

# Cost of Diet assessment

Lindi Rural District, Tanzania



## **Acknowledgments**

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## Abstract

### *Background*

Chronic malnutrition is a persistent problem in Lindi Rural District. Although the rates of acute malnutrition in the region are low, the prevalence of chronic malnutrition is much higher than the national average at 53.5%. This is a cause for concern as children with chronic malnutrition are more vulnerable to infection, don't reach their full height potential and experience impaired development of the brain, which has negative consequences for a child's schooling and productivity later in life. There are many reasons underlying the high rates of malnutrition in the Lindi region including lack of safe drinking water, lack of knowledge on nutrition and health issues, and poor child care and feeding practices<sup>1</sup>. In addition, research has shown that poverty is likely to be an underlying cause of malnutrition in children under 2 years of age, as diet quality is significantly associated with wealth<sup>2</sup>.

### *Objective*

The aim of this study was to assess whether economic constraints are preventing households in the agricultural zone of Lindi Rural District from accessing a nutritious diet. The study set out to answer the following questions:

- Is the current diet for children aged 6-24 months nutritionally adequate?
- What is the cost of a nutritionally adequate diet for a typical household in the agricultural zone of Lindi Rural District?
- What are the limiting nutrients in the region that increase the cost of a nutritious diet?
- Are there any neglected and underutilised crops available in the region that could decrease the cost of a nutritious diet?
- How affordable is the diet for a typical household in each wealth group?
- Has national economic growth increased the affordability of a nutritious diet for households?

In addition, modelling was carried out to determine how nutrition, food security and social protection interventions could result in improved household access to food.

### *Methodology*

The study was conducted in Chikonji, Narunyu and Mnolela villages using the *Cost of Diet*; a tool developed by Save the Children to develop and cost out nutritionally appropriate diets. Information was collected on foods available locally and their market price, current consumption patterns and food sources using a market survey,

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<sup>1</sup> Save the children, *Two nutritional anthropometric surveys: Lindi Rural and Ruangwa districts, Lindi Region, Tanzania, 2009*

<sup>2</sup> Perry, A. *Cost of the Diet – novel approach to estimate affordability of a nutritious diet. Website: <http://fex.enonline.net/34/cost.aspx> (Accessed August 2011)*

dietary pattern survey and focus group discussions. Using this data the lowest cost diet was calculated using the Cost of Diet tool. This was compared with income data to determine the affordability of a nutritious diet at the household level by wealth group.

### *Results*

An analysis of current consumption patterns among children aged 6-24 months showed that the quality of the diet is low among the poorest households in the pre-harvest season. In addition to the low partial breastfeeding rate and feeding frequency as shown by an anthropometric survey in 2009<sup>3</sup>, this study showed that the quality of foods given to children was insufficient to meet their micronutrient requirements. An analysis of whether the *actual* diet provides the nutrients required for optimal growth and development show that there are major deficiencies in vitamin A, C, B12 and Zinc. These deficiencies are likely to be an underlying cause of both malnutrition and morbidity.

The Cost of Diet assessment showed that poverty is a major constraint to accessing nutritious food for both the poor and middle wealth groups. A comparison of the cost of a nutritious diet with annual income (the monetary value of food produced plus cash income) revealed that the income available to the poorest households means they are unable to afford a nutritious diet, and the middle wealth group (who spend 45% of their total income on food<sup>4</sup>) would have to spend 78% of their total current food & income to be able to afford a nutritious diet.

The minimum cost of a fully nutritious diet is TSh 4,000 per day for an average household of 6 people. In a diet that provides the full nutrient needs of a household, most of the cost relates to micronutrient-rich foods. The micronutrients that are most expensive are fat, riboflavin, iron, vitamin C and A, found in animal source foods, fruit and vegetables.

National economic growth has not improved affordability of the diet for the poorest households. Comparison of the affordability of a nutritious diet in 2007 and 2011 shows that a nutritious diet has become less affordable for all wealth-groups over the last 5 years despite national economic growth<sup>5</sup>. In addition there has been no improvement in the quality of the diet over the same period for the poorest children aged 6-24 months. A study by the International Food Policy Research Institute also showed that high agricultural growth in Tanzania has done little to improve nutrition<sup>6</sup>. This highlights the need for policies and interventions that improve access

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<sup>3</sup> 72.5% partial breastfeeding up to 24 months, 0.9% of carers give 5 meals a day to their youngest child as is recommended. Save the children, *Two nutritional anthropometric surveys: Lindi Rural and Ruangwa districts, Lindi Region, Tanzania, 2009*

<sup>4</sup> Save the Children, *Livelihoods of Lindi Rural District, A Household Economy Assessment in Southern Tanzania. 2003*

<sup>5</sup> US government Feed the Future, *Tanzania FY 2010 implementation plan, 2010*

<sup>6</sup> International food policy research institute. *Leveraging agriculture for improving nutrition and health: highlights from an international conference.* New Delhi. 2011

to a nutritious diet for the poorest and most vulnerable households alongside policies to encourage equitable national economic and agricultural growth.

### *Recommendations*

In a diet that provides the full nutrient needs of a household, most of the cost relates to micronutrient-rich foods and therefore policies are needed to increase the availability of these foods thus reducing their market price. Nutrition-friendly agricultural policies should also be in place to promote the local production of food with improved nutritional value. Livestock & fishing policies should be adjusted to make meat and fish more widely available to all at an accessible price in recognition of the importance of animal source foods in the provision of a nutritious diet.

To ensure that the poorest households have sufficient resources to be able to act upon nutrition education messages, a nutritious diet must be made more affordable. To improve economic access to a nutritious diet for households in the Lindi region, a package of interventions is recommended. Interventions should be implemented at household, community and regional level in recognition that malnutrition is a result of many different interacting factors that occur at all levels of society.

Bio-intensive kitchen gardening and livestock programmes are recommended where feasible to improve access to key limiting micronutrients. These should be designed in a way that does not negatively impact on women's time to adequately care and feed themselves and their children. In addition micronutrient supplement programmes and fortification of staples should be considered to address critical nutrient deficiencies in children's diets that are particularly challenging to afford through local foods e.g. iron, vitamins C and A.

For the poorest households who have insufficient purchasing power to buy the nutritious diet needed both for their children's healthy growth and development and for the nutrient needs of pregnant and lactating women, social protection programs & livelihoods approaches are needed alongside fortification of food staples and/or micronutrient supplementation. Further research is required to determine how such programs should be designed to increase purchasing power in a sustainable manner.

All interventions should be supported by nutrition education programmes with the aim of improving the diet pattern towards nutritious but affordable choices of food for the household. Breast feeding promotion should also be stepped up due to the low rate of exclusive breastfeeding alongside education on the prevention of illness and caring for sick children due to the cyclical relationship between malnutrition and disease.

## 1. Introduction

Chronic malnutrition is a persistent problem in Lindi Rural District. Although the rates of acute malnutrition in the region are low at 2.9%, the prevalence of chronic malnutrition is 53.5% which is much higher than the national average of 42%<sup>7</sup>. This is a cause for concern as children with chronic malnutrition are more vulnerable to infection, don't reach their full height potential and experience impaired development of the brain, which has negative consequences for a child's schooling and productivity later in life.

Child care and feeding practices of young children are poor. The rate of exclusive breastfeeding up to 6 months is 2.7%, partial breastfeeding up to 24 months is 72.5% and only 0.9% in Lindi Rural District report giving 5 meals a day to their youngest child as is recommended. This was shown to be due to the heavy workload of mothers<sup>8</sup>. Understanding of nutrition and health issues is also poor among the majority of the population including knowledge about suitable weaning foods and energy/protein- rich diets for growing infants.

Morbidity is also an underlying cause of malnutrition in the region. Although 98.3% of households use dispensaries and health centres as their health facility, the health care system is heavily understaffed and under equipped and suffers from a shortage of essential drugs<sup>4</sup>. In addition, malaria is a major public health concern for all Tanzanians, especially for pregnant women and children under age 5 accounting for up to 40 percent of all outpatient attendance<sup>1</sup>. There is also a lack of safe drinking water which contributes to waterborne diseases like diarrhoea. With 57.3% of households using an unsafe drinking water source to satisfy their needs this is likely to be contributing to the high prevalence of chronic malnutrition.

Food insecurity is also a key underlying cause of chronic malnutrition. The World Food Summit of 1996 defined food security as existing "when all people at all times have access to sufficient, safe and nutritious food to maintain a healthy and active life<sup>9</sup>". Therefore in order to achieve food security, households must have sufficient resources to be able to meet not only their requirements for energy but for a nutritious diet. In many countries, economic constraints prevent the poorest households from accessing a nutritious diet. Therefore strategies aimed at reducing chronic malnutrition need to address economic constraints as well as behavioural determinants which have tended to be the focus of traditional nutrition strategies. Poverty is likely to be a key contributing factor to food insecurity in the Lindi region which was ranked second to last according to the national Basic Needs poverty line

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<sup>7</sup> National Bureau of Statistics, *Tanzania Demographic and Health survey*, Dar Es Salaam, 2010

<sup>8</sup> Save the children, *Two nutritional anthropometric surveys: Lindi Rural and Ruangwa districts, Lindi Region, Tanzania*, 2009

<sup>9</sup> World Health Organisation, *Trade, foreign policy, diplomacy and health*, Website: <http://www.who.int/trade/glossary/story028/en/> (accessed June 2011)

(defined by the Tanzanian government in 2001) with 51% of the population falling below this threshold<sup>10</sup>.

## **Aim**

The aim of this study was to assess whether economic constraints are preventing households in the agricultural zone of Lindi Rural District from accessing a nutritious diet, using Save the Children's Cost of Diet Tool. The study set out to answer the following questions:

- Is the current diet for children aged 6-24 months nutritionally adequate?
- What is the cost of a nutritionally adequate diet for a typical household in the agricultural zone of Lindi Rural District?
- What are the limiting nutrients in the region that increase the cost of a nutritious diet?
- Are there any neglected and underutilised crops available in the region that could decrease the cost of a nutritious diet?
- How affordable is the diet for a typical household in each wealth group?
- Has national economic growth increased the affordability of a nutritious diet for households?

In addition, modelling was carried out to determine how nutrition, food security and social protection interventions could result in improved household access to food.

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<sup>10</sup> The Research and analysis working group, *Tanzania Poverty and Human Development report*, United Republic of Tanzania, 2005

## 2. Overview of the study area

Save the Children has been working in Lindi Rural District since 2006 through community mobilisation and activities on malaria prevention, nutrition and antenatal and newborn care in rural communities. The aim of this work has been to improve the health system by strategic technical support to government dispensaries, and has involved nutrition education in recognition of the importance of addressing malnutrition in impacting health outcomes. In addition, Save the Children piloted a cash transfer programme in 2008 in response to research highlighting the impact of poverty on health<sup>11</sup>. Consideration is being taken as to whether programmes should be broadened to incorporate food security and livelihoods and the findings of this study will be used to inform this debate.

### 2.1 Key nutrition indicators and caring practices

Lindi has the second highest prevalence of chronic malnutrition and anaemia in the country according to the latest DHS survey<sup>9</sup> (see Table 1). In addition, vitamin A supplementation coverage is 57% among children aged 6-59 months which is lower than the national average of 60%. This has serious long-term implications for both health and productivity in the region.

Table 1: Prevalence of malnutrition in Lindi in children under 5 years

Indicator	
Prevalence of global acute malnutrition <sup>12</sup> (WFH* < -2 SD and/or bilateral oedema)	4.1%
Prevalence of severe acute malnutrition (WFH < -3 SD and/or bilateral oedema)	0.9%
Prevalence of global chronic malnutrition (HFA* , < -2 SD)	53.5%
Prevalence of severe chronic malnutrition (HFA , -3 SD)	20.5%
Prevalence of anaemia in children (<11.0g/dl)	76.8%

\*WFH= weight-for-height; HFA= height-for-age

The high prevalence of chronic malnutrition highlights the importance of measuring household access to a quality diet that meets both energy and nutrient requirements. In addition, the most common cause of anaemia in Tanzania is nutritional anaemia resulting from inadequate dietary intake of nutrients such as iron, folate and vitamin B12<sup>13</sup>. Therefore it is important to measure household

<sup>11</sup> Save the Children, *The Unbearable Cost of Illness: Poverty, ill-health and access to healthcare – evidence from Lindi Rural District, Tanzania*, 2005

<sup>12</sup> WHO references children aged 6 -59 months

<sup>13</sup> National Bureau of Statistics, *Tanzania Demographic and Health survey*, Dar Es Salaam, 2010

access to foods containing these nutrients in order to understand how access may be improved.

## 2.2 Household profiles and key economic characteristics

Lindi rural district can be divided into four livelihood zones in which households obtain their food and cash income by roughly the same combination of means. These are the coastal fishing, highland forest, *simsim* and agricultural zones. In 2002 Save the Children conducted HEA baselines in two of these zones; coastal & agricultural. This study focuses on the agricultural zone as it represents 65% of the rural population. The deep fertile soil makes it the district's best and dominant farming area and most households generate income from crop sale, and agricultural labour. Cashew nuts and *simsim* (sesame) are the most important cash crops in this region, although only a small proportion of the poorest households harvest them. In addition cassava, maize, sorghum, rice, pulses, legumes and coconuts are grown for sale and consumption and most households own poultry or shoats to provide additional income. Almost all households are also involved in some form of petty trade or small business<sup>14</sup>.

In Lindi agricultural zone, wealth and poverty at the household level are determined by access to land, tree and livestock ownership, labour power and ratio of active members to dependents, as well as other capitals. Unlike the coastal zone, the ownership of productive assets doesn't play such an important role as a wealth determinant. The ability to invest in the inputs required makes a big difference in the average harvest per cashew nut tree. The land size owned and number of producing coconut and cashew nut trees clearly distinguish the different wealth groups. The main income generating activity that distinguishes the 1.5 acre group is their reliance on agricultural labour, while the 3 and the 4.5 acre groups can afford to hire the 1.5 acre group to cultivate their land.

The most recent wealth ranking exercise was conducted in 2010 based on the key characteristics of 'well-off,' 'middle,' and 'poor' households as defined by a Household Economy Approach in 2003<sup>7</sup>. An 'extremely poor' group was also defined in 2006 providing a detailed picture of particularly vulnerable households household economy differs from the poor due to lack of land and active household members. Results are shown in Table 2.

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<sup>14</sup> Save the Children, Livelihoods of Lindi Rural District, A Household Economy Assessment in Southern Tanzania. 2003

Table 2: Wealth breakdown, household profiles and key economic characteristics

Wealth group	Proportion of households	Wealth rank 2010
Well off	10-15%	10-15 acres land 70-75 coconut trees 75-300 cashew trees 10-30 shoats 30-70 chickens
Middle	20%	3-6 acres land 15-40 coconut trees 40-200 cashew trees 4-15 shoats 10-20 chickens
Poor	50-55%	1-3 acres land 5-10 coconut trees 10-50 cashew trees 1-10 shoats 0-5 chickens
Extreme poor	15%	0.5-1 acres land No trees No animals

### 2.3 Food sources

According to a Household Economy Approach (HEA) conducted in 2003, households in the agricultural are food secure in normal years. However, this definition of food security relates to the ability of households to meet their minimum energy requirements and does not take into account the micronutrients required for the prevention of malnutrition, micronutrient deficiencies and disease.

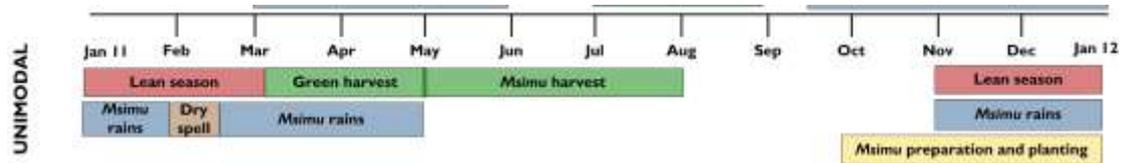
Households in the Lindi agricultural livelihood zone are partly dependent on the market to meet their energy needs as they are semi-subsistence farmers. Many households grow for their own consumption: sorghum, maize, rice, cowpea, leaves, vegetables (in the rainy season), oranges and coconuts. Own production accounts for 59%, 65% and 85% of the energy needs of the poor, middle and better off households respectively<sup>15</sup>. (Production levels of the extremely poor households were defined within the category for poor.) However, production is seasonal and yields vary significantly depending on land access and location. There are two main harvests during the year, the green harvest where green maize, vegetables and pulses are harvested and the msimu harvest for cereals (see figure 1). Before the main harvest, food stocks in many households are low and so households have to rely on the market to source their food. In 2011, household sorghum stocks ran out in January for the poorest households and the harvest is expected in August.

In comparison to Zone 1, households have less coping options and their dependency on agriculture makes this zone overall more vulnerable to negative changes. In this

<sup>15</sup> Save the Children, Livelihoods of Lindi Rural District, A Household Economy Assessment in Southern Tanzania. 2003

area almost 50% of the population falls into the 1.5 acre group, this means that 50% of the population of the largest zone in Lindi Rural District have a limited flexibility of 1%.

Figure 1: Seasonal calendar for Lindi region<sup>16</sup>



The poorest households rely on the market to meet 34% of their annual energy needs as compared to 15% for better off households<sup>9</sup>. This makes the poor particularly vulnerable to changes in the price of food items. Markets are dependent upon Dar Es Salaam and Songea for the supply of rice, maize and beans as there is a major production deficit in the Lindi region. Although FEWSNET has described food security conditions at the national level to be generally satisfactory with adequate food availability in markets across the country there is recognition that food prices increases are constraining food accessibility for low-income market-dependant households<sup>10</sup>.

A dietary pattern survey study in 2007 showed that dietary quality was associated with wealth group<sup>17</sup>. According to a HEA the poor spend about 70% of their income on food, while the middle wealth group and the better-off spend 45% and 15% respectively on food. In addition, expenditure on food items differs by wealth group, with the *poor* spending more on staple food items while the *better-off* can purchase additional non-staple foods like oil, pulses, fish and meat as households resort to purchasing cheaper energy-dense staple foods.

<sup>16</sup> Famine Early Warning systems network, Website:

<http://www.fews.net/Pages/marketcenter.aspx?loc=3&gb=tz&l=en> (accessed June 2011)

<sup>17</sup> Save the Children, *Tackling Chronic malnutrition: What would it take to be able to afford a quality diet?* 2007

### **3. Methods**

#### **3.1 Location and season**

The study was conducted in Chikonji, Narunyu and Mnolela villages by Save the Children in partnership with staff from PEMWA, a local NGO. The villages selected were the same as those selected for the cost of diet assessment in 2007 so that a direct comparison of costs could be made. Villages were purposively chosen in 2007 in order to capture a range of village types (e.g. differences in accessibility from the road and markets, both cashew and coconut growing areas, recent and old settlements) whilst excluding very small and very large villages, and any economically 'unusual' villages.

The assessment was carried out during the dry season in May. This is after the green harvest and before the main harvest season so prices for green vegetables were low and prices for cereals were high. The rains in 2011 were late and so the maize harvest was not expected until June and the sorghum harvest until August therefore cereal prices were expected to remain high during this period.

#### **3.2 Data collection**

##### **a) Market survey**

Market surveys were conducted in each of the main markets in Chikonji, Narunyu and Mnolela, and a range of smaller stalls in order to gain a representative sample of where the poorest households purchase their food.

Prior to collecting price data, a comprehensive list of all food items available in the region was developed using the food list from 2007 as a basis. Additional foods were added following discussions with enumerators and during a pilot survey in Lindi market. Based on this food list price and weight data were collected through interviews with local traders and consolidated during consultation with the assessment team. There were no major differences in the availability and price of food items between markets.

##### **b) Dietary patterns survey**

To strengthen the Cost of Diet analysis, information was also collected on current consumption patterns. This provided an understanding of current dietary quality so that a culturally acceptable nutritious diet could be modelled.

Data was collected through a questionnaire given to the primary caregiver of children aged 6-23 months in the poor and extremely poor wealth group to collect information on current consumption habits and food sources. 36 of the poorest households were selected by village leaders across the 3 villages, of which 27 were used for analysis after data consolidation. (3 carers interviewed did not have

children between 6 and 24 months and 6 interviewed were not in the poor or extremely poor wealth group.)

The questionnaire included questions on the child's and household's characteristics (to cross-check wealth group and age of the child) a 24-hour recall and questions on dietary practices (to calculate dietary diversity scores and cultural preferences) and questions on household food sources (to validate 2003 HEA production data.) Although the dietary pattern survey followed a questionnaire format, enumerators were encouraged to use a semi-structured style of interviewing in order to enable more open discussions.

Dietary diversity was used as the indicator to assess dietary quality. The food group index used to determine dietary diversity scores was the same as that used in 2007, in order to allow comparison of diet quality over time. Food groups are based upon an IFPRI/ FANTA publication (Dewey et al, 2005.) More details of the food groups used can be found in Annex 1.

### **c) Focus group discussions**

Focus group discussions were conducted to understand the dietary practices of the poorest wealth group, household sources of food and the daily labour rate. Information was collected on cultural taboos, 'normal' consumption patterns, household production, livestock ownership, reliance on the market and factors affecting purchase and production of foods and earning potential for households according to the daily agricultural labour rate.

Rapid rural appraisal techniques were used to gather the necessary information from the area. Information was gathered from representatives of each wealth group to discuss their dietary intake and food sources. Individuals were sampled purposively to ensure representativeness. The information was crosschecked with previous interviews and secondary data sources. Triangulation of results took place when comparing information each evening and any anomalous results were followed up during subsequent interviews.

### **3.1 Determining whether the current diet meets all nutrient requirements**

An 'average' diet among children aged 6-24 months was determined using 24-hour recall data taken from 27 children. Food items were selected for inclusion in the 'average' diet if more than half of the children interviewed were reported to have consumed the food in the previous 24-hours. In order to determine average daily intake of each food item in grams, the average daily frequency of consumption was calculated and multiplied by portion size data (taken from the Tanzanian Food Composition table and adjusted to meet energy requirements<sup>18</sup>.) A national food composition table specifying the nutrient content of local cooked foods was used to

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<sup>18</sup> Muhimbili University of Health and Allied Sciences, Tanzania Food and Nutrition Centre and Harvard School of Public Health. *Tanzania Food Composition Tables*. 2008

determine the energy and nutrient content of the diet<sup>15</sup>. These results were compared to WHO nutrient requirements for children aged 6-24 months<sup>19</sup> to determine the nutritional adequacy of the diet. Breast milk was included at 45% of the recommended intake in order to reflect the inadequate breastfeeding practices in the region.

Data was collected during May; the 'pre-harvest' season, between the green and main harvests. Results are likely to differ across seasons due to fluctuations in the price and availability of foods.

### **3.2 Calculating the lowest cost nutritious diet**

The 'Cost of the Diet' is a method developed by Save the Children UK to calculate the minimum amount of money a family will have to spend to meet their energy, protein, fat and micronutrient requirements using locally available foods. The 'Cost of the Diet' technique originates from the linear programming work done by the World Health Organization to develop and cost out nutritionally appropriate complementary diets. However, this method has proven to be ground breaking because it is the only tool currently available that can:

- Calculate the minimum cost of a diet for an individual child *and* the whole family.
- Take into account seasonal variations in food price and availability when costing the diet.
- Provide region-specific data on dietary costs and food availability.

The food list and price data were inputted into the Cost of the Diet (CoD) program to calculate the lowest cost of a nutritious diet during the pre-harvest season. Food items were selected from the composition database included in the program using a closest-fit approach and all price data was converted from the cost per local unit to cost per 100g.

A standard household size of six people (four children and two adults) was used. This household size dictates the macro and micronutrient requirements that need to be met using the foods locally available.

A 'physiological' diet was calculated i.e. with no constraints other than those automatically included in the program, and no additional limits on the types of foods that could be included. This was adjusted to reflect cultural practices in order to model a diet that was locally feasible for consumption. Maize and sorghum were forced into the diet at a minimum of 6 times per week and the consumption of raw cassava was limited to once per week as this is considered a 'famine food.' The average daily cost of the diet during this pre-harvest season was calculated. All costs are given in Tanzanian Shillings. Although not strictly the lowest cost diet, this will be referred to throughout the report as the lowest cost nutritious diet.

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<sup>19</sup> WHO/ FAO. *Vitamin and mineral requirements in human nutrition*. Second edition. World Health Organisation and Food and Agricultural Organisation. 2004

The CoD program can also be used to model the cheapest diet that will just meet kilocalorie requirements. Hence, in addition to calculating lowest cost diets to meet macro and micronutrient requirements, lowest cost 'energy only' diets were calculated in order to examine how the cost of a diet changes according to requirements being met.

### **3.3 Calculating the affordability of the lowest cost nutritious diet for the poorest households**

#### *3.3.1 Determining affordability according to annual income*

Annual income figures for each wealth group were taken from a Household Economy Approach conducted in 2006. Figures were updated according to national inflation rates<sup>20</sup>. In order to account for household production of food, an additional income value was added to each income figure based on the monetary value of household crop production (annex 2). The household production figures used are those presented in the HEA and are specific to wealth group. Each crop was assigned a monetary value based on the market price of food items collected during the Cost of Diet assessment in order to calculate the total monetary value of household production.

Annual income was compared to the annual cost of a nutritious diet in order to assess affordability. Ideally results would be presented according to season but information on income and the cost of a diet by season were not available. The cost of diet was assumed to be the same price across the year. Although prices do fluctuate according to season, the cost of the diet was conducted during May which falls between the green harvest and main harvest and so prices are likely to be close to their annual average.

#### *3.3.2 Determining purchasing power*

Purchasing power was determined by comparing the cost of the diet with the daily wage potential of different types of poor households. Information on daily wage rates was collected via focus group discussions in each of the villages. As household size dictates the macro and micronutrient requirements that need to be met using the foods locally available, the cost of diet was calculated for different household sizes (section 4.3).

The affordability of the diet was calculated for the poorest households based upon different households earning potential. Typical income from agricultural labour per day is shown in Table 3.

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<sup>20</sup> World Bank, website: <http://www.tradingeconomics.com/tanzania/inflation-cpi>  
Accessed June 2011

Table 3: Daily earning power rate according to household composition

Household composition	Number of active household members	Typical household income from contact labour/ day (Tsh)
Active couple with 3 dependents	1	2000
Active couple with 4 dependents	1	2000
Young woman with 3 dependents	1	1000
Active elderly with 1 dependent	2	2000
Active elderly with 2 dependents	2	2000

### 3.3.3 Determining the livelihood protection threshold

The livelihoods protection threshold (as defined by a HEA in 2006) was adjusted to account for the cost of essential non-food needs. The livelihoods protection threshold is the total expenditure necessary to; ensure basic survival, maintain access to basic services, sustain livelihoods in the medium to longer term and support a locally acceptable standard of living. The list of essential non-food needs as defined by the HEA is presented in Table 4. The figure has been updated using national inflation rates as explained in section 3.3.1

Although the livelihood protection threshold is specific to wealth group, the livelihood threshold for the middle income group has been used for all households in order to define an 'optimal' standardised cost for essential non-food needs.

Table 4: Essential non-food needs

Item	unit	amount	price	total
Paraffin	Kg	52	40	2,080
Match box	Pcs	52	25	1,300
Salt	Kg	12	50	1,800
Soap	Pcs	52	100	5,200
<i>Clothes</i>	People	6	2917	17,502
<i>Education</i>	Child			9,000
<i>Medical</i>	Cases	3.5	3,750	13,125
Agriculture and Labour				78310

<b>Total cost</b>	<b>128,317</b>
<b>Adjusted for inflation</b>	<b>196,002</b>

## 4. Key findings

### 4.1 The quality of the diet among children aged 6-24 months is low among the poorest households in the pre-harvest season

An analysis of the quality of the actual diet, as defined by 24-hour recall data collected from children aged 6-24 months, showed that the quality of the diet is low among the poorest households in the pre-harvest season. In addition to the low partial breastfeeding rate and feeding frequency as shown by an anthropometric survey in 2009<sup>21</sup>, this study showed that the quality of foods given to children was insufficient to meet their micronutrient requirements. An analysis of whether the *actual* diet provides the nutrients required for optimal growth and development show that there are major deficiencies in vitamin A, C, B12 and Zinc.

These deficiencies have significant negative side-effects which are likely to be an underlying cause of both malnutrition and morbidity. Vitamin A deficiency increases the risk of death from diarrhoea, measles and malaria and causes xerophthalmia which can lead to irreversible blindness. Although national vitamin A supplementation programmes are in place to improve the vitamin A status of children, coverage in Lindi is low with only 57% of children aged 6-59 months reported by their mothers to have received vitamin A supplements as recommended<sup>22</sup>.

Vitamin C deficiency increases susceptibility to infection, causes scurvy and can lead to iron deficiency anaemia as it is needed for the absorption of iron. Vitamin B12 deficiency also causes a form of anaemia known as pernicious anaemia. These are likely to be contributing to the high prevalence of anaemia (76.8%) among children which is higher than the national average.

Zinc deficiency results in retarded growth and is associated with an increased risk of mortality from diarrhoea, pneumonia and malaria. It is likely to be contributing to the high rate of chronic malnutrition in the region.

### 4.2 Comparison of dietary diversity scores from 2006 reveal that there has been no improvement in the quality of the diet over the last 5 years

The poorest households in the Lindi agricultural zone consume a monotonous diet with virtually no animal products and a limited quantity of fruit, legumes and nuts. A 'normal' household diet has not changed significantly since 2007<sup>23</sup>.

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<sup>21</sup> 72.5% partial breastfeeding up to 24 months, 0.9% of carers give 5 meals a day to their youngest child as is recommended. Save the children, *Two nutritional anthropometric surveys: Lindi Rural and Ruangwa districts, Lindi Region, Tanzania, 2009*

<sup>22</sup> National Bureau of Statistics, *Tanzania Demographic and Health survey*, Dar Es Salaam, 2010

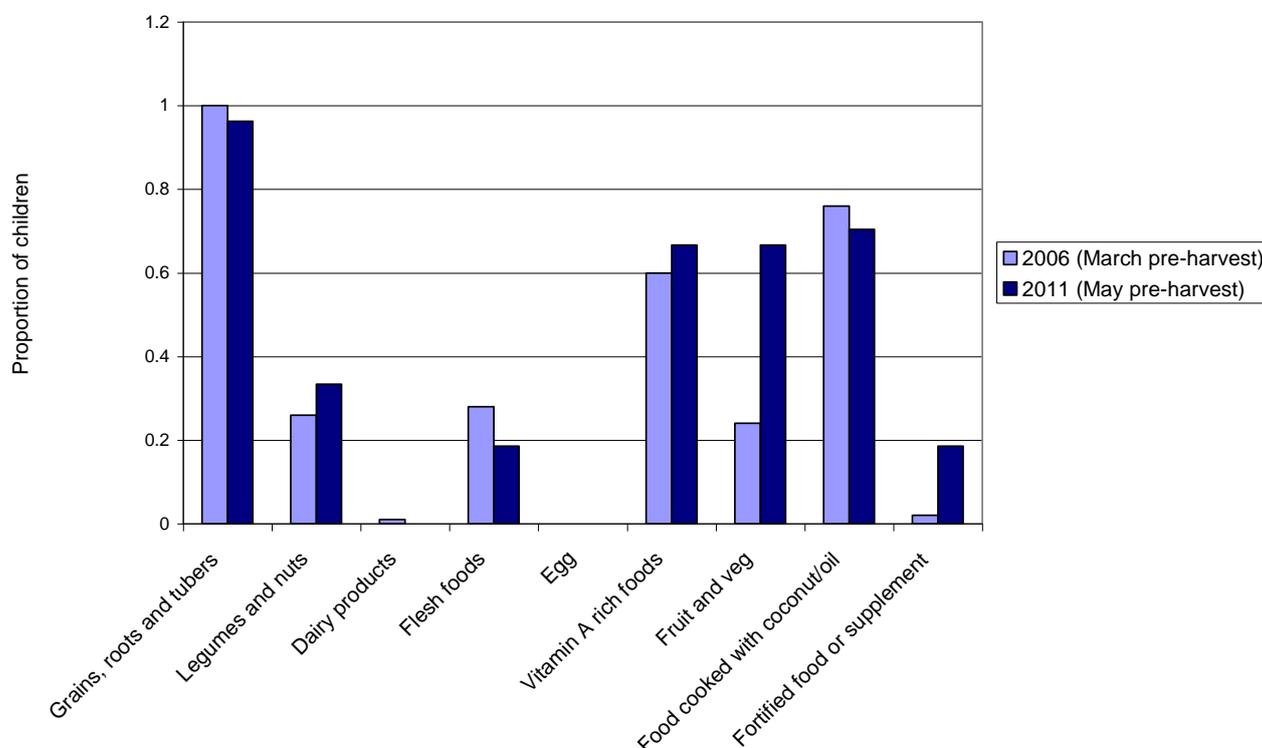
<sup>23</sup> Save the Children, *Tackling Chronic malnutrition: What would it take to be able to afford a quality diet?* 2007

The basis of the traditional diet during the pre-harvest season is a stiff porridge made from crushed sorghum, chosen for its availability and price. Alternative staples include the more expensive and preferred maize, and cassava which is considered by many households to be a famine food. Wild roots (Mingoko) are also collected for consumption during this season by the poorest households.

The staple is served with salt or a sauce, depending on seasonal availability, purchasing power and taste. Many households consume a sauce made of water, salt and green leaves and occasionally tomato, onion, okra, pulses or fish. Wealthier households may also consume oil, fish or meat (poultry, goat, wild game). Although the consumption of vegetable oil is limited to the wealthy, many households substitute vegetable oil with coconut milk in small quantities.

Comparison of dietary diversity scores collected in the same region in 2006 reveal that there has been no improvement in the quality of the diet over the last 5 years, although results are not statistically significant due to the small sample size. The proportion of children consuming fruit and vegetables appears to have increased during this period; however this is likely to be due to timing of data collection as data was collected before the green harvest in 2006.

Figure 2: Proportion of children who consumed various food groups in the past 24h<sup>24</sup>  
(See annex 1 for definitions of each food group)



<sup>24</sup> 2006 Data: Save the Children, *Tackling Chronic malnutrition: What would it take to be able to afford a quality diet?* 2007

Dietary diversity scores are a proxy indicator for the nutrient adequacy of the diet as a varied diet is needed to obtain the nutrients required for optimal growth and development. Dietary diversity scores reflect the nutrient adequacy of the diet that shows major deficiencies in vitamin A, C, B12, and zinc (section 4.1.) Very few children consume flesh foods which partially explain the lack of vitamin B12 and zinc in the diet. However, livestock are a vital source of income in the Lindi region and therefore households cannot afford to consume livestock products. In addition no children were reported to have consumed dairy products or egg in the preceding 24 hours. These are an essential source of vitamin A, vitamin B12, and zinc. In addition, vitamin A rich foods are consumed in small quantities.

### **4.3 The minimum cost of a fully nutritious diet is TSh 4,000 for an average household per day**

The cost of three types of diet were calculated; the lowest cost diet that meets only energy requirements, the lowest cost diet that meets all nutrient requirements, and the lowest cost diet that meets all nutrient requirements adjusted to ensure it is culturally acceptable. Results are based on a 'typical' household profile with six members as defined by the Household Economy Approach<sup>25</sup>. Results for children under two are presented in detail because of their specific requirements.

#### *Energy-only diet*

The minimum cost of a diet that meets only a household's energy need is TSh<sup>26</sup> 2718 per day. The diet contents and costs are presented in Table 5. The key components of the diet, as selected by the Cost of Diet programme, are sorghum, cassava and *mingoko* (a wild root.) Some dried fish and oil are included due to their high energy-content. Sorghum has been selected by the software over maize as it is a cheaper source of energy than maize and due to its higher iron content.

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<sup>25</sup> Save the Children, Livelihoods of Lindi Rural District, A Household Economy Assessment in Southern Tanzania. 2003

<sup>26</sup> Tanzanian Shillings

Table 5: The lowest cost diet for a typical household that meets only energy requirements

Weight/ day (g/day)		
	Child aged 12-23 months	Rest of family (5 people)
Breast milk	On demand (estimate 532 ml/day)	-
Sorghum, couscous	91	1185
Small dried fish	23	454
Cassava	75	1135
<i>Mingoko(wild yam)</i>	75	1135
Oil	0	28
<i>Cost (day TSh)</i>	146	2572
<b>Total cost for the household (day TSh)</b>	<b>2718</b>	

*Minimum cost nutritious diet*

The minimum cost of a nutritionally adequate diet that meets all of households' nutrient requirements is TSh 3868 per day. The diet contents and costs are presented in Table 6. The key components of the diet, as selected by the Cost of Diet programme, are sorghum and *Mingoko*.

Table 6: The lowest cost diet for a typical household that meets all nutrient requirements

Weight/ day (g/day)		
	Child aged 12-23 months	Rest of family (5 people)
Breast milk	On demand (estimate 532 ml/day)	-
Sorghum, couscous	86	1185
Guava	0	993
Cowpeas	20	0
Amaranth leaves	45	851
Cassava leaves	39	219
Small dried fish	30	369
<i>Mingoko(wild yam)</i>	39	1419
Oil	4	247
<i>Cost (day TSh)</i>	222	3646
<b>Total cost for the household (day TSh)</b>	<b>3868</b>	

*Minimum cost culturally acceptable diet*

The diet recommended above is problematic because it includes only sorghum as the staple. Focus group discussions revealed that the population find the consumption of one staple food item monotonous and favour maize over sorghum. Therefore households purchase a variety of staple food items depending on availability and the purchasing power of the household. In order to account for this the programme was re-run with additional constraints to ensure that the diet include a minimum amount of both maize and sorghum. This culturally acceptable diet is presented in Table 7.

The minimum amount of cash that a family of 6, including a child aged 12-23 months, would need to be able to purchase a culturally acceptable nutritionally adequate diet from the market is **4019 Tsh/ day**. This is based upon rural market prices in the Lindi region during May 2011.

*Table 6: The lowest cost culturally acceptable diet for a typical household that meets all nutrient requirements*

	Weight/ day (g/day)	
	Child aged 12-23 months	Rest of family (5 people)
Breast milk	On demand (estimate 532 ml/day)	-
Maize flour	20	373
Sorghum, couscous	47	811
Cowpeas	27	0
Amaranth leaves	45	851
Cassava leaves	45	170
Pumpkin leaves	0	46
Small dried fish	30	509
<i>Mingoko(wild yam)</i>	74	1419
Oil	4	235
<i>Cost (day TSh)</i>	<i>240</i>	<i>3780</i>
<b>Total cost for the household (day TSh)</b>	<b>4019</b>	

The key components of the diet, as selected by the Cost of Diet programme, were sorghum, leaves, fish, oil and *mingoko*. Sorghum makes the largest contribution to the total energy, and contributes nearly a third of the iron requirement for the household. In addition, oil provides a fifth of the total energy and 69% of the fat requirement. Small dried fish play an important role in meeting both the protein requirement (61%) and micronutrient requirements including calcium, zinc, niacin and vitamin B12. Amaranth, cassava and pumpkin leaves are a cheap source of vitamins A and C, contributing to 91% and 96% of the vitamin A and vitamin C requirements respectively.

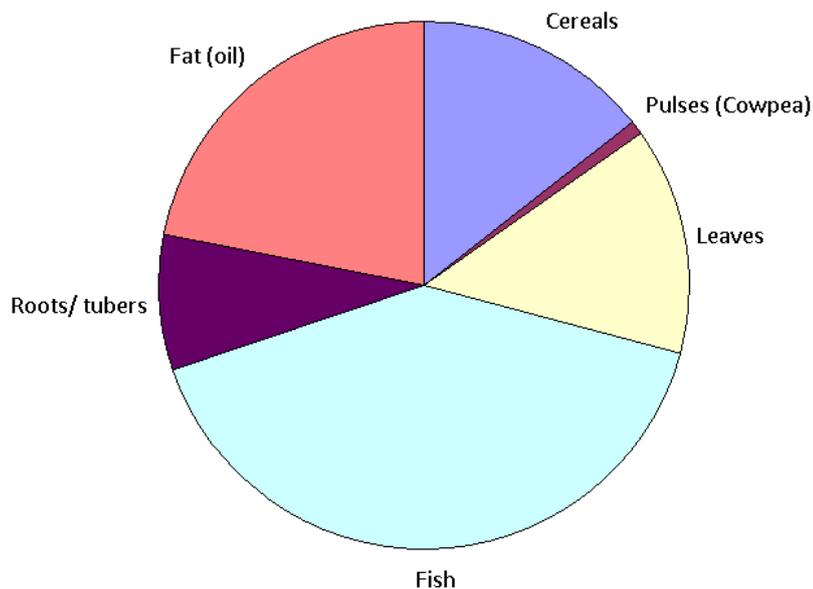
It is important to note the essential contribution of breast milk to the lowest cost diet for children aged 6-24 months. Although breast feeding should only be partial

after 6 months of age and only contributes 39% of the energy needed, it makes the greatest contribution to fat, vitamin A and vitamin C requirements. In addition it provides 14% of the zinc requirement. Breast milk is low in iron however, so it is essential that iron-rich complementary foods are available for children aged 6-24 months. Neonatal stores are sufficient to meet the iron requirement for the first 6 months in full-term infants but are not sufficient to meet the requirements of older children.

**4.4 In a diet that provides the full nutrient needs of a household, most of the cost relates to micronutrient-rich foods**

In a diet that provides the full nutrient needs of a household, most of the cost relates to micronutrient-rich foods (Figure 3). The micronutrients that are most expensive are fat, riboflavin, iron, vitamin C and A.

*Figure 3: The contribution of food groups to the cost of a nutritious diet*



The food group that contributes the greatest proportion to the cost of the diet is meat, poultry, fish and eggs (figure 3). This is because animal source foods are of limited availability in the Lindi region but have to be included in a nutritionally adequate diet to meet fat, riboflavin and iron requirements. The cheapest source of these nutrients in Lindi is fish and therefore this has been included in the diet instead of goat or chicken products. The high price of animal products is reflected by the household consumption patterns of the poor as very few households consume livestock products.

Oil contributes a large proportion to the cost of the diet as it is needed to meet fat requirements. Vegetables (leaves) also contribute significantly to the cost of the diet as a large quantity is needed to meet vitamin C and A requirements.

### 4.3 The contribution of wild foods to a nutritious diet

Information on the availability and consumption of wild foods was collected to determine whether there are any neglected and underutilised crops that could provide essential micronutrients during the pre-harvest season. A list of the foods available in the region is shown in Annex 3. Household interviews did not reveal any food items that used to be consumed and are no longer eaten, although mingoko, angadi and mabung'u are considered famine foods and only consumed in times of need. Consumption of all wild foods was determined by the time taken to collect crops and the availability of other foods.

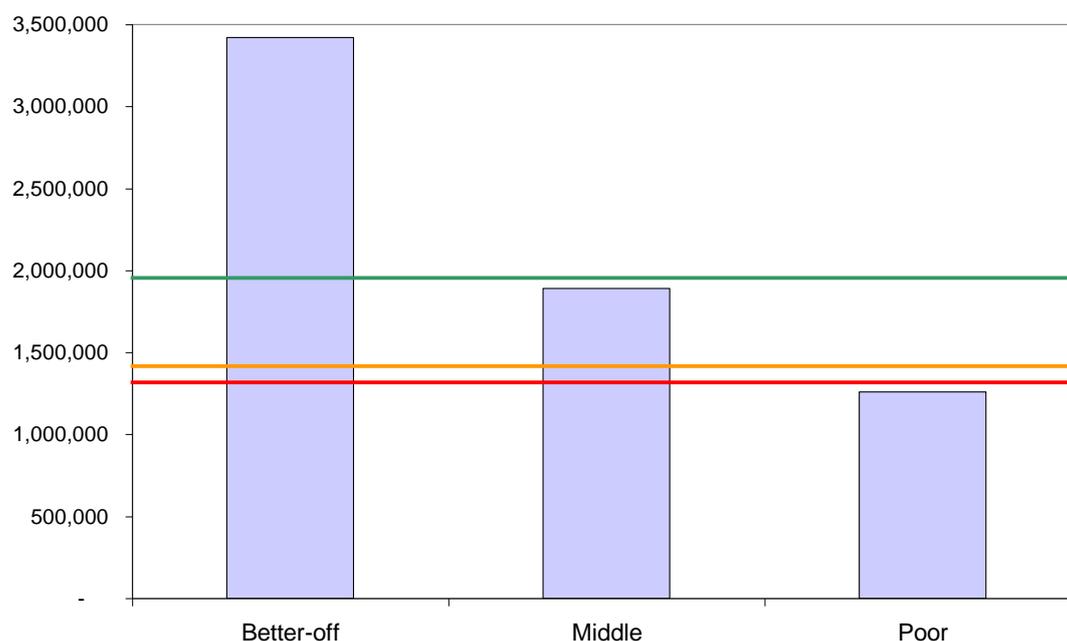
*Mingoko* has been selected by the programme for inclusion in the lowest cost diet as it is a cheap source of energy. However, information of the nutrient composition of the other wild foods listed in Table 3 are needed to determine whether they could provide key limiting nutrients at critical periods of the year.

### 4.4 Poverty is a major constraint to improving the nutritional status of poor households in Lindi

A comparison of the cost of a nutritious diet with annual income (the monetary value of food produced plus cash income) by wealth group revealed that the poorest households are unable to afford a nutritious diet, and the middle wealth group would have to spend 78% of their total current food & income to be able to afford a nutritious diet. This shows that poverty is a major constraint to accessing nutritious food for both the poor and middle income groups.

Figure 5 shows the affordability of a diet that meets only energy requirements and a nutritious diet by wealth group. In addition, the livelihoods protection threshold as defined by a Household Economy assessment is presented. This represents the total income required to sustain local livelihoods. This means total expenditure to; ensure basic survival, maintain access to basic services (e.g. routine medical and schooling expenses), sustain livelihoods in the medium to longer term (e.g. regular purchase of seeds, inputs vet drugs) and support a locally acceptable standard of living (e.g. sugar, coffee, pepper, etc.)

Figure 5: Comparison of annual food & income with the cost of a nutritious diet



*Red relates to the cost of an energy-only diet per year, orange to a nutritious diet and green to the cost of a nutritious diet and the livelihoods protection threshold*

The poorest families (categorised in the study as ‘very poor’ and ‘poor’) represent more than half of the population of the area. They can barely afford a diet that fulfils their energy requirements let alone one that includes the essential nutrients critical for children’s healthy growth and development. Poor households in Lindi would need 104%<sup>27</sup> of their total current food & income in order to be able to meet their energy needs and 115% of their total current food & income in order to be able to afford a fully nutritious diet. Therefore families unable to access the foods they require for healthy growth and development.

Comparison of the cost of a diet that meets only the energy requirements with a nutritious diet shows that households are less able to afford a nutritious diet (Figure 5). While some poor households may be able to provide a diet that meets their energy requirements alone, they are less likely to be able to afford a diet that provides the essential nutrients required for children’s healthy growth, including calcium, vitamin B12, iron and zinc. This is likely to be contributing to the high levels of child stunting in the region.

In addition, poor households are particularly vulnerable to a drop in wage rates, availability of work, ability to work and food price increases. The cost of the diet also assumes that households will be meeting a proportion of their requirements from

<sup>27</sup> Due to the low acute malnutrition rates in the region the inability of households to afford a nutritious diet is not addressed as a concern in this report. The additional 4% of income needed is likely to be due to limitations in the methodology (i.e. use of income figures that are adjusted using national inflation rates and the use of international energy requirements.)

household production. In a year of poor rainfall, household productivity will be reduced, increasing household dependency on the market.

Medium income households in Lindi would need 70% of their total current food & income in order to be able to meet their energy needs and 78% of their total current food & income in order to be able to afford a fully nutritious diet. When the livelihoods protection threshold is taken into account a nutritious diet becomes unaffordable for the middle wealth group.

#### **4.5 Households are vulnerable to a lack of purchasing power**

The cost of a nutritious diet was compared to the daily wage potential of a poor household in order to determine purchasing power. Agricultural labour is an important source of income for the poorest households contributing to more than half of their annual income;<sup>28</sup> therefore agricultural labour rates give a good indication of a household's economic access to a nutritious diet.

As the number of active household members to dependents is critical in determining the daily wage potential and thus affordability of the diet, purchasing power has been determined for different household structures. The situations that have been illustrated are:

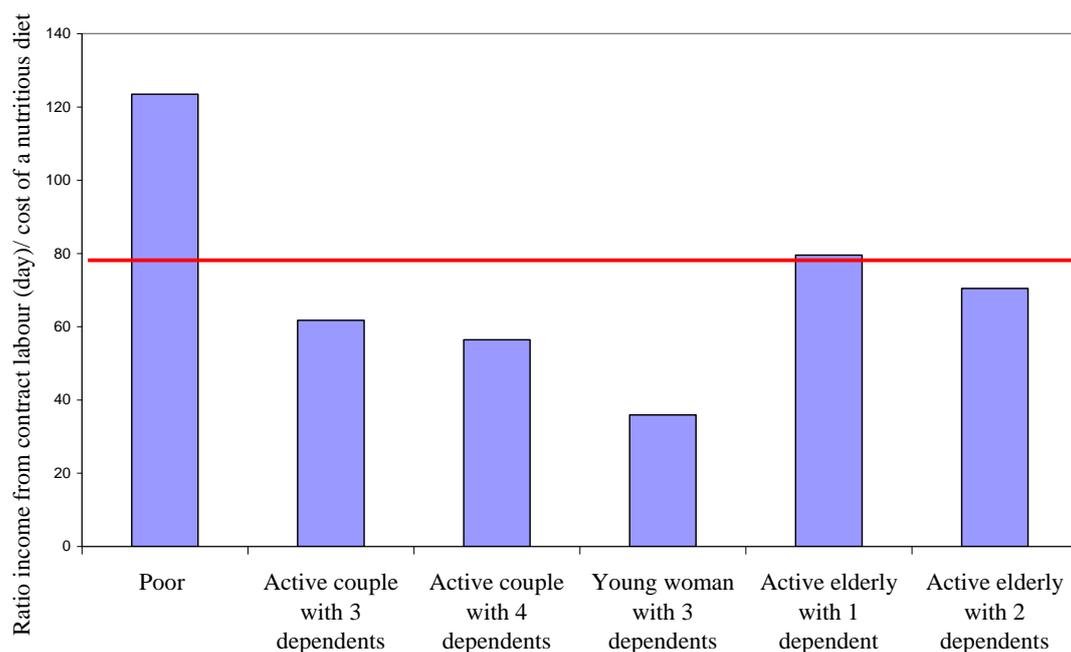
- Older-headed households, looking after young children (As people are paid by the contract or piece, weaker labourers typically manage fewer contracts per day than an active man.)
- Female-headed households, with several children
- Active couples who have a number of children in quick succession, and face the costs of children plus loss of the woman's labour during pregnancy and the first few months after birth

Results show that the poorest households have insufficient purchasing power to buy the nutritious diet needed for their children's healthy growth and development (figure 6.) Older-headed households, female-headed households and active couples who have children in quick succession are all unable to purchase a nutritious diet for their household with the income gained through agricultural labour. The most concerning figure is that of the young women with 3 dependents who can only afford 36% of the cost of a nutritious diet. Results are also likely to be optimistic of real purchasing power as the cost of essential non-food items has not been accounted for.

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<sup>28</sup> Save the Children, Livelihoods of Lindi Rural District, A Household Economy Assessment in Southern Tanzania. 2003

Figure 6: Comparison of the daily labour wage with the cost of a nutritious diet



The red line refers to the Cost of a nutritious diet = income from contract labour

Within the poor and very poor wealth groups vulnerable households with few active members are common, particularly as many young people move to local towns leaving behind children and elders and decreasing the labour force. Results show that many of these households won't be able to afford a nutritious diet. Therefore families unable to access the foods they require for healthy growth and development. They are also unable to act upon nutrition education messages that form a key component of interventions to reduce malnutrition in the region.

#### 4.5 National economic growth has not improved affordability of the diet for the poorest households

Comparison of the affordability of a nutritious diet in 2007 and 2011 shows that a nutritious diet has become less affordable over the last 5 years despite national economic growth<sup>29</sup>. In 2007 the poor would need 78% of their total current food & income in order to be able to afford a fully nutritious diet whereas in 2011 they would need 115%. The middle income group needed 29% of their total current food & income in order to be able to afford a fully nutritious diet in 2006 compared to 78% in 2011, and the better off needed 17% of their total current food & income in order to be able to afford a fully nutritious diet in 2006 compared to 41% in 2011 whereas in 2011 they would need 115%.

Results also show that purchasing power has decreased since 2007. The cost of a nutritious diet has increased from 1031Tsh/day to 3868 Tsh / day during the pre-

<sup>29</sup> US government Feed the Future, *Tanzania FY 2010 implementation plan*, 2010

harvest season for a family of 5 including a child aged 12-23 months. The daily wage potential for a household with two active adults in 2006 was 1500 Tsh, and in 2011 is 4000 Tsh during the pre-harvest season. Therefore, the ratio of income to the cost of the diet has decreased from 146% to 111%.

Increases in the price of food are likely to be due to a number of factors. National FEWSNET data that shows that high cereal food prices in 2011 were most likely due to poor rainfall performance and high transportation costs caused by rising fuel prices. As cereals are imported into the region this is likely to have a direct effect on rural market prices. Most animal products and vegetables are sourced locally and therefore prices are affected by season and local supply. Communities are therefore vulnerable to livestock disease, erratic rainfall and pests. Key informants stated that livestock disease, in particular Newcastle disease, had resulted in high poultry prices in 2011. Vegetable production was also reported to be low due to pests and a prolonged dry spell.

## 5. Recommendations

### 5.1 There is a need for policies and infrastructure to reduce the cost of micronutrient rich foods in Lindi region

The Cost of Diet analysis has shown that national economic growth has not improved affordability of the diet for the poorest households and that there has been no improvement in the quality of the diet over the same period. A study by the International Food Policy Research Institute also showed that high agricultural growth in Tanzania has done little to improve nutrition because it was driven primarily by crops that the poor people were less likely to grow due to their lack of financial resources and technology<sup>30</sup>. This highlights the need for policies and interventions that improve access to a nutritious diet for the poorest and most vulnerable households alongside policies to encourage national economic and agricultural growth.

In a diet that provides the full nutrient needs of a household, most of the cost relates to micronutrient-rich foods and therefore policies are needed to increase the availability of these foods thus reducing their market price.

Nutrition-friendly agricultural policies should also be in place in order to promote the local production of food with improved nutritional value. Crop production data for Lindi for 2010/11 shows a surplus in cereal and pulse production for the region reflecting food security at a regional level in terms of carbohydrate and protein (see Annex 4). However, this does not reflect whether crop production is sufficient to meet the nutrient requirements of the population. Livestock policies should also be drawn up to ensure that to encourage livestock ownership at the household level in recognition of the importance of animal source foods in provision of a nutritious diet.

These policies will provide a framework in which the government and other actors can implement programmes. Examples of such programmes are;

- Mass and continued coverage with the Newcastle vaccine
- Encouraging farmers and co-operatives to diversify crops
- Increased support to small-holder farmers
- Improved market linkages to lower the price of staple foods on the market. Currently there are poor market linkages for beans, maize and rice due to a reliance on one or two trade routes into the Lindi region which is likely to be a factor confounding price increases in the region<sup>31</sup>.

In order to improve economic access to a nutritious diet for households in the Lindi region, a package of interventions is recommended. Interventions should be

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<sup>30</sup> International food policy research institute. *Leveraging agriculture for improving nutrition and health: highlights from an international conference*. New Delhi. 2011

<sup>31</sup> Famine Early Warning systems network, Website:

<http://www.fews.net/Pages/marketcenter.aspx?loc=3&gb=tz&l=en> (accessed June 2011)

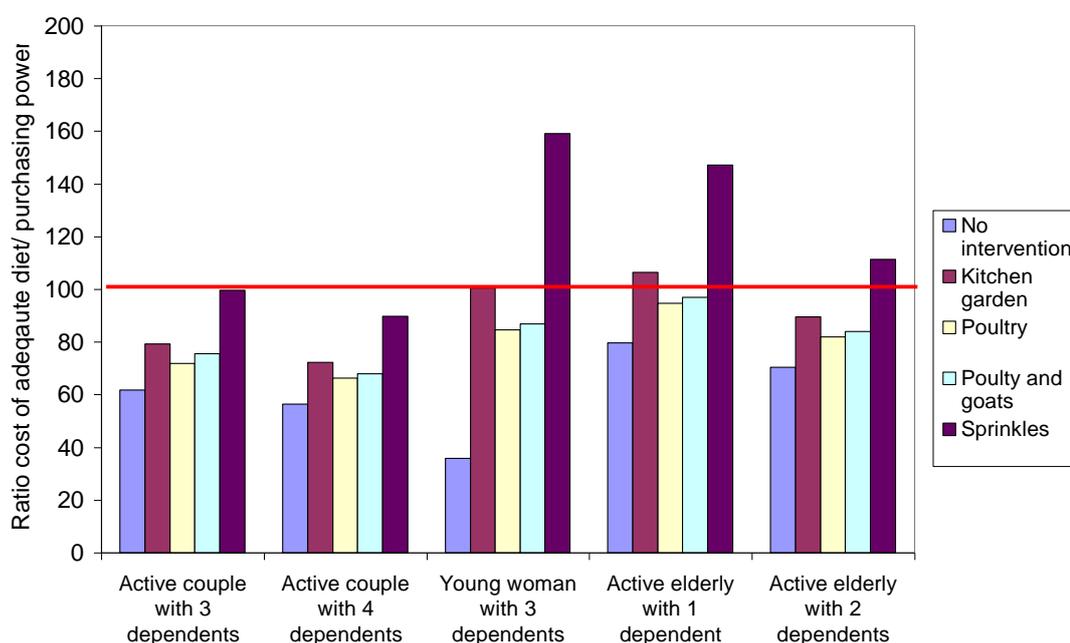
implemented at household, community and regional level in recognition that nutrition outcomes are determined by multiple inter-relating factors, as defined by the UNICEF conceptual framework.

## 5.2 Implement programmes to reduce the cost of a nutritious diet for the poorest households

In order to ensure that the poorest households have sufficient resources to be able to act upon nutrition education messages, there is a need to decrease the cost of a nutritious diet. Although household production goes some way to reducing the cost of an adequate diet at its current level it is insufficient to ensure that families can afford a nutritious diet.

The Cost of Diet has been used to model the potential effect of livestock, bio-intensive farming interventions and micronutrient supplementation in lowering the cost of an adequate diet. The intervention which could result in the greatest decrease in the cost of a nutritious diet is micronutrient supplementation in the form of a multi micronutrient powder for children under 5 and pregnant and lactating women<sup>32</sup> (Figure 6.)

Figure 6: The potential affects of interventions on the cost of a nutritious diet



<sup>32</sup> Composition: 15000µg RAE, 500mg Vitamin D, 600mg vitamin E, 3000mg Vitamin C, 50mg Thiamine, 50mg vitamin B2, 60mg niacin, 50mg vitamin B6, 16000µg folic acid, 90µg vitamin B12, 106mg iron (adjusted for absorption), 500mg zinc, 30mg copper

### a) Promote bio-intensive kitchen gardening and livestock programmes

In addition to lowering the cost of a nutritious diet, increasing household production makes households less vulnerable to market price changes. Households do not currently use their land to grow sufficient nutritious food to meet their nutrient requirements. However, a greater quantity of nutrient-rich foods could be grown by the household if issues currently limiting household production such as vulnerability to weather and pests are addressed.

Modelling of the inclusion of fruit and vegetables into a nutritious diet for free illustrated how bio-intensive kitchen gardens could be used to decrease the cost of a nutritious diet (figure 5.) Orange, lime, guava, watermelon, eggplant, okra, cowpea leaves, amaranth leaves, and cassava leaves were all included in the diet at a frequency of 7 times per week during the pre-harvest season as these items were all available in the Lindi region after the green harvest and before the main harvest. This resulted in a decrease in the cost of a nutritious diet between 22 and 29%. In order to minimise the cost of inputs, seed should initially be distributed to resource-weak households. An analysis of additional cost-saving inputs should also be conducted.

Modelling the inclusion of animal products also lowered the cost of a nutritious diet as is shown in figure 5, with the lowest cost diet achieved when households have access to both goat and poultry products<sup>33</sup>. This did not have as great an impact on reducing the cost of the diet as a kitchen-garden intervention, resulting in reductions of between 16 and 18%. In addition, modelling did not take into account the additional costs associated with livestock upkeep including veterinary bills and fodder. However, there may be critical periods of the year when animal source foods are essential due to the seasonal availability of vegetables. Further research on the seasonal availability of fruit and vegetables should be conducted to determine these critical periods.

Both kitchen-garden and livestock interventions should be supported by education programmes to ensure sustainability. Key messages should be prepared on crop husbandry, biological pest control and livestock rearing in order to ensure that households understand how to maximise production. This should include messaging on how to adapt techniques in years of poor rain as most households are dependent on rain-fed agriculture.

Save the Children is already working with 128 community groups across the Lindi region through community outreach workers to educate households on food consumption and preparation. Therefore SC is well placed to provide additional messaging on food production. Outreach workers are also able to provide the long-term support that is required to ensure sustainability. Some of these groups have small community gardens and livestock rearing and these should be used as examples for scale-up. All interventions should be gender-sensitive, taking into

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<sup>33</sup> Modelling was based on the following quantities of animal source foods per week: goat meat (1), Chicken meat (1), eggs (7)

account the significant role that women play in household crop production and the negative effect that a mothers workload can have on child feeding practices.

#### **b) Provide supplements to address critical deficiencies in children's diet**

The intervention which could result in the greatest decrease in the cost of a nutritious diet is micronutrient supplementation in the form of a multi micronutrient powder for children under 5 and pregnant and lactating women (Figure 5.) If a multi-micronutrient powder was provided for children under five and pregnant and lactating women, the total costs of a nutritious diet for a household can be reduced by up to 55%.

Arguably, a food supplement is only justified when food availability is an issue and issues of sustainability should be taken into account when considering such an intervention. Further research on seasonal changes in the availability of nutrient-rich foods would give an understanding of critical periods of the year when availability is a problem. The fortification of staples should also be considered to address key micronutrient deficiencies in children's diets that are particularly challenging to afford through local foods.

In addition, multi-micronutrients were modelled as free, assuming that they would be distributed among poor households and would not require purchase. Therefore, further research is needed to determine how to effectively deliver supplements to children who are the most in need whether through free distribution or sale to the household at minimal cost. In the medium term local production of complementary foods should be explored in order to increase the availability of low-cost nutritious foods.

### **5.3 Boost households' purchasing power to enable them to afford a nutritious diet**

The Cost of Diet analysis showed how the poorest households have insufficient purchasing power to buy the nutritious diet needed for their children's healthy growth and development. For these households social protection programs & livelihoods approaches are required to increase purchasing power.

Cash transfers are one such social protection programme that has the potential to support incomes and livelihoods, and also to address economic barriers to an adequate diet<sup>34</sup>. In order to ensure that a cash transfer programme has positive nutrition outcomes, the size of a cash transfer should be sufficient to cover the cost of a nutritious diet as presented above. However, the amount of cash given would have to take into account a household's broader minimum non-food needs to have a meaningful impact on children's diet. Further research into seasonal changes in the cost of the diet should be conducted to determine critical periods for transfers.

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<sup>34</sup> Save the Children, *Lasting Benefits: The role of cash transfers in tackling child mortality*, 2009

The programme should build upon learning from the cash transfer programme conducted in 2008. This highlighted the need for households to be trained on alternative income generating activities. An analysis of livelihood strategies is recommended to understand alternative ways in which the purchasing power of households may be increased as a basis for such training. In addition, linkages with other social protection programs in the region should be explored for example, the Aga Khan Village savings and loan program.

#### **5.4 Continue nutrition education programmes and support of exclusive breast feeding**

All interventions should be supported by nutrition education programmes with the aim of improving the diet pattern towards nutritious but affordable choices of food for the household. Messaging on the importance of consuming nutrient-rich fruit and vegetables should be continued through Save the Children's community mobilisation campaign and updated to include information on the cheapest sources of essential nutrients as described in section 4.2. In addition, messaging about the importance of livestock consumption is required in order to ensure that, when available, livestock products are consumed by the family instead of being sold to generate income.

Breast feeding promotion should also be continued due to the low rate of exclusive breastfeeding. A review of evidence has shown that exclusive breastfeeding for the first 6 months of life, and continued partial breastfeeding up to 2 years of age or beyond is the optimal way of feeding infants and children. Breastfeeding is also the most cost-effective method of feeding and should be strongly encouraged alongside any programme.

Education on the prevention of illness and caring for sick children should also be scaled up due to the cyclical relationship between malnutrition and disease. Malaria remains a major public health concern for all Tanzanians, especially for pregnant women and children under age 5, accounting for up to 40 percent of all outpatient attendance, and the prevalence of diarrhoea is higher than the national average highlighting the need for education on water, sanitation and hygiene<sup>35</sup>.

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<sup>35</sup> National Bureau of Statistics, *Tanzania Demographic and Health survey*, Dar Es Salaam, 2010

## Annexes

### Annex 1: Food groupings used to derive the dietary diversity index (adapted from Dewey et al, 2005)

Food groups	Examples of foodstuff included in the group
Grains, roots and tubers	Maize, sorghum, rice, cassava, bull rush millet, finger millet)
Legumes and nuts	Beans, cashew, ground nut, pigeon peas, cow peas
Dairy products	Milk
Flesh food	Fish, chicken
Eggs	
Vitamin A-rich fruits and vegetables	Pumpkin, mango, dark and mid-green leafy vegetables such as amaranth, cow pea leaves and cassava leaves
Other fruits and vegetables	Banana, potato, tomato, onion
Food cooked with fats, oil or <i>coconuts</i> *	Sesame oil, ground nut oil
<i>*Fortified food or supplements</i>	Blue band, cow berry

### Annex 2: Household production amounts

#### Poor wealth group

Own production	% of total		Price per 100g	Market value
	kcal	Total (kg)		
Cassava fresh	11	386.2	31.7	122417.7
Cassava dry	14.5	212.4	31.7	67322.6
Maize green	3.5	77.8	74.6	58009.6
Maize dry	13.5	171.5	60.6	103934.9
Sorghum	6.5	90.0	40	36016.3
Rice	10	127.4	141.5	180265.5
Pulses	4.5	67.6	143.2	96849.5
Pumpkin	1.5	530.7	24.7	131071.5
Coconut	1	65.7	81.2	53348.4
<b>Labour (sorghum)</b>	2	27.7	83.2	23050.4
<b>Wild Food (ming'oko)</b>	3	142.2	84.2	119763.6
<b>TOTAL</b>				<b>992,050</b>

*Middle income group*

	<b>% of total kcal</b>	<b>Total (kg)</b>	<b>Price per 100g</b>	<b>Market value</b>
Cassava	16.5	579.3	31.7	183626.5
Maize green	2.5	55.5	74.6	41435.4
Maize dry	14.5	184.2	60.6	111633.7
Sorghum	12	166.2	40	66491.6
Rice	13	165.6	141.5	234345.2
Pulses	3	45.1	143.2	64566.4
Pumpkin	2	707.5	24.7	174762.0
Coconut	4	262.8	81.2	213393.6
<b>Sub-total</b>	<b>67.5</b>			<b>1,090,254</b>

*Better-off group*

<b>Own production</b>	<b>% of total kcal</b>	<b>Total (kg)</b>	<b>Price per 100g</b>	<b>Market value</b>
Cassava	10.5	368.6	31.7	116853.2
Maize green	30	666.5	74.6	497225.2
Sorghum	16	221.6	40	88655.4
Rice	26	331.2	141.5	468690.3
Pulses	8	120.2	143.2	172176.9
Pumpkin	1	353.8	24.7	87381.0
Coconut	8	525.6	81.2	426787.2
<b>Sub-total</b>	<b>99.5</b>			<b>1,857,769</b>

### Annex 3: Wild foods available in the Lindi region

Local name	Description	Seasonal availability	Name (scientific)
Mingoko	Plant is trailing/climbing vine about 2 millimeters thick, palmate leaves resembling matembele narrow sweet leaves. Edible part is tuber - thickness as midfinger. Plant grows wild in bushy area)	June-August	Wild yam
Makun'gu/ matili/ Mabung'u/	Fruits growing in vines, found in the bush/forest, orange size, porridge-consistency flesh with small seeds, divided into segmnets. Yellow in colour	Feb- March	Landolphia kirkii
Fiwi	Herbacious plant, like cowpea or green gram plant, leaves are sticky and smelly, pod beas 2-3 seeds	Feb-April	Lablab purpureus
Matopetope por	Yellow, size of orange, seeds and flesh	Dec-April	Annona senegalensis
Zambarau	Fruit size of thumb, violet color, soft flesh, one seeded, like plum	Dec-Feb	Syzygium cumini
Upupu	Velvet bean resembles bufallo bean		Mucuna pruriens
Angadi	Like a sweet potato tuber	August	Unknown

### Annex 4: Lindi Region Food security situation 2011/ 2012

DISTRICT	POPULATION (2002 census)	FOOD NEEDS (mt)		HARVESTED PRODUCTS (mt)		EXCESS (mt)	
		Cereals/carbo	Protein	Cereals/carbo	Protein	Cereals/carbo	Protein
KILWA	185,783	44,077	4,408	89,621	14,123	45,544	9,715
LINDI RURAL	234,586	55,656	5,566	93,432	20,135	37,776	14,569
LINDI URBAN	44,419	10,538	1,054	22,230	2,368	12,192	1,314
LIWALE	81,333	19,296	1,930	40,807	15,912	21,511	13,982
NACHINGWEA	175,509	41,640	4,164	125,795	22,839	84,155	18,675
RUANGWA	134,414	31,890	3,189	56,184	15,912	24,294	12,723
<b>TOTAL</b>	<b>856,044</b>	<b>203,097</b>	<b>20,311</b>	<b>428,069</b>	<b>91,289</b>	<b>225,472</b>	<b>70,978</b>

**Cereals/carbo:** = maize, sorghum, paddy, cassava

**Proteins:** = plant sources (cowpeas, pegin peas, green/mung beans, bambara groundnuts)