

Assessing the cost of a nutritious diet in Muzaffargarh, southern Punjab, Pakistan

December 2011



Acknowledgments

I would like to thank everyone involved in all stages of the study, for all their input and support and without whom this study would not have been possible.

Thanks to Aqeel Nawaz Khan and Zulquarnain Baloch and the Save the Children Food Security and Livelihoods team in Islamabad for their input to the design and logistical arrangements for the study. My special thanks and much appreciation goes to the assessment team; Dr Asif Iqbal, Uzma Litaf, Sadia Khan, and Ruhul Amin. Thank you so much for your efforts and enthusiasm during the training and data collection.

I would like to thank Daison Ngirazi and the rest of the HEA team who worked tirelessly for the month preceding this study to complete a full HEA baseline for this livelihood zone. The information gathered has been an extremely useful foundation for this CoD study. I would also like to thank the Hunger Reduction team in London for supporting the study and for their feedback and suggestions.

Last but by no means least, this study and report would not have been possible without the activists, market traders, and women who participated in focus group discussions in Muzaffargarh. Their time, hospitality and insights are greatly appreciated.

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1. INTRODUCTION

1.1 Overview of the Cost of Diet tool

Save the Children UK have developed a method and computer software to estimate the minimum cost for a typical family of meeting their recommended dietary requirements for energy, protein, fat and micronutrients using home grown or locally available foods. The Cost of Diet (CoD) software uses linear programming to work out the cheapest combination of locally available foods that will enable a family to meet their nutrient requirements whilst setting constraints on the combination and quantities of foods that can be included in the lowest cost nutritious diet so that they are practical and reasonable. The CoD technique originates from work done by the World Health Organization to develop and estimate the cost of nutritionally appropriate complementary diets for young children. The CoD method has proven to be ground-breaking because it is the only tool currently available that can:

- Estimate the minimum cost of a diet for an individual *and* for a typical family;
- Take into account seasonal variations in food prices and availability when costing the diet
- Provide region-specific data on dietary costs using locally available foods

The CoD method came about as a response to research undertaken by Save the Children which demonstrated that the impact of traditional nutrition education programmes has been limited because of the economic constraints facing many households in low-income countries. There has been increasing recognition that such activities are only effective among food secure populations and so need to be part of wider social protection programmes, including cash-based interventions. However, there is a lack of tools available to make objective decisions about the types of social protection packages, including the size of cash transfers required to achieve a nutritious diet for the family. The CoD can provide a much better understanding of 'nutrition insecurity' in the fullest sense, it can be used to identify seasonal nutritional gaps, and to model the impact of potential interventions to enable households to meet their nutrient requirements by nutritional or other means. The evidence on the impact of cash transfers on nutrition remains mixed. There are numerous other factors beyond the size of the transfer which would influence this impact, which would also need to be taken into account in designing cash interventions with intended nutritional outcomes.

The first CoD programme was developed in 2006 and has been used widely within Save the Children UK to inform advocacy work by examining the role of poverty as a constraint to nutritional status. The first version of the CoD software (now referred to as the Tier 1 model) proved to be useful for advocacy, but because the diets calculated by the programme were not necessarily feasible for households to consume, it had limited practical application. As a result, a new model (called the Tier 2 model) has been developed which can estimate diets that are more realistic

and thus provides much greater insight into the nutritional insecurity of poor households. At the end of 2011 the software was updated and several additional calculations were added.

A Cost of Diet analysis should be conducted when chronic and/or long-term acute malnutrition due to energy or micronutrient deficiencies has been identified as a problem and when the availability or affordability of nutrient-dense foods is likely to be an immediate cause. The tool estimates the minimum cost of a nutritionally adequate diet for an individual child and the whole household based on locally specific data on food availability, dietary habits and cost. When compared with income data this indicates the degree to which a household can afford a nutritious diet. The tool can also be used to test the effect of specific interventions on access to a nutritious diet for a typical household.

The results of CoD analysis can be used directly to inform and influence critical nutrition and food security policy and advocacy processes and to contribute to debates at a national and global level. Theoretically, the results may also be used as indicator for food security and nutrition early warning systems, or can be used to inform nutrition, food security, livelihood and social protection programmes. This is an area which Save the Children intends to test and explore further.

1.2 Rationale for a CoD analysis in Pakistan

On the Human Development Index, Pakistan trails at 125 out of 162 nations. High government spending, a small tax base and challenges in securing donor support have resulted in more government borrowing and a rising fiscal deficit. Economic growth has been negatively affected by widespread flooding in 2010 and increases in the price of crude oil on the international market. Inflation remains persistently high, and food prices in particular are rising year on year. The 2010 floods left millions displaced and destroyed or damaged their livelihoods. People were yet to recover from history's worst floods in 2011 when monsoon floods inundated the southern part of the country again. These second floods exacerbated the delicate food security situation nationally so that several staple food commodities such as sugar and flour are exorbitantly expensive or simply unavailable.

The resultant picture at household level is one of increasing poverty, food insecurity and malnutrition. As incomes become less secure and the price of foods increase, poor households will be increasingly obliged to make difficult choices about how they spend their limited money. If a nutritious diet becomes beyond the purchasing power of poor households, the risk of malnutrition among children in those households increases.

The study area is a district which was severely affected by the 2010 flooding and has a high rate of chronic malnutrition (see section 2 below for details). It was selected as the study area because Save the Children plans to build on its emergency and

recovery interventions in the District, to support households to build their resilience in the long-term. This analysis will provide a sound basis for designing these future interventions.

1.3 Overview of the study area

Muzaffargarh falls in the Irrigated Food and Cash Crop Farming with casual Labour livelihood zone, one of six zones in Southern Punjab. Rainfall in this zone is not adequate to support crop cultivation and hence the extensive development of irrigation canals. Irrigation makes the zone fairly productive with sufficient production and no seasonal migration for food. Crop production is mainly done in two seasons. Wheat, cotton, rice and sugar cane are the major crops grown in the zone. Livestock are kept under intensive management with farmers growing and buying feed when crop residues are finished. The predominant livestock are cattle, goats and buffalo with a few sheep and donkeys. Casual labour is an important livelihood strategy for the poorest households. The main constraints to successful livelihoods in this zone are the inability to invest in the land or pay for draught power, inputs, and labour. Unemployment is a huge threat to livelihood security for the poorer households.

The major commodities produced for sale in this zone are rice, cotton, sugar cane and surplus wheat. Food crops are purchased and sold through local markets by middle-men who take produce to town markets and to milling companies. Cotton and sugarcane is sold to middlemen who later sell produce to urban markets, textile companies and milling companies such as Mahmood Textiles and Fazal Cloth mills for cotton, and Tandlay wala and Fatima mills for sugar.

Livestock and milk from this zone is sold through collection points in local markets and is delivered mainly to urban areas and dairy companies. The main market centres in the zone are Chowk qureshi, Khan garh, Jatoi, Alipur, Kot adu, Sinanwan and Muzaffargarh. These urban centres provide sources for off-farm related labour in particular loading and off loading of goods. The poorest households often provide labour to better-off households and to milling companies on a casual basis to earn food and cash income. The labour market is largely localised except in bad years when households are forced to migrate to distant markets such as Sarghorda and Karachi. Market access is fair with a road network and rail line passing through the zone. However the marketing structure of produce is constrained by the role of middlemen who offer low prices for produce, so strengthening the marketing skills of farmers could provide them with better prices either with middlemen or directly with destination markets¹.

1.4 Aim of the Study

Save the Children has supported poor and vulnerable communities in Southern Punjab to respond to the devastating floods of 2010. Emergency food security and

¹ HEA assessment, Save the Children 2011

nutrition interventions have taken place to protect the most vulnerable. As we approach the eighteen month milestone since the floods, the emphasis must shift from response and recovery to addressing the underlying causes of food insecurity and malnutrition in order to identify appropriate and lasting solutions to support families in the long-term and to build their resilience to future shocks. The Cost of Diet tool is one approach which can enable this, in particular to understand the economic drivers of malnutrition. This CoD analysis has been carried out in conjunction with a Household Economy Analysis (HEA). The HEA describes how households live, what risks they are vulnerable to and how they cope with “shock”. It describes the assets and resources accessible for different types of households, and how these resources are exploited in the daily, seasonal and long-term process of meeting household food and other requirements. Specifically the HEA considers the value of assets, how households access their basic needs (including food, social services etc) and how they derive the income used for basic needs, for investment or to meet social obligations. It looks particularly at access to markets, including employment opportunities, and considers the relationship of households and communities with the wider economy.

In conjunction with the HEA, the findings of the CoD analysis can be used to estimate the cost of a basic nutritious diet and the difference between this cost and typical household income of different wealth groups. This can support the development of a joint approach to tackling food insecurity and undernutrition and better understanding the linkages between the two. These findings will be used in conjunction with the HEA findings to shape the design of Save the Children’s future programme and policy interventions in southern Punjab and beyond.

The study set out to answer the following questions:

- Is a nutritious diet possible with the foods locally available?
- What is the financial cost of a nutritionally adequate diet for a typical household in the agricultural zone?
- What is the cost of a locally appropriate diet that is nutritionally adequate and lowest cost for a typical household in the zone, i.e. one that takes into account cultural dietary patterns?
- How affordable is this diet for a typical household in each wealth group, i.e. What is the difference between estimated income in cash and food and the cost of purchasing a nutritionally adequate diet?
- What are the nutrients that contribute most to the cost of a nutritious diet?
- Are there any micronutrients which cannot be provided in adequate amounts by the foods available in local markets to the poorest wealth groups?
- What food security and livelihood-based interventions could contribute to increasing affordability, either by reducing the cost of a nutritious diet or by increasing incomes?
- How can social protection policies contribute to a household’s affordability of a nutritious diet?

During the training sessions, participants also identified the following specific objectives from their personal perspectives:

- To help us challenge assumptions made about the links between poverty and nutrition and to understand the actual situation
- To link food security and nutrition at a policy level, particularly to help advocate for a move beyond repeated emergency responses (and a bias for food aid) and towards addressing the underlying causes of hunger and malnutrition
- To help to write meaningful proposals based on actual community needs and constraints
- To provide evidence for the BISP, a national social protection scheme, which is currently unlikely to have a significant impact on nutrition as the size of transfer is too small. The inadequacy of the BISP is widely recognised.

2. OVERVIEW OF CHRONIC MALNUTRITION AND FOOD INSECURITY IN MUZAFFARGARH

The nutrition situation in Muzaffargarh is well captured in a summary statement made in the Government of Punjab report on flood affected districts. *“A high rate of chronic malnutrition with other aggravating factors, makes the community vulnerable and warrants serious attention and appropriate targeted intervention to prevent future catastrophes²”*.

2.1 Malnutrition prevalence

The data that are available for Muzaffargarh and more widely for the Punjab point to a concerning situation of chronic malnutrition. A recent National Nutrition Survey supported by Unicef indicates that 37% of children under five years are stunted³. This figure is lower than in other Provinces, for example Sindh, where an estimated 45.9% of children are stunted, but what is alarming about this figure is that because of high population density in Punjab this represents 4.8 million children in Punjab compared with 2.3 million in Sindh, a large burden of malnutrition.

A nutrition survey conducted by the Government of Punjab also highlights possible causal factors and proxy indicators for chronic malnutrition⁴. It highlights a positive correlation between poverty and malnutrition, and an inverse correlation between mothers' education and malnutrition. For example, the prevalence of stunting is 24% lower in the highest quintile of wealth than in the lowest while the prevalence of stunting is 21% lower in the women with most education than with no education.

² Nutrition Survey in the flood effected areas of Punjab Province, Pakistan, Government of Punjab, Shamim Rafique, SM Moazzem Hossain, Aurore Birayie, Tahir Manzoor, January 2011

³ National Nutrition Survey in Pakistan 2011, Aga Khan University, Pakistan

⁴ Government of Punjab (2009). *Multiple Index Cluster Survey (MICS) Punjab 2007-08*. Punjab: Planning and Development Department, Bureau of Statistics, Government of Punjab, pp 243.

These results are not surprising but serve to indicate that the underlying factors associated with chronic malnutrition are multiple and interrelated.

Another important assessment which contributes to the picture of malnutrition in the area was that carried out by the Government of Punjab in January 2011⁵. This was a nutrition survey of people in areas of Punjab affected by floods. In August and September 2010 devastating floods had inundated large parts of the country and Muzaffargarh was one of the districts considered 'severely affected'. The survey, about five months after the disaster struck, highlights the impact of shocks such as these on nutrition. The prevalence of wasting, also called global acute malnutrition, was estimated to be 13.9% in flood-affected parts of Punjab, and the prevalence of underweight was 39.5%. The prevalence of underweight was highest, at 46.5%, among children age 18-29 months. Children under 24 months are the most vulnerable to the lasting affects of chronic malnutrition, so this finding is concerning.

2.2 Micronutrient deficiencies

The DFID/UNICEF survey also identified deficiencies of key micronutrients among children under five:

- 63% of children under 5 had a low haemoglobin concentration and were classified as anaemic
- 45% had a low serum retinol (vitamin A) concentration
- and 38% had a low serum zinc concentration

Clearly, micronutrient deficiencies are common among children with potentially serious and irreversible effects on their mental and physical development.

2.3 Infant feeding practices & dietary habits⁶

Survey findings on infant feeding practices in the flood affected districts of Punjab are also concerning. While almost 96% all children aged between 6-59 months had at some point been breastfed, only 25% of mothers had started breastfeeding within one hour of birth, 38% began between 1 hour to 1 day, and the rest started after a lapse of 1 day or more. Only 74% of the children aged between 6 – 24 months were still being breastfed at the time of the survey. Worryingly, there are no data given on the prevalence of exclusive breastfeeding, suggesting that due importance is not given to this practice by nutritionists carrying out the survey. Members of the assessment team offer the explanation that the practice of feeding newborn babies

⁵ Nutrition Survey in Flood Affected Areas of Punjab Province, Pakistan. Bureau of Statistics, Planning and Development Department, Government of the Punjab in collaboration with UNICEF and ACF. January, 2011

⁶ Nutrition Survey in the flood effected areas of Punjab Province, Pakistan, Government of Punjab, Shamim Rafique, SM Moazzem Hossain, Aurore Birayie, Tahir Manzoor, January 2011

and infants sweet or herbal drinks believed to have medicinal properties is very widespread, carried out particularly by older female family members, so exclusive breastfeeding is uncommon.

Other important indicators related to malnutrition in the flood-affected areas include health and water and sanitation. In areas severely affected by floods (including Muzaffargarh), 72.5% of children had been ill during the last two weeks, 52% with fever and 15% with diarrhoea. Of children suffering from diarrhoea, 25% had not received treatment either by a physician or at a hospital. Statistics on sanitation are particularly alarming: 61% of people in severely affected areas were still using unimproved toilet sources (often open defecation) in January 2011, six months after the floods and 33% of households did not have soap for hand-washing.

Results on the food security situation in the flood affected areas also give cause for concern. Almost half of adults reported taking food less than three times a day and among children aged 6-59 months, 37% had been given meals three times or fewer each day. The majority of people reported that they were eating cereals, wheat, oil and sugar for more than 5-6 days a week, but the consumption of meat, fruits and vegetable was extremely low, a maximum of 2-3 times a week. It is worth noting that these results are not disaggregated by wealth group so it is probable that for the lowest wealth groups, food consumption was even less frequent and diverse than indicated here.

These dietary habits are mirrored in the findings of an HEA done in November 2011⁷. Cereals provide the majority of household food energy needs for all wealth groups: 74% for the very poor, and between 78% for the poor and 74% middle and 74% for better-off. Milk and pulses are the main dietary sources of protein. The consumption of oil, sugar and meat, which tends to be indicators of wealth, were greater among the better-off than the very poor.

2.4 Additional nutrition information

The participants in the data collection element of the analysis were deliberately selected for their knowledge of food security and nutrition issues in Pakistan, and of the specific context of Punjab. In addition to the secondary data presented above, they also highlighted the following cultural practices:

- Discrimination in favour of male children is common in households, regardless of wealth. Boys are often given larger and better quality portions of food and they also benefit from more attention and care during meal times.
- Salt for the most part is iodised and sold in packets which are clearly labelled
- It is customary among all wealth groups for newborn babies to be fed a sweet solution (e.g. water, honey, crushed dates) by elder women in the family. Herbal solutions are regularly given to young children by older women for their health.

⁷ Muzaffargarh Livelihood Baseline Profile, Irrigated Food and Cash Crop Farming With Casual Labour, Daison Ngirizi, December 2011

- There are several misconceptions among women that lead to a low rate of breastfeeding. For example if a mother has lost a previous child she may blame her breast milk and assume it is poisonous, therefore refusing to breastfeed subsequent children.
- Mothers in law are deferred to as the authority in the household on infant feeding and they often perpetuate misconceptions. They will have a say in what foods are purchased, how they are prepared, and how they are allocated within the household.

3. LIVELIHOOD PROFILES

The Household Economy Analysis (HEA) study carried out in October and November 2011 just prior to the CoD study reflects the observations above on food security and indicates that the problem is more chronic in nature than acute, linked to chronic poverty rather than solely the impacts of the floods.

Overview: Households in this zone depend mainly on irrigated food and cash crop cultivation as well as casual employment. Most land is owned by a few landlords with a majority of households depending on leasing or renting land (known in Pakistan as the zamindar system). The zone has recently experienced floods that have affected household savings and livestock holdings. This area has a high potential for agriculture and current production is limited by production costs mainly for ploughing, fertilisers and pesticides⁸. An increasing population density is also having an impact on the area of productive land used for growing crops and livestock because of sub-division. This means that households have to keep fewer livestock as crop residues from wheat and rice cannot provide enough feed year round.

Wealth Breakdown: Households were categorised into one of four wealth groups: 36% were very poor, 28% were poor, 23% were in the middle category and 13% were classified considered better-off. The average household size of 8 people was the same in all wealth groups. Household size is not a key determinant of wealth, although dependency ratios are. Among the very poor and poor households, there are more dependent children under the age of 5 years compared with the middle and better off wealth groups that have fewer children under five but more in the school going age range. Although on average there are 2 adults capable of working in each household, the better-off households have economic activities that are more stable compared with the two poorer groups who rely on casual and seasonal employment. **Access to land for agricultural production either through ownership or rental/leasing, is the primary determinant of wealth as well as livestock, particularly cattle and buffalo.** A summary of the main characteristics of each wealth group is given below.

Table 1. The characteristics of wealth groups in Muzaffargarh, Punjab according to a Household Economy Approach survey in November 2011

⁸ HEA Assessment, Save the Children 2011

		Wealth Groups Characteristics					
		HH size	Land area cultivated (acres)	Crops cultivated	Livestock Holding		
					Cattle	Goats	Buffalo
Very Poor	36 %	7-9	0	No Cultivation	0-2	0-2	0
Poor	28 %	7-9	2-4	Wheat, Rice, Cotton	1-3	1-3	0-1
Middle	23 %	7-9	5-10	Wheat, Rice, Cotton, Sugarcane	2-4	2-3	0-2
Better Off	13 %	7-9	10-14	Wheat, Rice, Cotton, Sugarcane	2-4	2-3	1-2
% of population							

Vulnerability: The poor households that depend on rolling credits to buy their food are highly vulnerable to food inflation which decreases their purchasing power and in turn compromises their food security. The poor have very few and limited coping mechanisms and often pursue harmful livelihood strategies that pose a risk to their long-term livelihoods such as selling livestock and permanent migration.

Food Sources: Crop production is the major source of food for the poor, middle and better-off households, and households strive to produce as much as possible to ensure their food security. The HEA survey estimates that crop production provides 62% of the food needed by the poor each year, and meets 72% of the needs of middle and better-off wealth groups. The very poor are the only wealth group that do not depend on food production as they do not have access to land for production purposes. Households in this wealth group depend largely on purchasing food and exchanging their labour to meet their needs for food. Very poor households buy 80% of their food. In the reference year for which data were analysed the very poor was the only wealth group that did not obtain all their food needs: they were estimated to obtain 96% of needs. This is an indication of borderline survival and further deterioration may result in food-related malnutrition.

Income: Most of the income of very poor and poor households comes from farming and other casual labour. The combined contribution of this work is estimated to provide 84% and 43% of very poor and poor households' annual income respectively. There is little diversity in options to earn income for the very poor which points to the need to establish stable income generating activities for the lower wealth groups and reduce their exposure to seasonal labour opportunities.

Expenditure: Most of the income of the very poor and poor households is spent on items for basic survival such as food and essential non-food items such as soap, salt and paraffin and the costs of grinding wheat. These basic costs account for 83% and 47% of the annual income for the very poor and poor households respectively. In contrast the middle and better-off households spent more of their income - 52% and 60% respectively - on inputs, mainly the costs of ploughing, fertilisers and pesticides. The very poor and poor are spending most of their income on essentials for survival, a picture that indicates poverty and very little buffer against any unforeseen shocks

Seasonality: Data on seasonality was captured during the HEA process. Figure 1 shows the main seasons and events relating to food security and livelihoods over the period of a year.

Figure 1. A monthly calendar of the main seasons in Muzaffargarh District

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
	Dry Season		Rain Season			Dry Season		Rain Season				
Legend	planting		Weeding			Harvest		Crop sales				
	cattle		sheeps			cattle and sheeps		Off farm				
Irrigation	Irrigation						Irrigation					
Land Preparation	Land Preparation			Land Preparation			Land Preparation					
Fertiliser/spraying	Fertiliser/spraying			Fertiliser/spraying			Fertiliser/spraying					
Weeding	Weeding			Weeding			Weeding					
Wheat	Wheat		Wheat			Wheat		Wheat				
Rice	Rice			Rice			Rice					
Sugar cane	Sugar cane			Sugar cane			Sugar cane					
Cotton	Cotton			Cotton			Cotton					
Gardening	Gardening			Gardening			Gardening					
Livestock heats and births	Livestock heats and births			Birth			Goat heats		Heat		Goat/sheep Births	
Livestock diseases	Livestock diseases			Livestock diseases			Livestock diseases					
Livestock Vaccination	Livestock Vaccination		Livestock Vaccination			Livestock Vaccination		Livestock Vaccination				
Milk production	Milk production			Milk production			Milk production					
Other	Other			Other			Other					
Hunger season	Hunger season			Hunger season			Hunger season					
Price increases	Price increases			Price increases			Price increases					
Local Labor	Local Labor			Local Labor			Local Labor					
Labor Migration	Labor Migration			Labor Migration			Labor Migration					
Female Labor	Wheat harvest		Female Labor			Cotton Picking		Female Labor				
Human Disease	Human Disease			Human Disease			Human Disease					

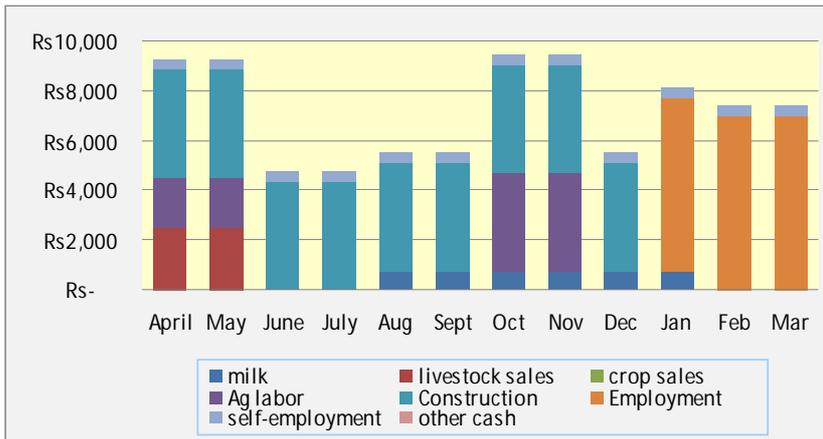
The zone has two main agriculture seasons, starting with the planting and harvesting of the main food crop, wheat, in the season of December to February and the second season during monsoon rains from June to August for rice and cotton production. The zone is heavily irrigated with high production of sugar cane which is an annual crop. Wheat is also an important crop. Wheat planting is mainly done in November and December with harvests starting April ending in May. Rice and Cotton are cash crops harvested in October to November. The harvesting of all crops provides income for poor households who provide labour to better-off households during the time of harvest.

Other labour activities include brick making, masonry assistance, mill employment, mango picking and labour migration which are pursued throughout the year with a depression during rainy seasons and religious holidays.

Food price increases coincide with the typical hunger season from January to March just before the start of the harvest. During this time households depend on credit which is repaid after harvest.

Income figures and sources fluctuate throughout the year for all wealth groups, but can be broadly divided into two seasons, mirroring the agricultural seasons, Summer (April to September) and Winter (October to March): see figure 2.

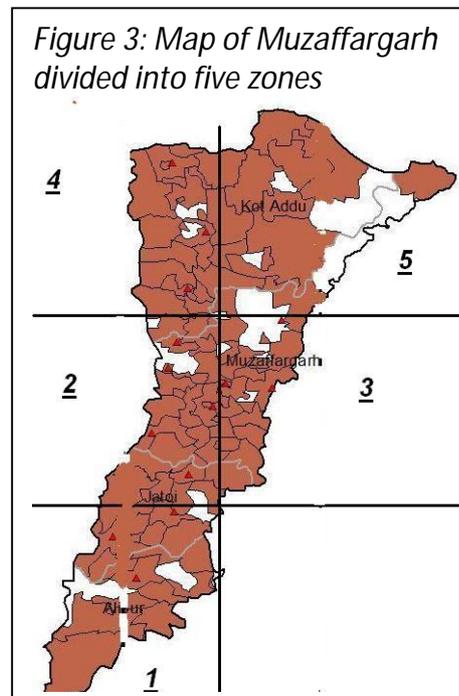
Figure 2. The estimated income by source and month of year of people classified in the HEA as very poor



4. METHODS

4.1 Location

The study was carried out in five Union Councils (UCs) in Muzaffargarh District: Rampur, Karam Dad Qureshi, Geray Wahin, Shadi Khan Munda, and Hanjrai. These were purposefully selected to reflect a broad representation of the livelihood zone, based on proximity to large urban centres, level of irrigation, and combination of livelihood strategies. The part of the District falling under the defined livelihood zone were represented on a map (Figure 3 on the left), and this was divided into five roughly equal parts (see map); one for each day of field work available.



Next, people with a good local knowledge were engaged to select the target UCs. This included SCUk staff and local partners who had participated in the HEA assessment, with senior staff from the Muzaffargarh field office. They were asked to select one UC from each of the five blocks into which the map had been divided, and ensure that the five UCs between them gave a broad representation of the livelihood zone according to the characteristics identified during the HEA. A summary of the rationale for their selection for each UC is given in Table 2.

Table 2. The characteristics of the five union councils selected for study.

UC	Characteristics
Rampur	Mostly irrigated cultivated land, small landholdings, no sugarcane, main crops are cotton and wheat. Particularly low education levels and literacy rates. Women work in fields. A relatively remote UC, away from urban areas.
Karam Dad Qureshi	Near highway with large market, fully irrigated lands, canals and other sources of irrigation. Main crops are cotton, rice, sugar cane. Economy controlled by big landlords, cotton factory, and an oil refinery situated in adjacent UC. Women work in fields.
Geray Wahin	Small landholdings, major crops are cotton, wheat. In a small portion of land there is saline land. Women work in fields.
Shadi Khan Munda	Almost entire land is cultivated and canal irrigated. Major crops are cotton, wheat. Type of land is sandy. Women work in fields. Settlers are living here who migrated from upper Punjab who came in year 1900 when irrigation systems were introduced here.
Hanjrai	People are poor with small landholdings. This is a particularly flood prone UC. Range land exists. Livestock is the main source of income. Major crops are rice and wheat. This is a large UC and quite remote from urban areas. There are low levels of education and a low literacy rate. Women work in fields.

4.2 Season

The survey was carried out between 28th November and 3rd December, a part of the winter season (see figure 1). In 2011 this occurred after the Eid ul Adhafestival, so not during a period when the prices of certain foods fluctuate (e.g. the cost of vegetables goes up, the cost of meat goes down). It appears from the survey that there are no noteworthy price fluctuations between seasons, though this is based on information from traders' rather than data collected. There are however a number of fruits and vegetables available during this time which are not available in summer and vice versa. For each food item, traders were asked to state the price for the current season and also for summer.

4.3 Data collection

4.3.1 Market survey

Market surveys were conducted in each of the main markets and a range of smaller stalls in order to gain a sample of the range of markets where the poorest households purchase their food. Each day of market data collection began with a brief meeting with an 'activist', a local resource person able to provide local knowledge. They advised the team on the various markets available and which were most likely to be used by poor members of the community. The markets visited captured the wide range of shops from which people purchase food. This included small shacks, mobile milk vendors, large shops and small village grocery stores.

Prior to collecting price data, a comprehensive list of all food items available in the region was developed, including foods widely available on markets, produced and collected (wild foods). An initial list was prepared by participants based on their knowledge of the area. This was followed by a field trial where participants both

practiced data collection while adding additional foods to the list. Baseera was selected for a field trial because it contained a large market close to the training facility. This meant that there would be a full range of food available in order to complete the food list, and allow time in the afternoon to complete work on the food list.

Based on this food list, data on prices and weight were collected by interviews with local traders and consolidated in consultation with the assessment team. There were some differences in the availability and price of food items between markets. Those which were more remote from urban centres and main roads had a smaller selection of foods available, particularly fruit, vegetables and meat, and the price was generally slightly higher than in larger markets. There were also some differences in quality, with the fruit and vegetables in smaller more remote markets generally less fresh than in larger markets.

Data collection on prices and weights of foods was followed with a series of qualitative questions relating to: annual price trends, observations on changes in consumer purchasing habits, and issues relating to supply pipelines.

4.3.2 Focus Group Discussion

The data collected from market surveys is sufficient to identify the lowest cost diet that meets the needs for energy and micronutrients. So in order to identify a diet that is also culturally acceptable, which is termed a locally adapted cost optimised nutritious (LACON) diet, a focus group discussion is required to identify 'normal' consumption patterns and identify key dietary boundaries.

Guidelines suggest that the focus group should consist of about 8 people who all are responsible for preparing food for their household. In Pakistan this is done by women. The informants should represent all wealth groups and the whole livelihood zone. In practice, this can be challenging to achieve, both in practice and culturally. If the livelihood zone covers a large area (as it does in this case), it is difficult logistically to assemble people from across the zone. In terms of mixing wealth groups, it is possible that poorer women may not feel able to speak out comfortably in the same focus group as better-off women. Therefore, in this instance, the FGD took place in Ranpur which was considered by staff and local resource people to be the most representative UC of the five selected in the specified livelihood zone. According to local resource people, this UC hosts the full range of livelihood activities found in the zone; is a moderate distance from main roads, and land is irrigated. The focus group included four women from the 'very poor' category and four from the 'better off'.

The LACON method is divided into two parts. First, a questionnaire is administered to each woman who is asked to state the frequency with which people in their households consume each food item on the list. This is grouped as never, once a week or less (classified as 'sometimes'), or more than once a week (classified as

often). These responses are tallied and the total for each food item from all 8 respondents is then calculated. This value is used to set the frequency with which foods are eaten, called consumption constraints, in the software.

The second stage is a facilitated discussion or semi-structured interview to understand dietary practices. Information was collected on food taboos, typical consumption patterns, and key staple foods. The questions were based on observations from the market data, comments from traders, and responses to the questionnaire. Questions were also included on foods that are never eaten for cultural reasons; foods that are never given to children; the average number of meals per day; preferences for staple foods; and foods considered essential to their diet. These responses were also used to set the maximum and minimum constraints in the software.

4.3 Calculating the lowest cost nutritious diet

4.3.1 Minimum cost nutritious diet with no constraints

The food list and price data were entered into the Cost of the Diet (CoD) programme to estimate the lowest cost of a nutritious diet during the pre-harvest season. Food items were selected from the food composition table in the software using a closest-fit approach. Food items in this list have been developed using food composition tables from a number of countries, including India (which is the closest in terms of food composition to Pakistan). All price data was converted from the cost per local unit of sale to the cost per 100g. Where food items were not already listed in the foods database they were identified in McCance and Widdowson's the Composition of Foods: Summary Edition (6th Edition) and added to the database with their full nutrient composition.

Table 3 shows the composition of a typical household by wealth group.

Household composition was determined during the HEA analysis. Household size was not determined by a household survey but through focus group discussions with key informants and then verified during focus groups with the different wealth groups. This household size dictates the macro and micronutrient requirements that need to be met using the foods locally available.

Based on this data, in the CoD software a household size of eight people (six children and two adults) was used:

Table 3. Household characteristics of the different wealth groups

	Very Poor	Poor	Middle	Better off
Characteristics	Average	Average	Average	Average
No. Men	1	1	1	1
No. Wives	1	1	1	1
No. Adults capable of work	2	2	3	2
Children 1-6 y	3	3	3	3
Children under 24 months				
Children 6-18 y	3	3	3	4
No. at School	2	2	3	3
HH Size	8	8	8	8

Household composition was estimated during the HEA focus group discussions with the different wealth groups during the month prior to this study. This typical household size determines the macro- and micronutrient requirements to be estimated by the software 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.

4.3.2 Locally Appropriate Cost-Optimised Nutritious (LACON) diet

The physiological diet described above was adjusted to reflect cultural practices in order to lead to a diet that was locally feasible for consumption. To do this rice (industrial broken, the cheapest variety) was 'forced' into the diet at a minimum of 5 times per week to reflect staple food consumption. 'Forcing' a food item into the software means inputting a minimum consumption frequency which forces the software to select that food item at least that number of times each week. Tomatoes and onions were also forced in at the same quantity as these are used to prepare every meal and are considered essential. Maximum constraints (i.e. maximum number of times per week the software is allowed to include a food item in the diet) were then set in line with results from the focus group discussions.

The responses of the focus group discussion members (never, sometimes or usually) were awarded different points, to be translated into maximum constraint amounts. A 'never' answer was awarded 0 points, sometimes 1 point and usually 2 points. This meant that each item could receive a minimum total score of 0 and maximum of 16. This was converted into maximum constraints as follows:

Table 4. Key to translating focus group responses into maximum constraints

Response	Focus group discussion			Max constraint in CoD software
	Points	Min	Max	
Never	0	0	0	0
Sometimes (less than once a week)	1	0	8	7
Usually (once a week or more)	2	0	16	14

It is important to note that the constraints applied are not intended to replicate the current diet. The limits are intended to reflect cultural constraints rather than mirror economic constraints, because the CoD is a tool to estimate the cost of the least costly but most nutritious diet that could be achieved.

The average daily cost of the diet during both seasons was estimated. All costs are given in Pakistani Rupees. Although not strictly the lowest cost diet, this will be referred to throughout the report as the lowest cost nutritious diet because it is considered more realistic than the physiological diet.

4.4 Energy only diet

The CoD program is used to estimate the cost of the cheapest diet that meets the energy requirements of the typical family. The details of the composition of this diet are provided in Annex X. Hence, in addition to calculating lowest cost diets to meet macro- and micronutrient requirements, the lowest cost 'energy only' diets were estimated in order to examine how the cost of a diet differs according to the requirements being met. In most contexts there is a significant difference between the cost of the energy only diet and that of the nutritious diet. The tool should not be used to promote an energy only diet because it is likely that it will not meet requirements for several micronutrients, which tend to be provided by costly foods. However, it is useful to model this diet in order to illustrate a) the potential for micronutrient deficiencies in a diet that is only concerned with meeting minimum energy needs; and b) the additional financial requirement of poor households in order to meet all their nutrient requirements compared with only their energy requirements.

4.4.1 Calculating the affordability of the lowest cost nutritious diet for the poorest households

The cost of a nutritious diet only becomes a meaningful figure when compared with the income and purchasing power of the poorest members of a given community. A diet may be cheap in comparison with other contexts, but if it is beyond the means of the poor, then the risk of malnutrition remains. Calculating the affordability of a

diet involves a comparison of the cost of the diet with household income. Income figures were estimated using data collected during the HEA assessment conducted during the month prior to this study.

The HEA provides us with estimates of the cash income earned by each wealth group. Table 5 shows the estimates for different wealth groups in Muzaffargarh.

Table 5: The estimated income of households classified into four wealth groups

Wealth Group	Cash income
Very Poor	83,685
Poor	112,675
Middle	213,445
Better Off	343,481

As highlighted in the wealth breakdown information provided above (table 1, page 13), livelihood security is largely linked to the ownership or ability to lease land. In the case of the middle and better-off who own land, they have multiple sources of cash income from agriculture, including sales of rice, cotton, wheat, milk, and livestock. The poor also have a fairly diversified livelihood strategy but as they own less land their income is lower than other wealth groups. They also supplement their agricultural income with other income from other activities including self-employment, construction and agricultural labour. For the very poor, who do not have access to land, cash income comes only from unpredictable casual labour largely in construction, agriculture and employment in mills, with a small amount of self-employment (e.g. petty trade, firewood sale etc). In times of stress additional income is derived from selling goats, but as people only have a few animals this risks having a harmful effect on the household's long-term livelihood security. Reducing the number of goats owned by a household will limit the income derived from the sale of goat milk, but also reduce the potential for increasing the herd later on. Also, it leaves the household with fewer assets to protect them in times of future stress.

For the purpose of the present study, in addition to the cash income, all food that was grown or produced by the household, given in exchange for labour, or provided as gifts was given a monetary value based on the market price, and that value was added to the income figure. This is in order to reflect the fact that many households meet a proportion of their requirements from their own production and do not need to purchase everything from the market. Table 6 shows the income and monetary value of foods produced for each wealth group.

Table 6: total cash in come and food income converted to cash by wealth group

Wealth Group	Cash income	Payment in kind	Own production	Total Income
Very Poor	83,685	4,537	915	89,136
Poor	112,675	3,402	31,803	147,880
Middle	213,445	0	37,154	250,599
Better Off	343,481	0	42,599	386,080

For the better-off and middle wealth groups, their own produce makes a considerable addition to their total income. For the very poor, this contribution is small and is typically derived from selling cow milk. It would be useful to examine further whether this milk is consumed by the household (particularly the child 6-23 months) or sold. Payment in kind makes a larger contribution as some agricultural labour is paid in this way, mostly in the form of wheat.

4.4.2 Determining affordability after meeting the survival threshold

The figures shown in Table 7 represent the total income and value of foods for households. As households have many demands on their finances beyond food, many of which are critical for their survival it is not realistic to compare the total income to the cost of the diet to assess affordability. These figures must be modified to account for essential non-food expenditures.

During the HEA assessment, information is gathered from focus group respondents about all household expenses. Discussions reveal which of these are essential for survival and cannot be reduced even in times of stress. These are: soap, firewood, electricity and the cost of grinding wheat into flour. The total cost of these items is estimated to be Rs 16,044 a year, irrespective of wealth group. Table 7 shows the revised income figures.

Table 7. The estimated income of four wealth groups less essential expenses which leaves income available to buy food

Wealth Group	Total income	Less non-food survival expenditure	= Income available for food
Very Poor	89,136	16,044	73,092
Poor	147,880	16,044	131,836
Middle	250,599	16,044	234,555
Better Off	386,080	16,044	370,036

The HEA also estimates the livelihood protection threshold. This is the cost to sustain livelihoods and maintain a locally acceptable standard of living. It adds the cost of animal drugs, education, health care, clothes, tea, pulses, milk and other items beyond the survival threshold. This figure varies significantly with each wealth

group. The well-off for example make significant investments in their livelihoods in order to sustain and expand them, whereas the poor who rely on paid employment do not.

The HEA definition of the livelihood protection threshold includes certain food items. Deducting this from the income figure would in effect be double counting. Therefore, for the purpose of this study the income figure used to estimate affordability will be the survival threshold. It is important therefore when considering the results to keep in mind that there remain other unmet household needs.

5. KEY FINDINGS

Table 8. Summary of CoD findings

Type of diet or model	Main assumptions	Annual cost	Annual income available to spend on food of very poor	% difference
Minimum cost diet	No constraints on choice of frequency of foods	92,270	73,092	21% gap of CoD
Energy only	Cost of diet to meet energy needs only	82,800	73,092	12% gap of CoD
LACON diet	Lowest cost diet that meets all nutrient needs and reflects key cultural dietary habits	105,469	73,092	31% gap of CoD
Poultry intervention	Diet after adding income and nutrients from egg production	94,700	112,970	119% of CoD met
Access to existing social protection scheme	Cost of LACON Diet. Income altered to model access to BISP transfer of Rs. 1000 per month	105,469	85,093	19% gap of CoD
Multiple micronutrient supplements	Given to child aged 12-23 months on 60d /year as a powder	97,450	73,092	25% gap of CoD

In both seasons it is possible to achieve a nutritious diet for a typical household of 8 people. However, especially for the youngest child (9-11 months old), it is difficult to

find a diet that meets all nutrient requirements with the foods available. This means that large amounts of vegetables, pulses and even condiment vegetables are included into the diet in order to meet all requirements, and this does not seem to be a very likely scenario (people will not be able to consume these quantities of so many different food items). The nutrients that are most difficult to meet are iron and zinc.

The cost per typical family does not vary a lot between the two different seasons, although composition of the cheapest diet varies slightly, due to seasonal availability of certain foods (mainly spinach).

→ Availability of nutrient-rich foods is not a main cause of malnutrition in this livelihood zone.

The cost of this cheapest nutritious diet was 92,270Rs for a typical family of 8 people. This is without restricting the software in any way to reflect broad dietary practices which are cultural rather than economic. This diet is therefore not very realistic and unlikely to reflect either actual or potential consumption.

5.1 The minimum cost of a more culturally appropriate (LACON) diet is Rs 105,469 per year for a typical household of 8.

This is the calculation for the Locally Appropriate Cost-Optimised Nutritious (LACON) diet. In this diet, rice, wheat flour, tomatoes and onions were forced into the diet a minimum of five times per week. All other food items were given maximum constraints in line with focus group responses. The total cost of this diet was Rs 105,469 per year for the typical family of 8 people. As explained above, this is the diet that has been selected for the remainder of the study.

This is because it can be considered a more realistic, achievable diet, based on the foods people consume regularly, sometimes or never, and making sure the main staple foods (wheat flour and rice) and vegetables (tomatoes and onions) were included for at least five times per week. This diet is slightly more expensive, but it is more likely that people want to eat it than the minimum cost nutritious diet.

5.2 Composition of the LACON diet

Table 9: composition of the LACON diet in both seasons for a child aged 12-23 months and the rest of the family

Food Item	Child 12-23 months Daily Quantity (g)	Rest of Family* Daily Quantity (g)
BREAST MILK (GENERIC)	532	0
WHEAT, FLOUR, MAIDA	29	331
RICE, BROKEN INDUSTRIAL	26	1294
CHICKPEA, YELLOW	15	148
LENTIL, RED SPLIT, DRIED, RAW	23	0
TOMATO, RIPE	7	180
SPINACH, RAW	30	754
ONIONS, RED	7	180
CORIANDER	10	251
SALT, IODIZED	1	0
CORIANDER LEAF POWDER	1	0
VEGETABLE OIL	0	5
BUTTER OIL (GHEE)	0	251
SUGAR, BROWN, NOT YET PURIFIED	0	126
MILK, BUFFALO	134	1883
LEAVES, RAPE (BRASSICA)	30	754
CHICKEN FEET, BOILED	0	81
CHICKEN, LIVER (INDONESIA)	4	29

* The rest of the family includes 2 adults (1 man and 1 woman), and 5 children

The diet did not vary much between the two seasons. It is interesting to note that the even the food items not forced into the LACON diet are not substantially different from the diet that poor people currently consume, according to expenditure data collected during the HEA analysis. However the quantities of nutrient-rich food are considerably larger, e.g. milk, green vegetables, tomatoes, and chicken (feet and liver) and would be consumed more commonly than in the actual diet. In order to consume an adequately nutritious diet it would not be necessary for people to make major changes to the current foods they are eating, but to increase the quantities in which they are consumed. However the diet only contains 12 foods plus salt and flavourings, so would be monotonous.

It is important to recognise however that there remain micro-nutrient deficiencies for the 9-11 month old children. Both iron and zinc are present in both animal and plant source foods, but in a mainly vegetable diet as consumed in this part of Pakistan, the phytate in unleavened bread might be hindering the absorption. Iron deficiency can lead to anaemia, zinc deficiency and can contribute to diarrhoea, severe skin problems and growth retardation. For this group therefore, changes to the current diet would need to be more significant and possibly include direct nutrition support (discussed below in section 5.6).

It is important to note the essential contribution of breast milk to the LACON diet for children aged 6-24 months. Although breast feeding should only be partial after 6 months of age and only contributes about 40% of energy needs, it makes the greatest contribution to requirements for fat, vitamin A and vitamin C. Removing breastmilk from the diet significantly alters its cost and composition (see below, section 6.4) In addition it provides 14% of the zinc requirement. Breast milk has a low concentration of iron however, so it is essential that iron-rich complementary foods are given to children aged 6-24 months. Neonatal iron stores may be sufficient to meet requirements for iron for all the first 6 months of life in full-term infants but are not sufficient to meet the requirements of older children.

5.3 A breakdown of the cost of the LACON diet for different household members:

Table 10. The seasonal cost of the diet by household members

Family member	Daily Cost (Rs) Season 1 (Winter)	Daily Cost (Rs) Season 2 (Summer)	Annual Cost (Rs)
9-11 month-old	14.4	14.6	5285
12-23 month-old	13.3	15.3	5216
Rest of Family	255.5	264.9	94968
TOTAL	283.2	294.7	105469

The cost of the LACON diet for the 12-23 month old is only 5% of the total cost of the diet for a family of 8. However the cost of the energy and nutrients in breast milk are included in the cost of extra food for the lactating mother, so are not included as a direct cost for the child.

5.4 A breakdown of the cost of the LACON diet by seasons

There was little difference in the cost of diet between seasons. There are small increases in the price of certain goods but since there is a harvest in each season, the overall variation is limited. This is also partly because the cost of the main staple, wheat, is fixed. It is important to note however that there are some significant variations in the price of certain items within seasons, which were described by market traders during qualitative discussions. These fluctuations are largely linked to religious festivals.

The Eid-ul-Fitr festival at the end of Ramadan marks the end of a month of fasting. Celebrations include the slaughter of animals. At this time, demand for meat increases so the price of meat (beef, buffalo, chicken) also increases. The price of tomatoes, onions and other condiment vegetables also increases around this time, as these items are used to cook meat. Even the very poor, who do not regularly consume meat, will do so during this festival where animals are specifically slaughtered as a part of religious beliefs. For the following Eid, Eid-ul-Adha, the festival of sacrifice, every Muslim is supposed to kill an animal and offer one third to

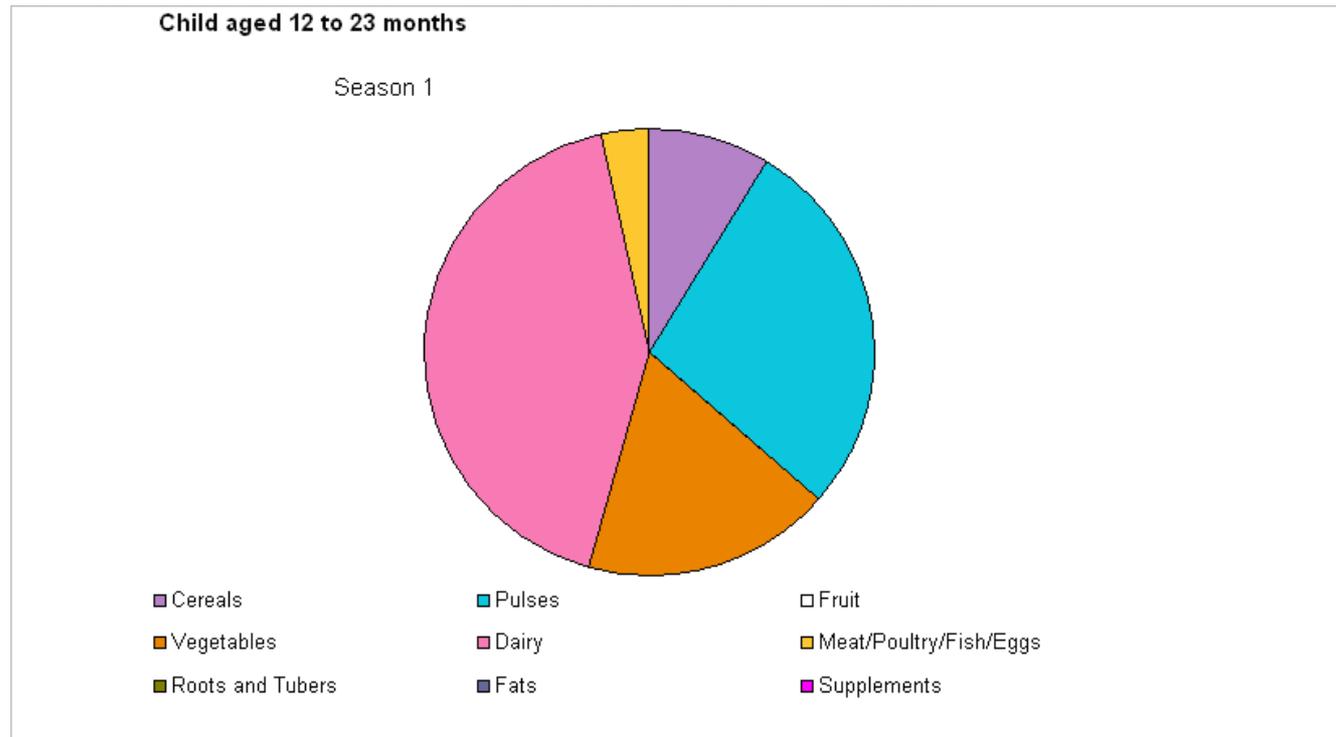
friends, one third to the poor and keep one third. This creates a demand for animals as the size of the sacrifice is supposed to reflect your wealth. It also represents income for people who breed animals. Poor people are often the major beneficiaries may cook and eat a large amount of meat on one day. The dates for these festivals move forward by about ten days each year, based on the position of the moon. For the last two years and for the next few years, this festival will fall late in the summer season.

A number of fruits and vegetables are only available in one season. For example, mangoes are only available in the summer and guavas only in winter but there are both summer and winter crops so there is a large choice of fruit and vegetables year-round. The price and availability differences however mean that the cost of fruit and vegetables in the diet is slightly more expensive in season 1 (winter) than season 2 (summer). The cost of fruit and vegetables also increases during Ramadan as these foods are consumed in the evening 'Iftar' meal which breaks the fast each day.

5.5 A breakdown of the cost of the LACON diet by food groups

A breakdown of the cost of the diet by food group reveals that the majority of costs in a minimum nutritious diet relate to micronutrient-rich food. Cereals for example, only comprise 9% of the diet for a child aged 12-23 months, whereas dairy, pulses and vegetables comprise 42%, 28% and 18% respectively. The food group which accounts for the greatest proportion of the cost of the diet is dairy produce, followed by pulses, vegetables, cereals and finally meat, poultry and eggs. Meat only constitutes a small proportion of the diet because it is expensive per 100g compared with other foods, so the software only selects this in small quantities. For example, the cost of 100g of chicken liver is Rs 9.9 and of beef is Rs 17.7 compared with Rs 2.9 for wheat flour and R.9 for cows' milk. Meat is selected because animal foods are the only source of some nutrients, such as vitamin B12, or are rich sources of others, such as iron. Because the animal products selected are so rich in micronutrients, only a small quantity is needed in order to meet requirements. Cereals on the other hand represent a small proportion of the total cost of the diet because they are low in cost compared with other food groups.

Figure 4. A Pie Chart showing the contribution of each food group to the total cost of the LACON diet of a breastfed 12-23 month old child in the winter season.



This information serves as an important reminder that the cost of meeting minimum energy requirements and the cost of meeting minimum nutrition requirements are considerably different. Furthermore, we know from the HEA that the well-off, middle and even to an extent the poor will be able to reduce these costs by producing their own food. Since they own land and cattle, they are able to produce a significant proportion of their own cereals, meat and dairy produce. The very poor on the other hand only produce small quantities of milk from a very small livestock base and without land they cannot grow their own cereals or pulses. This means they will be entirely reliant on markets to meet these dietary needs.

The high cost of animal foods, pulses and vegetables is reflected by the household consumption patterns of the poor as very few households consume these items in sufficient quantities to meet their nutritional needs.

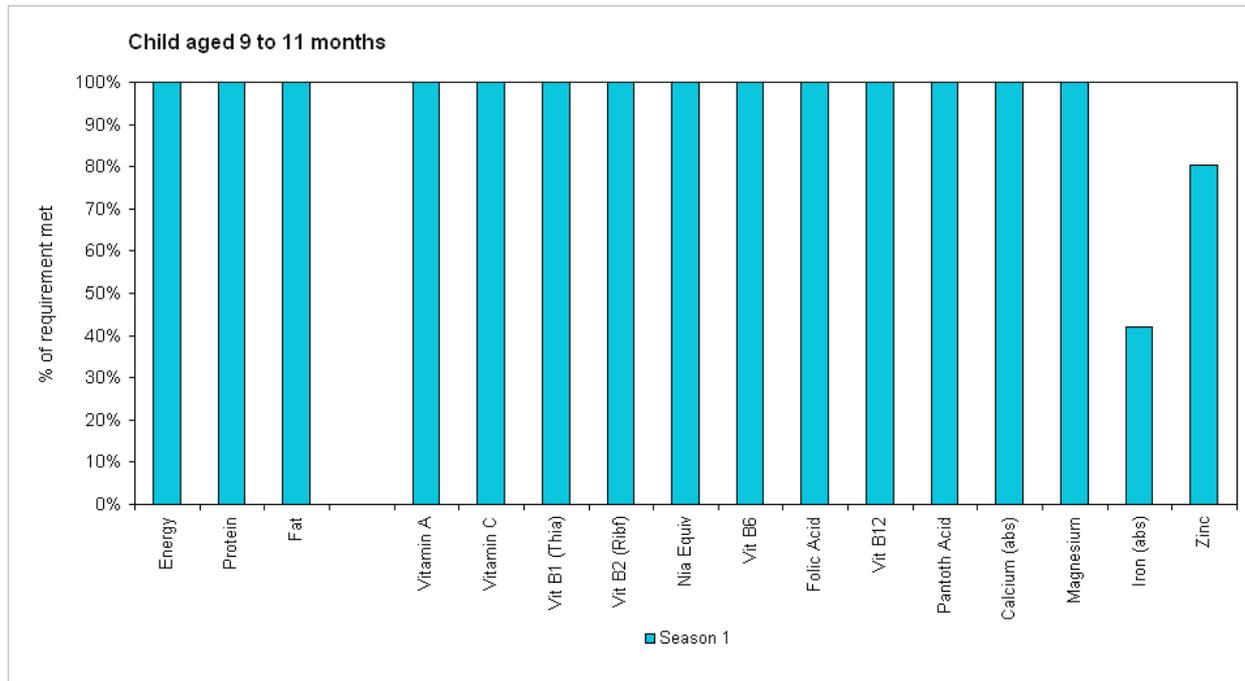
5.6 Micro-nutrient deficiencies in the LACON diet

The Cost of Diet software is programmed to meet the recommended intakes of energy, protein, fat and micronutrients from commonly eaten local foods for all members of the family at the lowest possible cost. In cases where the software is not able to meet a particular micronutrient requirement, this means that it is not possible with the given food items, portion sizes and consumption constraints. Where a micronutrient requirement has only been met exactly, so 100% rather than

greater than this, it indicates that the software has just met this requirement and may be dependent largely on a single food item. There are also upper limits for the different micro-nutrients as well as portion size constraints which mean a that food items cannot be consumed in limitless quantities until requirements are met.

Figure 5 below shows that the LACON diet was able to meet all the nutritional requirements for all members of the family other than for children aged 9-11 months. In both seasons, the diet was unable to meet the requirements for zinc or iron for that age group:

Figure 5. % of micro-nutrient requirements met by the LACON diet for the 9-11 month old child in the winter season

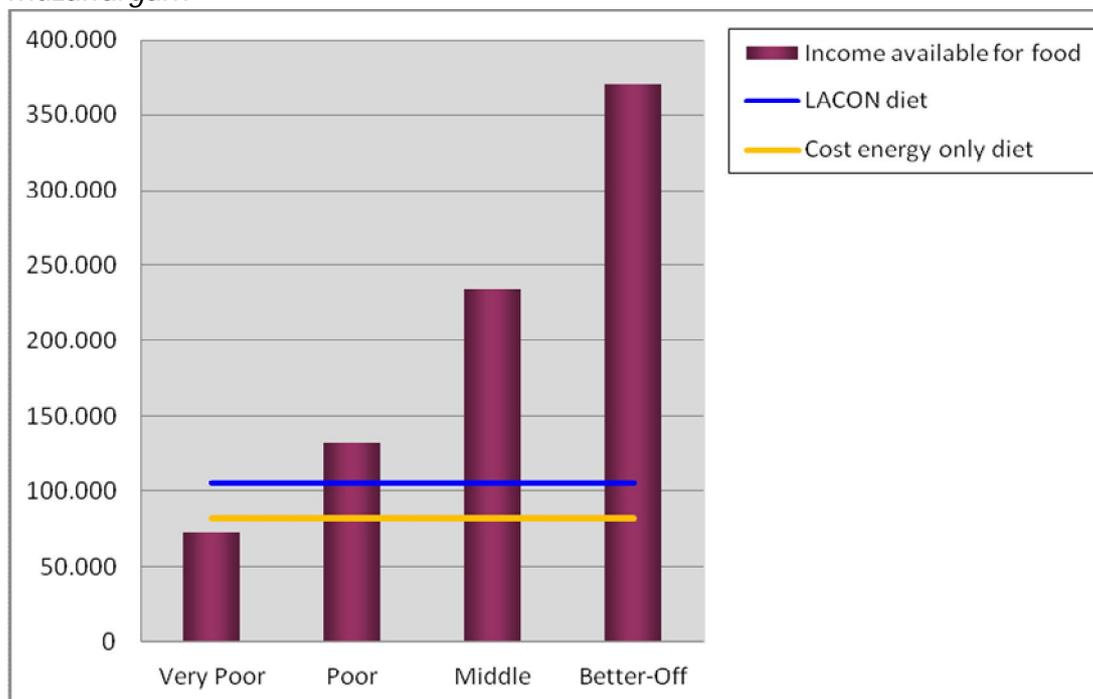


These are extremely serious micronutrient deficiencies in children of this age group. Iron deficiency leads to anaemia, and zinc deficiency can contribute to growth retardation. Both iron and zinc are present in animal and plant source foods, but in a mainly vegetable-based diet as consumed in this part of Pakistan, the phytate in unleavened bread binds irreversibly to iron and zinc so that much is not absorbed.

5.7 Comparing the minimum cost nutritious diet with an energy only diet

A diet that meets energy requirements only costs an estimated Rs 82,800, which is 21% cheaper than the minimum cost nutritious diet as highlighted below in figure 6. This diet is made up of wheat flour, broken rice, sugar, spinach, coriander and tomatoes and onions which remain forced in.

Figure 6. The costs of the LACON diet and cost of an energy-only diet compared to the average annual income available for food for all four wealth groups in Muzaffargarh



Although this diet may be sufficient to ensure that energy requirements are met, the cost saving comes at a significant cost in terms of nutrition. Micronutrient deficiencies that are likely to result from an energy only diet as both the 9-11 month and 12-23 month children are unable to meet key micronutrient requirements.

The only requirements that need to be met for the energy-only diet are the energy requirements of all family members, and at the lowest cost possible. From previous CoD assessments it is known that energy requirements are relatively easily met, compared to other nutrients. In other words: meeting requirements of other nutrients, such as iron or vitamin A is usually more difficult and more expensive than meeting energy requirements. For the very poor in Muzaffargarh, even an energy-only diet is not affordable, although it is cheaper than the LACON diet.

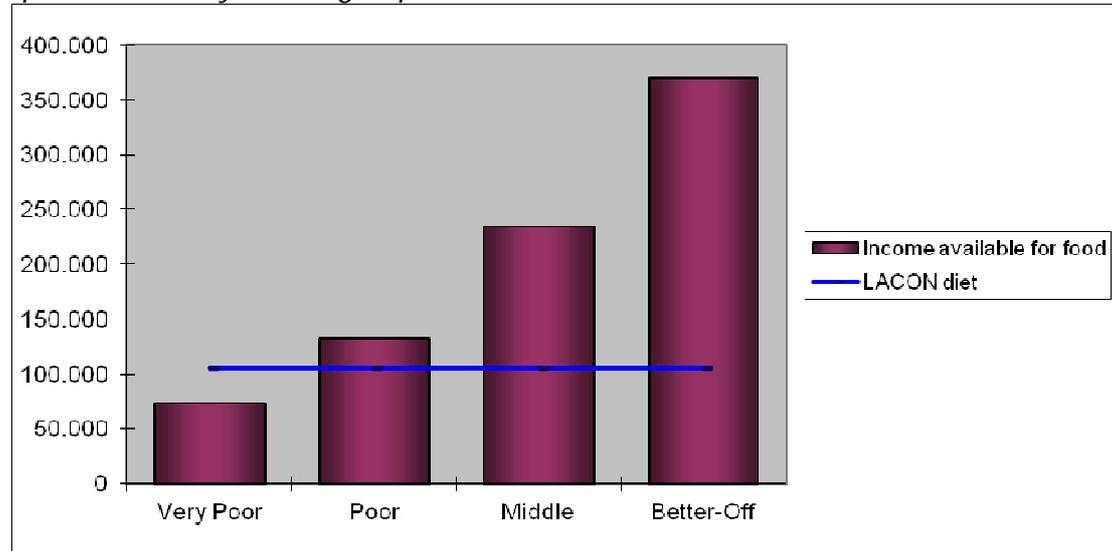
This highlights the danger of food security policies or interventions that focus solely on meeting energy requirements as they fail to address the critical nutritional needs for infants and young children.

5.8 Affordability: Poverty is a significant barrier to a nutritious diet for the very poor

Findings revealed that for the very poor households there was a gap of Rs. 32,375 of their annual income per year or 31% of the total estimated cost of the minimum nutritious diet, while the poor wealth group would need to spend 80% of their total

income to be able to afford a nutritious diet. This indicates that poverty is likely to be a major limit to access to nutritious foods for both the very poor and poor income groups. This is illustrated in Figure 7 which shows estimated incomes by wealth group (very poor on the left, then poor, middle and better-off on the right) measured against the cost of a nutritious diet.

Figure 7. Comparison of the cost of the LACON diet with annual income available to spend on food by wealth group



The very poor are also unable to meet the cost of a diet that meets only their energy needs: the analysis indicates a gap between the cost and income for the very poor of about Rs. 9,700 or 11.6% of income.

The poorest families (categorised in the study as 'very poor') represent more than a third (36%) of the population of the area. They can barely afford a diet that meets average energy requirements let alone one that meets the requirements specified by the WHO for the micronutrients that are essential to guarantee children's healthy growth and development. These households in Muzaffargarh would need 113% of their total current food and income in order to be able to meet their energy needs (and maintain their very basic cultural food preferences) and 144% of their total current food and income in order to be able to afford a fully nutritious diet. Therefore, it is unlikely that families will access the foods that children require they require for healthy growth and development.

5.9 Affordability: the vulnerability of very poor households to fluctuating food prices and wage rates risks widening the gap between income and the cost of a nutritious diet

During the market data collection, traders were asked open questions about trends in the availability and price of key food items, and about changes in consumer spending on food. Almost all traders, regardless of which food items they were selling, reported considerable increases in food prices over the last few years. For example, several vegetable traders commented that cauliflower was sold at Rs 10 in 2009; Rs. 15 in 2010 and Rs 25 in 2011: an increase of 150% in just two years. Several traders also reported an increase in the price of pulses (dried chickpeas, lentils, mung beans) of about 20% in the last year. A number of grocery store traders selling cereals, dried pulses, oils, condiments, eggs and other basic household items, reported that the greatest degree of inflation has been for basic food items for which demand is inelastic, such as rice, sugar and ghee. Fruit and vegetable traders reported that consumer demand was extremely elastic as changes in their price resulted in immediate changes in purchases; either a reduction in the quantity purchased or substituting cheaper alternatives. Meat traders reported that the very poor do not frequently purchase meat, and when they do it tends to be either for special occasions e.g. at Eid, in small quantities or cheaper cuts e.g. chicken feet to make a soup.

If accurate, the increases in food prices are well in excess of the general rate of inflation in Pakistan, which stood at 11% in October 2011⁹. Given that wage rates will therefore not keep pace with the rising food prices, the purchasing power of the very poor is likely to diminish. Furthermore, the HEA study revealed that the wage labour on which the very poor depend is unpredictable and insecure. Climatic shocks that affect agricultural production for example, can lead to a sharp and sudden decrease in demand for labour (and possibly also rates of pay).

Even if the poor are not affected by shocks and are able to maintain the same level of employment and income, rising food prices will reduce their power to purchase nutritious foods.

Finally, several market traders explained that prices in Pakistan should legally be guided by government food prices which are set at national level for most food items. These prices are set extremely frequently; weekly or even daily, and can fluctuate significantly in a short space of time. This makes it difficult for both traders and consumers to budget accordingly and know their purchasing power in advance.

5.10 Access to a nutritious diet by poor, middle and better off wealth groups

According to the malnutrition prevalence rates described above, the prevalence of stunting, an indicator of chronic malnutrition, in Punjab is 37%. The proportion of

⁹ <http://www.tradingeconomics.com/pakistan/inflation-cpi>

the population that is classified as 'very poor' is 36%. Data from the Punjab MIC Survey in 2008 gives greater insight into the possible correlation between wealth and nutritional status¹⁰: This is analysed in table 11 below:.

Table 11. Correlation between stunting, wasting and poverty

Wealth quintiles	% under weight	Relative risk	Attributable fraction (exposed)	% stunted	Relative risk	Attributable fraction (exposed)	% wasted	Relative risk	Attributable fraction (exposed)
Lowest	43.5	1.89	0.47	53.9	1.78	0.44	14.0	1.03	0.03
Second	38.1	1.66	0.40	47.0	1.55	0.36	13.1	0.96	-0.04
Middle	33.3	1.45	0.31	42.0	1.39	0.28	13.1	0.96	-0.04
Fourth	28.3	1.23	0.19	36.7	1.21	0.17	13.3	0.98	-0.02
Highest	23.0	1.00	0.00	30.3	1.00	0.00	13.6	1.00	0.00

The table above presents data from the 2008 survey in the Punjab with calculations of relative risk and the attributable fraction (exposed) for each indicator of undernutrition. It shows the relative risk of being underweight, stunted or wasted compared with children in the highest wealth group. Children in the lowest wealth quintile have nearly twice the risk of being underweight (1.89) or stunted (1.78) as children in the highest wealth group. As there is undernutrition in the highest wealth groups as well, not all undernutrition is attributable statistically to the difference in wealth. The fraction that can be attributable to wealth between the highest and lowest groups can be estimated at 0.47 for underweight, so 47% or about a half of the prevalence of underweight is statistically attributable to differences between the lowest and the highest wealth groups. It seems reasonable to suggest that poverty is the underlying difference, but it could be due to a greater incidence of disease in the poorest groups, not just a poorer diet than the wealthiest consume. The wealthy may also actually be quite poor, as the differences are relative.

5.11 Links between vulnerable livelihoods and malnutrition

Cost of Diet studies in other contexts have sometimes indicated that a minimum cost nutritious diet may be unaffordable by all wealth groups, indicating that the problem is one of a lack of availability of reasonably priced nutritious food on the market¹¹. This is not the case in this context. The fact that in Muzaffargarh the poor, middle

¹⁰ Government of Punjab (2009). *Multiple Index Cluster Survey (MICS) Punjab 2007-08*. Punjab: Planning and Development Department, Bureau of Statistics, Government of Punjab,

¹¹ Malnutrition in a Land of Plenty: Key findings from research in East Kasai province, the Democratic Republic of Congo, Save the Children, November 2010

and better-off groups seem able to afford a nutritious diet indicates that the major barrier to affordability for the very poor is their low income.

The HEA study describes in detail the characteristics of the livelihood strategies of the very poor and how these lead to vulnerability and poverty. Details of this are given above in section 3. In summary, the very poor have very few productive assets and most importantly do not have access to land, which is the key determinant of wealth in the livelihood zone. Consequently they are almost entirely dependent on wage labour to meet their household needs, which contributes 87% to total household income. This income is seasonal in nature and linked to the production of staple foods such as wheat and rice and cash crops such as cotton. Changes in agricultural production or in the market prices of these commodities, or other economic or climatic shocks, could result in a sudden drop in the availability and wage rate of this employment. With few assets, no food stocks or own food production, the very poor have little buffer in such an event and are forced to resort to potentially harmful coping strategies such as long-term migration or the sale of livestock beyond that which can be replenished. Household incomes are further restrained by the restricted opportunities for women to work. The HEA revealed that of the range of labour opportunities available to households, women would only engage in cotton picking, which is seasonal, or domestic labour, which is irregular and in low supply. A lack of education and training and cultural restrictions on their movement outside the household, mean that the contribution made by women to household income is below its potential.

The links between livelihoods and nutrition in this context cannot be overlooked. The poor earn just enough to survive, but probably not quite enough to meet their minimum energy requirements and some essential non-food items. Even if very poor households have good knowledge of nutrition and infant caring practices and the will to put it into practice, they are constrained from doing so by livelihoods that do not yield sufficient food or incomes. There are also issues of intra-household allocation of food which merit further investigation.

6. MODELS OF POTENTIAL SOLUTIONS

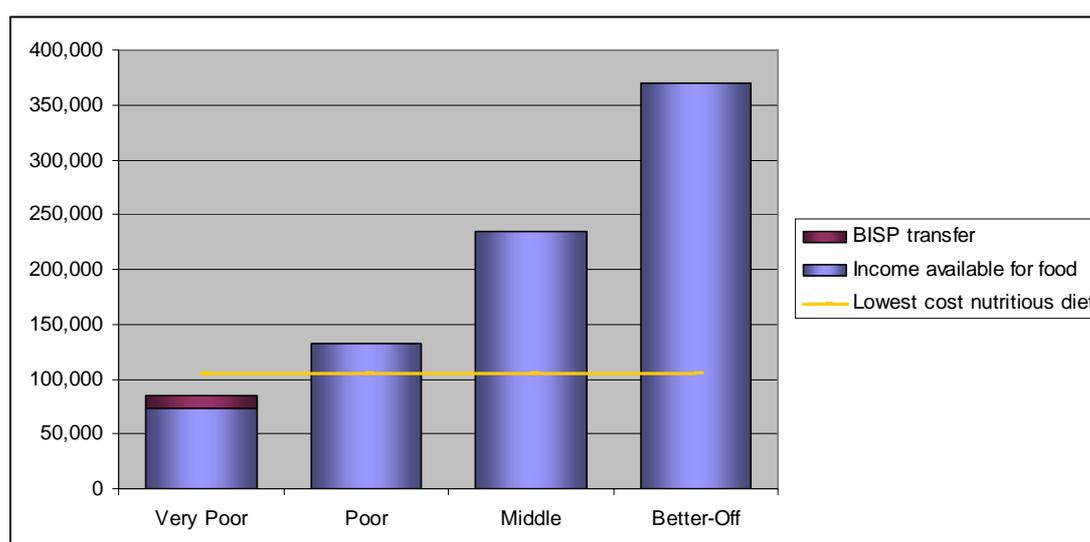
The CoD software enables models to be developed to examine the impact of interventions that affect the content and affordability of a minimum nutritious diet. For example, this can be done by making changes to income figures, changes to the cost of foods or by including more nutritious variants of crops and foods. Such models can help illustrate the potential for interventions or activities and draw upon changes in underlying assumptions, past experience or new data. The models illustrated below can be used to generate ideas; test assumptions on the impact of certain activities on household nutrition; and to set clear targets and indicators. The models are illustrative and perhaps indicative as, in reality, the situation will be influenced by other external factors and the actual effects may be different.

6.1 The potential impact of social transfers on the affordability of a minimum nutritious diet

During the HEA study households were asked to give details of all of their cash and food income. In all the 12 Union Councils (UCs) visited, none of the wealth groups reported receiving a social transfer of any kind. The largest social protection programme in Pakistan is the government-led Benazir Income Support Programme (BISP): <http://bisp.gov.pk/>. This aims to provide five million families living below the national poverty line with a cash transfer of Rs. 1000 per month. Poverty is defined according to proxy indicators assessed using a poverty score card.

The CoD software was used to examine the impact on the affordability of a nutritious diet if very poor households in Muzaffargarh were given this transfer. Figure 8 below shows the current income of the very poor, supplemented with Rs. 12,000 per year as a BISP transfer.

Figure 8. Affordability of the nutritious diet by wealth group, including access to BISP transfers (cost against annual income)



This transfer reduces the affordability gap from 31% to 19%, but there is still a gap of about Rs 20,000 per year. This would suggest that the current transfer size of the BISP would not be sufficient to have a significant impact on malnutrition in this livelihood zone.

A social protection programme that aims to fully address the affordability gap of a LACON diet, would need to be increased to a value of about Rs. 32,300 per year or **2,700/month**. This is an increase in the size of the cash transfer of 270%. Considering the scale at which the BISP is operating, this would clearly represent a significant challenge for the Government of Pakistan.

6.2 The potential impact of poultry rearing by women on a minimum cost nutritious diet

In order to explore the potential impact of expanding income-generating opportunities, a poultry project was modelled. This is an intervention which has been implemented by Save the Children as part of the support to help households to recover and rebuild their livelihoods after the floods. These projects have both increased incomes and access to food in the form of hens' eggs, which make the intervention an appropriate one to model in this context. The project in the past has targeted women. As mentioned previously, livelihood options open to women are limited. The fact that this project takes place in the homestead is one factor which makes it culturally appropriate for women to undertake.

In order to model this intervention, data were collected from existing poultry projects on: running costs, hen productivity, egg consumption, the price of eggs, and bird deaths. The average weight of eggs, the price of eggs, the portion size and the nutritional value of eggs was then applied to the software to examine different possibilities: 'forcing' a certain quantity of eggs into the diet without cost, thereby modelling the effect of consuming eggs; increasing income to reflect egg sales, so modelling the effect on the increased ability to buy other foods; and subtracting from any income the cost of keeping chickens and a value for the opportunity cost of labour missed. The sale and consumption of birds was not included in the model, except for the consumption of one bird a year, as this would affect the sustainability of egg production. It was assumed that as birds died they would be replaced from hatched eggs. The assumptions and results are shown in Table 12.

The assumptions used to estimate the cash income and extra food offered by an intervention to rear poultry for a typical household in the livelihood zone in Muzaffargarh District.

Table 12. Estimated egg production, consumption and cash income from poultry projects

Productivity	
Number of birds provided	30
Number of birds surviving (90%)	27
Average eggs laid per day	21
Average eggs laid per year (300 days)	6,300
Cash Income	
Number of eggs sold/year	4,800
Income from eggs (11 Rs/egg)	52,800
Food income	
Chicken consumed per year (5%)	1
Eggs consumed (5/day)	1,500
Expenses	
Expenditure on food, medicine and hen coop	10,560
Total annual poultry income	42,240

The estimated total income less expenses was added to current annual income of the very poor wealth group. From this amount was subtracted the opportunity cost of poultry upkeep in terms of labour opportunities foregone. Given that women's main livelihood is cotton picking, the income gained from cotton picking was reduced by 25% (Rs. 2,363). This is on the basis of 2 hours spent per day taking care of the poultry, which is 25% of an average 8 hour day picking cotton. This produces a new annual income total for the very poor of Rs. 112,970, an increase of 45%.

The assumptions used to estimate the effect of consuming more eggs on the cost of a nutritious diet were based on the data in table 13.

Table 13. Estimated egg consumption figures

No eggs/day	5
Weight/egg	43 g
g per day	215 g
Portion size per egg	20 g
Total portions/day/hh	10.8
Total portion per person (8/hh)	1.3

The next step was to convert the eggs consumed into quantities which could be applied in the CoD software without monetary cost. The assumptions applied are shown in Table 13.

If it is assumed that eggs will be laid on 300 days a year (about 80%), the household will eat eggs about 80% of the time, so the frequency of egg consumption was rounded down to 1 portion per person per day. Eggs were therefore entered into the CoD software with minimum and maximum weekly constraints of 7, and at a cost of zero. This addition of free eggs into the diet resulted in 11% lower cost of a minimum nutritious diet of Rs. 94,700.

The ownership of poultry has an effect on affordability on both sides of the equation: increasing household income and decreasing the cost of the diet. The effect of this is to not only close the affordability gap, but to produce an excess of Rs. about 9,700 per year under the assumptions specified.

This model indicates that a well targeted and effectively implemented poultry programme has the potential to greatly increase economic access to a nutritious diet. This is based on the assumption that additional income is used to purchase nutrient-rich food items and not only staples; that eggs are consumed and not all are sold; and that the birds are protected from death caused by floods or disease. It is also assumed that very poor households will have sufficient economic stability to continue to sustain the investment, and will not be forced to sell birds as a coping strategy unless they are in excess of needs to sustain egg production.

It must also be noted that because eggs do not contain substantial amounts of zinc or iron, these key micronutrient deficiencies among children aged 9-11 months, remain unaddressed by this intervention.

6.3 Micronutrient supplements (include observation on iodised salt)

As the current diet for children under two does not meet all nutrient requirements (see figure 5 above), the effect of adding a multiple micronutrient supplement was examined to see how this would and reduce the cost of meeting nutrient needs. The composition of the added multi-micronutrient powder is shown in Table 14.

Table 14. Composition of the multi-micronutrient powder included in the diet for children under two

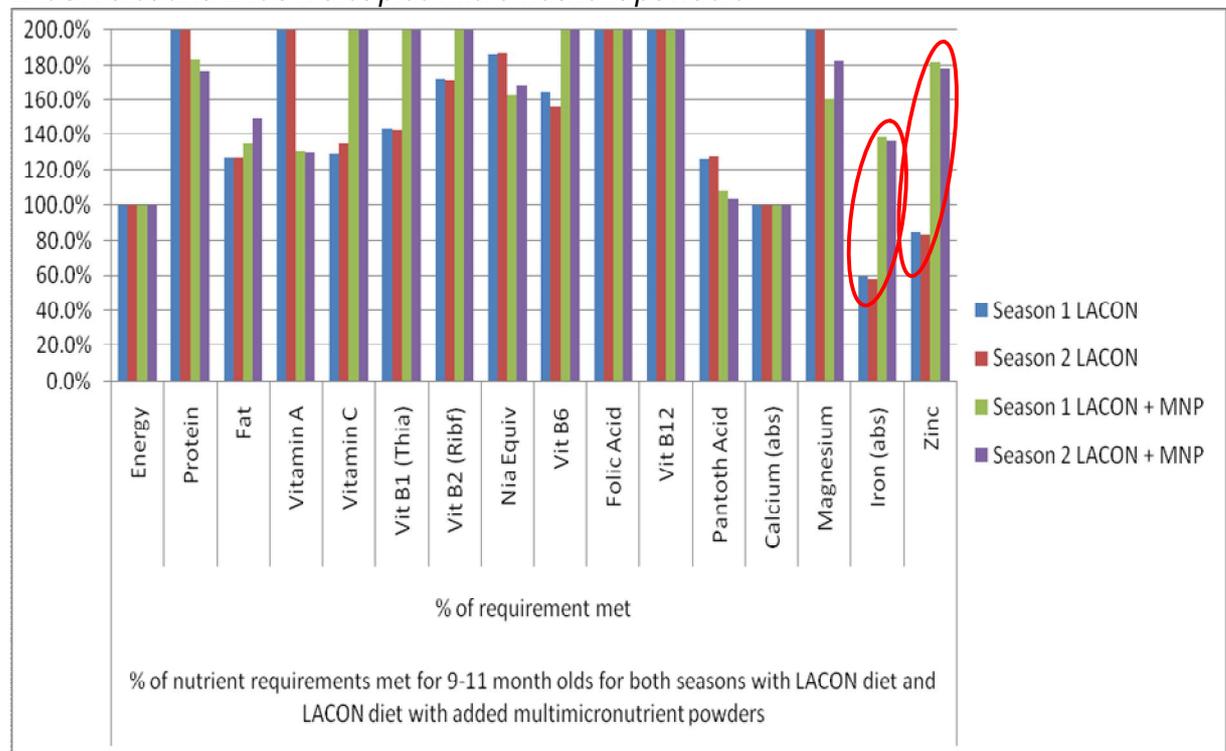
Nutrient	Content/100g	Nutrient	Content/100g
Thiamine	50.0 mg	Zinc	500 mg
Riboflavin	50.0 mg	Iron (absorbed)	106.3 mg
Niacin	60.0 mg	Vitamin A (retinol)	15000 µg RAE
Vitamin B6	50.0 mg	Vitamin C	3000 mg
Vitamin B12	90.0 µg	Folic acid	16000 µg

When a multiple micronutrient powder was added to the diet of children aged 9 to 11 months and 12 to 23 months all nutrient requirements were met (see figure 8). The total cost of a nutritious diet for the household was reduced only by 5%, but the cost for the child was reduced considerably: by >60% for the 9-11 month old child

and by almost 20% for the 12-23 month old, as the most expensive foods in their diets were the foods providing zinc and iron. These reductions are for a diet where the multi-micronutrient powders are provided at no costs; they will be slightly less when the supplement would need to be purchased (see below). The analysis does not include the cost of breast milk, which is included in the cost of the additional nutrient requirements of the lactating woman.

Although adding a multi-micronutrient powder to the diet does not address affordability of a nutritious diet, it addresses micronutrient gaps and thereby enables the family to achieve a nutritious diet for children under two years old, which is important as children in this age group are most vulnerable to the effects of chronic malnutrition. It does not appear that with the foods currently available to the very poor in markets, that it is possible to meet these requirements through dietary solutions, as is shown in previous paragraphs.

Figure 9. % nutrient requirement met for 9-11 month child for both seasons with LACON diet and LACON diet plus micro-nutrient powders



The estimated cost per child for 60 sachets of micronutrients per year, given twice a year over a period of 30 days six months apart, is about USD 1.5 per child per year at a unit cost of USD 0.025 per sachet. If the micronutrient powder was produced in Asia (e.g. China) the costs would probably reduce by half. This does not include any costs for delivery or training mothers to use the powders.

Also it is worth noting that the salt consumed in Muzaffargarh is already iodised. Salt samples were collected from eight Union Councils and tested for their iodine content. All but one were iodised and sold in packets with this clearly marked on them

6.4 Modelling the effect of non-optimum breastfeeding on the cost of a nutritious diet

The minimum cost nutritious diet is based on the assumption that breast milk is provided to children under two years old in amounts that meet the WHO guidelines. However, it is clear that the reality is different and that only 73% of children under two are breastfed. Therefore, the effect of non-optimum breast milk consumption on the annual cost of a nutritious diet was examined.

In this model, it was assumed that only the younger of the two children in the typical family was still breast-fed and that the 12-23 month old child was given no breast milk at all, as breast feeding usually stops when a mother discovers she is pregnant. In the model the 9-11 month old received only 50% of the recommended amount of breast milk.

Although the total annual costs of the diet increased by 16% to 118,721.86 Rs, and the costs for the 9-11 month old even increased by 65% to 80% (season 2: 65%; season 1: 80%), and iron requirements still could not be met. For the 12-23 month old a nutritious diet could be met, but in order to meet all nutrient requirements the diet would have to include large quantities of different foods. It is unrealistic that families will manage to achieve this because of current feeding practices and the child's stomach capacity. The cost in this case increased by 240%. This suggests therefore that without continued breastfeeding an adequate complementary diet cannot be met by poorest families.

Table 15. All food items and quantities to be included in the cheapest nutritious diet for a non-breastfed 12-23 month old child

Food Item	Daily Quantity (g)
WHEAT, FLOUR, MAIDA	16
RICE, BROKEN INDUSTRIAL	26
CHICKPEA, YELLOW	15
BLACK GRAM, DRIED, RAW	15
ALMONDS	8
GUAVA	1
COCONUT, DRIED	25
CHILE, GREEN	10
CORIANDER	10
SPICES, MIXED	10
CORIANDER LEAF POWDER	10
POTATO	50
VEGETABLE OIL	0
SUGAR, BROWN, NOT YET PURIFIED	5
TEA (LEAF, DRY)	10
MILK, COW, FRESH	145
MILK, BUFFALO	136
CHICKEN FEET, BOILED	6
BEEF, LIVER	1

7. RECOMMENDATIONS

The findings of this study in conjunction with data from Household Economy Approach and nutrition surveys point to a number of recommendations to address chronic malnutrition. These are intended to address both aspects of affordability, including income and the cost of the diet, and also to protect the best infant feeding practices to ensure that affordability translates into prioritised expenditure on nutritious food.

- Improve the understanding of the linkages between Food Security, Livelihood and Nutrition at national level by government and civil society:

The HEA and CoD studies imply the linkages between food security, livelihoods and chronic malnutrition. These issues are frequently addressed in isolation, addressed by different NGOs and government ministries. Improved analysis and evidence of the linkages between these must be produced and disseminated, and reflected in joint planning and policy making.

- Advocacy on specific policies which affect affordability of a nutritious diet

A number of government policies have a direct impact on incomes and food prices, and therefore influence for many very poor households, their affordability of a nutritious diet. Agencies should engage in dialogues with these policy makers to present evidence on how they can be reformed to tackle the alarmingly high rates of malnourished children in Pakistan.

Social protection is a critical area of both policies and programmes in which there is great potential to address malnutrition by increasing economic access to nutritious foods. 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 diet¹². In order to ensure that a cash transfer programme enables a household to purchase nutritious foods, 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.

As the modelling exercise demonstrated, the current BISP programme, even if coverage were to increase to 100% of very poor households, cannot enable households to buy enough food to meet all their nutrient needs because the transfer

¹² Save the Children, *Lasting Benefits: The role of cash transfers in tackling child mortality*, 2009

size is currently inadequate. If this programme is to attempt to contribute to nutritional outcomes, it will need to be reformed in line with the affordability gap.

Given the cultural importance of wheat flour to the diet, policies governing wheat subsidies and subsequent market prices of wheat, have a direct impact on the cost of a diet. A decision to remove wheat subsidies and increase prices would lead to a significant increase in household expenditure on wheat, thereby shrinking the availability of funds that can be spent on other nutritious foods. This could lead to an increase in the prevalence of micronutrient deficiency diseases and an increased risk that children will die due to infectious diseases.

- Increase household production and consumption of micronutrient-rich foods

Increasing the amount of nutritious foods which households produce without cost will reduce the cost of a nutritious diet. Animal foods are rich in micronutrients but are expensive, so increasing the household production of milk, eggs and meat would significantly reduce the cost of additional foods which the household would need to purchase to meet their energy and nutritional requirements. Vegetables rich in micronutrients such can also be produced by households in kitchen gardens. Preserving foods such as by drying, can also help to improve access to seasonal foods which may be unavailable or more expensive at different times of the year.

Very poor households in Muzaffargarh are currently producing small quantities of milk from their cattle but this is being sold in order to purchase cheaper, more energy-dense foods such as wheat or rice. This illustrates that interventions to breed livestock or poultry must recognise that poor households are only likely to consume nutritious produce once their basic needs for energy and other essential have been met.

Foods which are rich in micronutrients and those which have a high market value are not necessarily the same. It is therefore also important that interventions clearly define their objectives in terms of increasing the consumption of nutritious foods versus increasing incomes. For example, growing leafy green vegetables may make a significant contribution to household nutrition, but other vegetables such as chillies, carrots or tomatoes have a higher market value when sold. Understanding whether people are likely to sell or consume the food they produce is therefore important.

- Strengthening livelihoods to increase incomes, particularly for women

The HEA findings highlight the vulnerability of current livelihood strategies of the very poor due to their dependence on unreliable labour opportunities for men. They also highlight a lack of income generating opportunities for women. Expanding livelihood opportunities should both aim to increase incomes but also reduce the vulnerability of livelihood strategies to external shocks. These should be based on a

sound market survey and value chain analysis to identify opportunities which are financially viable and build the opportunities and skills of the very poor.

- Nutrition education programmes and support of exclusive breast feeding for children 0-6 months and continued breastfeeding for children under two.

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. Messages on the importance of consuming nutrient-rich fruit and vegetables should include information on the cheapest sources of essential nutrients. In addition, messages about the importance of dairy consumption is required in order to ensure that, when available, milk is consumed by the family, particularly the 6-23 month child, instead of being sold to generate income.

Breast feeding promotion should take place due to the low rate of exclusive breastfeeding. The WHO recommends that exclusive breastfeeding for the first 6 months of life, and continued partial breastfeeding up to 2 years of age or more is the optimal way of feeding infants and children. Breastfeeding is also the most cost-effective and safest method of feeding young children and should be strongly encouraged by every programme.

Education on preventing infectious diseases and how to care for sick children should also be scaled up due to the cyclical relationship between malnutrition and disease.

Nutrition education programmes typically tend to target mothers. It is important to recognise that in Pakistani culture mothers do not have sole responsibility for determining household expenditure on food, how food is allocated within the household, and how young children are fed. Nutrition education messages should also target men, elders and mothers-in-law so that the understanding of the importance of nutritious food and optimal caring practices is shared throughout the family and the needs to care for mothers as well as children is stressed

- In-home fortification using Multi-Micronutrient Powders (MMP)

The role of MMP for home fortification of complementary foods as a component of Infant and Young Child Feeding promotion in Pakistan should be explored. As the modelling exercise demonstrated, use of MMP can reduce the gap between the income of the poorest families and that needed to achieve a nutritious diet. Home fortification can also ensure that dietary requirements for zinc and iron in children 6-23 months are met. This is particularly important for very poor households as ensuring the appropriate intake of these two micronutrients is extremely difficult at low cost. Furthermore ensuring sufficient intake of the remaining micronutrients, in some cases requires very high of consumption of some commodities. Fortifying foods with MMP, lowers amounts of these commodities required and makes achieving a low cost locally available nutritious diet a more practical possibility.