Save the Children

A Causal Analysis of Malnutrition,
Including the Minimum Cost of a Healthy Diet

El Wak, North Eastern Province, Kenya

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A Causal Analysis of Malnutrition, Including the Minimum Cost of a Healthy Diet

El Wak, Northern Kenya

Save the Children UK

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Abbreviations

ACF	Action Contra La Faim
ASAL	Arid and Semi-Arid Lands
BMI	Body Mass Index
CTC	Community-Based Therapeutic Care
CHW	Community Health Worker
GAM	Global Acute Malnutrition
HEA	Household Economy Approach
MoH	Ministry of Health
MSF	Médecins Sans Frontières
SAM	Severe Acute Malnutrition
SFP	Supplementary Feeding Programme
TBA	Traditional Birth Attendant
WFP	World Food Programme

Executive Summary

Aims
Save the Children UK carried out a Nutrition Causal Analysis in four divisions of Mandera Central District and the division of Takaba in Mandera Western District, North Eastern Province, Kenya, from 24th September – 4th October, 2007. The study aimed at gaining a sound understanding of the causes of acute and chronic child and maternal malnutrition in the area. The aim was also to highlight what food and non-food related causes should be taken into consideration in future hunger reduction programme planning and policy work.

Methods
Drawing information from four concurrent Household Economy Assessments,[1] this broadly qualitative causal analysis of malnutrition also includes a study on the minimum cost of a locally available and healthy diet. In addition to a preliminary desk study of secondary data, the analysis consisted of qualitative data collection including: focus group discussions, key informant interviews and case histories of acutely malnourished and well nourished children as well as a specialised cost of diet survey, looking at food availability and costs in markets and amongst consumers. The Household Economy Assessment provided an analysis of household food security, economic access and affordability issues, disaggregated by wealth, and according to different seasons and years in four livelihood zones across the North Eastern Province.

Key findings (see Annex 1: El Wak Malnutrition Causal Framework)
Acute malnutrition continues to plague the population of Central Mandera District with typical rates of acute malnutrition in the under 5s as high as 15-20% and up to 30% during crisis.[2] Women are also at high risk of malnutrition; compared to national averages, a much higher percentage of pregnant women in the North Eastern Province are malnourished (BMI <18.5kg/m^2). The mostly pastoral communities are extremely marginalized. The erosion of productive assets over many years has lead to a substantial percentage of the population becoming dependant on emergency interventions, including food aid. Limited availability of food items necessary to form a balanced diet, and where availability permits, unaffordability of the balanced food basket, probably add to this dependence. Many factors have contributed to this situation, therefore calling for a multi-sector approach to have any lasting positive impact on the nutritional status of the population.

Basic causes **(policies and resources)**

Insufficient basic infrastructure

- Government investment in basic infrastructure, from roads to electricity or health, has been insufficient, leaving the population lagging far behind the rest of Kenya in terms of literacy levels, vaccination coverage, access to safe drinking water and other basic human needs. Although the former Mandera District has recently been split into three new districts (with the stated aim of encouraging greater resource allocation), and the government does recognise the need to address issues of under re-sourcing in the Arid and Semi Arid Lands of Kenya, only draft policies exist at present and resource allocations remain insufficient.

Impact of climate changes

- Climatic changes seen in this region since the 1997 El Nino phenomenon, have led to serious drought conditions and intermittent flooding. Access to fodder and water has been affected, resulting in the high loss of livestock in mainly pastoralist communities, which will take a number of years to regenerate. Consequently, a substantial proportion of this nomadic population have settled, either in satellite settlements or bigger towns, or in small rural villages, where they struggle for access to the fundamental basics of health, education, safe water, sanitation and markets. Employment

[1] See: Livelihood Profiles: Four Livelihood Zones in North Eastern Province, Kenya Assessed Using the Household Economy Approach (HEA), October 2007

[2] E.g. prevalence rates from recent nutrition surveys (results in WFH Z-Score <-2 GAM, <-3 including oedema SAM): Nutritional and baseline health survey and retrospective mortality assessment, Mandera District, Kenya, October 2006; GAM 15.3%, SAM 1.0%. ACF, Nutritional Anthropometric Surveys Results Summary, Northern and Western areas of Mandera Division, North Kenya, February – March 2007; Mandera Central and Khalalio Divisons: GAM 20.9%, SAM 1.2%; Banisa, Malkamari and Rhamu Dimtu Divisions: GAM 18.7%, SAM 1.7%; Takaba and Dandu Divisions: GAM 17.5%, SAM 2.3%.

opportunities are limited, except some daily labour and the sale of bush products. Such activities impact negatively on the environment, leading to deforestation around the bigger towns.

***Underlying causes* (sectoral issues such as healthcare)**

Poor household food security

- Varied food availability and therefore diet diversity, are extremely poor, particularly for populations in rural areas and particularly in rainy seasons; it is not possible to achieve a balanced diet with the food available in the rainy seasons in some smaller rural settlements. Main calorie sources are carbohydrates in the form of cereals, sugar and milk. No cereals are grown in the Central Mandera Mixed Pastoral Livelihood Zone therefore all cereals for household consumption have to be purchased or are received in the form of food aid or gifts. Food aid has become a major coping strategy in recent years, with the very poor getting 66% of food needs in the form of food aid. Regarding other food groups, meat is a rare luxury; vegetables are not traditionally grown or eaten in this area and are only available on the market in larger towns; fruit is only seasonally available in towns; and there appears to be little value on eggs although eggs are available, particularly in rural areas. Iron and folic acid are deficient in the cheapest available diets, particularly in the rural settlements.
- Information on cash incomes relative to the cost of food suggests major economic constraints in meeting nutritional requirements, in locations and seasons where appropriately diverse foods are available. While the cheapest adequate diet, where available, in the sampled Central Mandera locations varies between US$1,244 and $3,283 per annum for the household ($3.4-$9.0 a day average), it is estimated that those in the 'very poor' wealth group earn just over $1 a day while the 'middle poor' earn only about double this amount.
- The analyses highlight the high degree of likely dependence on food aid for basic household food security.

Social and caring practices

- There are many taboos around food during pregnancy with negative perceptions surrounding protein/iron rich foods, which are considered not good in later pregnancy due to perceptions that they can cause the baby to "grow too big" leading to obstructive labour.
- While it appears that infant and young child feeding practices have improved somewhat, overall they remain suboptimal. While mothers are commencing to breastfeed sooner after delivery than before, most mothers do not exclusively breastfeed to 6 months, instead introducing sugar/water and animal milk soon after delivery. Conversely, the introduction of other complementary foods is late (>6 months) and infrequent, and with extremely limited variety of foods in the diet, these complementary food are unlikely to be suitably nutritious.
- Caring practices for young children are also poor, in part due to the huge burden of work on women, in particular fetching water and firewood. This results in small children being left with somebody else for substantial periods of time during the day. This affects the care given to young children, in particular feeding practices, and may be one reason why the risky practice of bottle feeding among this community is very common in young children.

Public health environment

- There appear to have been some gains in child health, e.g. improved recognition of the benefit of vaccination, although vaccination coverage is still far below acceptable levels to prevent outbreaks of disease. However, facilities and in particular staffing (numbers and quality, supervision and motivation), remain basic barriers to effective service delivery (e.g. cold chains do not exist in some rural areas and appropriate staff to carry out vaccinations is not always available).
- Maternal health is still poor. TBAs remain the initial focal person in caring for pregnant women in rural areas and although some have received MoH training (in particular around identifying high risk mothers and encouraging them to go to a health facility for delivery), often distances are great (the journey to Mandera hospital can take 12-24 hours) and transportation extremely limited prohibiting timely assistance. Furthermore, the health facilities themselves do not always have the qualified personnel to deal with these complicated deliveries.
- Despite support and intervention by CARE (borehole construction and rehabilitation) and the water authority (infrastructure), water availability is problematic in this semi arid area. In addition, hygiene

poor hand washing practices). Latrines are also not widely available.

Key recommendations

Strengthening access to basic infrastructures on a par with the rest of the country

- Lobby and advocate with the government, provincial authorities and district authorities and also donors for increased resources to support and improve basic infrastructure including roads, communications, water and sanitation and health and education, in line with other areas in Kenya.
- Coordinate and work closely with the ASAL, local authorities and other implementing partners so that programmes complement other activities in the area and are in line with national policies.

Multi-pronged/integrated approach to ensure durable household food security

Consider addressing longer term food security in this area with a multi-sector approach by addressing food access, availability and utilisation, to improve dietary diversity:

- **Access:** Cash transfers (at critical times of the year for certain groups), along with safety nets for the chronically poor to ensure coverage of basic needs; support to the local markets; support to (women's) groups to develop small projects.
- **Availability:** Support local producers and markets, in order to improve availability (and consumption) of balanced foods, with a specific focus on milk, poultry and vegetables.
- **Utilisation:** In conjunction with interventions aimed at increasing food access and availability, nutrition education around:
  1) Nutritional value of foods and what constitutes a balanced diet
  2) Food hygiene and conservation/storage
  3) Nutrition education on optimal infant and young child feeding practices is also necessary

- While longer-term strategies should focus on improved food access, availability and utilisation through, for example, increased incomes and nutrition knowledge, given the high cost of the healthy diet compared to cash incomes available currently, strengthening micronutrient supplementation will be a necessary adjunct in the short term, to programmes aiming to reduce chronic malnutrition.[4]
- Any planned reductions in food aid should follow assessments to determine whether the market will respond in case of higher purchasing power and should be staged, and/or pilots might be considered prior to complete cessation.

Support informal adult education targeting both men and women

- It is necessary first to find out what the community want, how it would work and who within the community could support this type of intervention if there is an interest.

Coordination with MoH and prioritisation

- Although there are deficiencies in the current health services (most notably in staffing), the MoH is presently targeting this sector for improvement. It is suggested that SCUK should focus on one sector, and food insecurity should be the priority. Although SCUK is presently working in emergency nutrition interventions, this study confirms that there is a need to address the underlying causes and reduce malnutrition by prevention.

[3] CARE International In Kenya, Mandera Emergency water and Sanitation Programme, Report on Knowledge, Attitude and Practice (KAP), El Wak Sub-District- Mandera District, North Eastern Province, May 2006

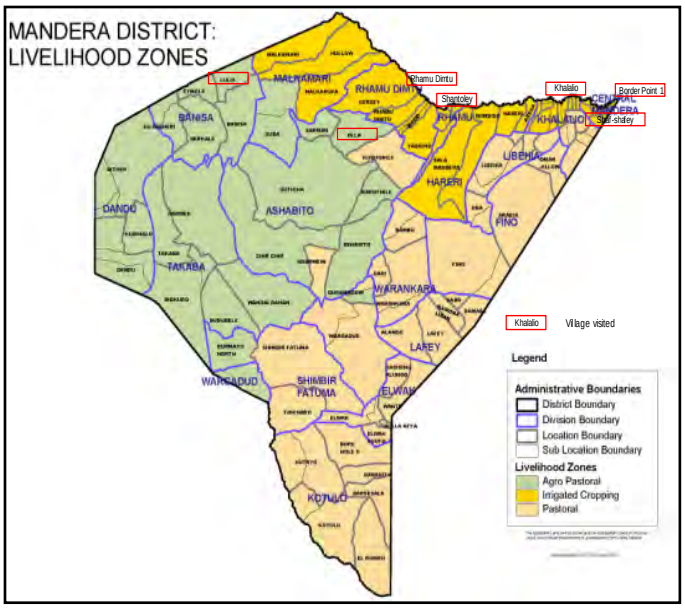
[4] Note, food fortification is unlikely to work given problems of identification of a suitable food and wide access to this food stuff year round given current market and infrastructure limitations.

1. Introduction

1.1 Background to the study

Save the Children programme in El Wak

Save the Children UK conducted assessments around El Wak town in early 2007 in response to a prolonged drought over a number of years, followed by serious flooding in November 2006. The initial response in May 2007 was a distribution of essential household items to vulnerable households, funded by the Gates Foundation. This was followed by an emergency nutrition intervention in four of the seven divisions of Central Mandera District. This present SCUK intervention funded by ECHO targets acute malnutrition through implementation of supplementary and out-patient therapeutic feeding programmes to identify and treat moderate and severe acute malnutrition and focuses on children less than five years old and malnourished pregnant and lactating women.



Objectives

Drawing on information from the relevant of four concurrent Household Economy Assessments,[5] this broadly qualitative causal analysis of malnutrition (including analysis on the minimum cost of a healthy diet) aims to:

- Gain a sound understanding of the causes of acute and chronic child and maternal malnutrition in Save the Children UK's area of operation based out of El Wak town (covering four divisions of the new Central Mandera District). Specifically, it will result in production of a causal model through exploring the immediate and underlying causes of malnutrition.
- Highlight what food and non-food related causes should be taken into consideration in future hunger reduction programme planning and policy work. Specifically, to help determine the affordability of a quality diet for cash transfer beneficiaries, and if nutritional supplement and/or other activities would be required alongside the cash transfers.

Location

Central Mandera District: The four divisions of El Wak, Shambir Fatuma, Kutolo and Wargadud where Save the Children UK have been operational in response to emergency needs since early 2007. These areas fall mostly in the Central Mandera Mixed Pastoral Livelihood Zone and, due to differences in livelihoods zones across administrative boundaries, data collection was also conducted in some parts of Takaba, West Mandera District, in the West Mandera Agropastoral Livelihood Zone (see map).

Methodologies

- Desk study of secondary data
- Qualitative data collection including: focus group discussions, key informant interviews, case histories of acutely malnourished and well nourished children, information on dietary habits
- Specialised cost of diet survey (qualitative and quantitative data collection including market and household food availability and cost)
- The Household Economy Assessment provided an analysis of household food security, economic access and affordability issues, disaggregated by wealth, and according to different seasons and years in four livelihood zones. A verification exercise was undertaken in the study sample frame of the causal and cost of diet analyses to determine utility of the HEA information deriving from 4 different livelihoods zones.

[5] See: Livelihood Profiles: Four Livelihood Zones in North Eastern Province, Kenya Assessed Using the Household Economy Approach (HEA), October 2007.

1.2 Context

Geographical and climatic
Central Mandera District, in which El Wak town is the district headquarters, lies around 5° north of the Equator. The topography consists of lowland plains between 400 and 970 metres above sea-level, with some rocky hills. There are a number of dry river beds that flow during the two rainy seasons; *main rains* are March to May, *small rains* October to December with intervening dry seasons June to September and January/February (see Annex 2 for detailed seasonal calendar). However, the rains are normally sparse, with on average only 225mm annually; ironically with more rain falling during the *small rains*.

Since the El Nino phenomenon of 1997 the rains have been more unpredictable in time and quantity. Except for the years 2002 and 2003 the rainfall has been below normal resulting in the need for an emergency response combining food aid with other interventions. From 2004 to 2006 the rainfall was extremely low leading to drought conditions, and extremely high livestock mortality and already depleted household resources were depleted even further. It is estimated that during this period 2004-2006 up to 25% of camel and goats and 50% of cattle died from the consequences of the poor rains. There was also stress migration to Ethiopia, Somalia and other parts of Kenya in search of fodder. The combination of loss of livestock and migration lead to serious negative implications for milk production and availability at the household level. In addition to this already dire situation, there were unseasonably heavy rains during the short rains (Nov/Dec 2006) leading to flooding with increased risk of communicable disease.

Population make-up and livelihoods
In Central Mandera District the population is predominantly Muslim and traditionally mainly nomadic/semi nomadic pastoralist, herding camels, cattle, sheep and goats in search of water and pasture. In the western part of Central Mandera District in the West Mandera Agropastoral Livelihoods Zone, some staple food items are planted (particularly around Shambir Fatuma).

However, over the last two decades more satellite villages/settlements have emerged and small urban/semi-urban towns have grown both in El Wak and Mandera and all over the North Eastern Province. There are numerous reasons for the population becoming more settled, of which probably first and foremost are the push factors associated with past droughts. The devastating drought of '05-'06 caused large livestock losses which forced a number of families to settle in search of other economic means of earning an income to feed and look after their families. Other, pull factors, include access to schooling for children, access to healthcare for the family and access to water and markets. The Government and WFP policy to support rural settlements has also encouraged this population to become more settled, along with clan issues among the Somali population.

The more rural the settlements, the poorer the services available, in particular health, education, access to water and typically there is no sanitation infrastructure. Unofficial schools have been opened and Koranic schools substitute the formal state school system. Markets are more limited, mainly due to poor road infrastructure. It is questionable whether some of these settlements are sustainable.

Water access and availability
Water is pivotal to the viable sustainability of this whole semi arid area. In Central Mandera District, there are a number of boreholes that support both the human population and livestock, especially during the dry seasons. In some areas, the borehole water is salty, particularly where hand-dug wells exist. Water pans have been dug where underground water has not been available or in new settlements, such as Elele.

Girls and women normally fetch the water for the household, a major labour intensive activity. They often travel long distances or queue for many hours to collect water on a daily basis. Water quality varies considerably. The deep protected boreholes are the safest, but there is a cost to purchase this water to pay for fuel and repairs. However, the majority of people in this district use unprotected wells.[6] During prolonged dry periods the water often dries up and tankering of water is necessary, but also expensive. The amount of water used by the household is below the 20 litres/p/d minimum Sphere standard with 68% using less than 20 litres.[7] Water contamination is a serious issue, in particular where water is taken

[6] CARE International In Kenya, Mandera Emergency water and Sanitation Programme, Report on Knowledge, Attitude and Practice (KAP), El Wak Sub-District- Mandera District, North Eastern Province, May 2006
[7] CARE International In Kenya, Mandera Emergency water and Sanitation Programme, Report on Knowledge, Attitude and Practice (KAP), El Wak Sub-District- Mandera District, North Eastern Province, May 2006

from the water pan it is of high risk of being contaminated at source. Protection/fencing of the water pans is normally not well organized with animals drinking in the pans. Human faecal contamination is also an issue as the water in the pans during the rainy season is mainly run-off surface water.

In Takaba (Western Mandera Agropastoral Livelihood Zone) the water situation is different and while no underground water available, making the population and livestock dependant on water pans and reservoirs, rainfall volume is higher which assists in the refilling of pans and reservoirs and permits the planting of some crops. The water pans in Takaba town in particular are well organized and well fenced and women's water committees supported by ACF manage the water resources.

CARE International has been instrumental in supporting water interventions in recent times in the El Wak area and the Arid and Semi-Arid Lands authority actively support water tankering when necessary. The Ministry of Water has also invested in the support to some water infrastructure over the last number of years.

Summary

This is a marginalised and isolated rural area with poor road infrastructure, lack of electricity and limited health and education facilities. Poor water and sanitation is a major issue. During the rainy season, road conditions are poor making some rural areas inaccessible for long periods, negatively affecting the transportation of foods and medicines and therefore limiting availability of a varied food basket in villages. In particular, it is important to note that poor road access between the dispersed settlements also affects the sale of dairy products from rural areas, as transportation to the larger semi-urban areas is extremely limited and expensive during the rainy season when commodities such as milk and eggs are more plentiful.

1.3 Nutritional status of the study population

Compiling selected available nutritional data (Table 1), highlights generally high prevalence rates of underweight among children 6-59 months of age, a composite measure which is determined by the prevalence of wasting and stunting.[8] Around 30% of all children are below the acceptable weight for their age compared to international reference populations (e.g. compared with the western Nyanza Province where comparable prevalence is 15%). Rates of stunting between about 10 and 15% are relatively low.[9] This is concurrent with the broader situation in North Eastern Province (average 24.3% compared to over 30% in other parts of Kenya).[10] Conversely, levels of wasting in North Eastern Province vary between 20-30% depending on the season, compared to around 5% in other parts of Kenya. Overall, it appears that high prevalence of wasting is the major reason for high rates of underweight in the Mandera area.

Table 1: Data on stunting and underweight - ACF nutrition surveys (see Annex 3)

		March 2006	March 2006	March 2007	March 2007
		Underweight	**Stunting**	**Underweight**	**Stunting**
Eastern Mandera	< -2 Z-Score	32.3%	15.4%	28.2%	15.6%
Central Mandera	< -2 Z-Score	30.6%	14.2%	27.6%	12.8%
Western Mandera	< -2 Z-Score	38.9%	18%	23.4%	9.8%

Acute malnutrition rates have always been problematic in this area, with huge seasonal fluxes and variations between years depending mainly on rainy season performance. ACF has conducted surveys in parts of Mandera over many years, and even with selective feeding programmes in existence and food

[8] Underweight is a condition measured by weight-for-age; a condition that can also act as a composite measure of stunting and wasting. Acute malnutrition reflects recent weight loss and is defined as weight-for-height <–2 z-scores or <80% weight-for-height median by NCHS standards and/or oedema, usually in children aged 6–59 months. This is also sometimes known as Global Acute Malnutrition. Chronic malnutrition reflects a height deficit and is defined as <–2 z-scores height-for-age by NCHS standards, usually in children aged 6–59 months. Note, differences between the body morphology of pastoral people and non pastoral people are important to recognize in explaining some of the regional variations in acute and chronic malnutrition rates. Pastoral populations have a taller and leaner body shape than other tribes in the region and this difference in body shape is exhibited from a young age. The consequence is a tendency to over estimate acute malnutrition rates and underestimate chronic malnutrition rates in pastoral populations through reference to the international reference and standard cut offs.

[9] It is important to note that unusually high variation is likely due to poor quality age data rather than being representative of real variation.

[10] Understanding Nutrition data and the causes of malnutrition in Kenya, A special report by the Famine Early Warning System Network (FEWS NET) USAID September 2006.

aid distributions taking place, the acute malnutrition rates have remained unacceptably high at around 20% <-2 WFH Z-score.[11] During the drought of '05-'06, when MSF Belgium responded in Central Mandera District, a nutrition survey conducted in March '06 indicated extremely high levels of acute malnutrition in children <5 years, which at 29.8% <-2 WFH Z-score, were significantly higher that the internationally recognised emergency threshold of WHO of >15% <-2 WFH Z-score. By the following October, with a selective feeding intervention in place and a substantial blanket food aid distribution of around 75% of the daily calorie needs per person (1575 kcal/day) to around 75% of the population[12] the rates had reduced to 15.3% <-2 WFH Z-score. However, this level may still considered above the international emergency threshold.

Malnutrition in adults is measured through looking at the Body Mass Index (a composite measure of weight and height). While Mandera level data is not available, the proportion of malnourished (chronically energy deficient) women in North Eastern Province of Kenya is higher than in other parts of Kenya, at 27.5% BMI<18.5 kg/m^2 (of which 7.4% BMI<16 kg/m^2) compared to an average of 10% nationally (of which 1.2% BMI<16 kg/m^2).[13] Maternal malnutrition is a risk factor for inter uterine growth retardation and premature deliveries, predisposing to low birth weight, rates of which are also higher in NEP than elsewhere in Kenya.[14]

Summary

The under-five year old population in the North East of Kenya, and within, in Mandera, have a much higher risk of acute malnutrition than other Kenyan children. The mothers also are poorly nourished with substantially higher levels of malnourished women than the national average.

[11] Nutritional Anthropometric Survey Results Summary, Northern and Western Areas of Mandera Division, Northern Kenya, February –March 06 and 07, Action Against Hunger – USA (ACF-USA) Kenya

[12] Nutritional and baseline health survey & Retrospective mortality assessment , Mandera district, Kenya, October 2006, MSF- Belgium

[13] Kenya Demographic and Health Survey (DHS), 2003

[14] Nb. It is worth noting that although these infants are born with low birth weights it is thought that they may be long and thin (linear growth) rather than short, which could partly explain why stunting is less prevalent but levels of acute wasting are high (the children are tall and skinny).

2. Methodology

This study comprises two different primary data collection components with data collected by two different teams: the qualitative data collection feeding in to the causal analysis, and the quantitative and qualitative data collection to permit the analysis of the minimum cost of a healthy diet. The data collection ran simultaneously and together with the secondary data review and the HEA results, the data feeds in to the overall malnutrition causal analysis and framework presented in this report. In addition, a one day visit was carried out to Mandera town to meet with authorities from the Arid and Semi-Arid Lands department to get an understanding of what policies, priorities and strategies are in place to support these communities. A meeting was also held with a community group (predominately women) based in El Wak town involved in income generating activities with funding from the Arid and Semi-Arid Lands department.

2.1 Causal analysis of malnutrition

Following review of secondary data, a data collection plan was made and questionnaires and checklists developed, revised with teams, pre tested and further revised. There was a one-day training on the study objectives and data collection tools with the teams. Primary data was collected on nutrition and feeding/caring practices of young children; food taboos, especially for pregnant and lactating women; breastfeeding and complementary feeding practices; health issues and water/sanitation issues, using a combination of questionnaires and interview/focus group discussion check lists. Interviews were conducted with different groups within the community to collect and verify different information and complement information that had previously been collected and was available as secondary data (see Annex 5 for secondary data references).

Interviews and focus group discussions were conducted with:

- Key Informants including:
  - Health staff including TBAs and CHWs
  - Teachers
  - District Commissioners
  - District Administrators
  - Senior staff within Arid and Semi-Arid Lands Department, Mandera
  - Treasurer of El Wak women's group

- Focus Group Discussions with:
  - Elders and community leaders
  - Groups of women

- Interviews with mothers of young children:
  - Malnourished
  - Non malnourished

Detailed interviews were conducted with forty mothers of young children randomly selected from the nine sites visited during the study (see Annex 4). The questionnaires addressed educational status of the women, livestock ownership (to permit wealth ranking), feeding and caring practices of the young children, and the mother's nutrition and any taboos around food during pregnancy and lactation. Data was also collected on health seeking behaviour, water, sanitation and hygiene practices. Eleven of the forty women had malnourished children in the SCUK feeding programme. A seven day dietary recall was conducted with a number of women in different sites to understand the diet diversity of a normal household in the different locations and how this varies by season. The dietary recall data was disaggregated for different members of the household including; 1) Adults and older children, and 2) Children under 2 years in different age categories: 0-5months, 6-8months, 9-11months and 12-23 months. Focus group discussions were conducted with elders and women's groups while key informant interviews were conducted with health workers including TBAs, school teachers, chiefs and administrative authorities.

2.2 Minimum cost of a healthy diet

An exhaustive list of all foods available in Central Mandera, including wild foods, was developed with the team by visiting markets and talking to community members. From this exercise, an exhaustive market data collection form was finalised. This form was used to collect and record data from a number of rural

and semi urban sites (the same sites as for the qualitative data collection undertaken for the causal analysis (see Annex 4)) on the different foods available during different seasons and the cost of this food during the different seasons. Traders and shopkeepers were interviewed where a formal market existed and groups of women were interviewed in the small rural settlements where no market existed. Data was also collected on the types of seasonal income generating activities available other than produce sale.

A food was considered to be available for a season if available for at least half the months of that season. Foods sold using local measures/containers/portion sizes were weighed, the cost recorded and later cost was calculated to a standard weight of 100g.

Data was transferred to an excel spread sheet and then analysed using the package Nutrisurvey for Linear Programming. Data from 3 semi urban and 3 rural sites are presented.

For the detailed method used to calculate the costs of the cheapest healthy diet available see Annex 6.

2.3 Geographical coverage for this study

In planning for the HEA, Eastern, Central and Western Mandera Districts were divided into three Livelihood Zones:

- Central Mandera Mixed Pastoral Livelihood Zone with camel, cattle and shoats, located in the east around the El Wak area
- Western Mandera Agropastoral Livelihood Zone (in the west) with camel and shoats, located in the west but also crossing into the western part of Central Mandera District (Shambir Fatuma and Fincharo)
- Mandera Riverine Livelihood Zone, located in the north/west of Mandera town on the border with Ethiopia surrounding the River Daua

The geographical focus of this study was mainly in the locations that SCUK is presently operating its nutrition interventions, in four divisions in Central Mandera District: Wargadud, Shambir Fatuma, El Wak and Kutulo, spanning Central Mandera Mixed Pastoral Livelihood Zone and to a lesser degree Western Mandera Agropastoral Livelihood Zone. The majority of the nutrition programme sites visited in the SCUK operational area for the causal analysis and cost of diet studies are in the Mixed Pastoralist Livelihood Zone (see Table 2). The sites for data collection were identified with the SCUK nutrition team. Most of the sites were visited on the same day the team were conducting the nutrition interventions. A total of eight sites were visited for data collection during the study (see Annex 4).

Table 2: Sites and livelihood zones for study

Mixed Pastoralist	Agro-Pastoralist
El Golicha (SCUK)	Takaba
Elele (SCUK)	Dandu
Sukela Tinfa (SCUK)	Darwer *
El Wak (SCUK)	Shambir Fatuma (SCUK)
Qurahmudn (SCUK)	Fincharo (SCUK)

* Chiefs did not allow study to take place
SCUK - sites where nutrition interventions are operational

With support from ACF, a two day field visit was undertaken deep in the Agropastoral Livelihood Zone in Western Mandera District (mainly Takaba and some surrounding villages), to collect data and ascertain if there was any difference in terms of caring practices, food availability and diversity, coping strategies and other cultural issues between the two livelihood zones that would impact on malnutrition, food availability, diversity and cost of diet.

2.4 Limitations to the study

- Given the complexity of the methods in use and the varied and multi-sector information sources, the study time frame was underestimated and could have been longer to facilitate the full analysis.
- The collection of HEA data in livelihood zones adjacent to, but not including the El Wak area, where the bulk of the primary data for the causal analysis and cost of diet analysis was collected, made it difficult to compare the different sets of data. While an HEA verification exercise completed in the El Wak area found that some differences did exist between the El Wak area and the Wajir Southern

Grassland livelihood zone (for example the much higher reliance on goat/camel milk in El Wak than in Wajir Southern), there were found to be more similarities than differences between the two livelihood zones. Nevertheless, there was a lack of complete information available on non cash income to further inform the cost of diet analyses.

- The HEA analysis was still ongoing at the start of the causal analysis and cost of diet studies, creating problems in the design of these primary data collection components and challenging the timely production of this complete causal analysis report.
- Several technical problems were faced in the analysis of the cost of diet data using the Nutrisurvey for Linear Programming software; including absence of camel milk in the database as well as the locally available wild foods. It is likely that wild foods, if included in the modelling, would improve diet quality and decrease cost, although to what extent cannot be ascertained.

3. Results

3.1 Political commitment

In the Horn of Africa, the nomadic pastoral lifestyle spans a number of countries including Ethiopia, Somalia, Djibouti, Kenya, Sudan and Tanzania. It is estimated that approximately a third of the Kenyan population (approximately 10 million people) benefit from the pastoral lifestyle. In recent years, there has been increasing awareness of the economic benefits that these communities bring to the national domestic economy, both in terms of food for the country as a whole and also financial gain from export of produce.

Policy development for pastoralist areas in Kenya is managed through the Office of the President directly by the Arid Lands Resource Management Project, indicating that this area is being given priority. Some funding has been allocated to ASAL (Arid and Semi-Arid Lands); however, it is mainly for emergency response such as water tankering. Through the ASAL, the Kenyan Government developed a *draft* policy document in 2004 called the "National Policy for the Sustainable Development of the Arid and Semi-Arid Lands of Kenya". Although an important step forward, this "groundbreaking statement of the new approaches to pastoralism",[15], has however yet to be implemented. Other countries where formal policies exist, such as Mali, Burkina Faso, Niger and Guinea, have seen benefits to pastoralist communities including increased representation, service provision and livelihoods support.

The process of addressing the arid and semi-arid lands issues has started with political decentralization, such as the recent subdivision of the district of Mandera into three smaller districts. There has been recruitment of administrative staff for each of the new districts and it is hoped that this will improve representation to the governmental structures for these communities and assist in targeting more resources to these communities at grass roots level.

Although it has been recommended that the policies need to be "comprehensive, relevant, child focused and driven by the pastoralist community"[16] there is still a long way to go before these policies become a reality.

Markets
Meat from livestock such as goats, sheep, cattle and camels are the main products available for sale in this area of Kenya and the main source of income from livelihoods. Other products include milk and by-products such as butter (ghee) and butter-milk, but, due to isolation and poor road infrastructure, market access is a major issue. Animals are sold in the semi-urban areas such as El Wak, Shambir Fatuma and Takaba for local consumption as there are legal small local abattoirs in existence; however, the vast majority of livestock is moved out of the area when being sold. Domestic markets are a long distance from the north eastern part of Kenya, and more accessible markets are those across the border in Somalia and Ethiopia.

Twenty years ago, herders travelled on foot to sell their large animals (camels and cattle) to places as far away as Nairobi; however, the migration routes with sufficient pasture and water are not accessible any more due to land fencing and scarcity of pasture in other pastoral areas. Smaller animals cannot travel as far on foot so need to be transported by truck to distant markets, but poor road conditions (particularly from Mandera as far as Garissa) prohibit movement. At present, the nearest commercial abattoir is in Nairobi. There is some government discussion taking place on funding an abattoir at Garissa to improve market access.

Healthcare and schooling
At present, static health facilities are experiencing many constraints, in particular the recruitment and retention of appropriate technical health staff. It is clear that in terms of healthcare and schooling a more mobile approach is necessary in some areas so that the services move with the pastoral communities that are mobile rather than having fewer static structures. This would particularly benefit EPI coverage to rural mobile communities and significantly impact on mortality and morbidity in young children. While authorities are considering options from other countries, the expense of maintaining and resourcing mobile facilities may be important barriers to service improvement.

[15] The Pastoral Child UNICEF ESARO July 2007.
[16] The Pastoral Child UNICEF ESARO July 2007.

The introduction of free education throughout Kenya in 2003 appears to have benefited these marginalised communities, with increase of school attendance, particularly amongst girl children. Teachers and authorities in the area voiced that there had been a substantial improvement in enrolment and attendance. School feeding programmes probably have also partly encouraged this positive trend. While current education services are by no means optimal, the changes in policy are promoting improvement in literacy levels. However, many children are still obliged to carry a labour burden, particularly in poor households, with older siblings caring for small children while mothers go for water and firewood and younger boys herding cattle for wealthier families. Sometimes the economic benefit of this child labour is minimal, but the child receives their food from outside their own household.

3.2 Livelihood zones and wealth grouping in the study sample frame[17,18]

Livelihood zoning of the study sample frame

Four Household Economy Approach assessments were undertaken in September 2007 and an assumption was made at the outset that the sample frame of the causal analysis and cost of diet analysis in the El Wak area would be similar to the Wajir Southern Pastoral Grassland Livelihood Zone and/or the West Mandera Agro-Pastoral Livelihood Zone (the HEA assessments were also conducted in Garissa Riverine Zone and a Peri-urban Livelihood Zone). This meant that findings of these HEA assessments could assist in understanding the contribution of household food and income to the causes of malnutrition, facilitating programme design accordingly. To examine this assumption a short verification exercise was conducted in the sample frame of the causal analysis and cost of diet analysis in the El Wak area, and the HEA data was examined, with emphasis on the Wajir Southern Pastoral and the West Mandera Agro-Pastoral Grassland Livelihood Zones.

Food and income sources across the livelihood zones

In all four livelihood zones, the household food comes from a number of different sources, including own crops, own livestock, purchasing food, school feeding, food aid and gifts. However, the percentage of food from the different sources can vary considerably in the different wealth groups and zones. In some zones where crops are not planted, there is no food available from this source.

Livestock are extremely important in all the livelihood zones (with the exception of the urban sub-zone) and wealth is locally defined by the types and number of livestock the household owns. In general, livestock holdings in this region have reduced over the last number of years. However, the prolonged drought in 2005-2006 further eroded the diminishing household assets substantially with estimated losses of 25% of camels and shoats and more than 50% of cattle.[19] The drought also affected fertility among the livestock with almost no offspring being produced during 2006 and camels and cattle only now producing off-spring; having serious implications for milk production. Due to conception patterns and different gestation period of the different livelihoods species, milk yields are higher during the rainy season than the dry season.[20]

For households with less livestock, income generating activities are essential for household food security especially in the dry seasons, when opportunities include casual labour such as construction and water pan digging/renovation and the collection and sale of bush products such as firewood, charcoal, construction material and gums/resins.

Ascertaining the livelihood zone of the sample study frame

As a part of the livelihood zoning verification exercise, during this study (while collecting nutrition and health data from mothers), women were asked how many of each category of animals her household owned (from a choice of camels, cattle, goats, sheep, donkeys and pack camels) to investigate

[17] With years of consecutive drought, the livelihood profiling compiled in Northeast Kenya in 2001 and 2002 needed to be updated and re-organised: 4 HEA (four livelihood zones) were undertaken in September/October 2007 to understand the economic dynamics within the household in different wealth groups and in different livelihood zones (nb. seasons are broadly similar in all four zones; there are two rainy seasons (October-December and April-June) and two dry seasons (January-March and July-September). Wealth ranking was divided into four categories which included very poor, poor, middle and better off households.

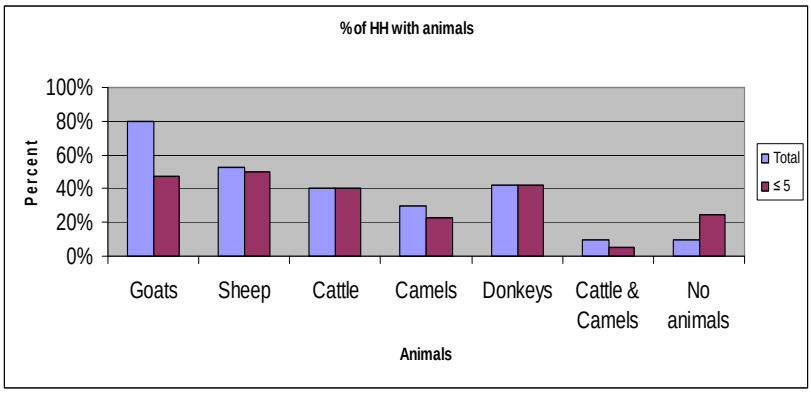
[18] Livelihood Profiles, Four Livelihood Zones in North Eastern Province, Kenya: Assessed Using the Household Economy Approach (HEA), October 2007.

[19] Long rain assessment 2006, Oxfam GB.

[20] Camels usually conceive towards the beginning of one rainy season and deliver a year later at the same time. Cattle usually conceive at the end of one rainy season and deliver nine months later at the end of the second dry season. Shoats usually conceive during a rainy season and deliver five months later during the next rainy season.

similarities between livelihood zones and wealth status of those questioned. As can be seen from Graph 1, 80% of the households interviewed had goats and over 50% sheep, only 40% had cattle and 30% camels and of the group with cattle and camels 10% had both cattle and camels. A further 10% had no livestock. However, apart from goats, most households had less than five animals of any variety. Of the 30% of households with camels, two thirds had less than 5 camels and of the 40% of households with cattle, all had fewer than 5.

Graph 1: Ownership of livestock in interviewed mother's households



Comparing the information collected during this study with the 2007 HEA wealth ranking in the Wajir Southern Grassland Pastoral Livelihood Zone there appears to be more cattle in all the wealth groups in Wajir southern grasslands with the very poor having 0-5 cattle and the poor with 3-13 cattle[21]. Wajir southern grasslands also appear to have more sheep than goats which is the reverse in El Wak/Central Mandera. In the 'middle well-off' group in Central Mandera, camels are more in numbers that cattle with on average 10 camels and 5 cattle per household for this wealth group while in the Wajir southern grasslands zone the 'middle well-off' have 10-30 cattle and 0-12 camels. There appears to be far fewer cattle in Central Mandera and fewer camels in the Wajir southern grasslands pastoral zone.

Comparisons between Wajir Southern Grasslands Pastoralist Livelihood Zone and Central Mandera Mixed Pastoral Livelihood Zone

These two livelihood zones are similar in many respects such as:

- Dependant on livestock for main source of income
- Semi arid environment similar with the same seasons and rainfall amount
- Poor infrastructure, particularly road infrastructure and rural isolation
- Access to markets difficult
- Semi-nomadic pastoralists
- Casual work particularly for the poor and very poor includes water pan digging/rehabilitation, herding and construction
- Self-employment consists of collection and sale of bush products including firewood, charcoal, and timber poles for building, gum and resins

The main difference identified:

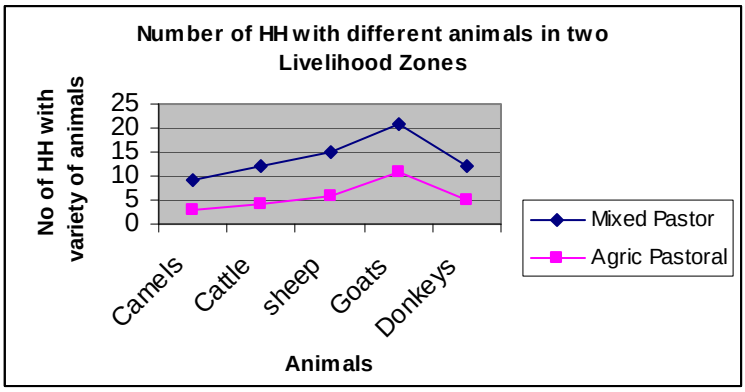
- Central Mandera appears to have more mixed livestock, with less cattle and sheep and more goats and similar percentage of camels to cattle, while Wajir South has more cattle and sheep

Mothers sampled in Central Mandera Mixed Pastoral versus Western Mandera Agro-Pastoral Zones

Comparing the variety of different animals between the two livelihood zones in Central and Western Mandera, there is little difference as shown in Graph 2. Although more households were interviewed in the Mixed Pastoralist Zone compared to the Agro-Pastoral Zone the general trends are the same in both zones. Goats are the most plentiful and camels and cattle are in a similar number of households in each zone.

[21] Livelihood Profiles, Four Livelihood Zones in North Eastern province, Kenya: Assessed Using the Household Economy Approach (HEA), October 2007

Graph 2: Number of households with different animals in two livelihood zones



Summary

It appears that within the sample of mothers interviewed, there is far less cattle owned by households in the Central Mandera Mixed Pastoral Livelihood Zone area compared to Wajir Southern Grassland Pastoral Zone, but, the coping strategies and ways of earning income are very similar. There appears to be many similarities between West Mandera Agro-pastoral livelihood zone also, except that in this area most households plant some staples for own use, and even if the quantity is low it assists in supporting household food security.

Central Mandera Mixed Pastoral Livelihood Zone

Income generating activities

It is unclear if the reduction in numbers of livestock in this livelihood zone is specifically due to the 2005-2006 severe drought (which resulted in large loss, in particular among cattle, goats and sheep) or whether there is a change in the type of livelihood as a coping strategy due to successive droughts over the past years. It also appears from the livelihood profile[22] conducted in 2002 and from interviews conducted in the course of the study, that the sedentary poor and pastoral poor previously had more shoats, camels and cattle.

Apart from economic benefits from the sale of livestock and livestock produce, there are few other opportunities for earning an income for either men or women, particularly in the most rural areas. A small source of income in the dry season only, is collecting gum from the bush. Other income sources include making small stools/tables and camel bells. Men also collect sticks and poles for sale, again during the dry season and at a small cost, earning 5-15 KSH (US$0.07-0.22) for a bundle of 10 sticks for construction.

Men and women collect firewood for sale, a bundle costs 20-30 KSH (US$0.3-0.45), with a donkey cart load for 500 KSH (US$7.44). Charcoal is sold around the bigger more populated areas (El Wak, El Golicha, Shambir Fatuma, Wargadud, Takaba and Dindu) with the price varying considerably between 150 and 350 KSH for a 50kg bag of charcoal (US$2.2-5.2). In the very rural areas, everyone collects their own firewood therefore there is no market for its sale. Men also transport stones for building purposes earning 120 KSH (<US$2) for a donkey cart load of stones (a strenuous day's labour). Casual labour includes the employment of men as porters in the larger settlements mainly to lift and carry 50Kg sacks of food earning 3-15 KSH per bag (US$0.14-0.22).

The only full time employment available in this area is herding of livestock by boys/men and domestic/household work by girls/women. Teams of women are sometimes employed on a casual basis to build the local houses and receive a fixed rate for the work usually around 100-200 KSH each (US$1.5-3.0). Finally women sometimes make mats or ropes in their homes. In general, these are not sold, especially in the more rural areas mainly due to the lack of a market; however, they are available for sale on the El Wak market. A mat can cost around 2000 KSH but it takes up to 3-4 months to actually produce it and the cost of raw material is around 1500 KSH therefore the profit is only 500 KSH (US$7.44). This is a very labour-intensive work for very minimal financial reward.

[22] Northeast Kenya Livelihood Profile, Mandera East Pastoralist Livelihood Zone, August 2002

Women's economic activities are mostly low revenue and only generate income around large settlements with permanent water-points.

Informal marketing occurs in the rural areas, where there are no formal markets, which involves the slightly wealthier people in the community purchasing extra foods in the larger town's markets and informally selling this produce on to other community members at a small profit.

The total income for the very poor through all types of activities including sale of livestock, livestock produce sale, employment (labour and remittance) and self-employment (collecting and selling firewood) is similar in both Wajir South and Central Mandera Livelihood Zones, with the annual income at US$379 -$385 (see Table 6). This equates to just about US$1a day for the household. For the better off household (middle income), the income is US$733 which is about double the income of the poor household, but they also have more food within their households as they get almost 15% of their food supply from their own livestock produce.

Food access and availability

At present, food aid (including school feeding) is the single largest component of the Central Mandera Livelihood Zone food basket, with the very poor receiving the majority of their food needs from this source: 66% in Central Mandera Mixed Pastoral zone and 60% in the Wajir Southern Grasslands Pastoral Zone. Even within the middle income group there is a high dependence on food aid (see Tables 3, 4 and 5). The other forms of food supply are through purchase and own livestock products although among the very poor, livestock product contribution is negligible at only 2% of food supply in both zones.

Table 3: Food sources (by wealth group) for Wajir Southern Grassland livelihood zone

Wajir South Grassland Livelihood Zone		**Very poor**	**Poor**	**Middle**	**Better-off**
Cereals	Purchase	17%	17%	26%	34%
	Food aid	37%	37%	23%	18%
	Own products	0%	0%	0%	0%
	Total	**54%**	**54%**	**49%**	**52%**
Pulses	Purchase	0%	0%	0%	0%
	Food aid	10%	10%	7%	5%
	Total	**10%**	**10%**	**7%**	**5%**
Sugar	**Total**	**14%**	**14%**	**18%**	**19%**
Oil	Purchase	0%	0%	0%	0%
	Food aid	5%	5%	4%	3%
	Total	**5%**	**5%**	**4%**	**3%**
Livestock products	Milk	2%	4%	13%	18%
	Meat	0%	0%	1%	2%
	Total	**2%**	**5%**	**14%**	**20%**
School feeding	**Total**	**8%**	**8%**	**11%**	**9%**
Payment in kind	**Total**	**0%**	**0%**	**0%**	**0%**
TOTAL		**94%**	**96%**	**102%**	**107%**

Table 4: Food sources (by wealth group) for Central Mandera livelihood zone

Central Mandera Pastoral		Very poor	Middle
Cereals	Purchase	19%	18%
	Food aid	43%	27%
	Own products	0%	0%
	Total	**62%**	**46%**
Pulses	Purchase	0%	0%
	Food aid	8%	7%
	Total	**8%**	**7%**
Sugar	**Total**	**10%**	**13%**
Oil	Purchase	0%	0%
	Food aid	6%	5%
	Total	**6%**	**5%**
Livestock products	Milk	2%	17%
	Meat	0%	1%
	Total	**2%**	**17%**
School feeding	**Total**	**9%**	**0%**
Payment in kind	**Total**	**0%**	**13%**
TOTAL		**97%**	**101%**

Table 5: Food sources (by wealth group) for West Mandera Agro-Pastoral livelihood zone

West Mandera Agro-Pastoral		Very poor	Poor	Middle	Better-off
Cereals	Purchase	20%	21%	28%	34%
	Food aid	25%	22%	12%	0%
	Own products	9%	12%	11%	11%
	Total	**54%**	**55%**	**52%**	**45%**
Pulses	Purchase	3%	3%	4%	5%
	Food aid	5%	4%	3%	0%
	Total	**8%**	**7%**	**7%**	**5%**
Sugar	**Total**	**12%**	**13%**	**14%**	**16%**
Oil	Purchase	2%	2%	4%	7%
	Food aid	4%	4%	3%	0%
	Total	**7%**	**6%**	**7%**	**7%**
Livestock products	Milk	4%	5%	10%	13%
	Meat	2%	2%	3%	8%
	Total	**6%**	**7%**	**13%**	**21%**
School feeding	**Total**	**11%**	**11%**	**9%**	**10%**
Payment in kind	**Total**	**0%**	**0%**	**0%**	**0%**
TOTAL		**97%**	**99%**	**101%**	**103%**

Table 6: Income sources (by wealth group) for Central Mandera and Wajir Southern Grassland livelihood zones

	Central Mandera		Wajir Southern		
	Very Poor	**Middle**	**Very Poor**	**Poor**	**Middle**
Income summary: Total (cash per year (Kenyan Shillings)	25450	49310	25975	31350	54175
Crop sales	0	0	0	0	0
Livestock product sales	0	11910	900	1800	9225
Livestock sales	1850	23600	2425	11700	44950
Employment (e.g. labour) + remittances	1600	4800	12000	7200	0
Self-employment (e.g. firewood)	16000	9000	7650	7650	0
Safety nets	0	0	0	0	0
Other	6000	0	3000	3000	0

***** Exchange rate used: US$1 = 67.2 Kenyan Shillings

Summary

At present, food security in Central Mandera Mixed Pastoral Livelihood Zone is precarious, especially among the poor and very poor. A high dependence on food aid has emerged over a number of years. Productive assets have substantially diminished over the years and income generating opportunities are extremely limited, making the lower wealth groups in particular, highly vulnerable to chronic food insecurity.

3.3 Educational status of women

Of the 40 women interviewed, none had received any formal or informal education, meaning 100% illiteracy within this group, a reflection of the very low female literacy rates more broadly in the district and province, particularly in rural areas. Most certainly, adult literacy rates are lower than national rates (74%[23]). Female illiteracy in particular has a major negative impact on how women manage resources in the home, including caring practices of young children, and limits women's opportunities to generate an income.

Nevertheless, there have been some visible changes with the introduction by the government in 2003 of free education for all children, which makes parents legally obliged to send their children to school. The management of the schools actively try to persuade parents to continue the education of all their children; a positive step forward for the right to education for children, even though there may still be many weaknesses in the education system. While this gives poor communities a better opportunity of registering and attending school, the most positive aspect of free education (voiced by several men and women interviewed during the survey) is that it gives girls in particular greater opportunity to receive an education, as evidenced by rising attendance rates. Girls were seen in school uniforms while visiting the villages/settlements and visiting a school in Dawer (a village close to Takaba), the ratio of boys to girls was around 2:1 in the lower classes, which the head teacher views as a big improvement since the introduction of free education. At present, there is still a much higher dropout of girls in the senior classes, but it is hoped this will improve over time. In Elele School, the overall ratio of boys to girls was similar and the teacher there stated that "even a short number of years ago parents did not send their boys to school as they felt the school taught western ideas and values". In the past, Koranic school substituted the state run schools in this area and was acceptable to both boys and girls.

There was a general consensus among all in the community that there was substantial value in sending girls to school, particularly from an economic standpoint, as girls who had received an education were employable and could look after their own family better than boys with a similar education level and were working. The boys married and had families of their own and in general did not give any excess money to their parents/siblings whereas the girls would send money back to their parents, even if married. In some instances there was also a higher bride price for educated girls.

[23] The State of the World's Children, 2006, UNICEF.

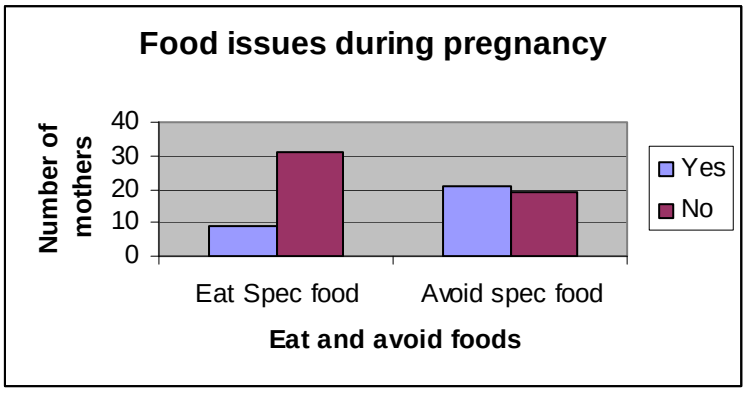
3.4 Marriage, pregnancy and nutrition

Early marriage
Traditionally in this area girls have been married off extremely young, mostly in their early teens. There is a major campaign to change this cultural practice. The formal government authorities, such as the district commissioner and administrators, have a responsibility to inform the traditional elders of the risks associated with early marriage and pregnancy in young girls. Within the health sector, these messages are similar and the TBAs received training in 2005 from the MoH which included information on the importance of changing the practice of early marriage. While the process of change is often slow, from speaking with people in the community and TBAs there is some change happening, e.g. girls may be married a fifteen years or older compared to the past when they could have been married as early as 11 or 12 years old. It is hoped that the opportunity of education for girls will also support change.

Pregnancy and lactation
In the past, once a woman reached six months of pregnancy and she was considered 'strong', the advice given was not to eat nutritious foods such as milk, meat, liver and eggs. However, this was when they had plenty of animals, the logic being that this was to prevent the baby from growing too big in the uterus and having complications during child birth. At present, people are poorer and there is a lack of nutritious foods. Although TBAs advise mothers to eat better foods, they may not be available or affordable.

Once the mother delivers her baby she is advised to only take fluids for a week, i.e. tea and milk only. The reason for this from the TBAs perspective is that "the baby is in the mother's stomach" and once the baby is born it takes the stomach a week to recover or heal so food should not be eaten.[24]

Graph 3: Food issues during pregnancy



From the interviews with the women during the study, it is clear that even though times may be hard and food less available, over half the mothers interviewed still believed certain foods should be avoided during pregnancy (see Graph 3). Nine out of forty mothers thought that liver, potatoes, meat and milk were "special foods" to be eaten during pregnancy when available. However, from Table 7 it can be seen that of the 21 mothers that thought that special foods should be avoided during pregnancy, eggs came top of the list, followed by maize, wheat and milk. Meat and liver were less common to be avoided. In one particular village, it was thought that meat taken during a funeral or if the animal was killed by a wild animal caused some sort of problem to the child's brain while in the uterus.

[24] Explanations that the baby was in a different area to the stomach caused more confusion as the main question that arose was how the baby ate and grew while in the mother. Further explanations that if the mother delivered in the hospital she would start to eat soon after delivery, elicited reasoning from the TBAs that this was because a special medicine was given in to hospital to heal the stomach.

Table 7: Foods not eaten during pregnancy (21 questionnaires)

Eggs	15	Milk	4
Wheat	4	Vitamin foods	3
Maize	7	Funeral meat	2
Liver	3	Meat killed wild animal	3
Beef	2	Beans	1
		Posho	2

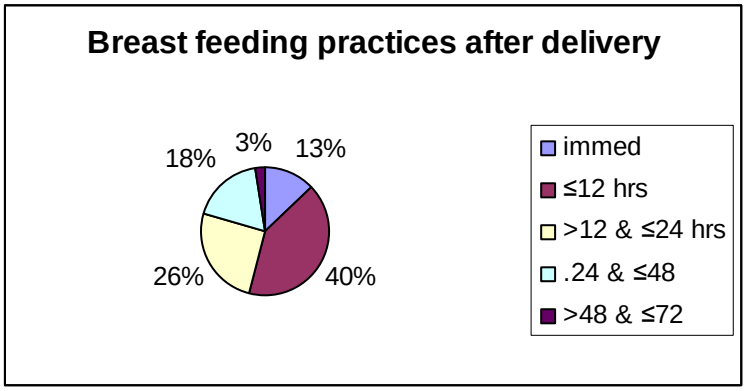
The single main reason voiced by the women for avoiding nutritious foods was to prevent the infant from growing too big in the uterus during pregnancy (12 out of 21 women's response). Some other reasons for not eating special foods during pregnancy included heartburn, food not good for the mother during pregnancy, maize scratched the stomach and wheat caused diarrhoea. It was often voiced that "vitaminous" foods were not good, but it was unclear what these foods were; one explanation was that they were protein foods.

Regarding intra household food utilisation, almost 50% of respondents stated that the father/husband ate first while the other 50% stated that children ate first at mealtime. In 90% of cases, the mother ate last at mealtime. This indicated that in general women ate last once everyone else was fed, therefore are likely to get less food and possibly poorer quality food.

3.5 Breastfeeding and complementary feeding

There has been an effort to improve infant feeding practices in the area around El Wak with the MoH conducting training with the TBAs in 2005. TBAs are the main carers for pregnant and lactating women, especially in rural communities. The CHWs are mainly men and may not have the same access to women during delivery and post delivery. Although TBAs interviewed felt that there was an improvement in the practice of breastfeeding soon after delivery and exclusive breastfeeding until six months, the reality seems different. Apparently, in the past women did not breastfeed for up to seven days after delivery, so there may have been some behavioural change, but still only 13% of women interviewed stated that they breastfed soon after delivery, while a further 40% breastfed within 12 hours of delivery. However, nearly 50% of women interviewed did not breastfeed for between 12 and 72 hours post delivery. This means that mothers introduce pre-lacteal liquids soon after birth, mainly either sugar water and/or animal milk.

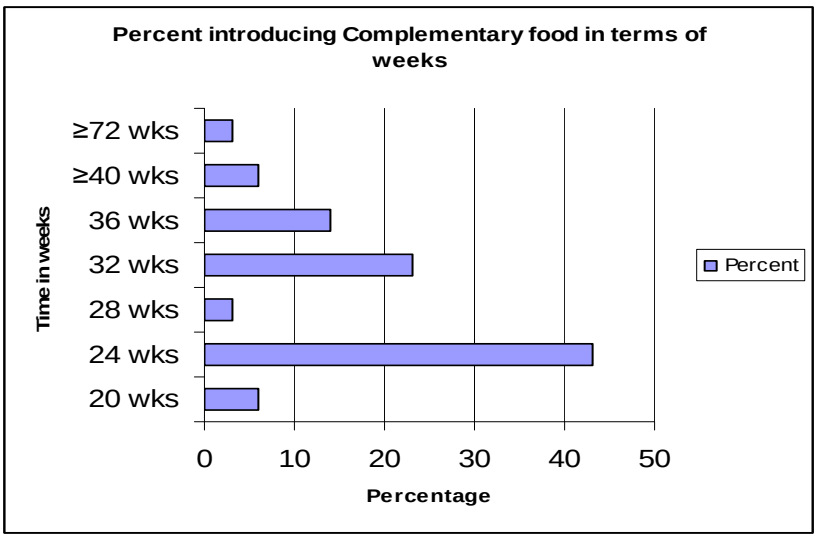
Graph 4: Breastfeeding practices after delivery



Timely complementary feeding is also suboptimal. Although animal milks may be introduced early on in the life of the child, sometimes immediately after birth, the introduction of semi-solid foods is late (WHO recommends semi-solids are introduced at 6 months). Less than 50% of interviewed mothers reported introducing complementary feeding at six months. About 25% started at 8 months, and another 25% started later than 8 months. In general, it appears that the food given is similar to what the rest of the family eats, which is a combination of *chapatti* with tea, crushed maize, rice, mashed potatoes, biscuits and animal milk. Some of the mothers interviewed said they prepared the food especially for the individual child making the food softer for the small child. But almost half of the children under 3 years eat from a common plate with other older children. 80% of the 40 mothers interviewed stated that they have bottle fed their small children: children were observed drinking from spouted cups. Some mothers

introduce cup feeding at birth when they give fluids to the baby after delivery. Mothers in general continue to breastfeed until the child is between 18-24 months old.

Graph 5: Complementary feeding trends



3.6 Caring and hygiene practices

High workloads of women and negative impact on child care

Due to huge work pressures on mothers it is difficult for them to stay at home with their young children. The single biggest chore is fetching water. It is not always a distance issue but can be time taken to queue for water; with a greater burden in the dry season. The main sources of water are boreholes and shallow unprotected wells, and where underground water is not available, water pan/reservoirs. Tankering occurs when there is a crisis in water supply. The other main activities are collecting firewood, herding goats/cattle when young children are not available and maintenance of the household/compound.

By the time an infant is six months old, at least half the mothers leave the child with somebody else. On average, half the mothers interviewed were away for 1-2 hours while the remainder were away for a longer period; anything from three to eight hours. This is a substantial time to be away from a small child being breastfed but also affects other caring practices. The main advice given to the carer is to give the child tea or milk if hungry or crying and protect from the fire. The grandmother was the main carer for 40% of those mothers interviewed, with older siblings accounting for a further 20% and neighbours/father or stepmother the other carers.

Hygiene practices

More than 75% of questioned mothers stated they washed their small children at least once daily. Poor water availability was the main deterrent for not washing children frequently. However, soap was rarely available or used, with only 25% of mothers acknowledging they used soap to wash hands. In general, the mothers felt it was important to wash hands before cooking, serving food and after going to the toilet. Only 27% of mothers interviewed had access to a latrine (own/neighbours latrine or school latrine) the remainder used the bush when they needed to go to the toilet. In Dandu (an ACF operational area), some of the people in the village had latrines and others were requesting ones as they were aware that open defaecation led to water contamination. This is a particular issue in that area as run off water during the rainy season is collected in the water pans/reservoirs and if this is contaminated it could potentially be a very serious health issue.

3.7 Access to health services

High level of vaccination coverage

Reported vaccination coverage was quite high among the children in this study (over 85%) and it appeared clear that in general women understand the importance of vaccinating children and are prepared to travel distances to receive vaccination. The mothers with un-vaccinated children stated poor access to healthcare was a barrier to uptake. Although this group of women had good vaccination

coverage this is partly because they are mainly living in semi-urban and village settlements and MSF and SCUK have been supporting vaccination coverage during nutrition and health interventions. The MSF(B) survey data[25] suggests that measles coverage is better in Central Mandera at 87% but this is mainly due to a measles campaign conducted by MSF(B) following an outbreak of measles in 2006. The overall EPI coverage of the three districts is estimated at 55%[26] which is well below acceptable levels. This is partly due to only static clinics being used for immunization and, in some areas, lack of cold chain equipment and experienced health workers.

Access to basic treatments and health support behaviour

Almost two thirds of the young children of those questioned mothers had been sick in the previous 2 weeks. The vast majority of mothers went to the nearest dispensary or hospital for treatment. Where a health facility was not close by, mothers took their children to the local CHW. In small rural settlements, some CHWs had opened small pharmacies to supply drugs to the local community. A small minority of mothers interviewed did not seek professional healthcare (less than 10%). Mothers in general were aware that ORS was for the treatment of "stomach upset" or diarrhoea, but many were not clear on what quantity of water to mix the ORS. A small number of mothers thought that ORS could be given to eat in the powder form without diluting it.

The community in general were aware of how to prevent malaria by the use of mosquito nets and had appreciated the distribution of these nets by SCUK and MSF in the past.

Perceptions from mothers of the main reasons for children becoming malnourished were a combination of illness and poor diet. The reasons given for children being 'skinny' included 1) poor parental care, 2) illness, 3) poverty, 4) lack of good diet, 5) lack of breastfeeding. Only one mother that was interviewed thought that a child could become malnourished from the "bad eye concept" ("If a neighbour said a child was in good health then it would become sick and loose weight").

Although people attend the health facilities for healthcare, these facilities are understaffed, poorly managed and lack the basic essential drugs.[27] Drugs are supplied to the dispensaries from a central base and they are not necessary the drugs that are in high demand, but what are available centrally meaning there are many expensive drugs in the stores which may never be used yet the basic life saving drugs are not available. The MoH also recognises that there are some serious issues that need to be addressed including human resource management, funding and supporting health to semi nomadic communities.[28] Staff recruitment to rural areas, staff turnover and lack of motivation are serious issues for health staff. Supervision and support to staff in rural areas is also difficult. The community recognise absenteeism as a problem.

Insufficient primary healthcare services and low capacity/coverage

Central Mandera District has one district hospital which is functioning, but not to its capacity. Parts are functioning, but the operating theatre needs to be renovated before it can be used. Surgical cases and serious obstetric cases need to be transferred to Mandera Hospital (4 hours by road). There are also four dispensaries, one in each of the divisions for the treatment of the community for all the normal communicable diseases. Although primary healthcare is recognised as the first line of healthcare in the community, supporting prevention and health education it has not been really developed as yet. The MoH has little capacity to develop primary healthcare in the immediate to medium term, therefore although the community attend the health posts/dispensaries there are many constraints.

Reliance on TBAs

TBAs are instrumental to the support to women during pregnancy, assisting during delivery and supporting mothers with breastfeeding and complementary feeding. However, these women are mainly illiterate, have received little training or support over the years to bring about change and improve practice. Many mothers still have serious food taboos around eating particular foods during pregnancy, breastfeeding practices and appropriate complementary feeding. Exclusive breastfeeding is rarely achieved. Most mothers introduce sugar/water and animal milk soon after birth and continue this practice throughout. Although the TBAs are respected in general it is difficult for then to bring change, particularly

[25] Nutritional & Baseline Health Survey & Retrospective mortality study, Mandera District, October 2006, MSF - Belgium
[26] Health and nutrition assessment, El –Wak sub district, Mandera District, Kenya, SCUK Feb 2007
[27] Health and nutrition assessment, El Wak sub district, Mandera district, Kenya. SCUK Feb 2007
[28] Mandera District Health Plan, 2007 -2008

if they are not well informed themselves. One TBA stated if she tried to get mothers to exclusive breastfeed “the mothers would only laugh at me”.

3.8 Food availability and seasonality

This is a semi arid hostile environment with low rainfall and high temperatures during the dry season. None of the forty mothers interviewed had a kitchen garden and none of the households had planted any of the main staples, even though one third of the interviews were conducted in the agro-pastoral zone (during the market data collection, it was stated that a small number of households grow maize, wheat, millet or sorghum in Takaba and to a lesser extent in Shambir Fatuma). This means that in general all food stuffs apart from those from animals are either purchased, received as a gift or come in the form of food aid.

Staples: Impact of food aid

The markets in the bigger settlements have a bigger variety of foods. However, the large amount of food aid distributions over the last number of years has also affected what is available in the market and the prices. Maize in general appears to be from food aid distributions, is not highly valued and sells cheaply at around half the price of other cereals. Maize flour (*posho)* is one of the main staples and is processed in Kenya. In general, it is available throughout the year except in very rural areas where transport is an issue during the rainy season. Wheat and sorghum have also been distributed as food aid in some areas and again sells cheaply in the market post distribution. Mothers like rice especially for the younger children as “it can be eaten alone”. This is mainly imported from Somalia and costs in general between 50 to 70 KSH per kg (75 cents to US$1); again more expensive in the rural areas. In general, rice is available throughout the year. Wheat flour is also available throughout the year. It can be purchased loose, 50kg sacks from Ethiopia or pre-packaged Kenyan flour. The Ethiopian flour is considered inferior and sells cheaper. Finally, pasta comes in two forms either loose imported from Ethiopia or pre-packaged. The pre-packaged pasta is much more expensive but available throughout the year, apart from in some isolated areas during the rainy season. However, the loose pasta (macaroni) is only available in the larger formal markets. Pasta is considered a treat and eaten occasionally, about once a month.

Seasonal availability of meat products

Meat is rarely eaten, especially in the rural areas where there are no formal butchers. In rural areas, animals are only slaughtered during ceremonies and when an animal is injured. It may also be eaten if it dies or is killed by a wild animal, and is eaten immediately. Where formal butchers exist in the larger settlements of El Wak, Wargadud, Shambir Fatuma, Takaba and El Golicha, meat is available throughout the year mainly goat and camel meat. Beef is only available at certain periods of the year even in El Wak. Meat is expensive with a kilo of goat around 200 KSH (US$3) and a kilo of camel between 120-170 KSH (US$1.7-2.5). Beef when available sells between 160-200 KSH per kg (US$2.4-3.0). Chickens are also available for sale and price is dependant of demand and availability. Prices vary considerably but are much lower in rural areas, sometimes as low as 70 KSH (US$1) while in the more urban areas or on the main roads where there is a passing trade they sell at around 200 KSH (US$3).

Dairy produce: Low milk production due to drought periods

The other main products consumed in Central Mandera District are dairy products; milk from cows, goats and camels. Goats’ milk is considered the most valuable and is the most expensive, but available quantities are much lower (see Table 8). Cows’ milk is the next most expensive and camels’ milk is the cheapest.

Goats’ milk is only available for a short period in the rainy season with one month high milk production and one month low production. Some goats conceive twice yearly so produce milk in both rainy seasons. Cattle produce offspring usually on an annual basis and produce milk for a six month period while camels only produce off-spring ever 2.5 years put produce milk for a full year. Thus, in terms of availability, quantity wise camels produce the most milk with up to 800 litres in a year while cattle produce around 200 litres and goats only produce 70 litres. In general, the highest quantity of milk from all species is during the rainy season. In past years, women made ghee from the surplus cows’ milk; however, due to high cattle mortality and low milk production in the last number of years, ghee is not being made. The drought also resulted in reduced fertility and the animals that survived the drought only started producing offspring again this year.

Table 8: Milk availability

Animals	Main lactation	Lesser lactation	Yearly	Annual milk supply
Goats	1 month @ 0.5-0.7L/day	1 month @ 0.25-0.35L/day	Maximum 2 lactations	70 litres
Cattle	3 months @ 1.5L/day	3 months @ 0.75L/day	Maximum of 1 lactation	200 litres
Camels	6 months @ 3L/day	6 months @ 1.5l/day	Maximum of 1 lactation	800 litres

Fruit, vegetables and other foods

Very poor availability of fruits and vegetables
In general, fruits and vegetables are not widely available and often not in the diet at all. Cabbage is the only green vegetable for sale and is available in El Wak and Takaba. Tomatoes and onions are the only other vegetables that appear in the market place and are seasonally available during the dry period in the larger settlements or on the main routes. Fruits available include bananas, mangos, water melon and lemons; but availability is highly limited in rural areas and items may only be available for short seasonal periods in the year in the semi-urban sites. Potatoes are the only root crop available in the semi urban markets throughout the year in general. Red beans are the main pulse available and these are only available during the dry season apart from in the main markets. This is due to both demand and cost. There is less demand for pulses when milk is more available. Peas have been available but these are sourced through food aid; yellow peas from WFP, selling in the market for a low price.

Other commodities
Sugar is a highly valued commodity and available throughout the year even in very rural areas. Tea is the main drink taken and is available loose from Ethiopia or pre-packaged (Kenyan tea) which is much more expensive. Coffee beans are sold loose and used for special occasions (ceremonies and meetings). Tomato paste is sold by the spoonful from tins. Loose spices are mixed together and then wrapped in plastic weighing around 5g and sold in this form. Roiqu cubes and Oyo (package of powder sauce 15g) are available to add to food for taste particularly in the dry season when milk is less available. In the rainy season when there is a surplus of milk, it is used as the main sauce to give food taste. Vegetable oil is sold and is the other main way of adding flavour to food. Salt is available throughout the year but is more expensive during the rainy season.

Wild food
There are a substantial number of wild foods available in this area, predominately during the rainy season. They comprise a combination of roots, wild fruit, gum, honey, seeds and a green leaf from the 'tirage' tree (see Annex 7 for detailed list of wild foods available). Some can be eaten raw and some cooked; some are used as a medicine, while others are useful when there is a lack of water available as they contain a substantial amount of liquid. The root crops seem more available during the rains and are then harvested. It is unclear to what extent these wild foods are used and how important they are in the diet. The only leaf that is eaten is normally eaten raw by children in small quantities, as a sort of snack.

3.9 Diet diversity

On conducting a seven day dietary recall with a number of women, it is clear that the diet diversity is extremely limited. The Ramadan eating pattern, with adults fasting from sunrise to sunset and eating during the night, made it more challenging to get an accurate dietary recall during this season. *Chapatti* is considered a soft food, cooked more often during Ramadan and possibly only available during this celebration.

In general, people ate one main meal daily and two small meals, sometimes just tea with milk and sugar. The main staples were *ugali* from maize flour, rice, maize or wheat crushed and cooked in water. Milk was the main sauce when available, otherwise sauces or spice cubes were purchased and used to add flavour to the diet. Oil was added when available and affordable. By and large, the diet seems to be particularly lacking micronutrients and protein, as meats and pulses are not often cooked and fruit and vegetables are mainly absent from the diet. Children eat the same diet, even the very young, often eating from the same common plate as the older children.

The diets hugely lack in variety with cereals and milk the main components of the diet. In rural areas, many women have never seen vegetables, have not cooked or tasted vegetables.

3.10 Cost of the cheapest adequate diet in study locations

The cost of diet was calculated using food prices for the 12 months prior to the data collection i.e. October 2006 to September 2007. The diet contents and costs presented in Tables 10-15 represent those cheapest diets meeting all nutritional requirements with the foods available, by season, where possible, in 3 semi urban and 3 rural locations studied.

Semi-urban locations

- *Food availability*

Table 9 presents a list of the foods available in Takaba during a dry and a rainy season as an example, showing that ***overall, the range of food available is limited throughout the year and the lack of pulses, fruits and vegetable is particularly striking during the rainy season***. The poor availability of diverse foodstuffs during the rainy seasons is in part a result of difficulties surrounding road transport. Availability of manufactured food is also low.

The computer model could not find a solution that would meet the requirements in ***iron and folic acid*** during the rainy seasons for both the child under two or the entire household in Takaba; as illustrated in Table 10.

Table 9: List of foods available and prices per 100g in Takaba during the 2nd dry and rainy seasons in Kenyan Shillings (KSH)

FOOD AVAILABLE	2nd dry	2nd rain
CHILI POWDER, RED	50,00	50,00
MAIZE, FLOUR, DRY	4,00	6,00
RICE, RAW	5,00	5,50
SORGHUM, GRAIN OR FLOUR,	1,20	N/A
WHEAT, FLOUR,	4,00	5,00
POTATO, IRISH	5,00	7,00
BEAN, KIDNEY, DRIED, RAW	5,00	N/A
CABBAGE, WHITE, RAW	4,00	N/A
TOMATO	5,41	N/A
ONION TUBER	8,70	N/A
GARLIC	37,04	N/A
LEMON	17,86	N/A
OIL	11,36	11,36
MILK, CAMEL	4,69	3,13
MILK, COW	6,25	4,69
MILK, GOAT	N/A	4,69
EGG WHITE	16,13	16,13
GOAT, RAW	20,00	20,00
CAMEL	12,00	12,00
CHICKEN, RAW	200,00	200,00
PASTAS	8,00	N/A
MACARONI	8,00	N/A
TOMATO, CONCENTRATE	12,82	N/A
BOUILLON MIX, ROIKO	50,00	50,00
SALT, NON-IODIZED	2,00	4,00
TEA (LEAF, DRY)	10,00	20,00
COFFEE (GROUND, DRY)	16,67	N/A
SUGAR	5,67	8,00
BREAST MILK	0,00	0,00

*1US$ = 67.2 KSH *N/A: Not available

Availability of diverse foodstuffs is better in El Wak and Wargadud than in Takaba during the rainy seasons enabling the computer model to determine a balanced diet in each season (see Tables 11 and 12).

- *Cost of the cheapest balanced diet*

In Wargadud, although the range of foods available is more limited during the rainy seasons, the cost of the cheapest diet tends to be lower than during the dry seasons. This could be partly explained by a substantially lower price of milk (cow and camel) during the rainy seasons. Milk is a key component of all the diets presented here. Alongside milk, beans are also systematically included alongside cereals.

The annual cost of the diet for the whole household in Wargadud is 176,485 KSH (error range: 150,012 – 220,606 which is equivalent to US$2,626 and this is close to double the cost of the diet in El Wak at 98,354 KSH (error range: 83,601 – 122,943) or US$1,464.

Rural locations

- *Food availability*

Tables 13 to 15 show that the diversity of food available is even more limited in rural areas than in semi-urban locations. The situation is particularly worrying in Elele (Table 13) where no balanced diet could be determined for the 12-23 month old child or the remainder of the household in any season. This is likely due to the non viability of this settlement which lacks adequate water access and is probably transitory. Limiting factors - i.e. lacking nutrients – are detailed in the last row of the table. Particularly noticeable are the ***deficits in folic acid*** which appears in three of the four seasons and ***iron*** for children 12-23 months.

The lack of iron and folic acid also prevents the computer model determining a balanced diet in Dindu during rainy seasons within the maximum levels set for the contribution of each food type.

In Fincharo, the pattern is different: low availability of vitamin C is the main limiting factor in all seasons for the entire household diet. It does not affect the diet of the 12-23 month old child. The computer model succeeded in meeting iron requirements from the food available and within the maximum levels set for the contribution of each food type, but only marginally.

- *Cost of the cheapest balanced diet*

As in Wargadud, Fincharo exhibits lower costs of diets during the rainy seasons than in the dry seasons. As food availability in rural areas does not allow for the determination of balanced diets, it is difficult to compare costs between rural and semi-urban areas and draw trends. The only possible comparisons are for the 12-23 month olds. In this case, the annual cost of the diet in Wargadud (6,402 KSH – error range: 5,442 – 8,003), or US$95, is equivalent to two third of the cost in Fincharo (9,929 KSH – error range: 8,440 – 12,411), or US$148. The annual cost in El Wak (3,769 KSH – Error range: 3,204 – 4,711), or US$56, is equivalent to only 38% of the cost in Fincharo. The difference is due to a higher cost of the diet during the dry season in Fincharo compared with the two other locations.

Semi-urban locations

Table 10 :

Takaba cost of diet summary

	Child 12 to 23 months				Whole household of 6 people			
Food (in grams)*	2nd rains	2nd dry	1st rains	1st dry	2nd rains	2nd dry	1st rains	1st dry
Maize flour		59		2		85		2
Sorghum		21		27		1724		1811
Potato		27		0		27		0
Kidney beans	Balanced	34	Balanced	104	Balanced	390	Balanced	474
Cow milk	diet not	49	diet not	54	diet not	1408	diet not	1363
Camel milk	feasible	102	feasible	64	feasible	1640	feasible	1602
Camel meat	with food	0	with food	0	with food	333	with food	346
White cabbage	available	0	available	7	available	0	available	7
Tomato paste		11		0		331		240
Oil		0		1		13		163
Chilli powder		0		2		0		39
Breastmilk		549		549		549		549
Daily cost in Ksh		15.0		13.6		340		317
Range		*(12.8 - 18.8)*		*(11.6 - 17.0)*		*(289 - 425)*		*(269 - 396)*
Seasonal cost		1352		1251		30587		29142
Range		*(1149 - 1690)*		*(1063 - 1564)*		*(25999 - 38234)*		*(24771 - 36428)*

* Wild food not included

Table 11 :

El Wak cost of diet summary

	Child 12 to 23 months					Whole household of 6 people				
Food (in grams)*	2nd rains	2nd dry	1st rains	1st dry	daily average	2nd rains	2nd dry	1st rains	1st dry	daily average
Sorghum	0	0	0	0	0	0	0	479	0	119
Wheat	100	103	0	101	76	2026	2045	0	2043	1530
Kidney beans	23	23	133	24	51	275	305	1902	306	696
Camel milk	107	110	49	107	93	546	551	156	548	451
Butter oil / milk fat	0	0	1	0	0	77	118	72	118	96
Oil	0	0	0	0	0	159	99	171	99	132
Mango	0	0	26	7	8	0	0	665	0	166
Banana	0	5	0	6	3	0	0	0	0	0
Powdered milk	4	3	9	4	5	351	349	356	350	352
Potato	11	0	0	0	3	0	0	0	0	0
Green pepper	0	1	0	3	1	0	189	0	191	95
Tomato paste	7	6	0	0	3	322	0	0	0	81
Breastmilk	549	549	549	549	549	549	549	549	549	549
Daily cost in Ksh	11	12	7	12	10	286	280	220	291	269
Range	*(9 - 13)*	*(10 - 14)*	*(6 - 9)*	*(10 - 14)*	*(9 - 13)*	*(243 - 357)*	*(238 - 350)*	*(187 - 275)*	*(247 - 364)*	*(229 - 336)*
Seasonal cost	975	1061	655	1077		26303	25196	20043	26812	
Range	*(823 - 1219)*	*(902 - 1326)*	*(557 - 819)*	*(916 - 1346)*		*(22358 - 32879)*	*(21417 - 31495)*	*(17037 - 25054)*	*(22790 - 33515)*	
Annual cost in Ksh	**3769**					**98354**				
Range	*(3204 - 4711)*					*(83601 - 122943)*				

* Wild food not included

Table 12:

Wargadud cost of diet summary

	Child 12 to 23 months					Whole household of 6 people				
Food (in grams)*	2nd rains	2nd dry	1st rains	1st dry	daily average	2nd rains	2nd dry	1st rains	1st dry	daily average
Maize	57	30	37	21	36	1079	555	1059	575	818
Rice	12	8	7	0	7	413	787	408	762	592
Kidney beans	47	91	84	109	83	606	720	643	711	670
Camel milk	96	87	85	87	89	1847	2094	1836	2167	1986
Cow milk	52	37	44	27	40	2693	745	2685	648	1695
Camel meat	0	0	0	0	0	0	503	0	525	256
Oil	1	0	0	0	0	180	145	180	138	161
Potato	25	0	0	0	6	0	0	0	0	0
Banana	0	0	0	0	0	0	0	0	0	0
Tomato paste	5	20	19	28	18	254	589	268	655	441
Breastmilk	549	549	549	549	549	549	549	549	549	549
Daily cost in Ksh	16	19	16	19	18	444	518	444	529	484
Range	*(14 - 20)*	*(16 - 24)*	*(14 - 20)*	*(16 - 24)*	*(15 - 23)*	*(377 - 555)*	*(440 - 648)*	*(377 - 555)*	*(450 - 661)*	*(411 - 605)*
Seasonal cost	1469	1697	1462	1774		40838	46597	40404	48647	
Range	*(1249 - 1836)*	*(1442 - 2121)*	*(1243 - 1828)*	*(1508 - 2218)*		*(34712 - 51048)*	*(39608 - 58247)*	*(34343 - 50505)*	*(41250 - 60809)*	
Annual cost in Ksh	6402					176485				
Range	*(5442 - 8003)*					*(150012 - 220606)*				

* Wild food not included

Table 13:

Elele cost of diet summary

Rural locations

	Child 12 to 23 months				Whole household of 6 people			
Food (in grams)*	2nd rains	2nd dry	1st rains	1st dry	2nd rains	2nd dry	1st rains	1st dry
Kidney beans	Balanced diet not feasible with food available	Balanced diet not feasible with food available	Balanced diet not feasible with food available	Balanced diet not feasible with food available	Balanced diet not feasible with food available	Balanced diet not feasible with food available	Balanced diet not feasible with food available	Balanced diet not feasible with food available
Goat milk								
Camel milk								
Camel meat								
White cabbage								
Breastmilk								
Lack of :	Iron, folic acid	Zn, iron, folic acid	Iron, folic acid	Ret equiv, Calcium	Fat, folic acid *Bordeline iron*	Folic acid, B12	Folic acid, fat *borderline iron*	Pantoth acid, ret equiv, B2, Ca

* Wild food not included

Table 14 :

Dindu cost of diet summary

Child 12 to 23 months

Food (in grams)*	2nd rains	2nd dry	1st rains	1st dry
Maize		49		0
Rice		12		3
Kidney beans	Balanced	51	Balanced	118
Potato	diet not	30	diet not	15
Camel milk	feasible	99	feasible	114
Cow milk	with food	8	with food	64
Oil	available*	0	available*	0
Tomato paste		17		0
Breastmilk		549		549
Daily cost in Ksh		14		11
Range		*(12 - 18)*		*(9 - 14)*
Seasonal cost		1267		32399
Range		*(1077 - 1584)*		*(27540 - 40499)*

Whole household of 6 people

2nd rains	2nd dry	1st rains	1st dry
	0		940
	333		423
Balanced	1088	Balanced	716
diet not	30	diet not	15
feasible	958	feasible	2136
with food	455	with food	2705
available*	188	available*	166
	246		237
	549		549
	352		290
	(299 - 440)		*(247 - 363)*
	31694		26712
	(26940 - 39618)		*(22705 - 33390)*

* Wild food not included

* Lack of iron and folic acid

Table 15:

Fincharo cost of diet summary

Child 12 to 23 months

Food (in grams)*	2nd rains	2nd dry	1st rains	1st dry	daily average
Kidney beans	83	83	83	83	83
Cow milk	350	380	350	350	357
Camel milk	87	87	87	87	87
Breastmilk	549	549	549	549	549
Daily cost in Ksh	20	34	20	35	27
Range	*(17 - 25)*	*(29 - 43)*	*(17 - 25)*	*(30 - 44)*	*(23 - 34)*
Seasonal cost	1831	3077	1824	3197	
Range	*(1556 - 2289)*	*(2616 - 3846)*	*(1550 - 2280)*	*(2718 - 3996)*	
Annual cost in Ksh	**9929**				
Range	*(8440 - 12411)*				

* Wild food not included

Whole household of 6 people

2nd rains	2nd dry	1st rains	1st dry
Balanced diet not feasible with food available*	Balanced diet not feasible with food available*	Balanced diet not feasible with food available*	Balanced diet not feasible with food available*

* Lack of availability of vitamin C
Borderline for iron

Comparing the cost of diet with household income

Unaffordability of balanced diet

The cost of the diet is usually compared with Household Economy Analysis data on households' income (including non cash income) for the different wealth groups. The comparison enables us to determine whether households from various socio-economic groups can afford the diet overall for a year and in different seasons. Amongst other uses, the result of the comparison can contribute to determining levels and types of transfers (food or cash) when these are considered an appropriate response to mitigate an income gap. It can also provide useful data for decision making on micronutrient supplementation or fortification need and can contribute to prioritization of resources by identifying areas where households are the least likely to meet their macro and micro nutrients requirements.

Different geographic coverage prevented direct comparisons between the data from the Cost of Diet and that of the HEA. However, the substantial disparity between the cash income of the very poor and the cost of the cheapest diet locally available is likely to be similar across locations. As evidenced in the HEA verification exercise (see Table 6), the incomes of the very poor and middle income households in Central Mandera District are far below the cost of the cheapest balanced diet. While the annual income of the very poor is only US$379 (KSH 25,450) (and for the middle income US$734 (KSH 49,310)), the annual cost of the cheapest balanced diet for a household varies between US$1,244 (83,601 KSH) and US$3,283 (220,606 KSH) in El Wak and Wargadud, respectively (US$3.4-$9.0 a day average). The cheapest balanced diet is over three times the annual cash income of the very poor and close to two times the annual cash income of the middle income households, suggesting that the majority of households are unable to afford a balanced diet. At present, the very poor are receiving 66% of their food in the form of food aid and this may be the reason why they are still able to cope.

Summary

Overall, the range of food available is limited throughout the year in all locations. Food diversity is particularly low during the rainy seasons when fruits and vegetable are not or hardly available; only one pulse is available and few manufactured foods reach the area.

Food diversity is more limited in rural areas than in semi-urban locations: balanced diets are not reachable in rural areas during the rainy seasons; the likelihood of meeting micronutrient requirements is reduced when one of the two risk factors (rural or rainy season) is present; micronutrients deficiency is particularly worrying in Elele throughout the year; and the recurrent limiting factors to reach a balanced diet appear to be lack of iron and folic acid (other micronutrients deficiencies feature less systematically). Iron and folic acid considerably push up the cost of the cheapest healthy diet.

Despite lower food diversity, the cost of the diet appears to be lower during the rainy season in some locations as milk is cheaper then. In addition, it would appear that the diet costs more in rural areas than in semi-urban during dry seasons, probably as a consequence of the transportation difficulties (poor roads and long distances), limited availability pushing up prices and distant non domestic sources of some foods.[29] Cash incomes are likely to be far below the cost of the available healthy diets, which together with the data indicating poor diverse food availability, suggest high reliance on food aid.

[29] Further investigation should be made in to cost variations by locations, including examination of proxy income indicators such as daily labour rates per season and in kind income from e.g. firewood collection.

4. Conclusions and Recommendations

4.1 Conclusions

Acute malnutrition continues to plague the population of Central Mandera District with typical rates of acute malnutrition in the under 5s as high as 15-20% and up to 30% during crisis.[30] Women are also at high risk of malnutrition; compared to national averages, a much higher percentage of pregnant women in the North Eastern Province are malnourished (BMI <18.5kg/m^2). The mostly pastoral communities are extremely marginalized. The erosion of productive assets over many years has lead to a substantial percentage of the population becoming dependant on emergency interventions, including food aid. Limited availability of food items necessary to form a balanced diet, and where availability permits, unaffordability of the balanced food basket, probably add to this dependence. Many factors have contributed to this situation, therefore calling for a multi-sector approach to have any lasting positive impact on the nutritional status of the population.

Basic causes **(policies and resources)**

Insufficient basic infrastructure

- Government investment in basic infrastructure, from roads to electricity or health, has been insufficient, leaving the population lagging far behind the rest of Kenya in terms of literacy levels, vaccination coverage, access to safe drinking water and other basic human needs. Although the former Mandera District has recently been split into three new districts (with the stated aim of encouraging greater resource allocation), and the government does recognise the need to address issues of under re-sourcing in the Arid and Semi Arid Lands of Kenya, only draft policies exist at present and resource allocations remain insufficient.

Impact of climate changes

- Climatic changes seen in this region since the 1997 El Nino phenomenon, have led to serious drought conditions and intermittent flooding. Access to fodder and water has been affected, resulting in the high loss of livestock in mainly pastoralist communities, which will take a number of years to regenerate. Consequently, a substantial proportion of this nomadic population have settled, either in satellite settlements or bigger towns, or in small rural villages, where they struggle for access to the fundamental basics of health, education, safe water, sanitation and markets. Employment opportunities are limited, except some daily labour and the sale of bush products. Such activities impact negatively on the environment, leading to deforestation around the bigger towns.

Underlying causes **(sectoral issues such as healthcare)**

Poor household food security

- Varied food availability and therefore diet diversity, are extremely poor, particularly for populations in rural areas and particularly in rainy seasons; it is not possible to achieve a balanced diet with the food available in the rainy seasons in some smaller rural settlements. Main calorie sources are carbohydrates in the form of cereals, sugar and milk. No cereals are grown in the Central Mandera Mixed Pastoral Livelihood Zone therefore all cereals for household consumption have to be purchased or are received in the form of food aid or gifts. Food aid has become a major coping strategy in recent years, with the very poor getting 66% of food needs in the form of food aid. Regarding other food groups, meat is a rare luxury; vegetables are not traditionally grown or eaten in this area and are only available on the market in larger towns; fruit is only seasonally available in

[30] E.g. prevalence rates from recent nutrition surveys (results in WFH Z-Score <-2 GAM, <-3 including oedema SAM): Nutritional and baseline health survey and retrospective mortality assessment, Mandera District, Kenya, October 2006; GAM 15.3%, SAM 1.0%. ACF, Nutritional Anthropometric Surveys Results Summary, Northern and Western areas of Mandera Division, North Kenya, February – March 2007; Mandera Central and Khalalio Divisons: GAM 20.9%, SAM 1.2%; Banisa, Malkamari and Rhamu Dimtu Divisions: GAM 18.7%, SAM 1.7%; Takaba and Dandu Divisions: GAM 17.5%, SAM 2.3%.

towns; and there appears to be little value on eggs although eggs are available, particularly in rural areas. Iron and folic acid are deficient in the cheapest available diets, particularly in the rural settlements.

- Information on cash incomes relative to the cost of food suggests major economic constraints in meeting nutritional requirements, in locations and seasons where appropriately diverse foods are available. While the cheapest adequate diet, where available, in the sampled Central Mandera locations varies between US$1,244 and $3,283 per annum for the household ($3.4-$9.0 a day average), it is estimated that those in the 'very poor' wealth group earn just over $1 a day while the 'middle poor' earn only about double this amount.
- The analyses highlight the high degree of likely dependence on food aid for basic household food security.

Social and caring practices

- There are many taboos around food during pregnancy with negative perceptions surrounding protein/iron rich foods, which are considered not good in later pregnancy due to perceptions that they can cause the baby to "grow too big" leading to obstructive labour.
- While it appears that infant and young child feeding practices have improved somewhat, overall they remain suboptimal. While mothers are commencing to breastfeed sooner after delivery than before, most mothers do not exclusively breastfeed to 6 months, instead introducing sugar/water and animal milk soon after delivery. Conversely, the introduction of other complementary foods is late (>6 months) and infrequent, and with extremely limited variety of foods in the diet, these complementary food are unlikely to be suitably nutritious.
- Caring practices for young children are also poor, in part due to the huge burden of work on women, in particular fetching water and firewood. This results in small children being left with somebody else for substantial periods of time during the day. This affects the care given to young children, in particular feeding practices, and may be one reason why the risky practice of bottle feeding among this community is very common in young children.

Public health environment

- There appear to have been some gains in child health, e.g. improved recognition of the benefit of vaccination, although vaccination coverage is still far below acceptable levels to prevent outbreaks of disease. However, facilities and in particular staffing (numbers and quality, supervision and motivation), remain basic barriers to effective service delivery (e.g. cold chains do not exist in some rural areas and appropriate staff to carry out vaccinations is not always available).
- Maternal health is still poor. TBAs remain the initial focal person in caring for pregnant women in rural areas and although some have received MoH training (in particular around identifying high risk mothers and encouraging them to go to a health facility for delivery), often distances are great (the journey to Mandera hospital can take 12-24 hours) and transportation extremely limited prohibiting timely assistance. Furthermore, the health facilities themselves do not always have the qualified personnel to deal with these complicated deliveries.
- Despite support and intervention by CARE (borehole construction and rehabilitation) and the water authority (infrastructure), water availability is problematic in this semi arid area. In addition, hygiene practices are pervasively poor (water contamination during drawing, transportation and storage,[31] poor hand washing practices). Latrines are also not widely available.

4.2 Key recommendations

Strengthening access to basic infrastructures on a par with the rest of the country

- Lobby and advocate with the government, provincial authorities and district authorities and also donors for increased resources to support and improve basic infrastructure including roads, communications, water and sanitation and health and education, in line with other areas in Kenya.
- Coordinate and work closely with the ASAL, local authorities and other implementing partners so that programmes complement other activities in the area and are in line with national policies.

[31] CARE International In Kenya, Mandera Emergency water and Sanitation Programme, Report on Knowledge, Attitude and Practice (KAP), El Wak Sub-District- Mandera District, North Eastern Province, May 2006

Multi-pronged/integrated approach to ensure durable household food security

Consider addressing longer term food security in this area with a multi-sector approach by addressing food access, availability and utilisation, to improve dietary diversity:

- **Access:** Cash transfers (at critical times of the year for certain groups), along with safety nets for the chronically poor to ensure coverage of basic needs; support to the local markets; support to (women's) groups to develop small projects.
- **Availability:** Support local producers and markets, in order to improve availability (and consumption) of balanced foods, with a specific focus on milk, poultry and vegetables.
- **Utilisation:** In conjunction with interventions aimed at increasing food access and availability, nutrition education around:
  1) Nutritional value of foods and what constitutes a balanced diet
  2) Food hygiene and conservation/storage
  3) Nutrition education on optimal infant and young child feeding practices is also necessary

- While longer-term strategies should focus on improved food access, availability and utilisation through, for example, increased incomes and nutrition knowledge, given the high cost of the healthy diet compared to cash incomes available currently, strengthening micronutrient supplementation will be a necessary adjunct in the short term, to programmes aiming to reduce chronic malnutrition.[32]
- Any planned reductions in food aid should follow assessments to determine whether the market will respond in case of higher purchasing power and should be staged, and/or pilots might be considered prior to complete cessation.

Support informal adult education targeting both men and women

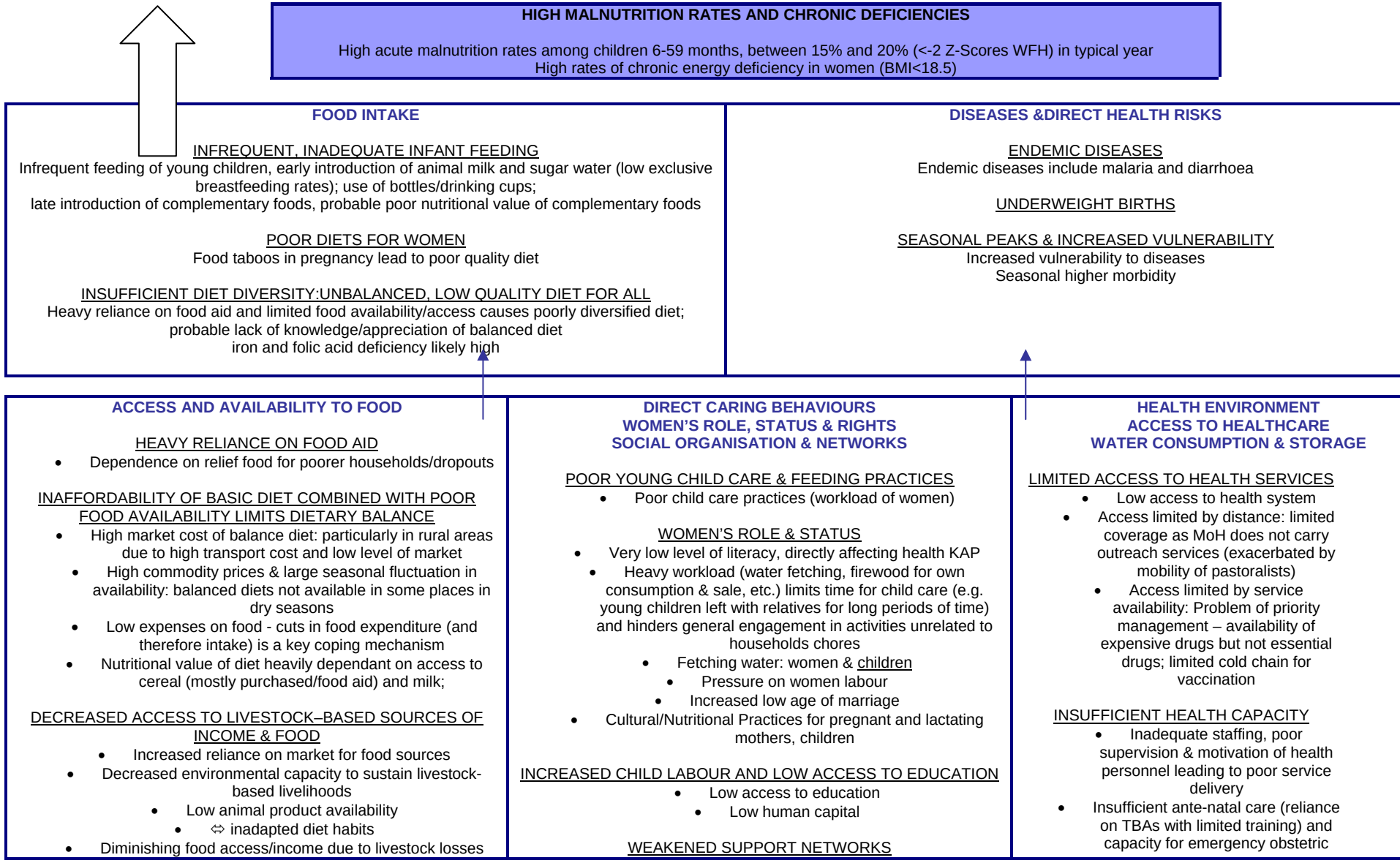
- It is necessary first to find out what the community want, how it would work and who within the community could support this type of intervention if there is an interest.

Coordination with MoH and prioritisation

- Although there are deficiencies in the current health services (most notably in staffing), the MoH is presently targeting this sector for improvement. It is suggested that SCUK should focus on one sector, and food insecurity should be the priority. Although SCUK is presently working in emergency nutrition interventions, this study confirms that there is a need to address the underlying causes and reduce malnutrition by prevention.

[32] Note, food fortification is unlikely to work given problems of identification of a suitable food and wide access to this food stuff year round given current market and infrastructure limitations.

Annex 1: El Wak Malnutrition Causal Framework



over drought years; particularly decreased milk production in dry seasons compared to pre-drought levels • Households more fully dependant on livestock and who reached unsustainable herd size probably more hard-hit than poorer households who already relied on casual labour before the drought <u>WEAKENED LIVELIHOODS</u> • Increased economic reliance on non-renewable bush products sales • Increased economic reliance on unreliable labour markets • Lower food production & income • Negative impact of aid on price of local maize • Limited/no capacity to replace lost assets • Access to credit dependant on number and health of animals • Improvement in animal health still fragile especially as no preventive animal health (vaccinations, etc.) and questionable surge capacity: key risk as livestock is still recovering from drought	• Drought has affected existing support networks in terms of volume: direct impact on zakat donations for instance, as percentage of wealth • Important support network within wealth groups and between wealth groups	care (distance, staffing insufficient) • Endemic diseases are not managed on time/well <u>BELOW STANDARD ACCESS TO WATER</u> • Necessity to pay and transport water, especially during dry season (when surface water unavailable) • Limited access (below <20l/pppd) • Poor water quality and use of unprotected water sources • Limited storage capacity <u>POOR HYGIENE PRACTICES</u> • Lack of knowledge of good personal and environmental hygiene practices • Limited number of latrines • Increased sanitation and health issues due to increased population density in settlements.

LOCAL PRIORITIES

• Sanctity of animals: i.e. reduced animals hence capacity to cope with new crisis limited – animals WILL NOT be sold to cover healthcare expenses for instance (particularly if woman or child affected). High number of children dropping out of school due to insufficient number of livestock.
• Similar focus on preserving surviving herds with water transport for instance: women transporting water long distances even if HH has capacity to rent or buy donkey through selling off other animals
Small stocks may be sold to cover for specific food items, however (sugar, milk)

ENVIRONMENTAL FACTORS – INCREASED FREQUENCY OF DROUGHTS

• Overgrazing, no contingency pastures and water points
• Low environmental capacity to sustain pastoral livelihoods
• More frequent, abnormal migration patters and increased settlements

FORMAL & INFORMAL INFRASTRUCTURES

• Dearth of essential infrastructure and/or lack of sustainability: includes education system, water
• Insufficient public health system: infrastructure, personnel
• Inadequate access (poor quality of road) raises transaction cost for trade and access to basic services
• Policy and cultural dynamics increasing the number of small unsustainable settlements where facilities cannot be provided but at high cost.

POLITICAL CONTEXT

• No pastoral policy
• Lack of efficient development policy, poor market linkages
• Lack of efficient urbanisation policy
• Chronic neglect of North East Province
• Insufficient provision of basic services: health, extension workers, etc.
• Changes may take place in the near future with El Wak becoming a district in its own right

Annex 2: Seasonal Calendar, Mandera Central District

Month	Climate	Important/religious event	Pastoralism	Agriculture	Economic Activities	Health situation
January	Hot and dry Cold nights	- Idd ul Hajj animal slaughter*[33] - Schools open; fees	- Livestock away at water points - Water pans emptying - Fetch water for animals at home	Maize crop ripening	- Animal sales for Idd and fees -Firewood collection[34] - stone and sand collection -Gum Arabica collecting***[35]	- URTI - Conjunctivitis -Skin diseases
February	Hot and dry Warm nights	Zhakhat collection*	- As above.	Maize crop harvesting	Animal sales for cash	As above
March	Beginning long rains		- Animals move nearer to homes - Milk available from goats	-Land preparation - Planting	Sale of milk	-Malaria season begins -Diarrhoea cases increase
April	Long rains Cold nights	Schools close	- Plenty of milk -Good animal prices - Water pans fill up		People move to Badias Home repairs	- Malaria - Diarrhoea - Pneumonias
May	End of rains	Schools open	- Plenty of fodder - Water pans full - plenty of milk	Weeding	Animal sales for fees	Malaria - Diarrhoea
June	Hot and dry		- Pans drying out - Animals back to water sources			
July	Cold dry		-Animals fat -Good market prices - Diminishing milk & fodder	-Maize crop harvest -Grain prices fair		pneumonias
August	Hot, dry, windy and dusty	Schools close	No milk			- URTI - Eye and skin diseases
September	Hot and dry	Schools open	- No milk -Use of stored fodder		-Sale of animals for fees	
October	Beginning of short rains	Ramadan* Idd Ul Fitr*	- Fodder grows - Camels calf - Milk available	Fields prep Maize planting		diarrhoea
November	Rains continue	Schools close	-plenty of milk	weeding		Diarrhea malaria
December	End of short rains	Schools closed	-plenty of milk	weeding		

* Dates vary from year to year according to Muslim lunar calendar
** Firewood collection for sale happens all year round, an activity mainly for women. Prices are low.
*** Gum Arabica for sale is collected all year round especially by men. It fetches a good price, about 60 KSH/kilo

Annex 3: Data on Stunting from the ACF Nutrition Surveys

Stunting and underweight data for Mandera district selected divisions from 2006 and 2007 nutrition survey data

1) Rhamu, Rhamu Dimtu, Hareri and Malkamari Divisions March 2006

Weight for Age in Z scores			Height for Age in Z score			Weight for Age in % Median			Height for Age in % Median		
Status	**n**	**%**	**Status**	**n**	**%**	**Status**	**n**	**%**	**Status**	**n**	**%**
< -3 SD	49	5.2%	< -3 SD	28	3.0%	< 70 %	66	7.0%	< 70 %	0	0.0%
< -2 SD and ≥ -3 SD	257	27.1%	< -2 SD and ≥ -3 SD	118	12.4%	< 80 % and ≥ 70 %	280	29.5%	< 80 % and ≥ 70 %	0	0.0%
< -2 SD	306	32.3%	< -2 SD	146	15.4%	<80%	346	36.5%	<80%	0	0.0%
≥ -2 SD	642	67.7%	≥ -2 SD	802	84.6%	≥ 80 %	602	63.5%	≥ 80 %	948	100.0%

2) Mandera, Khalalio and Libehia Divisions March 2006

Weight for Age in Z scores			Height for Age in Z score			Weight for Age in % Median			Height for Age in % Median		
Status	**n**	**%**	**Status**	**n**	**%**	**Status**	**n**	**%**	**Status**	**n**	**%**
< -3 SD	52	5.5%	< -3 SD	31	3.2%	< 70 %	71	7.4%	< 70 %	0	0.0%
< -2 SD and ≥ -3 SD	240	25.2%	< -2 SD and ≥ -3 SD	104	10.9%	< 80 % and ≥ 70 %	251	26.3%	< 80 % and ≥ 70 %	0	0.0%
< -2 SD	292	30.6%	< -2 SD	135	14.2%	<80%	322	33.8%	<80%	0	0.0%
≥ -2 SD	662	69.4%	≥ -2 SD	819	85.8%	≥ 80 %	632	66.2%	≥ 80 %	954	100.0%

3) Banissa, Dandu, Takaba and Ashabito divisions March 2006

Weight for Age in Z scores			Height for Age in Z score			Weight for Age in % Median			Height for Age in % Median		
Status	**n**	**%**	**Status**	**n**	**%**	**Status**	**n**	**%**	**Status**	**n**	%
< -3 SD	77	8.10%	< -3 SD	42	4.40%	< 70 %	91	9.60%	< 70 %	0	0.0%
< -2 SD and ≥ -3 SD	292	30.80%	< -2 SD and ≥ -3 SD	129	13.60%	< 80 % and ≥ 70 %	311	32.80%	< 80 % and ≥ 70 %	0	0.0%
< -2 SD	369	38.90%	< -2 SD	171	18.00%	<80%	402	42.40%	<80%	0	100.0%
≥ -2 SD	580	61.10%	≥ -2 SD	778	82.00%	≥ 80 %	547	57.60%	≥ 80 %	949	0.0%

1) Banisa, Malkamari and Rhamu Dimtu Divisions, March 2007

Weight for Age in Z scores			Height for Age in Z score			Weight for Age in % Median			Height for Age in % Median		
Status	**n**	**%**	**Status**	**n**	**%**	**Status**	**n**	**%**	**Status**	**n**	**%**
< -3 SD	31	4.1%	< -3 SD	28	3.7%	< 70 %	39	5.1%	< 70 %	0	0.0%
< -2 SD and ≥ -3 SD	183	24.1%	< -2 SD and ≥ -3 SD	90	11.9%	< 80 % and ≥ 70 %	196	25.9%	< 80 % and ≥ 70 %	0	0.0%
< -2 SD	214	28.2%	< -2 SD	118	15.6%	<80%	235	31.0%	<80%	0	0.0%
≥ -2 SD	544	71.8%	≥ -2 SD	640	84.4%	≥ 80 %	523	69.0%	≥ 80 %	758	100.0%

2) Mandera Central and Khalalio Divisions, March 2007

Weight for Age in Z scores			Height for Age in Z score			Weight for Age in % Median			Height for Age in % Median		
Status	**n**	**%**	**Status**	**n**	**%**	**Status**	**n**	**%**	**Status**	**n**	**%**
< -3 SD	15	2.7%	< -3 SD	15	2.7%	< 70 %	21	3.7%	< 70 %	0	0.0%
< -2 SD and ≥ -3 SD	140	25.0%	< -2 SD and ≥ -3 SD	57	10.2%	< 80 % and ≥ 70 %	149	26.6%	< 80 % and ≥ 70 %	0	0.0%
< -2 SD	155	27.6%	< -2 SD	72	12.8%	<80%	170	30.3%	<80%	0	0.0%
≥ -2 SD	406	72.4%	≥ -2 SD	489	87.2%	≥ 80 %	391	69.7%	≥ 80 %	561	100.0%

3) Takaba and Dandu Divisions, March 2007

Weight for Age in Z scores			Height for Age in Z score			Weight for Age in % Median			Height for Age in % Median		
Status	**n**	**%**	**Status**	**n**	**%**	**Status**	**n**	**%**	**Status**	**n**	**%**
< -3 SD	21	2.5%	< -3 SD	10	1.2%	< 70 %	23	2.8%	< 70 %	0	0.0%
< -2 SD and ≥ -3 SD	172	20.8%	< -2 SD and ≥ -3 SD	71	8.6%	< 80 % and ≥ 70 %	197	23.9%	< 80 % and ≥ 70 %	0	0.0%
< -2 SD	193	23.4%	< -2 SD	81	9.8%	<80%	220	26.7%	<80%	0	0.0%
≥ -2 SD	632	76.6%	≥ -2 SD	744	90.2%	≥ 80 %	605	73.3%	≥ 80 %	825	100.0%

Annex 4: Timetable for Nutrition Causal Analysis and Cost of Diet Study in El Wak

Date	Nutrition data	Personnel	Market Data	Personnel
Friday 21st September 2007	Travel from Nairobi to El Wak	Mary Corbett		
Saturday 22nd	Briefing and finalizing timetable and survey material on Study	All staff	Briefing	All staff
Sunday 23rd	Training	All nutrition data staff	Training	Market data staff
Monday 24th	El Golicha (stable community) close to El Wak 10km	Nutrition staff	El Golicha	Market data collection team
Tuesday 25th	Fincharo – 50km	Nutrition team & Asumpta	El Wak	Market data collection team & Mary
Wednesday 26th	Shimbir Fatuma (50kms)	Nutrition team	Shambir Fatuma	Market data team
Thursday 27th	Elele (64km)	Nutrition team	Wargadud & Elale	Market data team
Friday 28th	Mandera Meet Arid Lands and MoA	Mary Maurice Asumpta		
Saturday 29th	Sukela Tinfa-62kms Qurahmudn	Nutrition team	Sukela Tinfa Qurahmudn	Market data team
Sunday 30th	Takaba and Dandu	Nutrition team	Takaba and Dandu	Market data team
Monday 1st October	Takaba (2 ½ hours) Darwer	Nutrition team	Takaba	Market data team
Tuesday 2nd	El Ram (78kms)	Nutrition team	El Ram	Market data team
Wednesday 3rd	El Wak- interview mothers	Nutrition team	El Wak – check data and correct errors-gaps	Market data team
Thursday 4th	Data analysis in El Wak	Mary Corbett		

Annex 5: References

- Health and Nutrition Assessment , El Wak Sub-District, Mandera District, Kenya, Save the Children UK, February 2007
- Seasonal Calendar for El Wak Sub-District, February 2007
- Action Against Hunger, Nutrition anthropometric surveys, results summary, Northern and Western Areas of Mandera District, February - March 2007
- MSF Nutrition Survey reports
- Knowledge, Attitude, and Practice (KAP), El Wak Sub-District, Mandera District, CARE International in Kenya, May 2006
- Guidelines for Cost of Diet fieldwork, draft August 2007
- Hunger Specific CRSA (Child Rights Situational Analysis): Guidelines and tools, Save the Children UK,(work in progress)
- Northeast Kenya Livelihood Profile; Mandera East Pastoralist Livelihood Zone, September 2007
- Household Economy Assessment, preliminary results, October 2007
- SCUK south Sudan Programme Nutrition Causal Analysis, Assessment Guidelines, Feb-March 2007
- Understanding nutrition data and the causes of malnutrition in Kenya, a special report from the Famine Early Warning Network, September 2006
- The Pastoral Child, UNICEF ESARO, July 2007
- State of the World's Children, UNICEF, 2006

Annex 6: Method to Calculate the Costs of Cheapest Acceptable Diets

A diet is considered acceptable for an individual when it covers both the micro and macronutrients requirements[36] for that particular individual circumstance.

The cost of the cheapest adequate diets was calculated using a linear programming tool (excel spreadsheet). The original software was developed by WHO (http://www.nutrisurvey.de/lp/lp.htm) and was expanded by Save the Children so that it could estimate the cost of diets for all household members, not just young children. Linear programming is a classical mathematical tool used to solve problems such as, in this case, the estimation of the minimum cost of a diet subject to multiple nutritional and acceptability constraints. The model calculates the cheapest diet acceptable using two standard databases and the locally specific data on food availability and price. The food composition database[37] built into the programme was established by the Food and Agriculture Organization (FAO), while nutrition individual nutrient requirements were based on WHO recommendations. Guided by these standards, the programme is able to determine the cheapest adequate diet when provided with:

- A list of locally available foodstuffs and prices per season
- Members for whom the diet is required
- The maximum amount of each food that various household members can consume so that amounts recommended by the programme remain realistic.

As food availability and prices vary according to season, the year was divided into four seasons: two rainy seasons from April to June and from October to December, and two dry seasons from July to September and January to March.

The cost of the diet was calculated for a household profile with six members presented in Table A1. The decision on the household size was guided by findings during data collection.

Table A1: Household composition

Baby (either sex), 12-23 months	1
Child (either sex), 3-4 years	1
Child (either sex), 7-8 years	1
Child (either sex), 12-13 years	1
Woman, 30-59y, 45 kg, vigorously active, lactating	1
Man, 30-59y, 50 kg, vigorously active	1

Results for children under two are presented both independently (because of their specific requirements) and as part of the entire household.

Maximum amounts of each food and food types for different age groups were determined as a maximum percentage of the daily energy requirement. For example, the energy contribution made by leafy vegetables to the diet of a 12 to 23 months old child cannot exceed 5% of the energy requirements (see Table A2). The thresholds were agreed through consultation with experts at the University College London, WHO and the University of California, Davis, but have not been internationally agreed.

The amount of breast milk for a child 12 – 23 months used was 549 ml, based on average intakes of breast milk.[38]

[36] According to WHO standards.
[37] The composition of camel milk was added to the database using data from: Barikmo, I., F. Ouattara, and A. Oshaug, Table de composition d'aliments du Mali, 2004, Oslo: TACAM.
[38] WHO (1998), Complementary Feeding of Young Children: A Review of Current Scientific Knowledge, WHO, Geneva.

Table A2: List of maximum percentages of Energy RDA for diet cost

Staples	120
Dairy	100
Fats	30
Fish	20
Fruit	8
Leafy vegetable	5
Pulses	50
Meat	20
Eggs	20
Breast Milk	20

Only the lowest cost physiologically acceptable diets are presented. It would probably be unreasonable to expect households to actually practice these diets for two key reasons:

- There may be environmental constraints which prevent them from being feasible. For example, each household might be expected to find 10 litres of goat milk per day in order to provide the cheapest possible source of nutrients. However, this may not be possible in practice if the source of food is not abundant as required.
- There may be cultural constraints and local customs which prevent them from being acceptable. For instance, households prefer to keep their animals or sell them in distant markets rather than slaughter them for consumption or sale on the local market. As a result, meat is not available as such locally.

Ensuring that the diets are both environmentally and culturally feasible requires an additional set of assumptions to be built into the data analysis and also means an increase in the cost of the diet. These are not presented here.

Costs are presented with an error range to take into account the following:

- The database has a limited number of food items (1717), so it was not always possible to find the exact food from the study areas. In these circumstances, the same food from the closest country on the database was chosen.
- Wild foods were not included as some are not available on the database or we only knew their vernacular names.
- the arbitrary decision of household composition as household profiles vary
- variations in measurement units in the field
- The maximum percentages of energy requirements are based on the advice of experts. Adjustments to these could have an impact on the cost of the diet.

Annex 7: Wild Foods Available in El Wak, Northern Kenya

ROOTS

Sambile: This is a root food. The stalk of the plant dries out in the dry season but the root can still be traced down into the ground. It is often collected when out herding the goats. It tastes like potato, can be thrown on the fire and cooked. Children in particular like this food.

Kurte: This is another root which can be eaten directly (does not need to be cooked). It has lots of water in it and is good when water is scarce. Everyone eats this root.

Singo: This is another root food which contains lots of water. This root can grow very big (size of a laptop). It can be cooked with tea. These are more available in Takaba.

Dagmes: This grows a bit like potatoes and there can be 20-30 pieces underground attached to the stem. It is very sweet like potatoes. The smaller ones can be eaten raw while the larger ones cooked on the fire.

Kelo: This is also a root which gets big during the rainy season (swells up). It can be taken as fluid or food. The outside is removed and the white flesh inside can be eaten.

FRUITS

Mader: This is a small yellow fruit when ripe, it is very sweet and can be eaten directly. It is not cooked at all. The tree that this fruit comes from is protected and should not be cut down.

Abu: This fruit comes from the sukela tree. The fruit is not cooked. Children like to eat as it is sweet. It looks a bit like peas in a pod.

Kosaye: This fruit is a bit like a mango as it has a large stone in the middle. It is yellow when ripe. The outer flesh can be eaten and then break the stone and eat the inner part. It is a little like the taste of peanuts. The stone can also be dried, stored and used later. Not found in Mandera West.

Kuro: This is a small fruit that is salt. It can be eaten when green/yellow. Women like to eat Kuro.

Ruqa: This fruit comes from a big tree. It is very salty. It is a good medicine for stomach upset. Dilute some with water and add sugar. There is an outer shell and the inside is red/brown and sticky.

GREEN LEAVES

Kurawa: This leaf comes from the triage tree. The leaf is salty and children in general eat small amounts of it as a snack.

SEEDS

Kodi: These are small seeds that are in a shell/cover a bit like peas in a pod (Abu), except smaller. Everybody likes to eat it.

Hulba: This seed comes from Ethiopia. It is a seed that is used as an herbal medicine. The seed is crushed and added to milk. It is apparently good especially for URTI (upper respiratory tract infection)

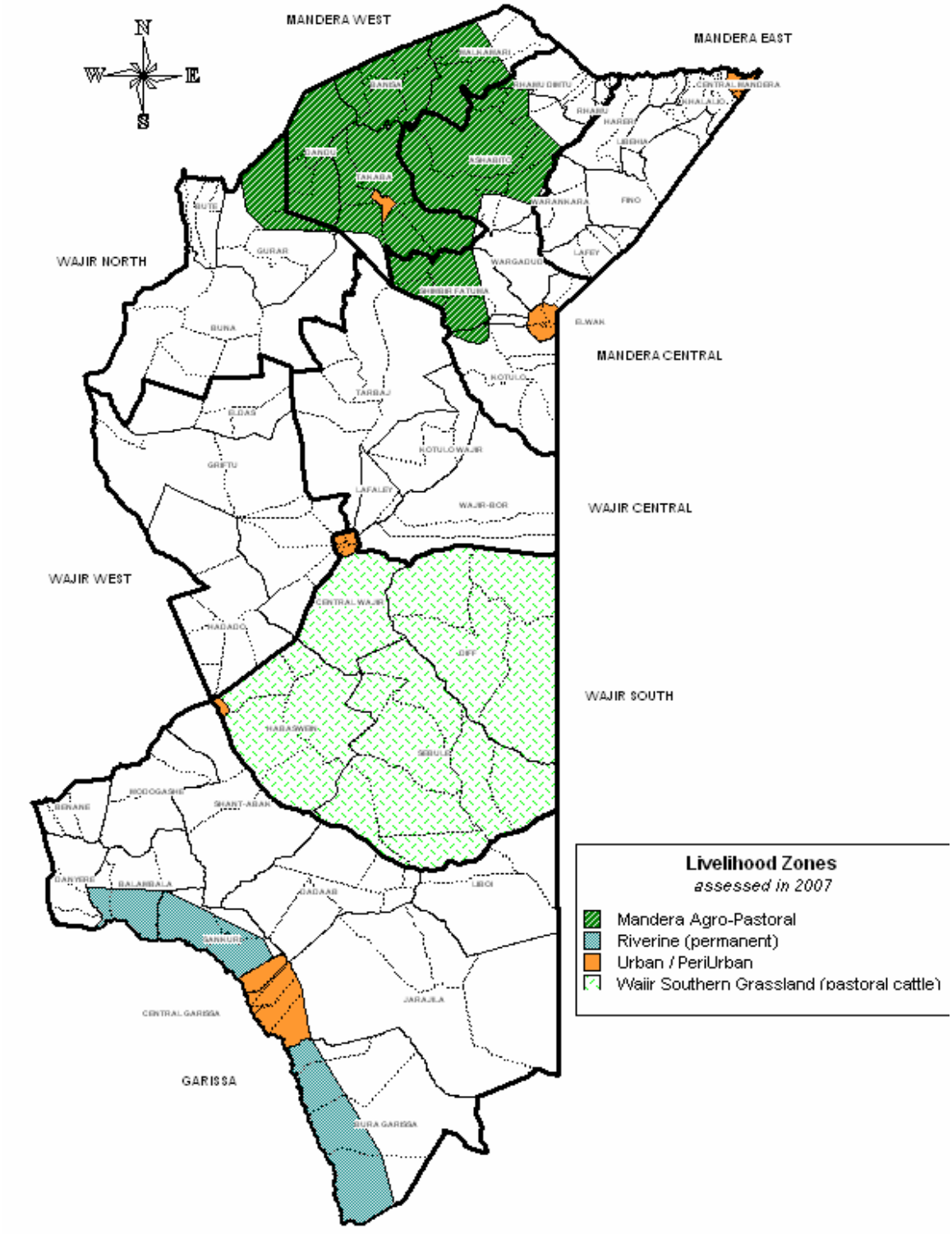
HONEY

Tunale: This is the tree were bees nest and then produce small quantities of honey. Small quantities are harvested and men and children like to eat in particular.

GUM

Hampe: This is a gum that seeps from a particular tree. It is collected and is one of the small scale income-activity in rural areas as it is transported out and sold outside. There is a demand for hamper. If hard it can be melted on the fire. It is sweet tasting.

Annex 8: Map of Livelihood Zones in North Eastern Province, Assessed Using the Household Economy Approach (HEA), September 2007



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