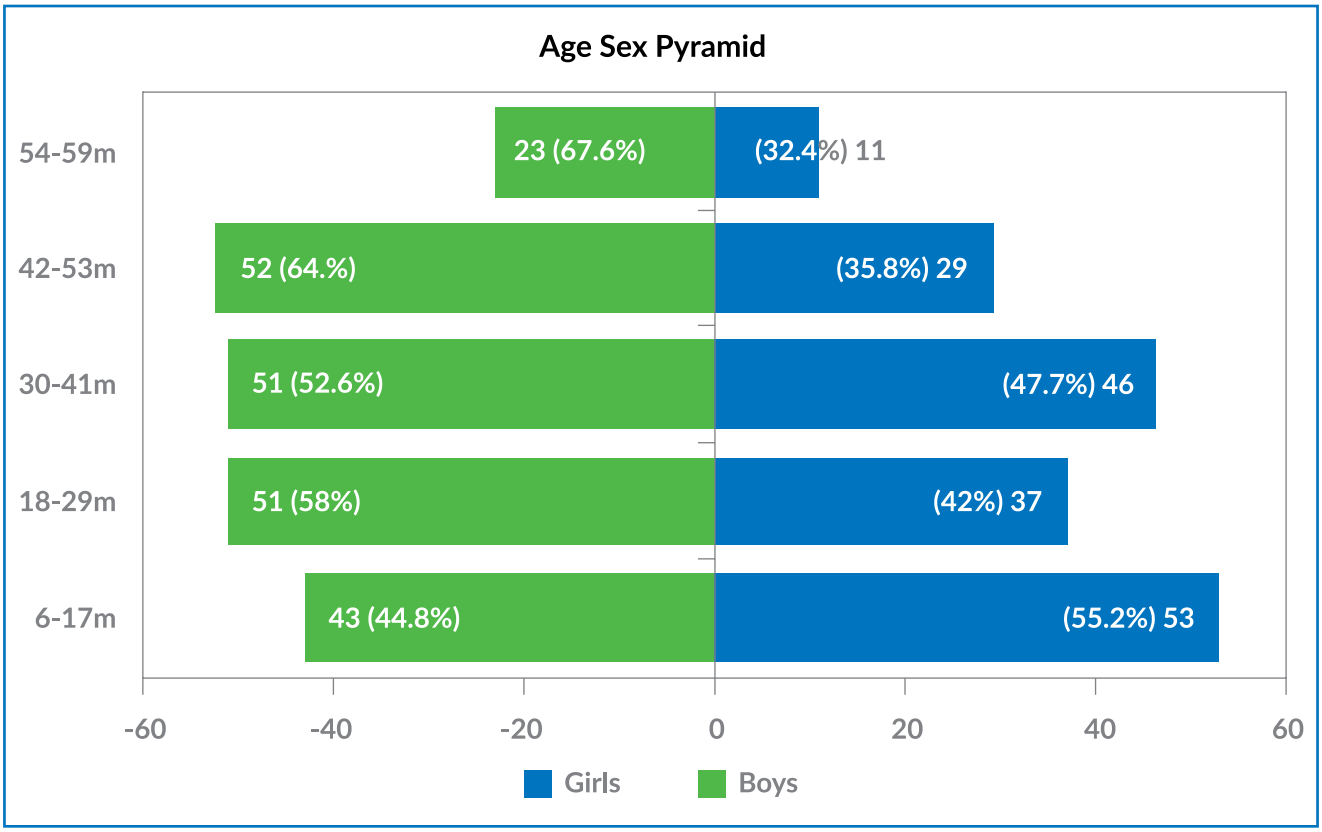
Table 6: Mean z-scores, Design Effects and excluded subjects

Indicator	n	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	394	-0.76±0.91	1.09	1	1
Weight-for-Age	393	-1.40±1.02	1.47	1	2
Height-for-Age	387	-1.57±1.21	1.24	1	8

** contains for WHZ and WAZ the children with oedema.*

Distribution of age and sex

Overall boys and girls werenot equally represented in the sample (p=0.027). Significant excess of boys were present in the sample. The age ration of children 6-29 months old and 30-59 months old was 0.836 which is not significantly different than expected (0.85). For the survey sample, age was normally distributed as expected (p=0.516) but age distribution was significantly different for girls in the sample (p=0.032). This significant difference in the age distribution of girls led to significantly different distribution for overall age/sex (p=003). (Full plausibility report is given in Appendix 1).



Graph 1: Pyramid showing age and sex distribution of Sample

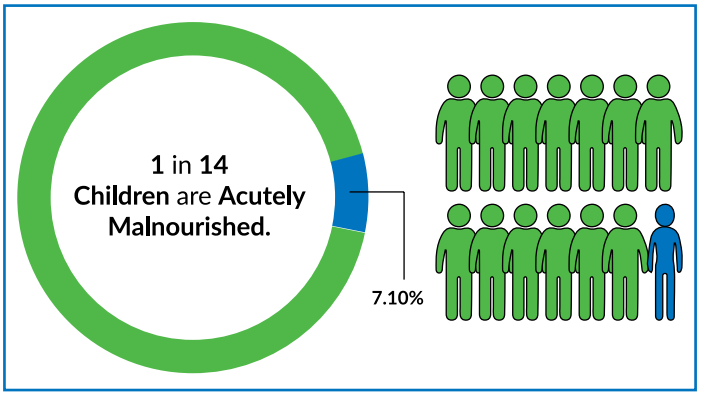


Figure 1: Prevalence of Acute Malnutrition.

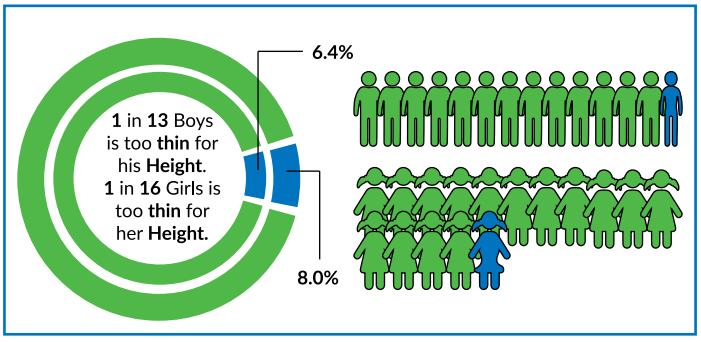


Figure 2: Prevalence of acute malnutrition by gender based on WHZ score.

4.1.1 ACUTE MALNUTRITION (WASTING)

Acute Malnutrition (by weight for height indicator)

Global acute malnutrition rate estimated in the survey was 7.1% (4.8-10.4, 95% C.I.). Severe acute malnutrition rate was estimated to be 1.8% (0.9 - 3.6, 95% C.I.). Overall, there was no significant difference in observed global acute malnutrition rate among boys and girls (p=0.536).

Although higher number of boys was screened, same number of acutely malnourished in both boys and girls were found. Higher number of girls was detected as severely acutely malnourished compared to boys.

Table 8 shows that a higher number of older children (30-54 months) identified as severely malnourished compared to younger children (6-29 months) but not significantly higher (P=0.07). Overall in global acute malnutrition there was no significant difference among the two age groups (p=0.44).

Table 7: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

Indicator	All n = 394	Boys n = 218	Girls n = 176
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(28) 7.1 % (4.8 - 10.4 95% C.I.)	(14) 6.4 % (3.8 - 10.6 95% C.I.)	(14) 8.0 % (4.8 - 12.8 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(21) 5.3 % (3.4 - 8.3 95% C.I.)	(12) 5.5 % (3.0 - 9.8 95% C.I.)	(9) 5.1 % (2.8 - 9.2 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(7) 1.8 % (0.9 - 3.6 95% C.I.)	(2) 0.9 % (0.2 - 3.7 95% C.I.)	(5) 2.8 % (1.2 - 6.6 95% C.I.)

The prevalence of oedema is 0.0 %

Table 8: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

Age (month)	Total no.	Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
		No.	%	No.	%	No.	%	No.	%
6-17	96	0	0.0	10	10.4	86	89.6	0	0.0
18-29	87	1	1.1	4	4.6	82	94.3	0	0.0
30-41	97	1	1.0	4	4.1	92	94.8	0	0.0
42-53	81	3	3.7	3	3.7	75	92.6	0	0.0
54-59	33	2	6.1	0	0.0	31	93.9	0	0.0
Total	394	7	1.8	21	5.3	366	92.9	0	0.0

Acute malnutrition by Mid Upper Arm Circumference

Global acute malnutrition rate identified by MUAC <125mm was 3.0% (1.6-5.6, 95% C.I.) which was significantly (p=0.008) lower compared to the rate (7.1%) identified by WHZ <-2SD. Further analysis by age revealed that significantly (p=0.049) higher number of younger children (6-29 months) were identified as wasted (MUAC <125 mm) compared to older age groups (30-59 months). MUAC has been shown to be biased towards detecting younger children and girls. This is due to the fact that MUAC is not a ratio, it is an absolute measurement of arm circumference and arm circumference is naturally smaller in younger children and girls. Rates of acute malnutrition by sex and age are given in below tables.

Table 9: Prevalence of acute malnutrition based on MUAC cut offs (and/or oedema) and by sex

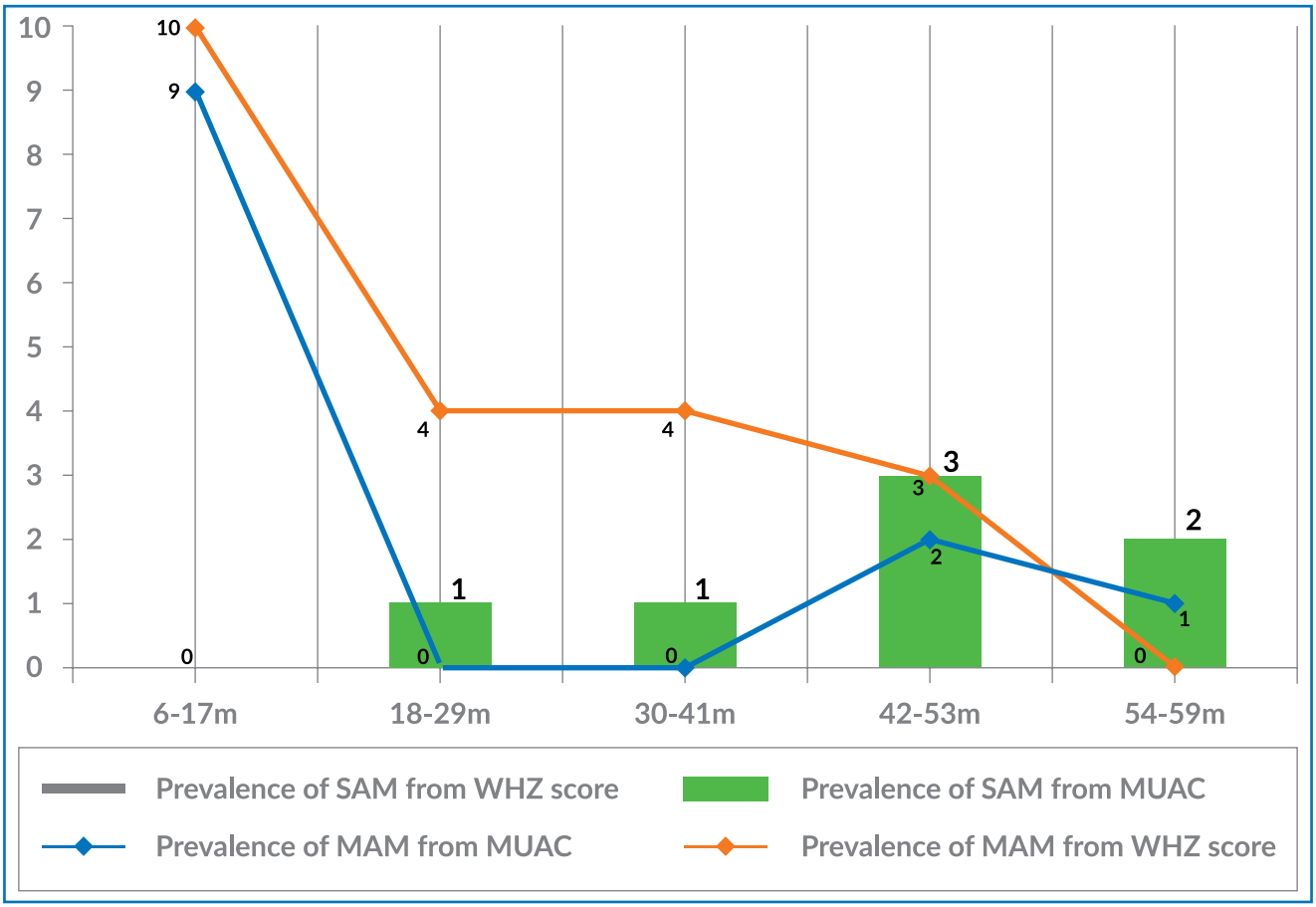
Indicator	All n = 396	Boys n = 220	Girls n = 176
Prevalence of global malnutrition (< 125 mm and/or oedema)	(12) 3.0 % (1.6 - 5.6 95% C.I.)	(4) 1.8 % (0.6 - 5.8 95% C.I.)	(8) 4.5 % (2.4 - 8.4 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(12) 3.0 % (1.6 - 5.6 95% C.I.)	(4) 1.8 % (0.6 - 5.8 95% C.I.)	(8) 4.5 % 2.4 - 8.4 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)

Table 10: Prevalence of acute malnutrition by age, based on MUAC cut offs and/or oedema

Age (month)	Total no.	Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
		No.	%	No.	%	No.	%	No.	%
6-17	96	0	0.0	9	9.4	87	90.6	0	0.0
18-29	88	0	0.0	0	0.0	88	100.0	0	0.0
30-41	97	0	0.0	0	0.0	97	100.0	0	0.0
42-53	81	0	0.0	2	2.5	79	97.5	0	0.0
54-59	34	0	0.0	1	2.9	33	97.1	0	0.0
Total	396	0	0.0	12	3.0	384	97.0	0	0.0

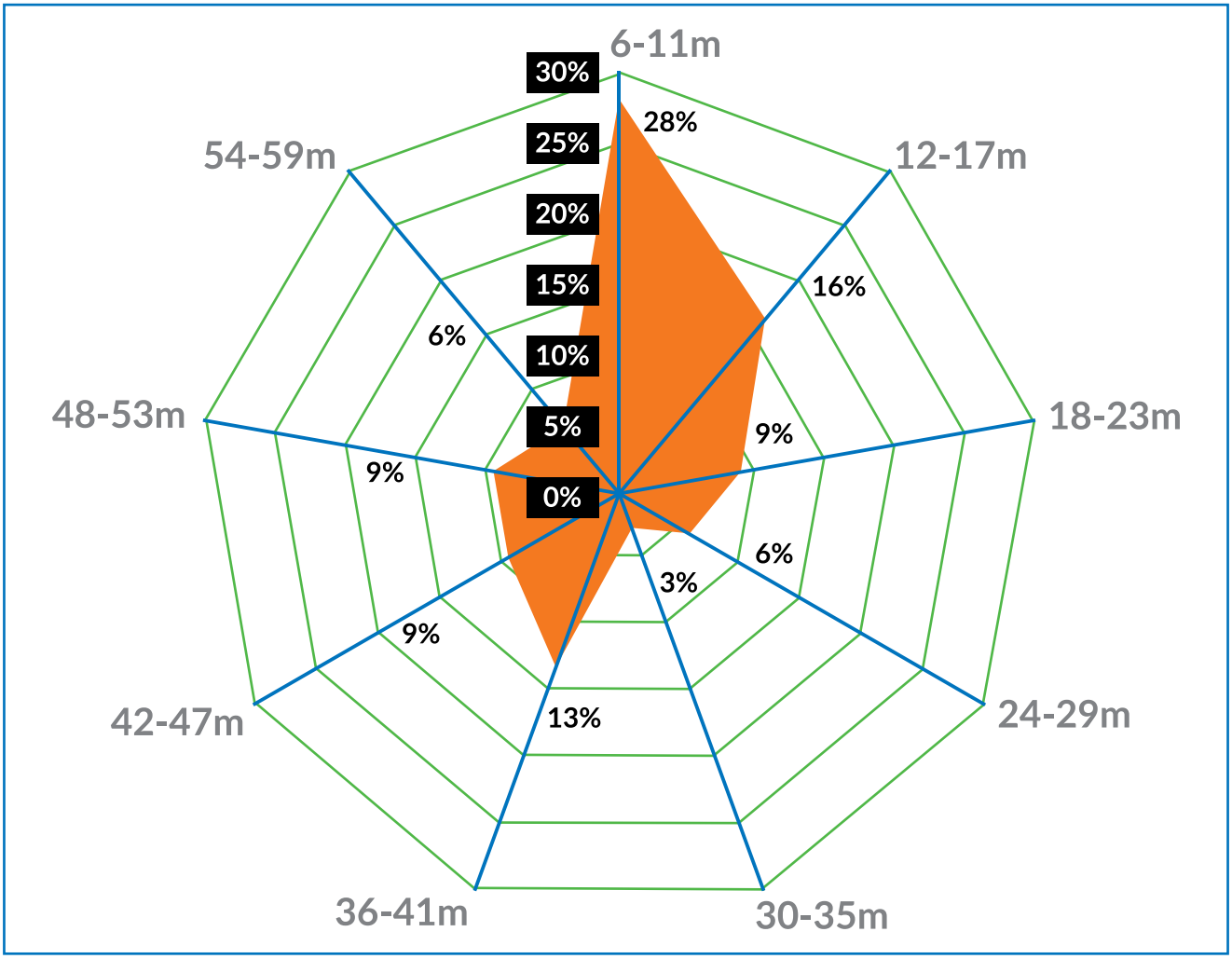
Comparison of SAM and MAM prevalence obtained from MUAC and weight-for-height z-score (WHZ score);

As suggested by the graph, number of MAM children as identified by WHZ score is comparatively higher than those identified by MUAC measurement. Both MUAC as well as WHZ score show that prevalence of MAM is higher among younger children (i.e. 6-17 m children) and the trend seems to decline thereafter. While the prevalence of SAM is seen higher among the age group of 42-53 m, this indicates that children aged 6-59 months are vulnerable to get acutely undernourished. This can further be justified on the grounds that younger children are inherently at a higher risk of death than older children (WHO, UNICEF, 2009).



Graph 2: Prevalence of acute malnutrition by age categories based on MUAC and WHZ score.

Combined rate of acute malnutrition (WHZ <-2SD or MUAC <-125mm)



Graph 3: Prevalence of combined global acute malnutrition by age categories based on MUAC <125mm or WHZ <-2SD.

Since there has been evidence that WHZ and MUAC indicator does not always include same children as acutely malnourished, the combined rate of acute malnutrition was estimated for the survey. It was estimated that the combined global acute malnutrition rate was 8.08 % (5.4-10.76, 95% C.I.) which was slightly higher than the rate of GAM rate identified by WHZ indicator only. Age segregated prevalence of GAM shows that younger children had higher rate of acute malnutrition (graph below).

4.1.2 UNDERWEIGHT

An estimated 29.3% (24.0-35.2, 95% C.I.) children are underweight in Nuwakot district reflecting to an estimated total of 7,210 children approximately. Severe underweight rate was identified as 4.1% (2.4-6.8, 95% C.I.).No significant difference of rate was observed among boys and girls (p=0.959).

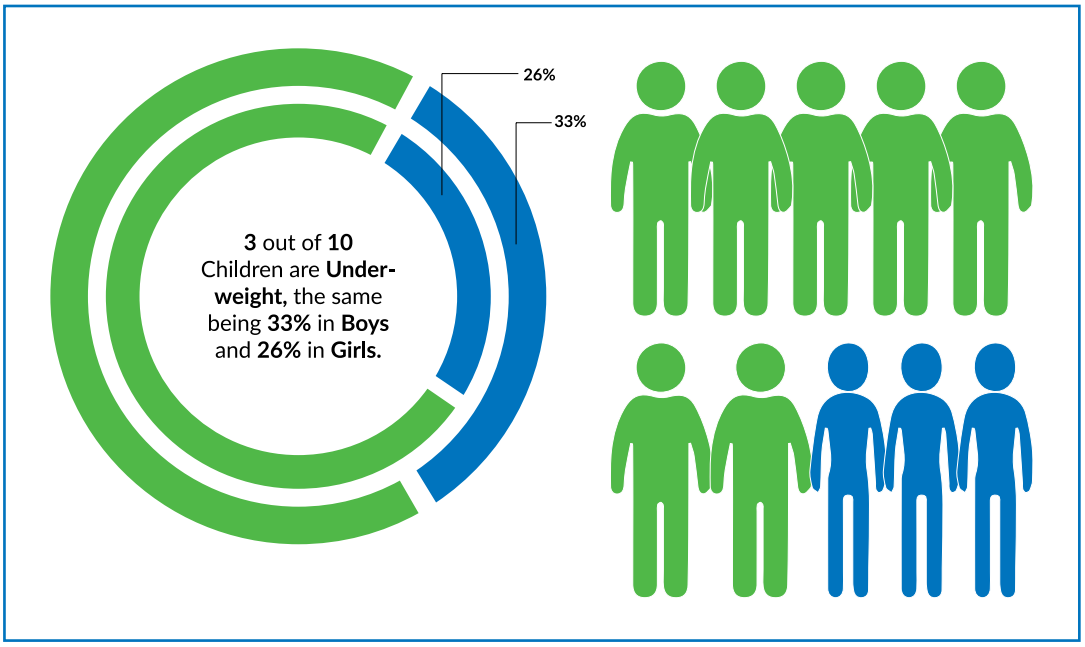


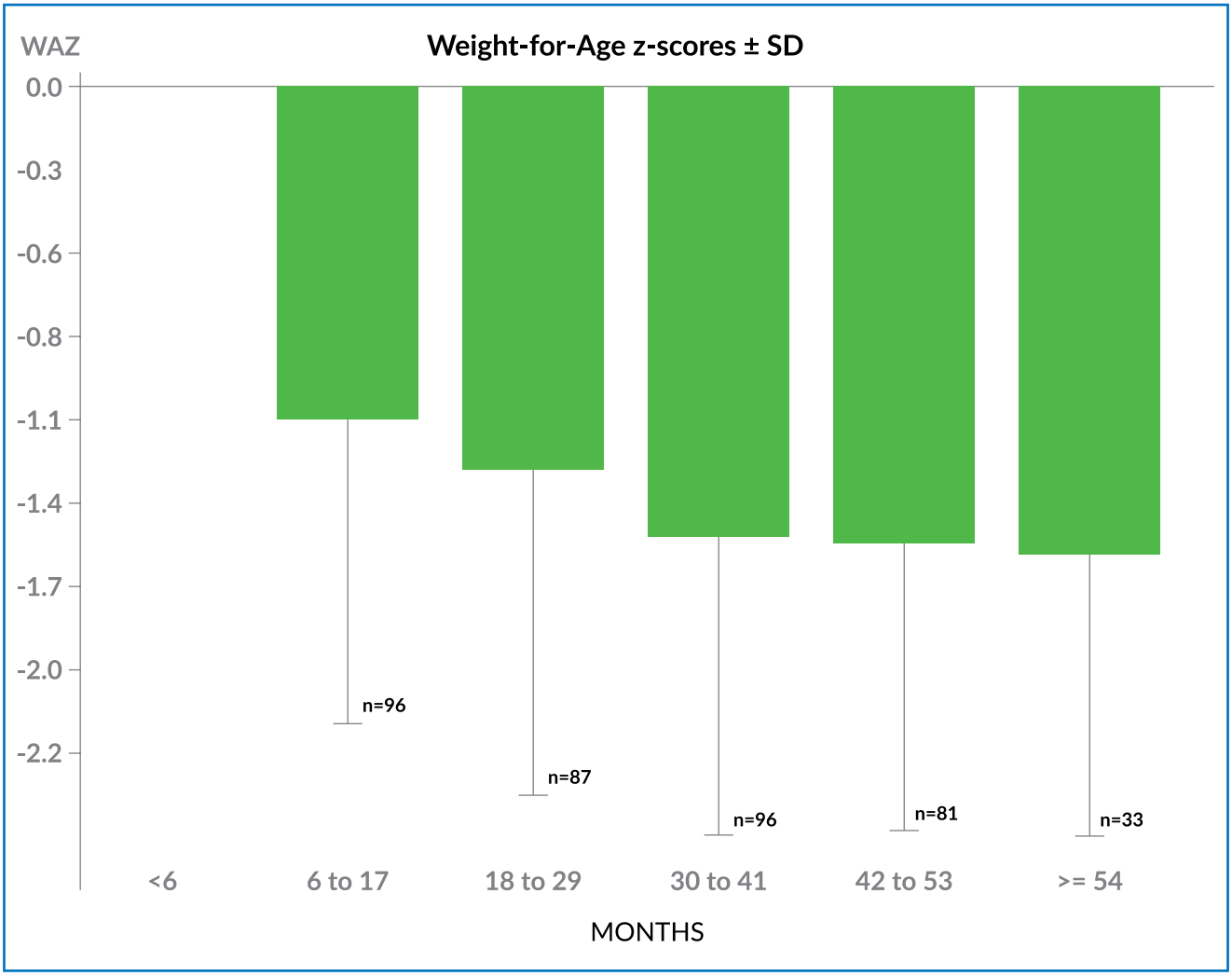
Figure 3: Prevalence of underweight by gender.

Table 11: Prevalence of underweight based on weight-for-age z-scores by sex

Indicator	All n = 393	Boys n = 218	Girls n = 175
Prevalence of underweight (<-2 z-score)	(115) 29.3 % (24.0 - 35.2 95% C.I.)	(57) 26.1 % (20.2 - 33.1 95% C.I.)	(58) 33.1 % (25.5 - 41.8 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(99) 25.2 % (19.8 - 31.5 95% C.I.)	(48) 22.0 % (16.4 - 28.9 95% C.I.)	(51) 29.1 % 21.7 - 37.9 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(16) 4.1 % (2.4 - 6.8 95% C.I.)	(9) 4.1 % (2.0 - 8.3 95% C.I.)	(7) 4.0 % (1.9 - 8.3 95% C.I.)

Table 12: Prevalence of underweight by age, based on weight-for-age z-scores

Age (months)	Total no.	Severe underweight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
		No.	%	No.	%	No.	%	No.	%
6-17	96	1	1.0	18	18.8	77	80.2	0	0.0
18-29	87	5	5.7	22	25.3	60	69.0	0	0.0
30-41	96	3	3.1	30	31.3	63	65.6	0	0.0
42-53	81	6	7.4	19	23.5	56	69.1	0	0.0
54-59	33	1	3.0	10	30.3	22	66.7	0	0.0
Total	393	16	4.1	99	25.2	278	70.7	0	0.0



Graph 4: Mean weight for age Z-scores by age categories

Above graph shows that the older the children are, the lower their mean weight for age z-scores reflecting the continuous long term nutritional deficits.

4.1.3 CHRONIC UNDERNUTRITION (STUNTING)

Stunting reflects to the continuous deficits of diet leading to slow linear growth among children compared to their age. In Nuwakot district, 38.2% (32.9-43.9, 95% C.I.) children aged 6-59 months were identified as stunted (shorter compared to their age) out of which 12.1% were severely stunted. The rate indicates that an estimated 9,400 children are stunted in the district currently. No significant differences of stunting prevalence was observed among boys and girls (p=0.726). However, table 14 shows that there were higher rate of stunting children among older age groups (age >29 months) compared to the younger age groups (age <30 months) which was statistically significant (p=0.002).

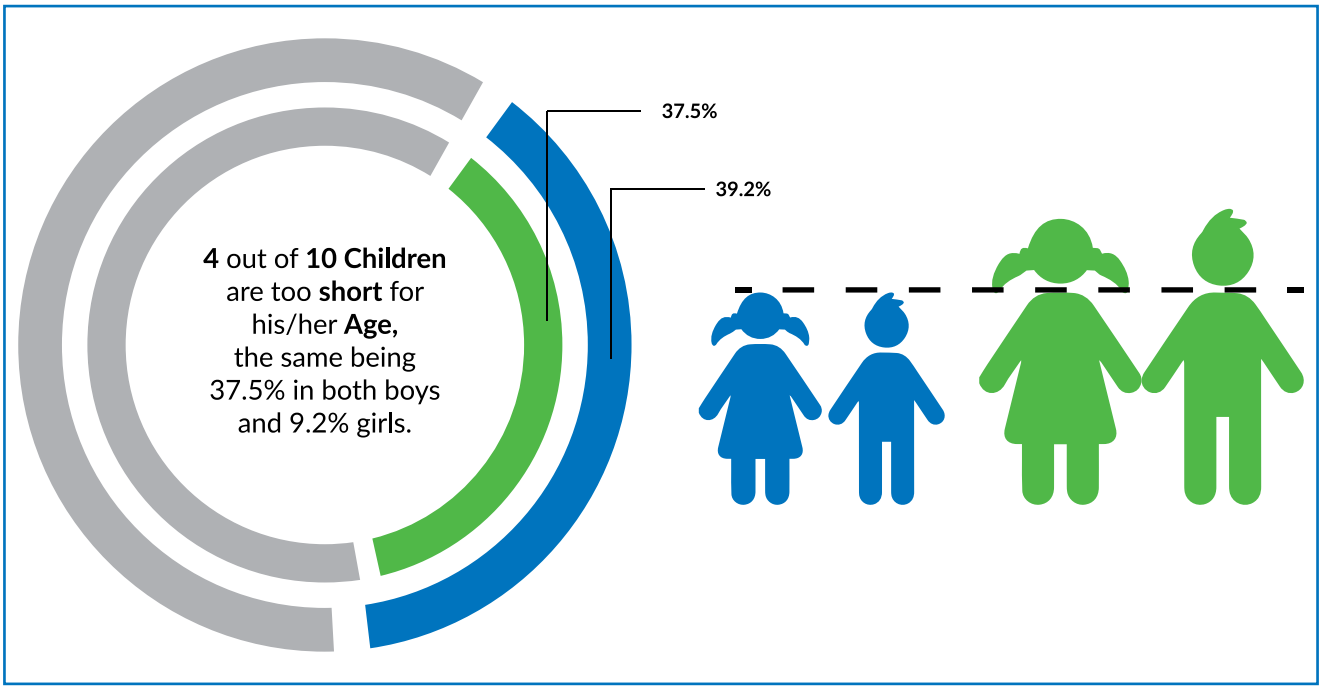


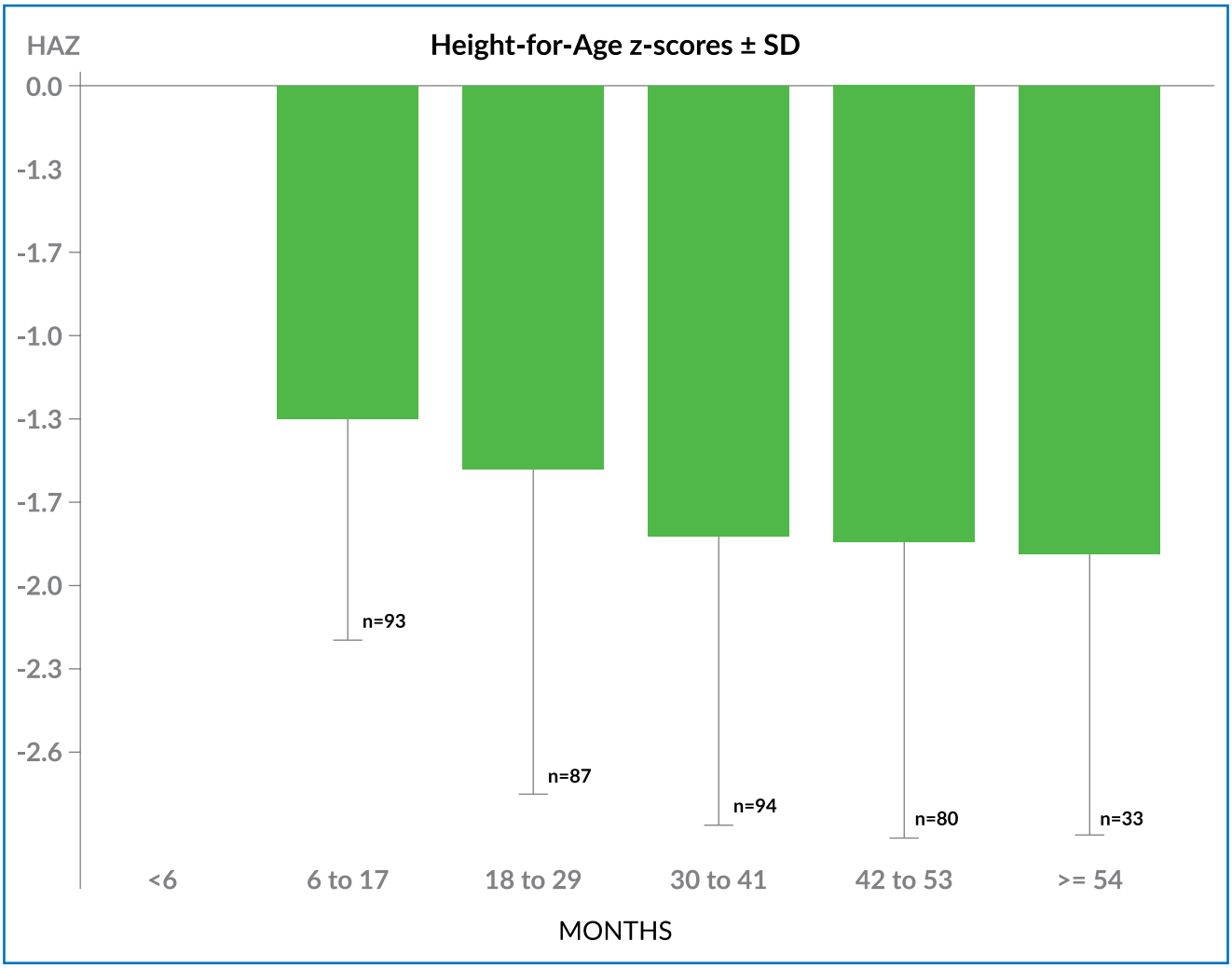
Figure 4: Prevalence of chronic malnutrition by gender

Table 13: Prevalence of stunting based on height-for-age z-scores and by sex

Indicator	All n = 387	Boys n = 216	Girls n = 171
Prevalence of stunting (<-2 z-score)	(148) 38.2 % (32.9 - 43.9 95% C.I.)	(81) 37.5 % (30.5 - 45.1 95% C.I.)	(67) 39.2 % (31.2 - 47.8 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(101) 26.1 % (21.8 - 31.0 95% C.I.)	(51) 23.6 % (18.8 - 29.3 95% C.I.)	(50) 29.2 % (22.5 - 37.0 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(47) 12.1 % (8.2 - 17.6 95% C.I.)	(30) 13.9 % (9.1 - 20.6 95% C.I.)	(17) 9.9 % (5.5 - 17.3 95% C.I.)

Table 14: Prevalence of stunting by age based on height-for-age z-scores

Age (in months)	Total no.	Severe stunting (<-3 z-score)		Moderate stunting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
		No.	%	No.	%	No.	%
6-17	93	2	2.2	22	23.7	69	74.2
18-29	87	14	16.1	16	18.4	57	65.5
30-41	94	16	17.0	23	24.5	55	58.5
42-53	80	10	12.5	29	36.3	41	51.3
54-59	33	5	15.2	11	33.3	17	51.5
Total	387	47	12.1	101	26.1	239	61.8



Graph 5: Mean height for age Z-scores by age categories

The above graph is representing the mean height for age z-scores. It shows that continuous deficits of nutrition in the diet that increases with age. i.e. in Nuwakot district older children are more stunted compared to the younger children (<30 months).

DISCUSSION

5.1 DATA QUALITY

Overall survey data quality was 4% which is excellent. Boys and girls were not equally represented in the sample (p=0.027). Significant number of boys was present in the sample. Overall age distribution was normal in the sample (p=0.516) except the fact that girls were not equally distributed and was significantly different (p=0.032) across different age categories.

Date of birth in reference to the health card/birth registration card was available for 97% of the sample children. However, a significant concern regarding the true age of children was raised from some of the mothers during the survey. According to mothers, the age registered in the cards was lower than the true age of children. The reasons for these differences in ages could not be clarified during the survey and was out of the scope. Although the survey team followed the age written in the health card, which is assumed to be lower than the true age, it might have an impact on the overall rate of stunting and underweight. Digit preference for weight, height and MUAC were excellent with estimates of 5, 6 and 7 respectively. Standard deviation (with SMART flags) for WHZ (0.91) and WAZ (1.02) were within the expected range of 0.8-1.2 for normally distributed population in the surveyed sample. However, the standard deviation (with SMART flags) for HAZ (1.21) was slightly more than the expected range of 0.8-1.2 for normally distributed population in the surveyed sample.

Statistical test (Sapiro-wilk test) for all three indicators has shown that data is normally distributed with p-value >0.05 for the surveyed children. Skewness results for WHZ, HAZ and WAZ also confirmed symmetrical distribution of data. While Kurtosis data for WHZ and WAZ has shown normal distribution, result for HAZ has indicated that the data might have a problem (kurtosis value for HAZ -0.38).

Index of dispersion data has revealed that cases for wasting were normally distributed across clusters while stunted and underweight children were aggregated into some specific clusters.

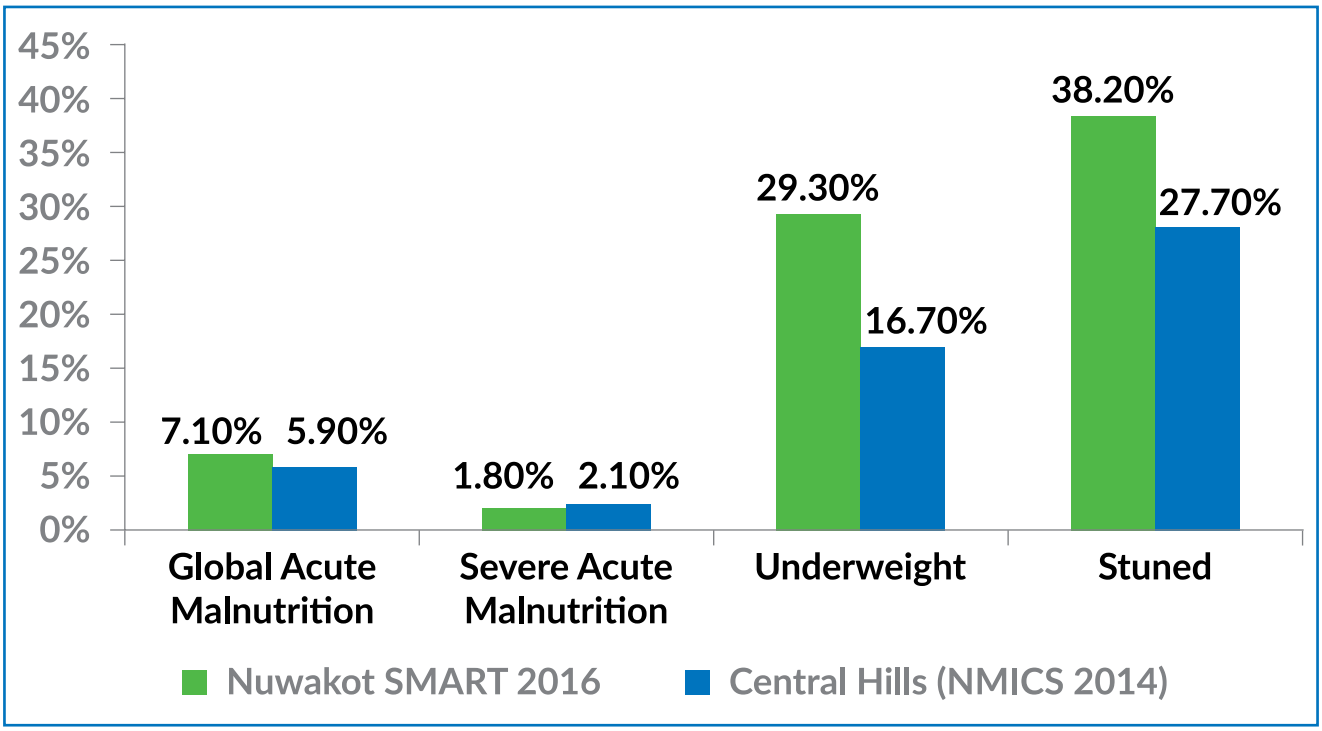
Detailed plausibility report is given in Appendix 1.

Relatively high number of flags for HAZ i.e. 8 has been excluded from the analysis. However, it is understood that probable inaccurate age documentation in the registration card/health card might have had an impact on this high number of flags including the possibility of errors in date conversion from Nepali calendar to English calendar.

5.2 UNDERNUTRITION RATES IN THE DISTRICT AND REVIEW OF ITS CAUSES

The district's high prevalence of stunting and underweight rates among older children (>29 months) reflects to the conclusion made by Allen in 1994 and can be interpreted as long term nutritional stress including inadequate diet, poor complementary feeding practices and infectious disease from which catch up growth is insufficient. The trend (Graph 2 and 3) also indicates that children might not be getting adequate nutrition from their regular diet with growing age especially after 18 months.

Secondary review on the available data on undernutrition rates was done and sub-regional level undernutrition rates from the multiple indicator cluster survey report 2014 was available to have a comparison with the district level prevalence. With the limitation of having no confidence interval for undernutrition rates from NMICS 2014, different methodology, geographic coverage and timing of the two surveys (NMICS 2014 and SMART 2016), the rates of GAM and SAM of the district has shown quite similar results whereas there is a discrepancy in the rates of underweight and stunting compared to the sub-regional findings (as shown in the graph below).



Graph 6: Comparison of undernutrition rates of Nuwakot district (2016) with sub-regional findings (2014)

There is limited literature that documents on the direct causal relationship or factors for undernutrition in the district or sub-regional level. However, the demographic survey report 2011, revealed high prevalence of diarrhoea (14%) at national level which was 11.2% for the central hill region. Besides coverage for increased fluids and continued feeding after diarrhoea (9.6%) and percentage of children fed ORS following an episode of diarrhoea (36%) was very low for central hill region. In contrast, safe disposal of child faeces in the sub-regional level (central hill) was 60% on 2011. However, the annual health report that also covered period after the earthquake also reported high incidence of diarrhoeal cases (556/1000) and ARI cases (660/1000) during 2014/2015. This reported high incidence of diarrhoea and ARIs might have had an impact on the undernutrition of children in the district. Although limited in-depth assessment finding is available on post-earthquake water & sanitation situation, the hand washing practices during critical points i.e. hand washing with soap before cooking (22.6%), before breastfeeding (5.6%), after cleaning child's bottom (5.9%) and after cleaning the toilet/potty (11.4%) in central hilly areas could be crucial factors affecting child health. [12]

In addition to the disease prevalence, IYCF practices i.e. the mean duration of breastfeeding (2.9 months); complementary feeding practices (6-23months) especially the rate of acceptable diet consumption (38.6%), rate of children with minimum acceptable dietary diversity scores (46.4%) were identified as very poor (NMICS 2014). The practices were even worse among the poorest wealth quintile index compared to other wealth quintiles and with mothers who had no or primary level education than mothers with

secondary or higher education[12]. This indicates that poverty, education of mothers may have influenced the nutritional status of children under five years old.

5.3 LIMITATIONS, BIAS AND CHALLENGES

- **High rate of absentees:** It is observed that the survey was conducted in May when high number of school going children were not present in the house. A total of 102 children were absent at household because they went to school, relative's house and did not return during data collection period (26 May to 05 June 2016) and was not feasible to revisit the household. Analysis of the age and sex of these children suggests that majority of the children (>70%) were aged 2 or above years. Most of the absent children were females. Since there is significantly higher number of boys in the survey, this high rate of girl absentees might have had an impact on the overall sex ratio.

- **Age of children:** It was observed that the recorded age of children and the true age as shared by mothers were different. In most cases, the age was recorded lower than the true age. Under or over reporting of age than the true age had a significant impact on the estimates of underweight and stunting in the surveyed area. However, it was out of the scope to explore the extent and impact of this discrepancy on the overall rates of stunting and underweight. Thus, it is considered as one of the limitation and challenge that raised concern on the estimates of underweight and stunting.

- **Geographical context and distance:** The geography itself considering accessibility, means of travel and time required to travel from district to VDC and VDC to Ward was a challenge for the survey team. At times, supervisors also had to split in groups to complete the data collection and had to stay in the cluster because it wasn't possible to return back after collecting data. However, it is understood that an in-depth contextual analysis during planning stage might help to adjust. As for example, increasing the number of teams, finding places in different sub-district/VDC level to stay and conduct survey for neighbouring clusters.

- **Security and access:** The district has hilly region and have to travel through hilly roads. Therefore, due to the distance of the selected clusters it was very challenging for the survey team to travel even at 7PM/19:00 H with potential risks of accidents.

CONCLUSION

The nutrition situation in Nuwakot district with an estimated total of 1,147 wasted children, 7,210 underweight children and 9,400 stunted children is not at critical or emergency level but remained poor/moderately severe in regards to public health significance.

It was also observed that among the wasted children (WHZ <-2SD), 42.9% children were also having stunting and 82.1% were underweight on top of wasting. This shows that children who are suffering from multiple types of undernutrition are at increased risk of death compared to children with one type of undernutrition or healthy. Children suffering from multiple types of undernutrition will benefit most from nutrition and child survival interventions[17].

Although the rate of severe acute malnutrition is 1.8%, higher incidence of diarrheal cases and acute respiratory infections acts as aggravating factors that urges needs for cautious and systematic treatment of severe malnutrition and for their medical conditions. If the problem of severe acute malnutrition along with high incidence of diarrhea and ARI are not addressed, there is a risk that the situation will continue to deteriorate in the district.

The increasing trend of underweight and stunting among older children (>29 months) highlights the need for doing further research on designing and laying out the feeding pattern for older children (>24 months). Specific recommendations can be included within the current complementary feeding practices counseling packages and delivered to the mothers with children aged 6-23 months.

The review of the result for complementary feeding practices results suggest that integration of nutrition counseling packages for earthquake affected families, poor families who are currently receiving food security & livelihood support may increase the overall impact in regards to nutritional outcomes. The poorest wealth quintile index households had higher rate of undernutrition in NMICS 2014, poor practices of complementary feeding as well as handwashing practices should be considered.

RECOMMENDATIONS

Recommendations for programming are as follows:

1. Continue the implementation of therapeutic feeding program for severely malnourished children through health facilities/OTC centers.
2. Nutrition sensitive interventions i.e. combined interventions from different sectors that would lead to a reduction in chronic and moderate acute malnutrition
3. Undernutrition is very much linked to lean season, harvest; postharvest in this part of Asia hence the importance of looking at percentages at different times during the year, if possible and also the evolution throughout the years.
4. Conduct barrier analysis for SAM treatment coverage to identify key barriers to further reinforce the case detection & referral mechanism.
5. Reinforce Growth Monitoring & Promotion activities in health facilities focusing on identifying growth failure and promotion of age appropriate IYCF practices
6. Integrate the growth monitoring and promotion activities with CB-IMNCI program in health facilities for children less than two years old
7. Design and implement behavior change interventions focusing on essential nutrition actions (with particular focus on IYCF)
8. Conduct assessment of locally available foods to develop context specific IEC materials for IYCF practices for children aged 6-23 months

APPENDICES

APPENDIX 1: PLAUSIBILITY REPORT

PLAUSIBILITY CHECK FOR: NUWAKOT_SURVEY.AS

STANDARD/REFERENCE USED FOR Z-SCORE CALCULATION: WHO STANDARDS 2006

(If it is not mentioned, flagged data is included in the evaluation. Some parts of this plausibility report are more for advanced users and can be skipped for a standard evaluation)

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	Score
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	0 (0.3 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	4 (p=0.027)
Age ratio(6-29 vs 30-59)	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	0 (p=0.836)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	0 (5)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	0 (6)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	0 (7)

Standard Dev WHZ Excl SD <1.1 <1.15 <1.20 >=1.20

. and and and or

. Excl SD >0.9 >0.85 >0.80 <=0.80

0 5 10 20 0 (0.91)

Skewness WHZ Excl # <±0.2 <±0.4 <±0.6 >=±0.6

0 1 3 5 0 (-0.10)

Kurtosis WHZExcl # <±0.2 <±0.4 <±0.6 >=±0.6

0 1 3 5 0 (0.19)

Poisson dist WHZ-2 Excl p >0.05 >0.01 >0.001 <=0.001

0 1 3 5 0 (p=0.392)

OVERALL SCORE WHZ = 0-9 10-14 15-24 >25 4 %

The overall score of this survey is 4 %, this is excellent.

There were no duplicate entries detected.

Missing or wrong data:

WEIGHT: Line=385/ID=6

HEIGHT: Line=385/ID=6

Percentage of children with no exact birthday: 3 %

Anthropometric Indices likely to be in error (-3 to 3 for WHZ, -3 to 3 for HAZ, -3 to 3 for WAZ, from observed mean - chosen in Options panel - these values will be flagged and should be excluded from analysis for a nutrition survey in emergencies. For other surveys this might not be the best procedure e.g. when the percentage of overweight children has to be calculated):

- Line=25/ID=1: HAZ (-4.944), Age may be incorrect
- Line=152/ID=9: HAZ (1.542), Age may be incorrect
- Line=202/ID=1: HAZ (3.006), Age may be incorrect
- Line=269/ID=4: HAZ (3.784), Age may be incorrect
- Line=317/ID=10: WHZ (2.461), WAZ (2.121), Weight may be incorrect
- Line=322/ID=5: HAZ (2.481), WAZ (1.732), Age may be incorrect
- Line=334/ID=2: HAZ (-5.247), Age may be incorrect
- Line=338/ID=7: HAZ (1.938), Age may be incorrect
- Line=392/ID=4: HAZ (1.482), Age may be incorrect

Percentage of values flagged with SMART flags:WHZ: 0.3 %, HAZ: 2.0 %, WAZ: 0.5 %

AGE DISTRIBUTION:

- Month 6 : ##
- Month 7 : ########
- Month 8 : #######
- Month 9 : ########
- Month 10 : #####
- Month 11 : #########
- Month 12 : ##########
- Month 13 : ########
- Month 14 : ######
- Month 15 : ###########
- Month 16 : ###########
- Month 17 : ########
- Month 18 : ###########
- Month 19 : #######
- Month 20 : #########
- Month 21 : #######
- Month 22 : #####
- Month 23 : ##########
- Month 24 : ########
- Month 25 : #####
- Month 26 : #####
- Month 27 : #
- Month 28 : ########
- Month 29 : ######
- Month 30 : ##############
- Month 31 : ########
- Month 32 : ##########
- Month 33 : ########
- Month 34 : #####
- Month 35 : #########
- Month 36 : ####
- Month 37 : ######
- Month 38 : #######
- Month 39 : #########
- Month 40 : ########
- Month 41 : ##########
- Month 42 : ###############
- Month 43 : ####
- Month 44 : ###
- Month 45 : ############
- Month 46 : ###########
- Month 47 : ####
- Month 48 : ###########
- Month 49 : #########
- Month 50 : ###
- Month 51 : #####
- Month 52 : ######

- Month 53 : ####
- Month 54 : ######
- Month 55 : #########
- Month 56 : ######
- Month 57 : ######
- Month 58 : ###
- Month 59 : ######

Age ratio of 6-29 months to 30-59 months: 0.87 (The value should be around 0.85).:
p-value = 0.836 (as expected)

Statistical evaluation of sex and age ratios (using Chi squared statistic):

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	43/51.0 (0.8)	53/40.8 (1.3)	96/91.9 (1.0)	0.81
18 to 29	12	51/49.8 (1.0)	37/39.8 (0.9)	88/89.6 (1.0)	1.38
30 to 41	12	51/48.2 (1.1)	46/38.6 (1.2)	97/86.8 (1.1)	1.11
42 to 53	12	52/47.5 (1.1)	29/38.0 (0.8)	81/85.4 (0.9)	1.79
54 to 59	6	23/23.5 (1.0)	11/18.8 (0.6)	34/42.3 (0.8)	2.09
6 to 59	**54**	**220/198.0 (1.1)**	**176/198.0 (0.9)**	**1.25**	

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

Overall sex ratio: p-value = 0.027 (significant excess of boys)
Overall age distribution: p-value = 0.516 (as expected)
Overall age distribution for boys: p-value = 0.754 (as expected)
Overall age distribution for girls: p-value = 0.032 (significant difference)
Overall sex/age distribution: p-value = 0.003 (significant difference)

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

Digit preference score: 5 (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.468
Digit preference Height:
- Digit .0 : ###################################
- Digit .1 : ################################
- Digit .2 : ##
- Digit .3 : ##
- Digit .4 : ##

- Digit .5 : ##############################
- Digit .6 : ##
- Digit .7 : ##
- Digit .8 : ###################################
- Digit .9 : ############################

Digit preference score: 6 (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.188
Digit preference MUAC:
- Digit .0 : ######################################
- Digit .1 : ##
- Digit .2 : ##
- Digit .3 : ######################################
- Digit .4 : ###################################
- Digit .5 : ############################
- Digit .6 : ###################################
- Digit .7 : ##########################
- Digit .8 : ##
- Digit .9 : ##

Digit preference score: 7 (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)
p-value for chi2: 0.051

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

no exclusion exclusion from exclusion from

reference mean observed mean

(WHO flags) (SMART flags)

WHZ

Standard Deviation SD: (The SD should be between 0.8 and 1.2)	0.92	0.92	0.91
Prevalence (< -2)			
observed:			
calculated with current SD:			
calculated with a SD of 1:			

HAZ

Standard Deviation SD: (The SD should be between 0.8 and 1.2)	1.32	1.32	1.21
Prevalence (< -2)			
observed:	38.0%	38.0%	38.2%
calculated with current SD:	36.0%	36.0%	36.1%
calculated with a SD of 1:	31.9%	31.9%	33.4%

WHZ

Standard Deviation SD: (The SD should be between 0.8 and 1.2)	1.05	1.05	1.02
Prevalence (< -2)			
observed:	29.1%	29.1%	29.3%
calculated with current SD:	27.8%	27.8%	27.9%
calculated with a SD of 1:	26.8%	26.8%	27.4%

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

WHZ	p= 0.371	p= 0.371	p= 0.293
HAZ	p= 0.069	p= 0.069	p= 0.382
WAZ	p= 0.290	p= 0.290	p= 0.674

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

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

Kurtosis

WHZ	0.38	0.38	0.19
HAZ	0.62	0.62	-0.38
WAZ	0.12	0.12	-0.12

Kurtosis characterizes the relative size of the body versus the tails of the distribution. Positive kurtosis indicates relatively large tails and small body. Negative kurtosis indicates relatively large body and small tails.

If the absolute value is:
- above 0.4 it indicates a problem. There might have been a problem with data collection or sampling.
- between 0.2 and 0.4, the data may be affected with a problem.
- less than an absolute value of 0.2 the distribution can be considered as normal.

Test if cases are randomly distributed or aggregated over the clusters by calculation of the Index of Dispersion (ID) and comparison with the Poisson distribution for:
- WHZ < -2: ID=1.04 (p=0.392)
- WHZ < -3: ID=0.86 (p=0.725)
- GAM: ID=1.04 (p=0.392)
- SAM: ID=0.86 (p=0.725)
- HAZ < -2: ID=1.61 (p=0.006)
- HAZ < -3: ID=2.04 (p=0.000)
- WAZ < -2: ID=1.59 (p=0.007)
- WAZ < -3: ID=1.17 (p=0.204)

Subjects with SMART flags are excluded from this analysis.

The Index of Dispersion (ID) indicates the degree to which the cases are aggregated into certain clusters (the degree to which there are "pockets"). If the ID is less than 1 and p > 0.95 it indicates that the cases are UNIFORMLY distributed among the clusters. If the p value is between 0.05 and 0.95 the cases appear to be randomly distributed among the clusters, if ID is higher than 1 and p is less than 0.05 the cases are aggregated into certain cluster (there appear to be pockets of cases). If this is the case for Oedema but not for WHZ then aggregation of GAM and SAM cases is likely due to inclusion of oedematous cases in GAM and SAM estimates.

Are the data of the same quality at the beginning and the end of the clusters?
Evaluation of the SD for WHZ depending upon the order the cases are measured within each cluster (if one cluster per day is measured then this will be related to the time of the day the measurement is made).

Time	SD for WHZ
point	0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3

- 01: 0.86 (n=45, f=0) ###
- 02: 0.75 (n=45, f=0)
- 03: 0.85 (n=42, f=0) ##
- 04: 0.85 (n=43, f=0) ##
- 05: 0.94 (n=39, f=0) ######
- 06: 1.03 (n=36, f=0) ##########
- 07: 0.84 (n=33, f=0) #
- 08: 0.95 (n=29, f=0) ######
- 09: 0.97 (n=22, f=0) #######
- 10: 1.10 (n=19, f=1) OOOOOOOOOOO
- 11: 1.42 (n=17, f=0) OOOOOOOOOOOOOOOOOOOOOOOO
- 12: 0.98 (n=10, f=0) OOOOOOO
- 13: 1.22 (n=07, f=0) ~~~~~~~~~~~~~~~~~~
- 14: 0.66 (n=05, f=0)
- 15: 1.23 (n=02, f=0) ~~~~~~~~~~~~~~~~~~

(When n is much less than the average number of subjects per cluster different symbols is used: 0 for n < 80% and ~ for n < 40%; the numbers marked "f" are the numbers of SMART flags found in the different time points)

Analysis by Team

Team	1	2	3	4	5	6
n =	69	47	77	61	64	78

Percentage of values flagged with SMART flags:

WHZ:	0.0	2.2	0.0	0.0	0.0	1.3
HAZ:	4.3	4.3	1.3	1.6	1.6	1.3
WAZ:	0.0	2.2	0.0	0.0	0.0	2.6

Age ratio of 6-29 months to 30-59 months:

0.68	0.96	0.60	1.65	0.83	0.90

Sex ratio (male/female):

0.86	1.61	1.14	1.54	1.56	1.17

Digit preference Weight (%):

.0 :	13	2	12	10	14	12
.1 :	7	15	13	20	9	10
.2 :	10	17	5	13	5	6
.3 :	14	13	14	11	6	12
.4 :	10	11	12	5	8	8
.5 :	12	9	10	7	16	8
.6 :	14	13	5	7	13	15
.7 :	4	4	9	10	11	12
.8 :	10	11	10	7	11	12
.9 :	4	4	9	11	8	6
DPS:	12	16	9	14	11	9

Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)

Digit preference Height (%):

.0 :	6	17	13	11	6	3
.1 :	4	9	9	11	8	8
.2 :	13	7	9	7	20	15
.3 :	13	15	12	13	9	12
.4 :	13	7	14	16	6	14
.5 :	12	13	8	3	9	5
.6 :	9	9	13	7	14	14
.7 :	9	9	8	13	16	10
.8 :	12	2	6	13	6	14
.9 :	10	13	8	5	5	5
DPS:	10	15	9	14	16	15

Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)

Digit preference MUAC (%):

.0 :	7	17	9	15	8	8
.1 :	9	17	12	10	13	12
.2 :	12	9	10	8	23	9
.3 :	9	6	10	11	9	13
.4 :	16	13	5	5	9	9
.5 :	7	13	4	11	3	5
.6 :	10	2	13	15	2	12
.7 :	6	2	12	10	3	5
.8 :	16	13	10	5	9	10
.9 :	9	9	14	10	20	18
DPS:	11	17	10	11	23	12

Digit preference score (0-7 excellent, 8-12 good, 13-20 acceptable and > 20 problematic)

Standard deviation of WHZ:

SD	0.91	1.06	0.77	0.95	0.95	0.90

Prevalence (< -2) observed:

%	6.5

Prevalence (< -2) calculated with current SD:

%	10.6

Prevalence (< -2) calculated with a SD of 1:

%	9.3

Standard deviation of HAZ:

SD	1.45	1.23	1.24	1.21	1.35	1.35

observed:

%	39.1	39.1	45.5	31.1	28.1	42.3

calculated with current SD:

%	37.2	30.0	45.5	31.9	31.5	36.4

calculated with a SD of 1:

%	31.8	25.9	44.5	28.4	25.7	31.9

Statistical evaluation of sex and age ratios (using Chi squared statistic) for:

Team 1:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	4/7.4 (0.5)	15/8.6 (1.7)	19/16.0 (1.2)	0.27
18 to 29	12	6/7.2 (0.8)	3/8.4 (0.4)	9/15.6 (0.6)	2.00
30 to 41	12	9/7.0 (1.3)	10/8.1 (1.2)	19/15.1 (1.3)	0.90
42 to 53	12	9/6.9 (1.3)	6/8.0 (0.8)	15/14.9 (1.0)	1.50
54 to 59	6	4/3.4 (1.2)	3/3.9 (0.8)	7/7.4 (1.0)	1.33
6 to 59	54	32/34.5 (0.9)	37/34.5 (1.1)	0.86	

The data are expressed as observed number/expected number (ratio of obs/expect)
Overall sex ratio: p-value = 0.547 (boys and girls equally represented)
Overall age distribution: p-value = 0.359 (as expected)
Overall age distribution for boys: p-value = 0.543 (as expected)
Overall age distribution for girls: p-value = 0.052 (as expected)
Overall sex/age distribution: p-value = 0.010 (significant difference)

Team 2:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	10/6.7 (1.5)	4/4.2 (1.0)	14/10.9 (1.3)	2.50
18 to 29	12	4/6.6 (0.6)	5/4.1 (1.2)	9/10.6 (0.8)	0.80
30 to 41	12	7/6.4 (1.1)	3/3.9 (0.8)	10/10.3 (1.0)	2.33
42 to 53	12	4/6.3 (0.6)	6/3.9 (1.5)	10/10.1 (1.0)	0.67
54 to 59	6	4/3.1 (1.3)	0/1.9 (0.0)	4/5.0 (0.8)	
6 to 59	54	29/23.5 (1.2)	18/23.5 (0.8)	1.61	

The data are expressed as observed number/expected number (ratio of obs/expect)
Overall sex ratio: p-value = 0.109 (boys and girls equally represented)
Overall age distribution: p-value = 0.854 (as expected)
Overall age distribution for boys: p-value = 0.443 (as expected)
Overall age distribution for girls: p-value = 0.475 (as expected)
Overall sex/age distribution: p-value = 0.043 (significant difference)

Team 3:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	6/9.5 (0.6)	6/8.4 (0.7)	12/17.9 (0.7)	1.00
18 to 29	12	9/9.3 (1.0)	8/8.1 (1.0)	17/17.4 (1.0)	1.13
30 to 41	12	12/9.0 (1.3)	13/7.9 (1.6)	25/16.9 (1.5)	0.92
42 to 53	12	10/8.8 (1.1)	6/7.8 (0.8)	16/16.6 (1.0)	1.67
54 to 59	6	4/4.4 (0.9)	3/3.8 (0.8)	7/8.2 (0.9)	1.33
6 to 59	54	41/38.5 (1.1)	36/38.5 (0.9)	1.14	

The data are expressed as observed number/expected number (ratio of obs/expect)
Overall sex ratio: p-value = 0.569 (boys and girls equally represented)
Overall age distribution: p-value = 0.196 (as expected)
Overall age distribution for boys: p-value = 0.645 (as expected)
Overall age distribution for girls: p-value = 0.336 (as expected)
Overall sex/age distribution: p-value = 0.124 (as expected)

Team 4:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	7/8.6 (0.8)	12/5.6 (2.2)	19/14.2 (1.3)	0.58
18 to 29	12	13/8.4 (1.6)	6/5.4 (1.1)	19/13.8 (1.4)	2.17
30 to 41	12	8/8.1 (1.0)	4/5.3 (0.8)	12/13.4 (0.9)	2.00
42 to 53	12	7/8.0 (0.9)	1/5.2 (0.2)	8/13.2 (0.6)	7.00
54 to 59	6	2/3.9 (0.5)	1/2.6 (0.4)	3/6.5 (0.5)	2.00
6 to 59	54	37/30.5 (1.2)	24/30.5 (0.8)	1.54	

The data are expressed as observed number/expected number (ratio of obs/expect)
Overall sex ratio: p-value = 0.096 (boys and girls equally represented)
Overall age distribution: p-value = 0.104 (as expected)
Overall age distribution for boys: p-value = 0.414 (as expected)
Overall age distribution for girls: p-value = 0.017 (significant difference)
Overall sex/age distribution: p-value = 0.002 (significant difference)

Team 5:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	5/9.0 (0.6)	7/5.8 (1.2)	12/14.8 (0.8)	0.71
18 to 29	12	10/8.8 (1.1)	7/5.7 (1.2)	17/14.5 (1.2)	1.43
30 to 41	12	9/8.6 (1.1)	6/5.5 (1.1)	15/14.0 (1.1)	1.50
42 to 53	12	12/8.4 (1.4)	4/5.4 (0.7)	16/13.8 (1.2)	3.00
54 to 59	6	3/4.2 (0.7)	1/2.7 (0.4)	4/6.8 (0.6)	3.00
6 to 59	54	39/32.0 (1.2)	25/32.0 (0.8)	1.56	

The data are expressed as observed number/expected number (ratio of obs/expect)
Overall sex ratio: p-value = 0.080 (boys and girls equally represented)
Overall age distribution: p-value = 0.632 (as expected)
Overall age distribution for boys: p-value = 0.428 (as expected)
Overall age distribution for girls: p-value = 0.732 (as expected)
Overall sex/age distribution: p-value = 0.053 (as expected)

Team 6:

Age cat.	mo.	boys	girls	total	ratio boys/girls
6 to 17	12	11/9.7 (1.1)	9/8.4 (1.1)	20/18.1 (1.1)	1.22
18 to 29	12	9/9.5 (0.9)	8/8.1 (1.0)	17/17.6 (1.0)	1.13
30 to 41	12	6/9.2 (0.7)	10/7.9 (1.3)	16/17.1 (0.9)	0.60
42 to 53	12	10/9.1 (1.1)	6/7.8 (0.8)	16/16.8 (1.0)	1.67
54 to 59	6	6/4.5 (1.3)	3/3.8 (0.8)	9/8.3 (1.1)	2.00
6 to 59	54	42/39.0 (1.1)	36/39.0 (0.9)	1.17	

The data are expressed as observed number/expected number (ratio of obs/expect)
Overall sex ratio: p-value = 0.497 (boys and girls equally represented)
Overall age distribution: p-value = 0.983 (as expected)
Overall age distribution for boys: p-value = 0.751 (as expected)
Overall age distribution for girls: p-value = 0.878 (as expected)
Overall sex/age distribution: p-value = 0.458 (as expected)

Evaluation of the SD for WHZ depending upon the order the cases are measured within each cluster (if one cluster per day is measured then this will be related to the time of the day the measurement is made).

Team: 1

- Time SD for WHZ
- point 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
- 01: 0.84 (n=07, f=0) ##
- 02: 0.60 (n=07, f=0)
- 03: 0.76 (n=07, f=0)
- 04: 1.02 (n=07, f=0) #########
- 05: 1.02 (n=07, f=0) #########
- 06: 0.64 (n=07, f=0)
- 07: 1.07 (n=07, f=0) ###########
- 08: 0.95 (n=06, f=0) ######
- 09: 1.18 (n=05, f=0) ################
- 10: 0.79 (n=04, f=0)
- 11: 0.59 (n=03, f=0)

(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked "f" are the numbers of SMART flags found in the different time points)

Team: 2

- Time SD for WHZ
- point 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
- 01: 1.05 (n=08, f=0) ###########
- 02: 1.16 (n=08, f=0) ###############
- 03: 0.78 (n=06, f=0)
- 04: 1.05 (n=07, f=0) ###########

- 05: 1.11 (n=05, f=0) ############
- 06: 1.36 (n=04, f=0) OOOOOOOOOOOOOOOOOOOOOOO
- 07: 0.99 (n=04, f=0) OOOOOOOO
- 08: 0.86 (n=03, f=0) OO

(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked "f" are the numbers of SMART flags found in the different time points)

Team: 3

- Time SD for WHZ
- point 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
- 01: 0.68 (n=08, f=0)
- 02: 0.80 (n=08, f=0)
- 03: 1.02 (n=08, f=0) #########
- 04: 0.73 (n=08, f=0)
- 05: 0.85 (n=08, f=0) ##
- 06: 0.80 (n=08, f=0)
- 07: 0.74 (n=07, f=0)
- 08: 0.81 (n=06, f=0) #
- 09: 0.54 (n=04, f=0)
- 10: 0.20 (n=03, f=0)
- 11: 0.97 (n=03, f=0) OOOOOOO
- 12: 0.24 (n=02, f=0)
- 13: 0.52 (n=02, f=0)
- 14: 0.94 (n=02, f=0) ~~~~~~

(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked "f" are the numbers of SMART flags found in the different time points)

Team: 4

- Time SD for WHZ
- point 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
- 01: 0.72 (n=06, f=0)
- 02: 0.89 (n=06, f=0) ####
- 03: 1.33 (n=06, f=0) ######################
- 04: 1.23 (n=05, f=0) ##################
- 05: 1.07 (n=05, f=0) ###########
- 06: 1.04 (n=05, f=0) ##########
- 07: 0.75 (n=05, f=0)
- 08: 0.67 (n=05, f=0)
- 09: 0.29 (n=04, f=0)
- 10: 1.11 (n=04, f=0) ############
- 11: 1.01 (n=04, f=0) #########
- 12: 0.79 (n=02, f=0)
- 13: 0.75 (n=02, f=0)

(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked “f” are the numbers of SMART flags found in the different time points)

Team: 5
- Time SD for WHZ
- point 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
- 01: 0.72 (n=08, f=0)
- 02: 0.29 (n=08, f=0)
- 03: 0.77 (n=07, f=0)
- 04: 0.59 (n=08, f=0)
- 05: 0.97 (n=07, f=0) #######
- 06: 1.17 (n=05, f=0) ################
- 07: 0.70 (n=04, f=0)
- 08: 1.42 (n=04, f=0) ##########################
- 09: 1.28 (n=03, f=0) OOOOOOOOOOOOOOOOOOOO
- 10: 0.62 (n=03, f=0)
- 11: 2.32 (n=03, f=0) OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO OOOOOOOOOOOOOOOOOOOOO
- 12: 1.99 (n=02, f=0) OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO OOOOOOO

(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked “f” are the numbers of SMART flags found in the different time points)

Team: 6
- Time SD for WHZ
- point 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3
- 01: 0.83 (n=08, f=0) #
- 02: 0.42 (n=08, f=0)
- 03: 0.41 (n=08, f=0)
- 04: 0.72 (n=08, f=0)
- 05: 0.58 (n=07, f=0)
- 06: 1.26 (n=07, f=0) ###################
- 07: 0.82 (n=06, f=0) #
- 08: 1.00 (n=05, f=0) #########
- 09: 1.07 (n=05, f=0) ###########
- 10: 1.63 (n=05, f=0) ###################################
- 11: 1.38 (n=04, f=0) ########################
- 12: 0.38 (n=03, f=0)

(when n is much less than the average number of subjects per cluster different symbols are used: 0 for n < 80% and ~ for n < 40%; The numbers marked “f” are the numbers of SMART flags found in the different time points)

(for better comparison it can be helpful to copy/paste part of this report into Excel)

APPENDIX 2: LIST OF CLUSTERS

Geographical unit	Population size	Cluster
Bageshwori 4	551	1
Balkumari 8	290	2
Belkot 5	1279	3
Betini 6	223	4
Bhalche 1	443	5
Bidur Municipality 2	1040	6
Bidur Municipality 4	4418	7
Bidur Municipality 6	2280	8
Bidur Municipality 8	2883	9
Bidur Municipality 9	4969	10
Bungtang 1	310	RC
Charghare 6	629	11
Chaughada 2	570	12
Chauthe 2	417	13
Dangsing 1	489	14
Deurali 9	495	15
Duipipal 7	1583	16
Fikuri9	253	17
Gaunkharka7	788	18
Gerkhu6	336	19
Gorshyang1	214	20
Jiling4	615	21
Kabilas3	380	22
Kakani3	1542	RC
Haldekalika3	431	23
Kalyanpur5	499	24
Kaule9	307	25
Khadgabhanjyang8	311	26
Khanigaun5	881	27
Kumari2	487	28
Kumari7	670	29
Lachyang8	498	30
Madanpur3	842	31
Madanpur9	1610	RC
Manakamana3	357	32
Narjamandap6	721	33
Okharpauwa4	869	34
Panchakanya3	173	RC

Raluka8	361	35
Rautbesi3	233	RC
Samari2	644	36
Samundradevi3	545	37
Shikharbesi4	402	38
Sundaradevi7	177	39
Suryamati6	363	40
Taruka2	487	41
Thanapati6	320	42
Thansing8	1161	43
Thaprek9	512	44
Tupche9	479	45

APPENDIX 3: LOCAL EVENT CALENDAR

Seasons	Religious Holidays	Local events	Other events	Month (English)	Month (Nepali)	Nepali Year	English Year	Age (M)
Dry season				April	Chaitra-Baisakh	2072	2016	0
Dry season	Shivaratri	Holi	Gyalpo Loshar	March	Falgun-Chaitra	2072	2016	0
Cold season	Shree Panchami	Sonam Loshar	Democracy Day	February	Magh-Falgun	2072	2016	1
Cold season	Maghi		Sahid Diwas	January	Paush-Magh	2072	2016	2
Cold season	Udhauli Parba/Yomari Punhi	Tamu Loshar	Christmas Day	December	Mangsir-Paush	2072	2015	3
Cold season	Tihar/BhaitikaChhat/Guru Nanak Day	Brischik Sankranti		November	Kartik-Mangsir	2072	2015	4
Dry season	Dashain/Kojagrat Purnima		Jitiya Parba	October	Ashwin-Kartik	2072	2015	5
Dry season	Rishi Panchanmi(Teej)/Indra Jatra/ Krishna Astami		Bakra Id	September	Bhadra-Ashwin	2072	2015	6
Rainy season	Janai Purnima/Gai Jatra			August	Shrawan-Bhadra	2072	2015	7
Rainy season	Karkat Sankranti			July	Ashar-Shrawan	2072	2015	8
Rainy season	Ashar 15 (Dahi Chiura Khane Din)			June	Jestha -Ashar	2072	2015	9
Dry season	Buddha Jayanti/Ubhauli Parba	Republic Day/ Ganatantra Diwas		May	Baisakh-Jestha	2072	2015	10
Dry season	Nepali New Year 2072	Loktantra Diwas		April	Chaitra-Baisakh	2072/ 2071	2015	11
Dry season	Holi			March	Falgun-Chaitra	2071	2015	12
Cold season	Maha Shivaratri	Democracy Day		February	Magh-Falgun	2071	2015	13
Cold season	Maghe Sankranti, Shree Panchami	English New Year	Sonam Loshar	January	Paush-Magh	2071	2015	14
Cold season	Christmas Day	Yomari Punhi	Tamu Lohsar	December	Mangsir-Paush	2071	2014	15
Cold season	Haribodhini Ekadasi			November	Kartik-Mangsir	2071	2014	16
Dry season	Dashain, Tihar	Chhat		October	Ashwin-Kartik	2071	2014	17

Seasons	Religious Holidays	Local events	Other events	Month (English)	Month (Nepali)	Nepali Year	English Year	Age (M)
Dry season	Ghatasthapana / Indra Jatra			September	Bhadra-Ashwin	2071	2014	18
Rainy season	Janai Purnima	Shree Krishna Janmastami	Teej/Rishi Panchami	August	Shrawan-Bhadra	2071	2014	19
Rainy season	Guru Purnima			July	Ashar-Shrawan	2071	2014	20
Rainy season	Ashar Sankranti			June	Jestha -Ashar	2071	2014	21
Dry season	Buddha Jayanti	Ganatantra diwas		May	Baisakh-Jestha	2071	2014	22
Dry season	Ram Navami	Nepali New Year	Lokatantra Diwas	April	Chaitra-Baisakh	2071/ 2070	2014	23
Dry season	Holi	Ghode Jatra	Gyalpo Loshar	March	Falgun-Chaitra	2070	2014	24
Cold season	Shree Panchami	Democracy Day	Maha Shiva ratri	February	Magh-Falgun	2070	2014	25
Cold season	English New Year	Mage Sankranti	Sahid Diwas	January	Paush-Magh	2070	2014	26
Cold season	Christmas Day	Yomari Punhi	Tamu Lohsar	December	Mangsir-Paush	2070	2013	27
Cold season	Tihar/BhaitikaChhat/Guru Nanak Day			November	Kartik-Mangsir	2070	2013	28
Dry season	Dashain / Jitiya Parba			October	Ashwin-Kartik	2070	2013	29
Dry season	Teez			September	Bhadra-Ashwin	2070	2013	30
Rainy season	Eid ul Fitr/Janai Purnima/Shree Krisna Janmasthami			August	Shrawan-Bhadra	2070	2013	31
Rainy season	Bhanu Jayanti			July	Ashar-Shrawan	2070	2013	32
Rainy season				June	Jestha -Ashar	2070	2013	33
Dry season	Bhddha Jayanti/ Ganatantra Dibosh			May	Baisakh-Jestha	2070	2013	34
Dry season	ShivaRatri	Chaite dasain (Ramnawami)		April	Chaitra-Baisakh	2070/ 2069	2013	35
Dry season	Gyalbo loshar	Holi		March	Falgun-Chaitra	2069	2013	36
Cold season	Prajatantra Diwas/ Mahashivaratri			February	Magh-Falgun	2069	2013	37
Cold season	Sonam loshar/English New Year/ Prithvi Jayanti	Maghi		January	Paush-Magh	2069	2013	38
Cold season	Christmas Day			December	Mangsir-Paush	2069	2012	39

Seasons	Religious Holidays	Local events	Other events	Month (English)	Month (Nepali)	Nepali Year	English Year	Age (M)
Cold season	Dipawali/Tihar			November	Kartik-Mangsir	2069	2012	40
Dry season	Ghatasthapana	Dasain/Chhat		October	Ashwin-Kartik	2069	2012	41
Dry season	Teez	Dasain		September	Bhadra-Ashwin	2069	2012	42
Rainy season	Krishna Janmastami/ Rakshabandhan			August	Shrawan-Bhadra	2069	2012	43
Rainy season	Bhanu Jayanti			July	Ashar-Shrawan	2069	2012	44
Rainy season				June	Jestha -Ashar	2069	2012	45
Dry season	Ganatantra Diwas			May	Baisakh-Jestha	2069	2012	46
Dry season	Nepali New Year 2069/ Shivaratri/Mata tirtha aeushi	Chaite Dashain (Ramnawami)		April	Chaitra-Baisakh	2069/ 2068	2012	47
Dry season	Mahashivaratri/ Nari Diwas	Holi		March	Falgun-Chaitra	2068	2012	48
Cold season	Prajatantra diwas			February	Magh-Falgun	2068	2012	49
Cold season	English New Year	Maghi		January	Paush-Magh	2068	2012	50
Cold season	Christmas Day/Tamu Loshar			December	Mangsir-Paush	2068	2011	51
Cold season	Dipawali/Chhat			November	Kartik-Mangsir	2068	2011	52
Dry season	Dashain			October	Ashwin-Kartik	2068	2011	53
Dry season	Gatasthapana			September	Bhadra-Ashwin	2068	2011	54
Rainy season	Teez/Kushe aushi			August	Shrawan-Bhadra	2068	2011	55
Rainy season	Guru Purnima			July	Ashar-Shrawan	2068	2011	56
Rainy season				June	Jestha -Ashar	2068	2011	57
Dry season	Buddha Jayanti/ Ganatanta diwas			May	Baisakh-Jestha	2068	2011	58
Dry season	ShivaRatri	Chaite Dashain (Ramnawami)		April	Chaitra-Baisakh	2068/ 2067	2011	59
Dry season	Mahashivaratri	Holi		March	Falgun-Chaitra	2067	2011	60
Cold season				February	Magh-Falgun	2067	2011	61
Cold season		Maghi		January	Paush-Magh	2067	2011	62

APPENDIX 4: RESULT TABLE ACCORDING TO NCHS GROWTH REFERENCE

Table 16: Prevalence of acute malnutrition based on weight-for-height z-scores (and/or oedema) and by sex

Indicator	All n = 442	Boys n = 237	Girls n = 205
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(32) 7.2 % (5.3 - 9.9 95% C.I.)	(17) 7.2 % (4.6 - 11.1 95% C.I.)	(15) 7.3 % (4.5 - 11.6 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(30) 6.8 % (4.9 - 9.3 95% C.I.)	(17) 7.2 % (4.6 - 11.1 95% C.I.)	(13) 6.3 % (3.7 - 10.6 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(2) 0.5 % (0.1 - 1.9 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(2) 1.0 % (0.2 - 3.9 95% C.I.)

The prevalence of oedema is 0.0 %

Table 17: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

Age (month)	Total no.	Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
		No.	%	No.	%	No.	%	No.	%
6-17	87	0	0.0	6	6.9	81	93.1	0	0.0
18-29	101	2	2.0	10	9.9	89	88.1	0	0.0
30-41	99	0	0.0	6	6.1	93	93.9	0	0.0
42-53	92	0	0.0	5	5.4	87	94.6	0	0.0
54-59	63	0	0.0	3	4.8	60	95.2	0	0.0
Total	442	2	0.5	30	6.8	410	92.8	0	0.0

Table 18: Prevalence of acute malnutrition based on the percentage of the median and/or oedema

Indicator	n = 442
Prevalence of global acute malnutrition (<80% and/or oedema)	(16) 3.6 % (2.3 - 5.6 95% C.I.)
Prevalence of moderate acute malnutrition (<80% and >= 70%, no oedema)	(16) 3.6 % (2.3 - 5.6 95% C.I.)
Prevalence of severe acute malnutrition (<70% and/or oedema)	(0) 0.0 % (0.0 - 0.0 95% C.I.)

Table 19: Prevalence of underweight based on weight-for-age z-scores by sex

Indicator	All n = 439	Boys n = 236	Girls n = 203
Prevalence of underweight (<-2 z-score)	(109) 24.8 % (20.4 - 29.9 95% C.I.)	(59) 25.0 % (19.2 - 31.9 95% C.I.)	(50) 24.6 % (18.3 - 32.3 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(87) 19.8 % (16.3 - 23.9 95% C.I.)	(51) 21.6 % (16.3 - 28.1 95% C.I.)	(36) 17.7 % (13.1 - 23.5 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(22) 5.0 % (3.2 - 7.8 95% C.I.)	(8) 3.4 % (1.7 - 6.7 95% C.I.)	(14) 6.9 % (3.9 - 12.0 95% C.I.)

Table 20: Prevalence of underweight by age, based on weight-for-age z-scores

Age (month)	Total no.	Severe underweight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
		No.	%	No.	%	No.	%	No.	%
6-17	86	3	3.5	13	15.1	70	81.4	0	0.0
18-29	99	5	5.1	24	24.2	70	70.7	0	0.0
30-41	99	7	7.1	17	17.2	75	75.8	0	0.0
42-53	92	3	3.3	17	18.5	72	78.3	0	0.0
54-59	63	4	6.3	16	25.4	43	68.3	0	0.0
Total	439	22	5.0	87	19.8	330	75.2	0	0.0

Table 21: Prevalence of stunting based on height-for-age z-scores and by sex

Indicator	All n = 434	Boys n = 238	Girls n = 196
Prevalence of stunting (<-2 z-score)	(95) 21.9 % (17.2 - 27.4 95% C.I.)	(56) 23.5 % (17.8 - 30.5 95% C.I.)	(39) 19.9 % (14.1 - 27.3 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(68) 15.7 % (12.7 - 19.1 95% C.I.)	(39) 16.4 % (12.3 - 21.6 95% C.I.)	(29) 14.8 % (10.4 - 20.7 95% C.I.)
Prevalence of severe tunting (<-3 z-score)	(27) 6.2 % (3.7 - 10.2 95% C.I.)	(17) 7.1 % (3.8 - 13.2 95% C.I.)	(10) 5.1 % (2.6 - 9.9 95% C.I.)

Table 22: Prevalence of stunting by age based on height-for-age z-scores

Age (month)	Total no.	Severe stunting (<-3 z-score)		Moderate stunting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
		No.	%	No.	%	No.	%
6-17	87	1	1.1	9	10.3	77	88.5
18-29	98	6	6.1	9	9.2	83	84.7
30-41	98	8	8.2	7	7.1	83	84.7
42-53	90	6	6.7	23	25.6	61	67.8
54-59	61	6	9.8	20	32.8	35	57.4
Total	434	27	6.2	68	15.7	339	78.1

APPENDIX 5

APPENDIX 5 (A): QUESTIONNAIRE (IN ENGLISH)

ANTHROPOMETRIC SURVEY DATA FORM

Date of Survey (DD/MM/YYYY) _____

District _____ Cluster Number _____ Team no./ID _____ Name of Team Leader _____

Village Development Committee/Municipality _____ Village name /tole _____

Ward Number _____

Household number	Household ID	Child ID	Full Name	Sex (F/M)	Birthday (DD/MM/YYYY) in B.S	Birthday (DD/MM/YYYY) in A.D	Age (in months)	Weight (kg)	Height (cm)	Edema (y/n)	MUAC (mm)	Clothes (Y/N)	If SAM child, ask is your child admitted in treatment program or not? (Y/N)
								±0.1 Kg	±0.1 cm	Please verify	±10 mm		

APPENDIX 5 (B): QUESTIONNAIRE (IN NEPALI)

शारीरिक नापतौल सम्बन्धी सर्वेक्षण तथ्यांक फारम

मिति (गते/महिना/साल) _____

जिल्लाः _____ समूह नं.: _____ टोली नं.: _____ टोली नेताको नामः _____

गा.वि.स/न.पाः _____ गाउँ र टोलः _____

वडा नं.: _____

घरधूरी नं.	परिवार नं.	बच्चा नं.	पूरा नाम	लिंग (पु/म)	जन्म मिति ग/म/सा	जन्म मिति ग/म/सा	उमेर (महिनामा)	तौल (किलो मा)	उचाई (से. मि.)	सुन्निएको (छ/छैन)	पाखुराको नाप (मि.मि)	कपडा लगाएको (छ/छैन)	कुपोषित भए, कार्यक्रममा भर्ना भएका (छ/छैन)
								+ ०.१ के.जी	+ ०.१ से.मि.	सुनिश्चित गर्नुहोस्	+ १० मि. मि.		

APPENDIX 6

APPENDIX 6(A): CLUSTER CONTROL FORM (IN ENGLISH)

CLUSTER CONTROL FORM

Date of Survey (DD/MM/YYYY) in B.S

District

Cluster Number

Team no./ID

Name of Team Leader

Village Development Committee/Municipality

Village name /tole

Ward Number

Household number	Household ID	Child ID	Head of Household Name	Outcome of First visit Code 1=Completed 2=Partly completed 3=refused 4=Absent child/family	Number of eligible children	Number of eligible children measured	HH needs to be revisited (Y/N)	HH revisited (Y/N)	Outcome of Second visit Code 1=Completed 2=Partly completed 3=refused 4=Absent child/family	Comments

APPENDIX 6 (B): CLUSTER CONTROL FORM (IN NEPALI)

समूह कन्ट्रोल फारम

मिति (गते/महिना/साल) _____

जिल्ला: _____ समूह नं.: _____ टोली नं.: _____ टोली नेताको नाम: _____

गा.वि.स/न.पा: _____ गाउँ र टोल: _____

वडा: _____

घरधूरी नं.	परिवार नं.	बच्चाको नं.	घरमूलीको नाम	पहिलो भेटको नतिजा कोड १. पूरा सकिएको २. आंशिक रूपमा सकिएको ३. नमानेको ४. बच्चा/परिवार नभेटिएको	मापदण्ड पुगेको बच्चाको संख्या	नाप लिएको बच्चाको संख्या	पुनःभेट आवश्यक (छ/छैन)	पुनःभेट गरिएको (छ/छैन)	दोस्रो भेटको नतिजा कोड १. पूरा सकिएको २. आंशिक रूपमा सकिएको ३. नमानेको ४. बच्चा/परिवार नभेटिएको	कैफियत

APPENDIX 7

APPENDIX 7 (A): INFORMED CONSENT FORM (IN ENGLISH)

Informed consent

Namaste, My name is _____. Let me introduce other team members of my team. They are _____. We are from ACF International. We work with Government of Nepal which includes health facilities and health workers. We are here to conduct nutritional assessment of children aged 6-59 months. This program works with the Government of Nepal including health workers and health facilities of this district.

Objectives of the survey:
The main objective of this survey is to assess the nutritional status of children (6-59 months) based on anthropometric measurements which will enable us to understand the nutritional situation of the district. This will also help to understand your child's nutrition status.

Process:
As part of the assessment, we randomly selected..... number of clusters and.....number of households from the district. Your village and household is one of those selected village and household. If there are any children under 5 in your household, we would like to take some measurements (weight, height, MUAC, oedema, age) to find out if your child/children is/are malnourished or not. This will enable us to estimate the percentage of children 6-59 months who are malnourished in this village as well as in the district.

Confidentiality:
The information we collect is completely confidential and will be used only for the purpose of survey.

Right to refusal:
The participation in the assessment/survey is voluntary and the right to participate or opt out of the survey is upon you.

Do you have any questions or concerns? (Ensure that child is comfortable going ahead with measurement). So, if we can have your permission we would like to go ahead with the measurement.

Signature of respondent: **Date:**

Signature of interviewer: **Date:**

APPENDIX 7 (B): INFORMED CONSENT FORM (IN NEPALI)

अन्तरवार्ताको लागि सुसूचित फारम

नमस्ते, मेरो नाम ..... हो । मेरो साथीहरूको नाम ..... हो । हामी ६-५९ महिनाका बालबालिकाको पोषणको लेखाजोखा गर्नका निम्ति ए.सि.एफ. इन्टरनेशनलबाट आएका हौं । यो संस्थाले नेपाल सरकारसँग मिलेर काम गर्दछ जसमा यस जिल्लाका स्वास्थ्यकर्मी र स्वास्थ्य संस्थाहरू पनि पर्दछन् ।

सर्वेक्षणको उद्देश्य:
यस सर्वेक्षणको मुख्य उद्देश्य भनेको ६-५९महिनाका बालबालिकाको लेखाजोखा गरी जिल्लाको पोषण स्थिति बुझ्नु हो । यसले तपाईको बच्चाको पनि पोषण अवस्था पत्ता लगाउन सहयोग गर्छ ।

प्रक्रिया:
यस सर्वेक्षणमा हामीले आँकलन / अड्कल गरी..... समूह र ..... घरधूरी लियौ । तपाईको गाउँ र घर यस सर्वेक्षणका लागि छनौट भएको छ । तपाईको घरमा ५ वर्ष मुनिका बालबालिका छन् भने, हामी उनीहरूको उचाई, तौल, पाखुराको नापका साथै उमेर पनि संकलन गर्नेछौ । यस प्रकारको जानकारी मार्फत् हामी तपाईको बच्चाको साथसाथै जिल्लाको कुपोषण स्थितिको जानकारी प्राप्त गर्नेछौ

गोपनीयता:
हामीले संकलन गरेका सम्पूर्ण जानकारीहरू पूर्ण रुपमा गोप्य राखिने छ र सर्वेक्षण विश्लेषणको लागि मात्रै प्रयोग गरिने छ ।

अन्तरवार्ता नदिन वा छोड्न सक्ने अधिकार:
यस सर्वेक्षणमा तपाईको सहभागिता स्वेच्छिक हुनेछ र तपाईले नचाहनु भएमा सहभागी नहुने अधिकार तपाईमा नै निहित हुनेछ ।

यस बिषयमा तपाईलाई केही प्रश्न वा चासो छन् ? (बच्चाको नाप लिन मिल्ने सुनिश्चित गर्न'स्) तपाईको बच्चाको आवश्यक नाप लिन अनुमति छ ?

उत्तरदाताको हस्ताक्षर: **मिति:**

अन्तरवार्ता लिनेको हस्ताक्षर: **मिति:**

APPENDIX 8

APPENDIX 8: AGENDA FOR ENUMERATOR'S TRAINING

Section Code	Section Title	Time	Duration
Day 1			
	Introduction of Participants	30 min	0800-0830
	Welcoming	15 min	0830-0845
	Pre-test	30min	0845-0915
1A	Enumerator Training Overview	45 min	0915-1000
1B	Survey Teams	45 min	1000-1045
	Break	15 min	1045-1100
3A	Malnutrition	45 min	1100-1145
3B	Weight	75 min	1145 -1300
	Lunch	60 min	1300 -1400
3C	Height/ Length	75 min	14 00-1515
	Break	15 min	1515-1530
3D	MUAC	45 min	1530-1615
3E	Oedema	30 min	1615-1745
Day 2			
	Day 1 Recap		0900-1000
3F	Interpretation of Measurements	30 min	1000-1030
	Break	15 min	1030-1045
2A	Questionnaire and Data Recording	60 min	1045-1145
2B	Event Calendar	60 min	1145-1245
	Lunch	60 min	1245-1345
4	Quality Checks (including Standardisation Test organisation)	75 min	1345-1500
	Break	15 min	1500-1515
	Mock Standardisation Test	60 min	1515-1615
	Summarization of the Day	60 min	1615-1715
Day 3			
	Standardisation Test	180 min	0800-1100
	Lunch	60 min	1300-1400
	Standardization Test	180 min	1400-1700
	Feedback and results of Standardization test		
Day 4			
5A	Arrival to Village	35 min	0900-0935
5B	Segmentation and Random Number Table	75 min	0935-1035
	Break	15 min	1035 - 1050
	Continuation of Segmentation and Random Number Table		1050-1105

Section Code	Section Title	Time	Duration
5C	Simple Random sampling	60 min	1105-1205
5D	Systematic random Sampling	60 min	1105-1205
	Systematic random Sampling	55 min	1205-1305
	Lunch	60 min	1305- 1400
5E	Continue Systematic random Sampling	30 min	1400-1500
	Special Cases	15 min	1500-1530
	Break	45 min	1530-1545
	Anthropometric Questionnaire	60 min	1545-1630
	Team Planning, Data collection plan and daily checklist for each team		1630-1730
Day 5			
	Field Test	Full day	
	Field test Feedback: entire team and individual teams		
	Practice identified areas of improvement: Last minute team preparations for first day of data collection		

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