

COST OF DIET ASSESSMENT

CERCE DE YOROSSO

**OXFAM GB
SAVE THE CHILDREN US**

DECEMBER 2009

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A SAVE THE CHILDREN UK METHODOLOGY

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Executive Summary

Background

The CoD assessment is a collaboration between Save the Children US and Oxfam GB to try and understand the reasons for the high levels of malnutrition in Yorosso area despite it being one of the more fertile parts of the country. CoD is a methodology developed by Save the Children UK which calculates the lowest cost of a nutritiously adequate diet for a household of varying sizes. The cost of diet is calculated for the different wealth groups as defined during the Household Economy Analysis which took part prior to the CoD.

Results

	Very Poor	Poor	Middle	Better Off	
Total Income + Cash equivalent - non food exp.	146123	236679	891700	2453127	
Tier 1 CoD Annual	243957	339896	716070	1112537	Requirements met
Tier 2	1333531	1929065	3830594	5826536	Requirements not met
Tier 2 with increased frequencies	715779	1004299	2063712	3138627	Requirements met

Tier 1 results show that the annual lowest cost diet which meets all the requirements of the household can be afforded by the middle income and better off households but not by the poor and the very poor. The daily cost of the diet is more expensive in the rainy season which is the time of year when income is also expected to be at the lowest.

Using the frequency data which was collected from the poorest households the tier 2 results show us that the diets of 12-23month olds are potentially struggling to provide sufficient iron, calcium and thiamine whilst the diets of the rest of the household (above 2years) may be struggling to provide sufficient iron. This is consistent with what can be expected from an area such as this where limited meat, green leafy vegetables and other sources of iron are rarely eaten.

Discussion

The results demonstrate the availability of a diverse range of foods in Yorosso area but they also highlight the inequality of access. The poorest household do not have sufficient income throughout the year to afford a diverse and nutrient rich diet and at times income will fall short of accessing diet which some essential micronutrients. This is especially crucial in the case of children aged 6-23months whose diets need to be packed with iron, zinc, calcium, thiamine amongst others in order to not only grow and develop appropriately and to reach their full potential but also to stay health and avoid illness which will put additional burden on the household. It seems that the earning capacity of the poorest household is extremely vulnerable to external forces; weather conditions, use of agricultural equipment, sale of assets to raise funds and that the seasonality has an impact on the earning capacity, as well as the cost of food. The most expensive time of the year to access a nutritious diet is also the time of year when labour opportunities are the least, before the main crop harvest

Recommendations

- Long term interventions which lift the poor out of the cycle of poverty. Increasing access to land for cultivation or transfer of assets
- Petit commerce or skills training in order to increase employment opportunity
- Further research into the seasonal fluctuation of income in order to confirm assumptions about seasonal income patterns.
- Analysis CoD data by village in order to establish which villages are experiencing the greatest need for food security intervention
- Use of the CoD methodology to monitor the ongoing food security situation and look at combining with other indicators to form part of an early warning system.

1. Introduction

1.1 Background

Yorosso livelihood zone is defined as being an agro-cotton zone where the main source of income is cotton production and cereals. Whilst the Yirosso zone and Skiasso region are fertile in comparison to the rest of Mali and are where fruits, vegetables and cereal crops can be grown easily the rates of malnutrition are among the highest in the country.

In order to better understand the reasons as to why the poorest households were experiencing malnutrition and food insecurity an HEA assessment was conducted in November 2009 followed by a CoD assessment in December 2009. The CoD assessment was a joint venture by Oxfam GB and Save the Children US.

1.2 Nutrition Situation

These indicators show the nutrition status of the under 5 population which is used as a proxy of the population level of food insecurity.

The nutrition indices show that malnutrition in Sikasso region is at a concerning level, the levels of wasting of during the lean season (July) is classified as high according to the WHO classification¹ and medium during the non lean period. This is showing that there is short term food insecurity in the area. That during the lean period household are unable to provide the amount food needed to meet energy requirements. This also indicates that if there is a shock which would worsen the situation, a failed harvest or decrease in earning capacity there will be many household which are vulnerable to a worsening situation.

The levels of stunting are also classified as high throughout the year which indicates long term food insecurity. This shows that children from a young age have experienced a sustained inadequate food intake that is of low quality. The diet is likely to be of limited diversity which means that insufficient sources of micronutrients exist in the diet restricted normal growth and development. The long term impact of chronic malnutrition is that children are unable to develop properly, limiting their learning capacity and long term earning ability.

Table 1 Nutrition indicators for 0 – 59month olds²

Nutrition Indicators		
Wasting (GAM) (<-2 z scores)	Jul 07	10.8%
	Mar 08	5.3 %
Stunting (<-2 z scores)	Jul 07	32.6 %
	Mar 08	35.0 %
Underweight (<-2 z scores)	Jul 07	33.9 %
	Mar 08	29.9 %
U5Mortality		

¹ WHO, 2000

² Enquete de base sur la securite alimentaire et la nutrition (EBSAN), EFP, HKI, UNICEF, 2008

Low Birth weight (<2.5)		
Vaccination BCG		58.5 %
Vit A Supplementation		11.9 %

1.3 HEA Results

The Household Economy Analysis assessment was carried out in the weeks prior to the CoD assessment. The HEA analysis was conducted using the reference year October 2008 – September 2009 as this is perceived as the consumption year. The results of the HEA will be used to assess the ability of households to afford a nutritious diet.

Yorosso livelihood zone is defined by agricultural production of cotton, millet and sorghum. Further information to add once received report

Table 2 HEA income and Expenditure Data

	Very Poor	Poor	Middle	Better Off
Total Income	204660	353543	1475573	3779711
Cash Equivalent of production consumed	63028	103455	410377	868992
Cash equivalent of stock or credit cereals	5700	5700	39900	68400
Total Income + Cash equivalent	273388	462699	1925850	4717102
Total non food expenditure	127265	226020	1034150	2263975
Total Income + Cash equivalent - non food exp.	146123	236679	891700	2453127

Figure 1

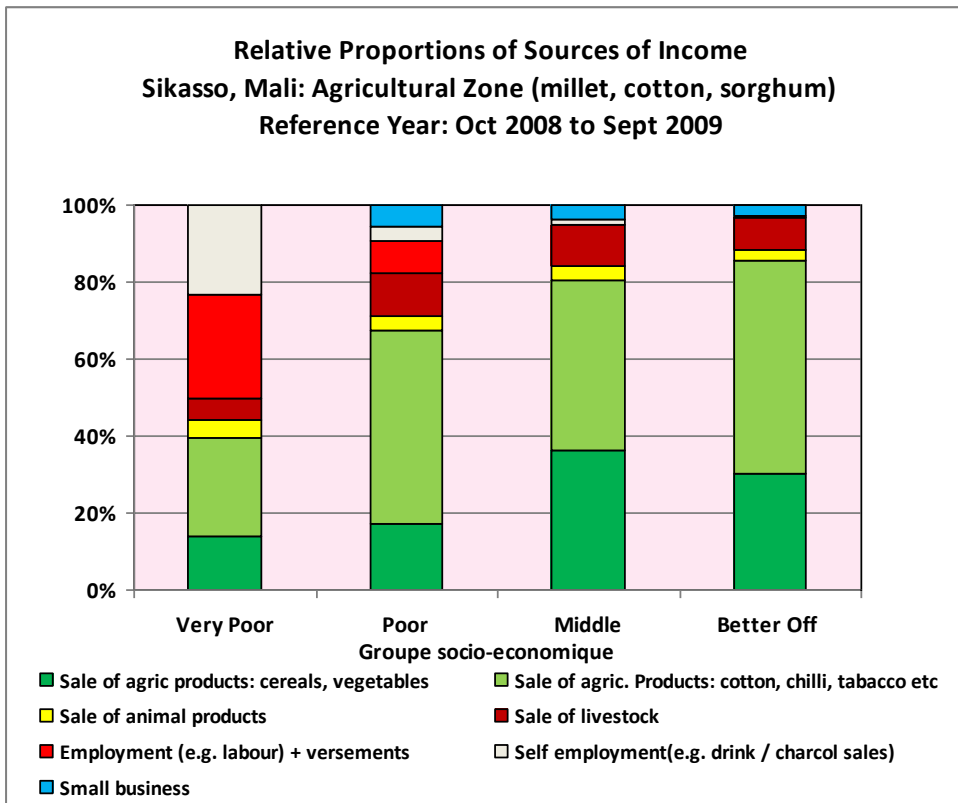
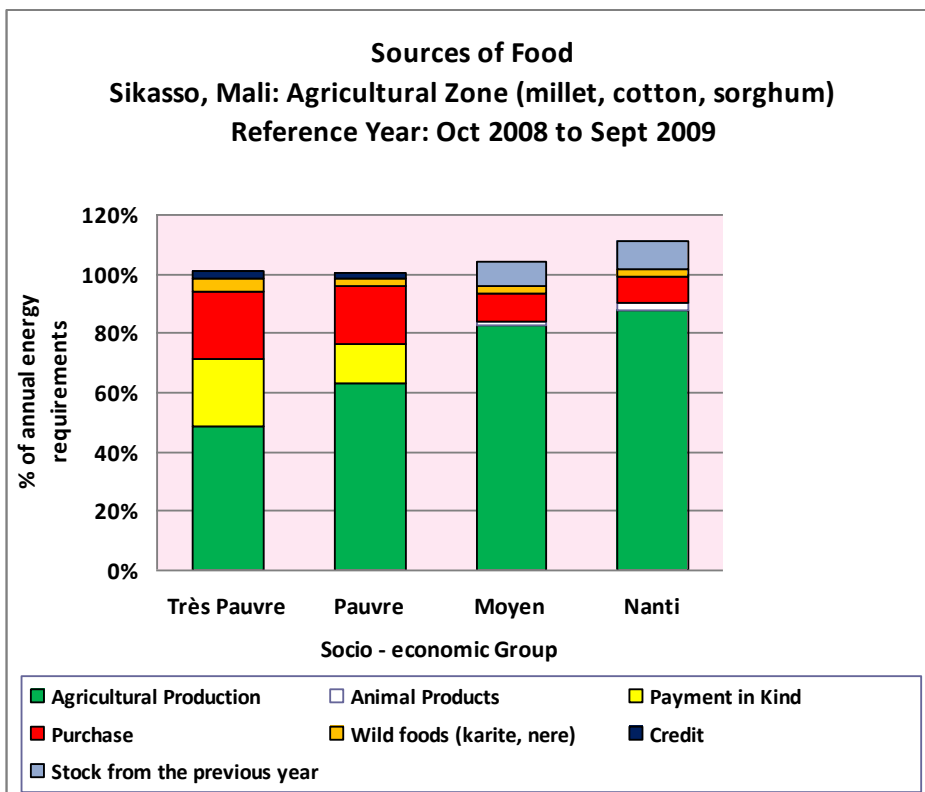


Figure 2



2. Method

The CoD is an assessment and analysis tool, a linear programming model built into Microsoft excel which can identify the gap between income or food expenditure and the lowest cost of a diet which meets all the energy and nutrient requirements of a household.

In order to use the CoD programme a list of locally available foods is required (foods available in the markets visited by the poorest households), and the seasonal variation in availability and cost of these food items. The programme uses the food list combined with a information detailing a family's food consumption patterns to calculate the cost of a diet to meet the energy and nutrient requirements of a user defined household. The CoD programme minimises the overall cost of the diets selected; thereby producing results which show the lowest cost of a diet which meets all the micro, macro and nutrient requirements of the household.

The diets selected have to respect user defined "constraints". These constraints are food pattern descriptions which are used for a variety of purposes: To ensure that sufficient breast milk is included into the diet of a breastfed child, to prevent the results from including quantities of foods which could not be feasibly consumed; 1 kg of spinach per day for a 12 – 23 month old for example, or to prevent food items from being included into the diet more frequently than could be expected to be eaten, for example eggs 3 times per day.

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

The CoD tool has been developed to allow 2 levels of analysis which are outlined below. The analysis for this study used both Tier 1 and 2 tiers.

2.1 Tier 1

Tier 1 analysis is the most basic analysis, where the results show the lowest cost of a nutritious diet. The food pattern constraints (as described above) are less specific and only restrict the portion size of each food allowed. The maximum portion sizes are determined by the overall contribution to the total energy made by each food group, the breakdown of which can be seen in annexe 1. The maximum portion sizes are often very large³ and therefore allow an unpalatable amount of food to be potentially selected. This means that the lowest cost of a nutritious diet could be based on a diet which could not be feasibly consumed by all members of the household.

Limited data is required to conduct tier 1 analysis in comparison to tier 2 and the results are a good indication of the overall availability of a nutritious diet using only locally available foods, as well as the lowest cost. The results can be used for developing advocacy messages around availability, cost and affordability.

2.1.1 Tier 2

Tier 2 analysis requires more detailed data concerning food portion sizes, frequency with which different food items are consumed, and the regularity with which foods from different food groups are consumed, in order to inform the user defined food pattern constraints. This enables a diet to be selected which more appropriately reflects the dietary patterns of the local population, and therefore gives more realistic results; the lowest cost of a diet which meets requirements *and* can be consumed as part of a usual Malian diet. The results of tier 2 analysis can also be used for advocacy purposes, as well as being used for helping to design programme intervention. Different scenarios can be modelled using tier 2 in order to

³ For example 1154g of potato per day is the maximum amount which can be included into the diet for a 12 – 23 month old.

explore the impact on cost and diet quality that an intervention such as supplementation, food rations, or behaviour change might have.

The results of either tier 1 or 2 can show either of the following two scenarios:

- 1) The lowest cost of a diet which meets all the requirements for all members of the household
- Or
- 2) The lowest cost of a diet which doesn't meet all the requirements. The cost would be based on the best possible diet that can be selected from the foods available when the portion size and frequencies are constrained by realistic or current eating patterns.

If the results fall under scenario 2 this would indicate that there are potential patterns of nutrient deficiency within the population, or that adequate intakes of certain micronutrients may be difficult to achieve from a locally available diet. This would inform the direction of any planned programme intervention to look not only at access in terms of affordability, but availability of nutrient dense foods at the individual and household level.

The CoD programme can then be used to model the impact of potential interventions such as supplementation or increased consumption of certain foods in order to explore the impact this would have on diet cost and quality.

Two databases are used within the programme;

- 1) A database of nutrient and energy requirements based on age, sex and activity level taken from WHO/FAO 2004 nutrient requirements database⁴.
- 2) A database of nutrient and energy content of food items taken from FAO Food composition database.

A focus on 12 – 23month olds

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

2.2 Data Collection

The data can be categorised by 1) Market data and 2) Frequency of consumption data.

1) Market Data

An initial exhaustive food list was developed to represent the foods which are available in the majority of the markets which are visited by the majority of the poor and very poor households within the zone. Market were then visited to establish a price per food item. The price is per local unit and the unit used was the one which the poor are more likely to buy their food in (for example a pile of onions rather than a KGg). The weight of each unit is also measured using electronic weighing scales. As many weights were collected in order to collect a good average of the weight per unit.

⁴ WHO/FAO Vitamin and Mineral Requirements in Human Nutrition Second Edition, 2004

If a food was not in season the price was collected for when it was in season and the weight of a similar food item was taken. If this was not possible then alternatives sources were used in order to ascertain an average weight per unit / item

2.3 Sampling

Eight villages had recently been sampled for the HEA study, they were sampled as being an appropriate representation of Yorosso livelihood zone.

Table 3 Villages selected for inclusion

HEA Villages	Local markets visited by households	Main Markets Visited by households
Simona	Simona market	Yorosso Koury
Founa	No village market	
Nampena	No village market	
Douna	Douna market	
Toro	Toro market	
N'Gorona	N'Gorona market	
Diarakongo	No village market	
Menemba	Menemba market	

Due to limited resources only a selection of markets and villages were visited. The intention was that stage 2 of the study would visit the remaining villages and the markets most frequented by households within those villages. The villages and markets visited in stage 1 are listed in table 2.

The village was selected according to the day when the market was being held in order to coincide with the days spent by the team in the village. Where possible village boutiques were also visited in order to collect retrospective price data and the gram weight per unit. During the visits to the villages interviews with women were also conducted in order to ascertain the normal frequency patterns of the foods available in the zone.

The women of the poor and very poor households were required to be interviewed. The selection process was based on asset identification as recommended by the HEA study.

This is shown in table 3.

Table 4 The criteria used for defining wealth group during CoD assessment

	Household size	Cultivated land (Ha)	Animals	Portion of population
Better Off	Approx 30 people in household	3	45 cows 16 sheep 20 goats 50 chicken / guinea fowl 3 donkeys	15 %
Middle	Approx 20 people in household	5.5	15 cows 12 sheep 15 goats 35 chicken / guinea fowl 2 donkeys	20 %

Poor	Approx 10 people in household	12.5	1-2 sheep 2 goats 18 chicken / guinea fowl 1 donkey	28 %
Very Poor	Approx 8 people in household	27	0 -1 goats 15 chicken / guinea fowl	37 %

The women were put forward to be included into the assessment by the village chief or another village representative such as the midwife.

2.4 Permissions and notification of the communities

Permissions were sought from local authorities within Yorosso. In order to notify the communities of our activities in the area, and which villages we intended to visit and the purpose of our study an announcement was broadcast on the local radio.

2.5 Training and Supervision – Stage 1

The training took place at Save the Children US office in Sikasso.

The first stage team include Oxfam partners from AOPP and Mobiom who are both active in promoting sustainable livelihoods in the Sikasso region.

The training schedule was as follows:

Day 1

- Introduction to CoD
- HEA and livelihood zones
- Identifying foods available in the zone and seasonal availability
-

Day 2

- Market identification
- Household composition
- Market data collection and pilot
- Food frequency data collection and pilot

Day 3 – 7

- Data Collection in the field

Day 8

- Data Consolidation and analysis training
- How CoD can be used by Oxfam and partners

2.5 Training and Supervision – Stage 2

The second team to be trained was made up of 6 Community Development Agents who all work in Sikasso region for Save the Children US. The training took place at the SCUS office in Sikasso and the pilot data collection took place at a local market and at the compound of one of the participants.

The data collection team were accompanied during the field work by the SCUS Monitoring and Evaluation Adviser.

Day 1

- Introduction to CoD, methodology
- HEA and livelihood zones
- Discussion of food list and seasonal availability
- Market data collection and pilot

Day 2

- Debrief market data collection
- Food frequency data collection and pilot
- Organisation of CoD assessment and logistical arrangements

Day 3 – 7

- Data Collection in the field

2.5 Development of food list

During the training the team developed an exhaustive list of all foods which are thought to be available in Yorosso zone throughout the year. This list included all foods available to purchase, grown and consumed at home as well as wild foods which are collected.

During the analysis some food items were grouped together such as offal, liver, kidney etc. This also happened for rice as there were many different varieties of rice available. For that reason data was collected for just local rice and imported rice.

2.7 Data Collection

The following data was collected for the analysis:

Market data:

- 1) Weight of food item in the unit which it is sold
- 2) Price of food item in the unit which it is sold

Common consumption data:

- 3) Frequency that each food item is consumed by 12 – 23 months olds and if it changes for different members of the family
- 4) Frequency with which any food items from a food group are consumed by 12 – 23month

During stage 1 of the assessment the data was entered on an daily basis after the field work. During stage 2 of the assessment the data was entered on return to Bamako.

The weight of the local unit of each food item (eg Kg, tas/pile) was consolidated, outliers removed and averaged in order to establish a weight in grams per local unit.

This then acted as a conversion figure in order to establish the price (in FCFA) per 100g of each food item.

In the region it is often not the price that changes as availability flucturates but the amount which is sold. In order to try and capture this the number of items sold in a pile, or how the size of the pile changes was recorded.

A lower and upper limit for the number of times any food item from a food group can be included into the diet was established by selecting the 25th and 95th percentile of the total range of frequency from the data that was collected.

In order to establish a maximum frequency with which any food item could be included into the diet, the 95th percentile of the maximum times a food item was consumed (taken from the data collected) was used as the upper limit.

All lower frequency limits were set at zero, meaning the minimum amount of times a food could be selected is zero. To ensure that the Tier 2 diets were culturally acceptable cereals had to be selected at least once a day. By setting the food group the 25th percentile this happened.

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

The portion sizes that are used in the tier 2 analysis are generic portion sizes that have been collated from a range of secondary and unpublished data, largely from Indonesia. Had portion size data from Mali been available it would have been included but in the absence of this generic data was used.

The portion size data for 12 – 23 month year olds is used as the basis, these are scaled up as a proportion of energy requirements for all other family members (eg. Provide an example).

The data was collected for reference year October 2008 – November 2009, the data was collected retrospectively asking store holders, vendors and market traders the price per unit of each food item over the previous year, month by month and noting any periods where it changed.

The food consumption frequency data was also collected retrospectively through interviews with the mothers of 12 – 23 month olds who were classified as poor or very poor (See HEA classification in Table 3)

2.6 Household size

The average household size for the different wealth groups was estimated during the eHEA assessment. During the CoD training the team estimated what they felt the average composition of this household looked like. This was triangulated whilst in the field and also with the stage 2 SCUS team.

The estimated household composition can be seen in annexe 1. It is assumed that the middle and rich households are polygamous whilst the poor and very poor are monogamous.

2.7 Analysis

The CoD analysis was conducted to represent the whole of Yorosso zone. Firstly tier 1 analysis was conducted in order to get a broad understanding of affordability and the availability of an adequate diet.

Tier 2 analysis was then carried out in order to explore the lowest cost and the nutrient adequacy of the diets in the way they are currently consumed. Based on these results different scenarios were then modelled, exploring the affordability gap as well as nutrient adequacy.

The data entry and analysis for tier 2 is based on a seven day diet in order to be able to capture a more realistically diverse diet however the results for both tiers are presented as a daily diet.

2.7.1 Income

In order to estimate the total amount of income available to the poor households for food purchasing a series of calculations were conducted. Households in Yorosso produced and consumed cereals thereby meeting a certain number of requirements through food not purchased. In order for this to be accounted for the amount of Kg of production which was consumed by the household was converted into a cash equivalent using the price per KG of production sold. Households in Yorosso also rely on either stocks of cereals from previous years (middle and better off) and taking cereals on credit (very poor and poor households). A conversion figure was used by taking the annual average of the price of millet, maize and sorghum. For more information on sources of income and see the Yorosso HEA report⁵.

Credit / stock?

The expenditure figure for non food expenses was also calculated and excluded from the final income figure so that the cost of a diet could be compared with total income available to be spent on foods.

2.8 Seasonality

In order to define seasonal affordability the seasonal definition as shown in figure 3 was used. This primarily defined as a result of climatic changes and agricultural activities. Figure 3 is a brief overview of the seasonal calendar which highlights the main periods for planting and harvest. For a full seasonal calendar (in French) see annexe 2

Figure 3 Seasonal Calendar

	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09
Season		Hot Season			Rainy Season					Cold Season		
Soil Preparation			Cotton	Mil, Sorghum, Peanut								
Harvest										Maize, Cowpea		
Harvest										Cotton		

⁵ Profil de Moyens d'Existence: Mali cone Agricole- mil, Sorgho, Coton: Cerce Yorosso" Save the Children US 2009

										Millet, sorghum
Wild foods					Nere	Shea				

During the training an initial mapping exercise was carried out in order to establish the main seasonal availability of food items.

Further information regarding seasonal availability of food items was captured during the data analysis as well as the fluctuation of price according to months and seasons.

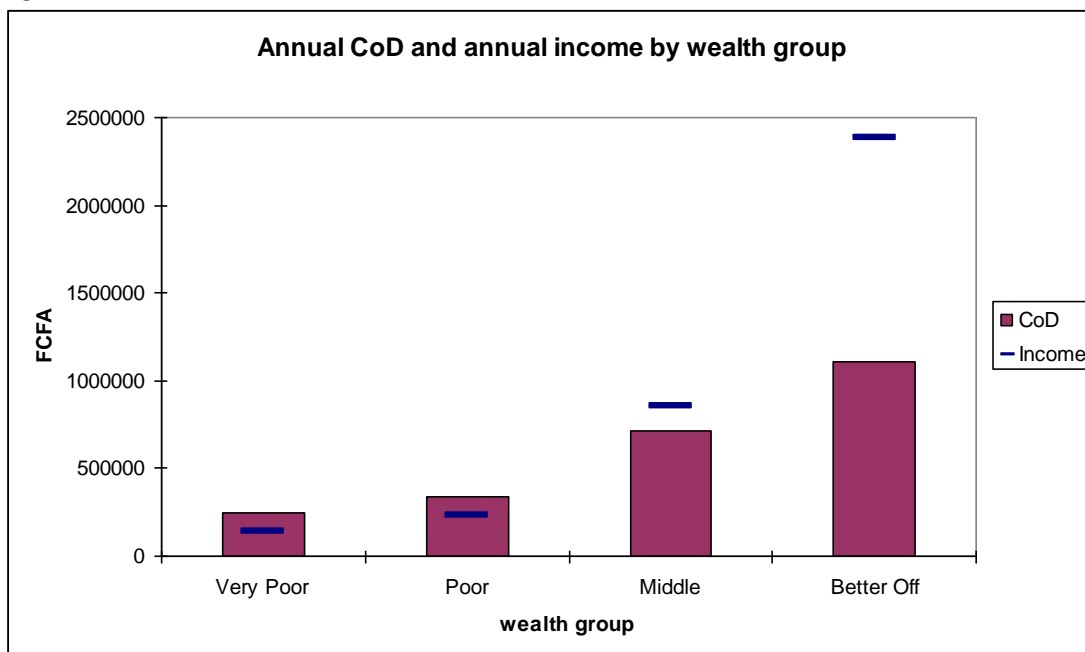
If a food was available for at least half of the season it was said to be available for the whole season.

3. Results

3.1 Tier 1 Results

When tier 1 diets were selected⁶ the lowest cost diet was calculated and demonstrated that a diet which met all nutrient and energy requirements for the whole household can be found from the food types which are available locally. The annual cost of the diet for the very poor and poor was higher than the annual income levels for those household, whilst the income for the middle income and better off household was in fact higher than the annual cost of the diet. Figure 4 demonstrates this. The annual income of the very poor would have to increase by 74% in order to meet the cost of diet and the income of the poor households would have to increase by 47%. For a full breakdown of figures see the annexe 3.

Figure 4



Figures 5 – 8 show how the daily CoD changes by season. The lowest cost diet is most expensive in the rainy season, which reflects the more limited availability of foods and the higher cost. The average daily income for each wealth group is also shown as a line on the graph. There is no data available on the seasonal income patterns although this certainly fluctuates throughout the year as the income capacity of the household is closely linked with the seasonal agricultural calendar. The peak earning period is in the cold season during the harvest of cotton and cereal crops.

Although figure 4 indicates that a middle income household can afford the lowest CoD on an annual basis figure 7 shows that on a seasonal basis this may not be the case. During the rainy season the average daily income would not be sufficient to afford the lowest cost diet. Table 5 show the grams per day that a household would have to consume in order to meet all the requirements for that tier 1 lowest cost. And Table 7 shows the percent contribution of the total cost by food group. There is a heavy reliance on sesame seed and soya to meet the requirements of the household however these are not food types which are regularly consumed by households within Yorosso. The frequency data shows that household on average consume legumes twice per day and this was predominantly peanuts, consumed on average 11 times per week (in roasted form or as a paste) or cowpea consumed on average twice per week.

⁶ Tier 1 – when the maximum portion sizes used are calculated automatically and therefore can often be unfeasibly large

The detailed breakdown of cost by season and wealth group can be seen in annexe 4.

Figure5

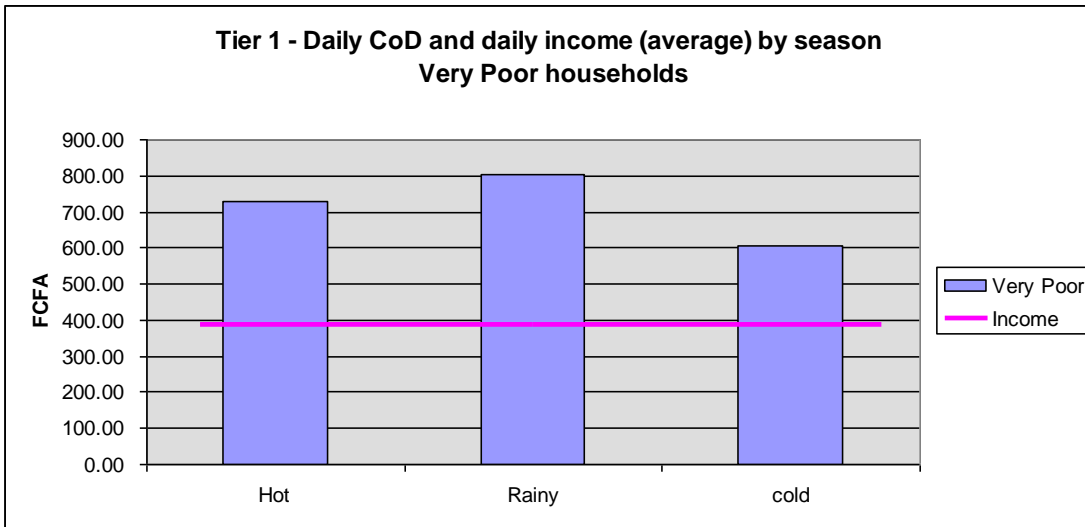


Figure6

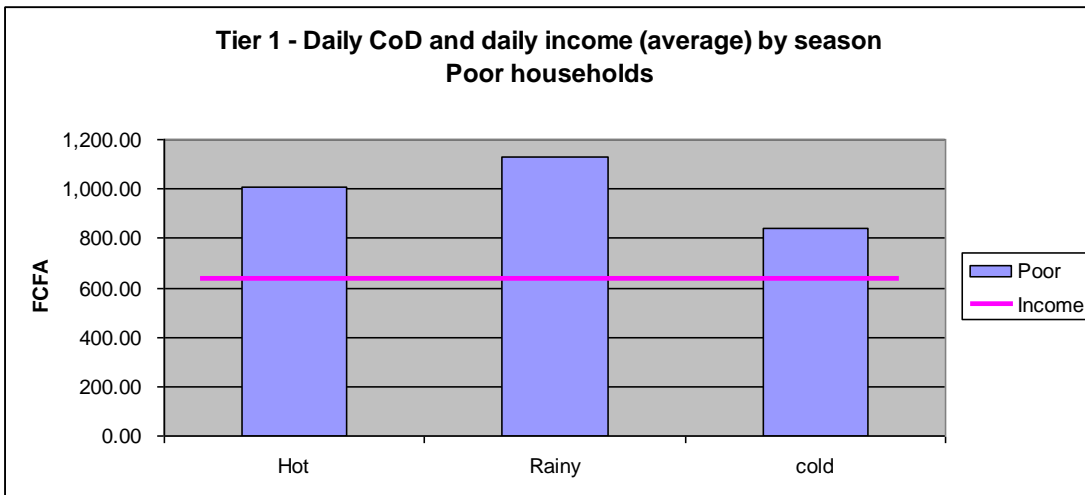


Figure7

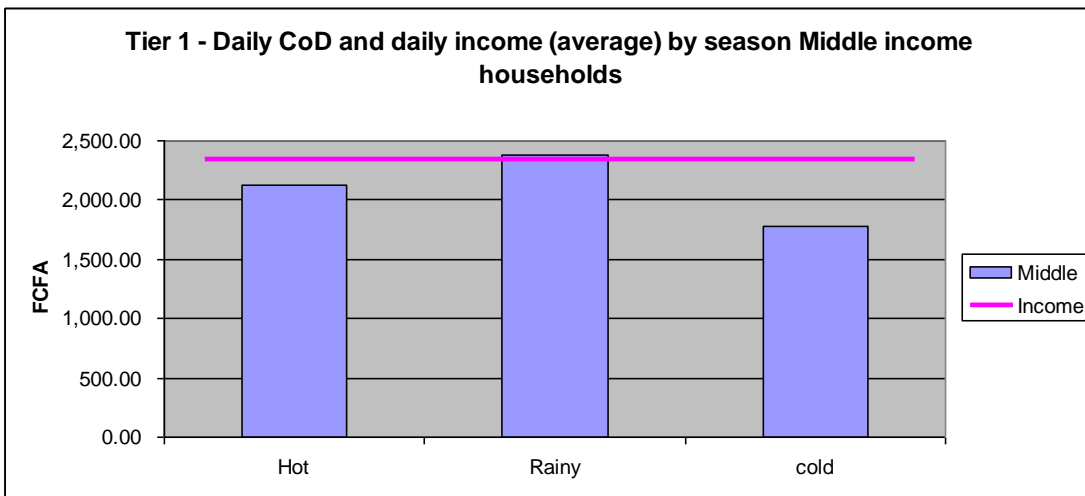


Figure8

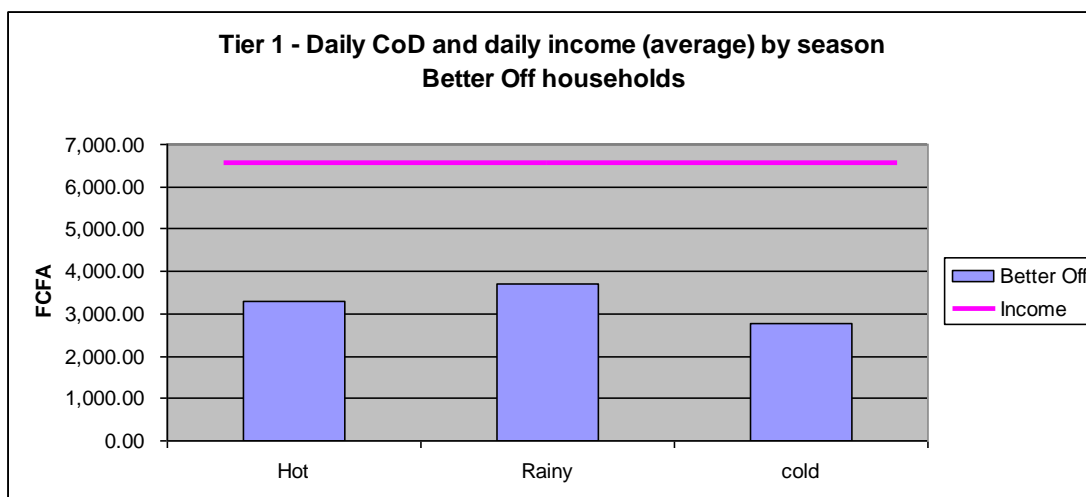


Table 5 Tier 1 Very Poor households grams per day selected in the lowest cost diet which meets all requirements

	Hot	Rainy	Cold
	Grams / day	Grams / day	Grams / day
Breast milk	549	549	549
Sorghum	2485	2493	2814
Cowpea (Niebe)	7	129	139
Peanut	0	183	57
Sesame	470	643	727
Soybean	966	228	232
Beef Liver	56	14	19
Mango	0	3220	0
Papaya	419	0	465
coconut	34	0	0

Table 6 Tier 1 Poor households grams per day selected in the lowest cost diet which meets all requirements

	Hot	Rainy	Cold
	Grams / day	Grams / day	Grams / day
Breast milk	549	549	549
Sorghum	3541	3158	3666
Cowpea (Niebe)	7	7	45
Peanut	0	184	0
Sesame	592	619	781
Soybean	1451	1267	1165
Beef liver	27	19	25
Mango	0	4540	0
Papaya	543	0	563
Coconut	122	2	0

Table 7 Percent of total cost from each food group

Food Group	Hot	Rainy	Cold
Staples	37 %	34 %	37 %
Fruit	7 %	4 %	8 %
Pulses	50 %	61 %	52 %
Meat	5 %	1 %	2 %

The results of tier 1, that is the lowest cost of a diet which meets all the requirements is based on a diet which includes large quantities of cereals and legume. Almost 4kg (3928g) of cereals and legumes would need to be consumed by the very poor households (2 adults and 6 children) in the hot season and very large quantities of mango would need to be consumed in the rainy season as this is a very cheap source of vitamin A and C.

3.2 Tier 2 Results

The tier 2 results calculates the lowest cost diet which can be found when the foods which can be included are restricted to reflect the way foods are currently eaten. The results then show us information about the lowest cost of the best possible quality diet if the frequency with which people currently eat foods doesn't change. The frequencies and portion sizes are shown in annexe 5.

When the tier 2 diets were calculated to reflect the way in which foods are consumed the results showed that the lowest cost diet was unable to meet some essential micronutrients. Therefore the lowest cost diet is based on the best possible diet that household can purchase from locally available foods IF they do not change the frequency or type of foods that they eat.

Because tier 2 diets are not able to put such large quantities of very cheap foods in order to maximise the nutrient content of food (because the portion size is limited to what is a realistic portion size) the foods selected are often more expensive nutrient dense foods. For this reason the overall cost of the diet is more expensive and none of the household can afford it, figure 9. These results must be read with caution however. These are the diets that are restricted in the way the are put together by the programme to highlight the quality issue. This is not necessarily the cheapest combination of possible foods to include in the diet.

The detailed breakdown of cost by season and wealth group can be seen in annexe 6

The diets of the 12-23month olds are showing that there are potential nutrients which are not being met, thiamine, iron and calcium whilst for the rest of the household (above 2years of age) iron seems to be the nutrient requirement that is most difficult to achieve.

Figure 9

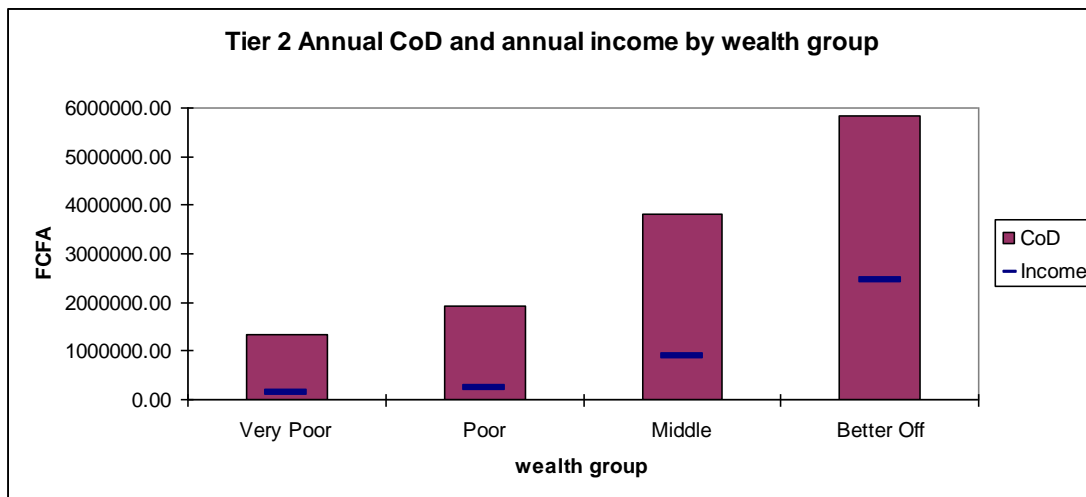


Figure 10

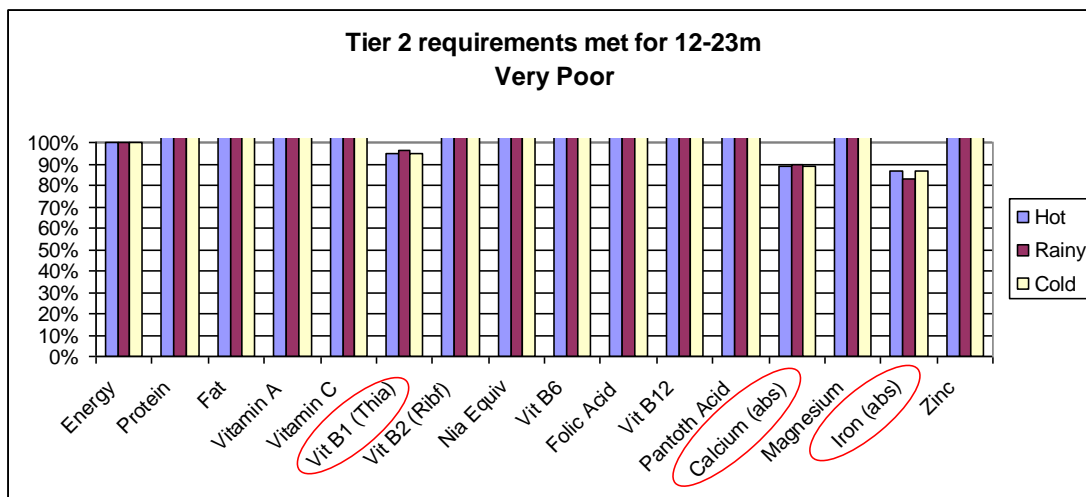


Figure 11

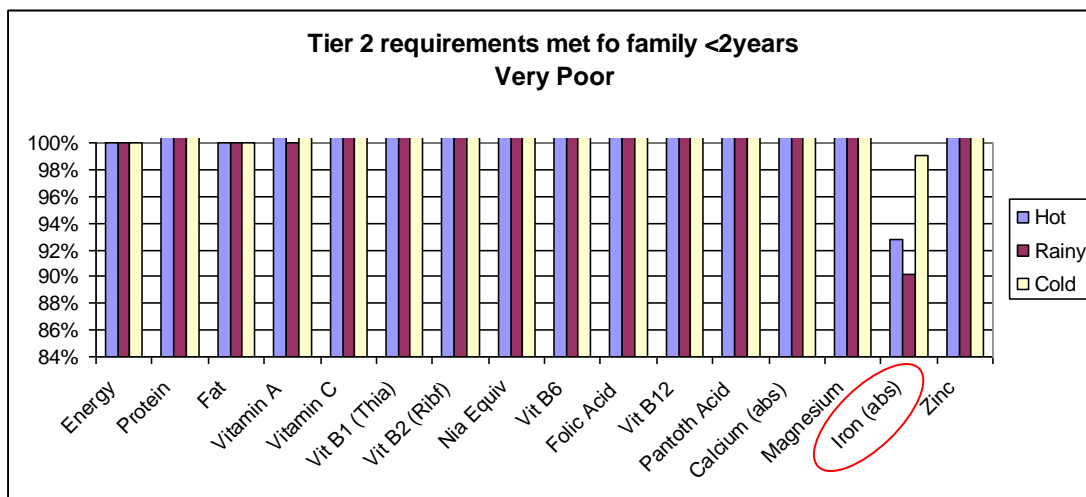


Table 8 Tier 2 diets for the very poor households by season

	Hot	Rainy	Cold
	Grams / day	Grams / day	Grams / day
Breast milk	532	532	532
Rice	562	566	562
Millet	1114	1115	1205
Sweet potato	300	300	300
Potato	4	-	4
Cassava	4	4	4
Taro	100	-	100
Cowpea	120	120	120
Peanut	60	60	2
Carrot	-	1	-
Okra (dried)	346	528	73
Milk	1633	1633	1633
Buttermilk	1633	1633	1633
Powdered milk	200	200	200
Beef	120	120	120
Beef offal	31	31	31
Mutton	60	60	60

Goat	60	60	60
Egg	80	80	80
Fish (dried)	322	322	322
Orange	840	840	840
Mango	-	77	-
Guava	168	-	168
Lemon	120	117	120
Banana	324	324	324
Papaya	336	336	336
Watermelon	168	-	168
Baobab pulp	280	280	280
Shea butter	237	235	255
Baobab leaf	321	47	731

3.3 Scenario results

3.3.1. Additional income required

There are 2 apparent barriers to the poorest household's from accessing a nutrient dense diet. The first barrier is economic. Both tier 1 and tier 2 results demonstrate that the main issue preventing the poorest household's from accessing a good quality diet is income. Figures 12 – 14 demonstrate the increase in daily income that would be needed in each season if a household would be able to afford to purchase a tier 1 diet.

Figure 12

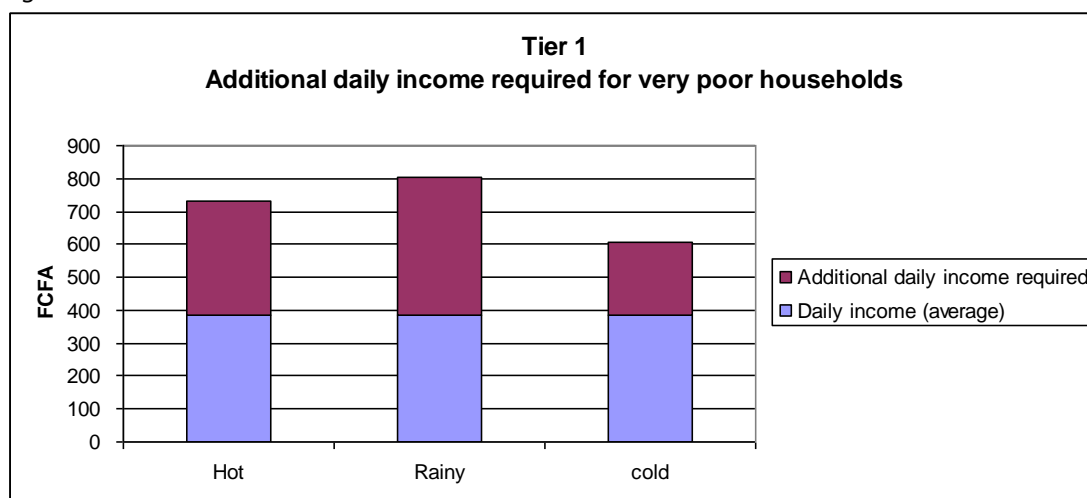


Figure 13

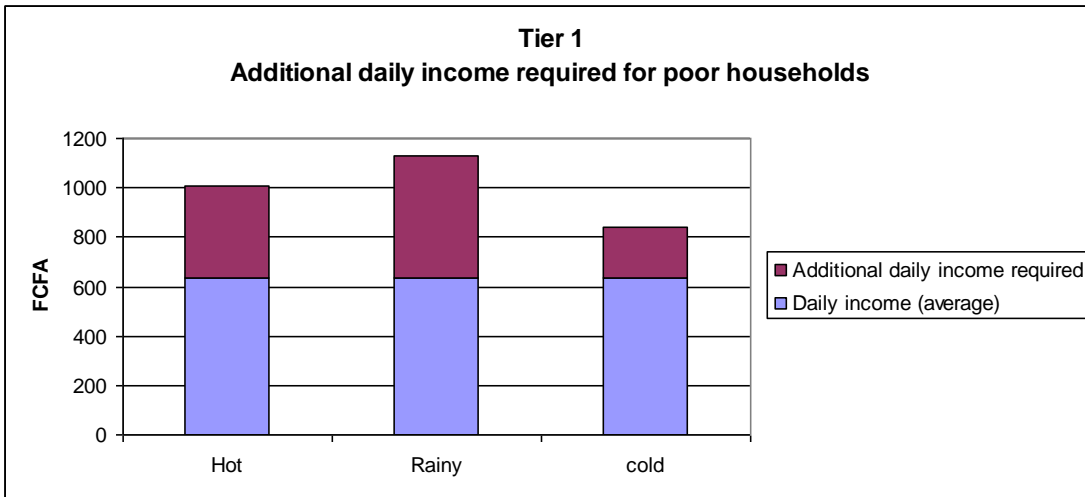
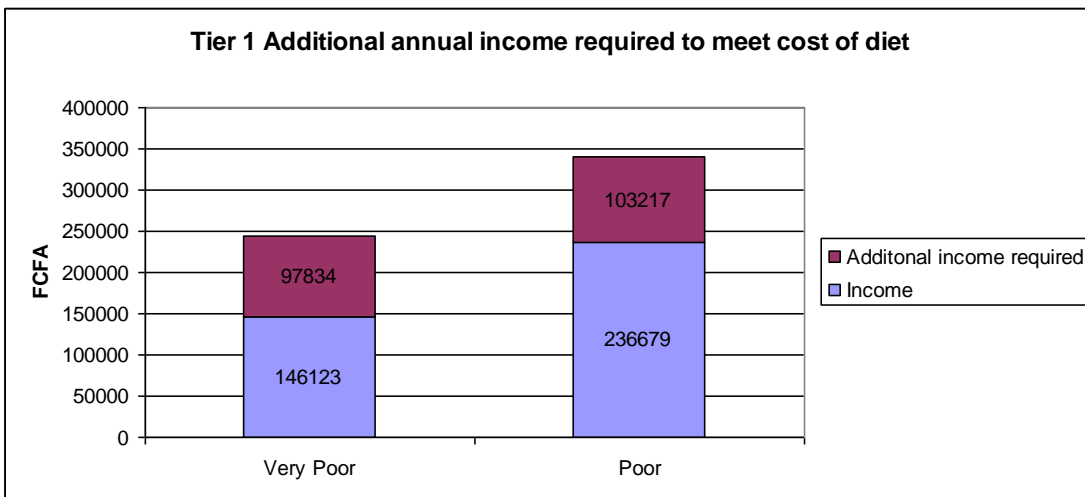


Figure 14



3.3.2 Increased Frequencies

The second barrier to household members accessing a nutritiously adequate diet maybe that the frequency with which certain foods are consumed is too low to enable the nutrient requirements to be met. This is entwined with the economic factors as it is often constraints of affordability which prevent household from purchasing the foods which are more dense in nutrients.

In order to make the tier 2 diets meet the requirements whilst still trying to minimise the cost the frequency with which any food item from any food group could be consumed was 21 times per week. That is food from each food group could be included up to 3 times per day per person. Any food items that already had a frequency of above 3 times per day was left the same but any food item which was under three was increased so that all food items could be included at least 3 times per day. This is to allow the programme to select the lowest cost diet from a broad range of food items without being restricted too much whilst still adhering to culturally acceptable consumption patterns. The requirements were then able to be met for all household members except of the very poor and poor households and shows that by increasing the consumption of certain highly nutritious foods the diet can be improved. The annual cost of the diet and annual income by wealth group is shown in figure 15. Table 9 demonstrates that number of servings per

day which would be needed from each food group in order to meet the requirements at the lowest cost as displayed in figure 15.

Figure 15

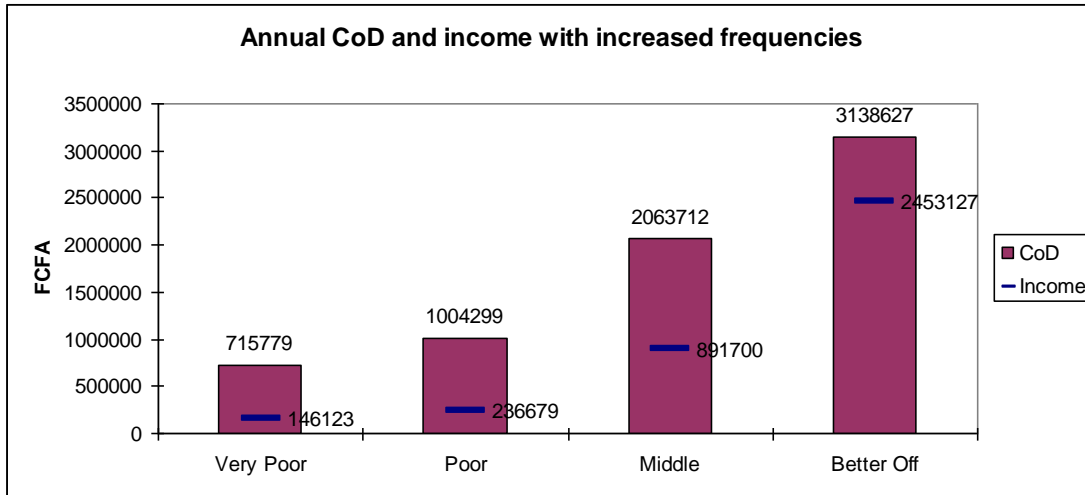


Table 9 Number of servings per person per day in order to meet all requirements at the lowest cost as per figure 15 for the very poor household

	Family >2years	12-23month
Cereals	2.0	2.0
Pulses	0.4	1.1
Fruit	2.2	3.0
Veg	1.7	1.4
Dairy	0.7	1.3
Meat, Poultry, Fish, Eggs	3.0	2.7
Roots and Tubers	0.1	0.4
Fats	2.2	0.4
Breast Milk	0.0	1.0

Table 10 Grams per day selected (with increased frequencies allowed) that meet all nutrient requirements for a the very poor household

	Hot Grams / day	Rainy Grams / day	Cold Grams / day
Breast milk	532	532	532
Rice	556	556	556
Millet	1028	893	893
Sorghum	434	568	568
Sweet potato	100	0	11
Taro	0	100	96
Cowpea (Niebe)	128	118	120
Soybean	6	6	6
Lettuce	174	0	0
Okra (dried)	431	560	554
Milk	296	1088	1088
Buttermilk	1633	1633	1633

Powdered Milk	1	1	1
Condensed milk	180	6	6
Beef	180	180	180
Beef Offal	192	192	192
Beef feet	96	96	96
Mutton	176	174	176
Mutton liver	0	61	60
Lamb head meat	96	36	36
Fish (dried)	120	120	120
Orange	840	30	30
Mango	0	3242	3182
Lemon	2	0	3
Papaya	504	18	18
Baobab pulp	73	0	4
Date	300	143	143
Shea butter	272	270	272
Buttermilk	42	24	22
Bamabaara	6	6	6

4. Discussion

The results from Yorosso highlight clearly the issue of economic access. The results from Tier 1 show that a diet that meets all nutrient and energy requirements is available from the foods available locally in Yorosso. There are a number of main markets and especially Koury market which benefits from the trade from nearby Burkina Faso which are visited regularly by all household. The better off household's were reported as visiting these more often than the poorer household but there are systems whereby goods can be bought on behalf of those household which do not visit. This means that household are gaining access to the markets and to the wide variety of food items which are available to purchase. There was less reported seasonal variation in the availability of many foods in Koury market as one might expect because it is on the main trade route from Burkina Faso and Mali. However the results from the CoD and the data collected during the frequency data collection indicate that the poorest household do not purchase or consume a very wide range of food items. It was also reported anecdotally that even the richer households did not vary the types of food they consumed and in fact they were still largely cereal based with limited amounts of more nutrient dense expensive foods such as meat or vegetables being consumed.

The seasonal breakdown of the cost of the diet demonstrates that the rainy season is the most expensive season to purchase an adequate diet. Without access to seasonal income data it is difficult to accurately state how the affordability gap changes seasonally but it can be assumed that the gap between actual daily income and daily cost of diet in the rainy season is likely to be as large if not larger than between the daily cost of the diet and the average daily income as calculated from the average annual income figure. The main sources of income are sale of agricultural products and labour on local farms, therefore the peak period for income is likely to be during the harvest period of the main crops; maize, millet and sorghum and cotton. The harvest period for these crops starts in October and therefore the peak period for income generation activities falls after the most expensive time of the year. The lean period, when the diets are most expensive therefore coincides with the time of year when income is likely to be at the lowest, further heightening the vulnerability of household to insufficient food sources.

Tier 1 results show that the better off household should be able to afford the diet at all times of the year however the middle income household may still be vulnerable to seasonal food insecurity and the poorest household are likely to be unable to afford a nutritious diet in any of the seasons.

This can be linked directly with access to land and assets. The poorest household do not have access to sufficient quantity of land to be able to harvest enough crop to consume as a household or to sell and therefore the income that they are able to make from the land is not sufficient to carry them through the lean period before the income generation activities pick up again (cold season).

In some villages there were reports of household gardens where fruits and vegetables were grown, even some of the poorer household's reported growing small amounts of vegetables however these were said to be sold rather than consumed in order to raise money to be able to purchase staples foods which are seen as more economical as they are bulky and prevent the feeling of hunger.

Despite chickens being raised within the villages the eggs were rarely consumed (reported on average less than twice a month), again they were sold in order to raise funds for other food and non food items. Eggs are an excellent source of protein and b-vitamins, including thiamine which is one of the potential "problem"⁷ nutrients as seen in the tier 2 results and therefore encouraging household to include the regular inclusion of egg into the diet of 12 -23 month olds could be a strategy to improve the quality of diet for a child at a time when they are most vulnerable to micronutrient deficiencies which can affect their growth and development. During the rainy season the wide spread availability of mango's which can either be collected for free or bought very cheaply are a superb source of vitamin c and a without which the diets in the rainy season would certainly be more expensive.

Tier 2 results demonstrate that there is a potential lack of iron in the diets of all members of the family. Iron deficiency can cause iron deficiency anaemia which is especially problematic for young children and women

⁷ "problem" nutrients are those nutrients which are potentially difficult to meet

of child bearing age. It can cause fatigue which can have a detrimental effect on a person's ability to work as well as carry out caring practices which in turn can have a negative effect on health and hygiene of the younger children.

Tier 2 scenario modelling demonstrates the impact on diet quality by increasing the frequency of certain foods. Up to 3 items from any food item could be selected per day for each household member and any food item could be selected at least 3 times per day. By not restricting the frequencies with which different foods can be selected to what is actually eaten the programme is able to select a lowest cost diet which meets all the requirements. The diets are still more realistically consumable than tier 1 diets, with a greater variety of foods and less reliant on consuming large quantities of legumes and cereals. The key foods which are contributing the requirements when allowed to be selected more frequently are milk and meat products and this is so that the diets can reach the adequate content of iron and calcium. Note that the tier 2 results show a possible lack of iron and calcium in the diets in the way they are currently eaten.

5. Recommendations

A long term and sustainable intervention is required to lift the poor and the very poor household out of the cycle of poverty which they are currently trapped. Without sufficient land the poorest households cannot grow adequate stocks of cereals to last them throughout the year, nor can they grow sufficient to make a profit, reports of the sale of livestock was also common further decreasing the earning capacity and the nutritional opportunity of the household. An intervention to address this is necessary and asset transfer or land loans whereby the harvest of the poorest can be increased must be explored.

Grain banks is one option for allowing households to select when they sell the grain in order to sell when the price is good.

As much of the land labour is done by the members of the household there are limited employment opportunities and therefore exploring small business opportunities and skills training programmes could be a viable opportunity for the poorest household to develop skills in order to increase the chance for them to gain employment during the lean time when employment is low.

CoD can be used as a tool as a targeting instrument on a very localised level. For example, the data could be analysed by village, using only the price and availability data from that specific village and from the markets that those households reach. This would be a way in which to select which villages are most vulnerable to food insecurity as a result of high prices and lack of affordability. If the tool is used in this way the results of course be triangulated with other targeting indicators such as distance to market, wealth distribution in village, access to health care and income.

In order to monitor the ongoing food security situation in Yiroso the CoD tool can be used as a monitoring instrument as part of a wider early warning system. Food price data can be selected on a monthly or quarterly basis in order to do regular analysis on the cost of a diet. This would immediately indicate if the overall CoD was increasing over time. This indicator could be combined with nutritional indicators of weight and height. As part of a long term monitoring scheme the prevalence of wasting and CoD could be measured over time in order to see if there is a correlation and also to assess whether we can use the change in the lowest cost of a nutritious diet as an indicator of nutritional status.

Annexe 1 – Household composition

Very Poor	8
12-23m breast fed (either sex)	1
3-4 yr (either sex)	1
5-6 yr (either sex)	1
10 - 11 yr (either sex)	1
14 - 15yr (either sex)	1
Hommes 30-59yr actif	1
Femme 30yr - 59 actif	1

Poor	10
12-23m	1
3-4 y	1
7 - 8 y	2
12 - 13 y	1
14 - 15yr	1
16 - 17 y	1
Hommes 18 - 29y actif	1
Hommes 30-59yr actif	1
Femme 30yr - 59 actif	1

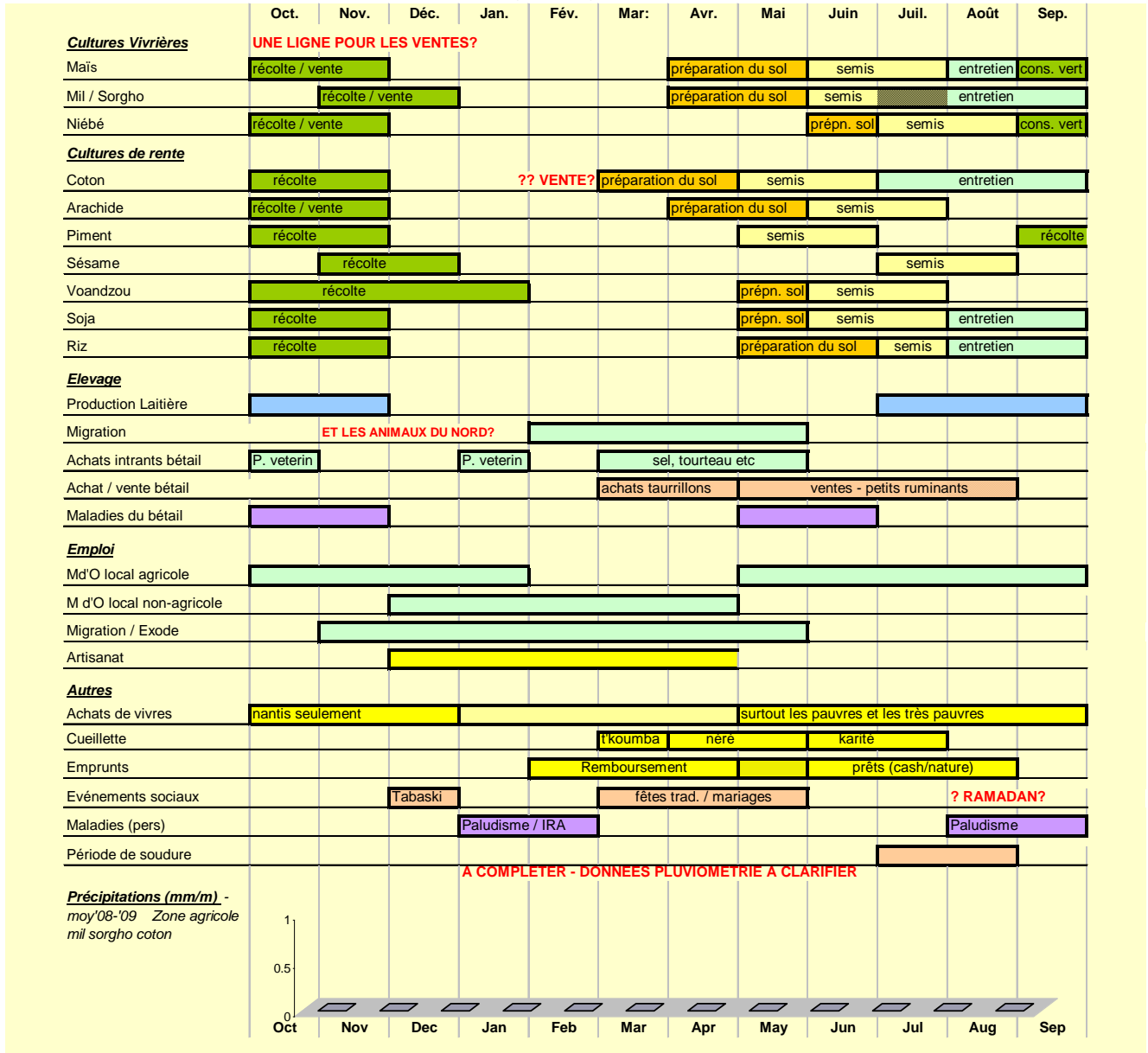
Middle	20
6 - 9 month	2
12-23month	1
4 - 5 yr	2
7 - 8 yr	2
12-13 y	2
14 - 15 yr	3
16 - 17yr	2
Femme 18 - 29y actif	3

Hommes 30-59yr actif	1
Femme 30yr - 59 actif	2

Better Off	30
6 - 9 month	2
12-23month	1
3 - 4 yr	2
6 - 7 yr	3
8 - 9 y	1
12-11 y	2
14 - 15 yr	3
16 - 17yr	4
Hommes 18 - 29y actif	3
Hommes 30-59yr actif	3
Femme 18 - 29 mod actif	2
Femme 30yr - 59 actif	3
Homme >60 yr non actif	1

Annexe 2
HEA Seasonal calendar

¹ Profil de Moyens d'Existence: Mali cone Agricole- mil, Sorgho, Coton: Cerce Yorosso" Save the Children
US 2009
(DRAFT)



Annexe 3
Tier 1 Breakdown of CoD and Income (FCFA)

		Hot	Rainy	cold	Annual
Very Poor	CoD	730	806	605	243957
	Income	400	400	400	146123
Poor	CoD	1004	1132	840	339896
	Income	648	648	648	236679
Middle	CoD	2122	2375	1781	716070
	Income	2443	2443	2443	891700
Better Off	CoD	3288	3689	2776	1112537
	Income	6721	6721	6721	2453127

Annexe 4
Tier 1 Breakdown of daily cost of diet

		Hot	Rainy	Cold
		Daily CoD in FCFA	Daily CoD in FCFA	Daily CoD in FCFA
Better Off	< 2 years	264	241	230
	Rest of Family	3,025	3,448	2,546
	Overall	3,288	3,689	2,776
Middle	< 2 years	173	168	150
	Rest of Family	1,948	2,207	1,631
	Overall	2,122	2,375	1,781
Poor	< 2 years	28	32	23
	Rest of Family	977	1,100	817
	Overall	1,004	1,132	840
Very Poor	< 2 years	28	32	23
	Rest of Family	703	774	582
	Overall	730	806	605

Annexe 5
Tier 2 Frequency and generic portion size

Cereals		14	21
Pulses		3	21
Fruit		6	35
Veg		4	14
Dairy		0	8
Meat, Poultry, Fish, Eggs		1	14
Roots and Tubers		1	8
Fats		3	14
Manufactured		0	0
Beverages		0	0
Condiment Vegetables		0	0
Sugars		0	0
Snacks		0	0
Supplement		0	0
Breast Milk	532	7	7
BREAST MILK (GENERIC)	532	7.0	7.0
RICE, LOCAL, PADDY (INDIA)	36	0.0	2.0
RICE, WHITE, MILLED (INDONESIA)	36	0.0	2.0
MILLET, WHOLE GRAIN (SENEGAL)	36	0.0	21.0
SORGHUM, WHOLE GRAIN, RED (SENEGAL)	36	0.0	21.0
MAIZE, WHOLE KERNEL, DRIED (SENEGAL)	36	0.0	21.0
FONIO, WHOLE GRAIN (SENEGAL)	36	0.0	0.0
SWEET POTATO, FRESH-AP (SENEGAL)	25	0.0	3.0
YAM, WINGED, FRESH (SENEGAL)	25	0.0	1.0

POTATO, ENGLISH, RAW (KENYA)	25	0.0	1.0
CASSAVA, YELLOW (INDONESIA)	25	0.0	1.0
TARO (EGYPT)	25	0.0	1.0
COWPEA, WHOLE DRIED (SENEGAL)	15	0.0	2.0
PEANUT, DRIED IN SHELL (SENEGAL)	15	0.0	1.0
SESAME SEED (EGYPT)	15	0.0	0.0
SOYBEAN, YELLOW (INDONESIA)	15	0.0	0.0
CARROT, RED (EGYPT)	25	0.0	1.0
CUCUMBER (EGYPT)	25	0.0	1.0
LETTUCE (EGYPT)	15	0.0	2.0
CABBAGE (MEXICO)	15	0.0	3.0
TOMATO (EGYPT)	10	0.0	14.0
EGGPLANT, WHITE (EGYPT)	10	0.0	13.0
CHILI, RED (KENYA)	1	0.0	14.0
ONION, FRESH (SENEGAL)	5	0.0	14.0
OKRA, DRIED (SENEGAL)	10	0.0	14.0
MILK, COW, FRESH (MEXICO)	136	0.0	3.0
BUTTERMILK (INDIA)	136	0.0	3.0
MILK, COW, PWD, WHOLE (KENYA)	25	0.0	2.0
MILK, COW, CONDENSED (MEXICO)	15	0.0	0.0
BEEF (INDONESIA)	15	0.0	2.0
BEEF, INTESTINES (INDONESIA)	8	0.0	1.0
BEEF, LIVER (INDONESIA)	8	0.0	0.0
BEEF, FEET (MEXICO)	8	0.0	0.0
MUTTON, MEAT (INDONESIA)	15	0.0	1.0
LIVER (EGYPT)	8	0.0	0.0

LAMB, HEAD MEAT (EGYPT)	8	0.0	0.0
GOAT (INDIA)	15	0.0	1.0
GOAT INTESTINES & STOMACH, RAW (KENYA)	8	0.0	0.5
CHICKEN (EGYPT)	15	0.0	2.0
EGG, CHICKEN (INDONESIA)	20	0.0	0.0
EGG (INDIA)	20	0.0	1.0
FISH, DRIED, FRESH WATER (MEXICO)	10	0.0	0.0
FISH, SMOKED, DRIED-EP (SENEGAL)	10	0.0	14.0
ORANGE (EGYPT)	42	0.0	5.0
MANGO (EGYPT)	42	0.0	21.0
GUAVA, FRESH (SENEGAL)	42	0.0	1.0
APPLE (EGYPT)	42	0.0	0.0
PINEAPPLE (INDONESIA)	42	0.0	10.0
LEMON (KENYA)	5	0.0	6.0
BANANA (EGYPT)	42	0.0	2.0
PAPAYA (INDONESIA)	42	0.0	2.0
WATERMELON (EGYPT)	42	0.0	1.0
BAOBAB, PULP, FLOUR (SENEGAL)	5	0.0	14.0
COCONUT, MATURE, MEAT (INDONESIA)	10	0.0	0.0
DATE (INDONESIA)	25	0.0	0.0
BUTTER, SHEA-BUTTERSEED (SENEGAL)	5	0.0	14.0
SESAME OIL (INDIA)	5	0.0	0.0
LEAF, BAOBAB, FRESH-EP (SENEGAL)	15	0.0	14.0
BUTTER, COW, UNCOOKED (SENEGAL)	5	0.0	0.0
PALM OIL, LOCAL (SENEGAL)	5	0.0	0.0
PUMPKIN (INDIA)	25	0.0	2.0

BAMBARA GROUNDNUT, DRIED, POWDERED (SENEGAL)	15	0.0	0.0
BAMBARA GROUNDNUT, FRESH (SENEGAL)	15	0.0	0.0

Annexe 6
Tier 2 Breakdown of daily cost of diet

		Hot	Rainy	Cold
		Daily CoD in FCFA	Daily CoD in FCFA	Daily CoD in FCFA
Better Off	< 2 years	244	216	220
	Rest of Family	18030	17036	16718
	Overall	18273	17252	16938
Middle	< 2 years	396	347	362
	Rest of Family	11570	10854	11057
	Overall	11966	11201	11419
Poor	< 2 years	157	141	143
	Rest of Family	6,215	5,499	5,263
	Overall	6,372	5,640	5,406
Very Poor	< 2 years	157	141	143
	Rest of Family	4,070	3,688	3,888
	Overall	4,227	3,829	4,031