Save the Children

Cost of Diet assessment

Daura LGA, Katsina State, Nigeria
November 2010

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DFID Department for International Development

UKaid from the Department for International Development

Cost of the Diet

EUROPEAN COMMISSION
Humanitarian Aid and Civil Protection

Acknowledgments

This Cost of Diet assessment would not have been possible without the contribution of many people. I especially want to thank the people in the participating villages for making time to answer patiently all our questions, even while so much of the information asked for was considered 'urban stuff, not relevant for the people in the villages'.

My special thanks and much appreciation goes to Garba Noura, who helped with the training and supervised one of the teams during the data collection. Without him the data collection would have taken much more time, and would not have been of the same quality.

I also would like to thank Save the Children Nigeria, and especially the whole Katsina team, who made me feel at home in Katsina, and assisted in so many ways to make my visit memorable and the assessment go smoothly.

Save the Children's partner organisations KTARDA (IFAD), the State Ministry of Health of Katsina, Service for Humanity, HMIS Katsina: thanks for releasing staff for such a long period, to conduct both a Household Economic Approach, and the Cost of Diet assessment! I hope the experience is useful in your work and that the great collaboration will continue.

All participants in the data collection: thank you so much for your efforts and enthusiasm during the training and the field work and for showing me northern Nigeria!

Binta Fatima Tukur	KTARDA – IFAD (CBARDP)
Yusuf Kaita Haruna	State Ministry of Health, Katsina
Isma'il Muhammad	Service to Humanity Foundation
Nelson Elijah Yilkur Barde	independent consultant
Binta Lawal Mashi	Health Monitoring and Information System Katsina
Aliyu Alhaji Kofar-Bai	PRRINN/MNCH Katsina

I would like to thank the Hunger Reduction team in London for all their support and suggestions, especially Vanessa Rubin, Miles Murray and to Rachel Evans who provided invaluable advice during the data analysis and report writing phase, and sorted out the income and expenditure figures and ran several scenarios.

Jennifer Bush (FEG Consultancy) and Jane MacAskill (Independent consultant) provided feedback and answered all my questions on the HEA.

Last but not least thanks to our donors European Commission Humanitarian Aid department and UKaid from the Department for International Development

Thank you all!!

Esther Busquet

Summary

Objectives

- Get a better understanding of underlying economical causes of malnutrition in Daura LGA
- Use scenario modelling to assess possible programmes to tackle the identified causes of malnutrition (to assist in programme design)

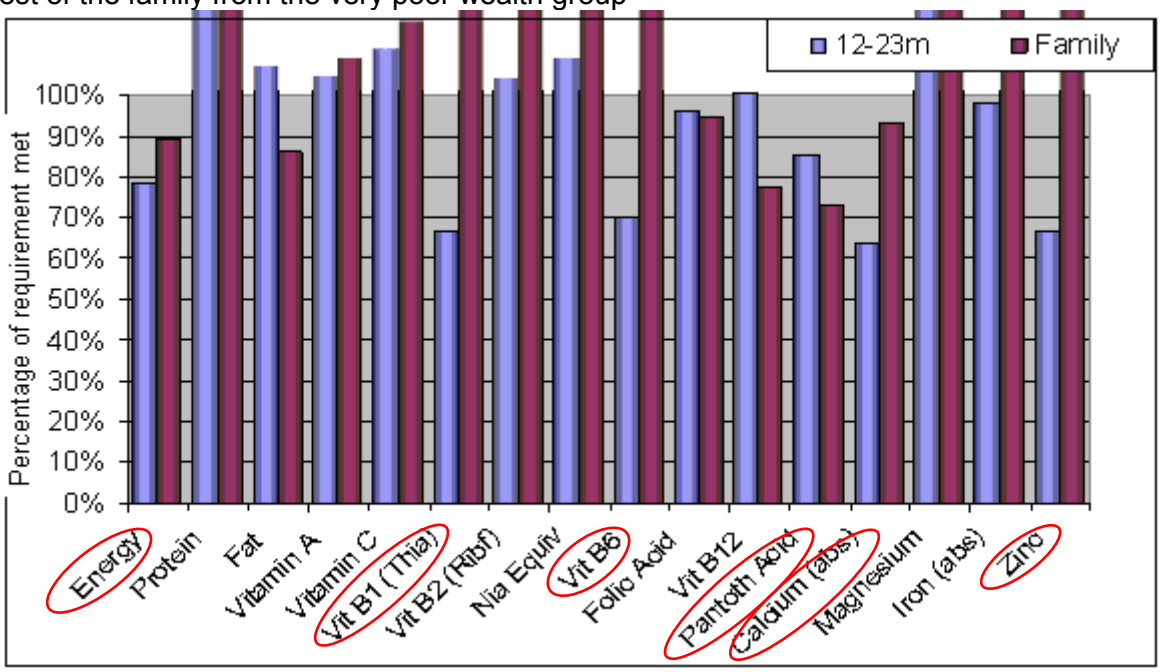
Methodology

The Cost of the Diet calculates the minimum amount of money a family will have to spend to meet their energy, macro- and micronutrient requirements using locally available foods. Data are collected within one livelihood zone, preferably just after an HEA assessment has been conducted, and collects data of foods available (for purchase, from own production and collection in the wild), prices of these foods and how often the foods are consumed by people from different wealth groups. The Cost of Diet software (which is using linear programming) calculates the minimum cost of a diet for an individual child *and* the whole family, taking into account seasonal variations in food prices and availability. Possible scenarios are run to look at impact of possible programmes tackling the identified economic barriers to a nutritious diet This CoD assessment took place in November 2010 in Daura LGA, Katsina State, which is the Millet and Sesame Livelihood Zone in northern Nigeria. Data was collected in four markets on food weights and prices, in 6 villages on food consumption frequency. Data on food consumption frequency was collected among the very poor and better-off wealth groups, for comparison.

Results

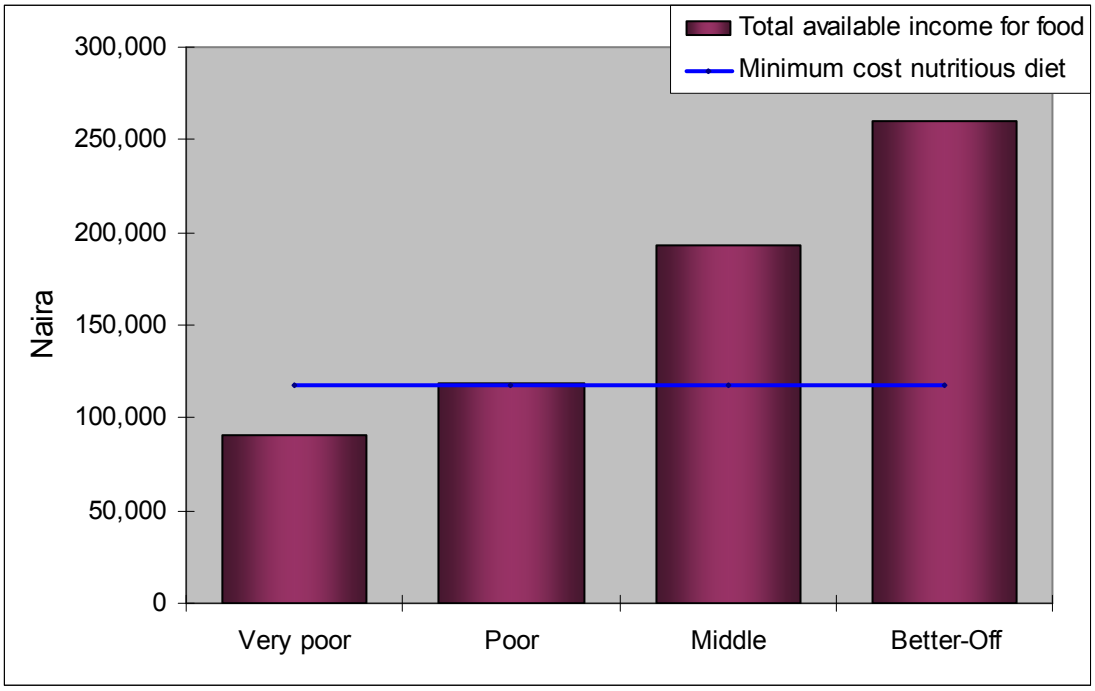
The diet constrained by the current consumption patterns of the very poor is not meeting all nutrient requirements as is shown below in figure I.

Figure I – Percentages of nutrient requirements met per nutrient for 12-23 month old children and the rest of the family from the very poor wealth group



The analyses show that it is possible to obtain a nutritionally adequate diet from foods available in the area, but that the very poor households cannot afford the minimum cost nutritious diet (See figure II).

Figure II – the costs of the lowest cost nutritious diet for very poor people, compared to the average total annual income (current expenditure on food + monetary value of produce and gifts in kind) available for food for all four wealth groups



Recommendations

In order to tackle malnutrition in northern Nigeria, it is essential to design a comprehensive package to treat those children already suffering (and dying) from severe acute malnutrition, and to tackle its causes.

The following recommendations should be taken into consideration when designing this comprehensive package:

1. To investigate existing social protection programmes and consider a cash transfer programme
2. To research the livestock value chain to assist in decisions on any possible livestock support programme
3. Nutrition education with clear achievable messages are essential
4. Expansion of the CMAM programme
5. To improve IYCF practices
6. to assess existing monitoring systems and to consider setting up a food security and nutrition surveillance system
7. To continue collaboration with government and other organisations and assure policies are in place and implemented
8. To repeat the Cost of Diet assessment in the other seasons, as availability and affordability are expected to be less than in the harvest season

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1. Introduction

1.1 Background

With more than 9.5 million of children under five stunted, Nigeria is the country that holds the record in number of malnourished children in Africa (Black et al, 2008). Malnutrition is also estimated to be an underlying cause in about half (53%) of under five deaths, i.e. more than half a million children every year (SCUK 2007). Despite these outraging facts, malnutrition is a highly neglected issue and there are almost no mechanisms to tackle neither its symptoms nor its causes.

The magnitude of the hunger situation in Nigeria varies from one state to another with major concerns in the northern states as shown by anthropometric surveys carried out at the national level in the framework of Demographic and Health Survey (DHS) and Multiple Indicators Cluster Survey (MICS). Data from the 2008 DHS suggest a deterioration of the situation, possibly linked to the recent economic difficulties (high prices of staple food items and fuel) that hit Nigeria last year and continuous inflation of prices of basic food items.

In the northern regions more than half of the children are stunted (chronically malnourished) and in eleven states of these regions the prevalence of acute malnutrition is above 15%. Similarly, micronutrient deficiencies and malnutrition of women of child-bearing age are also widespread. For example in the north-west region of the country 21% of women are considered to be malnourished (BMI <18.5) while the national average is 12% (DHS 2008). In Katsina State, the state in the north-eastern region where Save the Children is carrying out nutrition programmes, the situation of child under-nutrition is particularly alarming, as shown by nutrition surveys in the region, such as the 2003 and 2008 DHS, and a nutritional anthropometric survey carried out by Save the Children in Daura and Zango LGAs in November 2010, of which the results are mentioned in Table 1.1 below.

Table 1.1 – Global and severe acute malnutrition in z-scores, Daura and Zango LGAs (SCUK 2010)

6 -59 months	WHO reference
Prevalence of global acute malnutrition *(WFH* < -2 SD and/or bilateral oedema)*	16.9% [13.1% - 20.7%]
Prevalence of severe acute malnutrition *(WFH < -3 SD and/or bilateral oedema)*	6.1% [3.8% - 8.4%]
Prevalence of global chronic malnutrition *(HFA* ,< -2 SD)*	47.7% [40.2% - 55.2%]
Prevalence of severe chronic malnutrition *(HFA , -3 SD)*	22.5% [17.0% - 28.0%]

** WFH = weight-for-height; HFA = height-for-age; SD = standard deviation*

Save the Children has been present in Nigeria since 2001, and working in the north of the country since 2006. Since 2006, Save the Children has been a key implementing partner of the PRRINN/MNCH (Partnership for Reviving Routine Immunization in Northern Nigeria – Maternal Newborn and Child Health Initiative), a consortium funded by DFID. The ultimate aim of PRRINN-MNCH is to assist states in northern Nigeria to reduce the excess burden of mortality, and disease, born by women, newborns and children and to generate insight into how validated innovations can inform programming in other parts of the country in support of the Nigerian effort to reach the Millennium Development Goals 4 and 5.
Since mid-2010 Save the Children in collaboration with the State's MoH and local partners, has been carrying out a pilot CMAM programme in Daura and Zango LGAs in the north of Katsina State, treating children under five suffering from severe acute malnutrition in two in-patient facilities and 14 out-patient facilities. From the first admission on 21 September till 31 December, 5461 patients were already admitted for treatment.

Although maternal ignorance and more broadly inappropriate IYCF practices are often considered by stakeholders involved in nutrition activities in Katsina State to be the major underlying causes of malnutrition, the economic determinants of child malnutrition are currently overlooked.
In order to better understand the nutrition situation and its possible underlying causes, Save the Children has conducted several assessments in the area where the CMAM programme is carried out: a nutrition anthropometric survey, a Household Economy Approach (HEA) and a Cost of Diet assessment (CoD). The results of the nutritional survey are summarised above, in Table 1.1. The main outcomes/conclusions of the HEA were:

- To provide a livelihood profile of an economy under some stress but not in crisis
- Food security of the poor is dependent on the market and labour situation
- More research on past trends is needed, coupled with ongoing price monitoring
- Widespread rural poverty appears to be closely linked to relatively high malnutrition rates among under fives in Daura LGA
- General livelihood thresholds should be refined with nutritional goals in order to reduce malnutrition effectively.

1.2 Objectives of the Cost of Diet survey

The objectives for conducting the Cost of Diet survey are:

1. To get a better understanding of the underlying economic causes of malnutrition in Daura LGA
2. To use scenario modelling to assess possible programmes to tackle the identified causes of malnutrition (in order to assist in programme design).

2. Methodology

The CoD is an assessment and analysis tool, using a linear programming model built into Microsoft Excel which can identify the gap between income or food expenditure and the lowest cost of a diet that meets all the energy and nutrient requirements of a household and/or of an individual within the household. It builds strongly on the findings of the Household Economic Approach that was carried out just before this Cost of Diet assessment.

In order to use the CoD programme the following information is required:

- A list of all locally available foods (foods available in the markets visited by the poorest households, foods grown and wild foods collected).
- The seasonal variation in availability and cost of these food items.
- Information about a family's food consumption patterns (to calculate the cost of a diet that meets the energy and nutrient requirements of a user defined household)

The diets selected have to respect user defined 'constraints': food portion sizes and food consumption patterns. These constraints are used for a variety of purposes:

- To ensure that sufficient breast milk is included into the diet of a 6-24 month old child
- To prevent the software programme from including quantities of foods which could not be feasibly consumed, such as 1 kg of spinach per day for a 12 – 23 month old child
- To prevent food items from being included into the diet more frequently than could be expected to be eaten, for example eggs 3 times per day.

The results from the CoD programme are then reviewed alongside income data collected during the HEA assessment in order to better understand and make estimations regarding the capacity of a household to afford a sufficiently nutritious diet.

Tier 2 is the second model used in the CoD software. The first model (tier 1) could only be used for advocacy messages around availability and affordability, and included quantities of food that could not be feasibly consumed by the household members (such as 4 kg of green leaves per person per day!). The tier 2 model uses portion sizes and food consumption patterns, so dietary patterns of the population are better reflected and quantities included for each food can feasibly be consumed. The results of Tier 2 analysis can also be used for advocacy purposes, as well as being used for helping to design programme intervention. Different scenarios can be modelled using Tier 2 in order to explore the impact on cost and diet quality that an intervention such as supplementation, food rations, or behaviour change might have.

2.1 Tier 2 analysis

As indicated above, tier 2 analysis requires more detailed data concerning the food portion sizes, the frequency with which different food items are consumed, and the regularity with which foods from different food groups are consumed, in order to inform the user-defined food pattern constraints. This enables a diet to be selected which more appropriately reflects the dietary patterns of the local population, and therefore gives more realistic results; the lowest cost of a diet which meets requirements *and* can be consumed as part of a usual diet in Daura LGA.

The results of Tier 2 can show either one of the following two scenarios:

1. The lowest cost diet which meets all the nutrient requirements for all members of the household

Or, if nutrient requirements cannot be met:

2. The lowest cost diet which does not meet all the requirements. The cost would be based on the best possible diet that can be selected from the foods available when the portion size and frequencies are constrained by realistic or current eating patterns.

The results falling under scenario 2 above would indicate that there are potential patterns of nutrient deficiencies within the population, or that adequate intakes of certain micronutrients may be difficult to achieve from a locally available diet. This could inform the direction of any planned programme intervention to look not only at access in terms of affordability, but also at availability of nutrient-dense foods at the individual and household level.
The CoD programme can then be used to model the impact of potential interventions such as supplementation or increased consumption of certain foods in order to explore the impact this would have on diet cost and quality (scenario modelling).

Two databases are used within the programme:

- A database of nutrient and energy requirements based on age, sex and activity level taken from WHO/FAO 2004 nutrient requirements database. [WHO/FAO 2004]
- A database of nutrient and energy content of food items taken from the FAO food composition database (FAO 1996).

A focus on 12 – 23 month olds

The CoD methodology has a special focus on the 12-23 month old children. Before the age of two children are vulnerable to the long-term effects of undernutrition, yet this is also the time where catch-up growth is possible. Thus, if a population is experiencing food insecurity and malnutrition targeting children under the age of 2 years and improving their nutritional status will have a long-term effect on the future health and well-being of the population. The needs of the 12-23 month olds are unique as they transition from breast milk to complementary foods. Continued breastfeeding is still recommended but as they grow up and start to eat the same foods as the rest of the family their requirements for a diverse and micronutrient rich diet are relatively higher than older members of the family.

2.2 Training

Six people who participated in the Household Economic Approach were selected to take part in the Cost of Diet survey. They received a two-day training from the Cost of Diet specialist and the supervisor who had previous experience in data collection for a Cost of Diet assessment.

The training conducted included:

- Introduction to CoD
- Identification of villages and markets
- Household composition and seasonal calendar
- Development of the Food List
- What data to collect and how to fill the forms
- Weighing exercise (how to use the scales)
- Pilot data collection on a market not included in the assessment
- Finalisation of the Food List

2.3 Retrospective vs. real-time data collection

Data for a Cost of Diet assessment can either be collected in real-time (for the current season/period at time of data collection) or retrospectively for a 12-month period. For this Cost of Diet survey data was collected retrospectively for the preceding twelve months (November 2009 till October 2010).

Minimal seasonal variations in food price and availability were shown during data collection. This led into question the validity of the retrospective data as prices were collected according to the low-price, mid-price and high-price seasons as defined during the CoD training and based on the HEA.

It is known that retrospective data is less accurate than real-time data because of recall bias. In addition, several CoD assessments conducted by the WFP in Mozambique and Zambia showed considerable discrepancies between real-time and retrospective data (WFP, *unpublished data*). Due to these findings it was decided to analyse only the data of the current season. This was the low-price or harvest season, November 2010.

The annual cost of a nutritious diet was calculated from the price of food items in November 2010. This is based upon the assumption that food prices are stable across all seasons which is unlikely to be the case. However, as data was collected during the harvest season the cost of the diet would increase if data were to be collected during the middle or high-price seasons.

2.4 Choosing location

The sampling for the CoD assessment builds upon the sampling that was done for the HEA assessment, and takes place in the same livelihood zone. Market data was collected from the markets where the poorest households purchase their food.

Livelihood zone
Both the HEA and the Cost of Diet assessment took place in Daura LGA, in the north of Katsina State, which is the Millet and Sesame livelihood zone (see figure 2.1). This zone is characterised by mixed food and cash cropping supported by livestock production and casual labour. The Millet and Sesame zone is one of 44 livelihood zones identified in across the 15 states of northern Nigeria in 2007 by FEWS NET (FEWS NET 2007).

Figure 2.1 – Daura and Zango LGAs in Katsina State, northern Nigeria

Villages and markets
For the Cost of Diet assessment the same villages were visited as for the HEA. For each of these villages the main markets where the very poor purchased their food were identified. As the villages included in both HEA and CoD did not have their own market or shops, people were dependent upon main (weekly) markets in the area. These markets were visited to collect information on the weight and prices of foods as they were sold (see table 2.1).

The interviews conducted to collect the food frequency data took place in the above mentioned villages. One of the villages was used for the pilot during the training, and it was decided not to

include these interviews in the analysis, as the Food List and thus the interviews were adapted considerably after this exercise.

All data was checked for error at the end of the day, but real quality control was done at the stage of data entry as there was not sufficient time during data collection.

At this second phase of quality control, the validity of the data collected among the very poor in two villages was questioned. Based upon HEA findings, it appeared that the households questioned were not from the very poor wealth group. As it was impossible at this stage to verify the correctness of the data it was decided not to use the data from these two villages (Madobi and Sharawa). Therefore the current consumption constraints for the very poor group are calculated from data of the other four visited villages (Gara, Yashi, Yamadawa and Bojo).

This experience shows clearly that it is very important to do the data cleaning and quality control at the time of collection, so that villages or markets can be re-visited if the quality of data is uncertain. If time is limited and there is no possibility for the team to check the data at the end of the day when returning from the villages, the team leader should consider taking one extra person into the area specifically for quick data cleaning and data entry, so that mistakes are identified and can be addressed during the time of the field visit.

Table 2.1 – Villages and markets visited for CoD data collection

Village	Market
Yamadawa	Kayawa
Gara	Mai'Aduwa
Yashi	Mashi
Bojo	Daura
Sharawa (data not used)	
Madobi (data not used)	

2.5 Development of the Food List and units

All participants in the Cost of Diet assessment were involved in the HEA just before the CoD, so their experience visiting the markets was used as a basis for the Food List. During the training all foods available in the markets throughout the past 12 months were added, together with the units in which the foods were sold on the market.
All foods that are produced in the area and wild foods which are available for collection were listed as well. During the pilot and in the feedback session afterwards, the food list was finalised. Any foods identified later on were added to an additional list, together with price and weight data. These foods were included in the final food list as entered into the CoD database. The final Food List, as entered in the database, (Annex I), includes the frequencies with which the different foods are consumed by both very poor and better-off families (see also paragraph 2.8).

Difficulties during the compilation of the food list
During the compilation of the Food List, several problems came up:

- Exhaustive list vs. used list. The Food List that was initially developed during the training, contained 175 foods, and this was only including the main prepared foods, such as fried foods (fried millet cake, fried sorghum cake, fried peanut cake, fried fish, etc), boiled rice with for example cowpeas or spaghetti, or boiled maize. After the pilot survey in Kalgo the list was reduced to 129 foods, and this list was further reduced when it was compared to the food composition table in the CoD software (see below)
- Exclusion of certain foods. It was decided to remove prepared foods from the list, as these foods are not part of the food composition table of the CoD software, and the team agreed that

these foods are not purchased by the poorest households. Several foods were excluded completely from the list, and some others were combined (see below)

Foods excluded from Food List:
- Leaves combined in dark green leaves (moringa leaves, yakua leaves, zobo leaves, bitter leaves and fresh baobab leaves were entered together as 'dark green leaves')
- Prepared foods (see above)
- Foods with missing data on price and/or weight (cashew fruit)
- Foods not included in the CoD food composition table (garden egg,
- Foods that were unclear (local fruit juice meant for one team freshly squeezed juices, and for another team the sachets with flavoured powder that need to be dissolved in water)

For some food items weight data were missing, but alternatives could be used:
- Fresh cowpeas: same weight as dried cowpeas
- Bambara groundnuts: same weight as groundnuts
- Pineapple: weight estimated at 900 grams (based on various weights indicated on Internet)
- Mango: estimated at 250 grams
- Fruit from cashew: same weight as guava
- Tangerine: estimated at 75% of the weight of an orange
- Fresh dates: same weight as dried dates
- Skimmed cow's milk: same weight as full-cream cow's milk
- Eggs of guinea fowl: same weight as very large chicken egg[1]
- Tea bag: estimated at 4 grams, as this is the weight of a tea bag in the UK.

Nearly none of the excluded foods were consumed by the very poor in the villages visited. The exception is cashew fruit, which was consumed and mentioned by the people, but no weight or price data were collected, as the fruit was not in season, and it was unclear when the fruit was available (thus, estimation of weight and price could be made but it remained unclear for which season to enter the fruit in the database).

2.6 Seasonality

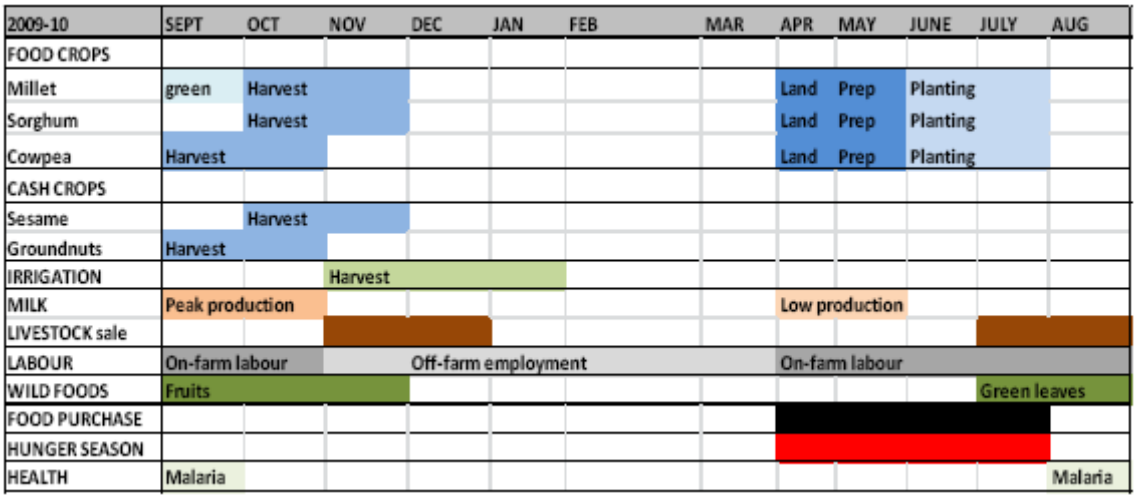
During the HEA 2010 a seasonal calendar for Daura LGA was established (See figure 2.1.)

After discussions within the team, the following seasons were used for the Cost of Diet assessment, as these are the seasons as used by people in Daura LGA:

- Low-price season (harvest season) September, October, November, December
- Mid-price season January, February, March, April
- High-price season (hunger season) May, June, July, August

[1] http://www.lioneggs.co.uk/

Figure 2.1 – Seasonal Calendar for Daura LGA, Katsina State (HEA 2010)



2.7 Household size and definition of wealth group

The average household size varies considerably in number and composition depending on wealth group, and even within the wealth groups, as in northern Nigeria polygamous, extended families usually tend to live within one large compound. For this Cost of Diet survey, the wealth groups and family size identified in the HEA in 2010 were used (see Figure 2.2). During the CoD the training the team decided on an average composition of a very poor family (mainly decision of the different age groups for the children and adults of the family). The results are given in Table 2.3.

The percentage of the population falling into each wealth group in Daura LGA is:

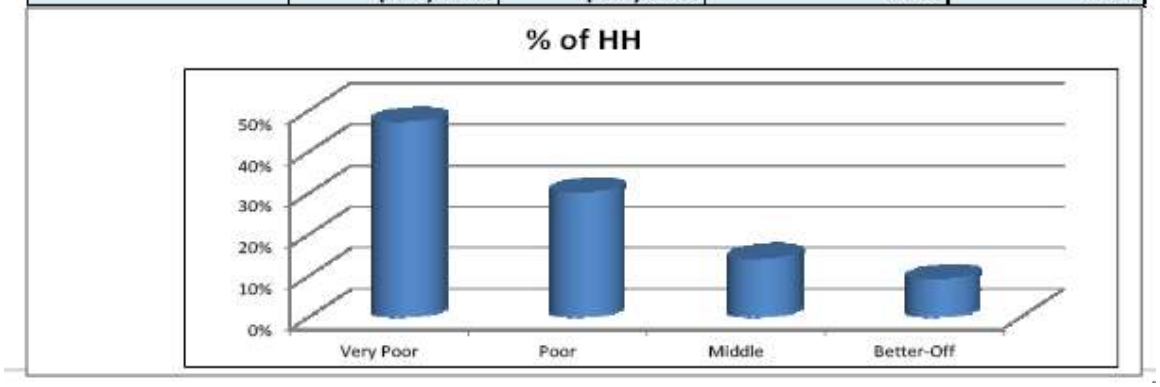
Very poor	47%
Poor	31%
Middle	14%
Better-off	8%

Table 2.3 – 'Average' household composition of the very poor as identified in the CoD training

Child 12-23 months old	1
Child 4-5 years old	1
Child 6-7 years old	1
Child 10-11 years old	1
Child 12-13 years old	1
Adult female 18-29 yrs old, moderately active, lactating	1
Adult male 30-59 yrs old, moderately active	1
Total in household	**7**

Figure 2.2 – different wealth groups in the livelihood zone, as identified by the people themselves [HEA 2010]

	Wealth Group Information			
	Very Poor	Poor	Middle	Better-off
HH Size	7	10	13	18
No. of wives	1	1-2	2-3	3
Area planted	0.8 ha	1.5 ha	4 ha	6 ha
Livestock	0 cattle 0 ox 2-3 shoats	1 cow 0 ox 3-10 shoats	10 cattle 2 oxen 10-25 shoats	15-25 cattle 4 oxen 25-75 shoats
Assets	hens	hens	hens, hives cart, plough	hens, hives cart, plough
Main food sources	purchase crops payment-in-kind	purchase crops payment-in-kind	crops purchase milk & meat	crops milk & meat
Main Income Sources	labour firewood sales petty sales	labour firewood sales petty sales	livestock sales milk sales trade	livestock sales milk sales trade



2.8 Data Collection and consolidation

The following data was collected for the analysis:

1. Market data
- The weight of a food item as it is sold
- The price of a food item as it is sold

2. Food consumption pattern data
- The number of times per week and per day each food item is consumed by 12 – 23 months olds
- Frequency with which any food items from within a food group are consumed by 12 – 23month olds

During the training it became clear that the patterns for children under two and the rest of the family would be very similar, so there was no need to conduct separate food consumption questionnaires for the different age groups.

All interviews were collected at the end of the day, and discussed with the teams, in order to detect any possible mistakes or missing values. As mentioned in section 2.4 not all quality control took

place at the end of the day due to time constraints, and this resulted in the exclusion of the interviews of the very poor from two villages for the final analysis.

Foods were included as raw ingredients; meals and dishes were not included.

The weight of the local unit of each food item (e.g. kg, pile) was consolidated, outliers removed and averaged in order to establish a weight in grams per local unit. Then the price per 100g of each food item was calculated in Naira (₦; Nigerian currency).

A lower and upper limit for the number of times any food item from a food group can be included into the diet was established by selecting the 10^{th} and 90^{th} percentile of the total range of frequency from the data that was collected. The foods are grouped by food type and in order to reflect the way in which the foods are eaten.

In order to establish a maximum frequency with which any food item could be included into the diet, the 95^{th} percentile of the maximum times a food item was consumed (taken from the data collected) was used as the upper limit. All lower frequency limits were set at zero, meaning the minimum amount of times a food could be selected is zero.

The limits are set at these percentiles rather than the average times consumed to avoid the upper limits acting as barriers to the optimal diet. They are used to guide the selection of food items to represent what could feasibly be consumed by a household rather than to represent exactly what is consumed.

As a minimum of 30 households is required per wealth group for the food frequency data, a minimum of five interviews per village was conducted for both the very poor and the better-off wealth groups. Due to time constraints no interviews were conducted for the poor and middle wealth groups.

The portion sizes that are used in the Tier 2 analysis are generic portion sizes that have been collated from a range of secondary and unpublished data, largely from Indonesia, as portion sizes for Nigeria are not available. The portion size data for 12 – 23 month year olds is used as the basis; these are scaled up as a proportion of energy requirements for all other family members.
The portion sizes are quantities that can reasonably be consumed during a meal by a 12-23 month old child; and larger for older family members. The used generic portion sizes are mentioned in Annex II.

2.9 Income Data

The income data used was collected during the HEA assessment and are for the reference year September 2009 – August 2010.

In order to estimate the total amount of income available to households for purchasing food, a series of calculations were conducted. Households in Daura LGA produced and consumed cereals, cowpeas and livestock products and are therefore meeting a certain number of requirements through food they did not purchase. In order for this to be accounted for, the amount of food produced and consumed by the household (in kg) was converted into a cash equivalent using the market price per kg of each food. Households in Daura also rely on gifts-in-kind which were converted to a cash equivalent in the same way. The monetary value of foods produced by households and received as gifts-in-kind was added to the figure for household income.

The expenditure figure for non-food expenses was subtracted from the final income figure to obtain the total amount of the income that was available to be spent on foods.

Table 2.4 – Total annual income and total income spent on food per wealth group

Wealth group	Total annual income (Naira)	Total spent on food (Naira)	% of total income spent on food
Very poor	126,569.00	90,610.35	71.6%
Poor	173,345.60	119,217.60	68.8%
Middle	565,250.50	193,276.50	34.2%
Better-off	1,167,031.60	259,924.60	22.3%

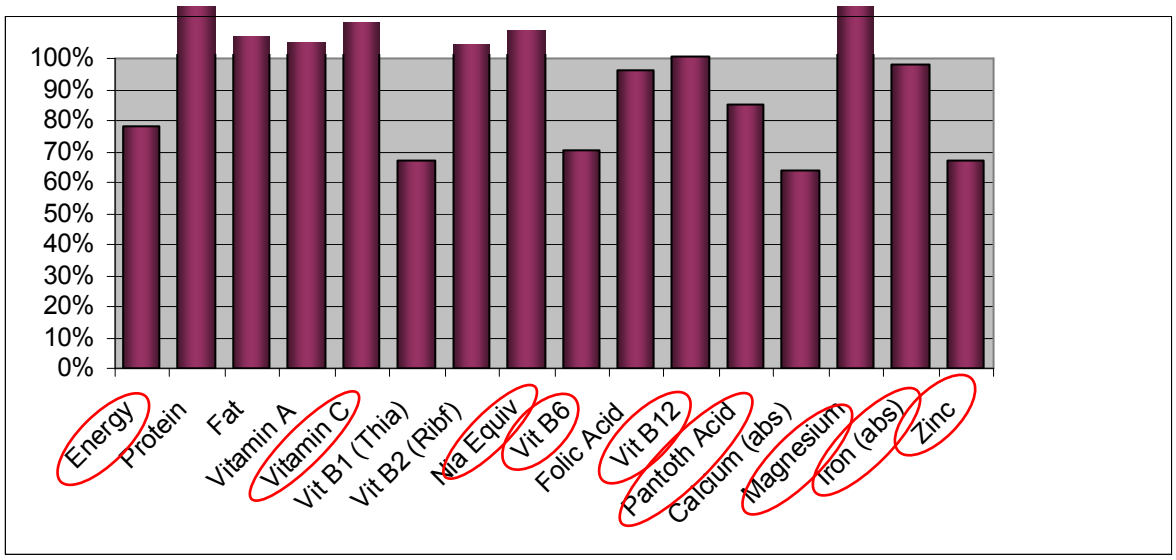
3. Results

3.1 Tier 2 analysis of the actual diet

For the tier 2 analysis the frequency with which the different foods could be consumed and the portion sizes were restricted to appropriately reflect the way in which they are eaten by the people in Daura LGA. This is to analyse the diet that is constrained by current consumption patterns of the very poor wealth group and to assess the quality of this diet. The analysis is based on data of four of the visited villages (Gara, Yashi, Yamadawa and Bojo).

The final Food List, including the frequency with which the different foods are consumed (95th percentiles of the frequencies indicated by people interviewed) is shown in Annex I.

Figure 3.1 – Percentages of nutrient requirements met per nutrient for 12-23 month old children from the very poor wealth group



The diet constrained by current consumption patterns does not meet all nutrient requirements, as is shown in Figure 3.1 for children aged 12 to 23 months and in Figure 3.2 for the rest of the family. For 12-23 month old children, energy, thiamine (vitamin B1), vitamin B6, folic acid, calcium, pantothenic acid, iron and zinc requirements were not met. For the rest of the family (anyone of 24 months old and above) the requirements for energy, fat, folic acid, vitamin B12, pantothenic acid and calcium could not be met. Although protein requirements are met, energy requirements could not be met. This can be explained by the fact that energy requirements are higher than protein requirements, so even if protein requirements are met and protein would provide energy, it would not necessarily mean it provided sufficient energy to meet energy requirements.

The percentages met of the 'problem nutrients' are indicated in Table 3.1 for both children aged 12 to 23 months and the rest of the family.

Figure 3.2 – Percentages of nutrient requirements met per nutrient for the rest of the family (all members of the family older than 2 years) from the very poor wealth group

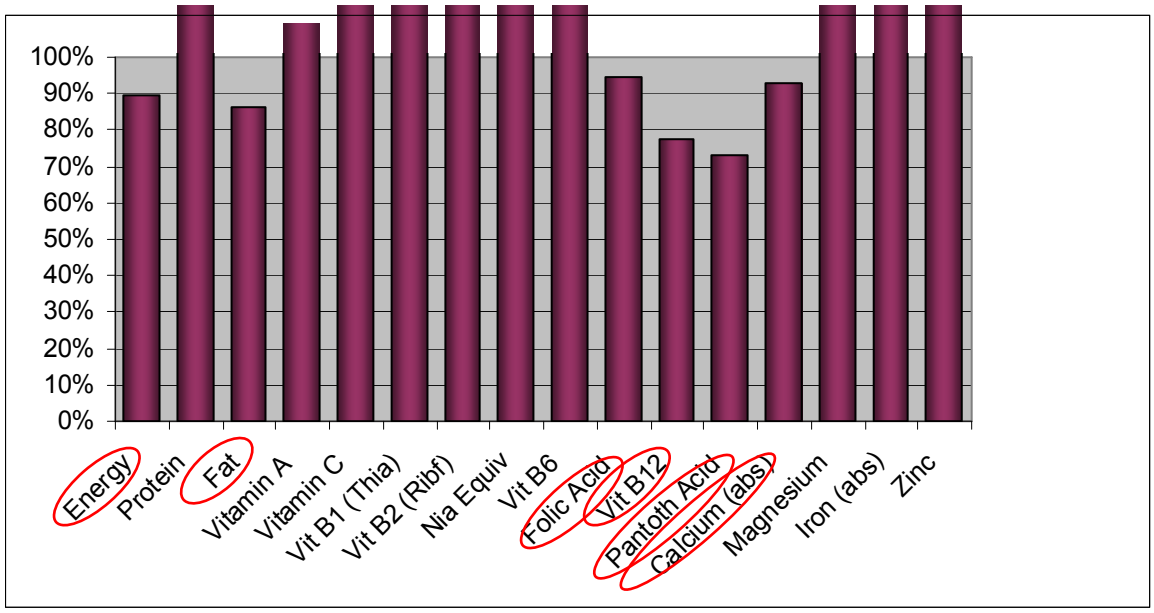


Table 3.1 – Nutrients that do not meet the recommended nutrient intake for children aged 12-23 months and the rest of the family in the very poor wealth group

Nutrient	Low-price season	
	12 – 23 months (% of RNI met)	Rest of family (% of RNI met)
Energy	78.2%	89.4%
Fat	100% met	86.1%
Thiamine	66.8%	84.5%
Vitamin B6	70.4%	100% met
Folic acid	96.1%	94.7%
Vitamin B12	100% met	77.2%
Pantothenic acid	84.9%	73.1%
Calcium	63.9%	93.1%
Iron	98.0%	100% met
Zinc	67.0%	100% met

Table 3.2 shows the food items included in the diet constrained by current consumption patterns of the very poor and the amount consumed per day for children of 12 to 23 months old and the rest of the family for the low-price season.

Table 3.2 – Food items and daily amounts in the actual diet for children 12-23 months old and the rest of the family of the very poor wealth group in the low-price season

Food item	Child 12-23 months gram/day	Rest of Family * gram/day
Breast milk	532	-
Millet, whole grain	35	1774
Cowpea, dried	9	53
Sesame seeds	-	158
Date, dried	11	264
Baobab leaves, dried	6	158
Cow's milk, full cream	97	2394
Cassava flour	7	162
Groundnut oil	2	53
Palm oil	1	18
Sugar	5	123
Biscuit	3	-

** NB these are the totals for all family members of 2 years old and above, but requirements per individual in this 'rest of the family' group are different (e.g. a 4-year old has different nutritional requirements than a 35-year old male adult)*

The diet of the better-off in Daura

Food frequency interviews were also carried out among the better-off (as defined by the HEA) in the villages visited to determine the current consumption habits of this wealth group and differences between this and the diet of the very poor.

The diet constrained by current consumption patterns for the better-off meets all nutrient requirements of both children under two and the rest of the family. The better-off consume additional foods to the very poor, and thus overall quantity and quality of the diet is considerably better. The diet constrained by current consumption patterns for the better-off is shown in Table 3.3 for the current season at time of data collection (the low-price season).

The fact that better-off families do meet all nutrient requirements with their diet shows that **behaviour (food consumption habits) is not a main cause of malnutrition in the area**, and that people could meet nutrient requirements if they would have more money available to purchase foods.

Table 3.3– Food items and daily amounts in the diet constrained by current consumption patterns for children 12-23 months old and the rest of the family in the better-off wealth group in the low-price season

Food item	Child 12-23 months gram/day	Rest of Family * gram/day
Breast milk	532.0	-
Millet, whole grain	36.3	722
Sorghum, whole grain	15.4	380
Rice	-	506
Cowpea, dried	2.1	53
Soybean	23.6	101
Guava	3.6	88
Date, dried	3.6	88
Coconut	14.3	352
Pumpkin	1.4	35
Onion	0.7	18
Baobab leaves, dried	34.3	845
Cow's milk, full cream	19.4	479
Cow's milk, skimmed	38.9	958
Fish, carp dried	2.4	-
Fish, small dried	2.9	70
Cassava dried	10.7	264
Cassava flour	3.3	81
Sweet potato	3.6	88
Groundnut oil	2.1	206
Palm oil	0.7	18
Margarine	-	18
Salt	0.3	7
Sugar	0.7	18
Sugarcane	0.7	18
Bouillon cube (Maggi)	0.3	7
Biscuit	1.6	39

** NB these are the totals for all family members of 2 years old and above, but requirements per individual in this 'rest of the family' group are different (e.g. a 4-year old has different nutritional requirements than a 35-year old male adult)*

3.2 Tier 2 analysis without food consumption constraints - availability

The analysis of the diet constrained by current consumption patterns has clearly shown that the quality of the diet currently eaten by the very poor is not sufficient to meet all nutrient requirements. To analyse possible causes of this inadequacy several analyses can be carried out. The first step is to see if all nutrient requirements can be met with the locally available foods. In order to check this, food frequency constraints are removed, so all foods would be available three times a day, seven days a week (so 21 times). The portion sizes used were still restricted to the estimated portion sizes, so the foods included in the lowest cost diet would not have to be consumed in unfeasible amounts. The software checks if all nutrient requirements can be met, and if this is the case it will show the lowest cost diet meeting all requirements.

With the foods available in Daura LGA, it is possible to obtain a diet that meets all nutrient requirements for all age groups and in all seasons. It should be noted that the seasonal availability and price increase are not clear in the data collected, so results might be slightly different for season 2 and 3 if data were collected during one of these seasons.

The fact that all nutrient requirements can be met with the foods available on the market indicates that **availability of nutrient-rich foods is not a main cause of malnutrition** – at least not in November, which is about two months into the main harvest period, when most foods are found in the market, and prices are at their lowest.

The minimum cost nutritious diet costs 117,873 Naira per year for the whole family (7 people). This is more than families from the very poor wealth groups have to spend on food (90,610 Naira.) The size of the gap is 39,238 Naira for a very poor family, **which means that for 47% of the people living in the rural villages in Daura LGA, a nutritious diet is unaffordable**. In reality, the problem is probably even bigger. The cost of the cheapest nutritious diet is based on the prices of the current season, which was the low-price season. It is known that prices increase considerably during the mid-price and high-price seasons. This means that although these calculations show that a nutritionally adequate diet would be affordable for people of the poor wealth group, this is only certain for the low-price season. If a nutritious diet became unaffordable for the poor and very poor wealth group this would mean that 78% of the population would not be able to afford a nutritionally adequate diet.

Figure 3.3 shows the cost of the lowest cost nutritionally adequate diet versus the total income available for food for each wealth group and the gap for the very poor.

The food items and quantities included in the lowest cost nutritionally adequate diet are shown in Table 3.3. This diet is the cheapest diet providing all nutrients in sufficient amounts, but it does not necessarily reflect a culturally acceptable diet. Any modelling of the lowest cost nutritious diet (for example by replacing one food by another) to make it more acceptable/ realistic for a household to consume would increase the cost of the diet (as this is the lowest cost nutritious diet). However, all foods included in the lowest cost nutritious diet were consumed by the people from the better-off wealth group, implying that the foods included in the nutritious would all be acceptable for the people in the survey area.

Figure 3.3 – the costs of the lowest cost nutritious diet for very poor people, compared to the average total annual income (current expenditure on food + monetary value of produce and gifts in kind) available for food for all four wealth groups

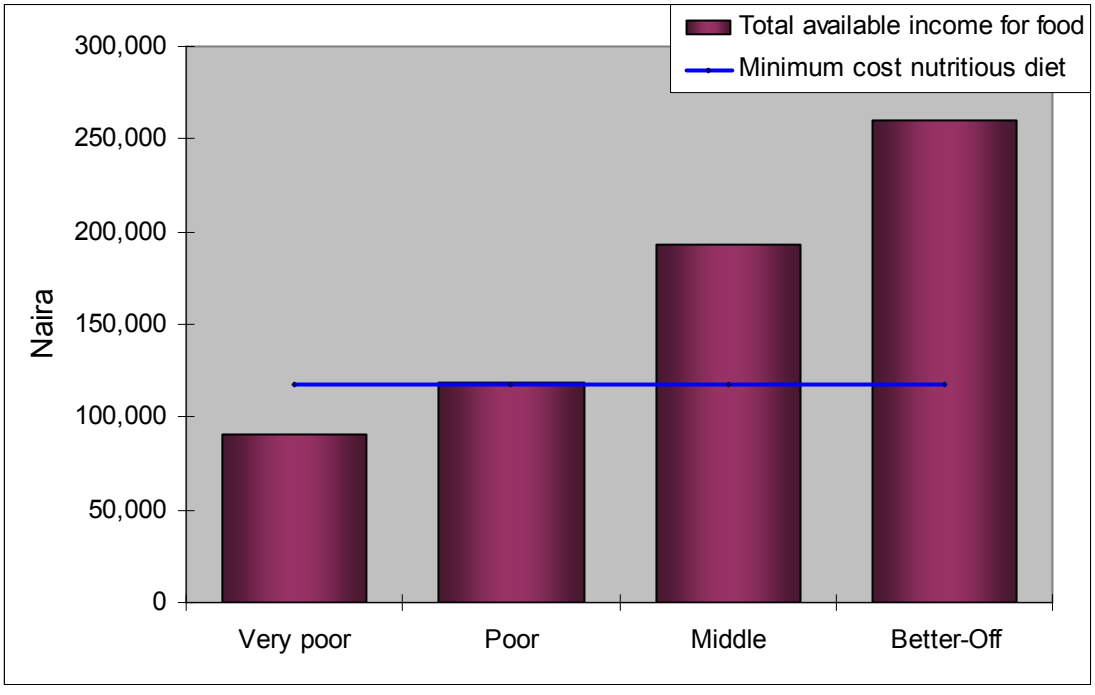


Table 3.3 – Food items selected in the lowest cost diet calculated without food frequency constraints* for both children aged 12-23 months and the rest of the family for the low-price season

Food item	Child aged 12-23 months	Rest of the Family †
Breast milk	532	-
Millet, whole grain	39	559
Soybean	9	-
Coconut	60	1479
Baobab leaves, dried	14	360
Fish, small, dried	13	346
Cassava, dried	54	1848
Margarine	-	83

* Without food frequency constraints = foods available 3 times per day, 7 days per week
† NB these are the totals for all family members of 2 years old and above, but requirements per individual in this 'rest of the family' group are different (e.g. a 4-year old has different nutritional requirements than a 35-year old male adult)

3.3 Scenario Modelling

Paragraph 3.1 and 3.2 clearly describe that the diet constrained by the current consumption patterns of the very poor in Daura LGA is not meeting all nutrient requirements, and that this is caused by the too high prices of nutrient-rich foods. In this paragraph a scenario is described to bridge the gap between the money available for foods and the cheapest nutritionally adequate diet.

Scenario 1 – Adding a cash transfer to the annual income

In Save the Children programming, a cash transfer is defined as predictable, regular transfers of cash to individuals or households by governments for the purposes of addressing poverty, vulnerability and children's development [SCUK 2009]. Evidence from a wide variety of cash transfer programmes in Latin America and sub-Saharan Africa shows beneficial effects of the programmes on households' access to food. Measured against a range of indicators – including calorie consumption, average numbers of meals and budget expenditure – families use cash to increase their food intake. Crucially for child survival, participants in cash transfer programmes improve the diversity of their diets, increasing their intake of animal protein, fats, fruits and vegetables [SCUK 2009].

For Daura LGA, the cheapest diet that meets all nutrient requirements for the whole family would cost 117,873 Naira for the whole year (see paragraph 3.2).

The HEA 2010 data show that a very poor family is spending 90,610 Naira on food (52,047 Naira of income and 38,563 Naira of income-in-kind). This leaves a gap of 27,263 Naira between a nutritious diet for the whole family throughout the year and the actually earned income available for food of these poorest families.

A cash transfer to cover this gap would be almost 2300 Naira per very poor household per month (2272 Naira; about £9[2]). Usually the contribution of a cash transfer would be 20-30% of household income, so a monthly contribution of 2272 Naira falls well within this range of examples mentioned in the Lasting Benefits report (discussing the role of cash transfers in tackling child mortality) by Save the Children UK [SCUK 2009].

The international poverty line of 1.25 US dollars per person per day is much less likely to be within reach of a cash transfer programme, as it would cost 352,493.5 Naira (~£1,410 or ~ 2350US$) per

[2] At time of assessment (Nov2010) the currency rate was: £1 = 250 Naira and 1US$ = 150 Naira

household per year to bridge the gap between the poverty line and the annual income of a very poor household, or a monthly transfer of 29,374.5 Naira (~£117.5).

The above calculations show that a cash transfer of 9 English pounds per family per month would allow these households to consume a nutritionally adequate diet for the whole family.

Scenario 2 – Modelling the effects of a livestock programme

The population of Katsina are pastoralist. However, the poorest households do own very little livestock (on average five hens and possibly one sheep/goat – HEA 2010) and therefore have limited access to animal products.

Several possible diets were modelled to determine the effect of a livestock programme on the availability and cost of a nutritious diet.

This modelling was based on including the following quantities of animal-source foods in the diet each week:

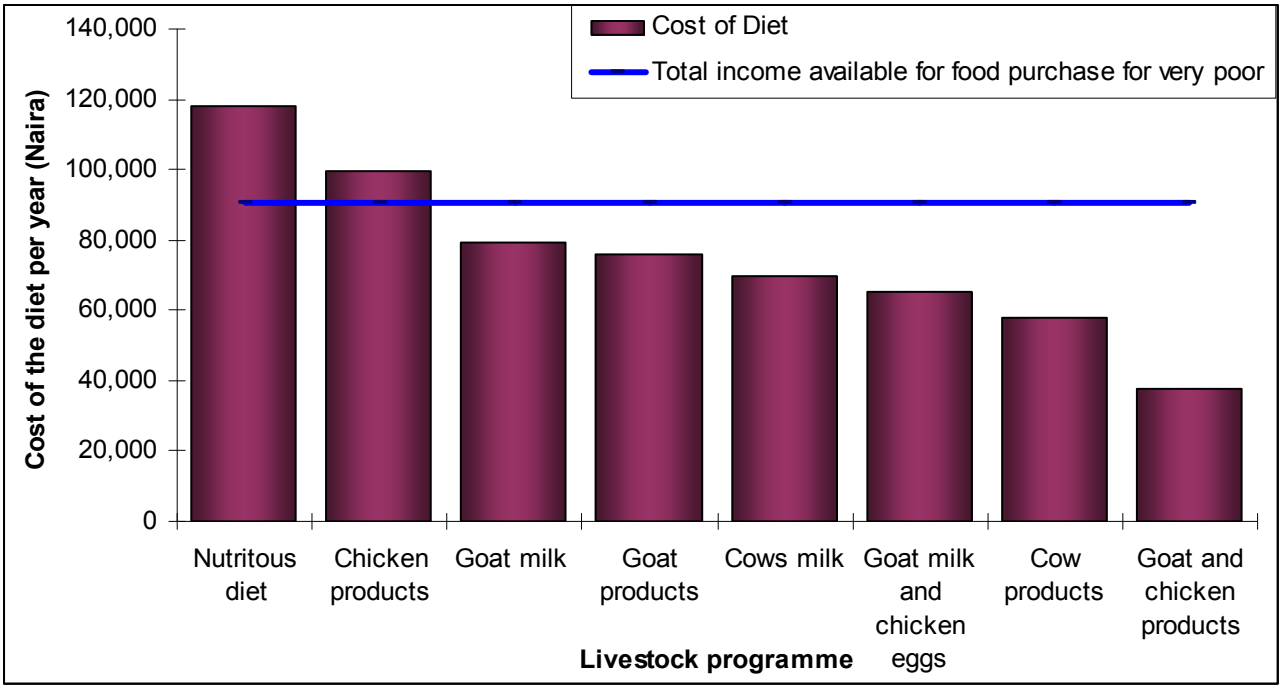
- Cow products: beef (1x/week), intestines (1), milk (7)
- Goat products: meat (1), intestines (1), milk (7)
- Chicken products: meat (1), intestines (1), broth (1), giblets (1), eggs (7)
- Cow milk: milk (7)
- Goat milk: milk (7)
- Combinations of the above

All animal-source foods were included as free.

Inclusion of chicken, goat or cow products or a combination of them, at the amounts detailed above only slightly improved the quality of the diet constrained by current consumption constraints. However, some nutrient requirements were still not met after adding these animal-source products to the diet based on current consumption constraints.

The inclusion of animal products decreased the cost of the minimum cost nutritious diet as is shown in figure 3.4. Modelling showed that the lowest cost diet is achieved when households have access to goat and chicken products.

Figure 3.4 – Modelling the effect of livestock programmes on the lowest cost nutritious diet



It is important to note that the costs of these nutritious diets do not take into account the additional costs for a household associated with livestock upkeep, including veterinary bills and fodder. The diets presented are based on an idealistic situation whereby households have access to significant quantities of animal-source foods for free. More research is needed on the livestock value chain before any programmatic recommendations can be made.

Scenario 3 – Adding supplements to the diet

As the diet constrained by current consumption patterns does not meet all nutrient requirements for either children under two or the rest of the family, a multi-micronutrient supplement was added to the diet to see if this would improve the diet.

Upon the addition of a multi-micronutrient powder to the diet of the children aged 12 to 24 months, the quality of their diet improved. However, several nutrient requirements were still not met: 93.7% of the energy requirement was met, 89.3% of the pantothenic acid requirement, and only 75.6% of the calcium requirement. The composition of the added multi-micronutrient powder is shown below, (table 3.4.)

The cost of the diet constrained by current consumption patterns was reduced by 1.8% upon the addition of the multi-micronutrient supplement, while several nutrient requirements were still not met. This shows that adding a multi-micronutrient powder to the diet of children under two is not sufficient to improve the nutrition situation in Daura.

If a multi-micronutrient powder was added to the lowest cost nutritious diet (for children under two), the total costs for the family reduced by only 0.6% (from 117,873₦ to 117,227₦ per year). This reduction is so small that it would not contribute to making a nutritious diet more affordable for the very poor.

In the above-mentioned models, the multi-micronutrients were included for free, assuming that they would be distributed among the very poor via a programme, not that they would be purchased by the family. However, the diet did not improve significantly (energy, pantothenic acid and calcium requirements were still not met), and the costs of the lowest cost nutritious diet did not reduce sufficiently to become affordable, showing that this should only be considered if there were no other possibilities to improve the diet of the very poor in the area, and even then the costs of carrying out the programme would probably outweigh the benefits.

Table 3.4 – Composition of the multi-micronutrient powder included in the diet for children under two

Nutrient	Content/100g	Nutrient	Content/100g
Thiamine	50.0 mg	Zinc	500 mg
Riboflavin	50.0 mg	Iron (absorbed)	106.3 mg
Niacin	60.0 mg	Vitamin A (retinol)	15000 µg
Vitamin B6	50.0 mg	Vitamin C	3000 mg
Vitamin B12	90.0 µg	Folic acid	16000 µg

Scenario 4 – Modelling the effect of food price rises on the cost of a nutritious diet

During the food price crisis of 2008, the price of maize, millet and sorghum increased by more than 280% during a period of 15 months in Nigeria according to FAO figures [FAO]. At the moment the prices are increased considerably again, and so the CoD tool was used to model the effect of a similar price increase on the cost of a nutritious diet.

To do this, the percentage increase between prices now and at their peak during the crisis was calculated for sorghum and maize, (141.7% and 145.1% respectively.) As the price of millet is only available until September 2008, it wasn't possible to calculate the percentage increase in the price

of millet directly. Therefore the percentage increase for sorghum has been used, as the percentage increase in food price for millet and sorghum correlated during the 2008 food price crisis (283.3% and 295.3% for sorghum and millet respectively.)

The cost of diet software was used to model the effect of a similar increase in food price rises on the cost of a nutritious diet, so it was based upon a 141.7% increase in the price of sorghum and millet and a 145.1% increase for maize.

The annual cost of a nutritious diet increased from 117,874 Naira to 119,739 Naira (1.5% increase). Although it is still possible to achieve a nutritious diet (as the foods are still available), the price has increased, which means that it is even further out of reach for the very poor, and that the diet is now also unaffordable for the poor wealth group.

This increase in the cost of a nutritious diet by 1.5% is smaller than was expected given the increase of 45.1% and 41.7% in the price of staples. This can be explained by the fact that the cost of a nutritious diet is dependent not only on cereals but also on nutrient-rich foods as shown in figure 3.5.

Increasing the price of cassava by the same percentage (141.7%), resulted in an increase in the annual cost of a nutritious diet to 133,778 Naira (13.5% increase). This highlights the importance of monitoring the price of non-cereal food items on the cost of a nutritious diet.

Figure 3.5 – The cost of the diet by food group for a child aged 12 to 23 months

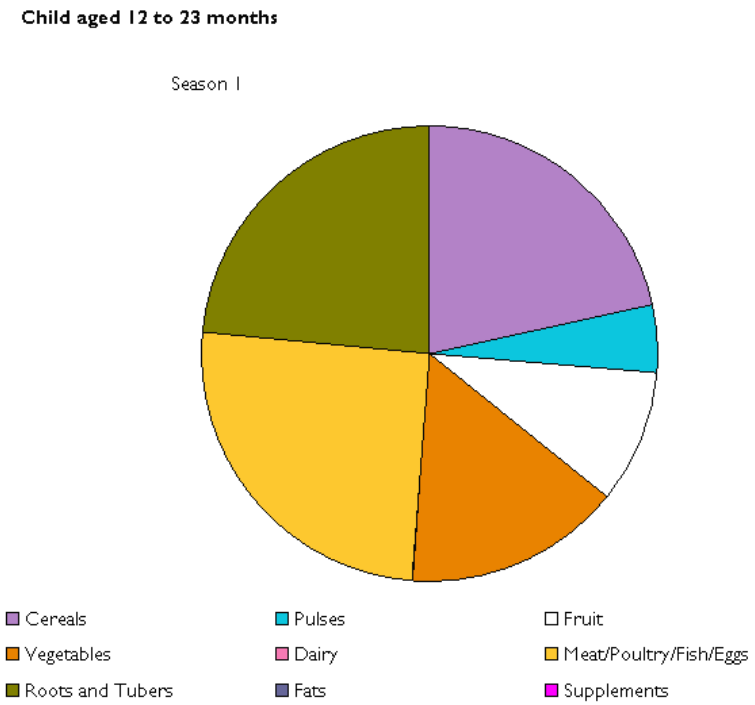


Table 3.5 shows the effect of the price increase on the composition of a nutritious diet. As shown in table 3.5, the composition of the diet changes as well (for example: the much more expensive millet has not been selected anymore for the rest of the family in this diet).

Table 3.5 Composition of the nutritious diet limited by a price increase

Food item	12-23 month old	Rest of family
Breast milk	532	-
Millet	39	-
Soybean	9	704
Coconut	60	1479
Baobab	14	351
Fish (small, dried)	13	372
Dried cassava	54	848

4. Discussion

Actual Diet

The diet constrained by the current consumption patterns of the very poor in Daura LGA does not meet all nutrient requirements. Energy, thiamine (vitamin B1), vitamin B6, folic acid, calcium, pantothenic acid, iron and zinc requirements were not met for 12-23 month old children and for the rest of the family the requirements for energy, fat, folic acid, vitamin B12, pantothenic acid and calcium could not be met. The possible nutrient deficiencies that are of most concern are those for children under two, as they are most vulnerable for both chronic and acute malnutrition. The fact that with the current diet energy requirements are not met can be a possible explanation for the high rates of global and severe acute malnutrition in the area (GAM 16.9% and SAM 6.1% - SCUK 2010). Thiamine and vitamin B6 deficiencies are linked to the way cereals are consumed (milled/pounded and bran removed). In the worst case thiamine deficiency can lead to beri-beri and hypoglycaemia. Calcium is essential during growth for the bones, and a deficiency can lead to bone weakness (rickets; osteoporosis; osteomalacia). Zinc deficiency hampers the immune system, and leads to growth failure, diarrhoea and severe skin problems (dermatitis). The deficiencies in iron and folic acid are of less concern as both are meeting more than 95 % of their requirements; however, both can lead to anaemia.

Several things should be noted here:
The diet constrained by current consumption patterns as described here is based on a food frequency questionnaire for the 12-23 month old child within the household. The interviews of all 30 households were taken together, and the 95th percentile was used as upper constraint within the software. Due to the linear programming used within the software, it is impossible to enter the average of all frequencies into the software; only minimum and maximum can be provided, in order to give the software opportunity to seek the optimal diet within the provided constraints. This means that the real actual diet might be slightly different from the diet described here (the 'diet constrained by current consumption patterns'); both in food items and quantities selected.

When analysing the interviews of the six villages it became very clear that for two villages the answers provided were significantly different than the other four villages. In these two villages food items were included as being consumed regularly, that according to both the interviewed people in the other villages and data collection team members were out of reach of the very poor. These items included rice and wheat products (white bread and wheat flour). People in the four villages had indicated that these food items were only consumed on special occasions (Muslim celebrations/holidays), and not during the rest of the year. However in the two other villages people interviewed indicated to eat these products on average 1-4 times per week. Because of this difference in consumption pattern, and based upon talks with village people and the data collection team, it was decided to exclude the interviews form the two villages from further analysis, as the people interviewed were probably not from the very poor wealth group, but from the poor or even middle wealth group. This experience shows clearly that it is very important to do the data cleaning and quality control at the time of collection, so that in case of any doubt of the data collected, villages or markets can be re-visited. If time is limited and there is no possibility for the team to check the data at the end of the day when returning from the villages, it should be considered to take one extra person into the area specifically for quick data cleaning and data entry, so that mistakes are identified and can be addressed during the time of the field visit

The data collected on the markets on food prices did not show a clear difference in food prices or availability of foods between the three seasons, which was confirmation that retrospective data collection is not sufficiently accurate, and should only be used if it is essential to analyse data of the whole past year. If this is not essential, only data of the current season should be collected, and if there is the opportunity to do so, additional data for the other seasons should be collected during those seasons (real-time data collection). For this CoD assessment only the data from the season at time of data collection were used, also for calculation of annual costs (so it was

assumed that prices remained the same, during an 'artificial' 365-day season). This does not reflect the reality in northern Nigeria, as it is known that both availability and prices of food items vary considerably throughout the year, and the seasons used were based on that fact (low-price (or harvest), mid-price and high-price (or hunger) season).

There are several possible explanations for the lesser accuracy of retrospective data

- Non-experienced interviewers. None of the team members had any experience in conducting food consumption frequency interviews. It is possible that questions were not asked exactly correct either due to this lack of experience or due to difficulties in correct translation into Haussa language.
- Memory bias. Data is collected retrospectively for a whole year (November 2009 – October 2010), and people probably don't recall the correct prices of the previous seasons, especially those from the season longest ago (the mid-price season from January till April 2010, or the two months longest ago from the low-price season at the end of 2009).
- High food prices. Due to a combination of factors (high inflation rates, low naira value, deregulation of oil sector, crisis in Nigerian bank sector, very high fuel prices) food prices remained relatively high throughout the year, showing less fluctuation than usual. Traders were transmitting the increased costs of transportation to the prices of food and non food items, and the fuel scarcity was limiting the ability of poor households to effectively market their production and to buy food at reasonable prices (Fewsnet 2010).
- Methodology of CoD. The way the food consumption frequency interview is conducted (by asking only 'when a food is available'…) and the way the outcomes of the interviews are used in the software (95th percentile as upper limit; see above) do not make a clear distinction between the different seasons, thus not correcting for any possible memory bias.

Analysis of the diet of the better-off showed that when people are able to spend more money on food, they do in general consume a nutritious diet. The better-off still eat the same food items as the very poor, but they add other food items, which increases both quality and quantity of the diet. This shows that habits (or behaviour) are not a major contributor to malnutrition in the area.

Minimum cost nutritious diet

The analyses have clearly shown that availability of foods is not a problem at the time of the assessment. A nutritionally adequate diet can very well be achieved with the locally available foods. However, very poor families who make up for 47% of the total rural population in Daura LGA are unable to afford the cheapest nutritious diet. As all analyses are based on prices collected during the harvest season, which is the season with the lowest prices), and it is known that prices increase considerably during the other two seasons, it is very probably that for at least part of the year people from the poor wealth group cannot afford a nutritious diet either. This would mean that up to 78% of the total population in the area would be unable to afford a nutritious diet.

In general, the lowest cost diet providing all nutrients in sufficient amounts is not necessarily a culturally acceptable diet, so it might be needed to replace some of the food items selected by other food items. However, this would increase the costs of the diet (as this is the lowest cost nutritious diet). The information from the better-off families shows that all food items included in the lowest cost nutritious diet were consumed, thus showing that the lowest cost nutritious diet for Daura would be an acceptable diet. Not all of these items are indicated in the diet constrained by current consumption patterns of the better-off (table 3.3), as this is the diet based on upper and lower limits set by 5th and 95th percentiles of the answers in the interviews, and thus not exactly the average actual diet as consumed.

Scenarios

Affordability of nutritious foods is a major barrier to achieve a nutritious diet in Daura. A cash transfer programme could help in bridging the gap between the actual income that is available for food and the budget needed to have a nutritious diet for the whole family. The amount of money needed to bridge this gap is 27,263 Naira (~£109) per year for a very poor family. The design of a cash transfer programme needs to take into account several other factors, such as the fact that people might not spend all money received on food.

This can be solved by including certain conditions to the transfers made, and by assuring that a strong nutrition education component is included in the designed programme. It is essential that families recognise malnutrition and will go for treatment if needed. Next to that, knowledge of nutritious foods, especially for infants and young children is essential to tackle malnutrition in the region.

Having access to animal-source food items would improve the current diet of the very poor, and if they would have access to these foods at no cost, the lowest cost nutritious diet would be considerably cheaper. The effects of having access to both goat and chicken products (eggs, milk, and meat) are similar or even slightly larger in reducing the costs of the nutritious diet. However, at the moment the very poor and poor on average do not have sufficient animals to get the quantities of animal-source food items needed to improve the diet sufficiently, as very poor families on average own 5 hens and 1 sheep/goat, and poor families own on average 6 hens, 3 sheep/goats, 1 guinea fowl and 1 cow. These animals would not produce sufficient quantities of eggs, milk and/or meat to provide a nutritious diet for the whole family throughout the year.

Addition of a multi-micronutrient supplement does improve the diet of children under two (the normal target group for these supplements), but still not all nutrient requirements could be met. Adding these supplement to the lowest cost nutritious diet showed a very small reduction of the total annual costs of food for the family. This shows that distribution of these supplements should only be considered as a component of a more comprehensive package to tackle the causes of malnutrition.

Modelling the impact of a food price crisis on the costs of a nutritious diet shows that this diet would become even more unaffordable for the very poor, and it would also become unaffordable for the poor. As the modelling was based on the lowest prices of the year, the impact would probably be even larger in the other two seasons. Although the middle and better-off wealth groups would have to spend more of their total income on food, they should be able to cope with an increase of food prices. However, these two groups only include 22% of the total population in Daura, which means that for 78% of the population a nutritious diet would be (even more) impossible.

Other issues

- Livestock. In the lowest cost nutritious diet, nearly no milk or milk products have been included, due to the high prices. However, in the villages where the interviews were conducted, nearly half of the very poor people were taking care of one or two cows. These families did not own the cow, but were taking care of the cow for a better-off family, in exchange for the milk. The milk could be used for consumption or sold on the market, and two families indicated to make butter for both consumption and sale. Although the system seems to be working well, not all very poor families did take care of a cow, and thus had no access to milk. When designing programmes to improve the foods security of households in the area, it might be worth looking into this livestock situation, as milk would be a great addition/ improvement to the diet for very poor households, but is now entirely depending on better-off families willing to give a cow to a very poor family to be taken care of.

- Observations in the CMAM programme and during CoD data collection. When visiting the CMAM programme Save the Children and its partners are running in Daura and Zango LGAs, as well as visiting the villages for the CoD data collection, mothers indicated that children aged as young as two months were already participating in the family meals. In general these children were still receiving breastfeeding, but not exclusively. These observations were confirmed by the outcomes of the nutrition anthropometric survey carried out in the area: an exclusive breastfeeding rate of 0%! These poor infant and young child feeding practices are probably another major cause of the high malnutrition rates in the area, next to unaffordability of nutrient-rich foods. Any programme designed to tackle malnutrition in the area should include components to tackle both the unaffordability of nutritious foods and to improve the IYCF practices, as these seem to be two of the most important causes of malnutrition.

Another observation was that people do not seem to have much knowledge about malnutrition, or that it can be treated. They only go to the health facility as last resort, and often when it is too late. Education to raise awareness on malnutrition, its causes and possible treatment and prevention is essential for any programme to be successful.

5. Recommendations

In order to tackle malnutrition in northern Nigeria, it is essential to design a comprehensive package to treat those children already suffering (and dying) from severe acute malnutrition, and to tackle its causes.

The following recommendations should be taken into consideration when designing this comprehensive package:

1. To investigate existing social protection programmes and consider a cash transfer programme
2. To research the livestock value chain to assist in decisions on any possible livestock support programme
3. Nutrition education with clear achievable messages are essential
4. Expansion of the CMAM programme
5. To improve IYCF practices
6. to assess existing monitoring systems and to consider setting up a food security and nutrition surveillance system
7. To continue collaboration with government and other organisations and assure policies are in place and implemented
8. To repeat the Cost of Diet assessment in the other seasons, as availability and affordability are expected to be less than in the harvest season

1. Social protection programmes

One of the main recommendations is to investigate what social protection programmes are already existing in Katsina and if policies are in place. It is very important to know what programmes exist, whom they are targeting, and if there are any gaps in these programmes that need to be addressed. Proper targeting is essential to make sure a programme contributes to an improvement of the nutritional situation. Setting up a cash transfer programme could be considered, as providing the poorest households with £9 per month would mean they would be able to afford a nutritious diet for the whole family throughout the year. In Myanmar Save the Children successfully provided cash to breastfeeding mothers to help them exclusively breastfeeding their child for six months, as the cash covered expenses in the family that forced the mothers to start looking for jobs away from home soon after delivering the child (thus assuring that the mothers could stay home for the 6-month period, and continue breastfeeding during this time).

2. Livestock support

Animal-source foods such as cow's milk would improve the diet of very poor households. At the moment very poor and poor households do not have sufficient access to these foods, as they only own a few animals (hens and sheep/goat), and sometimes have a cow 'on loan' from a better-off family.

More research is needed on the livestock value chain before any programmatic recommendations can be made.

3. Nutrition education

Teaching people about malnutrition and its causes, how to prevent malnutrition and to seek treatment if needed, will be essential to get communities involved in any programme.

4. Expansion of the CMAM programme

As the malnutrition rates are very high in the area (not only in Daura and Zango LGAs), it is essential to continue the pilot CMAM programme to save lives, and to expand the programme to surrounding LGAs where the situation is of similar concern.

5. Programmes to improve IYCF practices

Breastfeeding and complementary feeding practices are poor in the surveyed area and seen as immediate reasons for high acute malnutrition. A multi-lateral approach for improvement of Infant and Young Child Feeding (IYCF) practices is recommended involving governmental health

institutions, religious leaders and the community. IYCF needs to be put high up on the agenda for addressing acute malnutrition:

- Integrate IYCF interventions into CMAM in the currently served and future health facilities
- Facilitate trainings on IYCF for health staff at hospital and health centre level
- Communicate IYCF messages in communities, include men
- Sensitise mullahs for support of optimal IYCF practises
- Establish women support groups for IYCF
- Establish a network of peer councillors for breast feeding
- Design and run a media/communication campaign for IYCF awareness

(Source: SCUK 2010)

6. Monitoring systems

The modelling of the impact of a new food price crisis on the affordability of a nutritious diet showed clearly that it is essential to monitor not only the price fluctuations of cereals, but also of non-cereals.

It is recommended to study what monitoring systems already exist in northern Nigeria, and to study if these data provide useful information to monitor the food security and nutrition situation adequately. If there is no monitoring system, setting up a surveillance system should be considered.

7. Collaboration with government and other organisations

The comprehensive package of interventions needed to address the complex causes underlying household food insecurity and malnutrition should be led and supported by adequate institutional arrangements, enhancing actions across ministers and sectors.

Collaboration between all stakeholders in food security and nutrition is essential to achieve the required improvements for poor and very poor households and to significantly reduce the high rates of both acute and chronic malnutrition.

Next to collaboration at all levels, policies need to be in place and implemented both at national and state level on:

- Social protection
- Food security and nutrition
- Agriculture (especially nutrition-friendly agriculture and a pro-poor focus)
- Health care (such as free health care for mothers and children)

For nutrition several policies exist already in Nigeria:

- National Policy on Food and Nutrition (2001; reprinted 2005)
- National Plan of Action on Food and Nutrition (2004)
- National Policy on Infant and Young Child Feeding in Nigeria (2005)

The National Policy on Food and Nutrition was designed to introduce a new focus on these issues, and to effectively integrate and coordinate all food and nutrition programmes across all sectors.

Existing policies in the above-mentioned areas should be in line with each other and responsibilities for a specific area should be clearly outlined, as they are often fragmented among different ministries.

8. Cost of Diet assessment in all three seasons

As the data collected during the assessment did not show any difference in availability or prices of food items between the three seasons, it is recommended to repeat the Cost of Diet in all three seasons, especially in the hunger season (the high-price season, from May till August), as it is known that far fewer food items will be available and for much higher prices than in the harvest season in which this data collection took place.

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Abbreviations

BMI	Body Mass Index
CMAM	Community-based management of acute malnutrition
CoD	Cost Of Diet
DFID	Department for International Development (UK Government)
DHS	Demographic and Health Survey
ECHO	European Commission's Humanitarian Aid department
FAO	Food and Agricultural Organisation (United Nations)
FFQ	Food Frequency Questionnaire
GAM	Global acute malnutrition
HEA	Household Economic Approach
HFA	Height-for-age
HMIS	Health management information system
IFAD (CBARDP)	International Funds for Agricultural Development (Community-Based Agricultural, Rural Development Project)
IYCF	Infant and young child feeding
KTARDA	Katsina Agricultural and Rural Development Agency
LGA	Local Government Authority
MICS	Multiple Indicators Cluster Survey
MoH	Ministry of Health
₦	Naira (Nigerian currency)
PRRINN/MNCH	Partnership for Reviving Routine Immunisation in Northern Nigeria/ Maternal, Newborn and Child Health
RNI	Recommended nutrient intake
SAM	Severe acute malnutrition
SCUK	Save the Children UK
SD	Standard deviation
SMoH	State Ministry of Health
STHF	Service to Humanity Foundation
UK	United Kingdom
US	United States of America
WFH	Weight-for-height
WHO	World Health Organisation (United Nations)

Annexes

Annex I – Food List and frequencies in which each food is consumed

	VERY POOR		BETTER-OFF	
	FREQUENCY		FREQUENCY	
FOOD NAME	***min***	***max***	***min***	***max***
CEREALS	0	14	7	21
Millet, whole grain	0	18	4	21
Sorghum, whole grain	0	11	3	14
Maize, white wholegrain dried	0	0	0	12
Maize, yellow wholegrain dried	0	0	0	2
Wheat flour	0	0	0	4
Wheat bread white	0	0	0	6
Spaghetti	0	0	0	4
Noodles	0	0	0	2
Rice, parboiled white	0	0	0	6
PULSES, SEEDS AND NUTS	0	7	3	18
Cowpea fresh	0	5	0	8
Cowpea dried	0	7	1	13
Groundnut with shell raw	0	0	0	11
Groundnut with shell dried	0	2	0	13
Groundnut without shell raw	0	2	0	4
Soyabean, dried	0	0	0	11
Sesame seed dried	0	3	0	8
Bambara groundnut fresh	0	4	0	7
Bambara groundnut dried	0	0	0	3
FRUITS	0	3	4	19
Guava	0	3	1	14
Watermelon	0	0	0	8
Pawpaw / papaya	0	0	0	3
Pineapple	0	0	0	4
Mango	0	5	3	25
Banana	0	0	0	3
Orange	0	2	0	6
Tangerine	0	0	0	2
Dates fresh	0	0	0	11
Dates dried	0	7	1	11
Coconut fresh	0	0	0	5
Lemon	0	0	0	3
VEGETABLES	0	7	3	20
Spinach	0	3	0	9
Moringa leaves	0	4	0	5
Yakua leaves	0	6	1	9
Zobo leaves	0	2	0	4
Bitter leaves	0	0	0	1
Cabbage	0	0	0	5
Carrot	0	0	0	6
Lettuce	0	0	0	6
Green pepper	0	0	0	11
Red pepper	0	3	0	18
Chillies red fresh	0	0	0	14
Chillies red dried	0	9	0	14

Chillies green dried	0	0	0	11
Tomatoes	0	4	0	18
Cucumber	0	0	0	2
Garlic	0	4	0	14
Pumpkin	0	3	1	16
Onion fresh	0	3	1	16
Spring onion	0	0	0	16
Okra fresh	0	2	0	9
Okra dried	0	5	0	9
Baobab leaves dried	0	7	3	16
Ginger	0	7	0	18
DAIRY	0	5	3	21
Cow milk whole	0	6	0	16
Cow milk skimmed	0	6	2	21
Milk evaporated	0	0	0	4
MEAT, POULTRY, FISH AND EGGS	0	1	2	11
Beef	0	0	0	6
Mutton	0	0	0	6
Goat	0	0	0	5
Offal beef	0	0	0	4
Chicken	0	0	0	4
Guinea fowl	0	1	0	4
Duck	0	0	0	2
Pigeon	0	0	0	2
Carp fresh (medium size fish)	0	0	0	4
Carp dried (medium size fish)	0	0	0	3
Fish, very small, dried	0	0	0	2
Sardines, canned	0	0	0	2
Grasshopper	0	0	0	7
Eggs guinea fowl	0	2	0	6
Eggs chicken	0	0	0	4
ROOTS AND TUBERS	0	2	2	9
Cassava fresh	0	1	0	4
Cassava dried	0	0	0	3
Cassava flour	0	2	1	7
Yam fresh	0	1	0	4
Sweet potato fresh	0	1	1	7
Cocoyam (taro)	0	1	0	4
FATS	0	4	3	21
Groundnut oil	0	3	3	19
Palm oil	0	2	1	13
Butter (cow)	0	0	0	21
Vegetable oil	0	0	0	4
Margarine	0	0	0	1
OTHER	0	8	0	21
Salt	0	14	7	23
Sugar	0	7	1	14
Sugar, brown	0	0	0	3
Sugarcane, fresh	0	1	1	13
Bouillon cube (Maggi)	0	14	2	21
Biscuits	0	2	1	7
Tea	0	0	0	4

Annex II – Generic portion sizes for 12-23 month old children

Source: unpublished data

All other portion sizes are based on these portion sizes. For example, goat's milk should receive the same portion size as cow's milk (136 gram).

Food Type	Generic Portion Size (g)
All cereals/grains	36
All flour	23
All meat	15
All offal	8
All pulses and seeds	15
All bread	28
All soft fruit	42
Unripe fruits (banana and papaya)	21
All fats/oils/butter	5
All berries / small/soft fruits	25
All fish	10
All leafy vegetables	15
Large root vegetable	25
Soft vegetables	10
Condiment vegetable	5
Citric fruits	5
Tofu	41
Paste / sauce	5
Cows milk	136
Eggs	20
All cakes	21
All biscuits	11
Coconut milk	5
All spices	1
Salt	0.3