



LONDON
SCHOOL *of*
HYGIENE
& TROPICAL
MEDICINE

**The availability and minimum cost of a
nutritionally adequate diet for rural
households in Turkana, Kenya**

Candidate #: 491784

Word Count: 9918

Supervisor: Elaine Ferguson

Submitted in part fulfilment of the requirements for the degree of
MSc Public Health Nutrition

Thursday 12 noon - 2 September 2010

List of contents

Abstract.....	7
1. Introduction	8
1.1 Overview of Turkana.....	8
1.1.1 Geography and ecology.....	8
1.1.2 Turkana North, a fishing economy.....	8
1.1.3 Turkana West, a pastoralist economy	8
1.1.4 Malnutrition	9
1.1.5 Food insecurity.....	10
1.1.6 Market function	10
1.2 European Commission food facility programme.....	11
1.2.1 Cost of Diet in the context of the programme	12
1.3 Background to the Cost of Diet programme	12
2. Aim and objectives.....	14
3. Materials and Methods	15
3.1 Study design	15
3.1.1 Sampling methodology.....	15
3.1.2 Location	15
3.2 Ethics.....	16
3.3 Data collection	16
3.3.1 Training.....	16
3.3.2 Development of food list and units	16
3.3.4 Market surveys.....	17
3.3.5 Food frequency questionnaires	18
3.3.6 Income data	18
3.4 Data analysis.....	19
3.5 Cost of Diet analysis.....	21
3.5.1 Model 1	21
3.5.2 Model 2	22
3.5.3 Model 3	22
4. Results	24
4.1 Turkana North	25

4.1.1 Availability of foods and identification of problem nutrients.....	25
4.1.2 Affordability of a nutritionally adequate diet	28
4.1.3 The effect of food aid	28
4.2 Turkana West	29
4.2.1 Availability of foods and identification of problem nutrients.....	30
4.2.2 The effect of food aid on the availability of a nutritionally adequate diet ..	31
5. Discussion	32
5.1 Availability and affordability of a nutritionally adequate diet without the general food ration	32
5.2 The effect of the WFP general food ration on the availability of a nutritionally adequate diet	33
5.3 Limitations and strengths	34
5.4 Recommendations and conclusions	36
Acknowledgements.....	38
Reference list.....	39
Appendix.....	42

List of tables

Table 1 Conversion factors for liquids to grams.....	20
Table 2 Food aid entitlement per month.....	23
Table 3 Amount of food aid that meets energy requirements.....	23
Table 4 Food list for Turkana North.....	24
Table 5 Food list for Turkana West	24
Table 6 Problem nutrients in Turkana North.....	26
Table 7 Cost of Diet model for foods available in Turkana North.....	27
Table 8 Problem nutrients in Turkana North with the addition of food aid.....	29
Table 9 Problem nutrients in Turkana West across all seasons.....	30
Table 10 Problem nutrients in Turkana West with the addition of food aid.....	31

List figures

Figure 1 Malnutrition trends in Turkana by cluster division (2002-2006).....9

Figure 2 Market trade flow in Turkana.....11

Figure 3 Cost of a nutritionally adequate diet in Turkana North by season.....28

Abbreviations

GAM- General acute malnutrition

WHO- World Health Organisation

USAID- United States Agency for International Development

HEA- Household Economy Assessment

EC-European commission

SC- Save the Children

COD- Cost of Diet

FDP- Food distribution point

Ksh- Kenyan shillings

CSB- Corn Soy Blend

Abstract

Background

The study aimed to determine whether it is possible for beneficiaries of the European Commission (EC) food facility project in Turkana to obtain a nutritionally adequate and affordable diet, using Save the Children's Cost of Diet linear programming tool (COD). The effect of the World Food Programme (WFP) general food ration on the availability of a nutritionally adequate diet was also assessed.

Methods

A market survey was used to price, per 100 grams, the foods available to EC beneficiaries. Based on this, a quantitative one-week food frequency questionnaire was developed and administered to 64 households. Data were analysed to generate the parameters required for COD analysis and the programme was run to select the lowest cost of a nutritionally adequate diet. The qualitative results were compared with income data.

Results

Results showed that it was not possible for beneficiaries to obtain a nutritionally adequate diet based on current consumption patterns. Five nutrient requirements could not be met in Turkana North and 12 in Turkana West. Increasing the consumption frequency of four food items in Turkana North would enable a nutritionally adequate diet to be obtained (daily cost 378.7 Kenyan shillings.) This diet was unaffordable for EC beneficiaries (daily income 78.6 Kenyan shillings.) The addition of the current WFP food aid ration increased the number of nutrient requirements that could not be met Turkana North and decreased the number in Turkana West.

Conclusion

This study demonstrated that a lack of availability of nutrient rich foods in Turkana West and high prices in Turkana North means that a nutritionally adequate diet cannot be achieved. Intervention efforts should focus on increasing the availability of affordable, nutrient rich foods in rural Turkana. In the interim, the WFP food aid ration, currently insufficient to meet nutrient requirements, should be modified to ensure that these are met.

1. Introduction

1.1 Overview of Turkana

1.1.1 Geography and ecology

Turkana is situated in North-western Kenya and borders Sudan, Ethiopia, Uganda, Lake Turkana and the West Pokot region of Kenya. It is a semi-arid district, with an average rainfall of 120-200mm per year and an average daily temperature of between 24 and 38°C¹. There are four seasons in Kenya which are known by the Turkana as Akamu (December-February), Akiporo (March-May), Nait (June-September) and Erupe (October-November.)

There are two rainy seasons, the long rains between March and July and short rains between October and November but rains are unreliable and erratic resulting in drought and flooding. The harsh climate means rain-fed cropping is not possible and so pastoralism is the predominant livelihood².

Turkana is spread over 77 000 km² and is made up of 17 administrative districts. A map of the area is shown in appendix 1. This study covers Turkana North which borders Lake Turkana and Turkana West which surrounds the town of Kakuma¹.

1.1.2 Turkana North, a fishing economy

The main food and income sources for Turkana North are food aid, fishing, livestock and wild fruits. The main economic activity is fishing which provides links with the national economy, although a household's access to fish is dependent on fishing equipment or ability to purchase fish¹. Fishing is also restricted by a lack of credit for fishing inputs, poor infrastructure, conflicts and the lake often being rough³. Catches are seasonal, with the number of fish caught being about 50% lower in the dry season as compared to the wet season. Domestic livestock still play a central role as animals are a valuable asset providing milk, meat, blood and hides, but herds are small, so milk and meat contribute to just 1-5% of energy needs¹.

1.1.3 Turkana West, a pastoralist economy

The main sources of food are food aid, livestock and wild fruits. Food aid is provided to 34% of the population, supplying between 1/4 and 1/3 of their energy

requirements. Wild foods are heavily relied upon, with 60% of the population receiving around 1/3 of their energy intake from them¹. The contribution of milk and meat in the diet is similar to Turkana North, although this percentage varies greatly with the number of livestock owned and the health of the animals. The staple food source is maize but it is not cultivated locally due to the dry climate. Instead, maize is obtained through the barter of goats or food aid. The sale of livestock is the main source of income¹.

1.1.4 Malnutrition

Turkana is an area that experiences chronic food insecurity due to its arid climate and the pressures of population growth. A third of the population of 500 000¹ rely on food aid but malnutrition rates remain high.

A nutrition survey conducted by Merlin in May 2009 revealed that 22.5 per cent of children in Turkana are acutely malnourished⁴. These results are consistent with an earlier study that showed the prevalence of general acute malnutrition (GAM) in these regions has been in excess of 15% since 2000, with the exception of the year 2002 (no drought) when the prevalence decreased to 13.7% (see figure 1)⁵. The World Health Organisation (WHO) classify a prevalence of GAM that exceeds 15% to be critical⁴ when assessing the severity of a nutrition related crisis, highlighting the seriousness of the situation in Turkana.

Figure 1 Malnutrition trends in Turkana by cluster division (2002-2006)⁵

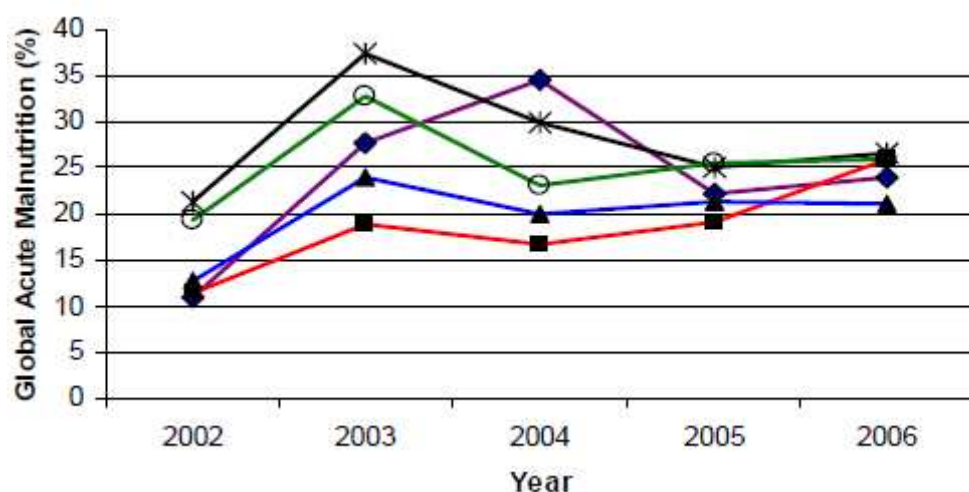


Figure 1 Taken from a United States Agency for International Development (USAID) paper on understanding the causes of malnutrition in Kenya⁵. It shows the prevalence of GAM in Turkana North (diamond) and Turkana West (square)

Micronutrient deficiencies are also a problem in Turkana. A study by the WHO in 2006 showed the prevalence of xerophthalmia, an indicator of severe vitamin A deficiency, to be 13.1% in one region of Turkana⁶. A survey of micronutrient deficiencies in Kenyan children in 2003 also showed that 19.5% of children were iron deficient (serum ferritin concentration $<2.2\mu\text{mol/L}$) and 50.8% of children had low serum zinc ($<10.2\mu\text{mol/L}$)⁷.

Micronutrient deficiencies lead to stunting and poor child development. Across all ages they increase susceptibility to infection⁸. Therefore, provision of adequate micronutrients in the diet is essential.

1.1.5 Food insecurity

Food insecurity is known to be an underlying cause of malnutrition in the Turkana region. Insecurity occurs as a result of low food availability and high food prices. Malnutrition has been shown to be intrinsically linked to household poverty⁹. However, low food availability is also an issue that transcends all wealth groups.

Food availability has been affected by a succession of severe droughts over the past 40 years which have led to water shortages and a decrease in the amount of pasture. Livestock numbers have diminished and those surviving are affected by heat stress and high temperatures which result in a decline in meat and milk production². Although the pastoralist community are used to drought, their increased duration and frequency prevents full recovery and diminishes the capacity to cope from future shocks¹⁰. Water shortages combined with an increase in population size has led to conflict and livestock raiding which contributes further to food insecurity at a household level.

1.1.6 Market function

The market system in Turkana is weak because it relies almost entirely on imports as crops cannot be cultivated in the region⁹. Figure 2 shows the trade flows of cereal into markets in the region. It shows how small satellite markets are dependent on the trade flow from three main towns; Lodwar, Kakuma and Loki. A recent household economic analysis (HEA) concluded that current trade flow is insufficient to cover food requirements¹.

Markets also suffer from marginalisation due to poor infrastructure. There is a potential market for dried fish caught in Lake Turkana with a high profit margin. However, poor roads decrease the frequency of sales to outside traders¹¹.

Figure 2 Market trade flow in Turkana⁹

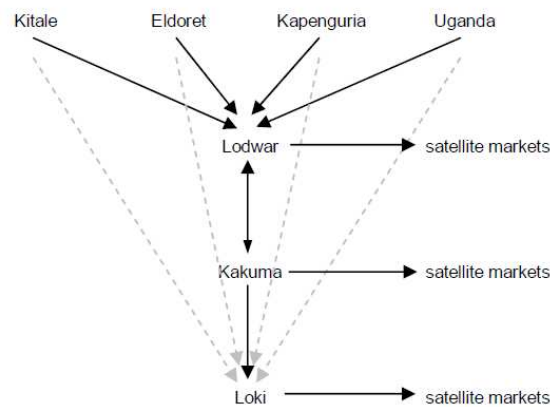


Figure 2, taken from a market survey conducted by Oxfam⁹, shows trade flows of cereal into markets in the region

1.2 European Commission food facility programme

Due to the increased frequency of drought over the past decades, humanitarian aid has been supplied to the region for over 20 years¹. Traditionally this has been in the form of food relief and at present the WFP supplies food aid to the region as part of a protracted relief effort¹¹. Although this is capping the rates of malnutrition, food aid undermines the local market and does not create a demand for local goods thus preventing economic growth in the region.

The aim of the European Commission (EC) programme is to stimulate market function and food production, benefiting local agricultural producers, traders and consumers in Turkana, a marginal pastoral area¹². The project combines the current WFP food aid ration with a market-based distribution system whereby local traders distribute the general food ration in exchange for vouchers given to EC beneficiaries. The project targets 6000 food insecure households in Turkana that can not meet their own nutritional needs¹¹. Traders receive a small profit for this service, providing a cash injection that is hoped will stimulate local markets. In addition, the corn soy blend component of the food ration currently distributed will be partly replaced by locally produced food items to encourage local production.

1.2.1 Cost of Diet in the context of the programme

Cost of Diet is a new tool that will be used to monitor the impact of the EC food facility programme in Turkana by analysing the cost and quality of a diet obtained from foods in the region. The data will be specific to EC food facility beneficiary households and to the foods available from food distribution points (FDP) where the programme is being implemented.

This project will be used as a baseline to assess whether it is possible to obtain a nutritionally adequate diet from foods available in Turkana. The programme will also be used to determine the cost of this diet. Availability and cost will be quantitatively analysed to give evidence as to the underlying causes of food insecurity. This information will be used in combination with other assessment tools including a market survey which will assess whether there is an increase in the volume of commodities sold at target food distribution points.

Data from this project will be compared with that from future surveys to assess whether there is a reduction in the cost of a nutritionally adequate diet in Turkana over the course of the project¹². Therefore, one component of this initial project is to ensure sufficient quality in data collection so that the survey can be replicated during future assessments, and that continuity in data collection is ensured.

This is the first time to the authors' knowledge that research has been carried out into the quality and cost of a diet from foods available in Turkana.

1.3 Background to the Cost of Diet programme

Save the children (SC) developed a linear programming tool in 2005 to calculate the lowest cost of a diet that meets the nutritional requirements of a household based upon the foods available in a specific location¹³. The Cost of Diet programme (COD) analyses the economic causes of malnutrition in recognition that a critical cause of malnutrition is poverty. It was initially developed in response to research that showed that nutrition education programmes in developing countries had a limited impact due to economic constraints at the household level¹⁴. COD gives an indicator of the gap between household income and the cost of a nutritionally adequate diet.

The programme is used to determine the minimum cost of a diet for a household based upon the normal household composition for a particular area and wealth group. Tier 1 was initially developed which used linear programming to generate the lowest cost of a diet that;

- Meets the energy, protein, fat and micronutrient requirements of each family member based on a database of nutrient and energy requirements based on age, sex and activity level taken from WHO/FAO 2004 nutrient requirements database¹³.
- Does not exceed the energy requirements of each family member
- Includes a fixed amount of breast milk for children aged 6-23 months

COD has since been refined and a second model developed (tier 2) that generates more realistic diets that conform to local food consumption practices. In addition to the constraints listed above diets must not exceed a maximum frequency of consumption per week for each food item. Portion sizes are limited to an edible quantity per serving and the maximum percentage of energy that can come from a particular food group is defined by the programme¹⁴.

Much research into food security has concentrated on meeting energy requirements and ignores micronutrient requirements¹⁵. COD contains a database of the nutrient and energy content of food items taken from the FAO food composition database that is used to determine whether a diet can be obtained that meets each nutrient requirement without exceeding recommended energy intakes. The model highlights nutrients and age groups for which the recommended intakes cannot be met, thus giving an indication of the quality of an available diet, the availability of nutrient rich foods and potential causes of nutrient deficiencies. Nutrients for which the recommended daily intake cannot be met are defined as 'problem nutrients.'

Since its development the tool has been used in Niger, Kenya, Ethiopia, Bangladesh, Myanmar, Mali, Zambia and Mozambique to determine the lowest cost of a nutritionally adequate diet in specific populations¹⁶. Data has also been compared with that collected from household economic analyses (HEA) surveys to determine whether families generate sufficient income to afford such a diet and the scale of the gap. This is the first time that COD will be used in the Turkana region of Kenya.

2. Aim and objectives

The aim of the project is to determine whether it is possible for a household in the Turkana region of Kenya to obtain a nutritionally adequate and affordable diet.

Using Save the Children's Cost of Diet linear programming tool, the key objectives are to:

1. Identify any problem nutrients that cannot be obtained from the foods available to EC food facility beneficiary households in Turkana North and West without food aid
2. Determine the lowest cost of a realistic nutritionally adequate diet without food aid for EC food facility beneficiary households in Turkana North and West
3. Compare income data with the cost of a nutritionally adequate diet to determine its affordability for EC food facility beneficiary households in Turkana North and West
4. Assess the effect of the WFP general food ration on the nutritional adequacy of an available diet for EC food facility beneficiary households in Turkana North and West.

3. Materials and Methods

3.1 Study design

A cross-sectional study was done during July 2010 to collect the data required to define the Cost of Diet analysis parameters. Specifically, a list of all local foods was required and for each food information was needed on its market price expressed as the number of Kenyan shillings per 100 gram edible weight, and its frequency of consumption per week at the household level. Additional information was required about typical family size and composition and average annual household income. Based on the Cost of Diet protocols, 32 households were surveyed from 4 food distribution points (FDP) in each livelihood zone¹⁷.

3.1.1 Sampling methodology

COD is designed to give results for a specific livelihood zone and wealth group and therefore sampling is not random as sites are selected according to these variables.

3.1.2 Location

Data was collected for two livelihood zones where the EC food facility programme is being carried out. These were Turkana West, a pastoral zone and Turkana North, a fishing livelihood zone. Each livelihood zone was expected to have a homogenous source of income and foods available; and these will likely vary across zones.

4 FDPs were selected per livelihood zone. Selection was based upon accessibility due to the time constraints. An FDP refers to a site with a small number of traders and is the equivalent of a market. Both EC food facility and non-EC food facility traders sell food at these points.

The FDPs chosen from Turkana North were Kataboi, Nachukui, Narikotome and Loarengak. For Turkana West they were Songot Loki, Letea, Lokangae and Lokore.

An exhaustive list of EC food facility beneficiaries was obtained for each FDP and a random number assigned to each household. Random selection was done by generating eight numbers for each FDP and the corresponding households were interviewed to provide an overall sample size of 32 per FDP. Random numbers were generated using the formula '=RAND()*n-1' in excel, where n is the sample size. This

limits the possible range of numbers that can be selected thus giving random numbers between 1 and the sample size. Further random numbers were generated to account for non-response.

In the field, finding 8 households with a 12-23 month old at each FDP was unachievable as many families were too far away to interview due to the pastoralist nature of the community. Therefore, some households were interviewed who did not have a child who was 12-23 months old. For these households (Turkana North n=15, West n=16) they were asked retrospectively about the food consumption patterns of their children when they were 12-23 months. The age range of the youngest child in these households was 24-72 months of age with the exception of 2 households in Turkana North and 3 in Turkana West for which the age range of the youngest child was up to 14 years.

3.2 Ethics

Ethics approval for the study was obtained from the London School of Hygiene and Tropical medicine Ethics committee for the collection of data from households in Turkana (#009/256). All participants in the study gave verbal informed consent. Information and consent forms are shown in appendix 2.

3.3 Data collection

3.3.1 Training

Training was conducted by the author over two days and included; introduction to COD, food list development, how to collect data on food prices and weights, how to fill out the household monitoring tool and food frequency questionnaires and a weighing exercise. Training slides are shown in appendix 3. A pilot study was carried out in Lodwar market during which it was decided that weight and price data should be collected simultaneously to prevent gaps in the data.

During data collection the author was present for data cleaning and for further consolidation of data collection methods.

3.3.2 Development of food list and units

During training a food list was developed based upon local knowledge of the foods available in Turkana. The list was developed by Oxfam field monitors during group

work whereby monitors were asked to list all foods in a specific food group and to feed back ideas. The author was present to ensure sufficient detail was collected on the food items listed. Any other foods sold in the market were added to an additional list and added to the COD database for analysis. However, these foods could not be added to the food frequency questionnaires (n=6) as all data were collected simultaneously. The final food list is included in the price and weight data collection forms (appendix 4).

3.3.4 Market surveys

Market surveys were carried out by field monitors and the usual unit of sale agreed before data collection was done in each livelihood zone. The price of a unit of food over the past year was recorded by interviewing 3 traders at 4FDPs and 10 weights of a unit of food were measured using Salter scales to provide approximately 40 weights per unit food for each of the two livelihood zones. In order to ensure fluctuations in seasonal price were accounted for, the traders were asked to report the price per food unit for each month during the previous year i.e., August 2009 to July 2010. Price and weight questionnaires are found in appendix 4.

As FDPs were small, monitors were asked to measure at least 3 weights from each trader. However, it was not always possible to collect the weight of 10 units of food from each FDP and therefore the average weight was calculated from a smaller sample of unit weights.

For food items that were usually sold by a trader but were not available during the data collection period, weight data could not be collected, and therefore these foods were not included. The foods that fell into this category were lemon, cabbage, tomato and carrot from Turkana North and ground nuts in Turkana West. Exclusion of these foods was justified because of their inconsistent availability.

Goat meat and milk were not available from FDPs in Turkana North but were consumed. It was decided that goat meat could not be included as a free food due to its value to the pastoral community, and so it was given the same market price as that of Turkana West. However, goat milk was included as free as its consumption does not affect future ability to obtain the food.

In some FDPs food could not be purchased in the unit previously chosen and so the weight and price were recorded for a different unit. This applied to cooking oil, sorghum and milk. During data cleaning it was decided to select the most common unit and use data only from that unit as scaling up prices to make equivalent units was thought to be inaccurate due to changes in price when purchasing in bulk. No food items were excluded from the food list as a result of this as weight and price data were available from other traders in the zone.

3.3.5 Food frequency questionnaires

Based on the food list a quantitative one-week food frequency questionnaire was developed and combined with a Household monitoring tool. This tool is administered monthly to EC food facility beneficiaries and is part of a larger research initiative into WFP food aid distributions. The tool contains questions on household composition and income which were also used for the purposes of the study. The tool was combined with the food frequency questionnaire to negate the need for the administration of two questionnaires to each household. The combined questionnaire is shown in appendix 5.

This combined questionnaire was administered by interviewers to the head of 32 households per livelihood area (i.e., total of 64 households) to obtain information on their own dietary practices and those of a 12-23 month old child. These data were analysed by livelihood area to generate the frequency of consumption of each food group and food item per week. Questions were asked to the head of the household who was usually female and the grandmother or caregiver or the child.

It was decided not to collect data on the food consumption patterns of pregnant and lactating women as a separate group due to the time constraints. It was also felt unnecessary as poverty limits the choice and amounts of food available to pregnant women¹⁸ and therefore it can be assumed that food patterns in Turkana are limited for all women equally.

3.3.6 Income data

The HEA conducted in 2006¹ was deemed outdated due to the recent global economic recession. The amount spent on food, commodities and services by each household during the previous week was recorded as part of the household monitoring tool and this data was used as a proximal indicator of income. Total

household expenditure was taken as a measure of daily income for the entire year as data on seasonal variations in income was not available.

A HEA report states that income levels do not differ greatly between wealth groups but herd sizes vary instead¹ which raises questions as to whether income data is the best measure to use to determine income. However, the poorest wealth group do not own livestock and so cash is their main source of trade, justifying the use of income data as an indicator of affordability.

3.4 Data analysis

All data were discussed with field monitors, outliers were removed and then data was entered into an excel spreadsheet by the author.

The parameters required for entry into the COD model were:

- The cost per 100g of each food item
- Typical family size and structure
- The maximum frequency of consumption of each food item and food group for a 12-23 month old and the rest of the family
- Average daily income

Data was analysed separately for each livelihood zone and therefore parameters had to be determined for both Turkana North and West.

The average weight in grams of each food was calculated and price data were averaged across all traders and FDPs per unit per month. These data were converted to the average price per 100g per season (appendix 7.) Seasons were defined as Akamu (December-February), Akiporo/ long rains (March-May), Nait (June-September) and Erupe/short rains (October-November.) It was decided to analyse data according to these seasons in order to allow comparisons across regions and with other reports.

For goat meat and chicken eggs, price data were available but weight data could not be obtained. Instead of excluding these nutrient dense foods, the weight of a unit of goat meat was assumed to be 1kg exactly as this was the unit purchased. For eggs, weight was assumed to be 53g as this is the average size of a small egg¹⁹. Although

these data are inaccurate, goat meat and eggs are two essential sources of nutrients and it was deemed necessary to include them in analysis.

Liquids were converted from millilitres to grams using the conversion factors shown in Table 1. Conversion factors were obtained from the propan guidelines²⁰.

Table 1 Conversion factors for liquids to grams²⁰

Liquid	Equivalent liquid	Density (g/ml)	Volume sold (ml)	Weight (g)
Mango juice	Tomato juice	1.38	1000	1380
Milk	Condensed milk	1.65	250	412.5
Soda	Diet cola	0.82	500	410
Juice syrup	Tomato juice	1.38	300	414
Beer	Beer	0.90	500	450
Vegetable oil	Oil	0.91	600	546

Data on family size and structure were collected as part of the household monitoring tool. The average size of each household was calculated and the most common family structure determined by selecting the age categories with the highest frequency. Household sizes were validated against the HEA report that states the average household size of the poorest wealth group for a pastoral and fishing livelihood zone in Turkana was between 5 and 7 people¹.

The frequency of consumption of each food group and food was obtained from the food frequency questionnaire as detailed in section 3.3.5. The lower and upper limits of food group consumption frequency were given by the 10th and 90th percentile of the total range. To establish the maximum frequency of consumption of an individual food item, the 95th percentile was taken as the upper limit and 0 as the lower limit. Results are given in appendix 8.

The total expenditure per household per week and the average expenditure on food was calculated. For Turkana West the average annual household expenditure was 17 875 Ksh which agreed closely with the figure of 16 000Ksh given by the HEA (appendix 6). For Turkana North, total household expenditure was 69 519Ksh which differed from the estimate of 30 000Ksh given by the HEA report. This limitation is discussed in section 5.3. Results show that 70% and 68% of income was spent on

staple foods for Turkana North and West respectively. These figures are validated by results from the HEA that show that 2/3 of income was spent on staple foods in 2006¹.

3.5 Cost of Diet analysis

Data on food consumption constraints, the price of food items, and family composition were entered into the Cost of Diet programme. Tier 2 analyses were run for each region to determine whether it is possible for a household to obtain a nutritionally adequate diet and its cost. Results were compared with income data to determine the affordability of a nutritionally adequate diet.

As the project was carried out to evaluate the cost of diet in Turkana, no further rigorous statistical comparison of samples was done.

The programme was run three times for each livelihood zone as follows:

Model 1: Using foods available at the current frequency of consumption

Model 2: Using foods available at the current frequency of consumption and the addition of some food items not currently consumed but available

Model 3: Using foods available at the current frequency of consumption in addition to the general food ration

3.5.1 Model 1

Foods in the programme food composition database were chosen that corresponded to the food list using a 'closest-fit' approach (n=25 foods for Turkana North, n=17 foods for Turkana West). Foods for which there was no corresponding data in the programme (n=7 Turkana North, n=10 Turkana West) were researched and their nutrient composition entered manually. Nutrient composition data on these foods was available from national food composition tables of Kenyan foods²¹. Botanical names were obtained for local wild foods and corresponding nutrient compositions found and manually entered into the programme. Information on the nutrient composition of edung, esokhon and ngitit were obtained from a book detailing the non-timber uses of selected arid zone trees and shrubs in Africa²². Amaranthas and ngakalalio were found on the USDA national nutrient database²³ and lady finger was obtained from the national food composition tables for Kenya²¹. Information on seasonal availability of these foods was obtained from the 2006 HEA report¹.

The maximum frequency of consumption was defined as shown in section 3.4.1. Portion sizes were taken from the COD practitioners guide, initially developed from research in Indonesia¹⁷. Portion sizes for soda and beer were based upon the size of a soda bottle.

The average family size and structure was entered. The average (SD) household size for participants in Turkana North was 6 (1.7) people. Of households surveyed (n=32), the 6 most frequent age categories within the family were; an adult woman (91% of households), an adult man (44%), a 14-15 year old (47%), a 7-8 year old (50%), a 3-4 year old (63%) and a 12-23 month old (53%).

The average (SD) household size for participants in Turkana West was 5 (1.7) people. Of households surveyed (n=32), the 5 most frequent age categories within the family were; an adult woman (88% of households) a 10-11 year old (41%), a 7-8 year old (50%), a 3-4 year old (69%) and a 12-23 month old (50%).

3.5.2 Model 2

The food list, portion sizes and household structure were identical to those used in model 1. The maximum frequency of consumption was incrementally increased for foods available but not consumed (i.e., sorghum, mango juice, egg and cows milk). For model 1 the maximum portion for these foods was 0 grams. For model 2 the maximum consumption frequencies for only these foods were increased until a nutritionally adequate diet was achieved.

The average daily income was compared to the cost of a diet for each season. Results were compared graphically using excel.

3.5.3 Model 3

The food list, food frequency of consumption, portion sizes and household structure were identical to those used for model 1.

The current amount of food aid distributed was calculated for each age group (Table 3) and forced into the programme using an equality constraint. The method for calculating the amount per person was as follows. The current food aid entitlement

distributed per household is shown in Table 2. It is designed to meet 85% of the daily energy requirement for each individual¹¹.

Table 2 Food aid entitlement per month¹¹

Cereal (Maize)	10.35 kg
Pulses (Beans)	1.8 kg
Corn Soy Blend (CSB)	1.2 kg
Enriched Vegetable oil	0.6 l

Assuming energy equivalent equal intra-household distribution, the amount of food aid required to make up 85% of each individuals energy intake was calculated and is shown in Table 3. The exception to this was the 12-23 month old children for whom breast milk is programmed by the COD model to provide 37.8% of the energy intake.

Table 3 Amount of food aid that meets energy requirements

Age	Energy requirement per day (Kcal) ⁺	Energy requirement from aid (Kcal) [*]	% of WFP ration needed to meet energy req ¹	Amount of maize per day (g)	Amount of pulses per day (g)	Amount of CSB per day (g)	Amount of veg oil per day (g)
12-23 months	894	548.02	0.340	116	20	13	1
3-4 years	1200	1020	0.634	216	38	25	3
7-8 years	1625	1381.25	0.858	292	51	34	4
10-11 years	2075	1763.75	1.095	373	65	43	4
14-15 years	2725	2316.25	1.439	490	85	57	6
18-29 year old man	3200	2720	1.689	575	100	67	7
30-59 year old woman	2300	1955	1.214	413	72	48	5

Table 3. The energy requirement per day for each age group was obtained from the COD programme and the results calculated as follows:

Energy requirement from aid (Kcal) = Energy req. per day (Kcal) X 0.85 (0.61 for 12-23 month old)

% of WFP ration needed to meet energy req. = Energy req from aid (Kcal) / Total energy from food aid per week (Kcal)

Amount of commodity per day (g) = (Amount of commodity per month (g) X % of WFP ration needed to meet energy requirement) / Average number of days per month (30.4)

4. Results

All foods sold and consumed in Turkana North and West are shown in Tables 4 and 5. There were less than 35 foods available in each region, emphasising the limited diversity of foods in each region. In Turkana West there were no fruit or vegetables available in FDPs and there was a limited supply in Turkana North. Some wild fruits were collected and eaten during periods of food insecurity but fruits and vegetables are not traditionally grown or eaten in the area. The Turkana are pastoralist so goat meat and milk were available.

Table 4 Food list for Turkana North

Foods available from FDP^a	(n=26)	Wild fruits (n=3)
Maize, white flour	Potato, irish, raw	Esokhon <i>Salvadora persica</i>
Maize, white, grain	Onion	Ngakalalio <i>Zizyphus mauritania</i>
Sorghum, grain	Milk, cow, UHT	Engol <i>Hyphaene compressa</i>
Wheat, flour	Vegetable oil	
Spaghetti	Animal fat	
White bread	Tomato sauce	Local foods (n=5)
Rice, white, husked	Soda	Donkey
Biscuit	Juice, syrup	Camel
Peas, yellow, split	Granulated sugar	Fish oil
Beans, red, dried	Beer	Camel milk
Mung bean	Salt	Goat milk
Fish, white fillet	Royco	Goat meat
Egg, chicken	Tea	
Mango juice		

a– FDP – Food distribution point

Table 5 Food list for Turkana West

Foods available from FDP^b (n=23)		Wild cereal (n=1)
Maize, white flour	Vegetable oil	edung <i>Boscia coriacea</i>
Maize, yellow flour	Animal fat	
Maize, white, grain	Soda	Wild fruit (1)
Wheat, flour	Juice, syrup	ngitit <i>Acacia tortilis</i>
	Granulated sugar	Wild vegetables (3)
Spaghetti	Beer	Lady finger
Biscuit	Salt	Lora Kimak <i>Adania volkensii</i>
Rice, white, husked	Royco	Lokiliton <i>Amaranthus graecizans</i>
Peas, yellow, split	Tea	
Beans, red, dried	Powdered milk	Local foods (n=2)
Goat meat	Fermented porridge	Donkey
Goat intestines and	Flour	Goat milk
stomach, raw	Yeast	

b– FDP – Food distribution point

During the data collection period, it was reported that the availability of food items is not seasonal in Turkana. However, market supplies are dependent on the outer market and these supplies are not consistent. Some foods were not available at the time when interviews were conducted because the traders had run out of stock of some foods.

The Cost of Diet program was run separately for Turkana North and West because of differences in food availability and price between livelihood zones. Differences between the zones are highlighted (Table 4). One key difference between the two zones was the availability of fish in Turkana North due to its proximity to Lake Turkana.

4.1 Turkana North

Assessment of the food frequency questionnaires showed that beneficiaries consumed a diet with little diversity (appendix 8). The median (25th & 75th) number of foods consumed were 8 (6, 15); n=64. They consumed only wild fruits and limited quantities of vegetables (n=4), roots and tubers (n=1). In addition to foods available from FDPs, goat meat and milk were also consumed.

4.1.1 Availability of foods and identification of problem nutrients

A key objective was to determine whether it was possible for a household to obtain a nutritionally adequate diet. All diets were modelled COD based on the current frequency of consumption of food items. Camel meat was excluded as it was not sold in FDPs and its availability is limited to those who own camels. Engol and was also excluded as it is not widely available¹.

Based on the current frequency of consumption in Turkana North, the COD programme was unable to find a solution that met all of the nutrient requirements. Problem nutrients were vitamins A, C, B6, B12 and pantothenic acid as shown in Table 6. For these nutrients, it was impossible to select a diet that met or exceeded 100% of a family's recommended nutrient intake level with deficits ranging from 40.5% to 93.4% of the RNI, depending on the nutrient, season and age group (Table 6). The author noted cases of xerophthalmia in children confirming the presence of vitamin A deficiency in the region.

Table 6 Problem nutrients in Turkana North

Nutrient	Season 1				Seasons 2-4			
	12-23 month old		Rest of family		12-23 month old		Rest of family	
	% RNI ^c	Amount (ug or mg) needed to meet RNI	% RNI	Amount (ug or mg) needed to meet RNI	% RNI ^c	Amount (ug or mg) needed to meet RNI	% RNI	Amount (ug or mg) needed to meet RNI
Vitamin A (µg)	85.6	57.6	59.7	1047.9	85.6	57.6	58.9	1069.5
Vitamin C (mg)	110.4	0	100	0	93.9	1.8	75.5	47.7
Vit B6 (mg)	54.7	0.2	70.0	1.6	55.6	0.2	100.0	0
Vit B12 (µg)	86.8	0.1	53.9	4.6	86.8	0.1	53.9	4.6
Pantoic Acid (mg)	74.9	0.5	47.7	11.0	75.2	0.5	40.5	12.5

c- RNI- Recommended nutrient intake

Results have been shown by season for Turkana North as the Vitamin C deficit in the diet was seasonal. It was a problem nutrient in seasons 2-4 but not in season 1. This is probably due to the availability of Ngakalalio (*Zizyphus Mauritania*) which is exclusive to season 1. Ngakalalio contains 69.0 mg of vitamin C per 100g and was included in the model diet at 2 servings per week.

It was noted that some foods were available from the FDP throughout the year but according to food frequency data were not normally consumed. These foods were sorghum, mango juice, eggs and cows' milk which are known to be rich in nutrients shown to be inadequate in the diet. Thus the model was run a second time, whereby the maximum frequency of consumption for each of these food items was increased from 0 to 3 servings to determine whether a nutritionally adequate diet could be achieved if these foods were consumed.

The results from this analysis showed that a household diet could be selected that met all nutrient requirements for a typical family of 6. This diet included 3 servings/week of sorghum, 1 serving/week of mango juice, 3 servings/week of egg and 3 servings/week of cows' milk (Table 7).

Table 7 Cost of Diet model for foods available in Turkana North¹

Food	Servings per week (12-23 month old)	Grams per week (12-23 month old)	Servings per week (Rest of family)	Grams per week (Rest of family)
Breast milk	7	3724.0	0	0.0
Cereal				
Maize, dried, raw	15	537.2	2	1467.1
<i>Sorghum</i>	3	90.4	3	2493.1
Rice, raw	0	0.0	3	2177.7
Pulses				
Bean, kidney, dried	2	35.1	11	3208.0
Mung bean	5	75.0	5	1512.3
Fruit				
<i>Mango juice</i>	1	249.1	1	4907.2
Vegetable				
Onion tuber	8	194.8	4	0.0
Meat, poultry, fish and eggs				
Goat, raw	4	60.1	3	1171.0
Goat intestines and stomach, raw	2	29.9	3	907.4
Fish, white fillet	5	50.0	0	0.0
<i>Egg, chicken</i>	3	60.0	3	1209.9
Roots and Tubers				
Potato, English, raw	3	75.0	3	1512.3
Fats				
Cooking fat	0	0.0	3	325.2
Dairy				
<i>Milk, cow, UHT</i>	3	408.0	3	8227.0
Local foods				
Milk, camel	3	408.0	7	8227.0
Milk, goat fresh	1	67.8	3	17853.8

1 - Food items for which the frequency of consumption was increased are italicised.

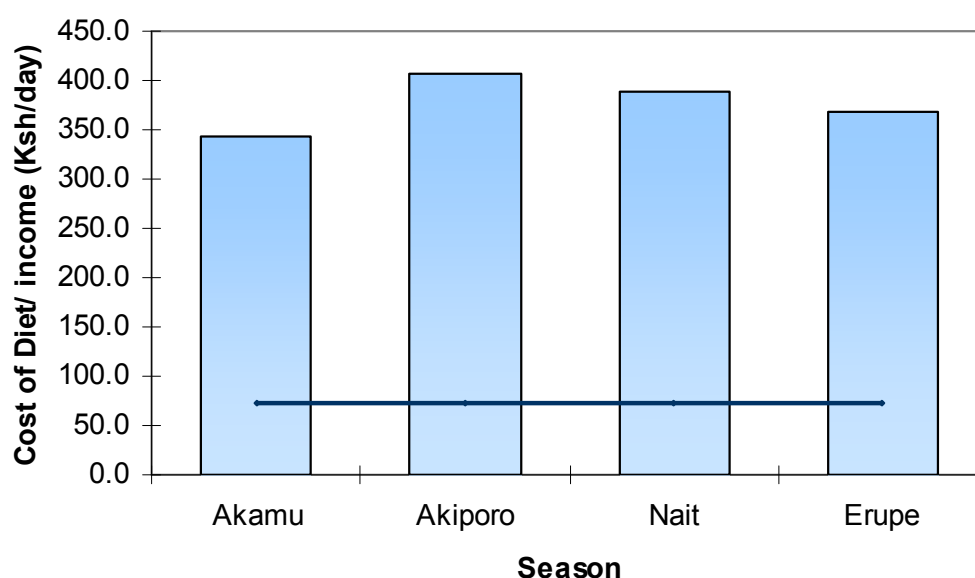
Table 7 shows the lowest cost nutritionally adequate diet selected for households living in Turkana North. It consisted of 16 foods. The food items that contributed most to total energy intake for the 12-23 month old were breast milk (38.7%) and maize (31.1%). For the rest of the family, goat milk (15.4%) contributed the most followed by beans (14.0%) and sorghum (11.0%). Maize contributed only 7.1% of the energy intake but it is the current staple food in Turkana.

4.1.2 Affordability of a nutritionally adequate diet

A key objective was to determine the lowest cost of a nutritionally adequate diet using COD. Only the affordability of one diet (Table 7) has been analysed as determining the affordability of a diet that is not nutritionally adequate is nonsensical.

The average daily expenditure on food during July 2010 was 73.6 Kenyan shillings (Ksh), 70% of the total daily expenditure. The average cost of the nutritionally adequate diet was 378.7 Ksh per day in July (Figure 3) and it fluctuated from 367.8 Ksh to 406.8 across seasons (Figure 1.) The greatest contributors to the diet's price were cows milk (29.8%), mango juice (24.6% on average), kidney beans (10.7%) and eggs (9.9%.) in all seasons.

Figure 3 Cost of a nutritionally adequate diet in Turkana North by season in relation to the average daily household income spent on food (70 Ksh/d)¹



¹ Figure 3 shows the Cost of a Diet from foods available (bars) and average daily income (line.)

Figure 3 illustrates that a nutritionally adequate diet is not affordable for EC food facility beneficiaries in Turkana for any season. The income gap is greater than 300 Ksh per day for a household of 6 people.

4.1.3 The effect of food aid

A further objective was to determine the effect of the WFP general food ration on the availability of an affordable nutritionally adequate diet for a household in Turkana

North. When food aid was forced into the programme it was unable to find a solution that met all of the nutrient requirements. Problem nutrients are shown in Table 8. The addition of food aid to the diet (at a level that met 85% of energy requirements of all family members except 12-23 month olds where it met 61% of needs) resulted in calcium, iron, zinc and vitamin B6 becoming problem nutrients in addition to the original problem nutrients (see Table 6) of fat, vitamin C, B12 and pantothenic acid. However, the Vitamin A requirement was met with the addition of the food aid ration.

Table 8 Problem nutrients in Turkana North with the addition of food aid

Nutrient	Season 1				Seasons 2-4			
	12-23 month old		Rest of family		12-23 month old		Rest of family	
	% RNI ^d	Amount (ug or mg) needed to meet RNI	% RNI	Amount (ug or mg) needed to meet RNI	% RNI ^d	Amount (ug or mg) needed to meet RNI	% RNI	Amount (ug or mg) needed to meet RNI
Fat (g)	91.2	2.6	65.4	127.5	91.2	2.6	53.1	172.8
Vitamin C (mg)	90.3	2.9	100.0	0	90.3	2.9	94.9	9.9
Vit B12 (µg)	71.8	0.3	24.1	7.5	71.8	0.3	24.1	7.5
Pantoth Acid (mg)	100.6	2.0	90.1	2.1	100.6	2.0	100.3	0
Calcium (mg)	59.0	61.5	100.0	0	59.0	61.5	100.0	0
Iron (mg)	80.7	0.1	129.9	0	80.7	0.1	129.9	0
Zinc (mg)	96.0	0.2	205.5	0	96.0	0.2	205.5	0

d- RNI- Recommended nutrient intake

4.2 Turkana West

Assessment of the food frequency questionnaires showed that beneficiaries consumed a diet with little diversity (appendix 8). The median (25th & 75th) number of foods consumed were 8 (5, 11); n=64. They consumed only wild fruits and vegetables and no roots or tubers. In addition to foods available from FDPs, goat meat and milk were also consumed.

The market survey revealed that CSB was being re-sold on the market as 'Unimix.' For the purposes of this analysis, Unimix was not included in the model run without food aid rations, as it was part of the provision of food aid. It is also possible that some maize and beans on the market are the result of food aid re-sale, however, these foods were also available independent of food aid i.e., they are true Market products and therefore were included in the food lists for both model runs.

4.2.1 Availability of foods and identification of problem nutrients

All diets were modelled using the Cost of Diet tool based on the current frequency of consumption of food items. Ngirit and lora kimak were excluded as no information was available on seasonal availability and edung was excluded as no information was available on its nutrient composition and it was consumed only twice per week.

The programme was unable to find a solution that met the energy requirements based on the current consumption frequency of each food item, including substituted local food items for any food aid rations reported. Problem nutrients were fat, vitamin A, C, B2, B6, B12, niacin, folic acid, pantothenic acid, calcium and zinc (Table 7.) Results show no seasonal variation and so have been presented for the whole year. These results illustrate the lack of energy dense and nutrient rich foods available in Turkana West.

Table 9 Problem nutrients in Turkana West across all seasons

Nutrient	12-23 month old		Rest of family	
	% RNI ^e	Amount (ug or mg) needed to meet RNI	% RNI	Amount (ug or mg) needed to meet RNI
Energy (Kcal)	100.0	0	94.6	390.4
Fat (g)	130.1	0	97.4	6.2
Vitamin A (µg)	72.7	109.2	15.2	1695.4
Vitamin C (mg)	96.9	0.9	67.9	48.1
Vit B2 (Ribf) (mg)	82.8	0.1	76.6	0.9
Nia Equiv (mg)	84.3	0.9	58.8	19.8
Vit B6 (mg)	31.0	0.3	21.6	3.2
Folic Acid (µg)	45.0	82.6	4.8	1189.7
Vit B12 (µg)	74.0	0.2	26.3	5.5
Pantoth Acid (mg)	70.4	0.6	31.4	11.0
Calcium (mg)	94.0	9.0	123.8	0
Zinc (mg)	42.5	2.4	48.3	11.6

e- RNI- Recommended nutrient intake

The maximum food frequency parameters for all foods available from FDPs were increased from current consumption levels to 21 times per week to determine whether food consumption habits were restricting the availability of a nutritionally adequate diet. Although this resulted in the energy requirement being met, 5 problem nutrients remained when this model was run; namely zinc (41% of RNI for 12-23 month old), pantothenic acid (77% and 44% of RNI for 12-23 month old and rest of family respectively), folic acid (96% of RNI for 12-23 month old), and vitamins A (72%

and 15% of RNI for 12-23 month old and rest of family respectively) and C (97% and 70% of RNI for 12-23 month old and rest of family respectively).

4.2.2 The effect of food aid on the availability of a nutritionally adequate diet

A further objective was to determine the effect of the WFP general food ration on the availability of a nutritionally adequate diet for a household in Turkana West. Food aid was forced into the programme at its current distribution level (section 4.1.3). Other foods were included at the current consumption level.

The programme was unable to find a solution that met all of the nutrient requirements. Table 10 shows the problem nutrients for Turkana West with the addition of the general food ration. However, the addition of food aid to the diet allowed the energy, vitamin A, B2, niacin, B6 and folic acid requirements to be met.

Table 10 Problem nutrients in Turkana West with the addition of food aid

Nutrient	12-23 month old		Rest of family	
	% RNI ^f	Amount (ug or mg) needed to meet RNI	% RNI	Amount (ug or mg) needed to meet RNI
Fat (g)	91.1	2.7	34.3	157.6
Vit B12 (µg)	71.8	0.3	19.8	6.0
Pantoic Acid (mg)	101.3	0	77.7	3.6
Calcium (abs) (mg)	37.8	93.2	53.7	584.8
Zinc (mg)	96.7	0.1	170.0	0
Vitamin C (mg)	100.0	0	95.4	6.9
Iron (mg)	76.9	0.1	735.7	0

f- RNI- Recommended nutrient intake

5. Discussion

5.1 Availability and affordability of a nutritionally adequate diet without the general food ration

It is not possible to obtain a nutritionally adequate diet using currently available local food sources in Turkana West (section 4.2.1). Energy and fat requirements could not be met for a household and 10 micronutrients were identified as problem nutrients. Further models were run with unrestricted food consumption parameters (data not shown) to determine whether food consumption habits or food availability were limiting availability of a nutritionally adequate diet. Problem nutrients were still identified which confirms that changes in food supply to FDPs are required in Turkana West to achieve a nutritionally adequate diet.

The reasons behind poor food availability are not addressed by the Cost of Diet tool. However, a Market survey conducted by Oxfam in 2006 concluded that food trade flow in Turkana is insufficient to cover food requirements and is likely to be confounded by population growth in the region¹. This is the result of a number of factors including poor infrastructure and the lack of access to cash due to the poor purchasing power of local people.

In Turkana North it is also not possible to obtain a nutritionally adequate diet using currently available local food sources at current food consumption levels (section 4.1.1). However, if consistent supplies of sorghum, mango juice, egg and cows milk could be assured then it is possible to select a nutritionally adequate diet.

Differences between food item availability in Turkana North and West were analysed in order to determine why a nutritionally adequate diet can be met in Turkana North but not West. It is likely that a few nutrient rich food items including sorghum, egg, potato, cows milk, onion and mango juice are enabling nutrient requirements to be met as they are present only in Turkana North. Our analysis showed these were key nutrient sources; sorghum is high in protein and iron, cows milk in vitamins A, B6 and B12, potato in vitamin C, egg in vitamins B12, A, B6, calcium, iron, and folic acid and onion and mango juice in vitamin C. It was decided not to run a further analysis on the addition of food items to the diet as it was beyond the scope of this project to assess food items that could be introduced into the area to increase dietary quality.

However, based on the COD analysis, a nutritionally adequate diet is not affordable even when it is available. The gap between the cost of a diet and income is greater than 300 Ksh for EC food facility beneficiary households (section 4.1.2). The greatest contributors to the cost of the diet were cows milk, mango juice and eggs. This could potentially explain why EC food facility beneficiaries do not currently consume these food items, although the diet was still unaffordable (150.5 Ksh) when the cost of these foods was subtracted. This shows that economic constraints are a barrier to meeting the nutritional needs of a household under the EC food facility programme as some nutrient rich foods are expensive. Therefore obtaining a nutritionally adequate diet is unachievable without a subsidy, an increase in local wages or cash transfer programme.

Food preferences are an important issue to address in the context of Turkana before concluding that a nutritionally adequate diet can be realistically achieved. At present, the population favour a cereal based diet that is low in fruit and vegetables⁷. However, cereals such as maize are high in phytate and fibre which inhibit the absorption of micronutrients such as zinc and iron⁷. Therefore, once food security is achieved, education to encourage consumption of fruit and vegetables and preparation techniques to avoid nutrient losses may be required. Further studies would be required to assess whether it would be acceptable for the local population to alter their dietary consumption patterns.

5.2 The effect of the WFP general food ration on the availability of a nutritionally adequate diet

At present, the WFP provide a general food ration as part of a protracted relief project to Turkana and so this was incorporated into COD to analyse its effect on the availability of an affordable nutritionally adequate diet. Food aid was forced into the programme at the current level of distribution; and it was modelled as zero cost i.e. as free.

The results show that, depending on local food sources available, food aid may not improve the diet. The addition of food aid increased the number of problem nutrients in Turkana North. This is explained by energy constraints as food aid takes up the majority of the energy source but the only food commodity that is nutrient rich is fortified CSB. The addition of food aid in Turkana West however had a beneficial effect, producing a diet for which the energy requirement was met and the number of

problem nutrients was decreased as food aid provided the necessary amounts of vitamins A, B12, B6, niacin and folic acid to meet the recommended nutrient intakes.

In both regions, in order to obtain a nutritionally adequate diet, the provision of food items that are nutrient-dense and low in energy must be ensured alongside the current food aid rations. These were unavailable in this region and therefore intervention efforts should focus on increasing the availability of nutrient rich foods in rural Turkana. An alternative solution may be to increase the quantity of CSB in the food ration. CSB contains vitamins B12 and C, pantothenic acid, calcium, zinc and iron as shown in the food database of the COD programme, which are currently problem nutrients in both Turkana North and West.

5.3 Limitations and strengths

Cost of Diet is the only tool currently being used in Turkana to assess the cost and affordability of a nutritionally adequate diet. The value of this tool is in addressing the quality of a diet in addition to the ability to meet energy needs. This study has demonstrated that a nutritionally adequate diet is unavailable to EC food facility beneficiaries in Turkana even with the addition of the WFP general food ration. The results allow the conclusion to be made that there is a problem of food insecurity in Turkana and this is likely to be a major cause of malnutrition in the region. Due to the low availability of nutrient rich foods there is a need for the provision of affordable nutrient rich foods to FDPs. In the interim, the nutrient content of the food aid ration should be modified.

However, the following limitations of the project and a full understanding of the context in which it was undertaken must be understood in order to prevent results from being over interpreted.

The results are applicable only to the rural poor in Turkana North and West. EC food facility beneficiaries are all within the poorest wealth group and their access to food will differ from those of other wealth groups due to access to cash and lack of transport. A nutritionally adequate diet may be available for the wealthy that own large herds of goats, camels or donkeys as they can obtain larger quantities of meat and milk and have access fruit and vegetables from central towns.

Price and income data is only accurate for July 2010. Recall bias will have occurred as price data was collected retrospectively and income data must be taken as a general guide as it was only collected for the week prior to the interview. The results on income for Turkana North do not agree with those of a recent HEA report that states that annual income in 2006 was roughly 30 000Ksh¹ compare to 69 519 Ksh given in the results. However, this does not alter the conclusion that a nutritionally adequate diet is unaffordable. As the study was completed as a baseline survey, price and income data will also be collected monthly from now on to give more accurate results. In addition, further information on spending patterns will be generated from the household monitoring tool to determine whether they are constant throughout the year.

There are limitations to the reliability of data on consumable portion sizes. Portion size data was taken from a study in Indonesia and although the figures are methodologically reliable, their application to the situation in Turkana could have resulted in error. Differences in food preparation and consumption habits could have limited or exaggerated portion sizes. In addition portion sizes were measured for 12-23 month olds and adjusted for adults within the programme and adjustments may be incorrect. Collection of portion size data for the region would have increased accuracy but time constraints prevented this analysis being carried out.

There are also issues of accuracy with nutrient composition. Some food items were included using a 'closest-fit' approach as foods were not listed in the programme food database so nutrient composition data was not specific to Kenya. Differences in farming techniques, soil and climate give slightly different nutrient composition data for foods. Moreover, the nutrient composition of raw foods was used and no conversion to the nutrient composition of cooked foods was made. This would have resulted in an overestimation of the availability of nutrients due to loss of nutrients when cooking. This would have required a further survey of the most common methods of cooking each food item and raw to cooked conversion factors to determine loss in the weights of foods during cooking which were unable to be carried out due to time limitations.

One potential source of nutrients that has not been fully addressed are wild foods as some wild foods have not been included in the analysis due to a lack of information on nutrient composition. Results from the food frequency questionnaire suggest that wild foods are consumed at low frequencies. However, there is a discrepancy

between this and a recent HEA report which stated that wild foods made-up 1/3 of the foods consumed by the poorest wealth group Turkana West¹. Research into the current availability and quantity of wild foods would enable an accurate analysis of the effect of wild foods on the quality of an available diet. Although this data is available from a HEA report during 2006, further research is required into the effects of the recent drought on the quantity of wild foods that can be collected as field monitors reported that amounts had decreased over recent years.

A further nutrient source for which true availability is unknown is goat meat. In theory, goat meat is readily available to the population of Turkana as they are pastoralist. However, it cannot be assumed that goat meat is available as goats are a valuable asset and may be bartered for other foods or services rather than used as a meat source. In addition herd sizes also decrease during drought and take 1.5 years on average to recover so frequent droughts hinder herd growth and recovery and animals are only slaughtered as a last resort to preserve herds after the dry season². Further information is needed to provide accurate data on the maximum amount of goat meat and milk that can be included in the diet as it is a rich source of nutrients and increasing consumption would have a beneficial effect on diet quality.

As this study is the first to measure the availability and cost of a nutritionally adequate diet in Turkana, there is no baseline data to which results can be compared and validated. However, future surveys can be used for this purpose.

5.4 Recommendations and conclusions

The aim of the project was to determine whether it is possible for a household in the Turkana region of Kenya to obtain a nutritionally adequate and affordable diet. This study demonstrated that it is not possible to obtain an adequate diet. The lack of availability of nutrient rich foods is the main barrier to obtaining a nutritionally adequate diet in Turkana West and high prices limit access to food in Turkana North.

A further aim was to assess the effect of the WFP food ration on the availability of a nutritionally adequate diet. Results show that there is still an essential need for the WFP food aid ration as an adequate diet cannot be obtained from only FDPs and locally available foods. However, the current WFP ration is not sufficient to meet nutrient requirements and the increased availability of nutrient rich foods in rural FDPs is required. Intervention efforts should focus on increasing the availability of

affordable foods that contain high quantities of vitamin C, B12, calcium and pantothenic acid. In addition appropriate complementary foods for infants are required that are high in iron and zinc. In the interim, the WFP food aid ration should be modified to ensure that the nutrient requirements of all household members are met.

It is hoped that the EC food facility project as detailed in section 1.3, will stimulate local trade, increasing the purchasing power of traders to buy in additional foods from the outer markets. Results from this study can be used to inform the EC traders as to the most nutritionally advantageous foods to purchase and sell.

In order to increase the accuracy of future Cost of Diet analyses, data should be collected on portion sizes for Turkana. Future surveys will increase the accuracy of food price and income data per season and can be compared with this initial baseline analysis. In addition, results from this report and future studies may be used in combination with market assessments planned as part of EC food facility monitoring to give more accurate information on the true availability of foods.

Acknowledgements

My gratitude to Elaine Ferguson for her constant encouragement, advice and support.

I would sincerely like to thank Esther Busquet (Save the Children London) for her guidance and enthusiasm and Save the Children Kenya for allowing me to become involved in the Cost of a Diet project and for sharing information with me. A particular thanks to Assumpta Ndumi, Ernesto Gonzalez and Catherine Fitzgibbon in Nairobi.

I would like to thank the team at Oxfam GB Turkana for their support and assistance with data collection. In particular I would like to thank Gabriel Ekuwam, Cosmas Ekadeli and the field monitor team.

Many thanks to the Denis Burkitt award scheme and Nestle for the financial help which enabled me to travel to Turkana.

Finally, I am grateful to Patrick Maundu (Bioversity Kenya) and Katja Kehlenbeck (ICRAF) who assisted with information on the botanical names of wild foods.

Reference list

- ¹ Levine S & Crosskey. (2006) A. Household Economy Assessment of North East Turkana. Available at: <http://www.odi.org.uk/hpg/papers/resources/OxfamTurkanareport.pdf> [Accessed 15 July 2010]
- ² Notenbaert A, Thornton P & Herrero M. Livestock development and climate change in Turkana District, Kenya. *ILRI Targeting and Innovation Discussion Paper*. 2007;**7**:47
- ³ Friends of Lake Turkana. (2009) Impacts of Gilgel Gibe III dam in the Turkana region Available at: <http://www.counterbalance-eib.org/images/mediaroom/doc/lake%20turkana%20paper.pdf> [Accessed 25 July 2010]
- ⁴ Merlin. (2009) Kenya food crisis: Urgent funding needed in Turkana. Available at: <http://www.merlin-usa.org/Lists/News-Detail.aspx?id=810> [Accessed 10 Aug 2010]
- ⁵ Grobler-Tanner, C. (2006) Understanding nutrition data and the causes of malnutrition in Kenya. Available at: http://pdf.usaid.gov/pdf_docs/PNADL375.pdf [Accessed 10 Aug 2010]
- ⁶ WHO (2006) Global Database on Vitamin A Deficiency. Available at: http://www.who.int/vmnis/vitamina/data/database/countries/ken_vita.pdf [Accessed 10 Aug 2010]
- ⁷ Bwibo N & Neumann C. The Need for Animal Source Foods by Kenyan Children. *J Nutr*. 2003;**133**:3936-3940
- ⁸ Caulfield L, Richard S, Rivera J, Musgrove P & Black R. Stunting, wasting and micronutrient deficiency disorders. In: Jamison D, Breman J, Measham A, Alleyne G, Claeson M, Evans D, Jha P, Mills A & Musgrove P, eds. *Disease Control Priorities in Developing Countries*. Washington: World Bank, 2006: p. 551-567

⁹ De Matteis A. (2006) Market Functioning in Turkana District, Kenya. Available at: <http://www.odi.org.uk/hpg/papers/resources/oxfamturkanamarketstudy.pdf> [Accessed 25 July 2010]

¹⁰ Magrath J. (2005) Climate change impacts on development. A note of Oxfam's experiences for the Stern Review. Available at: http://www.oxfam.org.uk/resources/policy/climate_change/downloads/climatechange_oxfam_stern.pdf [Accessed 10 Aug 2010]

¹¹ Gonzalez E. (2010) Using Food Aid to Stimulate Markets in Pastoral Communities [Powerpoint slides for Oxfam presentation]

¹² Save the Children. Logical framework for the EC food facility project. EuropeAid; 2010 Feb. Report No.: 128608. Sponsored by the European Commission.

¹³ Hilton J. A study to establish the minimum cost of a nutritionally adequate diet for 12-23 month olds using a linear programming tool; the tool's refinement and application in Bangladesh. 2008 [Masters Report LSHTM]

¹⁴ Perry A. (2008) Cost of the Diet – novel approach to estimate affordability of a nutritious diet. Available at: <http://fex.ennonline.net/34/cost.aspx> [Accessed 3 Aug 2010]

¹⁵ Chastre C, Duffield A, Kindness H, LeJeune S & Taylor A. (2007) The Minimum Cost of a Healthy Diet: Findings from piloting a new methodology in four study locations. Available at: http://www.savethechildren.org.uk/en/docs/The_Minimum_Cost_of_a_Healthy_Diet_Final.pdf [Accessed 3 Aug 2010]

¹⁶ Hilton J. (2010) The lowest cost of a nutritious diet: SCUk training London [PowerPoint slides]

¹⁷ Hilton J. The Cost of the Diet. (2010) [A practitioner's guide]

¹⁸ Ramakrishnan U. Nutrition and low birth weight: from research to practice. *American Journal of Clinical Nutrition*. 2004; **79**:17-21

¹⁹ British lion eggs. Egg sizes and quality. Available at:
<http://www.egginfo.co.uk/page/egg sizes> [Accessed 28 July 2010]

²⁰ PAHO/WHO. ProPAN: Process for the Promotion of Child Feeding. 2003 [Manual for Ministries of Health, NGO's, and international organisations interested in improving infant and young child feeding practices]

²¹ Kaur Sehmi J. *National food composition Tables and The planning of Satisfactory Diets in Kenya*. Nairobi, Kenya: Government press; 1993.

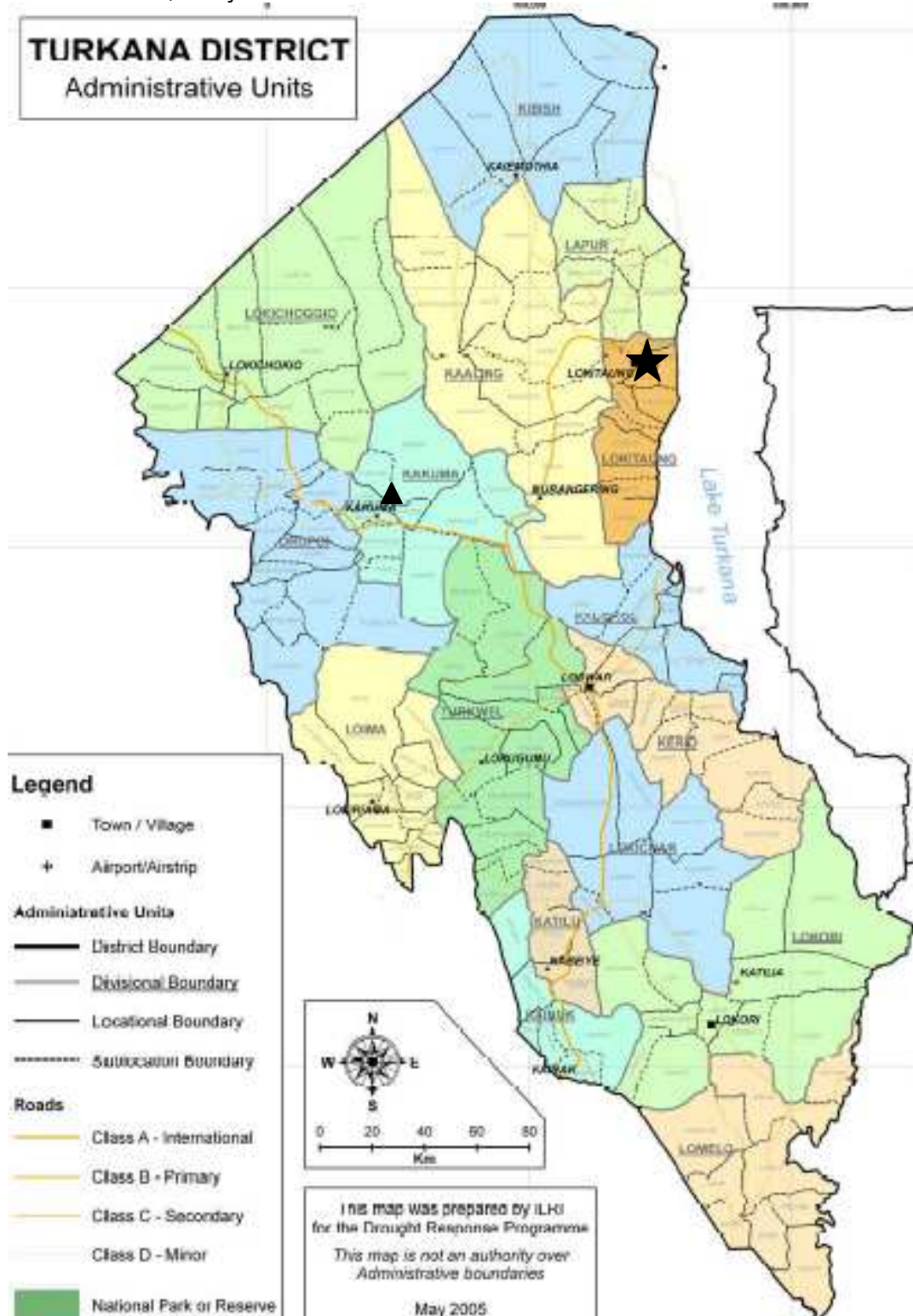
²² Booth F & Wickens G. *Non-timber uses of selected arid zone trees and shrubs in Africa*. Rome: FAO 1993.

²³ Agricultural Research Service. USDA National Nutrient Database for Standard Reference. Available at: <http://www.nal.usda.gov/fnic/foodcomp/search> [Accessed July 2010]

Appendix

APPENDIX 1

Map of Turkana taken from a paper on Livestock development and climate change in Turkana District, Kenya²



Appendix 1 shows the area of Turkana. Turkana North is south of Lokitaung (★), Turkana West surrounds Kakuma (▲)

APPENDIX 2

INFORMATION SHEET AND CONSENT FORM

A study into the minimum cost a nutritionally adequate diet for rural households in Turkana, Kenya in relation to household income.

Investigator: Rachel Evans (Rachel.evans@lshtm.ac.uk)

Contact: Save the Children, Riverside Mews off riverside drive, PO Box 39664-00623, Nairobi, Kenya

The research is being undertaken as part of a Masters' degree.

The objective of the study is to determine whether it is possible for a household to obtain a nutritionally adequate and affordable diet in the Turkana region of Kenya. It is important in understanding whether a diet that contains all of the nutrients needed for growth and health is affordable. Your cooperation is important in providing information on the usual diet of someone from Turkana.

Taking part in the research is entirely voluntary and withdrawal possible at any time without having to give a reason.

If you take part the study will involve one interview where you will be asked questions on the usual diet of your 12-23 months old; what they eat each week, what food groups they eat each week and the portion size they usually consume. You will be also asked how many people there are in your household and their age and sex.

Who will be responsible for the confidentiality of the material and its use or disposal at the end of the study.

The data will be recorded on questionnaires, and inputted into a computer spreadsheet for analysis. Those with access to the data will be the principle investigator and the staff of Save the Children Kenya. The data will be analysed in a report where all households will be represented anonymously.

The Ethical Committees for the London School of Hygiene and Tropical Medicine have approved the study

Consent form

A study into the minimum cost a nutritionally adequate diet for rural households in Turkana, Kenya in relation to household income.

Investigator: Rachel Evans (Rachel.evans@lshtm.ac.uk)

Contact: Save the Children, Riverside Mews off riverside drive, PO Box 39664-00623, Nairobi, Kenya

I _____ have read the information leaflet or heard it on tape. It explains what you are trying to find out and why you would like to talk to me.

Please put a mark in the box to the right if you think the sentence is true:

I have asked all the questions that I need to and I am happy with the answers you have given me. ☐

I allow you to write about what I have said during our talk and I understand that you won't be using my real name. ☐

I understand that I don't have to talk about things that I don't want to talk about. I know that I can stop our talk at any time and without giving a reason for this. ☐

I don't mind that you record our talk. ☐

Cost of Diet project

A study into the minimum cost a nutritionally adequate diet for rural households in Turkana in relation to household income.

I understand that I can take a look at the draft report for this study if I want to.

I would like to take part in the study. I can still change my mind at any time.

My questions have been answered by _____

Participant (name in BLOCK CAPITALS)

Signed _____

Date _____

Researcher (name in BLOCK CAPITALS)

Signed _____

Date _____

APPENDIX 3

TRAINING POWERPOINT SLIDES

(Adapted from slides used by Esther Busquet (SC) in Mozambique)

Cost of Diet Survey

Training Lodwar
July 2010

We Save the Children Will you?

Save the Children® Registered UK charity no. 213890

Objective training

To learn

- What **Cost of Diet** is measuring
- Which data to collect
- How to collect the data
- How to fill the data collection forms

Save the Children®

Overview

DAY 1 <ul style="list-style-type: none">• Introduction to CoD• Food list• Food prices and weights	DAY 2 <ul style="list-style-type: none">• Afternoon: Discuss pilot
DAY 2 <ul style="list-style-type: none">• Review day 1• Weighing exercise• Food frequency	DAY 3 <ul style="list-style-type: none">• Pilot – data collection• Feedback on pilot <p>Data collection and consolidation</p>

Save the Children®

**An Introduction to
Cost of Diet**

We Save the Children Will you?

Save the Children® Registered UK charity no. 213890

What is the Cost of the Diet?

CoD is a method developed by **SC UK** for calculating the **lowest cost diet that meets nutritional requirements of a whole family.**

Originates from the linear programming work done by Andre Briand and others at WHO.

Save the Children®

Cost of the Diet

Cost of the Diet method

- Can calculate the minimum cost of a diet for an individual child *and* for the whole family
- It takes seasonal variation in food prices into account when costing the diet.
- It is region-specific (price and availability of food is gathered at local level)

Save the Children®

Why was it developed?

- Recognition that many households have insufficient income to purchase foods that are nutritionally adequate

Save the Children

What does it tell us?

We Save the Children Will you?

Save the Children® Registered UK charity no 233890

CoD results tell us:

- Availability of nutrient rich foods. Quality of an available diet and potential patterns of nutrient deficiencies
- Affordability and cost of a nutritious diet

Save the Children

CoD So Far.....

- Niger
- Kenya
- Ethiopia
- Bangladesh
- Myanmar
- Mali (Oxfam GB)
- DRC
- Zambia (WFP)
- Mozambique

Save the Children

Why are we using Cost of Diet in Turkana?

We Save the Children Will you?

Purpose

- Is there an improvement in the diversity of foods in the market as a result of the EC food facility programme?
- Is there a reduction in the cost of a nutritionally adequate diet?

Save the Children

How will we monitor this?

- Survey the availability and price of foods in markets targeted as part of the EC food facility programme
- Survey households to determine normal food consumption patterns

Save the Children

Data collection

We Save the Children Will you?

Data collection - where?

- 4 Food Distribution polls (8 households in each)
- Markets most visited by households

Save the Children

Data Collection - Who?

- Interviews with traders
 - Weight in grams / unit (seasonal)
 - Price / unit - seasonal
- Interviews with Carers
 - Food frequency

Save the Children

Income Data

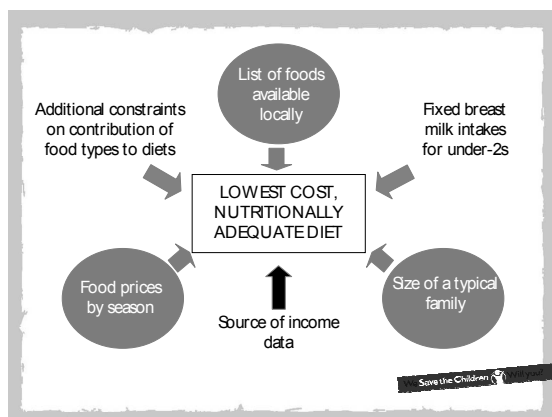
- Household income is assessed to determine whether a family can afford a nutritionally adequate diet

Save the Children

Retrospective

- Retrospective data collection: information collection about past 12 months

Save the Children



Save the Children

Food list

We Save the Children Will you?

Save the Children® Registered UK charity no 213890

Generating the Food List

- Exhaustive list of ALL foods which are available to purchase in the sites selected in the last 12 months
- Detailed description of the food
Eg. Rice – is it brown, white, husked, no husk, broken, sticky
- Ongoing revision (following pilot)

Save the Children

What to include in the food list

- All foods available in the markets
- All commonly eaten foods
- Foods available in ANY season
- **Do not** include expensive manufactured foods
- **DO** include foods even if they are cultural taboos
- **DO** include wild foods

Save the Children

Food Groups

- Cereals
- Pulses
- Fruits
- Vegetables
- Meat, Poultry, Eggs and Fish
- Roots and Tubers
- Fats
- Dairy
- Other (Beverages, sugars, snacks)

Save the Children

Wild Foods

- Include all the foods which are collected, gathered or picked
- When are they in season?
- Who collects them?
- How much can they collect?
- Are they sold on the market as well as consumed for free?

Save the Children

Data collection

We Save the Children Will you?

Save the Children® Registered UK charity no. 213890

What Unit?

- What unit is most commonly used to buy food? The unit that it is most commonly bought in by the poorest households.
- Does it change across the zone?

Save the Children

Unit of sale

Food Item	Unit of Sale	Weighted marks per unit sale										
		1	2	3	4	5	6	7	8	9	10	Aver 201
Cereal 1												
Rice												

Save the Children

Retrospective

- Data collected for previous 12 months

Food Item	Unit of Sale	Price per month											
		Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10
Cereal 1													

Save the Children

Seasonal availability

Food type	Unit	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cereal 1													
Rice													
Maize flour													
Maize grain													
Sorghum													

Save the Children

Methodology

Weight and Price data

We Save the Children Will you?

Save the Children® Registered UK charity no. 213890

Weight per local unit of each food item

- What is the weight in grams of unit sold?
- Weigh as many examples of a unit as possible from as many different traders
- Aim: 10 examples from each site

Save the Children

Food Weight Data

- Ask market trader's permission, Explain our purpose
- Weigh on a flat surface
- Use a bowl (set to zero)
- Butter, meat and other difficult items:
 - Wait until somebody purchases and then ask to weigh
 - Weigh in a bag / paper
 - You may have less results

Save the Children

RETROSPECTIVE DATA COLLECTION - WEIGHT

Date	Village/place of trade		Interviewer					
If the trader doesn't know the answer write "??" If the food is sold in a pile - write the number of pieces in the pile under the weight. If the trader is not a consumer - ask the trader to weigh the food in a bowl (or paper) and then ask the trader to weigh the food in a bowl (or paper) again.								
Food Item	Unit of sale	Weight1	Weight2	Weight3	Weight4	Weight5	Weight6	Weight7
Cereal 1								
Pulse 1								

Save the Children

Weighing exercise

- Weigh one food from each group

Save the Children

Tips for collecting weight data...

Weigh on a flat surface

- Use a bowl (set to zero)
- Butter, meat and other difficult items:
 - Wait until somebody purchases and then ask to weigh
 - Weigh in a bag / paper
 - You may have less results

Save the Children

Tips for collecting weight data...

- Weigh only the edible part of the food
e.g. do not weigh the skin of the banana
If it is not possible to weigh the edible portion in the market, purchase the food and weigh back in the office.
- Beverages

Save the Children

Price per local unit of each food item

- Interviews with local traders 3-4 interviews per site.
- Ask the cost of *Food Item* now and last 12 months.

Save the Children

Tips for collecting price data

- Ask the traders permission and explain our purpose
- No space on the form should be left blank
- If the price is the same across the whole year....cross check
- You can ask by season and then month:
 - "What was the price during the rainy season?"
 - "Was it that price throughout the whole season?"

RETROSPECTIVE DATA COLLECTION - PRICE

Date: _____ Village/place of trade: _____

ALSO POSSIBLE PER SEASON, BUT ALWAYS CHECK FOR CHANGES IN SEASON!!!

If the trader doesn't know the answer write "X"
 If the food is sold in bulk - write the number of pieces in the pile under the price. The number of pieces that are sold in a pile may change by month and season.
 If the food is sold in season then write "S"

Food Item	Unit of Sale	Price per month						
		Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09
Cereals								
Pulses								

Save the Children



Food Frequency

- Caregivers of 12-23 month olds
- 8 interviews per village
- Usual eating patterns of the child and mother

Save the Children

- Ask each caregiver to read an information sheet and to sign a consent form
- Record the ID number of each family

Save the Children

3.2.3 Dietary consumption patterns

- Ask for both 12-23 month old and for the rest of the household
- CSB: Ask consumption patterns for when it is available

Save the Children

For each food item ask

"How many days per week does *name child* eat *food*?"
 "On that day how many times does *[name]* eat *[food]*?"

When you have asked the questions for all food items in a food group ask:

"How many days per week does your child eat any of those foods (eg cereals)?"
 "On those days how many times does your child eat any of those foods?"

Repeat for the rest of the family

Save the Children

DATA COLLECTION - WEEKLY FOOD FREQUENCY

Village: Yomoso
 Interviewer: Janna
 Date: 12-Nov-09

After finishing all different or all 1, ask "How often does your child eat any of these foods?" And how many times on the days it is eaten?

FOOD ITEM	Number days per week?	On the day that it is eaten? How many times per day?
Cereals		
Rice	7	2
Sorghum	7	1
Millet	3	1
Wheat	0	0
Pulses		
Peanuts		
Cowpeas		

Save the Children

- Also ask if there are any taboos?

Save the Children

Income data

Estimate of weekly household expenditure

Item	Quantity	Unit Price	Total Spent
Maize (purchased on market)			
Other Cereals (Rice, Sorghum, Millet)			
Pulses			
Roots and Tubers			
Vegetables			
Fruits			
Fish			
Purchase of livestock or farm assets			
Purchase of water			
Soap and other detergents			

Save the Children

Checking forms

We Save the Children Will you?

Save the Children® Registered UK charity no. 213890

Finished?

- Look through the answers. Make sure every box has something in it
- Does anything stand out?
- Go back and check
- If there is a reason? Then write it down.

Save the Children

location

We Save the Children Will you?

Save the Children® Registered UK charity no. 213890

Data collection - where?

- 4 Food Distribution polls (8 households in each)
- Markets most visited by households

Save the Children

Choosing the location

- Where do the poor and very poor buy their food?
- 6 sites across the zone
- Capture all places of purchase; village stall, markets, boats, passing trucks
- Seasonal access to markets

Save the Children

Pilot

We Save the Children Will you?

Save the Children® Registered UK charity no. 213890

Pilot

- Lodwar market
- 4 groups
- Collect price and weight data different types of food item

Save the Children

APPENDIX 4

PRICE DATA COLLECTION FORMS (WITH COMPLETE FOOD LIST)

RETROSPECTIVE DATA COLLECTION - PRICE

Date	Village/place of trade	Interviewer
------	------------------------	-------------

If the trader doesn't know the answer write "?"

If the food is sold in a pile - write the number of pieces in the pile under the price. The number of pieces that are sold in a pile may change by month and season

If the Food is not in season then write NS

[illegible]

WEIGHT DATA COLLECTION FORMS

RETROSPECTIVE DATA COLLECTION - Net weight											
Date		Village /place of trade		Interviewer							
<p>If the trader doesn't know the answer write "?"</p> <p>If the food is sold in a pile - write the number of pieces in the pile under the price. The number of pieces that are sold in a pile may change by month and season</p> <p>If the Food is not in season then write NS</p>											
Food Item	Unit of Sale	Weight estimates per unit of sale									
		1	2	3	4	5	6	7	8	9	10
Cereals											
Maize, white flour											
Maize, yellow flour											
Maize, white, grain											
Maize, yellow , grain											
Maize, cob, raw											
Maize, cob, cooked											
Sorghum, grain											
Sorghum, flour											
Wheat, Bulgar, Brown, flour											
Wheat, Bulgar, white, flour											
Wheat, Bulgar, Brown, split											

APPENDIX 5

HOUSEHOLD MONITORING TOOL

Produced by the WFP for use in monitoring the EC food facility programme. (June 2010 version)

Household Food Access and Consumption Monitoring

*Household Questionnaire to be administered two weeks after the last food distribution, either monthly or quarterly as the plan may be
Follow all the instructions, carefully and make sure that your answers are legible.*

Section 1: Basic Data (all households answer this section)

1.1 Interview Details

Project/Programme*		District	Division	FDP	HH Number
ECFF beneficiary	<input type="checkbox"/>	BIC No:		Interviewer's name	
GFD beneficiary	<input type="checkbox"/>			Date of Interview	___/___/___
Non-beneficiary	<input type="checkbox"/>				
Has the HH received food aid in the last month (4 weeks)? (Circle)					Yes No
Are you (respondent) the one who collect food during the last distribution? (Circle)					Yes No
Were you (respondent) aware of your ration entitlements? (Circle)					Yes No
To be answered only by FFA Project Beneficiaries					
Did any household member participate in FFW in the last 4 weeks? (Y/N)					Yes No
If no member of the registered household participated in FFW in the last 4 weeks give the reason (Tick closes Response)	1	Not applicable: Household in not registered			
	2	Wage is not attractive			
	3	Have more lucrative work elsewhere			
	4	Wanted to work, but was prevented for other reason			
	5	No able bodied adults in the household			
	6	Nobody in household wanted to work			

1.2 Details of Household Members

HH Member (Circle Respondent)	Registered?	Participates in FFA ¹	In SMP ²	In SFP ³	In BSFP ⁴	In HSNP ⁵	Approximate Age (Years)	Marital Status (from list)	Sex (Circle)	Relationship to HHH (from list)	Occupation (from list)	MUAC (only for U5s)	Remarks ⁷ (e.g. why child is not attending school, what kind of petty trade)
1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	F			
2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	F			
3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	F			
4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	F			
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	F			
6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	F			
7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	F			
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	F			
9	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	F			
10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	F			
11	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	F			
12	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	F			

RELATIONSHIP TYPES				MAIN OCCUPATIONS			
A	Is head	G	Adopted/fostered child	A	Agricultural labor	I	Infant
B	Spouse of head	H	Friend of head	B	Livestock herding	J	School Going Age but not attending school
C	Child of head	I	Employee of head	C	Other farm	K	Retired
D	Parent of Head			D	Waged labor (salaried)	L	Housewife
E	Grandparent of head			E	Waged labor (casual)	M	Domestic help
F	Other relation of head			F	Petty trade	N	Hunting, gathering, firewood/charcoal
MARITAL STATUS				G	Unemployed	O	Other Specify:
				H	Student		
M	Married	W	Widowed				
S	Single						

¹ FFA= Food for assets intervention, which is a community based public works intervention

² SMP= School meals programme, where children receive a meal at school

³ SFP = supplementary feeding programme

⁴ BSFP= blanket supplementary feeding programme

⁵ HSNP = Hunger Safety Net Programme (cash transfer)

⁶ If the respondent does not know, ask for a rough guess, don't leave this blank

⁷ used to make sense of the percentages e.g. = . If 10% the children are reported not to be attending school, what is the most common reason?. Write more notes if necessary

Section 2: Food Aid Related Questions (only WFP beneficiaries)

2.1 Receipt of food aid commodities

Number of Household members receiving food (Household size) – Copy from section 1.2:											
Food Aid Item	How much food aid was received in last month in KG?				Was the amount received equal to the correct ration entitlement? – Only for GFD (Tick yes)	IF NOT: Reason Given for Inadequate Rations (Circle code)					
	Direct from FDP	From Gov.	From Friends / kin/ Faith based	No. of Days Food Lasted							
Cereals					<input type="checkbox"/>	0	1	2	<input type="checkbox"/>	4	5
Pulses					<input type="checkbox"/>	0	1	2	<input type="checkbox"/>	4	5
Oil					<input type="checkbox"/>	0	1	2	<input type="checkbox"/>	4	5
CSB					<input type="checkbox"/>	0	1	2	<input type="checkbox"/>	4	5
Salt					<input type="checkbox"/>	0	1	2	<input type="checkbox"/>	4	5
Meat					<input type="checkbox"/>	0	1	2	<input type="checkbox"/>	4	5
Milk					<input type="checkbox"/>	0	1	2	<input type="checkbox"/>	4	5
Fish					<input type="checkbox"/>	0	1	2	<input type="checkbox"/>	4	5

KEY: REASON FOR INADEQUATE RATIONS	CODE
Not applicable: ration was adequate	0
Not enough available at FDP	1
Under-scooping, or unfair distribution	2
Misappropriation/diversion of food by RC	4
Distribution to beneficiaries not on the register	5

Verify the quantity of food received by the HH by checking food balances at the time of the visit

2.1.1 How many times did you redeem the vouchers during the month?					
	All vouchers redeemed at once	Two times in a month	Three times in a month	Four times in a month	More than four times in a month
Cereals					
Pulses					
Oil					
CSB					

2.2 Opportunity Cost of Food Collection

2.2.1	Time taken by beneficiaries to travel to FDP in hours ⁸			
2.2.2	Time taken receiving rations and carrying home (hours) ⁹			
2.2.3	Payment in Ksh for transport of food to home (0 if no payment)			
2.2.4	Means of transport from Home	Means of transport back		
2.2.5	Payment in Ksh for milling (include all milling related costs) ¹⁰			
2.2.6	Payment in Ksh for service rendered at the FDP if any(offloading, security, storage, scooping etc)			
2.2.7	What activities are sacrificed for collecting the food? (Tick the <u>one</u> most appropriate)			
	Not applicable (No activities sacrificed)			<input type="checkbox"/>
	Farm labour and animal husbandry			<input type="checkbox"/>
	Income Generating activity (Petty trade)			<input type="checkbox"/>
	Paid labour			<input type="checkbox"/>
	Domestic tasks including childcare			<input type="checkbox"/>
	Leisure			<input type="checkbox"/>
	Schooling			
2.2.8	Who collected the food aid from the distribution point? ¹¹	Adult Male <input type="checkbox"/>	Child Male <input type="checkbox"/>	Adult Female <input type="checkbox"/> Child Female <input type="checkbox"/>
2.2.9	Provide further comments on opportunity cost of food collection			

⁸ Ensure that this time accounts only for actual travelling hours and not time take chatting with friends along the way or passing through other places

⁹ This time should only account for effective waiting time and exclude early arrivals for other purposes like catching up with friends

¹⁰ Enumerators should gather further information on dynamics of milling. Do beneficiaries mill before they go home, if not how far are milling facilities from their households, if payments are made in kind then they should all be converted to cash based on the prevailing market price

¹¹ If it is the respondent who collected food then the enumerator do not have to ask this question. This question could be answered together with the question in section one to avoid tiring the respondent

2.3 Food Aid Utilization

Of the food aid received, approximately what percentage was used for each of these purposes? Use proportional piling to derive the answers.										If any quantity of food aid was sold ... (answer this only if food aid was sold)									
FOOD AID COMMODITY	Sold on ¹² the market	Bartered ¹³ for other items	Shared with kin (outside HH)	Saved for seed	Lost through theft or poor storage	Consumed by household members	Fed to animals	Brewing	Other	TOTAL	Price Received for Sale in KSH/KG	Most Important Reason for Resale ¹⁴ (circle)							
Cereals										100 %		0	1	2	3	4	5		
Pulses										100 %		0	1	2	3	4	5		
Oil										100 %		0	1	2	3	4	5		
CSB										100 %		0	1	2	3	4	5		
Salt										100 %		0	1	2	3	4	5		
Meat										100 %		0	1	2	3	4	5		
Fish										100 %									
Milk										100 %									
Comments (what items were obtained from bartering or selling food aid)																			

Hints: Check totals add up to 100

KEY: REASONS GIVEN FOR RESALE OF FOOD AID	
REASON GIVEN	CODE
Not Applicable: Did not resell	0
Don't have any other source of money	1
Household food resources are adequate	2
Food aid commodities are not appropriate	3
Costs too much to take food aid home	4
In need of other items	5

¹² If Reason is "In need of other items", ask which items and enter in the section "Comments".

¹³ Enter the items that the food was bartered for in the section "Comments"

Section 3: Household Food Access and Consumption

3.1 Coping Strategy Index

FILTER QUESTION: In the past 7 days, were there times when you did not have food or enough money to buy food?		If NO, then the CSI=0 (no more questions)	
In the past 7 days, how often has your household had to:		If YES, then proceed with the following questions to measure the CSI	
	RAW SCORE (insert frequency value - 0 to 7)	UNIVERSAL SEVERITY WEIGHT (these values are fixed)	WEIGHTED SCORE (for each row, multiply the frequency value by the related weight)
1. Rely on less preferred and less expensive food?		1	
2. Borrow food, or rely on help from a friend or relative?		2	
3. Limit portion size at mealtime?		1	
4. Restrict consumption by adults in order for small children to eat?		3	
5. Reduce number of meals eaten in a day?		1	
CSI - TOTAL HOUSEHOLD SCORE (sum down the weighted scores)			

3.2 Food Consumption

3.2.1 Frequency of Meals

Refer to the current month only (meals only)

How many meals do your family adults (>18yrs) eat per day?	
How many snacks do your family adults (>18yrs) eat per day?	
How many meals your family members, 5 – 18 yrs eat per day?	
How many snacks your family members, 5 – 18 yrs eat per day?	
How many meals do your family children (6 – 59 months) eat per day?	
How many snacks do your family children (6 – 59 months) eat per day?	

3.2.2 Dietary Diversity

Have you eaten any of the following foods in the last seven days? Indicate the number of days each of the foods have been consumed also indicating the primary and secondary source					In the last 24 hrs did children consume any of these foods
FG #		Days eaten in the past seven days	Primary Source of food	Secondary Source of food	
1	Maize, Porridge, rice, pasta, bread and other cereals				
2	Cassava, potatoes, sweet potatoes				
3	Bean, peas, groundnuts, cashew nuts				
4	Vegetables – kales and cabbage				
5	Fruits				
6	Beef, goat, pork, eggs and fish				
7	Milk, mala, yoghurt, cheese				
8	Sugar and sugar products				
9	Oils, fat and butter				

3.2.3 Dietary Consumption patterns

How many days per week do you eat (specific food)? On the day that you eat the food, how many times is it eaten during that day?

How many times per week do you eat (food group)? On the day that you eat (food group), how many times is it eaten during that day?

	12-23 month old		Rest of family	
	How many days per week?	On the day it's eaten how many times per day?	How many days per week?	On the day it's eaten how many times per day?
Cereals				
Maize, white flour				
Maize, yellow flour				
Maize, white, grain				
Maize, yellow , grain				
Maize, cob, raw				
Maize, cob, cooked				
Sorghum, grain				
Sorghum, flour				
Wheat, Bulgar, Brown, flour				
Wheat, Bulgar, white, flour				
Wheat, Bulgar, Brown, split				
Wheat, Bulgar, white, split				
Wheat, flour				
Wheat, grain				
Bread, white				
Bread, brown				
Maccaroni				
Spaghetti				
Rice, white, husked				
Rice, white, unhusked				
Rice, brown, husked				
Rice, brown, unhusked				
Millet, brown, grain				
Millet, brown, flour				

<i>edapal</i> Dobera glabra				
<i>Edung</i> Borscia coriacea				
Pulses				
Lentils, brown, wholegrain				
Cowpea				
Peas, yellow, whole				
Peas, yellow, split				
Peas, green, whole				
Peas, green, split				
Beans, white, dried				
Beans, red, dried				
Beans, yellow, dried				
Beans, black, dried				
Green grams				
Ground nuts, roasted				
Soybean, flour				
Fruits				
Mango, ripe				
<i>Mango, juice</i>				
<i>Orange, ripe</i>				
<i>Orange, juice</i>				
<i>Watermelon</i>				
<i>Banana, sweet</i>				
<i>Banana, big, ripe</i>				
<i>Banana, big, unripe</i>				
<i>Banana, big, cooked</i>				
<i>Pawpaw, ripe</i>				
<i>Pawpaw, juice</i>				
<i>Lemon</i>				
<i>edapal</i> Dobera glabra				
<i>emeyan</i> Berchamia discolour				
<i>engomo</i> Grewia tenax				
<i>edome</i> Cordia sinensis				
<i>esokhon</i> Salvadoria persica				
<i>ngakalalio</i> Zizyphus mauritania				
<i>ebei</i> Balanites orbicularis				
<i>engol</i> Hypahaene coriacea				

<i>engol</i> , powder				
<i>Elero</i>				
<i>ngitit</i> Acacia tortilis				
<i>Ekoleese</i>				
Vegetables				
Kale (sukumawiki)				
Cabbage				
Spinach				
Cowpea, leaves				
Pumpkin, whole				
Pumpkin, leaves				
Tomato				
Carrot				
Onion				
Lady finger (murere)				
Amaranthas, leaves				
<i>Lora Kimak</i>				
<i>Lokiliton</i>				
Meat, Poultry, Fish, Eggs				
Goat, raw				
Goat, cooked				
Goat intestines and stomach, cooked				
Goat intestines and stomach, raw				
Camel				
Donkey				
Chicken, raw				
Chicken, cooked				
Beef, cooked				
Beef, raw				
Fish, white, fillet				
Fish, white, large, smoked				
Fish, white, large, salted				
Fish, white, large, dried				
Fish, white, large, fried				
Fish, white, small, smoked				
Fish, white, small, salted				
Fish, white, small, dried				

Fish, white, small, fried				
Egg, chicken				
Egg, duck				
Roots and Tubers				
Potato, irish, raw				
Potato, irish, cooked				
Potato, sweet, raw				
Potato, sweet, cooked				
Potato, irish, fried				
<i>egilai ngakaparai</i> Vatovaea pseu				
Fats				
Vegetable oil				
Fish oil				
Animal fat				
Dairy				
Milk, cow, fresh				
Milk, cow, sour				
Milk, camel, fresh				
Milk, camel, sour				
Milk, goat, fresh				
Milk, goat, sour				
Other				
Soda				
Ready to drink juice, syrup				
Beer				
Granulated sugar				
Salt				
Royco				
Dried ginger				
Fresh ginger				
Eminae (Gum)				
Ao (Honey)				

Are there any taboos?

3.3 Household Expenditure

Expenditure is used as proxy for household income;

In the space provided below, give the quantities and unit prices of all items purchased in the week prior to the interview:

Item	Quantity	Unit type	Unit Price	Total Spent ¹⁴
1. Maize (purchased on market)				
2. Other Cereals (Rice, Sorghum, Millet)				
3. Pulses				
4. Roots and Tubers				
5. Vegetables				
6. Fruits				
7. Fish				
8. Meat				
9. Milk				
10. Sugar				
11. Tea Leaves				
12. Eggs				
13. Salt and spices				
14. Oils and Fats				
15. Purchase of livestock or farm assets				
16. Purchase of water				
17. Soap and other detergents				
18. Hiring of labor for security				
19. Hiring of labor for farm/herding				
20. Purchase of medicine				
21. Veterinary services and medicine				
22. School Fees				
23. Purchase of other household items including clothing				
24. Travel and related expenses				
25. Purchase of alcohol or entertainment				
26. Gifts or loans to other people				
27. Loan repayments				
28. Drugs and medical assistance (Health Clinic)				
29. Rental of housing				
30. Other Items				

APPENDIX 6

HOUSEHOLD EXPENDITURE RESULTS

	Turkana North		Turkana West	
Item	Average expenditure per week (Ksh)	Average expenditure per year (Ksh)	Average expenditure per week (Ksh)	Average expenditure per year (Ksh)
Maize	81.3	4193.5	9.688	503.8
Other cereals	37.8	2029.7	12.81	666.3
Pulses	43.9	2356.8	12.81	666.3
Roots and tubers	3.1	167.7	0.625	32.5
Vegetables	7.5	404.3	0	0
Fruits	4.8	255.0	0	0
Fish	31.0	1497.9	3.125	162.5
Meat	77.0	4133.2	19.69	1024
Milk	18.6	998.1	8.75	455
Sugar	120.8	6382.6	84.06	4371
Tea leaves	13.8	704.5	12.66	658.1
Eggs	0.0	0.0	1.25	65
Salt and spices	7.5	387.5	4.219	219.4
Oils and fats	52.6	2737.5	2.813	146.3
Purchase of livestock or farm assets	0.1	6.7	0	0
Purchase of water	21.3	1142.3	7.5	390
Soap and other detergents	20.9	1120.5	5.625	292.5
Hiring of labour for security	0.3	16.8	0	0
Hiring of labour for farm/herding	0.4	20.1	0	0
Purchase of medicine	16.1	862.2	6.25	325
Veterinary services and medicine	0.5	26.8	75	3900
School fees	673.8	36165.2	65.63	3413
Purchase of other household items including clothing	22.2	1192.6	0	0
Travel and related expenses	43.8	2348.4	6.25	325
Purchase of alcohol or entertainment	3.1	167.7	0	0
Gifts or loans to other people	3.1	167.7	0.625	32.5
Loan repayments	0.0	0.0	0	0
Drugs and medical assistance	0.0	0.0	3.125	162.5
Rental of housing	0.0	0.0	0	0
Other items	0.6	33.5	1.25	65
Expenditure on food	515.1	27078.6	172.5	8970
Total expenditure	1305.8	69519.0	343.8	17875
Percentage income spent on food	70.2	70.2	68.48	68.48

APPENDIX 7**AVERAGE PRICE OF 100G OF EACH FOOD ITEM****TURKANA NORTH**

FOOD NAME	AVERAGE PRICE PER 100G PER SEASON			
	AKAMU	AKIPORO	NAIT	ERUPE
CEREAL				
Maize, white flour	6.65	6.31	6.82	7.33
Maize, white grain	4.48	4.01	4.29	4.87
Sorghum, grain	1.90	1.90	1.90	1.90
Wheat, flour	6.56	6.36	6.60	6.71
Bread, white	16.08	17.54	17.54	17.54
Spaghetti	15.54	15.27	15.94	16.34
Rice, white, husked	8.61	8.88	8.48	8.09
Biscuit	20.00	20.00	20.00	20.00
PULSES				
Peas, yellow, split	3.97	3.97	3.97	3.97
Beans, red, dried	7.83	7.70	7.73	7.99
Green grams	4.00	4.00	4.00	4.00
FRUITS				
Mango, juice	11.59	12.08	12.32	11.59
VEGETABLES				
Onion	12.20	12.20	12.20	12.20
Tomato sauce	27.38	28.57	26.79	25.00
MEAT, POULTRY, FISH, EGGS				
Fish, white fillet	7.48	8.02	7.22	6.42
Egg, chicken	25.16	28.30	23.58	18.87
ROOTS AND TUBERS				
Potato, irish, raw	3.13	3.13	3.13	3.13
FATS				
Vegetable oil	39.17	40.33	38.59	36.86
Cooking fat, hard	16.67	17.14	16.29	15.14
DAIRY				
Milk, cow, fresh pasturised	9.00	9.33	8.78	8.32
OTHER				
Soda	11.79	12.20	11.83	10.98
Ready to drink juice syrup	4.79	5.07	4.60	4.23
Beer	23.43	23.61	24.44	23.06
Granulated sugar	11.66	10.37	11.87	13.54
Salt	5.00	5.00	5.00	5.00
Royco	61.82	63.64	60.91	58.18
Tea leaves	71.66	73.47	70.75	68.03

TURKANA WEST

FOOD NAME	AVERAGE PRICE PER 100G PER SEASON			
	AKAMU	AKIPORO	NAIT	ERUPE
Cereals				
Maize, white flour	4.86	4.74	4.60	4.87
Maize, yellow flour	4.50	4.50	4.58	4.83
Maize, white, grain	4.35	4.14	4.21	5.00
Wheat, flour	7.23	6.63	6.98	8.34
Spaghetti	12.56	12.86	12.43	12.29
Rice, white, husked	9.22	9.18	9.03	9.08
Biscuit	30.37	28.89	28.89	28.89
Pulses				
Peas, yellow, split	5.08	4.89	5.17	5.98
Beans, red, dried	7.68	7.77	7.59	7.46
Meat, Poultry, Fish, Eggs				
Goat, raw	15.33	16.00	15.00	14.00
Goat intestines and stomach, cooked	9.33	10.00	8.50	8.00
Goat intestines and stomach, raw	9.33	10.00	8.50	8.00
Fats				
Vegetable oil	15.89	15.33	15.75	17.03
Animal fat	21.31	21.33	20.42	20.67
Other				
Soda	12.36	12.20	12.20	12.44
Ready to drink juice, syrup	7.11	7.10	6.87	6.72
Beer	25.68	25.19	25.19	25.93
Granulated sugar	11.24	11.55	11.36	11.16
Salt	5.00	5.00	5.00	5.00
Royco	65.57	65.57	65.57	65.57
Tea	60.61	60.61	60.61	60.61
Powdered milk	67.31	67.31	67.31	67.31
Yeast	40.88	40.88	37.96	40.88
Fermented porridge flour	9.50	11.00	10.25	9.50
Unimix	3.94	3.94	3.94	3.94

APPENDIX 8

FOOD FREQUENCY OF CONSUMPTION PARAMETERS

FOOD NAME	Turkana North				Turkana West			
	CHILDREN 12-23m		REST OF FAMILY		CHILDREN 12-23m		REST OF FAMILY	
	FINAL FREQUENCY		FINAL FREQUENCY		FINAL FREQUENCY		FINAL FREQUENCY	
	<i>for food group total</i>		<i>for food group total</i>		<i>for food group total</i>		<i>for food group total</i>	
	<i>min</i>	<i>max</i>	<i>Min</i>	<i>max</i>	<i>min</i>	<i>max</i>	<i>min</i>	<i>Max</i>
Cereals	5	21	5	21	8	21	7	21
Maize, white flour	28		17		21		14	
Maize, yellow flour	0		0		7		7	
Maize, white, grain	10		21		21		21	
Maize, yellow , grain	0		0		0		7	
Maize, cob, raw	0		0		0		0	
Maize, cob, cooked	0		0		0		0	
Sorghum, grain	0		0		7		5	
Sorghum, flour	0		0		5		2	
Wheat, Bulgar, Brown, flour	0		0		1		1	
Wheat, Bulgar, white, flour	0		0		0		0	
Wheat, Bulgar, Brown, split	0		0		0		0	
Wheat, Bulgar, white, split	0		0		0		0	
Wheat, flour	8		11		4		4	
Wheat, grain	0		0		0		0	
Bread, white	0		0		0		0	
Bread, brown	0		0		0		0	
Maccaroni	0		0		0		0	
Spaghetti	2		3		1		1	
Rice, white, husked	3		3		5		3	
Rice, white, unhusked	0		0		1		1	
Rice, brown, husked	0		0		0		0	
Rice, brown, unhusked	0		0		0		0	
Millet, brown, grain	0		0		0		0	
Millet, brown, flour	0		0		0		0	
<i>edapa</i> Dobera glabra	0		0		0		0	
<i>edung</i> Borscia coriacea	0		0		2		2	
Biscuit	-		-		0		0	
Pulses	0	21	2	21	4	21	3	14
Lentils, brown, wholegrain	1		0		12		8	
Cowpea	0		0		0		0	
Peas, yellow, whole	0		0		4		6	
Peas, yellow, split	21		21		21		17	
Peas, green, whole	1		2		0		0	
Peas, green, split	0		0		0		0	
Beans, white, dried	0		0		0		0	
Beans, red, dried	8		15		17		17	
Beans, yellow, dried	0		0		0		0	
Beans, black, dried	0		0		0		0	
Green grams	5		1		0		0	
Ground nuts, roasted	0		0		0		0	
Soybean, flour	0		0		0		0	

Fruits	0	0	0	0	0	0	0	0
Mango, ripe		2		0		0		0
Mango, juice		0		0		0		0
Orange, ripe		2		0		0		0
Orange, juice		0		0		0		0
Watermelon		0		0		0		0
Banana, sweet		1		0		0		0
Banana, big, ripe		0		0		0		0
Banana, big, unripe		0		0		0		0
Banana, big, cooked		0		0		0		0
Pawpaw, ripe		0		0		0		0
Pawpaw, juice		0		0		0		0
Lemon		0		0		0		0
edapal Dobera glabra		1		1		0		0
emeyan Berchamia discolour		0		0		0		0
engomo Grewia tenax		0		0		0		0
edome Cordia sinensis		0		0		0		0
esokhon Salvadora persica		1		1		0		0
ngakalalo Zizyphus mauritanica		2		2		0		0
ebei Balanites orbicularis		0		0		0		0
engol Hypochaeris coriacea		3		6		0		0
engol, powder		7		10		0		0
Elero		0		0		0		0
ngitit Acacia tortilis		0		0		1		1
Ekoleese		0		0		0		0
Vegetables	0	8	0	8	0	6	0	6
Kale (sukumawiki)		2		4		0		0
Cabbage		2		6		0		0
Spinach		0		0		0		0
Cowpea, leaves		0		0		0		0
Pumpkin, whole		0		0		0		0
Pumpkin, leaves		0		0		0		0
Tomato		0		3		0		0
Carrot		0		0		0		0
Onion		8		11		0		0
Lady finger (murere)		0		0		2		2
Amaranthas, leaves		0		0		0		0
Lora Kimak		0		0		3		3
Lokiliton		0		0		4		4
Tomato sauce		0		0		0		0
Meat, Poultry, Fish, Eggs	0	14	0	14	0	3	0	4
Goat, raw		6		7		2		2
Goat, cooked		1		1		5		5
Goat intestines and stomach, cooked		1		1		1		1
Goat intestines and stomach, raw		3		3		0		0
Camel		2		2		0		0
Donkey		2		2		1		1
Chicken, raw		0		0		0		0
Chicken, cooked		0		0		0		0
Beef, cooked		0		0		0		0
Beef, raw		0		0		0		0
Fish, white, fillet		5		5		0		0

Fish, white, large, smoked	1	1	0	0
Fish, white, large, salted	1	1	0	0
Fish, white, large, dried	1	1	0	0
Fish, white, large, fried	0	0	0	0
Fish, white, small, smoked	1	1	0	0
Fish, white, small, salted	1	1	0	0
Fish, white, small, dried	4	4	0	0
Fish, white, small, fried	4	1	0	0
Egg, chicken	0	0	0	0
Egg, duck	0	0	0	0
Roots and Tubers	0	3	0	0
Potato, irish, raw	3	3	0	0
Potato, irish, cooked	1	1	0	0
Potato, sweet, raw	0	0	0	0
Potato, sweet, cooked	0	0	0	0
Potato, irish, fried	0	0	0	0
<i>egilai ngakaparai</i> Vatovaea pseu	0	0	0	0
Fats	4	21	3	2
Vegetable oil	21	21	21	21
Fish oil	3	3	0	0
Animal fat	6	6	9	9
Dairy	0	14	0	0
Milk, cow, fresh	0	0	1	1
Milk, cow, sour	0	0	0	0
Milk, camel, fresh	0	0	0	0
Milk, camel, sour	3	3	0	0
Milk, goat, fresh	17	17	4	4
Milk, goat, sour	14	14	6	6
Other	0	21	0	3
Soda	1	1	0	0
Juice, syrup	1	1	0	0
Beer	0	0	0	0
Granulated sugar	21	21	24	24
Salt	21	21	14	14
Royco	10	10	6	6
Dried ginger	0	0	0	0
Fresh ginger	0	0	0	0
Eminae (Gum)	0	0	0	0
Ao (Honey)	0	0	0	0
Tea	0	0	17	17
Powdered milk	0	0	0	0
Yeast	0	0	0	0
Juice packet	0	0	0	0