

# MILK MATTERS

The Role and Value of Milk in the Diets of  
Somali Pastoralist Children in Liben and  
Shinile, Ethiopia



Participatory Research for the Pastoralist Health  
and Nutrition Initiative

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## Acronyms

ARI	Acute Respiratory Infection
CAHW	Community Animal Health Worker
CHW	Community Health Worker
DPPA	Disaster Prevention and Preparedness Bureau, Ethiopia
ENN	Emergency Nutrition Network
FAO	Food and Agricultural Organization
FGD	Focus Group Discussion
FIC	Feinstein International Center, Tufts University
FSAU	Food Security Analysis Unit, Somalia
IDP	Internally Displaced Person
ILRI	International Livestock Research Institute
IRB	Institutional Review Board
MUAC	Mid-Upper Arm Circumference
NGO	Non-Governmental Organization
ODI	Overseas Development Institute
PHNI	Pastoralist Health and Nutrition Initiative
PI	Principal Investigator
PIA	Participatory Impact Assessment
PLI	Pastoralist Livelihoods Initiative
RNI	Recommended Nutrient Intake
SCUK	Save the Children UK
SCUS	Save the Children USA
UNHCR	United Nations Humanitarian Commission for Refugees
WHO	World Health Organization

## List of commonly used Somali words and their meaning

<i>Ambula, Garow or Harur</i>	whole grain millet, wheat or maize cooked and served with milk (or <i>garoor</i> ), sugar or ghee.
<i>Cano la'an</i>	a local term to describe 'the suffering due to the lack of milk' among children
<i>Deyr</i>	the second rainy season (October to December)
<i>Digre</i>	the wood/bark of a small tree, cooked in boiling water and added to milk or water for consumption by young children.
<i>Garoor</i>	fresh milk (usually camel) that is several days old and has soured
<i>Ghee</i>	a clarified butter made from surplus goat or cow milk in the rainy season.
<i>Gooryan</i>	'worms' or intestinal parasites
<i>Gu</i>	the long rainy season (April to June)
<i>Hagaa</i>	the dry windy season (July to September)
<i>Irmaansi</i>	the practice of the better off lending a milking animal to a poorer relative or neighbor
<i>Jilaal</i>	the hot dry season (January to March)
<i>Khat</i>	green leaves of the plant chewed in order to achieve a state of euphoria and stimulation
<i>Laxoox</i>	a type of injera (Ethiopian bread) made from wheat flour, sugar and oil.
<i>Nafaqo-daaro</i>	a local term for malnutrition. The signs described by women to define it included weight loss, thinness around the face, lethargy and sickness (or more regular episodes of illness).
<i>Ouji</i>	a soft thin porridge made with flour and cooked with milk or ghee, water and sugar.
<i>Soor or Shuro</i>	a solid paste made from sorghum, maize, wheat or millet flour cooked with water and served with milk or ghee and sugar.
<i>Zakat</i>	the yearly Islamic redistribution of wealth (such as crops and animals) to the poor

## Summary

Children that live in pastoralist areas of Africa are increasingly referred to as some of the most nutritionally vulnerable in the world. In Somali Region Ethiopia, levels of global acute malnutrition among young children are regularly reported to rise above 15%; the level defined as a nutritional emergency by the World Health Organization. Yet, from work going back many decades in the Region, we know that animal milk; one of the most nutritionally complete foods in the world, plays an extremely important role in the diets of these children. Whilst there is considerable research and early warning literature that highlights the importance of livestock and livestock products for the income and the dietary intake of pastoralists in Somali Region, there is little work that describes the distribution of livestock-derived products such as milk within households or the use of such products by vulnerable groups. Particularly, the approach used by this study explores the link between animal products and nutrition of infants and young children by seeking out local views and perspectives.

Conducted in Shinile and Liben Zones of Somali Region, this study aimed to ask pastoralist women and men what they think about the important causes of child malnutrition, links between child nutritional status and milk supply, and 'best bet' interventions for addressing malnutrition in their communities. It used recognized participatory methods such as matrix scoring, seasonal calendars and ranking to produce detailed information on how young children were fed, the reasons behind the choice of foods used, and on seasonal trends and relationships.

The main study findings include the following:

- Somali pastoralists, and especially women, are a valuable source of knowledge on child nutrition. Despite a context of a harsh environment and limited formal education, they are well aware of the nutritional value of foods such as livestock milk and try to prioritize the consumption of these foods by young children.
- The demand and perceived benefit of animal milk for young children is high and generally much higher than that for cereals. In Liben and Shinile, the milk of camels and goats is held in particularly high regard. This is linked to these animals' ability to produce milk through the dry season, for the perceived health benefits of the milk and for the taste.
- The large contribution that animal milk makes to the dietary intake of young children in the study communities is startling. When milk is available it is added to most complementary foods in both Liben and Shinile, and during a normal wet season the average milk intake of a one year old provides about two-thirds of the mean energy required and 100% of the protein required by a child of this age.
- Season plays a crucial role in milk supply and by the end of a 'normal' year milk intake of young children has reduced by more than 70%.
- In a drought year this reduction in intake was far more pronounced. By the end of a drought year milk intake in young children had fallen to negligible amounts in both areas.
- When milk is in short supply it is replaced, in the most part, by an increase in grain consumption, and by the end of a long dry season or drought year the grain is cooked and consumed with little else but water. Such a severe reduction in milk intake has a serious impact on dietary quality by reducing the amount of high quality protein, fatty acids and micronutrients that young children consume.

- Study participants perceived a direct and important association between reduced milk intake and weight loss among their young children. They use the phrase *Cano la'an* to describe 'the suffering due to lack of milk' which is known by local people as the pre-cursor to malnutrition as they define it. In future it will be important to examine the implications of this seasonal availability of milk for patterns of nutritional status as defined by international indicators and how this overlaps with pastoralists own definitions of malnutrition in this context.
- In the opinion of the pastoralists that participated in this study, the most effective way to improve availability and access to milk for young children is clear; that is through the maintenance of the health and nutritional status of their livestock. They identified broad areas for possible intervention, including animal health, fodder production and water supply that could help to maintain the supply of milk to children during the dry season and drought. The separation of larger stock from young children during seasonal migrations was also highlighted as an important factor that disrupted children's access to animal milk. It is these areas therefore that have potential to form the basis of any intervention that aims to improve children's resilience to drought and malnutrition.
- Many of the programs that might fall into the broad categories discussed are not new, and there is already some evidence that they can lead to real improvement in livestock health and milk production. There is far less evidence however of any impact of such interventions on the nutritional status of children, and it is here that more work is needed.
- Given the issue of milk access for young children during late dry season and drought, especially access to camel milk, it is possible that the benefits of interventions that aim to improve child nutrition such as veterinary care for camels or camel restocking would not be fully captured in terms of milk consumption by children at critical times. This points to a need to review these projects and look more carefully at ways to ensure that milk reaches young children when they need it most.

## Introduction

Animal milk has long been recognized as an important component of pastoralist diets across the world (Sadler, Kerven et al. 2009). At the same time, milk is a nutrient dense food and is thought to contribute a high proportion of the nutrients required by the many pastoralist groups that rely on it (Lindtjørn, Alemu et al. 1993; Galvin, Coppock et al. 1994; Fratkin, Roth et al. 2004; Barasa, Catley et al. 2008). However, children that live in pastoralist areas of Africa are increasingly referred to as some of the most nutritionally vulnerable in the world and nutrition surveys in Eastern Ethiopia (SCUK 2007; Ethiopian Health and Nutrition Research Institute, UNICEF et al. 2009) and other pastoralist areas of Africa (Grobler-Tanner 2006; Mason, Cercone et al. 2008) have long identified seasonally high rates of acute malnutrition. Discussion of the reasons behind this malnutrition often refer to a broad spectrum of direct causes that include the health environment and infection, infant feeding and maternal caring practice, and reduced availability of milk and cereals, but have rarely examined the relative importance of any one of these causes. Whatever the causes, the dominant nutrition response from the international community to malnutrition in these areas continues to be the delivery of an often limited commodity food basket that rarely includes a protein source suitable for infants and young children.

In common with other pastoralist groups across the world, a substantial portion of the income and the dietary intake of pastoralists in Somali Region Ethiopia comes from livestock and livestock products; various reports estimate that, on average, pastoralists in the Region consume between 20% and 50% of their energy requirement as milk and animal products in a normal rain year (Webb and Braun 1994; SCUK and DPPA 2002; SCUK and DPPA 2002; SCUK 2007). Some of the same reports suggest that this reliance on milk extends particularly to the diets of young children and that young children are often prioritized for the milk that is available. Seasonality is also noted by many to play a vital role in the patterns of consumption of Somali pastoralists, with the hungry season falling at the end of the dry season when milk availability is low and animals are in poor condition (Devereux 2006; SCUK 2007; Mason, Chotard et al. 2008). This is reflected particularly in the Government of Ethiopia's own early warning system, that uses Save the Children UK's household food economy analysis to produce seasonal calendars and to document food and income sources and utilization, for each livelihood zone (DPPA 2006).

Despite some availability of studies and early warning literature on the Region, the analysis presented by these reports is broad and often uses the community or household as the unit of analysis with no reference to accessibility or consumption of various foods by different household members. The authors could find no documentation of the quantity and type of milk and milk products that Somali pastoral *children* eat and how this varies by season and by year. In addition, the importance, perceived by Somali pastoralists themselves, of animal milk and its role in the diets of young children is rarely discussed. All this is clearly needed for any analysis that attempts to examine the importance of specific causes of child malnutrition in the Region and for the design of programs that aim to address the problem in the long term.

Save the Children USA and Save the Children UK, partners on this project, have been active in the Somali Region of Ethiopia for more than 20 years. They are currently involved in a number of programs which aim to improve food security and nutritional status at community level and of children. These include livestock programs (veterinary, restocking, feed etc), safety net programs and standard food and non-food relief programs in response to specific events. Some of these have been assessed (Dejenu 2004; Admassu, Nega et al. 2005; Cullis, Mekonnen et al. 2007; Abebe, Cullis et al. 2008; Bekele and Tsehay



2008; Catley, Bekele et al. 2008; Catley, Abebe et al. 2009) but rarely do these assessments document impact on the final outcome indicator of child nutritional status.

Part of Save the Children's African Region Pastoral Initiative<sup>1</sup>, 'Milk Matters' is a joint venture between the Feinstein International Center at Tufts University, Save the Children USA and Save the Children UK in Ethiopia and aims to improve the nutritional status of children in pastoralist/semi pastoralist areas in the Horn of Africa. The first phase of 'Milk Matters' examined the role of milk in the diets of children in pastoralist communities, how seasonal availability of milk in these communities might be associated with the nutritional status of children, and priority interventions that could reduce vulnerability to malnutrition in this group. The first step in this process was a literature review which aimed to improve our understanding of those aspects of pastoral child nutrition that are well established and those issues that remain debated or poorly covered by the literature (Sadler, Kerven et al. 2009)<sup>2</sup>. Subsequently, this study aimed to build on the literature review and 'ground-truth' some of the review findings. Focusing on Save the Children's program areas in the Somali Region of Ethiopia, the intention was to ask pastoralist women and men themselves what they think about the important causes of child malnutrition, links between child nutritional status and milk supply, and 'best bet' interventions for addressing malnutrition in their communities. The main research questions were:

- How does dietary intake by specific food types of children 6-59 months of age differ by season and during drought versus a normal year?
- How do pastoralists perceive seasonal variations in dietary intake, by specific food types, to influence the nutritional status of their children?
- What are the most important factors that influence changes in the dietary intake of young children?
- Which of these factors have most impact on the nutritional status of young children?
- What do pastoralists perceive to be 'best-bet' interventions to address seasonal changes in the nutritional status of their young children?

Ethical approval for this study was granted by the Institutional Review Board of Tufts University, USA.

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<sup>1</sup> The goal of the Save the Children Africa Region Pastoral Initiative is to "deepen and replicate innovative approaches to improve access to basic services and reduce vulnerability to drought in pastoralist populations in order to create positive change for children in this unique and harsh environment."

<sup>2</sup> This review can be downloaded at <http://fic.tufts.edu>

# Methodology

## Study location

The study was conducted in two areas of Somali Region Ethiopia: Liben Zone in the south of the Region where Save the Children USA were implementing programs, and Shinile Zone in the north of the Region where Save the Children UK were implementing programs. Both areas were inhabited by pastoralists, agro-pastoralists and agricultural communities. In each area approval for data collection was sought from the zonal administration office. The Zone Administrator and the Save the Children team in each area supported the identification of two study areas that were considered to be of a purely pastoralist livelihood type. The study areas selected for data collection were Boqolmayo and Bioley in Liben, and Gad and Lasdhere in Shinile (see Appendix 1: Map of the study areas). All areas were typical of land occupied by pastoralist ethnic groups; arid plains covered, in a large part, with scrub-like vegetation, with very limited infrastructure. Data collection took place over a three-week period during December 2008, which was the end of the short rainy season (or *Deyr*) in both areas.

## Training of facilitators

The study team comprised the principal investigator (PI) [KS] from Tufts University USA, two translators/lead facilitators and four facilitators. All translators and facilitators were natives of one or other of the study locations; the two translators were national Save the Children employees with an extensive knowledge of the areas in which data was collected, the four facilitators were selected from Dollo town in Liben Zone and had a good understanding of the pastoralist livelihood. All team members met in Addis Ababa before data collection started and participated in a two day training led by an expert in participatory assessment methods [AC] whom provided ongoing support to this study. The training covered all methods utilized for data collection that are outlined below. Once the team arrived in Liben, the first study location, the PI led a second review training during which the study team practiced data collection using the selected participatory assessment methods.

## Study participants

Before the study team arrived in each of the four locations one of the translators/lead facilitators visited the area, usually with a member of the zonal administration team, and met with the community leaders. The lead facilitator discussed the aims and objectives of the study with community members and requested their assistance in the selection of participants for the focus group discussions. Participants at each location included:

- Eight to 12 pastoralist women of mixed wealth group. These women were the focus of most of the data collection activities, including structured exercises. For most exercises the group was split into two smaller groups, and findings were then compared when the entire group came back together again to discuss results and key issues.
- Four to 10 male participants, including community leaders and family members of the female participants, were involved in some exercises that required a specific knowledge of livestock movement, health and nutrition.

No mention of any incentive to participate was made during the initial discussions. However, at the end of data collection in each area the female participants were reimbursed with a small amount of cash to cover their time and travel costs.

Before any data collection began, an IRB approved verbal consent script was read to all participants and their consent was noted for the file.

## Participatory methods

Participatory methods were used with groups of participants over a two day period, as summarized in Table 1.

Table 1: Summary of participatory methods used to assess the role and value of animal milk in the diets of pastoralist children

Method	Use	Sample size
Matrix scoring	To compare different foods fed to young children using community defined value indicators	2 groups of informants in Liben zone and 3 groups in Shinile (4-12 people per group)
Seasonal calendars	To determine variation, by season and by 'normal' versus 'drought' year, in rainfall and in dietary intake of milk by species and other foods given to young children.	3 groups of informants in Liben zone and 4 groups in Shinile (4-12 people per group)
Consumption calendar	Linking relative changes in intake of animal milk by young children with absolute measures.	2 groups of informants in Liben zone and 4 groups in Shinile (4-12 people per group)
Simple ranking	To determine how communities perceived the importance of factors such as causes of malnutrition.	3 groups of informants in Liben zone and 4 groups in Shinile (4-12 people per group)
Focus group discussion, probing key issues.	Used with all other methods to cross check information and clarify responses.	4 groups of informants in each area (4-6 people per group)

### Matrix scoring

A standardized matrix scoring was used to understand local perceptions of different foods fed to young children. In summary, the female participants were asked to list all the foods that were commonly given to young children below the age of five years, and simple line drawings were made to represent each food type. Pairs of food types were then compared with each other, with the questions "Which is better?" and "Why?" In this way community defined value indicators were established. These indicators, also represented by a simple line drawings, were placed along the top (*x-axis*) of the matrix and the women were asked to score each food (placed along the *y-axis* of the diagram) against each of the value indicators. For each food, scoring involved dividing 20 stones between all of the defined value indicators, with more stones representing greater value for that particular indicator. Numbers of stones were then converted into ranks, 1 being the most preferred for the indicator in question and 6 being the least preferred, for presentation of data below (see Table 2).

### Seasonal calendars

Standardized seasonal calendars were used to describe the seasonal change in rainfall and dietary intake of young children in both a normal year (defined simply as with 'good rain') and a drought year (defined simply as with 'very little rain'). The methodology was similar to that used for constructing the matrix scoring. Local names for seasons were used (see below) and each season was represented with a simple line drawing along the bottom (*x-axis*) of the diagram. The same line drawings used to represent each food fed to young children during the matrix scoring exercise were used here and were placed along the *y-axis* of the diagram. For each food, the female participants were asked to distribute the stones across the seasons according to child intake at different times of the year, with more stones representing higher intake. Women were asked to redistribute stones (add to, or subtract from piles) for a drought year (see Figures 2 and 3 and Appendix 2).



### Consumption calendars



Consumption calendars were used to link relative changes in animal milk intake of young children with absolute measures. The completed seasonal calendar (above) was used as a reference and the female participants were asked to think about the total animal milk intake of a child of one year in age. Using a local measure of known volume (a 'Somali cup' from which young children often drink animal milk) women were asked to show facilitators how much animal milk, on average, a child drinks at each meal for each season of the year, by pouring water into the cup. The facilitator then established how many times per day a

child received this quantity of milk by season and recorded the amount (in fractions of a cup) and frequency of milk given to a 1 year old. These amounts were converted into ml/day by the PI at the end of each day (see Table 3).

## Simple ranking

Simple ranking was used several times during discussions. For example it was used to determine how communities perceived the relative importance of the ability of different factors to cause malnutrition. Objects or line drawings of each factor were laid on the ground and participants were asked to distribute stones across all factors according to their perceived importance (see Tables 4 and 5).

## **Verifying ages and seasons**

Seasons were discussed with all groups. Whilst the length of different seasons may vary from year to year and the pattern of rainfall varies slightly between study areas, the following pattern and naming of seasons was agreed by all participant groups:

- *Jilaal*: during the hot dry season (January to March), livestock are cheap because pasture and water are scarce, animals are susceptible to diseases, and pastoralists are in great need for purchased food, so they sell their animals at almost any price.
- *Gu*: during the long rainy period (April to June), livestock prices rise as pasture and water are available. Animals are calving and are in milk, and pastoralists are under less pressure to purchase food, so the volumes offered for sale are low. Instead of selling, many pastoralists are buying animals for fattening, pushing up prices.
- *Hagaa*: during the dry windy season (July to September), prices fall as animals lose weight and exports are limited by shipping constraints, some caused by strong winds blowing in the Red Sea.
- *Deyr*: during the second rainy season (October to December), rain volume is usually less and lasts for shorter periods.

The age given to young children was discussed with each group and drawn on a flipchart using simple line drawings to represent the year divided into seasons. Whilst female participants in both areas agreed that children are thought to achieve one year of age only when they have passed through a full *Gu* (or long wet) season, this generally agreed with age allocated according to the Gregorian calendar. Therefore, ages discussed below are understood to represent 12 months with each additional year of age. At the beginning of each two day workshop facilitators emphasized that the focus of discussion and data collection would be on children less than five years old.

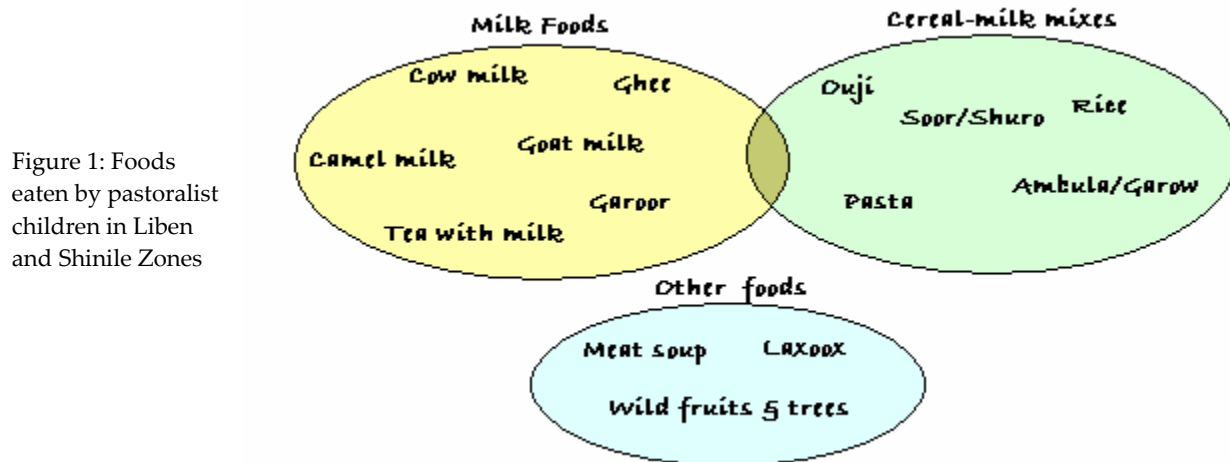
## **Data recording and analysis**

Discussion and the results of all exercises were recorded by hand by the translators/lead facilitators and by the PI. All discussion was audio recorded. Written notes were subsequently compiled into one report for each study area and revised by translators from the audio recordings. The PI, with the help of one research assistant at Tufts University, compiled all results by theme and noted where levels of agreement were moderate to high.

## Findings

### Foods fed to young children and how they are perceived

Women in both Shinile and Liben listed many foods that are given to young children. Most of these foods are cereal and/or milk based.



All groups mentioned the following foods:

- Tea with milk and sugar. When milk is available the relative proportion of milk to tea in the mix is large.
- Fresh goat milk, camel milk and cow milk, often with sugar added
- *Ouji*: a soft thin porridge made with flour (usually wheat, maize, millet, rice or a blended flour), cooked with milk or ghee, water and sugar.
- *Soor (Liben) Shuro (Shinile)*: a solid paste made from sorghum, maize, wheat or millet flour cooked with water and served with milk or ghee and sugar.
- *Ambula (Liben) Garow or Harur (Shinile)*: whole grain millet, wheat or maize cooked and served with milk (or *garoor* preferably), sugar or ghee.
- Meat soup: pieces of meat in a watery soup. The watery component is given to young children.

Most groups mentioned these foods:

- *Garoor*: fresh milk (usually camel) that is several days old and has soured
- *Ghee*: a clarified butter made from surplus goat or cow milk in the rainy season.
- Rice: boiled and given with milk or *garoor*, sugar and ghee when available or chili and vegetable when milk and ghee are not available.
- Pasta: boiled and given with milk, sugar and ghee when available or chili and vegetable when milk and ghee are not available.
- Wild fruits: given in the wet season when available

A few groups mentioned:

- Sheep milk
- *Digre*: the wood/bark of a small tree, cooked in boiling water and added to milk or water. Perceived by one group to keep children healthy and free of diarrhea.

- *Laxoox*: A type of injera (Ethiopian bread) made from wheat flour, sugar and oil, served with vegetable or meat soup when available.

### Milk for strength, growth and taste

Table 2 shows the average preference ranking by informants of different milks and milk-cereal mixes against seven indicators of nutritional value, health, cost and availability.

Table 2: Preference ranking of different milks against indicators of health, cost and availability.

Type of Milk	Indicator median rank (range)						
	Strength <sup>1</sup>	Health <sup>2</sup>	Growth <sup>3</sup>	Availability <sup>4</sup>	Availability during drought <sup>5</sup>	Cost <sup>6</sup>	Nutritional value <sup>7</sup>
Camel milk	1 (1 – 4)	1 (1 – 2)	1 (1 – 2)	2 (1 – 6)	1 (1 – 3)	2 (1 – 6)	4 (2 – 4)
Cow milk	3 (1 – 7)	3 (2 – 5)	2 (2 – 4)	5 (1 – 6)	4 (3 – 4)	4 (1 – 6)	1 (1 – 2)
Goat milk	2 (1 – 3)	2 (1 – 4)	2 (1 – 3)	1 (1 – 3)	3 (2 – 3)	2 (2 – 3)	2 (2 – 3)
Tea with milk	5 (3 – 6)	5 (5 – 7)	5 (2 – 6)	4.5 (4 – 6)	3 (1 – 4)	4.5 (4 – 5)	4 (2 – 7)
<i>Ouji</i>	3 (3 – 4)	4 (3 – 4)	4.5 (3-6)	2.5 (2 – 3)	2 (2)	3 (2 – 4)	-
Rice with milk	6 (5 – 7)	5 (5 – 7)	6 (6)	3.5 (3 – 4)	4 (4)	2.5 (1 – 4)	6 (5 – 7)
<i>Ambula</i> with milk	4 (3 – 5)	4.5 (4 – 5)	3 (3)	5 (5)	4 (4)	4 (4)	4.5 (4 – 5)
<i>Shuro</i> with milk	4.5 (3 – 6)	2.5 (2 – 3)	5.5 (5 – 6)	4.5 (3 – 6)	-	3.5 (3 – 4)	4 (2 – 6)
Dried milk	5 (5 – 6)	6 (5 – 6)	4.5 (4 - 5)	3 (3 - 5)	4 (3 - 5)	6 (6)	5.5 (5 - 6)

#### Notes

Number of groups conducting the ranking = 5 (2 in Liben, 3 in Shinile)

Interpretation of ranks: 1 = most preferred for indicator in question, 6 = least preferred for indicator in question

<sup>1</sup>Strength encapsulated the aspects of milk that were thought to promote physical endurance (fast running or walking long distances for example) and building of lean muscle vs. laying down of fat

<sup>2</sup>Health was defined by mothers as the absence of illness and therefore encapsulated the aspects of milk that protected children against disease

<sup>3</sup>Growth was defined by mothers as growth in stature i.e. ‘tallness’

<sup>4</sup>Availability was defined by mothers as milk supply either from their own animals or for sale or through social exchange

<sup>5</sup>Availability during drought was defined by mothers as milk supply during drought either from their own animals or for sale or through social exchange

<sup>6</sup>Cost was defined by mothers as the amount of money required to purchase milk from neighbors or markets

<sup>7</sup>Nutritional value was defined by mothers as the number and level of nutrients included in milk, particularly the level of fat.

Animal milk was perceived by all groups as 'better' than milk-cereal mixes and dried milk for most indicators discussed. In general, animal milk was perceived to be a very important food for young children by mothers; 'cooling' their bodies, settling them mentally and promoting growth, health and development. Most informants stated that other cereal-based foods helped children remain free of hunger but did not contain the health and nutritional benefits of animal milks. There were particularly strong feelings about the benefits of camel milk amongst all participants. It was perceived to promote strength and speed in young children ('fast runner' was mentioned several times in relation to camel milk). It was also perceived to be more satiating than other milks and to prevent children becoming hungry and/or thirsty. Camel milk was thought to support growth by both mothers and children alike; "*A boy who drinks camel milk grows faster*" said one boy in Liben and "*Camel milk makes us thin and long but very healthy*" said another in Shinile. Cow and sheep milk were generally perceived to make children fat but not as strong. Dried milk was ranked by most groups as the type of milk least likely to protect against disease.

All informants thought goat and camel milk to be 'stronger' and 'tastier' than cow's milk and preferred these milks in tea. "*City boys like cow's milk, it is like water with no taste - but pastoral boys like camel milk*" (young male participants in Liben Zone). For this reason, camel and goat milk were often diluted when given fresh to young children (< two years old) and a smaller quantity of these milks was required for tea compared to cow's milk.

#### Milk to keep children free of disease

Most participants felt that both camel and goat milk kept children healthy and free of infection that might cause diarrhoea and vomiting. They linked this benefit to the level at which these animals graze; eating high off the ground and grazing different trees and bushes was thought to produce milk that contained less 'parasites'. For the same reason goat milk was often used as a 'medicine' to treat young children. Cows on the other hand ate from the ground, and their milk was perceived to contain many 'parasites' which might cause vomiting in young children. The word used for parasites in this instance was *gooryan*, which literally translated means 'worms' or intestinal parasites.

#### Camel milk for availability and goat milk for accessibility

Both goat milk and camel milk were ranked highly by all informants for the indicators 'availability' and 'availability during drought'. All groups agreed that camels produced the highest quantity of milk and were the best milk producers during the dry season and drought (see the high ranking, Table 2). Goats were also known to be better than cows at yielding milk for much longer during the dry season.

However, there was some discussion in both areas around the concepts of availability and accessibility. Whilst most groups agreed that camel milk supply continues through drought, many participants also discussed the problem of accessibility to camel milk by women and young children during the dry season when camels (and cows) move to distant grazing areas. All groups agreed that camel milk was scarce in the dry season and during drought because camels travelled long distances away from where the women and young children stayed. How camel milk was used by the men and boys who herded the animals was not discussed, but this question would be useful to explore in the context of any surplus milk (i.e. milk that is not consumed by those staying with the animals) and why this milk does not reach women and children in other locations.

Some women stated that they did not own camels, and owned few cows. For non camel or cow owners, use of this milk was limited in some cases due to cost. In contrast, goats were owned by nearly all



households and stayed with women and children during the dry season and drought. Therefore access to goat milk was easier for most participants, although quantities were relatively small.

Camel and goat milk were generally considered to be least costly, as they were most widely available in all areas. Goats were often sold during the dry season and drought to purchase camel milk, although some participants (two groups out of four) were concerned that this milk was 'watered down' for sale.

### **Variation in dietary intake of young children by season and during drought**

The seasonal calendars in Figures 2 and 3 below show marked seasonal variation in milk intake of young children during a 'normal' or a 'non drought' year. In both areas young children consumed the most animal milk (all types) during the wet season (*Gu*). In the dry season (*Hagaa* and *Jilaal*) milk intake was reduced considerably (for example, in Liben the median intake reduced in relative terms from 8 to 3). In Shinile a similar reduction took place, although the size of the reduction was slightly smaller for camel milk.

This seasonal reduction was also shown by the 'milk intake calendar' (Table 3). On average, the quantity of animal milk fed to a young child of 1 year was 0.85 liters per day<sup>3</sup> in the wet season. This provided about two thirds of the mean daily energy required (560 kcals) and 100% of the protein required (27g) by a child of this age. In the dry season, average milk intake fell to 0.22 liters per day which provided only 145 kcals (16% of the RNI for energy) and 7g protein (50% of the RNI for protein); this was a considerable reduction in nutrient intake. In a drought year this seasonal reduction in intake was far more pronounced. Compared to a 'normal' wet (*Gu*) season, milk intake reduced during a drought year *Gu* season by, on average, 50% in both Liben and Shinile (Figures 2 and 3). By the end of a drought year milk intake in young children had fallen to negligible amounts in both areas. This substantial reduction was also shown by the 'milk intake calendar' (Table 3) that estimated the average milk intake at the end of dry season to be only 100ml/day.

*"We like all milk. It satisfies hunger, we become strong and healthy and playful and happy. It is given to us during Gu and Deyr [the rainy seasons]. During Hagaa and Jilaal [the dry seasons] we get soor, tea with milk and ambula. When milk becomes less we get less playful and weak."* (A group of young boys in Liben Zone)

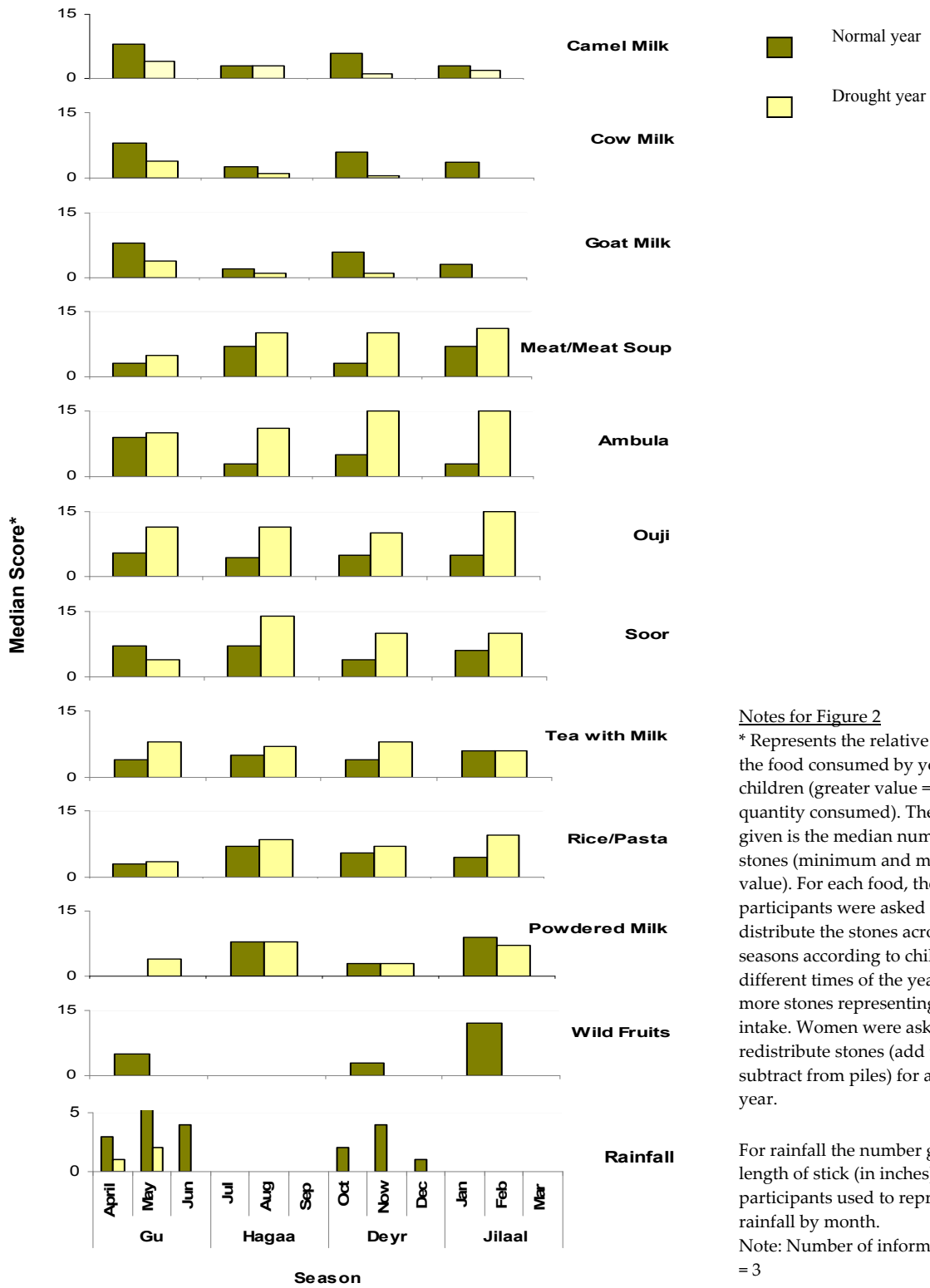
The seasonal calendars show that the reduction in milk intake in the dry season and drought years coincided with an increase in grain and meat consumption. In both areas the amount of meat soup given to young children increased considerably in the dry season as animals were slaughtered more often, yet all groups stated that animal slaughter, both during normal and drought years, was a rare event.

In Liben, the amount of cereal-milk mixes consumed was stable from the wet to the dry season of a normal year, but increased quickly once dry season turned to drought. According to Figure 2 young children were eating at least twice as much of many of these mixes towards the end of a drought year compared to the dry season of a normal year.

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<sup>3</sup> This amount compares to the required daily fluid intake of between 600 and 1300ml/day for a child of this age, and therefore appears to be a plausible intake. Dewey, K. (2005). Guiding Principles for Feeding Non-Breastfed Children 6-24 months of Age. Geneva, World Health Organization.

Figure 2: Seasonal calendar of foods consumed by young children, Liben Zone



Notes for Figure 2 (continued)

Gu=long rainy season; Haggaa=dry windy season; Deyr=short rainy season; Jilaal=dry hot season

See Appendix 2 for detailed seasonal calendar data including median scores and ranges

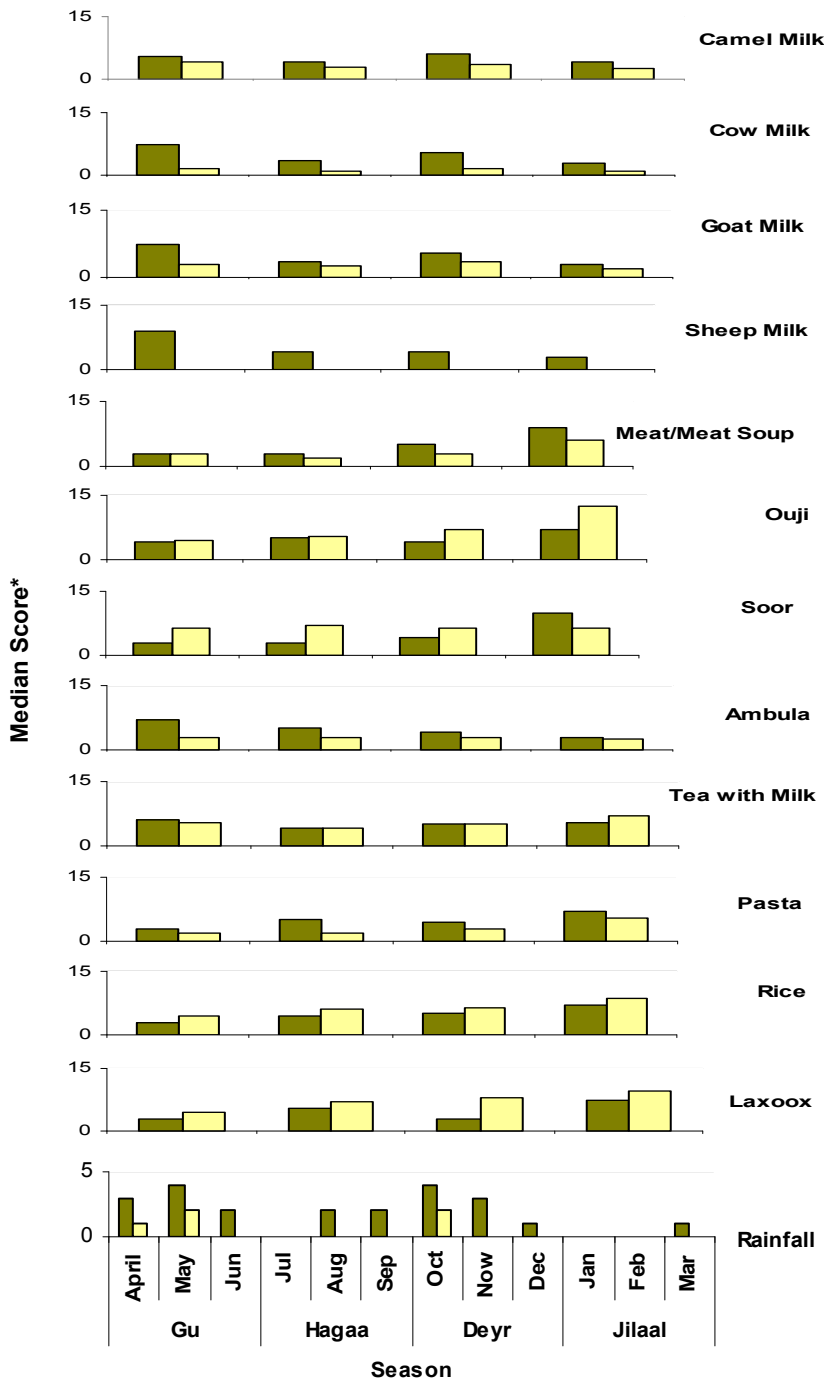
Meat soup: pieces of meat in a watery soup. The watery component is given to young children.

Ambula: whole grain millet, wheat or maize cooked and served with milk (or garoor preferably), sugar or ghee.

Ouji: a soft thin porridge made with flour (usually wheat, maize, millet, rice or a blended flour), cooked with milk or ghee, water and sugar.

Soor: a solid paste made from sorghum, maize, wheat or millet flour cooked with water and served with milk or ghee and sugar.

Figure 3: Seasonal calendar of foods consumed by young children, Shinile Zone



Notes for Figure 3

\* Represents the relative quantity of the food consumed by young children (greater value = larger quantity consumed). The number given is the median number of stones (minimum and maximum value). For each food, the female participants were asked to distribute the stones across the seasons according to child intake at different times of the year, with more stones representing higher intake. Women were asked to redistribute stones (add to, or subtract from piles) for a drought year.

For rainfall the number given is the length of stick (in inches) that participants used to represent rainfall by month.

Note: Number of informant groups = 4

Notes for Figure 3 (continued)

*Gu*=long rainy season; *Hagaa*=dry windy season; *Deyr*=short rainy season; *Jilaal*=dry hot season

See Appendix 2 for detailed seasonal calendar data including median scores and ranges

Meat soup: pieces of meat in a watery soup. The watery component is given to young children.

*Ouji*: a soft thin porridge made with flour (usually wheat, maize, millet, rice or a blended flour), cooked with milk or ghee, water and sugar.

*Soor*: a solid paste made from sorghum, maize, wheat or millet flour cooked with water and served with milk or ghee and sugar.

*Ambula*: whole grain millet, wheat or maize cooked and served with milk (or garoor preferably), sugar or ghee.

*Laxoox*: A type of injera (Ethiopian bread) made from wheat flour, sugar and oil, served with vegetable or meat soup when available.

Table 3: Seasonal calendar of average daily milk intake of a one-year old child, Liben and Shinile combined

Type of year	Season			
	<i>Gu</i>	<i>Hagaa</i>	<i>Deyr</i>	<i>Jilaal</i>
Normal year	850	450	900	220
Median ml (range)	(600 – 900)	(250-800)	(450-900)	(100-600)
Drought year	200	200	200	100
Median ml (range)	(120 – 600)	(80-400)	(80-450)	(80-160)

Number of informant groups = 6

In Shinile the amounts of cereal-milk mixes fed to young children increased quickly through the dry season and remained high throughout a drought year. Here also, the amount of cereal-milk mixes eaten by young children was at least double during a drought compared to consumption during the wet seasons (Figure 3). In one of the areas visited in Liben, powdered milk supplied from across the border in Kenya was purchased during the dry season to replace fresh milk for young children. Women stated that they sold animals (usually a goat) to obtain this milk.

Although the seasonal calendars clearly demonstrate a change in the dietary intake of young children across seasons, they do not adequately reflect the deterioration in the quality of the diet that occurs. In particular, women in both areas emphasized how the proportion of the different foods which were used to prepare a cereal-milk mix changed as wet season turned into dry season and ultimately, to drought. During the wet season, any surplus cow and goat milk was made into ghee. This ghee, as well as sugar, was added to cereal mixes during the dry season in place of some of the milk for as long as it was available. As the dry season progressed into drought, the amount of milk or milk products (such as ghee) used in the mixes quickly reduced until children were drinking black tea and eating cereals or rice cooked mainly with water. In the absence of milk or milk products, chilli or a small amount of wild fruits or vegetables might be added to rice or other cereals to improve palatability. Two groups of women also mentioned sugared water as a replacement feed for milk when milk became scarce.

*“In Jilaal, when there is less milk, a lot of tea is added to a very small amount of milk, this makes the milk go further” (women in Liben Zone).*

*“Milk is reduced in everything during drought. We drink black tea and rice as a soup with chili. The name for shuro without milk is yaabis (dry), even though the taste of shuro changes without milk we have to eat it because sorghum is one of the cheapest flours. We can’t afford to buy pasta during drought” (women in Shinile Zone).*

## Local perceptions of malnutrition and nutritional status

*Cano la'an* is a Somali phrase for 'the suffering due to lack of milk' when children become 'weak and ugly' and is applied to children even before the signs of malnutrition (in Somali *nafaqo-daaro*) appear.

Discussion by women around *cano la'an* focused particularly on the mood of their children and an observation that a lack of milk caused complaints of tiredness, hunger and thirst. This 'complaining' was perceived as an 'ugly' characteristic. The signs described by women to define malnutrition (*nafaqo-daaro*) among their children included weight loss, thinness around the face, lethargy and sickness (or more regular episodes of illness).

## Linking milk intake with malnutrition and sickness in young children

Discussion in both areas emphasized a strong perceived association between reduced milk intake by young children and weight loss and sickness or *nafaqo-daaro*. In all groups, women agreed that this happens to young children during the long dry season (*Jilaal*) (and to a lesser extent during *Hagaa*) and is linked to reduced availability of milk for young children as well as other factors (mainly disease– see Table 4 below).

This weight loss and sickness was also linked to age. Children of 1-3 years (or those that have stopped breastfeeding) were thought to be particularly vulnerable and because of this, many women agreed that any milk available is prioritized for this age group. Some women suggested that older children (> 5 years) are often out herding the animals and so would get milk in the field. Therefore they are not prioritized for milk at home.

## Other factors that are linked to malnutrition

There were several other factors, in addition to reduced availability of milk, that were linked by women to a deterioration of the nutrition and health status of young children.

Childhood illness such as fever, diarrhea, cough/cough with fever (likely to be acute respiratory infection) and malaria were associated with weight loss by all women. As a cause of malnutrition, illness was ranked as a factor as likely to cause malnutrition as reduced milk and food intake (see Table 4 below).

Table 4: Ranking of the most important causes of malnutrition

Cause of malnutrition	Median rank (range)
Reduced milk/food availability	1.5 (1-3)
Childhood infection	1.5 (1-2)
Moving long distances	2.5 (1-4)
Mother's workload, including separation from mother	2.5 (1-3)

Number of informant groups = 7

Interpretation of ranks: 1 = very likely to cause malnutrition, 4 = least likely to cause malnutrition

Measles was noted as a problem in a number of the areas visited during this study, and was reported to be the cause of recent child deaths by two of the groups interviewed. Vaccination campaigns were reported as *ad hoc*, and in the past were thought to have occurred only in response to measles outbreaks. During discussions around seasonal calendars, about half the women agreed that diarrhea, cough/cough with fever and measles were most common during the long dry season and malaria during the wet season. However, this component of the discussion was unclear or missing for some groups and needs more focused data collection and analysis.

Most groups discussed the link between the workload of women and the nutritional status of their children. In particular, all women who discussed this issue felt that the volume of breast milk was less when lactating women had to work hard, and as a result, infants needed other foods such as sugar or animal milk diluted with water. They also referred to several chores, such as fetching water and firewood and looking after animals, which led to separation of mother from child. This reduced the frequency of breastfeeding. Implicit in these discussions was the understanding by women that maintaining regular breastfeeding was crucial for the health and nutritional status of their young children and any interruption increased the likelihood of sickness and malnutrition. Traveling long distances with animals in search of pasture, particularly during drought, was also linked to the problem of interrupted breastfeeding and reduced breastmilk supply. All groups felt that very young children do not fare well during long migratory periods and for this reason, they have often stayed behind with their mothers and some milking goats when the search for water and pasture was likely to be prolonged.



*“If someone slaughters an animal for meat this is always shared with neighbors” (women in Shinile)*

Lastly, poverty and social exchange were often mentioned in discussions around food supply and malnutrition. All groups acknowledged that the poorest households had access to less milk than wealthier neighbors. However, most women also said that sharing between better and worse off households was still common.

In Somali communities '*Irmaansi*' is the practice of the better off lending a milking animal to a poorer relative or neighbor, and '*Zakat*' is the yearly Islamic redistribution of wealth (such as crops and animals) to the poor. Although these two practices were identified by all groups in the study, some groups noted that both *Irmaansi* and *Zakat* were becoming less common. They explained this change by reference to overall decreases in livestock holdings and the need for a donating household to own more than forty animals to participate; such households, in the opinion of participants, were becoming rarer.

Other factors associated with malnutrition by participants included destruction of wild foods, poor caring practices and lack of water. Each was mentioned rarely however and did not appear in the ranking exercise.

### **Factors that influence milk availability**

Subsequent discussion with participants focused on the particular issue of milk availability as a causal factor of malnutrition. Both male and female participants contributed to these discussions and those around interventions. Broad themes and issues were highlighted, many of which will need further exploration for the design of interventions.

Animal disease was highlighted by every group as an important factor that reduces milk supply across livestock species. Male participants mentioned a number of diseases that were particularly important for reducing milk supply, and these included trypanosomiasis in camels and cattle (*dhukaan, gendi*), camel pox (*furuq*), worms (*caal*) and tick infestation (*shillin*).

The issue of scarce water and pasture for animals during dry season and drought was also commonly highlighted. This is accepted as part of the pastoralist livelihood and means that animals must move, often long distances, for food and water. When animals have to move particularly long distances (during long dry seasons and drought) the impact on their health status and milk supply is particularly severe. Accessing water was much more difficult in Liben than in Shinile. Both groups in Shinile referred to shallow wells nearby that provided water for most of the year (in a normal year).

Separation of camels and cows from the women with young children during long dry seasons and drought was highlighted in both areas as an important factor affecting access to milk. At the time of this study, all camels in Liben had moved some distance from the settlement where the women and children were staying. This meant that, in most cases, the only milk available to women and children was goat milk. Many of the milking goats stayed with the women and children during the long dry season (*Jilaal*) but stopped producing milk during severe drought. In Shinile, camels and cows appeared to be more accessible during *Jilaal* and in one area cow's milk was being transported back to the settlement from the grazing areas during our visit. In severe drought however, the larger stock in this area also traveled much further for pasture, and consumption of milk by young children was severely reduced. All groups agreed that it is the men that make the decision about who should travel and who should stay behind, but usually the very young with their mothers, the sick and the elderly will stay whilst the rest will travel with the larger stock animals to find pasture. As well as some milking goats, many men also said that they leave some charcoal and money with the women to enable purchase of cereals.

## Interventions to improve access to milk by young children and their nutritional status

Again, during discussion around interventions, broad themes and issues were highlighted, many of which would need further exploration for program design. Interventions considered by all groups to be important to improve milk supply and access by young children were:

- Fodder production, on rain-fed farms in Shinile and in the riverine areas in Liben, was mentioned by all groups to address lack of pasture during drought. One group in Liben said that good rain during one year could provide fodder for 500 goats for three drought seasons. Others mentioned use of a pump or harvested water to irrigate fodder production. Land preservation (i.e. fencing of grazing land for drought) was mentioned by some; it was thought that agencies like Save the Children could play a role in raising awareness in the community for the need for this practice and could act as a coordinating body. Fodder supply during drought was discussed by all groups. One group in Liben mentioned transportation of animal fodder (e.g. grain and grass) from Mandera, Kenya.
- Animal health including the prevention and treatment of disease. Many men suggested that previously vaccination has not covered enough animals (for herd immunity) and that often vaccination did not happen until there was a disease outbreak. Some men suggested that subsidizing vaccination and treatment services was a good strategy. Several groups discussed the need for more training and drugs for community animal health workers (CAHWs) and others suggested that they (the men) would be able to treat animal disease if sufficient drugs were available for purchase. A number of diseases and infestations were mentioned that reduced milk supply (see previous page).
- In Shinile, both groups discussed possibilities for water catchment during floods (or heavy rain), which happen every year. Although water availability for animals was not such a problem in Shinile, there was agreement that clean, potable water (for human consumption) was often scarce. In Liben, discussion focused on improving and repairing water points e.g. wells, and water catchment points.
- Restocking was felt to be important. Most participants have lost animals (particularly cows and camels) in recent years. They felt that camels could help to ensure a continued supply of milk through drought, particularly to young children, although the problem of physical separation of animals from young children was not addressed. 'Jisin' was mentioned in Shinile as a traditional mechanism of restocking for those in need; it was suggested that NGOs might support this mechanism.
- A number of female participants felt that income generation projects, which work through women's groups, would ensure continued access to milk (through purchase of milk at markets) during the long dry season. They suggested projects including grinding mills, cereal stores, animal trading and brokering, vegetable trading, sale of *khat* and a tea shop.

Other interventions, thought to be important for addressing malnutrition generally in young children included:

- Treatment and vaccination for children; investment in construction and supply of clinics nearer to pastoral settlements; more training and support for community health workers (CHWs) who are particularly important for pastoral communities on the move. Many women felt that the CHWs could do more than the very basic tasks that they usually cover. It was agreed, for example, that they could provide antibiotics for acute respiratory infection which is a common childhood illness in the study areas.
- Food aid during drought, particularly foods suitable for young children such as soft flours with vitamins.



Table 5: Ranking of interventions to improve milk supply for young children during drought

Intervention	Median rank (range)
Fodder production	1 (1-4)
Animal health	2 (1-3)
Water point improvement and catchment	2 (1-2)
Restocking (camels)	3 (2-3)
Land reservation	3 (2-3)
Income generation	3.5 (3-4)

Number of informant groups = 7

Interpretation of ranks: 1 = most preferred with highest impact, 4 = least preferred

## Discussion

### Scope of the study

To our knowledge, this is one of the very few studies with Somali pastoralist communities which examine in detail the different types of food consumed by young children, seasonal variations in consumption by children in both normal and drought years, and local perceptions on linkages between food, health, season and malnutrition in children. The study aimed to move beyond the more general early warning analyses used in Ethiopia which, due to the objectives such systems, tend to use households as the primary unit of analysis and summarize different food types (such as different types of livestock milk) into a single category. Similarly, the early warning reports produced are not very useful for helping practitioners to design programs (this isn't the objective of these reports). This study was designed with programming in mind and aimed to explore the pattern of animal milk consumption by young children, how this was perceived by pastoralists in Liben and Shinile to be linked with child malnutrition and 'best bet' interventions that might address poor nutritional status of children in the study areas.

The study used recognized participatory methods which were similar to those used in other studies in pastoralist areas and which have been used and adapted by some early warning systems for many years. The methods produced simple numerical data which could be understood by a range of stakeholders, while also allowing in-depth discussion leading to narrative data. This approach produced very detailed information on how young children were fed, the reasons behind the choice of foods used, and on seasonal trends and relationships. An understanding of these factors would be very difficult to determine with quantitative approaches alone and the use of qualitative methods were the only way of capturing some of this information, particularly in terms of preferences, behaviors, attitudes and understanding of causal relationships. The research indicated that Somali pastoralists, especially women, are a valuable source of knowledge on child nutrition and within a context of a harsh environment and limited formal education, are well aware of the nutritional value of foods such as livestock milk and try to prioritize the consumption of these foods by young children. As with any research in the context of limited time and resources, there was a trade-off between additional detail and depth, and geographical coverage. It is important to note that there exists huge variation in how different pastoralist groups manage their animals, secure food and feed their children. By intention, this was a small focused study which did not aim to make recommendations beyond the specific study areas.

### The demand and perceived benefit of animal milk

Study findings demonstrate that the demand and perceived benefit of animal milk for young children is high and generally much higher than that for cereals. In Liben and Shinile, the milk of camels and goats is held in particularly high regard. This is linked to these animals' ability to produce milk through the dry season, for the perceived health benefits of the milk and for the taste. The preference of different pastoralist groups for owning certain animal species is well researched, and their herding strategy is known to be adapted to environment to maximize milk yields (Al-Najim 1991; Nauheimer 1993; Fratkin and Smith 1994; Degen 2007). Specifically, in Somali pastoralist areas, the use of camels to ensure milk supply during dry seasons and drought is very well documented (Baumann, Janzen et al. 1993; Barrs 2000; El-Agamy 2006) and helps to explain the prominent role of camels in Somali culture. The perceived health, strength and taste benefits of different animal milks are less well documented, but are nonetheless important considerations for any strategy that aims to improve animal milk intake for specific

populations. Particularly, the perception by pastoralist women in this context that cow's milk causes vomiting in young children and that camel and goat milk protect against it is interesting. In the literature, unpasteurized cow's milk is not generally thought to support intestinal parasitic growth, but there may be other factors behind these associations. The presence in camel's milk of specific immunoglobulins to human rotavirus (the main diarrhoea-causing agent in infants) for example, has been noted by one study (El-Agamy and Nawar 2004), although this would need further investigation in this context. In addition, it is camel milk that is often eaten in its soured form (*garoor*) by Somali pastoralists. The probiotic benefits for gut health of fermented (or soured) milk is widely reported (Heyman 2000; Sazawal, Hiremath et al. 2006) and may be linked to the observations here. Dried milk was almost universally ranked lowest by participants for protection against disease (see Table 2). This may be associated with the need to mix dried milk with water; the risks of which are well established in the literature (UNHCR 2006).

### **Variation in animal milk intake in young children**

The large contribution that animal milk makes to the dietary intake of young children is startling. When milk is available it is added to most complementary foods in both Liben and Shinile, and during a normal long wet season the average milk intake of a 1 year old provides about two thirds of the mean energy required and 100% of the protein required by a child of this age<sup>4</sup>. This finding alone suggests that milk still plays a critical role in the diets of young pastoral children in the study areas. This is in contrast to findings of other recent studies that have found a diminished role for milk in the diet of some pastoral populations (Coppock 1993; Sikana, Kerven et al. 1993; Fratkin 2001). However, the findings of this study have reiterated the seasonality of milk supply; a subject well covered by the literature on pastoralism (Loutan and Lamotte 1984; Lindtjørn, Alemu et al. 1993; Shell-Duncan 1995; Sellen 2000; Zeleke and Bekele 2001; Roth, Fratkin et al. 2003), and how this impacts on household food security. Our findings confirm, as others have noted, that milk supply is closely associated with rainfall. In relation to this, we looked specifically at consumption by young children and Figures 2-3 and Table 3 show that by the end of a drought year, milk intake of young children has reduced by more than 90%. It is important to note here that milk yields are not only determined by rainfall in the 'current' season but also by rainfall during past seasons; the impact of poor rainfall on livestock fertility and milk production gets progressively worse the longer the absence of any significant precipitation. This is shown in Table 3 by the very low level of milk intake by children by the end of a drought year. When milk is in short supply it is replaced, in the most part, by an increase in grain consumption, and by the end of a long dry season or drought year the grain is cooked and consumed with little else but water. Whilst the grain may prevent energy intakes in young children from dropping too dramatically, there is no doubt that such a severe reduction in milk intake has a serious impact on dietary quality by reducing the amount of high quality protein, fatty acids and micronutrients that young children consume.

### **Perceived links between animal milk intake and malnutrition**

The pastoralists involved in this study confirmed that, in their opinion, there is a direct and important association between this reduced milk intake and malnutrition (as they define it) among their young children. They use the phrase *Cano la'an* to describe 'the suffering due to the lack of milk' which is known

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<sup>4</sup> It is important to note here that, in the context of energy metabolism, without sufficient energy to meet requirements any protein supplied by food will be broken down by the body to provide energy and fill the energy gap. When energy dense foods such as cereals and oils are in short supply therefore, the amount of protein supplied by milk is likely to be reduced.

by local people as the pre-cursor to weight loss (or *nafaqo-daaro*)<sup>5</sup>. Although this work could not look specifically at how children defined as 'malnourished' by this population overlapped with those that would be defined as malnourished using international indicators of nutritional status (such as weight for height), there does appear to be agreement that weight loss plays an important role in the definition. Weight loss among young children will often lead to wasting: internationally defined as < 80% of a WHO reference weight for height (Onyango 2009). The perception by this population that low milk intake leads to weight loss, agrees with work elsewhere that has shown that high milk intake over time is protective against wasting and other forms of malnutrition in children (SCUK 2007; Dewey and Adu-Afarwuah 2008) and that has linked a reduction in milk access and supply to deteriorating nutritional status among pastoral children (Catley 1999; Fratkin, Nathan et al. 2006). In future it will be important to examine the implications of this seasonal availability of milk for patterns of nutritional status as defined by international indicators and how this overlaps with pastoralists own definitions of malnutrition in this context.

### **Improving availability and access to milk**

In the opinion of the pastoralists that participated in this study, the most effective way to improve availability and access to milk for young children is clear; that is through the maintenance of the health and nutritional status of their livestock. They identified broad areas for possible intervention, including animal health, fodder production and water supply that could help to maintain the supply of milk to children during the dry season and drought (see Table 5). The separation of larger stock from young children was also highlighted as an important factor that disrupted children's access to animal milk. It is these areas therefore that have potential to form the basis of any intervention that aims to improve children's resilience to drought and malnutrition.

Many of the programs that might fall into the broad categories discussed are not new, and there is some evidence that they can lead to real improvement in livestock health and milk production (Simpkin 1985; Nalitolela and Allport 2002; Lotira 2004; Admassu, Nega et al. 2005; Cullis, Mekonnen et al. 2007; Burns and Suji 2008). There is far less evidence however of any impact of such interventions on the nutritional status of children, and it is here that more work is needed. It is also clear that many of the interventions mentioned by study participants were externally driven; this is likely to reflect the recent experience of participants of programming by international agencies. Given the issue of milk access for young children during late dry season and drought, especially access to camel milk, it is possible that the benefits of interventions that might seem to hold potential for improving child nutrition such as veterinary care for camels or camel restocking will not be fully captured in terms of milk consumption by child children at critical times. This points to a need for careful intervention design that builds on local strategies, approaches and behaviors to ensure that milk reaches young children when they need it most. For animal health interventions this might mean a focus not only on those diseases that affect milk production most severely, or on specific groups of animals according to their relevance to milk production and calf survival (Barasa, Catley et al. 2008), but also, on the physical proximity of these animals to young children at critical times of year. Emergency supplementary feeding for animals could target those animals, such as goats, that stay close to young children during dry season and drought; restocking interventions could focus on those animals that are best at maintaining milk supply during drought, but only if this supply is accessible to young children; and community-based milk processing could target surplus milk supply from large stock that are grazing at some distance from young children, with the aim

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<sup>5</sup> The signs described by women to define malnutrition (*nafaqo-daaro*) among their children included weight loss, thinness around the face, lethargy and sickness (or more regular episodes of infection).

that milk products are transported back for their consumption. To develop an understanding of the possible benefits of such projects on child nutrition, it is crucial that they are accompanied by rigorous monitoring and impact assessment. A combination of quantitative and systematic participatory approaches and methods could fulfill this role.

### **Examining access to animal milk and childhood infection in the causal framework for malnutrition**

This study, although by no means a comprehensive analysis, has begun the process of identifying which specific factors, in the opinion of pastoralists themselves, are most likely to lead to malnutrition, particularly to episodes of weight loss, in young children in Somali Region. Our results point towards milk availability and access, along with a high incidence of childhood illness, as key in this causal framework (see Table 4). It is important to note however, that like previous work, this study was not able to provide any real insights as to the relative importance of disease versus milk consumption as a cause of malnutrition. This distinction might be particularly challenging in this context because, according to some participants of this study, considerable childhood infection occurs during '*Jilaal*' at the same time as severely reduced access to animal milk. This has been noted by other studies (SCUK 2007). More work is required for this relationship to be better understood. These study findings have reiterated that access to preventative and curative health care is extremely poor in pastoral areas like Liben and Shinile (Salama, Assefa et al. 2001; CSA, EDRI et al. 2006; Devereux 2006; Catley, Bekele et al. 2008). The presence, during recent history, of measles in two study communities was particularly worrying and would have played an important role in raising levels of wasting among young children at that time. Malnutrition in young children cannot be solved without addressing key health issues and for this reason the inclusion of a large health component in the next phase of PLI<sup>6</sup> and the launch of 'Health Matters' by Save the Children in Ethiopia is much needed. 'Health Matters' aims to improve access to primary health care for women and children in pastoralist regions of Africa<sup>7</sup> and, with PLI II, will serve as a vital complement to any of the interventions discussed here that might aim to improve dietary intake.

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<sup>6</sup> PLI II is the second phase of the USAID funded Pastoralist Livelihoods Initiative which aims to protect and strengthen the lives and livelihoods of pastoralists and ex-pastoralists in Ethiopia.

<sup>7</sup> Specifically, 'Health Matters' aims to lay the foundation for a gender-focused health care pilot initiative in pastoral areas of Ethiopia and to gather an evidence base in order to:

- Strengthen community based health care delivery systems
- Strengthen public/private partnership to improve delivery systems
- Address specific barriers to health care access faced by women and girls

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## Appendices

Appendix 1: Map showing Ethiopian administrative zones with study areas marked



Appendix 2: Seasonal calendar data from Liben and Shinile zones

	Normal Year				Drought Year			
	Gu	Hagaa	Deyr	Jilaal	Gu	Hagaa	Deyr	Jilaal
Camel milk	•••• •••• 8 (7-10)	•• • 3 (2-3)	••• ••• 6 (5-7)	•• • 3 (3-4)	•• •• 4 (2-5)	•• • 3 (2-3)	• 1 (0-3)	•• 2 (0-6)
Goat milk	•••• •••• 8 (7-11)	•• 2 (1-3)	••• ••• 6 (6-7)	•• • 3 (3-4)	•• •• 4 (4-20)	• 1 (0-2)	• 1 (0-1)	0 (0)
Cow milk	•••• •••• 8 (7-9)	•• • 2.5 (2-3)	••• ••• 6 (5-7)	•• •• 3.5 (3-4)	•• •• 4 (3-5)	• 1 (0-2)	• 0.5 (0-1)	0 (0)
Ouji	••• ••• 5.5 (3-8)	••• ••• 4.5 (3-6)	••• ••• 5 (4-6)	••• ••• 5 (3-7)	•••••• •••••• 11.5 (11-12)	•••••• •••••• 11.5 (11-12)	•••••• •••••• 10 (9-11)	•••••••• •••••••• 15 (14-16)
Soor	•••• •••• 7 (3-9)	•••••• •••••• 7 (3-7)	•• •• 4 (3-5)	•••• •••• 6 (3-7)	•• •• 4 (3-8)	•••••••• •••••••• 14 (8-16)	•••••• •••••• 10 (3-16)	•••••• •••••• 10 (8-13)
Ambula	•••••• •••••• 9	•• • 3	••• •• 5	•• • 3	•••••• •••••• 10	•••••• •••••• 11	•••••••• •••••••• 15	•••••••• •••••••• 15
Tea with milk	•• •• 4 (3-9)	••• •• 5 (3-7)	••• •• 4 (3-5)	•••• •••• 6 (3-8)	•••• •••• 8 (4-9)	•••• ••• 7 (5-11)	•••• •••• 8 (5-10)	••• ••• 6 (6-10)
Meat/meat soup	•• • 3 (2-8)	•••••• •••• 7 (3-7)	•• • 3 (3-6)	•••••• •••• 7 (3-8)	•••• •• 5 (5-14)	•••••• •••••• 10 (7-10)	•••••• •••••• 10 (4-11)	•••••• •••••• 11 (7-18)
Wild fruits	••• •• 5 (0-10)	0 (0)	•• • 3 (0-6)	•••••• •••••• 12 (10-14)	0	0	0	0
Rice/pasta	•• • 3 (3)	•••••• •••• 7 (7)	••• ••• 5.5 (4-7)	•••• ••• 4.5 (3-6)	•• •• 3.5 (0-7)	•••••• •••• 8.5 (7-10)	•••• ••• 7 (6-8)	•••••• •••••• 9.5 (7-12)
Powdered milk	0	•••• •••• 8	•• • 3	•••••• •••• 9	•• •• 4	•••• •••• 8	•• • 3	•••• •••• 7
	Gu	Hagaa	Deyr	Jilaal	Gu	Hagaa	Deyr	Jilaal

*Seasonal calendar of foods consumed by young children, Liben Zone – all data*

\* Represents the relative quantity of the food consumed by young children (greater value = larger quantity consumed). The number given is the median number of stones (minimum and maximum value)

Note: Number of informant groups = 3

Gu=long rainy season; Hagaa=dry windy season; Deyr=short rainy season; Jilaal=dry hot season

Meat soup: pieces of meat in a watery soup. The watery component is given to young children.

*Ambula*: whole grain millet, wheat or maize cooked and served with milk (or garoor preferably), sugar or ghee.

*Ouji* : a soft thin porridge made with flour (usually wheat, maize, millet, rice or a blended flour), cooked with milk or ghee, water and sugar.

*Soor*: a solid paste made from sorghum, maize, wheat or millet flour cooked with water and served with milk or ghee and sugar.

	Gu	Hagaa	Deyr	Jilaal	Gu	Hagaa	Deyr	Jilaal
Camel milk	••• ••• 5.5 (4-7)	•• •• 4 (3-4)	••• ••• 6 (5-6)	•• •• 4 (1-6)	•• •• 4 (2-6)	•• • 3 (3-4)	•• •• 3.5 (1-5)	•• • 2.5 (1-5)
Goat milk	•••• •••• 7.5 (4-8)	•• •• 3.5 (2-5)	••• ••• 5.5 (4-7)	•• • 3 (3)	•• • 3 (0-3)	•• • 2.5 (2-3)	•• •• 3.5 (1-4)	•• • 2 (1-5)
Cow milk	•••• •••• 7.5 (7-9)	•• •• 3.5 (3-6)	••• ••• 5.5 (4-7)	•• • 3 (2-3)	•• • 1.5 (0-3)	• • 1 (0-4)	•• •• 1.5 (0-3)	• • 1 (0-2)
Sheep milk	••••• •••• 9	•• •• 4	•• •• 4	•• • 3	0	0	0	0
Ouji	•• •• 4 (4)	••• •• 5 (4-6)	•• •• 4 (3-5)	•••• ••• 7 (7)	••• •• 4.5 (3-6)	••• ••• 5.5 (4-7)	•••• ••• 7 (3-11)	•••••• •••••• 12.5 (7-18)
Shuro/ Soor	•• • 3 (3-8)	•• •• 3 (3-4)	•• •• 4 (3-4)	••••• ••••• 10 (5-10)	•••• ••• 6.5 (3-10)	•••• ••• 7 (4-10)	•••• ••• 6.5 (3-10)	•••• ••• 6.5 (4-9)
Garow/ Ambula	•••• ••• 7 (7-8)	••• •• 5 (4-5)	•• •• 4 (4-6)	•• • 3 (3-4)	•• • 3 (3)	•• •• 3 (2-4)	•• • 3 (3)	•• • 2.5 (2-3)
Tea w/ milk	••• ••• 6 (4-8)	•• •• 4 (3-5)	••• •• 5 (5)	•••• •••• 5.5 (4-7)	••• ••• 5.5 (2-9)	•• •• 4 (2-6)	••• •• 5 (3-7)	•••• ••• 7 (7)
Meat/meat soup	•• • 3 (3)	•• • 3 (3-4)	••• •• 5 (5-7)	•••• •••• 9 (6-9)	••• •• 3 (2-5)	••• •• 2 (2-9)	•••• ••• 3 (3-11)	••••• •••• 6 (6-11)
Rice	•• • 3 (3-4)	••• •• 4.5 (4-5)	••• •• 5 (4-6)	•••• •••• 7 (6-8)	••• •• 4.5 (2-9)	••• ••• 6 (3-8)	•••• ••• 6.5 (3-13)	••••• •••• 8.5 (6-13)
Pasta	•• • 3 (3-4)	••• •• 5 (5-7)	••• •• 4.5 (3-5)	•••• •••• 7 (5-8)	•• •• 2 (0-7)	•• •• 2 (0-9)	•• • 3 (0-10)	•••• ••• 5.5 (0-14)
Laxoox	••• ••• 3 (3)	••• ••• 5.5 (4-6)	•• •• 3 (3-6)	•••• •••• 7.5 (7-9)	••• •• 4.5 (3-8)	•••• ••• 7 (4-14)	•••• •••• 8 (3-16)	••••• ••••• 9.5 (9-14)
Digre	•••• ••• 7	•• •• 4	••• ••• 6	•• • 3	••• •• 5	•• •• 4	••• •• 5	•• • 3
	Gu	Hagaa	Deyr	Jilaal	Gu	Hagaa	Deyr	Jilaal

**Seasonal calendar of foods consumed by young children, Shinile Zone – all data**

\* Represents the relative quantity of the food consumed by young children (greater value = larger quantity consumed). The number given is the median number of stones (minimum and maximum value)

Note: Number of informant groups = 4

Gu=long rainy season; Hagaa=dry windy season; Deyr=short rainy season; Jilaal=dry hot season

Meat soup: pieces of meat in a watery soup. The watery component is given to young children.

*Ouji* : a soft thin porridge made with flour (usually wheat, maize, millet, rice or a blended flour), cooked with milk or ghee, water and sugar.

*Soor*: a solid paste made from sorghum, maize, wheat or millet flour cooked with water and served with milk or ghee and sugar.

*Ambula*: whole grain millet, wheat or maize cooked and served with milk (or garoor preferably), sugar or ghee.

*Laxoox*: A type of injera (Ethiopian bread) made from wheat flour, sugar and oil, served with vegetable or meat soup when available.