Nutrition Causal Analysis

Maize Livelihood Belt of Aleta Chucko and Aleta Wondo Woredas, Sidama Zone, SNNPR

Ethiopia

Final Report

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Jennifer Holden, NCA Analyst

Acknowledgements

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Abbreviations and Acronyms

ACF   Action Contre La Faim

ARI   Acute Respiratory Infection

ANC   Ante-Natal Care

ARI   Acute Respiratory Infection

CHD   Community Health Day

CI   Confidence Interval

CMAM   Community-based Management of Acute Malnutrition

EDHS   Ethiopian Demographic and Health Survey

ENCU   Emergency Nutrition Coordination Unit

GAM   Global Acute Malnutrition

HEW   Health Extension Workers

KAP   Knowledge, Attitudes and Practices

NCA   Nutrition Causal Analysis

NGO   Non-Governmental Organisation

PNC   Post-Natal Care

PPI   Progress out of Poverty Index

SAM   Severe Acute Malnutrition

SNNPR   Southern Nations, Nationalities and Peoples' Region

TFP   Therapeutic Feeding Programme

1. Introduction

Action Contre La Faim (ACF) has been working in Sidama Zone, SNNPR since 2003, focusing on nutrition interventions in addition to food security, livelihoods and water, sanitation and hygiene programmes.

Child undernutrition continues to be a major public health problem in the Sidama zone of the Southern Nations, Nationalities and Region (SNNPR), an area marked by the paradox of the 'green hunger'. The area possesses fertile lands, receives rains and is characterised by a good diversity of crops (false banana or enset, maize, barley, vegetables and coffee as a cash crop). Yet, the zone has persistently high levels of global acute malnutrition (GAM) in previous years, which peak during the lean 'hunger' season.

ACF together with scientific partners, have developed a standardised method for analysing the causes of malnutrition and consequently improving the relevance and effectiveness of stakeholder programming in a given context. Based on its nutrition causal analysis (NCA) approach, in collaboration with National, Regional and Zonal Government and NGO partners, ACF conducted an NCA in the maize livelihood belt of Aleta Chucko and Aleta Wondo woredas from January to May 2014. This report presents the findings from the Nutrition Causal Analysis study.

1.1 Study Area

The Maize Livelihood zone of Sidama Zone was selected as the study area including 14 kebeles from Aleta Chucko Woreda and 3 kebeles from Aleta Wondo Woreda, selected using Government livelihood data. ACF is actively involved in nutrition, food security and WASH interventions within the area and so the ACF study will serve as an important operational baseline study for future interventions.
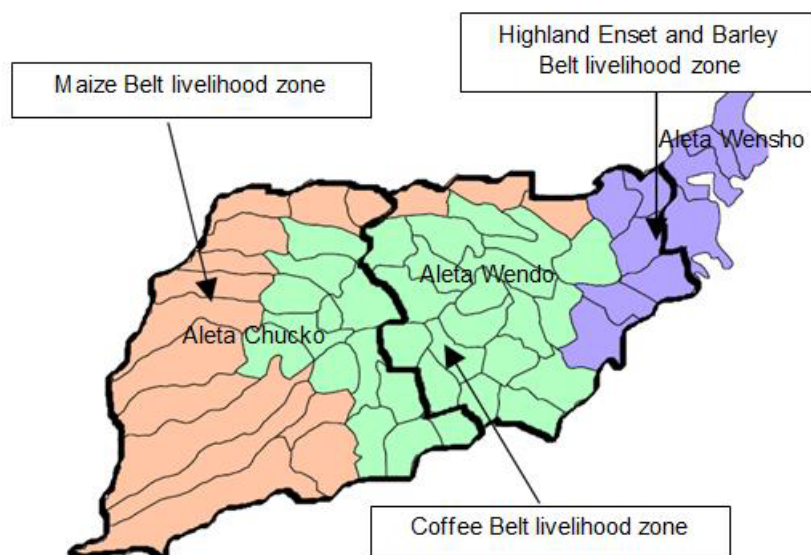
1.2 Context

1.2.1 Malnutrition

Child undernutrition continues to be major public health problem in the SNNP Region of Ethiopia with malnutrition rates similar to national levels as reflected in the rates of three commonly used anthropometric indicators. According to the results from the 2010 Ethiopian Demographic and Health Survey (EDHS), almost half (44 per cent) of children under 5 are stunted and 23 per cent are severely stunted, 8 per cent of children under 5 are wasted and 2 per cent are severely wasted, and over a quarter (28 per cent) of children under 5 are underweight, with 10 per cent severely underweight, in the SNNP Region. [1]

The three common micronutrient deficiencies in Ethiopia, as elsewhere, are vitamin A, iodine, and iron. Nationally, forty-four percent of children age 6-59 months are anaemic, with 21 percent mildly anaemic, 20 percent moderately anaemic, and 3 percent severely anaemic [2]. In the SNNPR, 37 per cent of children aged 6-59 months are anaemic, with 21 per cent mildly anaemic, 15 per cent moderately anaemic and 0.5 per cent severely anaemic.

A 2011 study in Sidama found 37.2 per cent, 8.3 per cent and 25.6 of children age 0-23 months were stunted, wasted and underweight respectively. Prevalence of stunting was higher for infants aged 6 to 8 months (43 per cent) than for those in 0-5 months (26.6 per cent) or 9-23 months (39 per cent) category. [3]

Within Sidama Zone, data from 2013 showed that malnutrition rates are higher in Aleta Chucko (predominantly maize livelihoods) than Aleta Wondo (predominantly coffee livelihoods), with the former being classified as a 'hotspot 1' woreda and the latter as a 'hotspot 3' woreda for malnutrition in April 2013[4]. More recent results from February 2014 have reclassified Aleta Wondo as a 'hotspot 2', whereas Aleta Chucko has yet to be classified.

Regionally, as per national guidelines, treatment and management of acute malnutrition is managed at the community level under the community-based management of acute malnutrition programme (CMAM). Under CMAM, severely malnourished children with medical complications are treated under the therapeutic feeding programme (TFP) in the "stabilization center" within the health center, with severely malnourished children with no medical complications treated under the Outpatient Treatment Programme (OTP) at the health post level. Management of moderate malnutrition at the community level is under the supplementary feeding programme (SFP).

Child Health Days (CHD) are biannual campaign-style events designed to increase the coverage of vitamin A and one or more other child health services (albendazol, measles vaccination); and the same CHD days conduct mass screening of acute malnutrition for all children under five and pregnant and lactating women once a quarter. CHD data shows seasonal fluctuations in rates of acute malnutrition, with the highest rates being observed in March and July in Aleta Chucko during the hunger

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[1] Central Statistical Agency and ICF International, "Ethiopia Demographic and Health Survey 2011," 2011.

[2] Ibid.

[3] Masresha Tessema, Tefera Belachew, and Getahyn Ersino, "Feeding Patterns and Stunting During Early Childhood in Rural Communities of Sidama, South Ethiopia," *PanAfrican Medical Journal* 14, no. 75 (2013).

[4] Based on food security assessment findings and trends of TFP admissions.

peak. The table below shows the rates of acute malnutrition in Aleta Chucko and Aleta Wondo in July and December 2013 from CHD data. As the table shows, in 2013 the GAM rate ranged from 5.2 per cent to 11.1 per cent in Aleta Chucko.[5]

Table 1: CHD anthropometric indicators in Sidama, children under five, 2013

	SAM		MAM		GAM	
	July	Dec	July	Dec	July	Dec
Aleta Chucko	2.2%	0.7%	8.9%	4.5%	11.1%	5.2%
Aleta Wondo	0.4%	0.6%	2.3%	3.7%	2.7%	4.3%

1.2.2 Food Security and Livelihoods

Agriculture is the main economic source for the majority of the population in the Sidama zone. Aleta Chucko woreda is made up of midland and lowland areas and Aleta Wondo woreda of midland and highland areas. The farming system, a combination of horticulture and animal husbandry, is characterized by the cultivation of maize, which is the principal staple food in Aleta Chucko, and false banana (*Ensete ventricosum*), which is the principal staple food in Aleta Wondo. In addition, some farmers may grow haricot beans and tef, and the main cash crops include coffee (*Coffea arabica*, a wild shrub indigenous to southern Ethiopia) and chat (*Catha edulis*, whose leaves are chewed as a stimulant).

Traditional rearing of animals, mainly cattle and goats, is practised to generate income, although the number of livestock per household is declining as grazing land becomes scarce with the increasing population.

Market access is relatively good in this livelihood zone, as it is bordered to the east by a major tarmac road and the feeder roads are mostly of all-weather quality. In addition, major urban markets for crops and livestock are relatively nearby.

There are significant seasonal fluctuations in the food security situation, and the Sidama zone is among the most food-insecure areas of the region[6]. According to Zonal Department data, most households in Aleta Chucko and Aleta Wondo face a food gap of between 4-5 months of the year, from mid-February to the end of May. In June, farmers rely on the maize green harvest to end the hunger gap.

1.2.3 WASH

According to the Ministry of Water Resources, access to safe water is 66 per cent in 2011, and access to excreta disposal, 96 per cent[7]. The burden of collecting water predominantly falls on women who in some cases may travel long distances to fetch

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[5] Unfortunately, CHD data is not disaggregated by sex or age, and there is no information available at zonal or woreda level on levels of stunting.
[6] Nigatu Regassa and Barbara J Stoecker, "Household Food Insecurity and Hunger Among Households in Sidama District, Southern Ethiopia," *Public Health Nutrition* 15, no. 07 (December 8, 2011): 1276–83, doi:10.1017/S1368980011003119.
[7] Federal Democratic Republic of Ethiopia, *Health and Health Related Indicators*, 2011.

water each day. This burden of fetching water inhibits women and girls involvement in other activities such as education, income generation and other social issues.

The situation with regards to sanitation and hygienic practices in rural areas of the Sidama zone is precarious. The rural latrine access coverage of Aleta Chuko woreda is 95 per cent as per information obtained from the local health authority. However, utilisation rates are just 27 per cent with maintenance and improper use an issue. Consequently, open defecation may be practiced.

The situation with regard to hygienic practices is also precarious. The statistics for appropriate hand washing in SNNPR are 22-30 per cent (Goal Ethiopia, an international NGO working in SNNPR, mid-term 2009 Knowledge, Attitudes and Practices (KAP) survey). The Goal Ethiopia report notes that is likely to be as much to do with the poor access to water and the low level of per capita usage as it is related to lack of knowledge about hand washing practice.

1.2.4 Child Care Practices

Adequate infant and child nutrition is the outcome of appropriate food and health inputs mediated through positive childcare practices. Good care practices can reduce the level of malnutrition by preventing the occurrence of infectious diseases and nutritional deficiency.

Optimal infant and young child feeding practices (IYCF) means that mothers are empowered to initiate breastfeeding within one hour of birth, breastfeed exclusively for the first six months and continue to breastfeed for two years or more, together with nutritionally adequate, safe, age appropriate, responsive complementary feeding starting at six months.

According to results from the 2011 EDHS, breastfeeding practices in the SNNP region are among Ethiopia's best. However, although 98 per cent of all children in the SNNP region are breastfed at some point in their lives, evidence shows that in many cases breastfeeding practices are not optimal.

The 2011 EDHS found that 10 per cent of children in the SNNPR are given something other than breastmilk during the first three days of life (pre-lacteal feeding) [8]. However, a 2011 study from Boricha District in the Sidama zone found a much higher percentage of mothers reported to practice pre-lacteal feeding (40.6 per cent). The study found that pre-lacteal feeding was a common, deep-rooted tradition for the first 2 to 3 days and the common pre-lacteal food was *amesa* (herbs mixed with water) [9].

In the SNNP Region, the median duration of breastfeeding is 25.4 months, the median duration of exclusive breastfeeding is 2.2 months and the median duration of predominant breastfeeding is 4.3 months[10]. Prolonged breastfeeding appears to be widely practised in Sidama Zone.

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[8] Central Statistical Agency and ICF International, "Ethiopia Demographic and Health Survey 2011."

[9] Masresha Tessema, Tefera Belachew, and Getahyn Ersino, "Feeding Patterns and Stunting During Early Childhood in Rural Communities of Sidama, South Ethiopia."

[10] Central Statistical Agency and ICF International, "Ethiopia Demographic and Health Survey 2011."

A 2009 study on feeding practices in Sidama Zone found that dietary diversity of complementary feeding is an issue with most children in the study age 6-23 months only receiving 0-2 food groups, which rarely included foods rich in vitamin A or iron [11].

1.2.5 Child Health

In addition to lack of food, one of the most important immediate causes of malnutrition and child death is disease. Rates of childhood preventable diseases appear to be high in the Sidama zone. According to data received from Aleta Wondo Woreda and Aleta Chucko Health Authorities, the top causes of morbidity in children under five in 2013 were malaria, intestinal parasites, Acute Respiratory Infections (ARI), diarrhea and pneumonia. Such infections have a cyclical relationship in which poor nutrition compromises immune function and predisposes children to infection, further exacerbating poor nutrition.

A lack of adequate health care services coverage (regarding "availability", "accessibility", "acceptability", "contact", and "effectiveness", as per Tanahashi model[12]), is highlighted by UNICEF as one of the main underlying causes of disease, which in turn affects child nutrition. According to the 2011 EDHS, the proportion of births assisted by a skilled provider (including doctor, nurse or midwife) are among the lowest in the country at just 6 per cent in the SNNP region.

1.2.6 Status of Women

Women's social status has been shown to impact on both her own nutritional status and care, as well as her child's nutritional status primarily through affecting birth weight as well as her ability to provide appropriate care. [13]

The status of women can be described as low in the Sidama zone, as shown by the intra-household division of labour, the allocation of food and resources within the household, the opportunities for schooling, and other functions [14]. Such access to resources has been found to significantly impact on ability to provide appropriate psycho-social care. Resources for care include: 1) education, knowledge, and beliefs; 2) health and nutritional status of the caregiver; 3) mental health, lack of stress, and self-confidence of the caregiver; 4) autonomy, control of resources, and intra household allocation; 5) workload and time constraints; and 6) social support from family members and community. [15]

According to the ministry of agriculture, on average, women have fewer years of schooling and heavier workloads than men. They perform a significant portion of farm work but tend to be excluded from control of farm income and inheritance of

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[11] Rosalind S. Gibson et al., "Inadequate Feeding Practices and Impaired Growth Among Children from Subsistence Farming Households in Sidama, Southern Ethiopia," *Maternal and Child Nutrition* 5 (2009): 260–75.

[12] Christian B, Ray D, Benyoussef A, Tanahashi T. Health and socio-economic development: An intersectoral model. *Social Science & Medicine (1967)* 1977; **11**(2): 63-9.

[13] Lisa Smith, *The Importance of Women's Status for Child Nutrition in Developing Countries* (Washington, DC: IFPRI, 2003).

[14] Sarah Coll-Black et al., *Targeting Food Security Interventions: The Case of Ethiopia's Productive Safety Net Programme*, ESSP Research Note 26 (International Food Policy Research Institute, June 2013).

[15] *An Assessment of the Causes of Malnutrition in Ethiopia.* (Washington, DC: International Food Policy Research Institute, November 2005).

property. Women also suffer disproportionately from environmental degradation as they have to walk longer distances to collect water and firewood. The lack of draught animal power tends to intensify their workload.

2 NCA Objectives

2.1 Main Study Objective

The main objective of the NCA is to identify the main causes of child undernutrition, in particular wasting of children age 6-59 months, in the maize livelihood belt of Aleta Chucko and Aleta Wondo Woredas in Sidama zone, SNNPR.

2.2 Specific Study Objectives

Specific objectives of the study include:

- To estimate the prevalence and severity of wasting, stunting and underweight among children age 6-59 months in the Maize Livelihood Belt of Sidama zone disaggregated by relevant characteristics including age, sex and other relevant characteristics identified during the technical expert workshop.

- To estimate the prevalence of known risk factors for under-nutrition among the population and key 'nutrition vulnerable groups'.

- To develop an 'emic' (local) definition and understanding of good nutrition, malnutrition and the believed causes of undernutrition within the target population.

- To understand how the community prioritise risk factors of under-nutrition, by prioritising the perceived causes according to: a) which factors are believed to cause undernutrition, b) which causes are believed to be most prevalent, c) which causes are believed to have the most serious effects.

- To identify seasonal and historical trends in under-nutrition.

- To determine which causal pathways of malnourishment are likely to explain most undernutrition cases in the area.

3 NCA Methodology

3.1 Overview of the NCA Approach

An NCA is a structured, participatory, holistic, multi-sectoral study, based on the UNICEF causal framework, to build a case for nutrition causality in a local context.

- **Structured** – the steps of the methodology are precisely defined and have all been tested in the field.

- **Participatory** – the study is giving a real opportunity to national technical experts as well as caregivers in the community to express their opinion on the causes of undernutrition, and to discuss, review and finally to validate the conclusions of the study.

- **Holistic** – undernutrition is here studied globally to avoid a sectoral approach, and to highlight the inter-relations between risk factors.

- **Multi-sectoral -** a nutrition causal analysis (NCA) investigates and presents a 'multi-sectoral' overview of the contributing factors affecting nutritional status within a given community.

- **Based on the UNICEF Conceptual Framework** - the NCA methodology uses the UNICEF framework to identify potential risk factors of under-nutrition.

- **Building a case for nutrition causality** – the core exercise of an NCA is to identify and rank causal hypotheses by order of importance.

- **In a local context** - causes of under-nutrition are often different from one location to another. The purpose of the methodology is to go beyond generic interventions by identifying really context specific causes in order to propose adequate solutions.

3.2 Study Design

The NCA methodology involves four key steps:

1. Preparatory Phase: During the preparatory phase of the NCA, a literature review and stakeholder interviews were undertaken to generate an overall understanding of the local context of undernutrition in the Maize Livelihood belt of Sidama zone.

2. Development of Causal Hypotheses: Based on the information generated in the first phase, causal hypotheses of context specific causes of undernutrition were developed and validated by Technical Experts at a workshop held on the 6th February 2014 in Hawassa.

3. Data Collection: Both quantitative and qualitative data was collected to provide much needed evidence on levels of undernutrition, key risk factors and community perceptions, practices and constraints.

4. Identify highest priority causes of undernutrition: Based on the evidence gathered as part of the NCA, the causal hypotheses were then ranked by order of

importance paying particular attention to seasonal differences and vulnerable groups. The results were then validated with the local community before being presented to stakeholders at a final stakeholder workshop on the 8th May 2014, where a consensus was then reached based on the evidence of the most important risk factors and priorities for action.

3.3 Sample

3.3.1 Sample Size and Eligibility.

The sample size for the quantitative survey was calculated using ENA for SMART delta software (November 2011 version). In calculating the sample size for anthropometry, the following parameters were considered:

- Anticipated malnutrition rate

- Design Effect

- Desired level of precision

- Average household size

- Estimated Proportion of under five children in the study area

- Non response rate.

Then by entering all these values into the ENA/SMART software (Delta Version, 2011), a required sample size was calculated for the study area and indicated in the below table.

Table 2: Sample Size Calculation for Anthropometric Assessment

Under 5 population	Average Hoh size	Estimated GAM rate	Precision	Design Effect	Non Response rate	Calculated Hoh size for anthropometry	No of clusters
15.6%	5.5	10%	3.5%	1.5	10%	663	35

In total, 663 households were sampled for the quantitative household survey, estimated to include approximately 461 children age 6-59 months.[16]

3.3.2 Sampling Procedure

A two-stage cluster sampling procedure was used. In the first stage, 35 clusters (villages) were selected according to Probability Proportional to Size (PPS), using village level population data. In the second stage, households within the clusters were randomly selected using a household list obtained in each village. In total, 19 households from each cluster were randomly selected, with only households with children under five administered the survey. In total, 429 households with children under five were surveyed. In addition, child level indicators were collected from 516 children age 0-59 months and anthropometric measurements were collected from 481 children age 6-59 months.

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[16] The IYCF indicators were too demanding in terms of sample size and so for these indicators we accept a slightly lower level of precision (11%).

3.3.3 List of Sampled Clusters

The following table displays the sampled clusters.

Table 3: Sampled NCA Clusters

Woreda	Kebele	Cluster/Village
Aleta Chucko	Dongora Morocho	Chala Latisha
Aleta Chucko	Gunde	Arjamo Tawo Agudo Andenet
Aleta Chucko	R/Chancho	Butanto Yamule Bo'e Bankano Dama Hankalama Sike Elelicho
Aleta Chucko	Dongora Elelicho	First Dangito
Aleta Chucko	Dongora Kebado	Wiridimatata
Aleta Chucko	Chicho Woyama	Mate 07 Chucho 19
Aleta Chucko	Tesso	Koworicho No.1 Gidicho No.2
Aleta Chucko	Mekella	Lawisha Dokima Borodhe Dokima
Aleta Chucko	Dibicha	Galadame Minichi Soyama
Aleta Chucko	Debeka	Dollo Chefa Tsega Selam
Aleta Chucko	Miridicha	Second Soyama
Aleta Chucko	Gambella	Wacho Melebo Merkato

		Lemela Burure
Aleta Chucko	Loko Hytela	Biribo Buchito
Aleta Wondo	Wicho	Simata No.1
		Elelicho No.2
		Buda No.1
Aleta Wondo	Hondowa	Runja Dama
Aleta Wondo	Dongora Elemate	2nd Koche
		Ginbanto No.2
		1st Temberako No.2

3.3.4 Sample for the Qualitative Study

The objective of sampling in the qualitative component of the NCA is not to be statistically representative of the population of interest, but rather to be representative of the diversity of the population. To ensure that the qualitative inquiry obtained in-depth information that gives a balanced picture of the situation of households in the maize livelihood belt of Sidama zone, a combination of random and purposive sampling methods were used.

For the first step in the sampling process, four villages, one from Aleta Wondo Woreda and three from Aleta Chucko Woreda, were randomly selected from clusters selected for the quantitative survey. The following table shows the sampled clusters for the qualitative study.

Table 4: Sample of villages for qualitative study

Woreda	Kebele	Village selected for qualitative survey
Aleta Chucko	Miridicha	Second Soyama
Aleta Chucko	Makala	Lawisha
Aleta Chucko	Dongora Kebado	Wiridimatata
Aleta Wondo	Wicho	Elelicho No 2

For the second stage of sampling, in each village, participants were purposively selected whose knowledge would be useful for the objectives of the NCA. Participants included:

- Key informants including local government representatives, health workers and any NGOs working in the area;

- Mothers of children under five. It was decided that mothers would be most likely to provide information on their children's health, issues related to food security and their own caring practices;

- Fathers of children under five;

- Mothers based on the nutritional status of their child.

3.4 Data Collection Methods

To assess the causes of undernutrition in the Sidama Zone, the NCA methodology applied a mixed-methods study design. A quantitative component was designed to objectively assess malnutrition status and the prevalence of known risk factors, while the qualitative component aimed to uncover the community's own conceptualisation of malnutrition, the degree to which it perceives it to be a problem, and what are perceived to be the causes. Thus, the qualitative and quantitative components are intended to generate complementary data.

3.4.1 Quantitative Household Survey

3.4.1.1 Field Team Composition, Recruitment and Training

In total, 8 field teams including 2 Field Officers conducted the household questionnaire under the supervision of four experienced Field Supervisors. In addition, two experienced data entry clerks were responsible for data entry.

The following diagram demonstrates the NCA field team composition.

Figure 1: Quantitative team composition
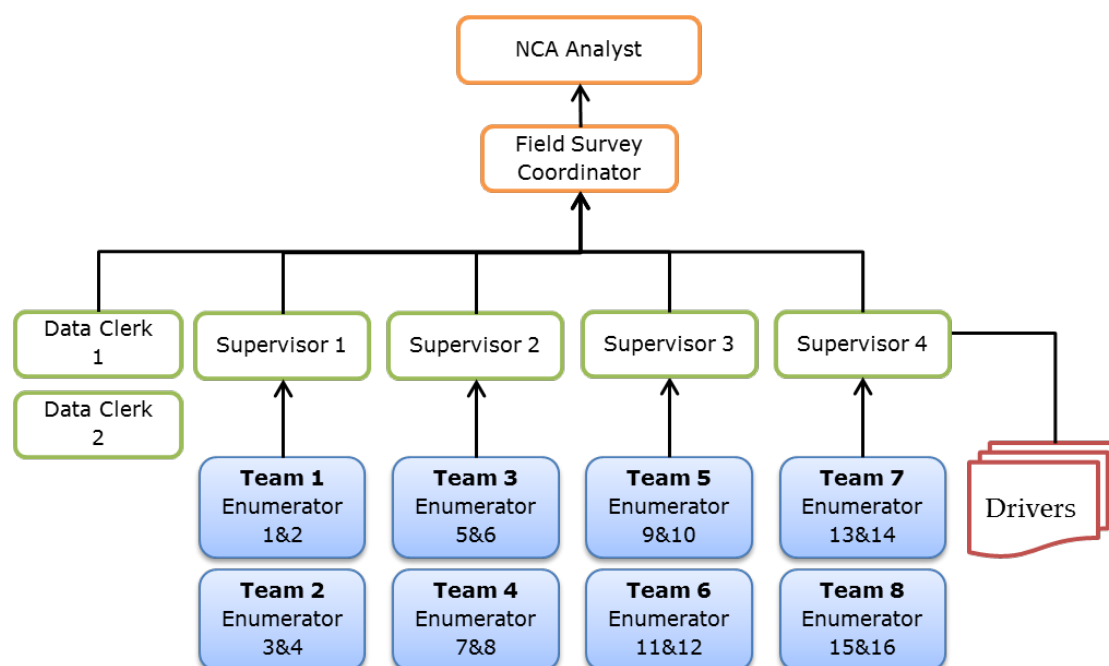
Experienced field staff were recruited for the NCA, all with experience of administering SMART surveys. All field officers and supervisors received a 10 day training between February 24th and March 7th. The training included anthropometric measurement using the SMART methodology and how to administer the household questionnaire, and included standardisation tests and a pretesting exercise.

3.4.1.2 Data Collection Tools

A quantitative NCA household questionnaire was designed to collect information on key risk factors. The questionnaire included both household level and child level indicators (collected for all children under five), and included both questions directed

to the household head, main caregiver as well as observations. The household questionnaire covered the following areas:

- Food security;

- IYCF practices;

- WASH;

- Care for women;

- Psychosocial care;

- Health service access and utilisation;

- Child health and nutritional status.

The questionnaire was translated into Amharic and administered in the local language Sidamigne[17]. The household questionnaire was pretested during the training of field officers in Gure kebele, Aleta Chucko Woreda on the 7th March 2014. Following pre-testing, the questionnaire was adapted and finalised.

3.4.1.3 Anthropometrics

Anthropometric measurements and oedema were measured to index children aged between 6 and 59 months, as per the SMART guidelines.

Height/Length: Children's length was taken were measured lying horizontally on the height measuring board for children below two years or below 85 cm, while standing height was taken for children aged two years and above.

Height and length was measured using standard UNICEF height boards borrowed from the Emergency Nutrition Coordination Unit (ENCU). Before taking the height/length, caretakers were requested to take off shoes (if any) and heavy clothes from the selected children and stand in a plank fort position against the height board, on flat level surface. Height was recorded in the nearest 0.1cm.

Weight/Height: Weight was measured by using salter hanging scales and recorded to the nearest 0.1kg. All subjects were weighed nude or nearly nude with adjustment made to control for light clothing.

MUAC: MUAC was measured on the left arm of all sampled under-five children following all the 7 steps for measuring MUAC as recommended in the 2008 revised Interim guideline for emergency nutrition assessment for Ethiopia. MUAC readings were recorded to the nearest 0.1cm.

Oedema was diagnosed by applying a moderate finger pressure just above the ankle on the inside of the leg where the shin bone is below the skin, or on the tops of the feet. If there is oedema, an impression remains for some time (at least a few seconds) where the oedema fluid has been pressed out of the tissue. The child was only be recorded as oedematous if both feet clearly had oedema. Any oedema diagnosed case were reported and verified by the survey team leader or supervisor.

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[17] Due to the lack of people who can read and write Sidamigne, the questionnaire was developed in Amharic. During the training of field officers particular emphasis was placed on exact Sidamigne phrasing of each question.

Any children identified as malnourished (MUAC <11cm with or without Oedema) were referred to the nearest health post. In total, 5 children during the quantitative survey and 3 children during the qualitative survey were identified as malnourished and referred to the nearest TFP site during the survey.

3.4.1.4 Data Collection

Data collection took place between the 10th March – 9th April 2014. On average each field team completed 3-4 questionnaires per day. The average time spent in each household was 51 minutes.

3.4.2 Qualitative Survey

3.4.2.1 Field Team Composition

The NCA Analyst led qualitative data collection with the assistance of a translator, who received an induction to the survey and qualitative research methods. In addition, in each village, the local health extension worker and village chief were recruited as 'Community Facilitators' to help mobilise the community.

Figure 2: Qualitative team composition
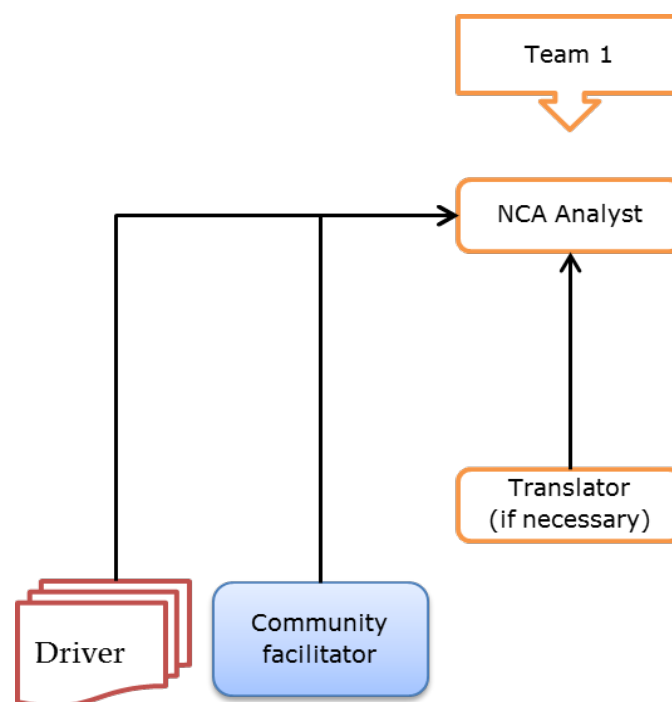
3.4.2.2 Research Instruments and Methods

Focus group discussions (FGD) and in-depth interviews were the methods employed to collect rich contextual data on community perceptions, practices and constraints with regards to child undernutrition. FGD and individual interview guidelines were developed and pre-tested, with a particular emphasis placed on the phrasing of questions in the Sidamigne language.

FGD guidelines were developed covering 8 key sessions:

- Good nutrition and malnutrition;

- Child Health;

- Food Security and Livelihoods;

- Child Care Practices;

- WASH;

- Perceptions of fathers;

- Seasonal and historical trends;

- Rating risk factors.

3.4.2.3 Data Collection

Qualitative data collection took place in four villages in Aleta Chucko and Aleta Wondo Woredas during March and April 2014. The following table displays background information on the study sites.

Table 5: Overview of villages, qualitative study

	Village 1	Village 2	Village 3	Village 4
Village name:	Lawisha	Second Soyama	Elicho 2	Wiridimatata
Kebele:	Makala	Miridicha	Wicho	Dongora Kebado
Woreda:	Aleta Chucko	Aleta Chucko	Aleta Wondo	Aleta Chucko
Topography:	Midland	Lowland	Midland	Midland
Religion:	Protestant	Protestant	Protestant	Prostestant/ Apostolistic
Distance to health post:	3km	2km	1km	1.5km
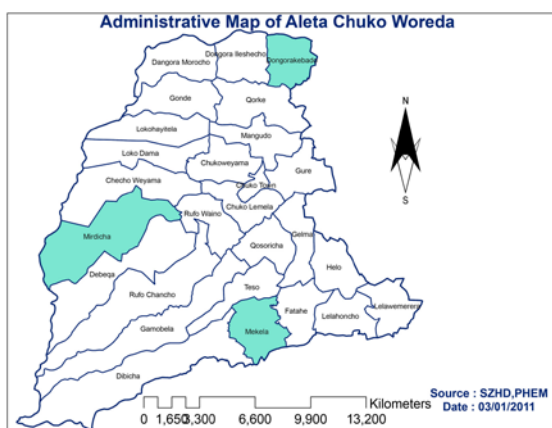
In total, 6 days were spent in each village during which focus group discussions were held with mothers and fathers of children under five, and semi-structured individual interviews were held with key stakeholders including Health Extension Workers (HEWs), health centre staff, village chief and mothers with well and malnourished children. In addition, the qualitative team visited each village at the end of the survey to present and validate results.

In total, 35 FGDs, 22 individual interviews were held in the four villages. The results shown in table below:

Table 6: Summary of qualitative data collection

Village	Number of FGDs	Number of Individual Interviews
1	8	5
2	11	5
3	8	5
4	8	7
Total	35	22

3.4.2.4 Stakeholder Consultations

A key aspect of the NCA methodology was the involvement of key stakeholders, including community members, as well as Government, NGO and academic partners.

Key stakeholders were interviewed in the preliminary stages of the project, in order to inform the development of causal hypotheses. In addition, a key aspect of the NCA methodology were two participatory stakeholder workshops: The preliminary technical expert workshop was held to validate causal hypotheses to be tested; the final workshop provided an opportunity for stakeholders to rank causal hypotheses based on the evidence presented and to validate results by providing a confidence note for each result.

Following analysis, the NCA analyst returned to each of the four villages to present and validate results of the qualitative inquiry. This reporting back process was integral to the qualitative research process and provided an opportunity for the communities to make recommendations for Government and NGOs.

3.5 Data Management and Analysis

3.5.1 Quantitative Data Management and Analysis

A data entry system was developed in SPSS version 21. Data from completed household questionnaires was entered each day into the SPSS database by two trained data entry clerks, and anthropometric data was entered into ENA software.

Quantitative data analysis was conducted using SPSS, and anthropometric analysis was conducted using ENA for SMART software Version November 2011.

3.5.2 Qualitative Data Management and Analysis

The process of qualitative data analysis was ongoing and iterative. Each evening, transcripts were written up and a weekly summary of key themes was developed.

Data was coded weekly according to key themes in order to address the main study questions, and the data was analysed using content analysis methods.

3.5.3 Ranking Causal Hypotheses

Based on the results of the NCA, the NCA analyst then ranked the causal hypotheses by order of importance by triangulating the following data:

- prevalence of risk factor from secondary data;

- prevalence of risk factor from the quantitative survey;

- strength of association between the risk factor and under-nutrition;

- seasonality of causal hypothesis related to seasonality of undernutrition;

- participatory rating exercise with communities.

Casual hypotheses were ranked based on the following classification:

Category	Definition
Major causal pathway to child undernutrition	The causal pathway is interpreted as a major contributor to child undernutrition prevalence in the study area.
Important causal pathway to child undernutrition	The causal pathway is interpreted as an important contributor to child undernutrition prevalence in the study area.
Minor causal pathway to child undernutrition	The causal pathway is interpreted as a limited contributor to child undernutrition prevalence in the study area.
Rejected causal hypothesis	The causal hypothesis is interpreted as a not relevant or significant contributor to child undernutrition in the study area.
Untested causal hypothesis	Information gathered is not sufficient to reach a plausible conclusion.

3.5.4 Final Stakeholder Workshop

The results of the ranking exercise were presented and validated by stakeholders at a final stakeholder workshop on the 8th May 2014. At the final workshop stakeholders were invited to inform the level of confidence they have in each result through a confidence note for each of the findings. The confidence note provides an evaluation of how reliable stakeholders think the results are, based on the strength of the information gathered for each result.

3.6 Research Ethics

Ethical approval was obtained from the Regional Health Bureau Research Ethical Committee on the 11th November 2013. Informed voluntary consent was obtained from all NCA participants.

Children who were found as severely malnourished or with any other medical condition were referred to the nearest health facility for medical attention and appropriate treatment.

3.7 Limitations

The methodology used is indeed a causal analysis although causality is not demonstrated from an epidemiological point of view. A low confidence note for certain results would signify that the information gathered is not convincing enough and advocates for complementary research to be conducted.

The NCA presented is valid for the population studied in the maize livelihood belt of Sidama Zone. All the results should be considered at this geographic level and not beyond without complementary analysis.

In the target area, as in other areas of Ethiopia, it is very unusual for children to have a recorded birth date. Consequently, the survey relied on approximating children's ages using a local calendar, which has limitations in terms accuracy. The calculated low rates of stunting and underweight should be understood in line with this limitation.

Since ACF is an NGO active in food security and WASH in the intervention area, it is possible that there may be a bias in the results as participants may perceive some benefit from taking part. This potential threat to the research was mitigated as far as possible by providing detailed information to study participants on the objectives of the study, and that their participation would in no way affect their receipt of NGO or Government support. Furthermore, this potential bias was taken into account in the analysis stage.

4 NCA Findings

4.1 Preliminary Technical Expert Workshop

4.1.1 Validated and Ranked Causal Hypotheses

Based on the results of a secondary data review and global literature review on risk factors to undernutrition, 19 causal hypotheses of causal pathways to undernutrition in the maize livelihood belt of Sidama Zone, were developed and presented to technical experts at a preliminary stakeholder workshop on February 6th 2014. These 19 causal hypotheses were then debated during the workshop, and collectively rated from 1 (minor risk factor) to 5 (major risk factor). The following table show the results of the rating exercise.

Hypothesis	Causal Hypotheses	Average Rating
R	Poor nutritional status of pregnant women and lactating mothers	5
G	Poor hygiene practices	4.75
O	Poor crop diversity and usage	4.75
A	High rates of preventable infections and childhood illness in children under 5.	4.5
P	Not enough food produced during the hunger season.	4.25
C	Sub optimal breastfeeding practices of children age 0-6 months	4.25
F	Access to safe water supply	4.25
D	Inadequate complementary feeding practices for children age 6-23 months	4
H	Poor utilisation of improved sanitation facilities	4
N	Small farm land size	3.75
S	Low birth weight	3.75
B	Poor health service access and utilisation	3.75
E	Intra-household food distribution discriminates against young children	3.75
J	Low status of women	3.75
K	High workload of women	3.75
I	Low level of education of caregivers	3.5
Q	Poor financial resource management	3.25
L	Unmet need for family planning	3

M	Early childbearing age	2.25

 In addition, 3 additional causal hypotheses were proposed and validated by stakeholders. [18]

Hypothesis	Additional causal hypotheses
T	Chronic poverty
U	Households unable to afford agricultural inputs
V	Adverse weather conditions

In total, the validated 22 causal hypotheses were then used to develop indicators and research instruments for the NCA study.

4.1.2 Nutrition Vulnerable Groups

The following groups were identified by technical experts as being particularly vulnerable to undernutrtion.

1. Children under 5 (children age 6-24 months, children age 2-5)

2. Pregnant and lactating mothers

3. Elderly (including widows)

4. Adolescents

5. People living with HIV or AIDS

In addition, the following types of households were viewed as being more at risk of child undernutrition:

1. People living in lowland areas (less rain fall, more malaria).

2. Households with small land size <0.25 hectares.

3. Households with a large family size.

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[18] Please see the NCA Technical Expert Workshop Report for additional information.

4.2 NCA Quantitative Survey Results

This section of the report presents results from the quantitative household survey including data on key risk factors as well as anthropometric results.

4.2.1 Household Composition

In total, 429 households were surveyed and child level indicators were collected from 516 children age 0-59 months. The mean number of members in each household was 5.62. In almost all cases, the head of the household was man age 18 or over (97.7 per cent) whose marital status was married (97.2 per cent) and whose occupation was a farmer (93.2 per cent).

In 97 per cent of households (416), the main caregiver of children under five was the mother. Over 95 per cent of main caregiver's described their occupation as 'housewife'.

Table 7: Household Composition Indicators

Indicator	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Mean number of household members	429	5.62	5.42	5.82
Head of household Man >18	429	97.7%	95.4%	98.8%
Marital status of household head, married	429	97.2%	94.9%	98.5%
Main occupation head of household, farmer	429	93.2%	90.10%	95.50%
Mother, main caregiver of children under five	429	97.00%	94.30%	98.40%
Main occupation of main caregiver, housewife	429	95.30%	92.20%	97.30%

4.2.2 Anthropometric Results

4.2.2.1 General Characteristics of the Study Population

The 663 households enumerated yielded 481 eligible children (aged 6-59 months). Out of the total 481 children surveyed, 234 were boys and 247 were girls. The boy: girl sex ratios within the age groups as well as the total ratio were within the expected ratio of 0.9-1.1, thus demonstrating an unbiased survey sample.

Table 8: Distribution of age and sex of the sample (children age 6-59 months)

	Boys		Girls		Total		Ratio
AGE (mo)	no.	%	no.	%	no.	%	Boy:girl
6-17	44	47.3	49	52.7	93	19.3	0.9
18-29	51	46.8	58	53.2	109	22.7	0.9
30-41	48	46.2	56	53.8	104	21.6	0.9
42-53	63	51.6	59	48.4	122	25.4	1.1
54-59	28	52.8	25	47.2	53	11.0	1.1
Total	234	48.6	247	51.4	481	100.0	0.9

None of the anthropometric measurements (WFH) of the 481 children was flagged as an outlier due to aberrant anthropometric values for WHO references.

4.2.2.2 Prevalence of Global Acute Malnutrition[19]

Weight-for-height (WFH) is a sensitive nutritional index which reflects the current nutritional status of an individual. Inadequate nutrient intake relative to body requirements and/or episodes of illness in the short term leads to wasting, also referred to as acute malnutrition, which is reflected by a low WFH.

Throughout this report, Global Acute Malnutrition (GAM) is defined as weight-for height < -2 z-scores and /or oedema. Severe Acute Malnutrition is defined as weight-for-height < -3 SDs and/or oedema. Mid upper arm circumference (MUAC) is also presented to indicate the level of wasting.

The prevalence of Global Acute Malnutrition [GAM] was estimated at 5.6 per cent [3.5 – 8.9 95% C.I].[20] From the total 481 surveyed children aged 6-59 months, one child was found to be severely malnourished. No child was identified to have nutritional bi-lateral oedema.

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[19] Based on WHO standards 2006 due to recommendations from the ENCU and UNICEF. Please see annex 1 for the anthropometric results based on the NCHS reference 1977.
[20] Please note, as the NCA was conducted at the beginning of the hunger season, we would expect the GAM rate to be higher towards the end of the hunger season.

	All n = 481	Boys n = 234	Girls n = 247
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(27) 5.6 % (3.5 - 8.9 95% C.I.)	(12) 5.1 % (2.9 - 8.9 95% C.I.)	(15) 6.1 % (3.3 - 10.8 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(24) 5.0 % (3.1 - 8.0 95% C.I.)	(10) 4.3 % (2.2 - 8.2 95% C.I.)	(14) 5.7 % (3.0 - 10.5 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score and/or oedema)	(1) 0.6 % (0.0 - 1.9 95% C.I.)	(0) 0.9 % (0.2- 3.5 95% C.I.)	(1) 0.4 % (0.1 - 3.0 95% C.I.)

As indicated in the table below, a relatively equal proportion of younger and older children were moderately malnourished. This indicates malnutrition is equally affecting both younger and older children in the study area. Three children age 6-17 months were identified to be severely wasted. No children were found to have a nutritional bi-lateral oedema.

Table 10: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (months)	N	No.	%	No.	%	No.	%	No.	%
6-17	93	3	3.2	6	6.5	84	90.3	0	0.0
18-29	109	0	0.0	4	3.7	105	96.3	0	0.0
30-41	104	0	0.0	2	1.9	102	98.1	0	0.0
42-53	122	0	0.0	7	5.7	115	94.3	0	0.0
54-59	53	0	0.0	5	9.4	48	90.6	0	0.0
Total	481	3	0.6	24	5.0	454	94.4	0	0.0

4.2.2.3 Prevalence of Acute Malnutrition by MUAC

The prevalence of under-nutrition among the under-fives (as indicated by MUAC <12.5cm) was 7.7% (5.4 - 10.9 95% CI). Out of the 37 children classified by MUAC as malnourished, 9 (0.8 - 4.4 CI) were severely malnourished (Table 3.6).

Table 11: Prevalence of acute malnutrition based on MUAC cut offs (and/or oedema) and by sex

	All n = 481	Boys n = 234	Girls n = 247
Prevalence of global malnutrition (< 125 mm and/or oedema)	(37) 7.7 % (5.4 - 10.9 95% C.I.)	(16) 6.8 % (4.3 - 10.6 95% C.I.)	(21) 8.5 % (5.1 - 13.8 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(28) 5.8 % (3.8 - 8.8 95% C.I.)	(12) 5.1 % (2.9 - 8.8 95% C.I.)	(16) 6.5 % (3.6 - 11.5 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(9) 1.9 % (0.8 - 4.4 95% C.I.)	(4) 1.7 % (0.6 - 4.4 95% C.I.)	(5) 2.0 % (0.7 - 5.5 95% C.I.)

4.2.2.4 Prevalence of Underweight by WFA

The weight-for-age (WFA) indices give a mixed reflection of both the current and past nutritional experience of the community, therefore, does not differentiate malnutrition due to current and past nutritional/health experience. As such, it is a composite measure of both wasting and stunting, thus, a useful tool in individual child growth monitoring. The findings (Table 11) indicated that 12.1 per cent (8.5-16.8 95% CI) of the children were underweight and 2.1 per cent (1.1-3.8 95% CI) severely underweight.

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

	All n = 481	Boys n = 234	Girls n = 247
Prevalence of underweight (<-2 z-score)	(58) 12.1 % (8.5 - 16.8 95% C.I.)	(31) 13.2 % (9.3 – 18.6 95% C.I.)	(27) 10.9 % (6.7 - 17.4 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(48) 10.0 % (7.2 - 13.7 95% C.I.)	(26) 11.1 % (7.7 - 15.7 95% C.I.)	(22) 8.9 % (5.4 - 14.3 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(10) 2.1 % (1.1 - 3.8 95% C.I.)	(5) 2.1 % (0.9 - 4.9 95% C.I.)	(5) 2.0 % (0.9 - 4.6 95% C.I.)

The figures illustrated in the table below show the age distribution of children found to be underweight. The figures show that younger children are more likely to be severely underweight, but older children are slightly more likely to be moderately underweight.

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	93	6	6.5	9	9.7	78	83.9	0	0.0
18-29	109	1	0.9	10	9.2	98	89.9	0	0.0
30-41	104	2	1.9	8	7.7	94	90.4	0	0.0
42-53	122	1	0.8	13	10.7	108	88.5	0	0.0
54-59	53	0	0.0	8	15.1	45	84.9	0	0.0
Total	481	10	2.1	48	10.0	423	87.9	0	0.0

4.2.2.5 Prevalence of Stunting

Stunting (height-for-age or HFA) measures linear growth and is thus an indicator of chronic malnutrition, which is reflective of cumulative effects of long-standing nutritional inadequacy and/or recurrent chronic illness. Unlike wasting, it is not affected by seasonality but is rather related to the effects of socio-economic development and long-standing food security situation. The prevalence of stunting was estimated at 15.0 per cent (11.0 – 20.1%, 95% CI)[21]. This is well below national and regional figures from the EDHS 2011, which show 44 per cent stunting in SNNPR.[22]

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

	All n = 481	Boys n = 234	Girls n = 247
Prevalence of stunting (<-2 z-score)	(72) 15.0 % (11.0 - 20.1 95% C.I.)	(39) 16.7 % (11.3 - 23.9 95% C.I.)	(33) 13.4 % (9.5 - 18.4 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(54) 11.2 % (8.2 - 15.2 95% C.I.)	(29) 12.4 % (8.3 - 18.2 95% C.I.)	(25) 10.1 % (6.9 - 14.6 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(18) 3.7 % (2.1 – 6.5 95% C.I.)	(10) 4.3 % (2.0 – 9.1 95% C.I.)	(8) 3.2 % (1.7 – 6.1 95% C.I.)

As illustrated in the table below, stunting is fairly evening distributed across age groups, though younger children (6-29 months) are slightly more likely to be moderately stunted than older children (30-59 months). Children in the age group 18-29 months were most likely to be severely stunted.

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[22] Such discrepancies between levels of stunting and underweight and regional figures have also been experienced in a number of other recent anthropometric surveys within SNNPR.

Table 15: Prevalence of stunting by age based on height-for-age z-scores

Age (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	3	3.2	13	14.0	77	82.8
18-29	109	7	6.4	15	13.8	87	79.8
30-41	104	3	2.9	10	9.6	91	87.5
42-53	122	3	2.5	14	11.5	105	86.1
54-59	53	2	3.8	2	3.8	49	92.5
Total	484	18	3.7	54	11.2	409	85.0

Table 16: 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	481	-0.50±0.94	1.54	0	0
Weight-for-Age	481	-0.91±0.92	1.87	0	0
Height-for-Age	481	-1.04±1.03	1.87	0	0

4.2.3 NCA Risk Factor Results by Causal Hypotheses

The following section presents the quantitative results of the NCA risk factor survey triangulated with relevant qualitative data, by causal hypothesis.

4.2.3.1 Causal Hypothesis A: High rates of preventable infections and childhood illness in children under 5.

In addition to lack of food, one of the most important immediate causes of malnutrition and child death is disease.

According to data received from Aleta Wondo and Aleta Chucko Woreda Health Authorities, the top causes of morbidity in children under five in 2013 were malaria, intestinal parasites, ARIs, diarrhoea and pneumonia.

The risk factor survey found high levels of childhood illness in the target population with 26.2 per cent of children under five having experienced symptoms of an ARI in the past two weeks (95% CI= 20.6-32.6%), and over a quarter of children under age five in the survey (27.3 per cent, 95% CI= 22.8-32.4%) had experienced diarrhoea. Diarrhoea was most common among children age 6-23 months at 41 per cent (95% CI= 33.3- 49.2%, n=156).

In total, 36.2 per cent of the children under age five in the survey had experienced a fever (a proxy indicator commonly used to measure malaria and other acute infection prevalence) in the two weeks previously (95% CI= 36.2 - 41.9%). Furthermore, over 80 per cent of children under five in the survey are exposed to malaria, as they do not sleep under a mosquito net (95% CI=71.7 – 87%).

Table 17: Child health status risk factor indicator results

Child Health Status Indicator	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of children with ARI symptoms in the past 2 weeks	516	26.20%	20.60%	32.60%
Proportion of children with diarrhoea in the past 2 weeks	516	27.30%	22.80%	32.40%
Proportion of children with a fever in the past 2 weeks	516	36.20%	30.90%	41.90%
Proportion of children who do not sleep under a mosquito net	516	80.40%	71.70%	87.00%

4.2.3.2 Causal Hypothesis B: Poor health service access and utilisation

A lack of health care services is highlighted as one of the main underlying causes of disease, which in turn affects child nutrition. Access to health services, health-seeking behaviour and barriers to access were explored as part of the risk factor survey with relation to this hypothesis.

Immunisation rates were very high, as reflected in DPT3 rates among children age 12-23 months with immunisation cards available. Of those children aged 12-23 months who had an immunisation card available, 97.1 per cent had been immunised for DPT3 (a proxy indicator for full immunisation) (95% CI = 80.3- 99.6%, n=34). However, immunisation cards were only available for 32.1 per cent of all children age 12-23 months.

Of those children who experienced diarrhoea in the past two weeks (n=140), for over a quarter of children (30.7 per cent, 95% CI= 23.9 – 38.5%), no advice or treatment was sought from a health professional.

In total, 77.4 per cent of mothers saw a health professional for ANC during their last pregnancy (95% CI = 70 – 83.3%). However, less than half of those (43.3 per cent) received a minimum of four visits (95% CI = 37.2 – 49.6%, n=328). Furthermore, the vast majority of births continue to be at home, with 90.3 per cent of mothers reporting to have given birth at home during their last delivery (95% CI = 87.3 – 98.1%, n=424). Furthermore, just 9 percent and 2.4 per cent of most recent births were assisted by a health professional or HEW respectively (n=424).

Over a quarter of child caregivers (33.1 per cent) reported to have experienced barriers accessing health services. Of those who had experienced barriers, the main barrier faced was cost (85.2 per cent), followed by transportation (5.6 per cent), quality of services (4.2 per cent) and opening times (1.4 per cent) (n=142).

Findings from the qualitative inquiry show that recognition of child malnutrition is still an issue, and health-seeking behaviour when children are malnourished is weak. In particular, mothers reported to do nothing if their child was too thin.

Access to Health Service Indicators	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Availability of immunisation card (children age 12-23 months)	106	32.1%	24.1%	41.2%
Proportion of children (age 12-23 months) with immunisation card, who have DPT 3 coverage	34	97.10%	80.30%	99.60%
Proportion of children with diarrhoea in the past 2 weeks for which advice/treatment was sought	140	69.3%	61.5%	76.1%
Proportion of children with diarrhoea in the past 2 weeks for which no advice/treatment was sought	140	30.7%	23.9%	38.5%
Proportion of women who received ANC during last pregnancy	424	77.40%	70.00%	83.30%
Proportion of mothers who received ANC during last pregnancy who had 4 or more ANC visits	328	43.30%	37.20%	49.60%
Proportion of respondents who have faced barriers accessing health services	429	33.10%	26.60%	40.30%
Proportion of mothers who gave birth at home during last delivery	424	90.30%	87.30%	98.10%
Proportion of mothers who were assisted by a health professional or HEW during last pregnancy	424	9.00% 2.40%	6.80% 1.20%	11.70% 4.60%

4.2.3.3 Causal Hypothesis C: Sub optimal breastfeeding practices of children age 0-6 months

In total, 100 per cent of sampled children age 0-24 months had ever been breastfed. The survey found very high levels of early initiation of breastfeeding, with 95.3 per cent of 0-23 month old children receiving breast milk immediately after birth (95% CI = 90.6-97.8%). Rates of exclusive breastfeeding are also high, with 81.3 per cent of children under 6 months old exclusively breastfed (n=32). Given the low sample of children in this age group in the sample, the confidence interval for this interval is very high and so results should be taken with caution (95% CI=60.1-92.6%).

Evidence from the qualitative enquiry suggests that in particular, the practice of feeding young children amesa in addition to breast milk may still be common. In addition to breast milk, mothers believe that amesa is important for children's health, to make their skin smooth and to help them grow well. Amesa is typically provided to young children two times per day up to 6 months of age. The local herb is collected from a local forest and then boiled with water. This correlates with findings from the 2011 EDHS, which found that 10 per cent of children in the SNNPR are given something other than breastmilk during the first three days of life (Central Statistical Agency and ICF International 2011). Furthermore, a 2011 study from Boricha District in the Sidama zone found a much higher percentage of mothers reported to practice pre-lacteal feeding (40.6 per cent). (Masresha Tessema, Tefera Belachew, and Getahyn Ersino 2013).

Findings from the qualitative enquiry show that breast milk is viewed as important for children's health and an important part of child care. Mothers report to breastfeed on demand for 'as long as the child desires', typically up to 4 years. The risk factor survey found that duration of breastfeeding is long with rates of continued breastfeeding at one year and at two years of age, 100 per cent and 92.5 percent of children respectively. However, the qualitative enquiry found that it is common for mothers to worry that they are not producing enough milk due to their limited diets.

Table 19: Breastfeeding Indicator Results

Breast Feeding Indicators	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of children (0-23 months) with adequate initiation of breastfeeding (<1hr after birth)	193	95.30%	90.60%	97.80%
Proportion of children (0-6 months) exclusively breastfed	32	81.3%	60.10%	92.60%
Proportion of children (12-16 months) continued breastfed after 1 year	31	100%	100%	100%
Proportion of children (0-24 months) ever breastfed	195	100%	100%	100%
Proportion of children (20-23 months) who are fed breast milk (continued BF at 2 years)	42	95.20%	82.80%	98.80%

4.2.3.4 Causal Hypothesis D: Inadequate complementary feeding practices for children age 6-23 months

The WHO recommends the introduction of solid foods to infants around the age of 6 months when breast milk is no longer sufficient to maintain optimal growth. The transition from exclusive breastfeeding to receiving complementary foods is a vulnerable period and a time when malnutrition starts for many infants because of inappropriate and/or inadequate feeding practices. Furthermore, early or late introduction of complementary feeding contributes to undernutrition.

Just over half of children age 6-8 months (55.6 per cent) received timely introduction of complementary foods, however since the sample of this age group is small, the CI is large and so this result should be taken with caution (95% CI= 31.8-77.0%).

Dietary diversity was found to be very low as measured using the individual dietary diversity score (IDDS). The mean IDDS of children age 6-23 months was 1.86 and just 9.4 per cent of these children received foods from four or more food groups the previous day (95% CI = 5.4 – 15.8%, n=160).

Responsive feeding is reportedly good, with the majority of children age 0-36 months (88.2 per cent) reportedly helped to eat and coaxed or encouraged to eat by using positive behaviour if they refuse to eat.

Findings from the qualitative inquiry show the common diet for children age 6 months to one year is thin maize porridge, forcefully fed to infants by holding the nose and feeding directly from the mother's hand. This practice is thought to be important to prevent hunger. Mother's believe food for young babies should be thin in consistency so that it is easy for the babies to digest. When children are one year of age, mothers typically switch from feeding thin maize porridge to feeding children family food, which is predominantly *kocho,* a staple food made from false banana or *enset.*

Table 20: Complementary Feeding Indicator Results

Complementary Feeding Indicators	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of children (6-8 months) with timely introduction of complementary feeding	18	55.60%	31.80%	77.00%
Mean dietary diversity score (children 6-23 months)	160	1.86	1.65	2.07
Proportion of children (6-23 months) with minimum dietary diversity score (>=4)	160	9.40%	5.40%	15.80%
Proportion of children (age 6-36 months) with reported responsive feeding	119	88.20%	82.50%	92.30%

4.2.3.5 Causal Hypothesis E: Intra-household food distribution discriminates against young children

Intra-household food distribution is an important part of food security, as not all household members may have equal access to sufficient, safe and nutritious food. This hypothesis was explored through the qualitative inquiry.

Though the risk factor survey did not examine food distribution, findings show that dietary diversity of children under five was found to be very low as measured using the individual dietary diversity score (IDDS).

Traditional dining practices in Sidama Zone dictate that husbands and men eat first and are prioritised in terms of the quality food. As is culturally typical in the area, men eat first at meal times and women each last. Mothers also reported to sometimes not eat at all in times of scarcity and to prioritise other family members in terms of quality of food. Furthermore, at times of scarcity men are prioritized, often over all other members of the family. However, this was not universal, and others reported to prioritise young children in times of scarcity. Mothers reported that intra-household food distribution was organised this way because of the belief that their husband is superior, in particular because he brings in income and does farm work.

4.2.3.6 Causal Hypothesis F: Access to safe water supply

Domestic water supply covers both access, quantity and quality. Poor water supply can negatively impact child nutritional status due to exposure to pathogens, which may cause illness, with diarrhoeal disease being the most common among children under 5. Although households may have access to a water supply, it may become contaminated due to maintenance issues. The amount of water available will also affect hygiene practices. Domestic water supply, and water storage and transportation practices were explored with relation to this causal hypothesis.

The proportion of households with access to an improved water source in the dry and rainy seasons respectively was 78.1 per cent and 77.6 per cent (n=429).

In addition to access, water usage was also measured in the risk factor survey. Firstly, water management was tested through observation of water containers in the household, with each household receiving a score of 0-7 with a score of 1, 2-4, 4-7 meaning the household was at minor, moderate or severe risk of water contamination respectively. The mean household water management score was 3.58 indicating a moderate risk of water contamination, and in total 70.2 per cent of households received a score between 4-7, indicating severe risk of water contamination.

Just 8.2 per cent of households reported to do something to their water to make it safer to drink (n=429). Of those, about half did something used a correct method including a water filter or adding bleach (48.60 per cent).

On average, the quantity of water used per capita per day was found to be very low at just 5.48 litres, just 10 per cent of the amount recommended using the Food and Nutrition Technical Assistance (FANTA) measurement guide[23]. Less than one per cent of households had a per capita water usage of 15 litres of more as per national guidelines. Such low per capita water usage could be explained by the fact that the majority of the target population wash themselves and clothes in the river. Indeed, 47.5 per cent of households report to not have collected any water for bathing the

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[23] Food and Nutrition Technical Assistance Project (1999) Water and Sanitation Measurement Indicator Guide, USAID

previous day. Furthermore, from the qualitative study, respondents report to typically wash every 5-7 days.

Findings from the qualitative study show that water access varies significantly by village, though for three out of the four villages safe drinking water access remained a big issue, with time/distance/cost significant barriers to access, and access affected by season. Consequently, in those villages communities reported to continue to use unprotected springs for drinking water.

Table 21: Water access and usage indicator results

Water Access and Usage Indicator	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of households with access to improved water source in dry season (main drinking water source)	429	78.10%	65.70%	86.90%
Proportion of households with access to improved water source in rainy season (main drinking water source)	429	77.60%	65.90%	86.20%
Mean water management score (0-6)	429	3.58	3.35	3.81
Proportion of households at severe risk of water contamination (with water management score 3-6)	429	70.2%	63.1%	76.4%
Mean daily water use (household in litres)	429	28.35 litres	26.43	30.27
Average daily water consumption per capita	429	5.48 litres	5.09	5.86
Proportion of households who do something to drinking water to make it safe	429	8.20%	4.40%	14.50%

4.2.3.7 Causal Hypothesis G: Poor hygiene practices

Poor hygiene practices can negatively impact child nutritional status due to exposure to pathogens, which may cause illness, with diarrhoeal disease being the most common among children under 5.

Handwashing practices were measured by asking child caregivers to demonstrate how and when they wash their hands and then assigning a score of 0-10, with scores over 8 indicating appropriate handwashing practices. Using this indicator, the mean score was 5.34 and 83.7 per cent of child caregivers demonstrated inappropriate handwashing practices (95%CI=76.4-89%, n=429). Furthermore, only 63.4 per cent had soap or ashes available in the house for handwashing purposes.

All children under five in the survey were observed as being either clean (recently cleaned or washing), moderately clean (child's hands and/or clothes are dirty but no

feces visible or can be smelled) or very dirty (stools are visible or can be smelt on the child's body or clothes). Using this observation scale, 11.8 per cent, 83.5 per cent and 4.7 per cent of children were found to be clean, moderately clean and very dirty respectively (n=515).

Knowledge of diarrhoea determinants was found to be relatively low among child caregivers, with 7.7 per cent, 29.1 per cent and 35 per cent of child caregivers knowing none, or just one or two causes of diarrhoea respectively. Furthermore, 24 per cent of respondents listed causes not related to the fecal-oral route. This is supported by findings from the qualitative inquiry which found that knowledge of causes of diarrhoea was weak among the community. In particular, the belief that kale causes diarrhoea is common.

Whilst hygiene practices are difficult to assess through focus group discussions, participants feel that not all people in their village practice hygienic practices and this is thought to be due to personality or lack of knowledge. In addition, a common challenge for most households is the lack of income to purchase soap on a regular basis.

Table 22: Hygiene Risk Factor Results

Hygiene Indicator	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of child caregivers with inappropriate hand washing practices (score >=8)	429	83.7%	76.4%	89.0%
Mean handwashing score (0-10)	429	5.34	4.93	5.76
Proportion of households with soap or ash available in the house	429	63.40%	57.80%	68.70%
Proportion of children who are clean, moderate and dirty	515	11.80% 83.50% 4.70%	8.60% 78.00% 3.00%	16.10% 87.80% 7.20%
Mean score (0-4) knowledge of diarrhoea determinants	429	1.91	1.74	2.09
Caregiver knowledge of 0, 1, 2, 3, 4 or more diarrhoea determinants	429	7.70% 29.10% 35.00% 20.50% 7.70%	5.20% 24.70% 30.00% 15.50% 4.80%	11.30% 34.00% 40.30% 26.60% 12.20%

4.2.3.8 Causal Hypothesis H: Poor utilisation of improved sanitation facilities

Poor sanitation negatively impacts child nutritional status due to exposure to pathogens, which may cause illness, with diarrhoeal disease being the most common among children under 5. If the outlet of feces is not well isolated from the environment by the use of appropriate sanitation facilities, it can contaminate water, food and insects that can in turn contaminate food and water.

Latrine coverage was quite high in the target area, with 66.7 per cent of households owning their own latrine (95%CI=59.5 – 73.1%, n=429). However, the proportion of households with a safe and hygienic sanitation facility as measured through observing the toilet facility was very low. Based on this criteria less than one per cent (0.7 per cent) of households have a safe and hygienic sanitation facility (95% CI = 0.2 – 2.2%).

Disposal of child feces was also examined as a risk factor. Approximately half of all children age 0-23 months (51.8 per cent, n=195) reportedly have their feces disposed of in a safe way. This finding is supported by observations of the NCA analyst in the qualitative inquiry where mothers were observed to simply cover children's feces with dirt on the floor of the household.

The qualitative inquiry also uncovered seasonal difference in latrine use, particularly in Wiridimatata village. During the rainy season, the latrines reportedly overfill with water and the area around becomes muddy, and so open defecation during the rainy season remains common. Although this issue was only mentioned in one village, during the presentation of results to communities in other villages, they also acknowledged that use of latrines during the rainy season is less than during the dry season.

Table 23: Sanitation Indicator Results

Sanitation Indicator	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of households with own latrine	429	66.70%	59.50%	73.10%
Proportion of households with a latrine where all adults use the latrine	286	96.50%	93.00%	98.30%
Proportion of households with a latrine where all children over 2 years old use the latrine	286	77.30%	71.50%	82.20%
Proportion of households with safe and hygienic sanitation facility	429	0.70%	0.2%	2.2%
Mean latrine sanitary hygiene and safety observation score (0-6)	286	3.66	3.48	3.84
Proportion of children 0-23 months for whom stools are disposed of safely	195	51.8%	43.7%	59.8%

4.2.3.9 Casual Hypothesis I: Low level of education of caregivers

Parental education, particularly of the mother, is linked to nutrition and child health, and is an important influencing factor for child undernutrition. It is also viewed as a proxy for socioeconomic status and improved care practices.

The risk factor survey found that the average number of years schooling of child caregivers was approximately grade four and almost a fifth of all caregivers had no schooling (18.9 per cent). The mean age of schooling correlates with economic status. Mothers from households with 50 per cent or more likelihood of living on less than 1.25 dollars a day, having an average level of schooling over one grade below the total average (2.76).

Table 24: Education of caregiver indicator results

Education Indicator	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Mean highest grade of school completed by caregiver	429	3.93	3.59	4.28
Proportion of caregivers with no schooling	429	18.90%	15.80%	22.40%
Mean highest grade of school completed by caregiver from households with <50% chance of living below the 1.25 dollar a day poverty line	51	2.76	2.13	3.40

4.2.3.10 Causal Hypothesis J: Low status of women

The status of women in the Sidama zone is thought to be low as measured along many proxy indicators. Low status of women may contribute to poor maternal nutritional status as well as to the ability to provide adequate care and therefore nutritional status of the child.

The low status of women is also reflected in low education attainment as discussed previously. The risk factor survey attempted to measure the psychological state of mothers using the WHO5 well-being index and MDI10 (major depression inventory). In total, 27.7 per cent of mothers were found to be at risk of depression using the WHO5 (n=429). Of those women at risk of depression 9.4 per cent, 30.8 per cent and 36.8 per cent were found to have mild, moderate and severe depression respectively (n=117).

The risk factor survey aimed to assess perceived social capital through asking if mothers felt supported. Just over half of mothers said that they felt supported by their family and/or community (54.2 per cent, n=426).

Furthermore, early childbearing may also be used as a proxy for women's empowerment and this risk factor is significantly linked to low birth weight as well as increasingly the risk of maternal mortality. The survey found that the mean age of first birth for women was 18.11 (n=426). Almost half of all mothers gave birth for the first time when they were younger than age 18 (41.2 per cent) and 22.2 per cent age

16 or below. The qualitative inquiry found that women typically get married age 15-17, though sometimes as young as 12, reportedly depending on when a girl reaches puberty, and childbearing begins shortly after.

Decision making power was measured by asking a series of question on who makes key financial, social and health-seeking related decisions. Based on this scale, 6.5 per cent of mothers were found to have no decision making power (husbands make key decision in all cases). In particular, decision-making power is lowest for women with regards to economic decisions with 56.9 per cent of mothers saying their husband always makes decisions regarding money.

Lastly, the number of days rest after delivery was also measured as a proxy for women's workload and empowerment. The risk factor survey found that the mean number of days rest was almost 32, less than the recommended 40 days. Furthermore, just 25.4 per cent of women had 40 days or more days rest after their last delivery.

As discussed under causal hypothesis E, low status of women is reflected at meal times, with husbands always eating first because they are viewed as superior.

Table 25: Maternal wellbeing indicator results

Maternal Wellbeing Indicator	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Perceived social capital. Proportion of mothers who feel supported.	426	54.20%	48.20%	60.1%
Proportion of mothers with WHO5 <13 (risk of depression)	429	27.70%	22.00%	34.30%
Proportion of mothers at risk of depression with mild, moderate or severe depression	117	9.40% 30.80% 36.80%	5.40% 22.40% 28.10%	15.90% 40.60% 46.40%
Mean age of caregiver when she gave birth for first time	426	18.11	17.85	18.37
Proportion of women with no decision making power	429	6.50%	4.10%	10.20%
Proportion of women who say fathers always make decisions about education of children	429	18.20%	13.80%	23.60%
Proportion of women who say fathers always make decisions about whether to seek medical health if child is sick	429	30.30%	25.30%	35.80%
Proportion of women who say fathers always make decisions about	429	56.90%	50.00%	63.50%

how money is spent				
Proportion of women who say fathers always make decisions about if and when to have children	429	13.10%	9.50%	17.70%
Mean number of days rest after most recent delivery	424	31.98	29.03	34.93

4.2.3.11 Causal Hypothesis K: High workload of women

High workload of women may contribute to maternal and child nutritional status and impact on care giving practices. Excessive calorie expenditure in the absence of increased caloric intake can result in poor maternal nutritional status.

The risk factor survey found that 31.1 per cent of mothers feel they have too much work to adequately care for their children. The workload of women was further explored in the qualitative inquiry. Women in the Sidama zone perform a significant portion of farm work as well as all work within the household. In particular, women bear the brunt of enset preparation, water collection and other arduous tasks.

The qualitative enquiry also found that women's workload is very high in comparison with men.

Table 26: Maternal workload indicator result

Maternal Workload Indicator	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of mothers who feel they have too much work to take care of their child.	428	31.10%	24.70%	38.20%

4.2.3.12 Causal Hypothesis L: Unmet need for family planning

Unmet need for family planning contributes to short birth intervals and high fertility rates, which in turn affects household resources and ability to provide adequate care.

Current use of family planning was found to be 75 per cent among mothers in the survey (n=420). Of those women who reported to be currently using a method of family planning, the most common method used was injectable (84 per cent) followed by the contraceptive implant (11 per cent). However, the risk factor survey found that 38.3 per cent of mothers had wanted to get pregnant later or not at all at the time of their last pregnancy.

The qualitative inquiry also found that family planning usage was reportedly very common and increasingly popular in recent years. The ideal family size is viewed as four children, though a preference for sons means that couples will continue to have children in order to have the desired number of sons. In one extreme case, a mother of a malnourished baby girl had seven other daughters, and so following the birth of the eighth daughter, her husband had remarried in order to have a son.

Despite family planning use being high, there is a lack of data on to what extent people are using family planning for spacing rather than limiting purposes.

Family planning method use (n=315)
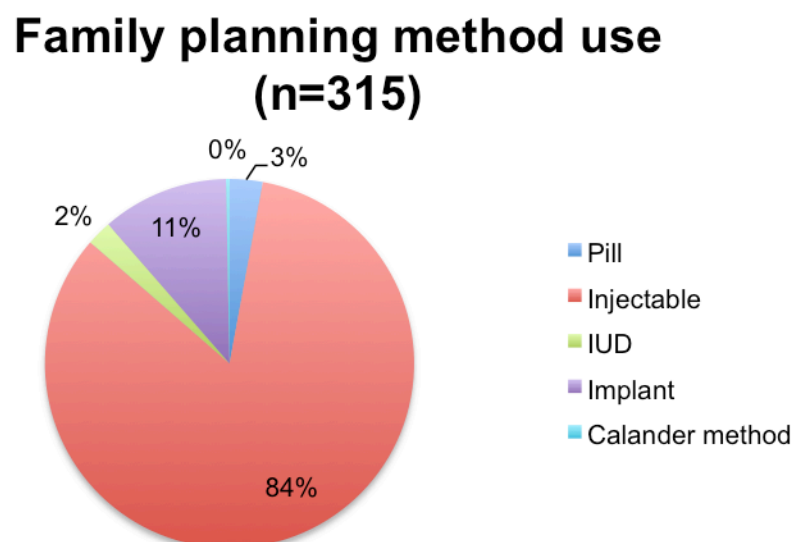
Table 27: Family planning and unmet need indicator findings

Family Planning Indicator	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Current use of family planning	420	75%	69.20%	80%
Mean number of household members	429	5.62	5.42	5.82
Proportion of mothers who wanted to wait or not get pregnant at all, at the time of their last pregnancy	423	19.60% 18.70%	14.70% 13.70%	25.80% 25.00%

4.2.3.13 Causal Hypothesis M: Early childbearing age

Early childbearing is significantly linked to low birth weight as well as increasingly the risk of maternal mortality. Furthermore, early childbearing may be used as a proxy indicator for women's empowerment. It is considered a risk factor of child undernutrition because young women may not be ready, motivated or mature enough to take care of a child, which tends to less caring, attention and patience provided to the child's development. A study by Naher et al (2010) found that severely underweight children were more likely to have mothers under 19 years old.

The survey found that the mean age of first birth for women was 18.11 (n=426). Almost half of all mothers gave birth for the first time when they were younger than age 18 (41.2 per cent) and almost a quarter (22.2 per cent) age 16 or below. The

qualitative inquiry found that women typically get married age 15-17, though sometimes as young as 12, reportedly depending on when a girl reaches puberty, and childbearing begins shortly after.

Childbearing age Indicator Results	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Mean age of caregiver when she gave birth for first time	426	18.11	17.85	18.37

4.2.3.14 Causal Hypothesis N: Small household farm land size

One important hypothesis is that landholding size is not sufficient to meet the needs of farming households and to generate enough cash to be able to meet with basic needs (both in quantity and quality) especially while facing market inflation.

In total, 99.1 per cent of households own farm land. The risk factor survey found that the mean farm land size of respondents was 0.53 hectares. Furthermore, 78 per cent of households have just 0.5 hectares or less and 46.3 per cent have only 0.25 hectares or less.

Low farm land size is compounded by large family size, as farmland is traditionally split between sons. The study area is very densely population with the average household size was found to be 5.62 people.

From discussions with community members in the qualitative inquiry, small land size is seen as a significant factor hindering crop production and diversity.

Farm land size Indicator	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of households with farm land	429	99.1%	97.7%	99.6%
Mean farm land size (in hectares)	425	0.53 hectares	0.47 hectares	0.59 hectares
Mean number of household members	429	5.62	5.42	5.82

4.2.3.15 Causal Hypothesis O: Poor crop diversity and usage

One hypothesis for persistence of malnutrition in a relatively fertile area is poor crop diversity and usage reflected in poor dietary diversity.

Most households depend on one or two rain fed crops and there is not a culture of vegetable growing despite land available for this purpose. This leads to a situation in which households are overly dependent on one or two crops, and vulnerable to

weather patterns and price fluctuations. Furthermore, over-dependency on the same crop depletes nutrients from the soil.

Crop diversity reflects dietary diversity. The risk factor survey measured the household dietary diversity score (HDDS) of sampled households to assess food access. The results found that the mean HDDS score was 5.77.

Table 30: Dietary diversity indicator results

Dietary Diversity Indicator Results	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Mean Household Dietary Diversity Score (HDDS) (0-12)	429	5.77	5.49	6.06

The following table shows the elaboration of profiles of HDDS. Included in this table are food categories eaten by at least 50 per cent of the households in their respective groups.

Table 31: HDDS profiles

Group 1: HDDS < 3 15 households (3.5%)	Group 2: HDDS 3-4 82 households (19.10%)	Group 3: HDDS 5-6 181 households (42.2%)	Group 4: HDDS >6 151 households (35.20%)
Root and tubers including Enset Coffee/tea	Grains and cereals including maize Roots and Tubers including enset Coffee/tea	Grains and cereals including maize Roots and Tubers including enset Coffee/tea Vegetables including kale, cabbage and onion Beans and pulses Oil, fat and/or butter	Grains and cereals including maize Roots and Tubers including enset Coffee/tea Vegetables including kale, cabbage and onion Beans and pulses Oil, fat and/or butter Fruit including bananas, mangoes Milk, yoghurt, dairy products

Evidence from the qualitative inquiry also support the finding that household dietary diversity is very low throughout the year. The predominant food crop grown for consumption is enset. In general, throughout the year, household dietary diversity is very low with mothers typically preparing coffee with kocho for breakfast and lunch, and kocho with kale an/or haricot beans for dinner. Meat is only consumed on special occasions such as Christmas, Easter and the New Year. Furthermore, evidence from the qualitative inquiry suggests that at household level nutritious food such as fruit, vegetables and eggs may be being sold rather than consumed. This may reflect that food utilisation is a bigger factor than food availability.

4.2.3.16 Causal Hypothesis P: Not enough food produced during the hunger season.

Most households in Aleta Chucko and Aleta Wondo Woredas face an annual food gap at the household level, leaving households unable to produce enough food or income. Knowing that levels of acute malnutrition peak during the hunger season, this is an important risk factor.

The risk factor survey measured months of adequate household food provisioning (MAHFP). The results show that 76.7 per cent of households face at least one month in the year of food shortage. The average number of months of adequate food provisioning was 9.14. The results show that the hunger gap lasts from around January to August/September with April, May and June the peak months of household food shortage (see figure 4).

From the qualitative inquiry, common coping strategies during the hunger period include men selling their labour to richer households, richer reducing meals to 2 times per day, reducing portion size for all household members and taking out loans.

Table 32: Months of adequate food provisioning indicator results

MAHFP Indicator Results	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of households with month(s) in previous 12 months without enough food to meet needs	429	76.70%	68.30%	83.40%
Mean Months of Adequate Food Provisioning (MAHFP)	329	9.14	8.99	9.28

The risk factor survey also measured household food insecurity through two different commonly used scales. The survey found that the mean household food insecurity access scale score (HFIAS) was 6.61. Using this scale, 16 per cent, 56 per cent and 7 per cent of households were found to be mildly, moderately or severely food insecure respectively. The following diagram illustrates the categories of food security of households.

Table 33: HFIAS Indicator results

HFIAS Indicator Results	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Mean Household Food Insecurity Access Scale (HFIAS)	429	6.61	5.76	7.46

Household Food Security Situation, HFIAS (n=429)

- Food Secure
- Mildly Food Insecure
- Moderately Food Insecure
- Severely Food Insecure

7% / 21% / 16% / 56%
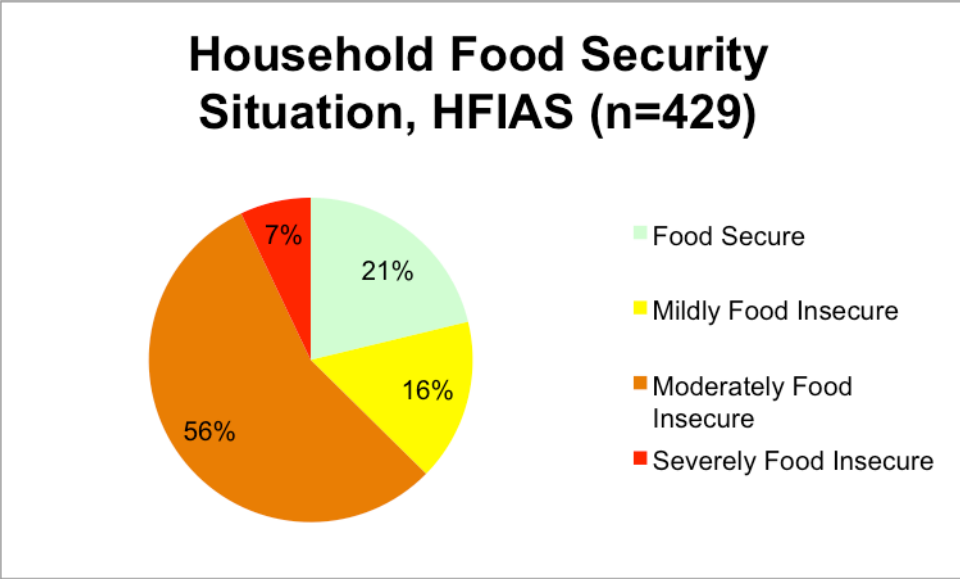
4.2.3.17 Causal Hypothesis Q: Poor financial resource management

Financial resource management may be an important factor affecting household food security. The risk factor survey examined income/expenditure, savings and debt in order to assess this causal hypothesis.

The survey found that the average monthly income/expenditure was 1651 ETB. The proportion of food as monthly expenditure can be used as a measure of food insecurity vulnerability. On average food made up 43 per cent of monthly expenditure which is classified as low food insecurity vulnerability. Based on the share of food expenditure data, in total, 10.5 per cent, 7.5 per cent and 22.8 per cent of households had medium, high and very high level of food security vulnerability respectively.

Table 34: Food security vulnerability indicator results

Food insecurity vulnerability Indicator Results	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of households with low level of food insecurity vulnerability (<50% share of food expenditure)	429	59.20%	53.40%	64.80%
Proportion of households with medium level of food insecurity vulnerability (50-65% share of food expenditure)	429	10.50%	7.50%	14.50%
Proportion of households with high level of food insecurity vulnerability (65-75% share of food expenditure)	429	7.50%	4.90%	11.10%

Proportion of households with severe level of food insecurity vulnerability (<75% share of food expenditure)	429	22.80%	18.00%	28.60%

Table 35: Mean household expenditure in last month by item
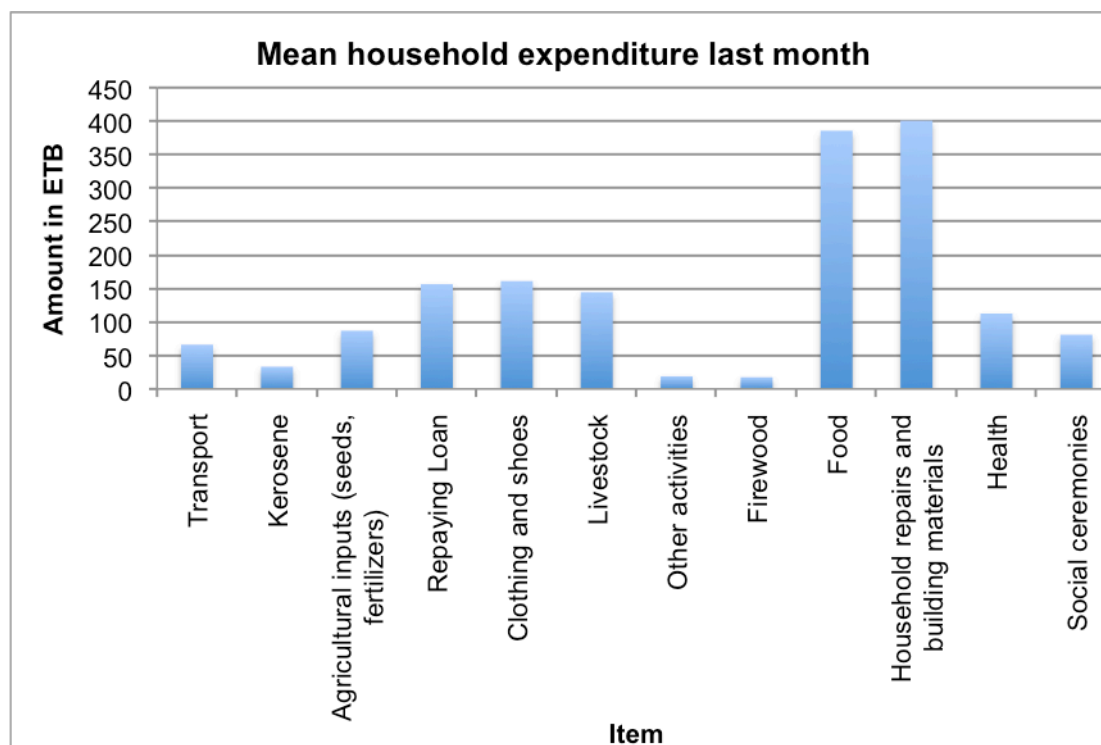
The risk factor survey also looked at levels of savings and debt. Cash savings were not common with just 17.9 per cent of households reporting to have any cash savings. Of those households who had cash savings, the average amount was 1301 ETB.

Almost half of all households currently had some debt (45.5 per cent) with the average amount of debt 1507 ETB. The primary reason for household debt was to purchase food.

The qualitative inquiry found that borrowing money from richer households is one of the common coping strategies. The interest rates on these informal loans are extremely high with households reporting to pay 100% interest on loans. Households typically repay these loans at the time of coffee harvesting, though sometimes households struggle to pay back such loans.

Figure 5: Primary reason for household debt

Primary Reason for Debt (n=195)
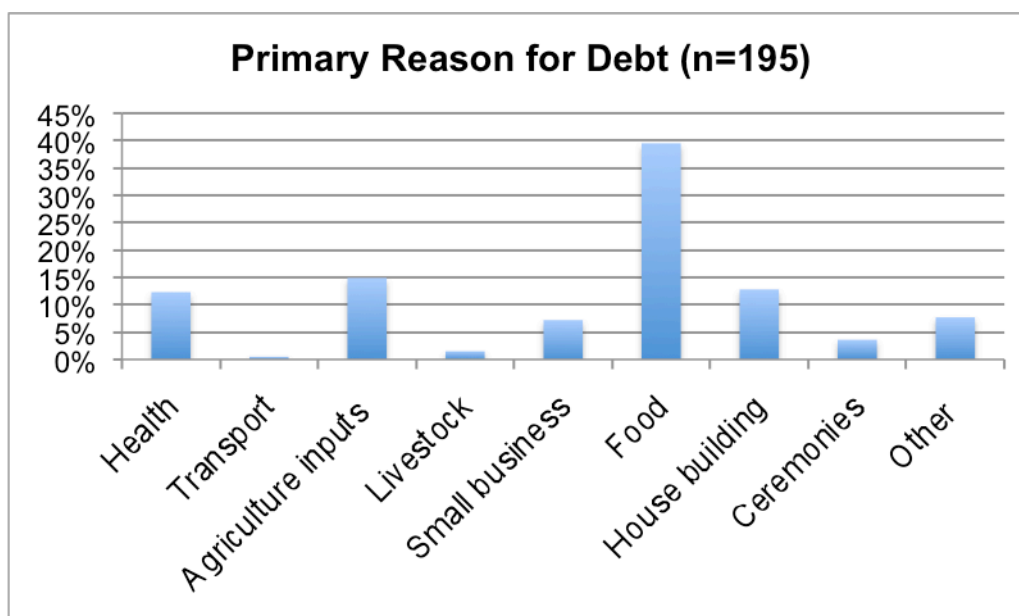
Table 36: Primary reason for household debt, n=195

Item	Percentage
Health	12.30%
Transport	0.50%
Agriculture inputs (seeds, fertiliser)	14.90%
Livestock	1.50%
Small business	7.20%
Food	39.50%
House building	12.80%
Ceremony (wedding, funeral etc)	3.60%
Other (specify)	7.70%
Total	**100%**

Financial Resource Management Indicator Results	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of households with cash savings	429	17.9%	14%	22.5%
Mean cash savings	76	1301 ETB	454 ETB	2149 ETB
Proportion of households with household debt	429	45.5%	38.10%	53%
Mean amount of debt	195	1507 ETB	1184 ETB	1830 ETB
Mean household monthly income/expenditure	429	1651 ETB	1200 ETB	2101 ETB
Mean share of food expenditure	429	43.9%	40.2%	46.8%

4.2.3.18 Casual Hypothesis R: Poor nutritional status of pregnant and lactating mothers

Pregnant and lactating mothers from low-income settings are considered as a nutritionally vulnerable group. Maternal nutrition during pregnancy has a significant impact on foetal growth and birth weight. Due to the nursing process, mothers are subjected to nutritional stresses, which may result in chronic energy deficiency, which likely affects ability to provide appropriate care. Poor maternal nutritional status may be due to insufficient food intake, excessive energy expenditure or poor utilization of nutrients, such as through illness. Cultural dining practices, dietary intakes and nutritional status of pregnant and lactating women were explored as part of this hypothesis.

The risk factor survey found that 38.8 per cent of mothers were currently moderately malnourished as defined by having a MUAC <23cm. Furthermore only 20.8 per cent of mothers reported to eat more during their last pregnancy. The qualitative inquiry explored maternal diet further and found that although mothers and fathers were aware of the importance of good diet during pregnancy, in practice they ate the same or less due to limited incomes and the desire for a small baby. Mothers reported to worry about the quantity of their breastmilk because of their limited diets. Lastly, cultural dining practices dictate that men are prioritised in terms of quality and quantity of food likely affect maternal nutritional status.

Table 38: Maternal nutritional status indicator results

Maternal Nutritional Status Indicator Results	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of mothers with MUAC <23cm	425	38.80%	31.90%	46.30%
Proportion of mothers who ate more during	423	20.80%	15.80%	26.90%

last pregnancy				

4.2.3.19 Causal Hypothesis S: Low Birth Weight

Infants who are low birth weight begin their lives at a disadvantage, as they are more likely to become stunted than their peers, among other potential negative long-term consequences related to mental and physical health and development (Hack et al. 2003). In a large study in Ethiopia, by far the most significant and consistent predictor of stunting and undernutrition among infants at 6 and 12 months was low birth weight; other important factors included male gender, poor household sanitary facilities and rural residence (Medhin et al. 2010).

Due to the high proportion of births still delivered at home, the risk factor survey was unable to find any data on birth weight, with no children having a birth certificate or health card displaying birth weight. There was also a lack of data on birth weights at health centre and health post level. Consequently, we were only able to measure perceived birth weight. Using this indicator, 12.2 per cent of children were perceived by their caregivers to be small or very small at birth.

Despite the lack of data, since the primary causal pathway for low birth weight is maternal nutritional status, the fact that 38.8 per cent of mothers were found to be moderately malnourished, supports the expectation that low birth weights may be a significant risk factor in the target area. Indeed, according to UNICEF data from 2005, 20 per cent of all births in Ethiopia were low birth weight.

Furthermore, evidence from the qualitative inquiry shows that mothers may deliberately eat less during pregnancy in order to have a smaller baby.

Table 39: Birth weight indicator results

Birth weight Indicator Results	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of mothers with MUAC <23cm	425	38.80%	31.90%	46.30%
Proportion of mothers who ate more during last pregnancy	423	20.80%	15.80%	26.90%
Proportion of children whose perceived weight at birth was very small or smaller than average. (Perceived low birth weight)	516	12.20%	9.10%	16.20%

4.2.3.20 Causal Hypothesis T: Chronic Poverty

Chronic Poverty is seen as the root cause of many of the other risk factors and as such, was measured as a risk factor.

The risk factor survey used the Progress out of Poverty Index (PPI) to measure levels of poverty. Using this indicator, almost a third of households (31.62 per cent) were found to be living below 1.25 USD per day. The survey also found that 15.6 per

cent of households had been beneficiaries of the productive safety net programme the previous year.

The qualitative inquiry found that low household income was perceived as one of the most significant challenges affecting ability to provide appropriate care.

Table 40: Socioeconomic status indicator results

Socioeconomic Status Indicator Results	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Proportion of households living below $1.25/day/2005 PPP Line (PPI Index)	429	31.62%	29.47%	33.76%
Proportion of households who were beneficiaries of the productive safety net programme in the previous year.	429	15.60%	11.90%	20.20%

4.2.3.21 Causal Hypothesis U: Lack of resources for agricultural inputs

This causal hypothesis was added at the technical expert workshop, believed to be an important risk factor affecting agricultural productivity, and therefore dietary diversity.

As discussed under causal hypothesis P and T, household incomes are limited, debt is high and poverty widespread. In addition, almost a third of households were found to be living on less than 1.25 USD per day.

Findings from the qualitative inquiry support this hypothesis with lack of resources for agricultural inputs emerging as a major challenge across all four villages. Lack of agricultural inputs was found to be a significant challenge for households, affecting both crop production and crop diversity, an issue which is compounded by the degrading quality of the local soil. The price of fertilizer has reportedly increased in recent years from 150 bir to 700-800 bir, a price which is unaffordable for most households. In addition to fertilizer, participants reported to be unable to afford special high yielding seeds.

4.2.3.22 Hypothesis V: Area prone to adverse weather conditions

The area is prone to climate change, with drought, landslides and other natural disasters not uncommon. This affects agricultural productivity, which affects dietary intake and therefore child undernutrition.

This risk factor emerged as a medium risk factor in the qualitative inquiry, closely linked to over dependency on one or two rain fed crops. Findings from the qualitative inquiry show that most households are very vulnerable to weather conditions, dependant on one or two rain fed crops in addition to some cash crops including coffee or chat. Last year, due to heavy rains coffee harvests were destroyed. This had a significant impact on household income. Furthermore, when rains are delayed,

as happened in early 2013, this affects crop yields and households become vulnerable to food insecurity.

4.3 NCA Qualitative Results

The following section presents results of the qualitative inquiry examining community perceptions, practices and constraints regarding child undernutrition.

4.3.1 Background Characteristics of Participants in Qualitative Study

In each of the four villages included in the qualitative component of the NCA, focus group discussion members included mothers of children under five, purposively selected from the poorest households and from slightly better off households.

Although the majority of mothers did not know their age, the estimated age of mothers was between 18 and 30, with participants from Lawisha village were noticeably younger than participants from the other three villages. The number of children ranged from 1 to 8, with number of children correlating with the age of the mother.

The level of education of participants ranged from no formal education and illiterate to grade 8, with the slightly better off group having a higher level of education than the mothers from the poorest households. Surprisingly, the educational level of younger mothers was sometimes among the lowest, with many women age 20 having left school after grade 2.

Almost all mothers described themselves as housewives with other income generating activities being extremely rare.

4.3.2 Local Definition and Understanding of Good Nutrition and Malnutrition

The initial focus group discussions with community members explored community perceptions and understanding of good nutrition and malnutrition.

Understanding of Good Nutrition
In general, good nutrition is understood by mothers as being a 'diverse diet', with 'good foods' for child growth including 'fat containing foods' and 'vitamin containing foods' including eggs, milk, butter, meat, oil, avocado, mangos, tomato and potato.

> *'Kocho is bad for children, but we feed it to them to stop them crying and to stop their hunger'* (Mother of child under five, Wiridimatata village).

Kocho and amicho, foods produced from enset are believed to be bad for children's health as these foods are believed to not contain vitamins and to bloat the child's stomach making them pass large stools, which is viewed as a sign of bad health. Participants also believe that sweet potato is bad for children and so they report to avoid feeding children this vitamin A rich food for fear of making their children sick. Furthermore, kale is believed to cause diarrhoea.

'Good nutrition' is thought to start from pregnancy, with the nutritional status of pregnant women thought to affect the nutritional status of the unborn child. Good foods for pregnant women are thought to include meat, milk, butter and tomato, and it is commonly believed that pregnant women should eat small amounts of food more frequently. In addition, after giving birth, women must eat special food for a period of 45 days including barley and butter in order to regain energy lost during pregnancy.

Despite awareness of the importance of good nutrition during pregnancy, in general women are unable to maintain good nutrition during pregnancy due to a lack of resources.

In addition to a lack of resources, many women report to avoid fatty foods while pregnant such as avocado, butter and milk as they fear that such foods will make the fetus very large, which in turn will make labour more difficult. Because of this common practice, it could be expected that low birth weight will be common in this community. According to local health staff, there have been no low birth weight babies born in this community in recent years. However, there is also a lack of data on birth weights at health post or health centre level because most deliveries still take place at home, but also it seems that birth weights are not being routinely collected.

> *'Pregnant women need meat, milk, butter and tomato, but we can not afford these foods'* (Mother of child under five, Lawisha village).

A good and diverse diet is also thought to be important for lactating mothers as diet may affect her ability to produce breast milk. Breastmilk is also thought to be important for a child's nutritional status and is thought to be good for child growth. Mothers typically feed their children colostrum and breast feed for as long as their children wish (more than 2 years).

For young children good food is thought to be thin maize porridge forcefully fed to infants by holding the nose and feeding directly from the mother's hand. This practice is thought to be important to prevent hunger. Mother's believe food for young babies should be thin in consistency so that it is easy for the babies to digest. When children are one year of age, mothers typically switch from feeding thin maize porridge to feeding children family food, which is predominantly Kocho.

Recognition of Malnutrition
From initial conversations with the community, participants do not see malnutrition as a very severe problem within their community as compared to other issues. However, in each village, children were identified by the qualitative team as being malnourished. This may be due to a combination of factors including inability to recognise undernutrition, low awareness that malnutrition is a disease that can be treated and poor health care seeking behaviour.

According to health staff, malnourished children are rarely identified as such by their parents but are most often identified during screening events or when they come to health facilities with other illnesses.

In general, the community feel that they are able to identify children who are too thin (*Maqa'e Shaala*). Children are identified as being undernourished if they are thin, not active, have swollen legs, ugly hair, cry often, fall over easily and do not play well. In general, mothers do not seem to perceive malnutrition as an illness, reporting to not take their children to the health post if they are not growing well, only if they are sick.

> *'[If our children are not growing well] we can only observe and wait. We can not do anything. We just give what we have available in the household'* (Mother of child under five, Wiridimatata).

In general, recognition of wasting is much stronger than recognition of stunting among both community members, but also health staff. In all of the four villages, community participants and health staff were unable to identify children who are too small for their age (*Lophpha Ajja*). The health staff interviewed also believe that stunting is non existent in the area.

> *'There is a big difference between urban and rural areas because they can cook different things for their children and can feed them many different things. We can only give our children maize flour porridge and bread'* (Mother of child under five, Elelicho 2 village)

Focus group members in Elelicho 2 village feel that there is a difference in growth between rural and urban children, due to differences in household income.

Perceived Causes and Consequences of Malnutrition

The main cause of children becoming too thin is thought to be because parents are unable to feed their children a 'diverse diet' (*Karsantinno Sagale*) with enough 'good foods' (*Dancha Sagale*). The mothers report that children are only fed such 'good foods' if they have enough income to purchase food or land to grow these foods themselves. Fathers also described lack of farm land and lack of access to agricultural products as the main factor why they were unable to provide an adequate diet for their children. Consequently, most households feed their children family food, which is predominantly food produced from enset, the main food crop grown in the village, despite believing that such food is not adequate for child growth.

> *'In our community there are no children who are growing well. Because after 6 months we feed adult food, we can not afford to feed other good things for our children'* (Mother of child under five, Lawisha village.)

In addition to poor food intake, illnesses which cause diarrhoea, vomiting and fever, drinking contaminated water, poor hygiene, and improper child care (not clothing or washing children) are also thought to be causes of children not growing well.

Participants believe that the consequences of child undernutrition include poor educational attainment, and that they will remain thin, inactive and unproductive as adults and will be more susceptible to diseases.

4.3.3 Description of Livelihoods and Food Security Situation

Livelihoods and Dietary Diversity

Livelihoods are very similar across all four villages with households typically farmers of small plots of land and primarily growing enset and maize as the main food crops, and coffee and chat the main cash crops, depending on the topography of the area.

The predominant food crop grown for consumption is enset. In general, throughout the year, household dietary diversity is very low with mothers typically preparing coffee with kocho for breakfast and lunch, and kocho with kale an/or haricot beans for dinner. Meat is only consumed on special occasions such as Christmas, Easter and the New Year.

Average land size is typically less than half a hectare, which is seen as a significant

risk factor to undernutrition.

> *'It is common for children in our community to be too thin, because we do not have enough land to grow a variety of crops, this is the main challenge so we give our children limited food'* (Father of child under five, Lawisha)

Depending on the economic status of households, ownership of a cow and/or hens is also common, though milk and eggs are commonly sold at the market as an important source of income rather than consumed at the household level.

Cash Crops

Most households have some cash crops of chat and coffee, depending on the topography of the area. Food security and household income is linked directly to cash crop production. A relatively recent phenomenon in Lawisha and Second Soyama villages is the production of chat, which has become widespread in recent years and is the main source of income for most households in these two villages. Households perceive chat as being very good for their livelihoods, with income commonly used to pay for social ceremonies, household building as well as general household expenses. Growing chat as a cash crop has become very common in the village over the past few years, but is not as lucrative as it once was because of changing market prices. Furthermore, chat takes 1-2 years to grow which is described as an additional challenge

> *'Chat is now consistently a low price, now all people grow chat so the price has reduced. Before we could sell for 10,000 bir, now we can only sell for 4,000 bir '* (Father of child under five, Second Soyama village).

By comparison in Elelicho 2 and Wiridimatata villages, coffee is the significant cash crop. In these villages, households are extremely dependent on the income they earn from the coffee harvest with income from coffee used to purchase clothes, educational materials, school fees as well as to pay for celebrations and repay loans.

Perceived Challenges to Food Security

In all of the villages, participants feel that the biggest challenges to their livelihoods is poor production caused by their inability to purchase agricultural inputs including seeds and fertilizer, as well as their small farm land size.

Lack of agricultural inputs is a significant challenge for households, affecting both crop production and crop diversity, an issue which is compounded by the degrading quality of the local soil. The price of fertilizer has reportedly increased from 150 bir to 700-800 bir in recent years, a price which is unaffordable for most households. In addition to fertilizer, farmers are unable to afford special high yielding seeds.

> *'Previously animal dung was enough, but now we need better fertilizer because of the poor soil quality, but we do not have money to purchase so maize production is very low'* (Mother of child under five, Wiridimatata village)

Households typically have just ¼ hectare of farm land. Because of a lack of land, households are unable to grow a variety of crops, which affects dietary diversity. This challenge of small farm land size is felt to be compounded by population growth due to the cultural practice of splitting land with sons.

Hunger Gap

Households typically do not have enough food between the hunger period of March/April and June/July. Common coping strategies during the hunger period include men selling their labour to richer households, richer reducing meals to 2 times per day, reducing portion size for all household members and taking out loans.

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'Most households take loans from March because many things are not available then. We borrow from richer households and repay when the coffee is harvest"(Mother of child under five, Wiridimatata village)

'Paying back loans is a big challenge. Sometimes we have to sell our land or our assets like cattle' (Father of child under five, Elelicho 2 village)

A common coping strategy to cope with the hunger period, particularly in those villages where coffee is a significant cash crop, is to take out loans from richer households. The interest rates on these informal loans are extremely high with households reporting to pay 100% on loans. Households typically repay these loans at the time of coffee harvesting.

Cultural Dining Practices

As is culturally typical in the area, men eat first at meal times and women each last. Women also reported to sometimes not eat at all in times of scarcity and to prioritise other family members in terms of quality of food. Interestingly, participants reported that in times of food shortage men are prioritized and eat first, whereas in times when there is enough food available children are fed first. Mothers reported eating in this way because of the belief that their husband is superior, in particular because he brings in income and does farm work.

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'I skip meals when there is not enough food available for the household' (Mother of child under five, Elelicho 2 village)

'The husband always eats first because he is superior. Because he earns income for food, if the mother does not give for him he will get sick and not be able to provide for the family' (Father of child under five, Elelcho 2 village)

4.3.4 Description of Child Health Situation

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'If the household has income and the child eats a good diet, then the child is well. If the household lacks money then the child does not have a balanced diet and is sick often' (Mother of child under five, Lawisha village)

From the communities perspective childhood illnesses are a common problem in the area, which directly impact the nutritional status of their children primarily by affecting appetite. Childhood illnesses are perceived as being directly linked to diet, and specifically the ability to

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provide an adequate diet.

Common colds are believed to be caused by 'cold air' and dressing children inappropriately, whereas diarrhoea and intestinal parasites are thought to be directly linked to inappropriate diet, with family food and kale thought to be major causes.

Though cases of malaria have reportedly declined in recent years, it remains a particularly big problem in Wiridimatata village, since the area is prone to stagnant water in the rainy season. Despite the high malaria rate, households in the village report that they do not own bed nets. They were provided with bed nets three years ago but they no longer use because of damage.

Like other villages, most women give birth at home because they believe that there is no danger involved or that sometimes babies are born at inconvenient times for visiting the health centre. Economic factors are viewed as significant barriers to accessing health facilities when children are sick. However, women have a good understanding of the importance of immunization.

4.3.5 Description of Child Care Practices

Good child care is thought to be bathing children regularly and clothing them well and appropriately for the weather, preparing food hygienically, providing breast milk and providing additional foods/a diverse diet. Mothers feel that they are restricted from providing good child care due to their low income. Women are solely responsible for child care, though the mother in law plays an influential role in providing advice on child care practices, since it is custom for women to move to their new husband's village.

> .'*My mother in law provides advice on how to prepare amesa, but I did not take this advice as I know it is not good for the child'* (Mother of child under five years of age, Elelicho 2 village)

Breast milk is viewed as important for children's health and an important part of child care. Breastfeeding practices are reportedly very good with mothers feeding children colostrum and on average breastfeeding on demand for 'as long as the child desires', typically up to 4 years. However, it is common for mother's to worry that they are not producing enough milk due to their limited diets.

> "*I give my children amesa from the day they are born until when they are 6 months*" (Mother of child under five, Lawisha village)

In addition to breastmilk, mothers believe that amesa is important for children's health, to make their skin smooth and to help them grow well. Amesa is typically provided to young children two times per day up to 6 months of age. The local herb is collected from a local forest and then boiled with water.

Mothers typically start to feed additional food to their children at 6 months, though in some cases mothers may start earlier if the child is 'uncomfortable' or 'crying a lot'. The first food fed to young children is usually thin maize porridge, made from water, maize flour and in some cases with the addition of salt, sugar or oil (if available at the

household level). Mothers typically feed their babies this porridge using the practice of 'force feeding', which involves holding the child's nose and the mother feeding using her hand. Mothers feel that force-feeding in this way is necessary and a good child care practice to ensure that the baby eats.

Whilst, force -eeding using the hand is also a common feeding practice, some mothers also described how they coax their child to eat by playing or trying different types of food, if their child does not want to eat.

When their child is one year old, mothers typically switch from feeding their children maize porridge to feeding their children family food, which is predominantly kocho. However, this depends on the economic situation of the household, and so in some cases this switch may happen after 7 or 8 months.

4.3.6 Status of Women

Women typically get married age 15-17, though sometimes as young as 12, reportedly depending on when a girl reaches puberty, and childbearing begins shortly after. It is normal for women to give birth one year after getting married.

"It depends on the growth of the girl. If she grows well she can marry at age 15. If she does not mature at age 15, then she can marry when she is a bit older" (Mother of child under five, Lawisha village).

"Males do not leave the home when they marry, so we want to have baby boys" (Mother of child under five, Lawisha)

Whilst the ideal family size was described as four or five children, respondents reported that most families had more children than this because of the high value placed on male children. Respondents reported to think the ideal age of marriage and first children to be 17 years of age. However, age of marriage and first pregnancy was young among the respondents, typically between 13 to 16 years of age.

The low status of women is reflected at meal times, with husbands always eating first because they are viewed as superior, in large part because of their farming tasks. Women's workload is very high in comparison with men.

"We have to do many things. Most work falls on women. We make kocho, fetch water, make coffee, keep the home environment clean, we do a lot of work compared to men" (Mother of child under five, Lawisha village).

4.3.7 Description of WASH Environment

Water access depended on the situation of the village, with all villages except for Lawisha village perceiving water access as an issue. In Lawisha village, the community felt that it has enough access to safe water for their needs, as the nearest

safe drinking water source is a borehole 30 minutes walk away from the village, where water is free of charge to collect.

For the other three villages, availability and access to safe drinking water is constrained by distance, cost, waiting times, accessibility and availability during the rainy season, and use of unprotected water sources for domestic purposes is still common.

In Elelicho 2 village, the community refer to an unprotected spring as their 'natural gift' and households commonly use this unsafe water for drinking. Despite having been provided Water Aga in the past to treat this water, villagers no longer do anything to this water to make it safe, in part because of a lack of money to purchase, but also because of a false sense that the water is indeed safe to drink.

Whilst hygiene practices are difficult to assess through focus group discussions, participants feel that not all people in their village practice hygienic practices and this is thought to be due to personality or lack of knowledge. In addition, a common challenge for most households is the lack of income to purchase soap on a regular basis.

'We keep the latrine clean by putting ash down the hole to prevent bad smells and worms, and we cover the hold when we do not use to prevent flies from contaminating the kale' (Mother of child under five, Elelicho 2 village)

Latrine coverage has increased dramatically over the past 5 years, and is now reportedly over 90 per cent in the four villages. Latrine use is reportedly good in Lawisha, Elicho 2 and Second Soyama, with community members reporting to always use them, typically using ash to reduce the smell.

However, in Wiridimatata village, use of latrines reportedly depends on the season,. Although latrine coverage is now high in the village, during the rainy season the latrines fill up with water and mud and so people prefer to use the forest during this time.

'Latrine use depends on the time of year, during the rainy season the hole fills up with water and so we can not use' Father of child under five, Wiridimatata village)

One additional issue which came out of focus groups, was that although the community was aware of the importance of proper disposal of human feces, they did not believe that animal feces presents any danger. Given the close proximity of animals to the household environment this lack of knowledge potentially presents an issue.

4.3.8 Seasonality of Risk Factors

Seasonal and historical calendars were developed together with focus group participants in each village to demonstrate how risk factors change at different times of year and over the past five years (see annex 7). The following summarises

findings on the seasonality and historical trends of risk factors identified across the four villages.

Malnutrition

Acute malnutrition is perceived to be highest during the hunger gap months from March until June/July. Acute malnutrition is perceived to have been getting worse in recent years as a consequence of worsening food security in large part due to adverse weather conditions, lack of fertilizer and bad harvests of cash crops.

Hunger Gap

Most households in the four villages face a food gap of between 4-5 months of the year, from March until June/July. Malnutrition is perceived by the community to be worse during the hunger season. During this time, households do not have enough food available at the household level and household income is lowest. Common coping strategies during this time include reducing portion sizes and eating less variety, men selling daily labour, and undertaking loans from richer households.

Income

Income is lowest during the hunger season and highest following the maize and coffee harvests between September and December. Household income is perceived to have reduced in all villages over the past five years, correlating with reduced crop productivity.

Food Prices

Food prices are highest from September to December, as households have income at this time, and lowest from April to August when less people have money available. The price of coffee and chat are highest from September to November. Food prices are perceived to have been rising over the past five years.

Ceremonies

The communities celebrate Christmas and Easter, and at this time money is spent to purchase meat for the family to eat.

Harvests

The main food crops such as maize, potatoes and haricot beans are sewed mid February and at that time farmers must spend money on fertilisers. Coffee is harvested from October to December and so in the coffee growing villages their income is highest at this time. From June- September the main crops are harvested including maize. In June, farmers rely on the maize green harvest to end the hunger peak.Chat is harvested in November and December and Coffee from September to December, and consequently household income is highest at this time of year. Kale is available in April and May and haricot beans commonly in June and July. Harvests have typically got worse over the past five years due to erratic weather conditions and the degrading quality of the soil.

Weather

Farming households are vulnerable to weather patterns. The two rainy seasons are the belg rains, which fall from late February – May, and the kremt rains, which fall from late June to early October. Most land preparation work occurs in the months before the start of the belg rains and most crops are planted with the start of the rain. The area is dependent on the Belg rains, since the belg rains in March – April are key for the production of maize, the main crop, which is planted only once per year. When rains are delayed, as happened in early 2013, this affects crop yields and households become vulnerable to food insecurity. In Aleta Wondo, due to excessive

rain in September/October 2013, there were landslides which caused crop failure, and significantly damaged coffee production.

Agricultural Inputs
The price of fertiliser has reportedly increased dramatically over the past five years from 150-800 bir. In Elelicho village, ACF used to have a food security project until 2011 so at that time households were provided with agricultural inputs.

Child Illness
Malaria is highest between April and May in the rainy season, when stagnant water is common (particularly in Wiridimatata village). Diarrhoea is highest in April at the start of the rainy season, which the community believe is due to the fact that at this time they feed their children kale. Pneumonia is thought to be highest between April and May because of weather changes, or in January and February because of 'bad air'.

In Wiridimatata, in 2011 the health centre provided the community with bed nets but they have since gone into misuse and so the community no longer sleep under bed nets. Furthermore, in Elelicho 2 village, there was an outbreak of acute watery diarrhea three years ago.

WASH
Hygiene practices are reportedly at their best from September to November, when households have income and so can afford to buy soap. Access to water has remained stable in the past five years. In Elelicho 2 village, the community was provided with Water Aga (water treatment) three years ago following an outbreak of acute watery diarrhea.

4.3.9 Positive Deviant Behaviours

In addition to looking at causes of under-nutrition, an objective of the qualitative inquiry was to highlight potential 'positive deviant' behaviours within the community. Positive deviance is the idea that '*in every community or organisation, there are a few individuals who have found uncommon practices and behaviours that enable them to achieve better solutions to problems than their neighbours who face the same challenges and barriers'.* In order to identify positive deviant behaviours, interviews were conducted with mothers of well nourished children, who face the similar constraints to mothers of malnourished children.

The following cases studies of poor mothers with well nourished children highlight some of these potential positive deviant behaviours.[24]

Positive Deviance Case Study 1

Birtukan is typical of many of the women in her community. Birtukan and her husband are from a poor household, and they own just ¼ hectare of farm land on which they grow maize, enset and haricot beans. Yesterday she fed her son roasted maize for breakfast, kocho for lunch and kocho with oil and kale for dinner.

Birtukan is 25 years old and has 6 children, including two children under five; a boy age 4 and a baby girl almost 6 months old. Both the boy and the girl are well nourished by international growth standards. Birtukan gave birth to all her children at home and she thinks her son was medium size when he was born. She did not change her diet when she was pregnant.

Her son has had diarrhea and malaria in the past but she always brings him to the health facility every time he is sick. She collects drinking water from the protected spring and never uses well water for drinking purposes. She says they always try to have soap in the house.

Birtuan started to breastfeed her little boy immediately and she breastfed him for 3 years. After 6 months she started to feed her baby thin maize porridge with salt and oil if she had available. She would also add a small amount of adult food as a snack at meal times. She also sometimes feeds her children milk from the cow if they have enough after selling at the market, though they never consume eggs.

Positive Deviance Case Study 2

Medhanat is age 25 and has two children. One girl age 6 years and one boy age 1 year and 4 months, who is well nourished by international growth standards.

Medhanat and her husband live on the market road in the village in a small house made from mud. They own ¼ hectare of farmland and grow enset and coffee. Their livelihoods and income level is similar to other poor households in their village.

Medhanat gave birth at home but she received ANC from the health post. Medhanat says she had a good diet when she was pregnant as she had a higher income at that time. Medhanat thinks her son is healthy because he was a big baby when he was born and she keeps him clean and breastfed exclusively for the first 6 months. She fed him breastmilk immediately after birth and she continues to breast feed him now on demand.

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[24] Please note names have been changed to protect the confidentiality of respondents.

At 6 months she started to feed him additional food to breast milk. The first food she fed him was thin maize porridge with sugar. She fed him this up to 9 months of age by using the common practice of force feeding using her hand. After 9 months she began to feed him medium thickness maize porridge including salt and oil. In addition, she sometimes provides additional foods as snacks such as avocado, banana or biscuits. After 1 year she started to feed him family food, which is predominantly kocho with haricot beans.

Yesterday she fed her son avocado and bread in the morning and kocho and haricot beans in the evening. She says she normally feeds him three times a day but she had no time yesterday. If her son does not want to eat, she tries to coax him by changing the type of food.

They collect water from the borehole and store it in a covered jerry can. She says that they normally have soap in the house but they do not today.

When asked why she thinks some of her neighbours have malnourished children she replied: *"I think it is because when they were born they were very thin. I do not provide additional things but my child was big when he was born"*.

Positive Deviance Case Study 3

Abebe is a young mother who lives with her husband, her mother in law and her 1 year and 8 month old son in a traditional Takul house with one main room. Like most women in the village, her husband is a farmer and she is a housewife. They grow enset and maize and they also grow some chat. They do not own any cattle or hens.

Whilst Abebe is not sure of her exact age, she thinks it is around 17, though based on discussions with the HEW she is more likely to be age 20. Abeb gave birth at the health facility and although the birth weight was not recorded she remembers that her baby was big compared to average when he was born.

Abebe began complementary feeding when her baby was 6 months. At that time she fed him thin maize porridge. Abebe says that she only fed her son this kind of thin porridge and sometimes cows milk from the market until the child was one year, at which point she started to feed family food, predominantly kocho sometimes served with haricot beans. When they have money she sometimes buys additional food items including banana. She started breastfeeding her son immediately and she continues to breast feed him now. She plans to breastfeed her son until he no longer wants to feed. During the hunger season they sell chat to buy food items for the child and she also reports to prioritise her son when the family have limited food.

The household does not have any soap and they store water in a covered jerry can.

Positive Deviance Case Study 4

Eyasu is 28 years old and she has five children, four girls and one boy, including a 3 year old baby girl.

Eyasu got married when she was age 16 and she has grade 4 education. Eyasu and her husband hown 1 hectare of farmland and they grow enset, maize, haricot beans, kale, chat and coffee. In addition, they own onw cow.

Eyasu gave birth to all her children at home. She thinks her baby girl was medium sized when she was born. She says that she ate the same when she was pregnant and did not have any special diet.

Eyasu started to breastfeed immediately following giving birth. She fed her baby amesa for one month and abish[25] for 5 months. She stopped breastfeeding 4 months ago as the baby girl did not want any more milk.

She started to feed additional food age 7 months and she fed her baby thin maize porridge prepared with a small amount of oil and salt. In addition, she occasionally fed her girl banana, kale and haricot beans.

Yesterday she fed her baby girl family food which was kocho with haricot beans and kale in the morning, kocho at lunch and flat breast with kale, oil and salt in the evening. She also fed her girl one banana. They sell the milk they get from the cow, but if there is any left then she gives it to the child. Every other day she goes to the market and often she has a little bit left over.

The husband eats first at mealtimes, but this depends on the mood of the baby, if she is crying we feed her first. During the hunger period, her husband sells labour and they use the money to purchase food. They also reduce portion size.

They have a latrine but do not buy soap, they use only water to wash hands. She stores water in a jerry can with a lid.

Summary
The PD approach typically involves in-depth observation of potential positive deviant mothers for one day in order to identify positive deviant behaviours, which was unfortunately not within the scope of this NCA. However, from the interviews with potential positive deviant mothers, they were found to share many of the same constraints and negative practices as the mothers with malnourished children including the feeding of amesa and not washing hands with soap. The potential positive deviant behaviours identified through the individual interviews include:

- ⚔ the addition of sugar and oil into maize porridge;
- ⚔ giving haricot beans and kale in addition to wheat porridge;
- ⚔ providing medium thickness porridge;
- ⚔ feeding bananas and avocados as snacks;
- ⚔ response feeding practices;
- ⚔ presence of soap in the house;
- ⚔ feeding children excess milk not sold at the market.

In addition, the case studies potentially highlight the importance of the nutritional status of the mother, being directly linked to the birth weight of the child. The findings from individual interviews show that there may be potential for applying the PD/Hearth approach within the target community. It is likely that the PD/Hearth approach may uncover more PD behaviours within the community

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[25] A traditional herb.

4.3.10 Risk Factor Rating Exercise

In order to understand how the community prioritise risk factors a final rating exercise was conducted with participants. The following table shows the results of the rating exercise, and the perceived top 10 biggest risk factors for each village (most significant risk factors are shown in red, and medium risk factors in orange).

A number of the perceived major risk factors are shared across each of the four villages including lack of agricultural inputs, inability to provide children with a balanced diet, low household income, small farmland size and not enough food produced during the hunger season.

Table 41: Community risk factor rating exercise

Lawisha	Second Soyama	Elelicho 2	Wiridimatata
Low household income	Lack of agricultural inputs (especially fertiliser)	Lack of agricultural inputs (especially fertiliser, seeds and cattle)	Lack of agricultural inputs (especially fertiliser)
Unable to feed young children a balanced diet	No access to low interest credit/high interest debt	Poor access to safe drinking water	Poor access to safe drinking water
Child illness common	Poor access to safe water	Low household income	Latrines do not function during the rainy season
Small farm land size	Unable to provide young children a balanced diet	Unable to feed young children a balanced diet	Stagnant water in rainy season/malaria/lack of bed nets
Lack of agricultural inputs	Low household income	Coffee harvest poor	Small farm land size
Not enough food during hunger season	Lack of rain	Small farm land size	Low household income
Food prices are too high	Small farm land size	Poor weather conditions	Unable to provide adequate diet for young children
Poor hygiene practices	Pregnant/lactating mothers do not have adequate diet	Not enough food during hunger season	Pregnant/lactating mothers do not have adequate diet
Population growth	Low price of chat	High number of children per family	Diarrheal diseases common
Pregnant/lactating mothers do not have adequate diet	Not enough food during hunger season	Pregnant/lactating mothers do not have adequate diet	Not enough food produced during the hunger period

4.3.11 Local Causal Model

A key component of the qualitative inquiry was the exploration of community perceptions of causal pathways to undernutrition. For each village, a local causal model was developed to show how risk factors are seen to cause undernutrition and how factors interlink. The following presents a merged local causal model for the maize livelihood zone of Aleta Chucko and Aleta Wondo Woredas.

Local causal pathways to child undernutrition in the maize livelihood belt of Aleta Chucko and Aleta Wondo woredas

Legend

- Economic Risk Factors
- Food Security Risk Factors
- Gendered Risk Factors
- WASH Risk Factors
- Child Health Risk Factors
- Care Practice Risk Factors
- Perceived pathway
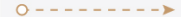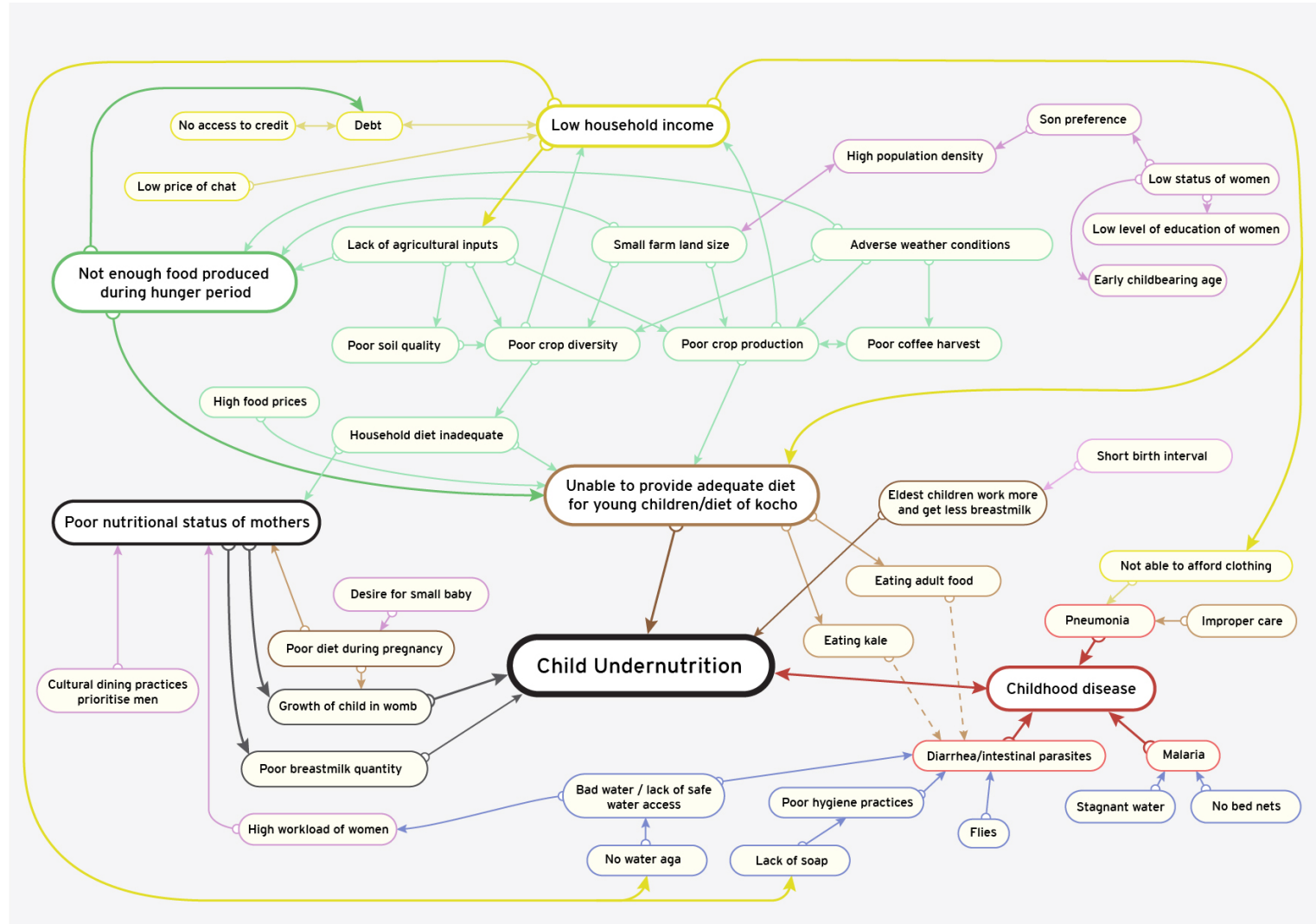
Description of Local Causal Model

Child undernutrition is perceived by the communities to be largely caused by household's inability to provide an adequate diet for young children. Although communities believe enset is unsuitable for young children, they feel that they have no choice but to feed their children this staple food due to their food security and livelihood situation. This problem is perceived as being beyond their control as due to the lack of variety crops produced, small farm land size, lack of agricultural inputs and high food prices. All of these factors lead to low household income. In addition, household income is also impacted by high food prices and their production of cash crops including coffee harvests.

Small farm land size is in part seen as a consequence of high population density as farm land is split between sons. The high population density is in part driven by a strong preference for sons. An underlying factor for son preference is the low status of women.

As well as their inability to provide an adequate diet, the community view high rates of childhood illness as being a significant cause of malnutrition, primarily through affecting the child's appetite. Malaria, pneumonia, diarrhoea and intestinal parasites are very common illnesses affecting children in the communities. Knowledge of diarrhoea determinants is low and the misconception that kale as well as adult food is the main cause of both intestinal parasites and diarrhoea, rather than factors related to the fecal-oral route. Although the community acknowledged that poor hygiene practices and the presence of flies may contribute. Optimal hygiene practices are seen as being constrained by most households inability to consistently afford to purchase soap.

Access to safe drinking water was an issue in three of the four villages, and consequently children continue to drink water from unprotected sources. In particular, communities report time/distance/cost as well as seasonal differences in availability of water supply, present significant barriers to safe water access.

Whilst malaria is perceived to have been declining in recent years, predominantly because of spraying efforts, in villages where stagnant water accumulates during the rainy season it is still seen as a big issue and due to a lack of bed nets at the community level children are still being exposed to malaria. Pneumonia is viewed to be caused primarily by parents inability to provide appropriate clothing, which is linked to low household income.

Lastly, the nutritional status of women is viewed as an important contributing factor to child undernutrition, by affecting the growth of the fetus but also in affecting the quantity of breastmilk. Factors impacting on the poor nutritional status of women include low income, but also cultural dining traditions which priotise men, as well as the desire for a small baby (believed to make child birth easier and safer). This low status of women though not directly recognized by the community as a risk factor in itself, is an important underlying factor contributing to high workload, low level of education, early child bearing age, poor nutritional status of mothers and high birth rate.

5 Ranking Causal Hypotheses

Based on the NCA findings, causal hypotheses were ranked by the NCA analyst as either major, important, minor, untested or rejected causal pathways.[26]

From the initial ranking exercise, 11 causal hypotheses were ranked as major causal pathways to undernutrition in the study area, 8 causal hypotheses were ranked as important causal pathways and 3 causal hypotheses were ranked as minor casual pathways. None of the causal pathways were initially ranked as untested or rejected causal pathways.

At the final stakeholder workshop, results of the preliminary ranking exercise were presented to stakeholders. Following the presentation, participants were split into four multi-sector working groups and each group was given information regarding 5-6 causal hypotheses including NCA results and details on the ranking exercise. Each group was asked to review the evidence and for each result, provide a confidence note (low, medium, high), and any suggested changes to the ranking exercise.[27] The results of this exercise were then presented back to the group and any suggested modifications were debated.

These stakeholder discussions proved very fruitful. The role of women and how this impacts on child undernutrition was discussed at length. Consequently, the low status of women was reclassified as major causal pathway to child undernutrition and high workload of women was reclassified as an important causal pathway to child undernutrition. Furthermore, the impact of health service access utilisation has on childhood illness, was also discussed and the consensus by stakeholders was that this should be regarded as a major causal pathway.

There was much discussion about causal hypothesis U, the inability of farmers to afford agricultural inputs with some stakeholders feeling that households can afford agricultural inputs and the issue is more poor financial resource management. However, given the significance of this issue from the qualitative inquiry results, it was decided to keep this as an important causal pathway.

It was suggested that given the evidence on poor nutritional status of mothers, low birth weight should be moved up a level as the two are strongly linked. However, given the lack of evidence on low birth weight, it was decided that we can not justify moving this up the ranking based on the ranking criteria. However, it is worth noting that more data on low birth weight is needed.

There was some discussion on causal hypothesis C, sub optimal breastfeeding practices of children age 0-6 months. Some stakeholders felt that given the strong causal association between this risk factor and undernutrition, and given the qualitative findings on pre-lacteal feeding it should be reclassified as a major causal pathway.

Finally, the issue of small farmland size was seen to be very significant to overall food security, household income and dietary diversity. However, while it is true that the NCA has provided evidence that small farm land size is the norm in the target community, the evidence showing a causal association between food security and specifically land size and child undernutrition is not conclusive, and furthermore, the

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[26] Detailed results of this ranking exercise can be found in Annex 4
[27] The results of this exercise and the following discussions can be found in Annex 4 and 5.

link between the seasonality of this risk factor and the seasonality of undernutrition is also not apparent. For this reason the NCA analyst decided to keep this as an important, rather than a major risk factor. For the same reason, it was decided to rank causal hypotheses O and P as important rather than major causes, despite the evidence supporting the magnitude of the risk factors.

The final results from the ranking exercise, including the average final confidence note from participants is shown in the table below.

Table 42: Final Ranking of Causal Hypotheses, with confidence notes

C-Hyp	Causal Hypothesis	Final Confidence Note (1=low confidence, 2=medium confidence, 3=high confidence)
Major Causal Pathways to Child Undernutrition in the maize livelihood belt of Aleta Chucko and Aleta Wondo Woredas		
Major Causal Pathways related to health		
A	High rates of preventable infections and childhood illness in children under 5.	2.95
B	Poor health service access and utilisation	2.65
Major Causal Pathways related to WASH		
F	Access to safe water supply	2.75
G	Poor hygiene practices	2.95
H	Poor utilisation of improved sanitation facilities	2.90
Major Causal Pathways related to status of women		
R	Poor nutritional status of pregnant and lactating mothers	2.95
J	Low status of Women	2.35
I	Low level of education of caregivers	2.90
Causal pathways related to financial factors		
Q	Poor financial resource management	2.70
T	Chronic poverty	2.75
Causal pathways related to care practices (IYCF)		
D	Inadequate complementary feeding practices for children age 6-23 months	2.90

C	Sub optimal breastfeeding practices of children age 0-6 months	2.5
Causal Pathways related to food security		
P	Not enough food produced during the hunger season.	2.80
O	Poor crop diversity and usage	2.55
Important Causal Pathways to Child Undernutrition in the maize livelihood belt of Aleta Chucko and Aleta Wondo Woredas		
Important Causal Pathways related to health		
S	Low birth weight	2.45
Important Causal Pathways related to food security		
N	Small household farmland size	2.30
U	Unable to afford agricultural inputs	2.05
V	Adverse weather conditions	2.10
Important Causal Pathways related to role of women		
K	High workload of women	2.2
M	Young childbearing age	2.15
Minor Causal Pathways to child undernutrition in the maize livelihood belt of Aleta Chucko and Aleta Wondo Woredas		
Minor Causal Pathways related to care practices		
E	Intra-household food distribution discriminates against young children	2.05
Minor Causal Pathways related to reproductive health		
L	Unmet need for family planning	2.3

Conclusions and Recommendations

The results of the NCA show that in line with the UNICEF Conceptual Framework causes of undernutrition in the maize livelihood belt of Aleta Chucko and Aleta Wondo Woreda are multi-sectoral and that addressing each of these factors is vital to ensure healthy outcomes for mothers and children.

Although the GAM rate (5.6 per cent) would categorise the situation as an 'acceptable situation' with regards to child undernutrition, given the high rates of aggravating factors, as well as the timing of the NCA at the beginning of the hunger season, the situation can be regarded as 'risky'[28]. Given the fact that ACF has been responding to nutrition emergencies in the area since 2003, there is clearly a need to strengthen preventative and resilience initiatives, rather than curative emergency response interventions. The NCA provides much needed data on major causal pathways to child undernutrition. Each of these causal pathways must be addressed in order to prevent such annual nutrition emergencies, and to ensure healthy outcomes for mothers and children.

As explained previously, the purpose of the NCA is not to design programmes, though the results can and can be used to inform programme design decisions by Government and NGO parnters. Based on the results of the NCA, ACF technical experts in related fields have made the following sectoral recommendations. Although arranged by sector, it is vital that sectors work together as risk factors overlap, there are a number of cross cutting areas and improvements in one sector will impact on others.

WASH

- Improve ability of community to build quality and durable latrines using local materials.

- Increase community awareness on diarrhoea determinants through context specific ICC/BCC strategies.

- Reduce risk of water contamination through providing practical education on water management at household level.

- Work with communities to provide more safe drinking water sources to reduce time/cost/distance/seasonal barriers to safe drinking water.

- Improve awareness of safe handwashing practices including the use of ash for households who cannot afford soap.

Food Security/Livelihoods

- Improve crop diversity through seed distribution combined with care practices component to ensure crops grown are incorporated into feeding habits.

- Continue to monitor trends in the cost of agricultural inputs and the impact on rural livelihoods, designing sustainable solutions to improve rural livelihoods as necessary.

- Improve nutrition knowledge of community and specifically address misconceptions such as sweet potato being a bad food for young children.

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[28] WHO decision tree for the implementation of Nutritional Programs. WHO. The management of Nutrition in Major Emergencies

- Promote income-generating opportunities, particularly for households living below the poverty line.

Role of Women

- Reduce women's workload through improving access to safe drinking water etc.

- Work towards transforming rigid gender norms which dictate the low status of women.

- Promote income generating activities for women to improve their decision making power with regards to financial decisions.

- Promote girls education.

- Tackle young child bearing age through addressing young age of marriage.

Health and Nutrition

- Improve community awareness of signs of malnutrition, as well as prevention and treatment efforts availability in government structures.

- Strengthen health system to reduce delays in children receiving treatment for acute malnutrition and complications.

- Promote institutional safe delivery by trained health professionals.

- Promote antenatal care visits (4 times during pregnancy, ANC 1-4) to improve pregnant mothers nutritional status.

- Improve systems for collecting data on birth weight.

Child care practices

- Complement the Ethiopian National Strategy on Infant and Young Child Feeding by localising complementary feeding messages to address local specific constraints and incorporate locally available ingredients.

- Raise awareness of the dangers of pre-lacteal feeding and promote exclusive breastfeeding in the study area.

- Improve feeding practices through promotion of separate eating instruments for each child.

General Programme and Policy Recommendations

In addition, the following broad programmatic recommendations can be drawn from the NCA results:

- **Shift approach to nutrition programming from emergency to prevention**

ACF have been responding to nutrition emergencies in the target area since 2003. There is a need to shift our approach from responding to nutrition emergencies to prevention. The NCA evidence shows that there are a number of multi-sectoral factors present in the target area which need to be addressed.

- **Strengthen the health system**

Though not the purpose of the NCA, the study identified several bottle necks in terms of the CMAM programme particularly related to the supply chain, quality of counselling and community dialogue. ACF is currently conducting an assessment of the health sector with regards to CMAM, in order to strengthen the system to better address malnutrition cases.

- **Promote gender transformative approaches to improve status of women**

The results of the NCA highlight the need to fully integrate gender into programmes aiming to address child undernutrition. The low status of women in the area is a key structural underlying factor contributing to their poor nutritional status as well as their ability to provide adequate care. As other studies have demonstrated, higher women's status has a significant positive effect on child nutritional status[29]. Women with a higher status have a better nutritonal status themselves, are better cared for and are able to provide better care. A gender transformative approach is needed to improve the status of women in the target area.

Recommendations from Participants

As discussed in the methodology, an important part of the NCA qualitative inquiry was a presentation and discussion of results at the community level. Based on these discussions, the following recommendations were made from the community to Government and NGOs in order to reduce child undernutrition:

- **Reduce price of fertiliser/Provide seeds and fertiliser**

From the communities perspective, the high price of fertiliser and other agricultural inputs is inhibitive and presents a significant barrier to their livelihoods. In Elelicho 2 village, the community reported to have had much higher income and less problems with child undernutrition three years previously, when ACF were implementing a food security project in the area, specifically distributing seeds and fertiliser, and the community requested additional support of this nature. For the other villages, the community requested that the price of fertiliser be reduced in order to improve their agricultural productivity.

- **Provide more safe drinking water sources locally (at least one per village).**

As discussed in the qualitative results, access to safe drinking water is viewed as a significant challenge in three of the four villages in the qualitative inquiry. Consequently the community feel they have no choice but to drink water from unprotected sources. Participants expressed a need to have at least one safe, affordable drinking water source per village in order to reduce time/distance/cost barriers.

- **Provide technical advice and support to build better latrines (especially in clay soil areas).**

In Wiridimatata village, a clay soil area, villagers expressed a need for better latrines, that function during the rainy season. The participant's requested assistance in how to build better, more durable latrines, using low cost local materials.

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[29] Lisa Smith, 2003 *The Importance of Women's Status for Child Nutrition in Developing Countries*.

- **Provide bed nets**

Malaria is seen as a significant cause of malnutrition in Wiridimatata village, and participants say their children are exposed to malaria because they do not have the means to purchase bed nets. The community requested support to purchase bed nets in order to protect their children from malaria.

- **Provide income generating activities and job opportunities**

Lack of income is perceived to be the biggest barrier preventing families from being able to provide an adequate diet for young children. Consequently, participants requested more income generating and job opportunities within their area.

Annex 1: Anthropometric Results based on NCHS reference 1977

Anthropometric Results based on NCHS Reference 1977

General characteristics of the study population

The 663 households enumerated yielded 481 eligible children (aged 6-59 months). Out of the total 481 children surveyed, 234 were boys and 247 were girls The boy: girl sex ratios within the age groups as well as the total ratio were within the expected ratio of 0.8-1.2, thus demonstrating an unbiased survey sample.

None of the anthropometric measurements (WFH) of the 481 children was flagged as an outlier due to aberrant anthropometric values for NCHS references. However, 2 (0.4%) and 5 (1%) of anthropometric measurements of children were flagged for WFA and HFA as outliers for NCHS reference, respectively.

Prevalence of Global Acute Malnutrition (based on NCHS reference 1977)

Weight-for-height (WFH) is a sensitive nutritional index which reflects the current nutritional status of an individual. Inadequate nutrient intake relative to body requirements and/or episodes of illness in the short term leads to wasting, also referred to as acute malnutrition, which is reflected by a low WFH.

Throughout this report, Global Acute Malnutrition (GAM) is defined as weight-for height < -2 z-scores and /or oedema. Severe Acute Malnutrition is defined as weight-for-height < -3 SDs and/or oedema. Mid upper arm circumference (MUAC) is also presented to indicate the level of wasting.

The prevalence of Global Acute Malnutrition [GAM] was estimated at 5.0 % [3.3 - 7.5 95% C.I]. From the total 481 surveyed children aged 6-59 months, none were found to be severely malnourished and thus, all the children with acute malnutrition were categorized as moderately malnourished. Likewise, no child was identified to have nutritional bi-lateral oedema.

Table 43: Prevalence of acute malnutrition based on weight-for height z-scores (and/or oedema) and by sex

	All n = 481	Boys n = 234	Girls n = 247
Prevalence of global malnutrition (<-2 z-score and/or oedema)	(24) 5.0 % (3.3 - 7.5 95% C.I.)	(13) 5.6 % (3.2 - 9.4 95% C.I.)	(11) 4.5 % (2.6 - 7.5 95% C.I.)
Prevalence of moderate malnutrition (<-2 z-score and >=-3 z-score, no oedema)	(24) 5.0 % (3.3 - 7.5 95% C.I.)	(13) 5.6 % (3.2 - 9.4 95% C.I.)	(11) 4.5 % (2.6 - 7.5 95% C.I.)
Prevalence of severe malnutrition (<-3 z-score 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.)

The prevalence of oedema is 0.0 %

As indicated in the table below, a relatively equal proportion of younger and older

children were severely and moderately malnourished. This indicates malnutrition is equally affecting both younger and older children in the study area.

Table 44: Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

Age (months)	N	Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
		No.	%	No.	%	No.	%	No.	%
6-17	93	0	0.0	6	6.5	87	93.5	0	0.0
18-29	109	0	0.0	6	5.5	103	94.5	0	0.0
30-41	104	0	0.0	3	2.9	101	97.1	0	0.0
42-53	122	0	0.0	6	4.9	116	95.1	0	0.0
54-59	53	0	0.0	3	5.7	50	94.3	0	0.0
Total	481	0	0.0	24	5.0	457	95.0	0	0.0

As indicated in the table above, no child was identified to have a WFH z-score of less than <3 and or to have a nutritional bi-lateral oedema.

Prevalence of Acute malnutrition by MUAC

The prevalence of under-nutrition among the under-fives (as indicated by MUAC <12.5cm) was 7.7% (5.4 - 10.9 CI). Out of the 37 children classified by MUAC as malnourished, 9 (0.8 - 4.4 CI) were severely malnourished (Table 45).

Table 45: Prevalence of acute malnutrition based on MUAC cut offs (and/or oedema) and by sex

	All n = 481	Boys n = 234	Girls n = 247
Prevalence of global malnutrition (< 125 mm and/or oedema)	(37) 7.7 % (5.4 - 10.9 95% C.I.)	(16) 6.8 % (4.3 - 10.6 95% C.I.)	(21) 8.5 % (5.1 - 13.8 95% C.I.)
Prevalence of moderate malnutrition (< 125 mm and >= 115 mm, no oedema)	(28) 5.8 % (3.8 - 8.8 95% C.I.)	(12) 5.1 % (2.9 - 8.8 95% C.I.)	(16) 6.5 % (3.6 - 11.5 95% C.I.)
Prevalence of severe malnutrition (< 115 mm and/or oedema)	(9) 1.9 % (0.8 - 4.4 95% C.I.)	(4) 1.7 % (0.6 - 4.4 95% C.I.)	(5) 2.0 % (0.7 - 5.5 95% C.I.)

Prevalence of Underweight by WFA

The weight-for-age (WFA) indices give a mixed reflection of both the current and past nutritional experience of the community, therefore, does not differentiate malnutrition due to current and past nutritional/health experience. As such, it is a composite measure of both wasting and stunting, thus, a useful tool in individual child growth monitoring. The findings (Table 46) indicated that 15.4% (12.0-19.6 CI) of the children were underweight and 2.1% (1.1-3.9 CI) severely underweight.

Table 46: Prevalence of underweight based on weight-for-age z-scores by sex

	All n = 480	Boys n = 233	Girls n = 247
Prevalence of underweight (<-2 z-score)	(74) 15.4 % (12.0 - 19.6 95% C.I.)	(35) 15.0 % (10.7 - 20.7 95% C.I.)	(39) 15.8 % (11.4 - 21.4 95% C.I.)
Prevalence of moderate underweight (<-2 z-score and >=-3 z-score)	(64) 13.3 % (10.5 - 16.8 95% C.I.)	(31) 13.3 % (9.5 - 18.2 95% C.I.)	(33) 13.4 % (9.6 - 18.3 95% C.I.)
Prevalence of severe underweight (<-3 z-score)	(10) 2.1 % (1.1 - 3.9 95% C.I.)	(4) 1.7 % (0.7 - 4.4 95% C.I.)	(6) 2.4 % (1.0 - 5.8 95% C.I.)

The figures illustrated in the table below show that younger age group children are more affected by being underweight as compared to older children in the study area.

Table 47: Prevalence of underweight by age, based on weight-for-age z-scores

Age (months)	Total no.	Severe underweight (<-3 z-score) No.	%	Moderate underweight (>= -3 and <-2 z-score) No.	%	Normal (> = -2 z score) No.	%	Oedema No.	%
6-17	92	5	5.4	12	13.0	75	81.5	0	0.0
18-29	109	2	1.8	17	15.6	90	82.6	0	0.0
30-41	104	2	1.9	12	11.5	90	86.5	0	0.0
42-53	122	1	0.8	15	12.3	106	86.9	0	0.0
54-59	53	0	0.0	8	15.1	45	84.9	0	0.0
Total	480	10	2.1	64	13.3	406	84.6	0	0.0

Prevalence of Stunting

Stunting (height-for-age or HFA) measures linear growth and is thus an indicator of chronic malnutrition, which is reflective of cumulative effects of long-standing nutritional inadequacy and/or recurrent chronic illness. Unlike wasting, it is not affected by seasonality but is rather related to the effects of socio-economic development and long-standing food security situation. The prevalence of stunting was estimated at 10.1(7.1 - 14.2 CI).

Table 48: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 475	Boys n = 230	Girls n = 245
Prevalence of stunting (<-2 z-score)	(48) 10.1 % (7.1 - 14.2 95% C.I.)	(23) 10.0 % (5.8 - 16.7 95% C.I.)	(25) 10.2 % (6.6 - 15.4 95% C.I.)
Prevalence of moderate stunting (<-2 z-score and >=-3 z-score)	(40) 8.4 % (5.9 - 11.9 95% C.I.)	(20) 8.7 % (5.1 - 14.5 95% C.I.)	(20) 8.2 % (5.1 - 12.7 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	(8) 1.7 % (0.9 - 3.2 95% C.I.)	(3) 1.3 % (0.4 - 4.0 95% C.I.)	(5) 2.0 % (0.9 - 4.8 95% C.I.)

As illustrated in the table below, stunting affects relatively higher number of younger children in the study area.

Table 49: Prevalence of stunting by age based on height-for-age z-scores

Age (months)	Total no.	Severe stunting (<-3 z-score) No.	%	Moderate stunting (>= -3 and <-2 z-score) No.	%	Normal (> = -2 z score) No.	%
6-17	93	2	2.2	11	11.8	80	86.0
18-29	106	3	2.8	11	10.4	92	86.8
30-41	103	0	0.0	5	4.9	98	95.1
42-53	121	2	1.7	11	9.1	108	89.3
54-59	52	1	1.9	2	3.8	49	94.2
Total	475	8	1.7	40	8.4	427	89.9

Table 50: 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	481	-0.71±0.81	1.04	0	0
Weight-for-Age	480	-1.13±0.87	1.31	0	1
Height-for-Age	475	-0.84±0.93	1.58	0	6

Annex 2: NCA Risk Factor Indicators

Table 51: NCA Quantitative Indicators

Indicator	N	Mean or proportion	Lower Confidence Interval -95%	Upper Confidence Interval-95%
Food Security and Livelihood Indicators				
Proportion of households with own farm land	429	99.1%	97.7%	99.6%
Mean farm land size (in hectares)	425	0.53 hectares	0.47 hectares	0.59 hectares
Proportion of households with cash savings	429	17.9%	14%	22.5%
Mean cash savings	76	1301 ETB	454 ETB	2149 ETB
Proportion of households with household debt	429	45.5%	38.10%	53%
Mean amount of debt	195	1507 ETB	1184 ETB	1830 ETB
Proportion of households with food as primary reason for debt	195	40%	31.80%	47.7%
Proportion of households beneficiaries of PSN programme	429	15.6%	11.90%	20.20%
Mean Household Dietary Diversity Score (HDDS) (0-12)	429	5.77	5.49	6.06
Proportion of households with month(s) in previous 12 months without enough food to meet needs	429	76.70%	68.30%	83.40%
Mean Months of Adequate Food Provisioning (MAHFP)	329	9.14	8.99	9.28
Mean Household Food Insecurity Access Scale (HFIAS)	429	6.61	5.76	7.46
Mean household monthly income/expenditure	429	1651 ETB	1200 ETB	2101 ETB

Mean share of food expenditure	429	43.9%	40.2%	46.8%
Proportion of households with high level of food security vulnerability (share of food costs 65-75% of total monthly expenditure)	429	7.50%	4.90%	11.10%
Proportion of households with very high level of food security vulnerability (share of food costs >75% of total monthly expenditure)	429	22.80%	18.00%	28.60%
Proportion of households living below $1.25/day/2005 PPP Line (PPI Index)	429	31.62	29.47	33.76
IYCF Indicators				
Proportion of children (0-23 months) with adequate initiation of breastfeeding (<1hr after birth)	193	95.30%	90.60%	97.80%
Proportion of children (0-6 months) exclusively breastfed	32	81.3%	60.10%	92.60%
Proportion of children (12-16 months) continued breastfed after 1 year	31	100%	100%	100%
Proportion of children (0-24 months) ever breastfed	195	100%	100%	100%
Proportion of children (20-23 months) who are fed breast milk (continued BF at 2 years)	42	95.20%	82.80%	98.80%
Proportion of children (6-8 months) with timely introduction of complementary feeding	18	55.60%	31.80%	77.00%
Mean dietary diversity score (children 6-23 months)	160	1.86	1.65	2.07
Proportion of children (6-23 months) with	160	9.40%	5.40%	15.80%

minimum dietary diversity score (>=4)				
Proportion of children (age 6-36 months) with reported responsive feeding	119	88.20%	82.50%	92.30%
Care of Women Indicators				
Proportion of mothers with MUAC <23cm	425	38.80%	31.90%	46.30%
Proportion of mothers who ate more during last pregnancy	423	20.80%	15.80%	26.90%
Perceived social capital. Proportion of mothers who feel supported.	426	54.20%	48.20%	60.1%
Proportion of mothers who feel they have too much work to take care of their child.	428	31.10%	24.70%	38.20%
Proportion of mothers with WHO5 <13 (risk of depression)	429	27.70%	22.00%	34.30%
Proportion of mothers at risk of depression with mild, moderate or severe depression	117	9.40% 30.80% 36.80%	5.40% 22.40% 28.10%	15.90% 40.60% 46.40%
Mean highest grade of school completed by caregiver	429	3.93	3.59	4.28
Mean age of caregiver when she gave birth for first time	426	18.11	17.85	18.37
Current use of family planning	420	75%	69.20%	80%
Proportion of children whose perceived weight at birth was very small or smaller than average. (Perceived low birth weight)	516	12.20%	9.10%	16.20%
Proportion of women with no decision making power	429	6.50%	4.10%	10.20%
Mean number of days rest after most recent delivery	424	31.98	29.03	34.93
Proportion of women with no decision making power	429	6.50%	4.10%	10.20%
Proportion of women who say fathers always make decisions about education of children	429	18.20%	13.80%	23.60%

Proportion of women who say fathers always make decisions about whether to seek medical health if child is sick	429	30.30%	25.30%	35.80%
Proportion of women who say fathers always make decisions about how money is spent	429	56.90%	50.00%	63.50%
Proportion of women who say fathers always make decisions about if and when to have children	429	13.10%	9.50%	17.70%
Psychosocial Care				
Mean child-caregiver interaction score (0-7)	516	6.17	5.99	6.35
Proportion of children with inappropriate child-caregiver interaction (score <3)	516	1.20%	0.50%	2.50%
Health Status and Access to Health Services				
Child Health Status				
Proportion of children with a cough in the past 2 weeks	516	26.20%	20.60%	32.60%
Proportion of children with diarrea in the past 2 weeks	516	27.30%	22.80%	32.40%
Proportion of children with diarrea in the past 2 weeks for which advice/treatment was sought	140	69.3%	61.5%	76.1%
Proportion of children with diarrea in the past 2 weeks for which no advice/treatment was sought	140	30.7%	23.9%	38.5%
Proportion of children with a fever in the past 2 weeks	516	36.20%	30.90%	41.90%
Proportion of children who do not sleep under a mosquito net	516	80.40%	71.70%	87.00%
Access to Health Services				
Availability of immunisation card (children age 12-23 months)	106	32.1%	24.1%	41.2%
Proportion of children (age 12-23 months) with immunisation card,	34	97.10%	80.30%	99.60%

who have DPT 3 coverage				
Proportion of women who received ANC during last pregnancy	424	77.40%	70.00%	83.30%
Proportion of mothers who received ANC during last pregnancy who had 4 or more ANC visits	328	43.30%	37.20%	49.60%
Proportion of respondents who have faced barriers accessing health services	429	33.10%	26.60%	40.30%
Proportion of mothers who gave birth at home during last delivery	424	90.30%	87.30%	98.10%
Proportion of mothers who were assisted by a health professional or HEW during last pregnancy	424	9.00% 2.40%	6.80% 1.20%	11.70% 4.60%
Water Environment				
Proportion of households with access to improved water source in dry season (main drinking water source)	429	78.10%	65.70%	86.90%
Proportion of households with access to improved water source in rainy season (main drinking water source)	429	77.60%	65.90%	86.20%
Mean water management score (0-6)	429	3.58	3.35	3.81
Proportion of households at severe risk of water contamination (with water management score 3-6)	429	70.2%	63.1%	76.4%
Mean distance (return journey time in minutes) to main safe drinking water source dry season	335	36.47 minutes	25.87	47.07
Mean distance (return journey time in minutes) to main safe drinking water source	333	35.61 minutes	27.25	43.98

rainy season				
Mean daily water use (household in litres)	429	28.35 litres	26.43	30.27
Average daily water consumption per capita	429	5.48 litres	5.09	5.86
Sanitation Environment				
Proportion of households with own latrine	429	66.70%	59.50%	73.10%
Proportion of households with a latrine where all adults use the latrine	286	96.50%	93.00%	98.30%
Proportion of households with a latrine where all children over 2 years old use the latrine	286	77.30%	71.50%	82.20%
Mean latrine sanitary hygiene and safety score (0-6)	286	3.66	3.48	3.84
Proportion of children 0-23 months for whom stools are disposed of safely	195	51.8%	43.7%	59.8%
Hygiene				
Proportion of mothers with inappropriate hand washing practices (score >=8)	429	83.7%	76.4%	89.0%
Proportion of households with soap available in the house	429	63.40%	57.80%	68.70%
Proportion of children who are clean	515	11.80%	8.60%	16.10%
Mean score (0-4) knowledge of diarrhoea determinants	429	1.91	1.74	2.09
Caregiver knowledge of 0, 1, 2, 3, 4 or more diarrhoea determinants	429	7.70% 29.10% 35.00% 20.50% 7.70%	5.20% 24.70% 30.00% 15.50% 4.80%	11.30% 34.00% 40.30% 26.60% 12.20%

Annex 3: Criteria of NCA ranking exercise

Causal hypotheses were ranked according to the following sets of criteria:

Table 52: Ranking criteria by source of information

Source of information	Ranking Criteria
Prevalence of risk factor from secondary data	[-] below prevalence to be considered as a public health issue [+] similar prevalence to be considered as a public health issue [++] higher prevalence to be considered as a public health issue [+++] much higher prevalence than considered as a public health issue.
Prevalence of risk factor from quantitative survey	[-] below prevalence to be considered as a public health issue [+] similar prevalence to be considered as a public health issue [++] higher prevalence to be considered as a public health issue [+++] much higher prevalence than considered as a public health issue.
Strength of association between the risk factor and under-nutrition from literature review	[-] NA – only risk factors having a demonstrated association with undernutrition are considered in this study [+] Association has been demonstrated in certain contexts [++] Strong association demonstrated in various contexts [+++] Strong and persistent associations demonstrated in most contexts
Seasonality of causal hypothesis related to seasonality of under-nutrition	[-] The seasonal variation of the prevalence of the risk factor is not corresponding to the seasonal variation of the undernutrition outcome considered [+] No seasonal variation of the risk factor or no contradiction observed [++] The seasonal variations of risk factor and undernutrition are as expected [+++] The seasonal peak(s) of prevalence of the risk factor matches with the seasonal peak(s) of the undernutrition outcome considered

Participatory rating exercise from qualitative inquiry	[-] The risk factor is not mentioned in the ranking exercise
	[+] The risk factor is occasionally mentioned in the ranking exercise
	[++] The risk factor is regularly mentioned in the most significant risk factors
	[+++] The risk factor is always regarded as the most significant risk factor by all communities

The categorisation of causal pathways is shown in the table below.

Category	Criteria
Major causal pathway to child undernutrition	No contradictory information AND Strength of association from literature review is classified as [++] or [+++] AND Majority of [++] or [+++] for all other sources of information
Important causal pathway to child undernutrition	No contradictory information AND Strength of association from literature review is classified as [++] or [+++] AND Majority of [++] for all other sources of information
Minor causal pathway to child undernutrition	Some contradictory information is permitted AND Strength of association from literature review is classified as [+] or [++] AND Majority of [+] for all other sources of information
Rejected causal hypothesis	No contradictory information AND Majority [-] or [+] for all sources of information
Untested causal hypothesis	Contradictory information AND/OR Information gathered not complete or unavailable

Annex 4: Preliminary Ranking by NCA Analyst

Causal Hypothesis	Prevalence of risk factor from secondary analysis	Prevalence of risk factor from quantitative study	Strength of association between the risk factor and under-nutrition (from literature review)	Seasonality of causal hypothesis related to seasonality of under-nutrition	Participatory rating exercise/qualitative inquiry	Interpretation
HYP A	+++	+++	+++	+++	++	Major Causal Pathway
HYP B	++	++	+++	+	-	Important Causal Pathway
HYP C	++	++	+++	+	++	Important Causal Pathway
HYP D	+++	+++	+++	+++	+++	Major Causal Pathway
HYP E	+	+	+++	++	-	Minor Causal Pathway
HYP F	+++	++	+++	+++	+++	Major Causal Pathway
HYP G	++	+++	+++	++	+	Major Causal Pathway
HYP H	+++	+++	+++	++	+	Major Causal Pathway
HYP I	+++	+++	+++	+ (NA)	-	Major Causal Pathway
HYP J	++	++	++	+ (NA)	-	Important Causal Pathway

HYP K	+	+	+	-	++	**Minor Causal Hypothesis**
HYP L	+	+	+ +	+ (NA)	-	**Minor causal Pathway**
HYP M	+	++	+++	+ (NA)	+	**Important causal pathway**
HYP N	+++	+++	+	+ (NA)	+++	**Important Causal Pathway**
HYP O	+++	+++	++	+++	+++	**Major causal pathway**
HYP P	+++	+++	+++	+++	+++	**Major causal pathway**
HYP Q	+	+++	++ (income)	+++	++	**Major causal pathway**
HYP R	++	+++	+++	+ NA	+++	**Major causal pathway**
HYP S	+	+	+++	+ NA	++	**Important causal pathway**
HYP T	++	+++	+++	+++	+++	**Major causal pathway**
HYP U	+	++	++	++	+++	**Important causal pathway**
HYP V	++	-	++	+++	+++	**Important causal pathway**

Annex 5: Final Stakeholder Workshop Ranking Exercise

Causal Hypothesis	Ranking Proposed by NCA Analyst	Confidence note given by working group (1=low, 2=medium, 3=high)	Ranking proposed by working group	Comments from working group	Result of group discussion
R: Poor nutritional status of mothers	Major	3	Major	Evidence and experience shows this is a major risk factor	
N: Small household land size	Important	1	Major	Major risk factor as land size significantly limits household level food access.	Group agrees to rank as major.
F: Access to safe drinking water supply	Major	3	Major	Evidence and experience shows that this is a major risk factor. However, the situation is improving in Aleta Wondo.	
B: Poor health care seeking behaviour	Important	3	Important	Evidence and experience confirms this is an important risk factor.	Based on discussions early in the day this risk factor has been reviewed and reclassified as major.
J: Low status of women	Important	3	Important	Evidence and experience confirms this is an important risk factor	From discussions, a number of participants proposed to move this to a major risk factor. The NCA analyst agrees with proposition
V: Adverse weather conditions	Important	2	Major	The association with child undernutrition should be very high.	No group consensus reached and so risk factor continues to be ranked as important
G: Poor hygiene	Major	3	Major	No comments.	

practices					
K: High workload of women	Minor	2	Important	The mother has a lot of work to do in the area and a lot of burdens so she is unable to provide appropriate care.	No group consensus reached and so risk factor continued to be ranked as important
S: Low birth weight	Important	3	Important		
O: Poor crop diversity and usage	Major	3	Major		
C: Sub optimal breastfeeding practices of children age 0-6 months	Important	2	Major	The breastfeeding practices are very important because of the nutritional value.	Group decide to rank this causal hypothesis as major.
T: Chronic poverty	Major	3	Major		Some discussion and explanation on the measure used (PPI)
L: Unmet need for family planning	Minor	3	Minor		Some discussion that the current family planning uptake rates might not show the real picture. However, no consensus reached and majority agree should stay as a minor causal pathway.
P: Not enough food produced during the hunger season	Major	3	Major		
H: Poor utilisation of sanitation facilities	Major	3	Major		
D: Poor complementary	Major	3	Major		

feeding practices of children age 6-23 months					
I: Low level of education of the caregiver	Major	3	Major		
U: Unable to afford agricultural inputs	Important	3	Important		Some discussion that it should be a minor factor, as household financial management may be more of an issue. However, from the discussion no consensus reached and this emerged as major factor from the qualitative inquiry and so we keep as the ranking important.
Q: Poor financial resource management	Major	3	Major		
E: Intrahousehold food distribution discriminates against young children	Minor	1	Important	In Sidamigne culture, men are prioritised and children eat last.	The NCA findings do not show this and so we lack evidence.
M: Young childbearing age	Important	3	Important		

Annex 6: Seasonal Calendars

The following seasonal calendars were developed together with focus group participants in each village, to demonstrate how risk factors change at different times of year.

Figure 6: Risk Factor Seasonal Calendar, Lawisha Village

Risk Factor *H = high L= low A=available NA = not available F=favourable D=dry R= rainy*	J	F	M	A	M	J	J	A	S	O	N	D
Acute Malnutrition												
- Perceived acute malnutrition (highest)				H	H	H	H	H				
- Perceived acute malnutrition (lowest)									L	L	L	L
- Peak of admissions in nutrition centres			H		H	H	H		H			H
Water Resources												
- Rain				R	R	R	R	R				
- Unprotected spring water available	A	A	A	A	A	A	A	A	A	A	A	A
- Borehole water available	A	A	A	A	A	A	A	A	A	A	A	A
- Soap available at hoh level									A	A	A	
Harvests												
- Hunger season				H	H	H	H	H				
- Haricot beans						A	A					
- Maize						A	A					
- Kale				A	A							
- Chat											A	A
- Coffee									A	A	A	A
Household economy												
- Men sell daily labour												
- Women's workload (highest)									H	H	H	H
- income (highest)										H	H	H
- income (lowest)				L	L	L	L	L				
Markets												
- Food prices highest										H	H	H
- Food prices lowest				L	L	L	L	L				
- Chat price highest										H	H	H
- Coffee price highest										H	H	H
Child Health												
- Diarrhoea prevalence highest				H	H							
- Malaria peaks						H	H					
- Common cold's highest	H	H										
Celebrations (meat consumed)												
- Christmas												A
- Easter				A								

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Figure 7: Risk Factor Seasonal Calendar, Second Soyama Village

Risk Factor H = high L= low A=available NA = not available F=favourable D=dry R= rainy	J	F	M	A	M	J	J	A	S	O	N	D
Acute Malnutrition												
- Perceived acute malnutrition (highest)			H	H	H							
- Perceived acute malnutrition (lowest)									L	L	L	L
- Peak of admissions in nutrition centres			H		H	H	H		H			H
Water Resources												
- Rain			R	R	R	R	R	R	R	R	R	
- Belg rains			R									
- Maher rains						R	R	R				
- River water available	A	A									A	A
- Borehole water available	A	A	A	A	A	A	A	A	A	A	A	A
Harvests												
- Hunger season			H	H	H	H						
- Haricot beans						A	A	A				
- Maize							A	A	A	A	A	A
- Enset	A	A	A	A	A	A	A	A	A	A	A	A
- Chat				A								
- Coffee										A		
Household Economy												
- Men sell daily labour			■	■	■	■						
- income (highest)									H	H		
- income (lowest)		L	L	L	L	L	L	L				
- Woman's workload (highest)	H	H										H
- Woman's workload (lowest)										L		
Markets												
- Food prices highest			H	H	H	H						
- Food prices lowest										L	L	L
- Chat price highest	H											
- Chat price lowest			L	L	L							
Child Health												
- Diarrhoea prevalence highest	H	H										
Celebrations (meat consumed)												
- Christmas												A
- Easter				A								

Risk Factor H = high L= low A=available NA = not available F=favourable D=dry R= rainy	J	F	M	A	M	J	J	A	S	O	N	D
Acute Malnutrition												
- Perceived acute malnutrition (highest)					H	H	H	H	H			
- Peak of admissions in nutrition centres			H		H	H	H		H			H
Water Resources												
- Rain			R	R	R	R	R	R	R			
- Unprotected spring water available	A	A	A	A	A	A	A	A	A	A	A	A
- Borehole water available	A	A	A	A	A	A	A	A	A	A	A	A
- Hygiene practices best/soap available at hoh level										A	A	A
Harvests												
- Hunger season					H	H	H	H	H			
- Haricot beans					A							
- Maize								A	A			
- Kale				A	A							
- Coffee										A	A	A
- Enset (more available)	A	A	A	A	A							
Household Economy												
- Men sell daily labour												
- Loans taken out												
- income (highest)										H	H	H
- income (lowest)					L	L	L	L	L			
- Woman's workload (highest)	H	H	H	H								
- Woman's workload (lowest)												
Markets												
- Food prices highest			H	H	H	H	H	H				
- Food prices lowest												
- Coffee price highest	H	H	H	H	H	H	H	H	H			
Child Health												
- Diarrhoea prevalence highest		H	H									
- Malaria peaks							H	H	H	H		
- Common cold's highest					H	H	H					
Celebrations												
- New year									A			
- Christmas												A
- Easter				A								

Figure 9: Risk Factor Seasonal Calendar, Wiridimatata Village

Risk Factor	J	F	M	A	M	J	J	A	S	O	N	D
Acute Malnutrition												
- Acute malnutrition (highest-perception of community)			H	H	H	H	H	H				
- Peak of admissions in nutrition centres				H	H	H	H	H	H	H		
Water Resources												
- Rain			H	H	H	H	H	H	H	H		
- Less rain			H	H	H			H	H	H		
- More rain						H	H					
- Unprotected well water available	A	A	A	A	A	A	A	A	A	A	A	A
- Protected spring water available and accessible	A	A									A	A
- Protected spring water (fee paying) available	A	A	A	A	A	A	A	A	A	A	A	A
- Hygiene practices best												
Harvests												
- Hunger season			H	H	H	H	H	H				
- Haricot beans						A						
- Maize								A	A			
- Kale				A								
- Sweet potatoe	A	A										
- Coffee	A										A	A
- Preparation of Kocho	H											
Household Economy												
- Men sell daily labour												
- Loans taken out				H	H	H						
- income (highest)	H									H	H	H
- income (lowest)			L	L	L	L	L	L	L			
- Woman's workload (highest)	H	H	H	H								
- Woman's workload (lowest)								L				
Markets												
- Food prices highest				H	H	H	H	H				
- Food prices lowest										L	L	L
- Coffee price highest	H											
Child Health												
- Diarrhoea prevalence highest				H								
- Malaria peaks				H	H							
- Pneumonia highest				H	H							
Celebrations (money spent and meat consumed)												
- Christmas												
- Easter												

Annex 7: Risk Factor Historical Calendars

Due to the low age of most mothers, we conducted this exercise for the previous 5 years instead of 10, as the pre-test exercise had shown that recall over 10 years was unfeasible. Please note the following years are the Ethiopian calendar.

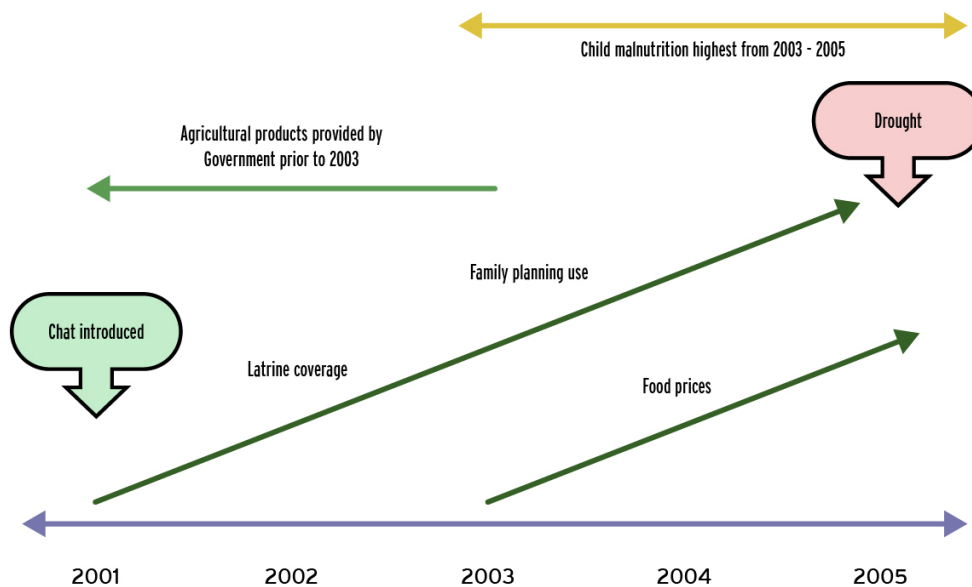**Figure 10: Lawisha Village Historical Risk Factor Calendar**

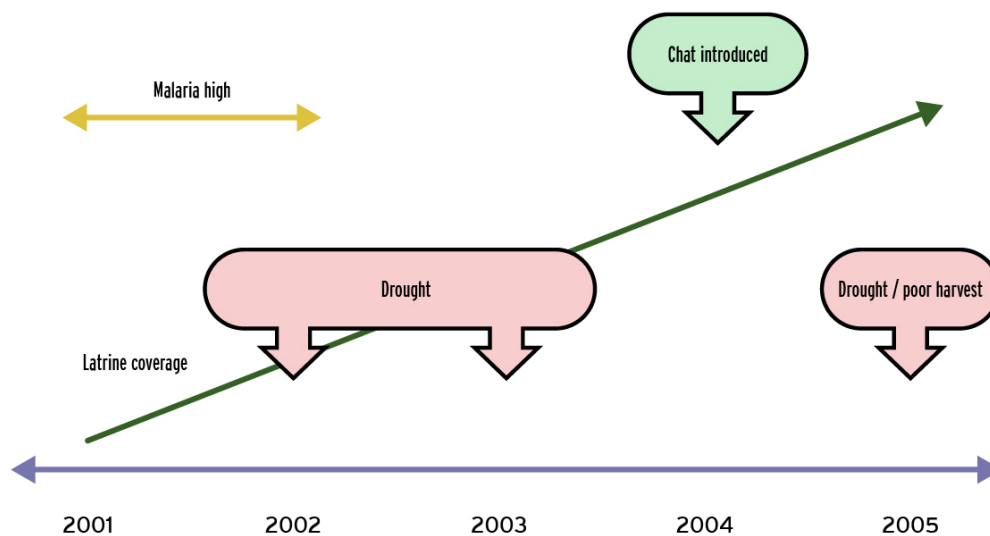**Figure 11: Second Soyama Village Historical Risk Factor Calendar**

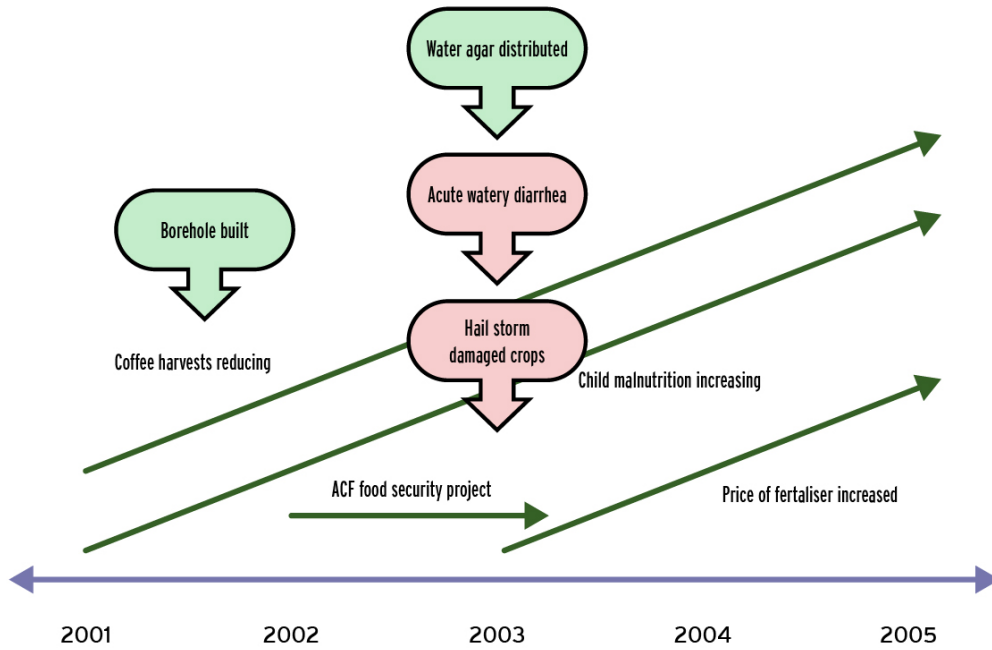**Figure 12: Elelicho 2 Village Historical Risk Factor Calendar**

Figure 13: Wiridimatata Village Historical Risk Factor Calendar