**Baseline survey
November/December 2006**

GCP/MOZ/079/BEL

Protecting and Improving Household Food security and Nutrition in HIV/AIDS affected areas of Manica and Sofala Province.

**FAO / Belgium Survival Fund
Ministry of Agriculture in collaboration with the Ministry of Healt, Ministry of Education and Culture, Ministry of Women and Social Action and the Ministry of Planning and Development.**

4 year project. 2005-2008.

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Glossary and Abbreviations

BMI	Body Mass Index
EC	European Community
FANTA	Food and Nutrition Technical Assistance Project
FAO	Food and Agriculture Organisation
HFIAS	Household Food Insecurity Access Scale
HDDS	Household Dietary Diversity Score
IDDS	Individual Dietary Diversity Score (IDDS)

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1.Introduction

The following report presents the findings from the baseline study for the food security and nutrition projects GCP/MOZ/079/BEL and GCP/MOZ/027BEL. The Belguim Survival Fund /FAO project 027 (including Tambara district in Manica province) started in June 2002 and will terminate in December 2007, the second Belgium Survival Fund project covering districts in the two provinces in the centre of Mozambique, namely Manica and Sofala (including the districts of Nhamatanda, Gondola and Chibabava) started in 2005 and will finish in February 2009. The project aims to work through the provincial and district agricultural services to support local community based organisations to improve household food security and nutrition. The areas selected for the project are affected by HIV/AIDS and/or chronic food security problems.

2. Objectives of the baseline

- Establish the food security status of households in the project area before the start of project activities
- Provide information to measure the impact of project activities on household food security status.

3. Field Pretest

The baseline survey instrument was developed using three basic indices of food security; namely:
- Household Food Insecurity Access Scale (HFIAS)
- Household Dietary Diversity Score (HDDS)
- Individual Dietary Diversity Score (IDDS) for women between the ages of 15-49 years of age).

The Household Food Insecurity Score (HFIAS) and the dietary diversity scores have been developed by the FANTA food security group as field monitoring tools for measuring socio-economic status and food insecurity.

In order to field test the instruments in Mozambique a pilot was undertaken in February/March 2006. Testing of the instruments involved a number of stages, namely:
- Adaptation and translation of the instruments
- Developing a training format for enumerators
- Application of the instruments in the field
- Review of the experience of using the instruments
- Review of the results from the field test

Adjustments were made to the instruments and t he training programme in order to ensure clarity and uniformity during the baseline. A full report of the field testing process can be found in annex A.

4. Design of baseline survey

4.1. Questionnaire and baseline instruments

The baseline instrument is comprised of the following modules and can be found in annex B
A: Demographic and basic habitation
B. Income sources
C: Goods and Livestock
D: Participation in local organizations and social support
E: Chronic illness and mortality
F: Household Dietary Diversity (HDD)
G: Household Food Insecurity Score (HFIAS)
H: Individual Dietary Diversity Score (IDDS) and Body Mass Index (BMI)

As far as possible questions were formulated to facilitate comparison with the National Vulnerability Assessment (2006)[1].

A further field instrument was developed to measure group/organizational maturity of a selection of the organizations working within the project area. The measure included the following information and can be found in annex C

- Reason for group formation
- Members and group stability
- Quality of leadership
- Internal procedures
- Frequency of meetings
- Income generating activities
- Financial health
- Social protection activities
- Diversification of support
- Activities carried out by the group.

The consultant discussed with the project management that it would be necessary to carry out a full participatory assessment of each organization that the project intended to work with, before starting activities, in order to establish benchmarks for organizational development. The maturity index carried out at the same time as the baseline was not participatory and worked with a selection of the local

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[1] Survey carried in 2006 in all provinces in the country to assess the food security and nutrition situation.

community based organizations identified by the project management and the district facilitators.

The baseline was developed in coordination with the EC/FAO Food Security Information for Action Programme for testing field instruments and the Division of Consumer Protection and Nutrition at FAO/Rome.

The final version of the instrument was approved by all collaborators in the project.

The survey was carried out in November and December 2007.

The selection of the sample districts for the baseline survey was based on the need to be able to distinguish between communities living directly on the major transport corridor (Beira corridor) and those communities living in the interior of the provinces with little contact with the transport corridor. The districts selected were part of the project area. Two districts were selected by project staff in each of the provinces in order to represent the different operational environments for the project. It was decided to purposively select district rather than select randomly in order to guarantee the mix of districts on the main transport corridor and districts in the interior of the province.

Province	District
Sofala	Nhamatanda – C
	Chibabava – NC
Manica	Gondola – C
	Tambara – NC

C = corridor
NC = non-corrdor

4.2 Characteristics of corridor districts.

Agricultural activities represent the major source of food and income for the households, but there is higher potential for developing other income sources linked to commerce on the transport corridor. Reported HIV prevalence is higher on the corridor than in the interior districts. Nhamatanda is on the corridor and serves as a busy trucking stop with a lively market and thriving centre. The majority of people continue to have livelihoods that are closely linked to agriculture. Gondola in Manica province is less than 20 Km from the capital city of the province. The district has huge agricultural potential and is a trading hub for agricultural goods for the province of Manica.

4.3 Characteristics of non corridor districts.

Agricultural is the basis of the livelihoods for households in the non corridor districts. They are characterized by having poor access to markets, lower population density and disperse settlement patterns. The communities are also affected by HIV mainly due to the patterns of migratory male labour out of the districts to work in South Africa / Zimbabwe. The real levels of prevalence are not known. Tambara district is semi arid where both livestock and agriculture play an important role in livelihood strategies. The district is also has high levels of migratory labour. Tambara is the most distant from the transport corridor. Chibabava is a district with agricultural potential. One part of the district is closer to the transport corridor. Chibabava also has a tradition of migratory labour to South Africa and Zimbabwe.

4.4 Reaching target populations

The districts have different population densities that has implications for the strategies the project adopts to achieve coverage of the beneficiary populations. In general it is easier to reach households that live in more densely populated areas due to both logistical considerations and socio-cultural factors. In terms of logistics it is physically easier to reach larger denser communities and maintain the intensity of contact through extension activities than in disperse communities (homesteads). Some of the socio-cultural factors to take into consideration include aspects of group formation, often harder in dispersed populations, and reasons the cultural reasons for the dispersed settlement patterns that may include rivalry and distrust in the community.[2] Specific strategies will be needed to be developed to address the settlement patterns in each of the areas.

4.5 HIV AIDS prevalence

As stated in the above paragraphs there is an assumption from contextual information that the corridor district have higher levels of HIV than the interior districts, unfortunately the national statistics do not report below provincial level and there are no available studies that look statistically at the differences. In addition, until recently most VCT facilities and treatment facilities were concentrated in provincial or selected district capitals so it was not possible to infer from clinical data the prevalence of HIV. [3] Mortality data is not routinely collected or collated.

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[2] Participatory work in the FAO 029 programme in Macossa showed that households live separately due to high levels mistrust and jealousy around the polygamous marriages.

[3] A recent experience of taking mobile VCT to the accommodation camps (flood affected households) in Tambara resulted in an extremely (and surprisingly) low HIV positive rate amongst adherents (less than 1% with high levels of testing in the camps). Source: Informal communication from the NGO Concern working on the emergency programme.

4.6 Sample Size

A total of 600 households in four districts make up the sample size for the baseline survey. The districts were selected by project staff to represent districts close to the transport corridors and districts in the interior of the provinces. The sample is statistically representative for comparison between corridor and non corridor populations.

The following tables indicate the distribution of the clusters by district. It can be seen from the table that the districts of Nhamatanda and Gondola (corridor districts) have a higher number of clusters (12 cluster for each district) compared to the Districts of Tambara and Chibabava (non corridor districts – 8 clusters per district). The distribution was made in this way due to the differences in the population of the four districts and does not affect the validity of the corridor / non-corridor comparisons.

NB: Each cluster = a village or a neighbourhood within the locality.

The households were selected using the cluster sampling method. Fifteen households were interviewed in each cluster. See algorism for selection of households in annex D.

District / population	Admin Post	Locality	# of Clusters
Nhamatanda 104.415	Nhamatanda	Nhamatanda	12
Chibabava 66.884	Chibabava	Chibabava	1
	Goonda	Goodna	1
	Muxungue	Muxungua	2
		Mucheve	4
Gondola 71.871	Amatonga	Amatonga	1
		Nhambonda	2
		Pindanganga	3
	Inchope	Doeroi	1
		Muda Serracao	1
	Matsinho	Charonga	3
Tambara 34.698	Nhacolo	Nhacolo	1
		Sabeta	3
	Buzua	Marmanau	2
	Nhacafula	Nhacafula	2

4.7 Questionnaire (annex B)

The questionnaire was developed with considerable input from FAO Rome and the final questionnaire was approved in Rome to represent the requirements of the baseline for the project, and in addition testing of the indices for EC/FAO project.

The indices used in the questionnaire (and will form part of the testing procedure) were:

Household Food Insecurity Acess Scale (HFIAS): An index built around nine questions that represent varying degrees of food stress in a household by the number of times households have experienced food stress.

Household Dietary Diversity Score (HDDS). A measure of the diversity of the diet of populations that has been correlated in other studies [4] with socio-economic status.

Individual Dietary Diversity Score (IDDS)
The dietary diversity of women and girls was measured for a female in the household between the ages of 15-49 who were not pregnant or had not given birth within the last three months.

Organisational Maturity: A form was developed to measure the organizational maturity of the groups working in the project area. This was difficult to apply as there had been very few groups identified in the selected sites for the baseline survey and even though the project had been underway for more than one year there had been little contact with the formal and non formal groups in the districts. Some work was carried out with identified groups but it would be difficult to draw any firm conclusions from the data

4.8 Anthropometric measurements

The BMI of non pregnant women and girls between the ages of 15-49 was taken using altimeters and digital weighing scales.

The BMI measurement was taken of the women who responded to the Individual Dietary Diversity section of the questionnaire.(total of 521 women).

4.9 Data entry and Analysis

Data was double entered using an Access developed by the EC/FAO team based on the questionnaire, and checked/cleaned using EPIINFO tools for data cleaning. The data was converted to SPSS for analysis. The indices for dietary diversity

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[4] FANTA HFIAS and HDDS/IDDS index.

(HDDS and IDDS) and food insecurity (HSIAS) were developed by the EC/FAO team to ensure comparability with other data tests underway in Malawi and Kenya. A wealth index was developed from information on asset ownership and housing conditions collected in the survey.

4.10 Indices used in the analysis.

The Household Diversity Dietary Score (HHDS) is comprised of the following twelve food groups:

Staple cereals; tubers; meat; eggs; fish and shellfish; legumes; vegetables; fruit; milk and milk products; oil and oil seeds; sugar; tea/coffee or alcoholic drinks.

The highest possible score for the dietary diversity is 12 and the lowest 1, where 12 is equal to the most diversified diet and 1 is the least diversified diet

The Individual Dietary Diversity Score (IDDS) was measured for women between 15-49 years of age. The IDDS includes fourteen food groups, but excludes consumption of coffee/tea and sugar.
The highest possible score for the IDDS is 14 and the lowest 1, where 14 is the most diversified diet and 1 is the least diversified diet.

The HFIAS is calculated using the scores for each of the 9 questions about household food insecurity. Each question has a potential score of 3 depending on the frequency of the experience (eg: 0 for "never" to 3 for "often"). The highest score for the index is 27 and the lowest 0, where 27 indicates households with the highest level of food insecurity and 0 indicates households with the lowest levels of food insecurity. Three methods for analyzing the HFIAS were employed in this report. The first is to report the mean score, the second is to divide the score into terciles, with the lowest tercile representing the best off households and the upper tercile representing the households with the most food insecurity. Thirdly, the HFIAS is used to classify households by food security status using a matrix that takes into consideration the frequency responses for each questions (never, rarely, sometimes or often). Annex D shows the matrix for household classification.

Body Mass Index (BMI): This index is calculated using weight (kg)/ height(m)^2 of women/girls between the ages of 15 -49 years old, who were not pregnant or had not given birth in the last two months.

The following cut off points were used to define the nutritional status of women:
≤18.5 = thinness 18.5- 24.9 = Normal   ≥ 25.0 overweight

The wealth index was created from the variables: source of income; animal ownership; housing materials; asset ownership (see annex E for details of wealth index).

Chronic illness by a household member in the past three months was used as a proxy for HIV or AIDS.

5. Results and discussion

5.1 Demographic results
Out of 600 household surveyed 361 were surveyed in the corridor districts and 239 in non corridor districts.

Table (1) shows the mean size of the households in the corridor and non corridor areas as 6.3 and 5.2 respectively, with dependency ratios of 97.6 in the corridor area and 102.6 in the non corridor area. The lower dependency ratios in the corridor area may be attributable to the higher levels of HIV with households expanding to take in orphaned children. Further analysis on the household composition and in-depth interviews to describe family relations within households would be needed to confirm this hypothesis.

Although there is no difference between the number of deaths suffered by households in the last 6 months between the corridor and non corridor districts there is a significant difference between the number of households with members that are chronically sick with the corridor areas showing 25.5% of households with chronically sick members against 14.2% of households in non corridor areas. Given that the corridor areas are assumed to have the highest prevalence of HIV in the country this statistic is not surprising and can probably be explained through the HIV related chronic illness.

The literacy levels of the people interviewed from the households and show a striking difference between corridor and non corridor areas. In total 235 respondents (48%) reported knowing how to read and write; 58% from the corridor zone compared to only 29.5% from the non corridor zone. When asked about the literacy level of the head of household, who may have been different from the respondent, the literacy level for corridor increased to 72%, but no increase was seen for non corridor heads of households compared to all respondents[5]. This follows an expected pattern of increased illiteracy rates in the interior rural areas. (see table in annex F) and is most probably related to the high levels of female headed households in the non corridor areas.

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[5] There were many missing values for the variable on literacy levels.

There is a significantly higher proportion of households in the non corridor areas that have female headed households (32.4%) against (19.9%) in the corridor areas. This can be explained due to the high levels of male migration from the rural areas to the cities or neighbouring countries. In the corridor districts there are more opportunities for paid labour and employment than in the rural areas away from the transport corridors, therefore it is more likely that men will remain with the households. Both of the districts selected for non corridor have a long tradition of male migratory labour to Zimbabwe and South Africa.

Table 1 - **Main demographic characteristics of the household by corridor**

Location	N	HH size Mean	Dep. ratio* Mean	Mortality %	Disease %	Male Head hh %
Corridor	361	6,3	97,6	4,9	25,5$	81,1$
Non corridor	239	5,2	102,6	4,6	14,2	68,6
TOT	600	5,82	99,5	4,8	20,9	76,4

*the dependency ratio is the ratio between the active population (16 to 59 years old) end the dependent population (0 to 15 and more than 60 years old)
§ Means are significantly different by corridor using T test, $p < 0,001$
$ Chi square test is significant, $p < 0,001$

Table 2 - Main demographic characteristic of the household by province

Province		HH size Mean	Dep. ratio* Mean	Mortality %	Disease %	Male Head hh %
Sofala	300	6,2	105,3	6,4	24,7$	75,4
Manica	300	5,4	93,36	3,1	17,1	77,4

§ Means are significantly different using T test, $p < 0.001$
$ Chi square test is significant, $p < 0,05$

5.2 Income source

Over half of the total sample reported production and selling of agricultural produce as their main source of income (61%). Disaggregated by corridor and non corridor, 90% of non corridor households sell agricultural produce as their first source of income compared to 43% in corridor households. The following sources of income are important for corridor households; agricultural piece work (16%); informal trading (16.3%); and salary (14%). These income sources are less important in non corridor households, however the remaining 10% of households who stated that agricultural produce is not their first source of income have similar income sources to corridor households. Interestingly very few households (12 in the whole sample) declared that remittances were their first source of income although there is a high level of male migration in both areas. This is possibly due to interview failure to probe sufficiently into the area of remittances.

There are insignificant levels of credit obtained by households both in corridor and non corridor areas (7%). This includes both informal and formal credit.

5.3 Land holdings

Cultivated land was divided into rain-fed land (land that depends on rainfall and is used for food and cash crops during the rainy season) and low lying land (where second season planting can take place and is usually a smaller cultivated plot). Given that ownership of traction animals is virtually non existent the use of cultivated land is limited to labour power within the household or that can be hired outside of the household.

Approximately a sixth of households were not cultivating rain-fed land at the time of the interview (15%)[6] and a further sixth were cultivating less than one quarter of a hectare (16%). A third of households cultivate between a quarter and 1 ht (33%), and (22%) cultivate between 1-2 ht. Only (14%) cultivate more than 2 ht

In contrast 41% of households did not have access to low lands; 24% had access to a quarter of a ht; and a further 23% had access to between a quarter of a Ht and 1 ht of low land. This cultivation pattern is as expected, with lower low lying land holdings.

5.4 Animals

Livestock holding are generally low, with the exception of the least poor households in Tambara that have higher livestock ownership.

A third of households do not have any chickens. This could be due to the high incidence if Newcastles disease in the communities surveyed. Just over a third of household have very few chickens (less than 6 chickens). Chickens are considered a hedge against food insecurity for the poorest households. A third of households hold more a substantial number of chickens (+ 7) that would be considered a minor source of income. It would be important to look at the impact of Newcastles disease on the chicken population of these areas and consider the introduction of a community Newcastles vaccination programme. (see table in annex F)

The number of pigs owned by the surveyed households is very low with less than a sixth of the households having any pigs. Surprisingly less than half of the households surveyed had any goats (table of distribution of goats in annex F). There is a scattered pattern of goat ownership with no significant difference

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[6] This appears to be a high percentage in the sample of people not cultivating and further analysis is needed to correlated people not cultivating dry lands with wet land cultivation, the composition of the household and primary income source.

between corridor and non corridor households, although there is higher goat holding in Tambara district (non corridor district).

Only 14 out of the 600 households had cattle, indicating that household potential to invest in larger livestock is extremely low. There was no evidence of traction animals among surveyed households in any of the districts.

5.5 Basic living conditions.

Living conditions in the two provinces are basic. The majority of homes are made from clay with thatch roofing. Very few homes are made from more durable material such as cement walls or plastic or zinc roofing. Sanitation facilities are rudimentary with 58 and 76 percent of families in the corridor and non-corridor respectively, reporting using the bush for sanitation purposes. Use of a traditional latrine was more common in the corridor (35%) as compared to the non-corridor (19%). The majority of the household do not use any form of sanitation. The majority of households in the corridor rely on petrol lamps for lighting, while in the non-corridor area petrol lamps and firewood are the main lighting sources.

5.6 Participation in Organizations

Participation in any sort of organization, ranging from religious organizations to peasant farmer associations, is extremely low for both corridor and non corridor households (4.5%). This is indicative of the way in which communities organise in the centre of the country with few formal links other than extended family relationships. See the discussion of the organizational maturity index for further information on community based organisations.

5.7 Summary of Dietary Diversity Scores (HDDS and IDDS) and Household Food Insecurity Access Scale (HFIAS).

The Household Dietary Diversity Score has been documented in a study by IFPRI [7] to be highly correlated to economic status of households. We will examine the links between the wealth index and the dietary diversity score, and the correlations between the dietary diversity scores, the food security index and the Body Mass Index for women between the ages of 15-49 years.

The table (3) below is a summary of the scores for the indices; where for HDDS and IDDS higher scores indicate a better diet and HFIAS where a higher score indicates higher levels of food insecurity at the household level.

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[7] **Hoddinott, J. & Yohannes, Y**. 2002. *Dietary diversity as a food security indicator*. FANTA 2002, Washington DC. http://www.aed.org/Health/upload/dietarydiversity.pdf

Table 3 - Dietary diversity and food access indicators

Dietary diversity indicators	N	Mean ± sd	Min	Max	Confidence Interval 95%
HDDS_ 12	594	4,3 ±1,5	1	10	4,24-4,50
IDDS_14	521	4,4 ±1,5	1	10	4,28-4,54
HFIAS	591	12,5 ±7,0	0	27	12,19-13,38

All variables (HDDS_12, IDDS_14 and HFIAS) show a significant difference for the mean by corridor and non corridor districts and by Province (Manica, Sofala)

The HFIAS mean for Sofala (14,6±6,8) is significantly higher than in Manica. (10,4 ±6,6), indicating that food insecurity in Sofala province is higher than in Manica. This score is influenced by the low HFIAS in Tambara district (Manica Province) where the HFIAS showed a low number of households with food insecurity.

5.8 Household Diets Disaggregated

In the table below the HDDS score is disaggregated to show the percentage of the households in the survey consuming different types of food. It is clear from the table that the 4.3 average score is principally made from the consumption staple cereals (97.1%) , high vegetable consumption (86%), fruit which was mainly mangoes as the survey was carried out in mango season, and either fish or legumes. Only 50% of the sample consumed oil (either cooking oil or oil seeds). Less than 10% of households consume meat or meat products and egg consumption is extremely low at (3.5%).

There are significant differences in consumption patterns between corridor and non corridor communities. The percentage of households consuming tubers (sweet potatoes, cassava) is nearly four times higher in the non corridor area than the corridor. This may be due to access to markets for grain as a preferred staple on the corridor or due to the increased production of cassava in the district of Tambara (non corridor Manica). A third more households consume oil/oilseeds in the corridor communities than in non corridor. Oil consumption is highly correlated with market access and/or socio-economic status, as is the consumption of sugar which again is over three times higher in the corridor communities. Market access and production patterns seem to play a role in the choice of protein consumption. In corridor communities, where markets are available, fish consumption is twice as high as non corridor and the opposite is true for legume consumption, where over 50% of non corridor households consume legumes (51.9%) as compared to 20.6% of corridor households.

The following graphs illustrate the differences between provinces and between corridor and non corridor communities by consumption of different food items.

Graph 1a, Consumption of food groups (% households) by province
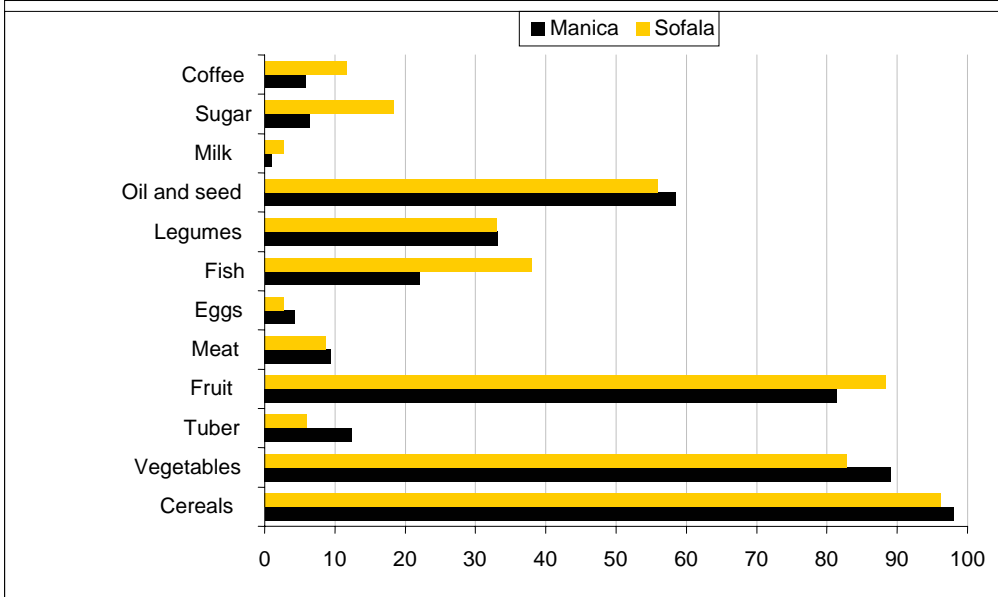
Graph 1b. Consumption of food groups (% households) by corridor and non corridor
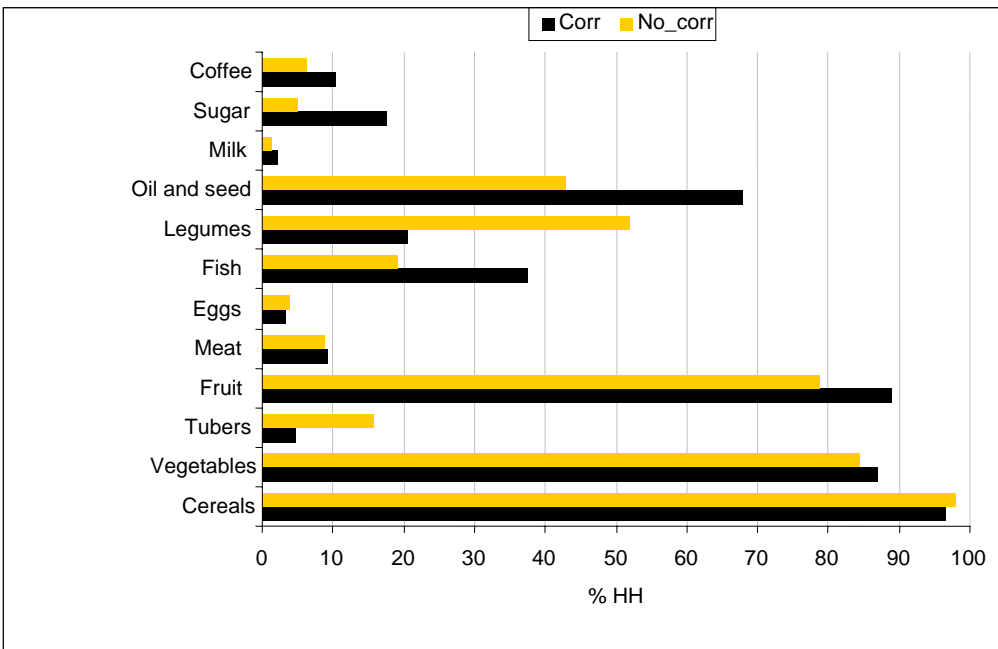
The foods items that comprise the additional diversity of the higher scoring diets are; oil, vegetables and additional protein sources such as beans and fish.

Table 4: Food groups that were consumed by > 50% of households by dietary diversity tercile

Lowest dietary diversity (≤ 3)	Medium dietary diversity (4 and 5)	High dietary diversity (≥ 6)
Cereals	Cereals	Cereals
Green leafy vegetables	Green leafy vegetables	Green leafy vegetables
Vitamin A rich fruit	Vitamin A rich fruit	Vitamin A rich fruit
	Oil	Oil
		Other vegetables
		Fish
		Legumes, nuts and seeds

As can be seen from the table below one of the food items that is consumed by households with a more diverse diet is animal protein (with Vit A and iron). The consumption of animal products is usually correlated to higher economic status.

Table 5: Percent of household consuming Vitamin A and Iron rich food by Dietary Diversity tercile

	Lowest DD (< = 3)	Medium DD (4-5)	High DD (>=6)
Vitamin A rich plant source	90	97	98
Vitamin A animal source	18	43	64
Iron animal source	18	42	64

5.9 Consumption patterns of Women and Girls (Individual Dietary Diversity. Score)

The dietary diversity of a randomly chosen woman and girl aged between 15-49 years who was not pregnant or given birth within the last two months and who was present in the household was interviewed about her eating patterns in the previous 24 hours. Weight and height were measured to assess her body mass index (measure of nutritional status).

As can be seen in table 6. females living in non corridor areas have a higher percentage of females with a lower IDDS score (38.2%) than females in the corridor areas (23.7%). This may be linked to the non availability of food stuffs for a diverse diet in the remote rural areas. There is no statistical difference between women living in the two provinces. (table 6)

Table 6-Percentage of women by IDDS terciles and Zones

Zones	IDDS14_tercile %			Total	P value
	1 low	2 medium	3 high		
Corridor	23,7	48,9	27,4	100	<0,00 1
Non_corridor	38,2	42,6	19,1	100	
Manica	26.8	48.7	24.6	100	p=.49 6
Sofala	31,4	44,7	23,9	100	

There is a significant association between going to market in the last 24 hours and Dietary Diversity both province and by corridor. Table 7 shows the percentage of women going to the market increases with IDDS14 terciles, this strengthens the argument that access to markets may signify increased access to a diverse diet.

Table 7. Percentage of women went to the "market" by IDDS_14 terciles and zones (corridor, province)

Zones	IDDS14_tercile %		
Went to Market (last 24 hours)	Low	Medium	High
Corridor	8,0	26,5	35,6
Non_corridor	3,8	13,8	20,5
Manica	3,3	20,7	25,0
Sofala	7,6	22,9	35,7

Less than a third of women living in the non corridor areas consumed animal sources of vitamin A or iron (29,7% and 29.3% respectively) . Nearly half of women in the corridor area consume these food items (animal source of Vit A food 47% , Iron rich food 46.5%). Given the high levels of malaria in each of the area the lack of consumption of iron rich food sources is a cause for concern.

The survey was carried out in November/ December of 2006 which coincides with mango season in Mozambique. The vast majority of women in both corridor and non corridor districts consumed mangos and thereby were classified as consuming vitamin A rich food. (see tables in annex F). A further survey will be carried out in two of the four districts in July 2007 where it will be possible to verify the levels of consumption of Vitamin A rich foods outside of the mango season.

Patterns of women dietary diversity as measured by the Individual Dietary Diversity questions show very similar patterns to household dietary diversity with high consumption of staple cereals., vegetables and either fish or legumes. Meat protein consumption is low as in household diets. Fruit consumption is high with nearly 80% of women consuming mangoes and 13% consuming other types of fruit.

5.10 Household Food Insecurity and Individual Dietary Diversity

The HFIAS and the IDDS results were divided into terciles for purposes of comparison; where HFIAS 1 is equal to most food secure and HFIAS 3 is equal to most food insecure; and where IDDS 1 is equal to the lowest dietary diversity and IDDS 3 is equal to the highest dietary diversity.

Table 8 - Relationship between IDDS_14 terciles and HFIAS terciles by zones

Corridor	IDDS14_tert	HFIAS_TERT		
		1_FS (food secure)	2_FSM (food secure medium)	3_FI (food insecure)
Corr[a]	1_low	10,7	28,0	61,3
	2_medium	34,2	28,3	37,5
	3_high	43,7	31,0	25,3
No_corr[b c]	1_low	33,3	44,9	21,8
	2_medium	34,9	41,0	27,9
	3_high	59,0	28,2	12,8

[a] Chi square test is significant, p<0,001
 ie low DD associated with higher food insecurity

[b] Chi square test is significant by Province, p<0,05
[c] for non corridor and Manica, association not in expected direction due to low levels of food insecurity in Tambara

HFIAS_tercile definition
1_FS food secure 0≤ HFIAS ≤9
2_FSM food secure medium 10≤ HFIAS ≤16
3_FI food insecure 17≤ HFIAS ≤27

Individual Dietary Diversity Score Tercile Definition
1. Low IDDS terciles is equivalent to low dietary diversity (1-3 food groups)
2. Medium IDDS terciles equivalent 4-5 food groups
3. High IDDS terciles means 6 or more food groups

The pattern between the food insecurity score and the dietary diversity are as expected in the corridor areas, see graph 1 below, however, the pattern is not so clear in the non corridor areas. This may be due to the distortions of the dietary diversity score through lack of access to markets that lowers the availability of choice for alternatives for dietary diversity (see paragraph 6.10.), or due to the low levels of food insecurity in Tambara district (non corridor) for the reasons already discussed.

Graph 2 : HFIAS (terciles) by Dietary Diversity (terciles) among households within the corridor
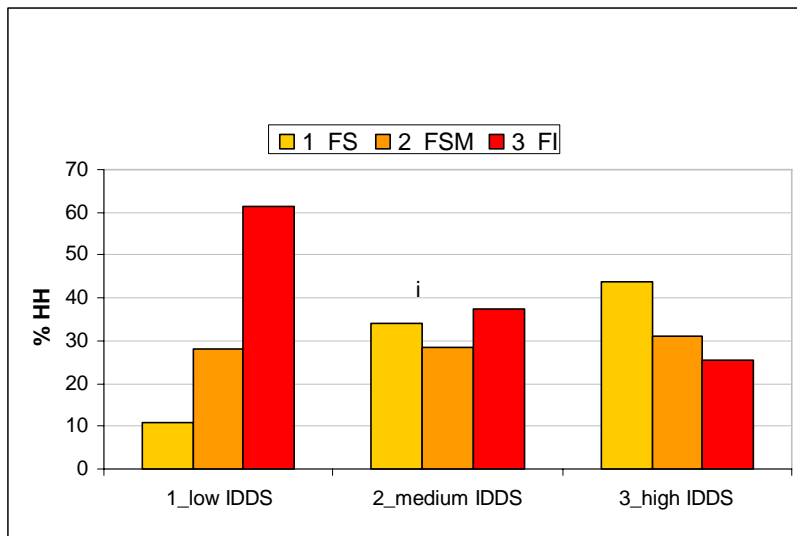
Legend: FS = Food Secure; FSM= Food Secure Medium; FI=Food Insecure

Graph 3: HFIAS (terciles) by Dietary Diversity (terciles) among households win the non corridor region

Percentage of household by HFIAS_tert and IDDS14 tert - No corridor
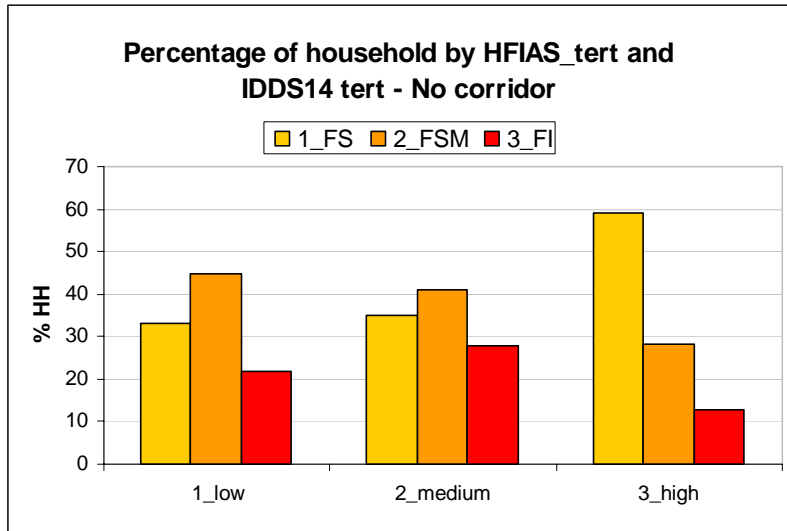
Legend: FS = Food Secure; FSM= Food Secure Medium; FI=Food Insecure

5.11 Measuring Food Insecurity using the HFIAS index.

The HFIAS can be used to classify households by food security status with respect to food access. Overall, 8% of households were assessed to be food secure, 6% mildly food insecure, 16% moderately food insecure and 70% severely food insecure. The high proportion of households classified as severely food insecure is a reflection of having answered that at any time in the past month, there was no food in the house OR someone went to bed hungry OR someone went a whole day without eating (see Annex F).

The following table shows the classification for corridor status and province.

Table 9: Food security classification by corridor status and province using the Household Food Insecurity Access Scale (HFIAS).

	Corridor Status (% households)		Province (% households)	
	corridor	non corridor	Sofala	Manica
food secure	3.1	14.6	11.5	4.0
mild food insecurity	3.9	10.0	8.8	4.0
moderate food insecurity	14.0	19.7	21.4	11.3
severe food insecurity	78.9	55.6	58.3	80.7
TOTAL	100	100	100	100

Significantly more households in the corridor area suffered from severe food insecurity at sometime during the last month. The difference reflects the low levels of severe food insecurity in particular in Tambara district (non corridor) where only 4% of households suffered severe food insecurity in comparison with nearly a third in all other districts – see graph 3 (table in annex F.)

Graph 4. HFIAS (Fanta classification) by District
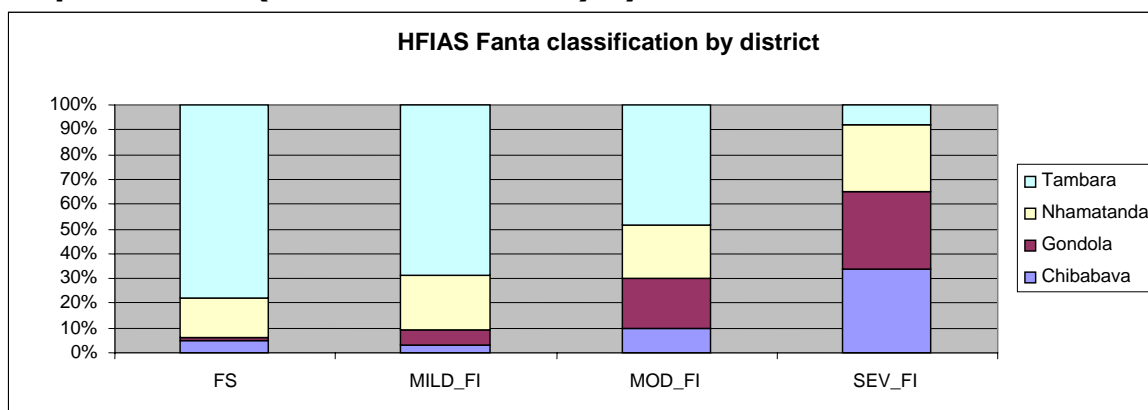
Legend: FS=Food Secure, Mild FI = Mild Food insecure, Mod FI= Moderate Food Insecure, Sev FI = Severe Food insecure

In order to highlight the occurrence of hunger, the HFIAS index was analysed using the following criteria:

Households that answered rarely, sometimes or often to the questions " did you or any member of your household go to bed hungry during the last month" or "

did you or any member of your household go a whole day without eating" were considered those experiencing hunger at some time.

Within the corridor group only a third of all households interviewed had not suffered from hunger at some time in the previous month: two thirds of households had either gone to bed hungry or not eaten anything during one day. In contrast, slightly less than half of the households in the non corridor areas had experienced hunger. .

Table 10. Experience with hunger: Corridor and non Corridor Households.

	Corridor	Non Corridor	p value
Hunger at some time in past month	67.4%	46.4%	<0.001

The measurement of <u>prolonged hunger</u> was also made, defined as households responding *"sometimes" or "often" to the questions "did you or any member of your household go to bed hungry during the last month?" or " did you or any member of your household go a whole day without eating in the past month?".*

The variable indicates households that suffered from a more regular form of hunger. Once again the pattern shown in the variable described above holds true. Corridor households are more likely to suffer from prolonged hunger than households in the non corridor area.

Table 11: Degree of prolonged by Corridor and non corridor households.

	Corridor	Non Corridor	p value
Prolonged hunger	44.1%	35.6%	0.041

For all measures of food security and hunger using the HFIAS, the non corridor areas were shown to be better off. This is largely influenced by the small number of households in Tambara that answered either, " sometimes or often" to the questions of going to bed hungry or not eating during a whole day. In Tambara district it was noted that there were relatively large holdings of small livestock that may be one of the factors that allows households some flexibility when household food stocks are exhausted (selling an animal to buy grain for example).

5.12 Mortality and Illness and Food Insecurity.

One of the associations explored through the baseline was the relationship between chronic illness and food insecurity. The association between HFIAS and illness is significant in Sofala but not in Manica because the number of food insecure in Tambara is low.

Table 12. Percentage of household with at least one member ill in the past three months by HFIAS terciles for province and corridor.

Illness		HFIAS_TERCILES		
		most food secure (row %)	medium food secure	most food insecure
Manica	Illness	42,9	32,7	24,5
	no_illness	49,8	29,5	20,7
Sofala	Illness	21,9	23,3	54,8
	no_illness	41,9	34,2	41, 9

Illness		HFIAS_TERCILES		
		Most food secure (row %)	medium food secure	most food insecure
Corridor	Illness	26,4	27,6	46,0
	no_illness	31,3	30,9	37,7
Non corridor	Illness	39,4	30,3	30,3
	no_illness	44,5	35,7	19,7

The association between HFIAS and illness is not significant in either corridor or non corridor. There is no association statistically for HFIAS by death in any of the 4 zones or for the total population.

Table 13. Percentage of household with the death of at least one member in the past six months by HFIAS terciles.

Death			HFIAS_TERCILE			Total
			1_low	2_medium	3_high	
	Death		29,6	29,6	40,7	100,0
	No_death		36,6	32,6	30,8	100,0

5.13 Anthropometric Measurements of Women between 15-49 years of age

The average BMI for the women in the survey is 21.5 with the minimum BMI detected of 13.1 and the maximum 33. 11.2 % of women are chronically energy deficient, 78% have normal BMI and 9.8 % are overweight.

Table 14– Girl/Women's Nutritional Status

Dietary diversity indicators	N	Mean ± sd	Minimum	Maximum	Confidence Interval 95%
BMI	518	21,5 ± 2,8	13,1	33,0	21,3-21,8

BMI and Dietary Diversity

The total sample of interviews on Individual Dietary Diversity Score has been divided into terciles where:
- Low IDDS (≤3 food groups consumed)
- Medium IDDS (4 or 5 food groups consumed)
- High IDDS (6 or more food groups consumed)

Against all expectation there was no strong statistical relationship between BMI and IDDS in either the province or by corridor /non corridor. One would expect that the nutritional status of women would be correlated with dietary diversity. However, there is no strong statistical relationship shown in the survey. The number of women with low BMI is not significantly higher for the lower dietary diversity.

This could be due to a number of reasons, including:
- Dietary diversity measures the quality of the diet and not the quantity of the Kcal/proteins consumed, while BMI is more reflective of dietary energy intake. Without carrying out a dietary survey it is not possible to confirm this hypothesis.[8]
- The lack of availability of diverse food sources is a limiting factor and not necessarily (economic) access to food, The Dietary Diversity Score assumes that if there is higher income or resources better off households will have a more diverse diet. If the limiting factor is food availability in terms of a diverse diet the relationship will not hold true.

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[8] It would be interesting to test BMI against IDDS and the MDAT dietary recall used in Mozambique that has limited quantification through asking how man times different foods are consumed and not merely the consumption of a food stuff.

Table 15 -Percentage of women by IDDS terciles and BMI

Corridor status	Corridor			Non corridor		
IDDS14_tercile	Chronic energy deficit (CED)	NORMAL BMI	OVERWEIGHT	CED	NORMAL	OVER
1_low	13,3	81,3	5,3	10,7	81,3	8,0
2_medium	11,6	77,4	11,0	12,9	72,9	14,1
3_high	9,2	81,6	9,2	5,1	84,6	10,3

While not statistically significant, this table does show that chronic energy deficit women was less frequent in women with high dietary diversity, and overweight was less frequent in women with low dietary diversity.

5.14 Measurements of Food and Nutritional Insecurity

Wealth Index and HHDS, BMI and HFIAS
The wealth index was created from the data collected from the 600 households (see Annex G for details). The wealth index has been cross tabulated with the HFIAS, the dietary diversity scores and BMI to test for robustness and indications of relationships between different measures of well being.

Three wealth categories have been created representing; the least poor; medium households; and poorest households. The proportion of households in each of the three wealth categories by corridor and non corridor is represented below in graph 4.

Graph 5 : Wealth Index distribution by Corridor and non Corridor households
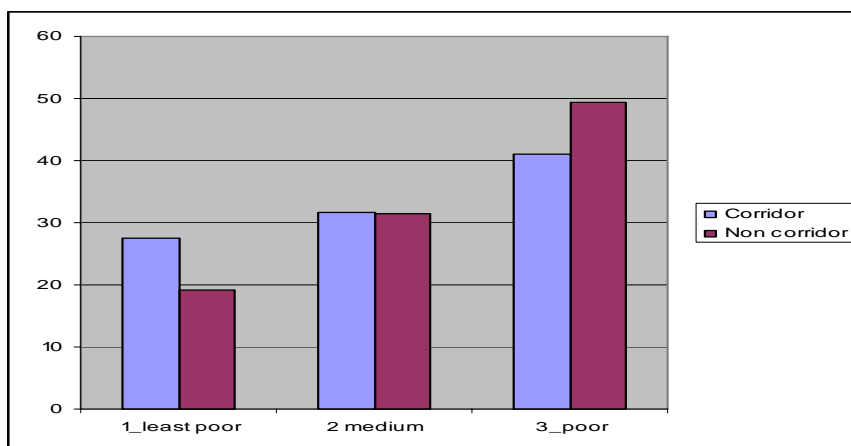
As can be seen from the graph above there is a higher percentage of households in the poor category in the non-corridor areas as compared to non corridor areas, this is consistent with the findings on HFIAS and DDS discussed above.

Household dietary diversity score and wealth ranking

The expected relationship between household dietary diversity (as seen in previous studies) and wealth ranking is confirmed in the survey where it is possible to see that the percentage of households with low HDDS is highest in the poorest households and lowest in the least poor households. (graph 5)

**Graph 6: Percentage of Households in Wealth Groups by Household Dietary Diversity Terciles**
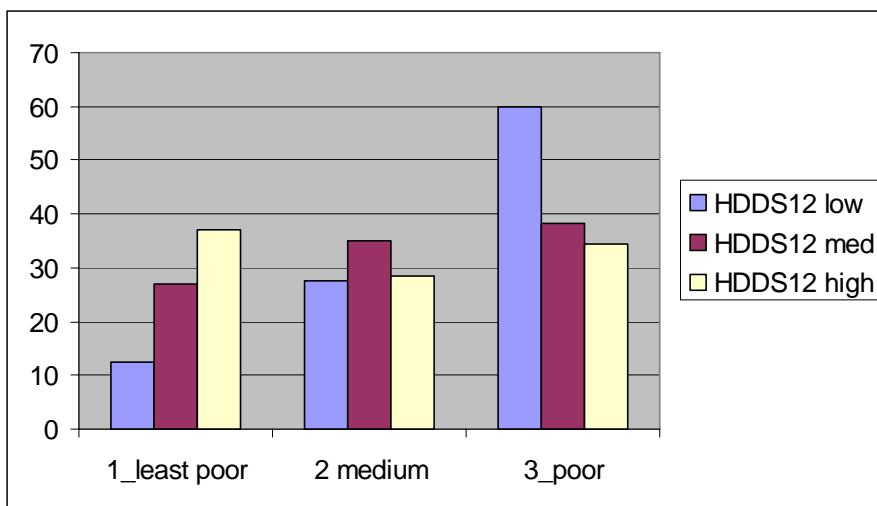
While women's BMI was related to the wealth ranking of the households, there was no relationship with dietary diversity.

The graph (6) below shows that of all the women with low BMI, the highest proportion fall in the poorest category of households. (Table in annex F)

Graph 7: Percentage of Women by BMI by Wealth Category
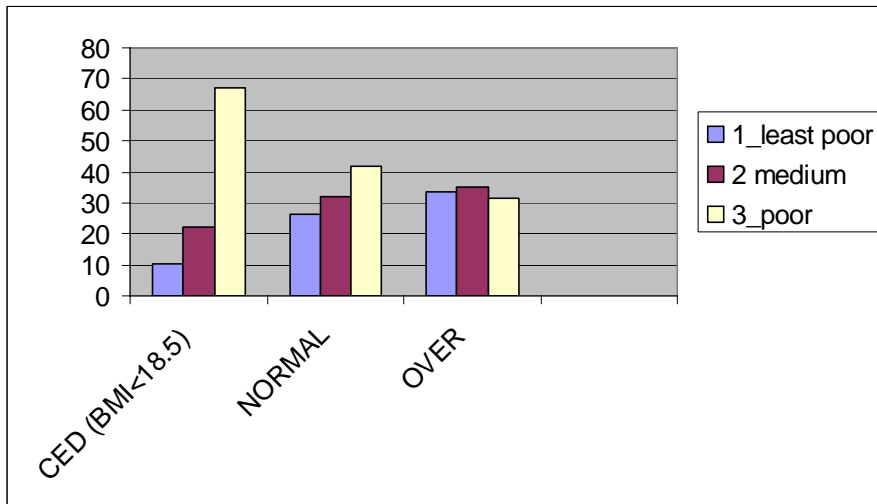
The relationship between the wealth categories and the HFIAS also holds true with the highest percentage of poor households showing the highest levels of food insecurity, and the lowest levels of food insecurity among the least poor households.

Table 16 : Food Security (HFIAS) by Wealth Ranking

HFIAS	Least poor %	Medium %	Poor %
Low food insecurity	55.2	42,	20.8
Medium FI	30	29.7	35.4
High FI	14.6	28,2	43.8

Graph 8: Percentage of Household by Wealth category by Household Food Insecurity Index
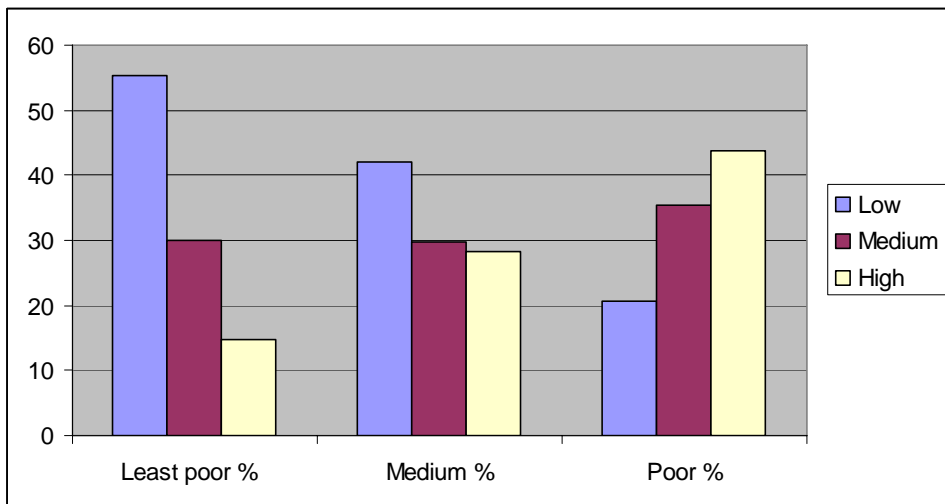
5.15. Additional Analysis of the Food Security Indicators

The EC/FAO project, with support from FANTA, has undertaken additional analysis of the indices used in the baseline survey to explore the robustness of the indices/scores in measuring food insecurity. Interestingly the report stresses that " poverty (as measured by the wealth index) was the most important factor associated with household food insecurity, household dietary diversity and women's BMI. Women's education level appeared to have an independent effect on dietary diversity" More details of the additional analyses that were conducted on the data can be found in the report:

"Supplementary Analyses of Household Food Insecurity and Dietary Diversity – Mozambique" May 2007. Terri Ballard, FANTA consultant, Lorenza Mistura, Italian Nutrition Research Institute.

5.16. Organizational Maturity

The baseline was undertaken at the end of the year one operating period. However there were very few organizations that had been identified by the project as partners at the time the survey was carried out. A list of potential partner organizations was supplied to the survey team and in each district the facilitators organized meetings with the CBOs. A total of 10 organizations were interviewed across three districts, namely Gondola, Nhamatanda and Chibabava. Tambara is part of the first Belgium Survival Project (079) and was not included in the organizational development index.

Of the total of the organizations only two could be considered to be mature organizations with a history of collaboration between members and long standing activities. Both of these organizations were associations of agricultural producers. A further organization was established in 2002 and had active membership and a variety of activities. The majority of the organizations were in the initial stages of organization, and many appeared to have formed in order to receive cash or in-kind grants. These organizations had all started between 2005-2006.

Reason for group formation
The main reason given by organizations was mutual support and in some cases the intention of the group was specifically to support more vulnerable households in the community. This appeared particularly in the groups formed during 2005/6 and may have been in response to the partner requisites for receiving grants.

Group membership
The groups ranged from the smallest with only 12 members to the largest with 60 members. All but one of the groups had both men and women in the group. The exception was the oldest group formed in 1996 as a farming association where there were only male members.

Quality of leadership
There were a variety of methods for selecting the president of the group and the governing body. Approximately half of the organizations elected the president and other positions, and half selected the people for the positions. In one case the president was self-selected as the only person interested in the post. The majority of the organizations were at the incipient stage of development so any leadership issues are not yet apparent.

Internal procedures
Frequency of meetings varied greatly between once a week and every three months for the less active groups. None of the groups had fixed internal procedures and less than half registered presences at meetings or took minutes of the deliberations.

Income generating activities
The main income generating activities undertaken by the groups were farming activities, chicken raising, cash crops, bee-keeping, and in one case sewing activities.

A third of the organizations raised money from member contributions or from a percentage of the profits from the farming activities.

Other Activities carried out by the group
Two of the groups were involved in home based care and a number of the groups work on community sensitization on health and sanitation and HIV/AIDS.

Financial health
All of the groups had bank accounts but the financial health of the organizations was precarious. Three organizations said they had money in the bank. A number of the organizations had received grants from FAO but only one organization still had remaining funds to spend (they received 96.000 MTN and had a balance of 18.000 MTN in the bank).

Social protection activities
Most of the organizations stated that they had social aims as well as economic aims. In two cases the reasons for forming the group had been specifically to work with vulnerable children or chronically sick people in the community. The rest of the groups claimed to carry out some unspecified social protection activities.

Diversification of support
Some of the oldest organizations had had in the past a variety of partners. In general the main support was FAO with two of the organizations also receiving support from the National AIDS Council. Much of the support from other partners was in –kind rather than sub-grants or cash transfers.

As stated at the beginning of the report the consultants strongly advised the project management that it was necessary to invest in a participatory exercise to measure the organizational development status of the potential partners as part of the selection and support process. Given the short remaining time frame for the implementation of the project this is essential for the design of any subsequent projects. However, any organizational analysis carried out will not be useful for measuring the impact of this project on community based organizations due to the short lead time for change.

6. Conclusions

6.1 HIV/AIDS, Food security and nutrition situation

a. Selected districts and sampling framework
Data was collected from 600 households in four districts in the central provinces of Manica and Sofala. The districts were selected using the assumption that they would represent lower and higher risks of HIV/AIDS due to their geographical positioning either on the major transport corridor or within the interior of the district. Although it is clear that the reported national prevalence rates are much higher in the corridor areas, the interior of the provinces is not immune to HIV/AIDS as there is a strong traditional of migrant labour to South Africa and Zimbabwe (both with extremely high rates of HIV) from these areas. Detection and reporting of HIV/AIDS in the interior districts is much lower than in the corridor districts.   In this study, chronic illness was used as a proxy for HIV/AIDS but is clearly an imperfect proxy that at best may indicate a source of stress to an involved household.

b. Food Insecurity in Corridor and non corridor districts
Information was collected using a questionnaire comprised of demographic, economic and agricultural, health and sanitation modules, three indexes namely; household food insecurity index, household dietary diversity score and individual dietary diversity score. In addition the body mass index of girls/women between the ages of 15-49 was measured.

The analysis of the information shows alarming rates of some degree of food insecurity as measured by the household food insecurity index (over 98% of households showing some level of food stress) and high levels of severe hunger – 59% of the total sample (67% of households in the corridor area and 46.4% in non corridor area) and prolonged hunger – 40.7% of total sample (44.1% of corridor households and 35.6% of non corridor households).

The relatively high levels of small livestock ownership in Tambara district (non corridor) coupled with a good previous years harvest seem to have protected the households in this traditionally food insecure district[9] from hunger; only 4% of households in Tambara declared that they went to bed hungry or had not eaten during a whole day, as compared to between 20-30% of households in the other districts.

The food insecurity index correlated with the wealth index showing that households with the highest levels of food insecurity were also classified as the poorest using the wealth index.

Correlations were found between the levels of food insecurity in a household and the dietary diversity score, where the households on the corridor with the highest levels of food insecurity also had the lowest dietary diversity scores.

c. Household and Individual Dietary Diversity

Household and individual female dietary diversity is both low (mean 4.3 and 4.4 respectively) and further analysis of the components of the diets show little variety and low levels of consumption of oil and animal products..

Consumption of vitamin A rich fruits was high due to the mango season but consumption of animal sources of either iron or vitamin A was extremely limited.

d. Female Nutritional Status
High levels of BMI have been detected in women between the ages of 15-49 years of age with 11.2% with a BMI of below 18.5. BMI was not correlated with dietary diversity scores but did correlate with the wealth index, showing that poorer households had proportionally more women with low BMI than in the least poor households.

e. Testing the robustness of the Indices:
(Wealth Index correlated against food security and dietary diversity indices and anthropometric measurements)

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[9] The food insecurity perceived in Tambara is strongly linked to grain deficit, coupled with the relative isolation of the district, and may be a misconception as traditional methods of assessing food insecurity have not taken into consideration sufficiently livestock holdings or cassava production .

The wealth index created from the survey data was highly correlated with the four indices used in the survey, namely; Household Food Insecurity: Individual and Household dietary Diversity; and girls/women Body Mass Index.

In all cases the relationships showed the expected tendencies, with the poorest households having the highest levels of food insecurity, the lowest levels of both individual and household diversity, and the highest proportion of underweight women.

It was clearly shown that dietary diversity, food insecurity index and the wealth index are correlated, however, there are still some questions about the lack of correlation with Dietary Diversity and BMI of women. This is probably due to the inability of the DDS to measure quantities consumed and this has higher bearing on nutritional status than dietary diversity, but may also be linked to the complex interaction of illness/ill health and nutritional status of women that is not captured in the survey. In order to look more closely at the relationship between dietary diversity and girl/women's nutritional status it would be necessary to conduct additional studies; a dietary consumption survey and a health and well being survey for women between the ages of 15-49 years of age.

f. Organisational development and participation
The organizations interviewed during the data collection exercise showed varying levels of maturity with the majority of the organisations only in the initial stages of consolidation. The project should invest in participatory assessments of the organisations in order to establish mutually acceptable goals and benchmarks for development over the remaining life of the project. This should be a priority as the sustainability of project activities depends on the capacity of the community based organizations to face the challenges of extreme food insecurity with coherent strategies.

6.2. Use of indices as field monitoring tools during the life of the project

HFIAS, HDD and IDD are useful field tools for establishing severity of food insecurity and providing proxy indicators for wealth in the community

All the indices are relatively simple to apply in the field, although the HFIAS requires attention to detail in terms of the way in which questions are asked.

The scoring of the HFIAS depends on the frequency responses to each question. There are drawbacks to using these frequency responses " never, rarely, sometimes and often" in the system of classification as these qualitative frequency

groupings may be interpreted differently by household respondents and also by interviewers.

a. Monitoring
Monitoring could be carried out on a three monthly basis with a selection of households using the indices of dietary diversity (HDD or IDD) and the HFIAS in order to measure progress towards changes in food security status. These tools are easy to implement and interpret and could be used to gauge progress towards greater and sustained food security.

The monitoring tool would need to take into account potential seasonal variations in the results.

The HFIAS is a strong " rights based" indicator as it explores the right of people to be without both the fear of hunger and hunger. This is a powerful tool to be used both a community and national level.

b. Impact Analysis
Given the strong association between the HFIAS, HDDS, BMI and the wealth index the project could usefully measure the following in order to measure the impact of the project on the well being of the population

i.   HDD and IDD increase from 4. to 6 (an increase of two foods to improve dietary diversity)
ii.   BMI for women reduce percentage of women with CED by 5%
iii.   HFIAS: reduce HFIAS score from average of 12.5 to 8.5 (reduction of food insecurity)
iv.   HFIAS: reduce the percentage of households experiencing hunger or prolonged hunger by 10% in the November /December period.

Measurement of the capacity of the organizations in the project to respond to the needs of members and the community should be measured using benchmarks established between the project and each of the partner organizations. Progress should be measured using mutually accepted indicators towards mutually accepted goals.

c. Timing of the baseline and usefulness of the exercise

The baseline was carried out a year after implementation of the project and the project has until February 2009 to run. This implies that there is just over two years of the project (from baseline to end) and is a short-time frame for the measurement of impact. The project should establish strong monitoring systems, using the indices tested in the baseline, to allow management to follow the

progress of the project over the next two years, and draw conclusions about at outcome level.

The baseline has been a useful test of the food security and dietary indices and has shown that they are fairly simple field tools that can be used to describe the food security and nutritional situation in an area. The indexes were robust in terms of correlation with a wealth index created from the data base using proxy-indicators.

As mentioned above in the monitoring and evaluation section, the indices could be used to measure progress against the baseline over the next period, in particular it would be useful to measure whether the indices are seasonally sensitive (for example DD and food insecurity improving after the harvest) in order to establish when such instruments should be applied in order to measure difference. [10]

7. Recommendations

7.1 General recommendations.

a. Baselines should be carried out as close to the starting date of projects as possible in order to allow time to measure change and test tools that could be useful for progress monitoring

Recommendation
An impact survey could be carried out a year after the end of the project in order to measure any lasting affects of project interventions

b. One of the objectives of the project is to strengthen the community based response to food and nutrition insecurity and HIV. As a key to the process the project aims to work with Community Based organizations.

Recommendation
Carry out an on-going participatory organizational development exercise with all existing and new partners (as they come on line) in order to establish mutually accepted benchmarks for comparison at the end of the project period (and one year after the project)

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[10] A further study in two districts will be carried out in July 2007 to test seasonality funded by the EC/FAO project.

7.2 Use of Indices

a. The indices are useful monitoring and impact measurement tools. Additional analysis with the baseline data could help in the selection of the most robust index to represent household food security.

Recommendation.
The project should consider developing a three monthly monitoring system using the indices as measures of food security in the community

An impact evaluation could be considered a year after the end of the project to see if t here has been measurable change (linked to the three monthly monitoring system)

Additional analysis of the data base to select the most robust of the indices for rapid evaluations and monitoring of household food security

7.3 Additional Studies

a. The relationship between female BMI and dietary diversity was not confirmed by analysis of the database for the baseline but it is worth continuing to investigate the relationship, perhaps adding frequency of food groups consumed as a measure of food quantity.

Recommendation

Further conceptual and field studies should be carried out to isolate the factors that affect women's nutritional status in order to improve interventions in this area.

b. The responses in the HFIAS are open to considerable interpretation and may be influenced by interviewer bias or bias within a community due to " expected " levels of hunger

Recommendation
Qualitative studies should be carried out to discuss the nature of the concept of hunger; tolerance levels, as well as discussing the concepts of never, rarely, sometimes and often.

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