

FOOD AND
NUTRITION
TECHNICAL
ASSISTANCE

**Development and Validation of an
Experience-based Tool to Directly
Measure Household Food Insecurity
Within and Across Seasons
in Northern Burkina Faso**

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August 2004

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This publication was made possible through the support provided to the Food and Nutrition Technical Assistance (FANTA) Project by the Office of Health, Infectious Disease and Nutrition of the Bureau for Global Health at the U.S. Agency for International Development, under terms of Cooperative Agreement No. HRN-A-00-98-00046-00 awarded to the Academy for Educational Development (AED). The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of the U.S. Agency for International Development.

Published August 2004

Recommended citation:

Frongillo, Edward A. and Siméon Nanama. *Development and Validation of an Experience-based Tool to Directly Measure Household Food Insecurity Within and Across Seasons in Northern Burkina Faso*. Washington, D.C.: Food and Nutrition Technical Assistance Project, Academy for Educational Development, 2004.

Copies of the publication can be obtained from:

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TABLE OF CONTENTS

Acknowledgements.....	ii
Acronyms.....	ii
Executive Summary.....	iii
1. Introduction.....	1
Map of Burkina Faso.....	2
Map of Zondoma study area around Gourcy.....	3
2. Methods.....	4
2.1. Study 1: Development of the food insecurity items for the Africare baseline survey.....	4
2.2. Study 2: In-depth qualitative interviews and refinement of the food insecurity items.....	5
2.3. Study 3: Quantitative, longitudinal measurement of food insecurity and related factors.....	7
2.3.1. Sampling.....	7
2.3.2. Data collection.....	9
2.3.3. Construction of variables.....	12
2.3.4. Analysis.....	13
Figure 1. Conceptual model of relationships among lack of wealth, food insecurity, inadequate dietary intake, and poor nutritional status, with constructs (bold) and measures (not bold).....	14
3. Results.....	16
3.1. Descriptive statistics for changes over seasons.....	16
3.2. Validity of the food insecurity score at each wave.....	17
3.2.1. Association of the food insecurity score with other variables at each wave.....	17
Figure 2. Changes in total assets over time across five waves.....	18
Figure 3. Changes in net income per capita over time across five waves.....	19
Figure 4. Changes in food insecurity and food share over time across five waves.....	20
Figure 5. Changes in number of eating occasions over time across five waves.....	21
Figure 6. Changes in energy intake per equivalent adult over time across four waves.....	22
Figure 7. Changes in child anthropometry over time across five waves.....	23
3.2.2. Association of wealth variables with dietary intake and anthropometry.....	24
3.2.3. Comparison of the food insecurity score with the observer measure.....	25
3.3. Validity of the food insecurity score to assess changes in food insecurity across waves.....	26
4. Discussion.....	27
4.1. Validity of the food insecurity score to capture overall seasonal differences.....	27
4.2. Validity of the food insecurity score to discriminate among households at each wave.....	27
4.3. Validity of the food insecurity score to discriminate changes in households across waves.....	28
4.4. Association of food insecurity score and child anthropometry.....	28
4.5. Assessment of dietary intake.....	29
4.6. Conclusions.....	30
References.....	31
Table 1. Items on household food insecurity, with scores assigned, and frequency of affirmative responses at waves 1 to 5.....	33
Table 2: Means and standard deviations of demographic, wealth, dietary and nutritional variables at waves 1 to 5.....	36
Table 3. Means and standard deviations of changes in demographic, wealth, dietary and nutritional variable between waves.....	37
Table 4. Bivariate correlation between food insecurity score and demographic, wealth, dietary intake and nutritional status for waves 1 to 5.....	38
Table 5. Bivariate correlation between the natural logarithm of total assets with dietary intake and nutritional variables at waves 1 to 5.....	39
Table 6. Bivariate correlation between the natural logarithm of per capita net income with dietary and	

nutritional variables at waves 1 to 5	40
Table 7. Bivariate correlation between the natural logarithm of food in store with dietary and nutritional variables at waves 2, 4 and 5.....	41
Table 8: Bivariate correlation between food share and dietary and nutritional variables at waves 2, 3, 4 and 5	42
Table 9: Comparison of wealth and insecurity across categories of food insecurity as rated by a single observer in wave 4.....	43
Table 10: Comparison of wealth and insecurity across categories of food insecurity as rated by a single observer in wave 5.....	44
Table 11. Changes in the multinomial logistic model fit and changes in the area under the ROC curve of the binary logistic models using the single observer rating of the households as response variable. 45	
Table 12. Correlation and standardized regression coefficients and p-values of the changes in food insecurity score as predictors of changes in wealth, dietary intake and anthropometrics between two each two consecutive waves, with the linear regression controlling for the initial values of both food insecurity score and the selected variable.....	46

APPENDICES

Appendix 1: Table of food insecurity categories (rows) versus themes, with the entries being level of severity, from the in-depth qualitative study	48
Appendix 2: Interview Guide for Household Heads.....	52
Appendix 3: Interview Guide for Women	57
Appendix 4: Food Security Items for the Household Heads.....	62
Appendix 5: Food Security Items for Women.	64
Appendix 6: Agricultural and Socio-economic Questionnaire for the Household	66
Appendix 7: Agricultural and Socio-economic Questionnaire for Women.....	74
Appendix 8: Food Diversity Form.....	82
Appendix 9: Form for Eating Occasions.....	83
Appendix 10: 24-hour Recall Form	85

ACKNOWLEDGEMENTS

We are grateful to the Africare country representative, project coordinator, and other staff who provided logistical support during data collection. We are grateful to the villagers who participated in the studies and to the enumerators who collected the quantitative data. We appreciate the various contributions that these individuals made to the studies: Judy Bryson, Harold Tarver, Ambroise Nanema, Kebré Boukari, Nanema Lucienne, Sanakra Issiaka, Bougma Karim, Alison Goldberg, Françoise Vermeulen, Coleen McCracken, Anne Swindale, Patricia Bonnard, Alice Willard, Tony Castleman, Gilles Bergeron, Per Pinstруп-Andersen, Suzanne Gervais, Avril Armstrong, and Ji-Yun Hwang. Jennifer Coates, Beatrice Rodgers, Patrick Webb, and Robert Houser made valuable suggestions to improve the final draft. Any mistakes are solely those of the authors.

ACRONYMS

BMI	Body mass index
CFA	Communaute Financiere Africaine
HAZ	Height-for-age z-score
FANTA	Food and Nutrition Technical Assistance
MUAC	Mid-upper arm circumference
ROC	Receiver operating characteristic
UNICEF	United Nations Children's Fund
U.S.	United States
WAZ	Weight-for-age z-score
WHZ	Weight-for-height z-score
ZFSI	Zondoma Food Security Initiative

EXECUTIVE SUMMARY

Organizations need to measure household food insecurity for program design, planning, targeting, implementation, monitoring, and evaluation, but existing measures often are inadequate. Three studies were conducted to develop and validate an improved measure of the food availability and access components of food insecurity in northern Burkina Faso.

First, a questionnaire tool built on local experiences of food insecurity was created, tested, and used in a cluster survey of 420 rural production units by Africare to assess food insecurity. Food insecurity varied substantially across and within villages, and was consistently associated with socioeconomic variables like income and livestock and equipment ownership.

Second, an in-depth qualitative study with 10 household heads and 26 women was conducted using interview guides. Ten households from two villages were selected to include: food secure and insecure, simple and complex, and polygamous and monogamous households. From the data analysis, we identified themes, classified households, created a table of food insecurity categories, identified questions to add or delete to the initial questionnaire, and developed and revised answer choices.

Third, a longitudinal study provided quantitative data on changes over time in households in food insecurity, household economic situation, and related factors. Data were collected on 126 simple and complex households from 9 villages each July and January from July 2001 to July 2003. These data allowed examination of changes in food insecurity twice annually across the best and worst seasons for food, and evaluation of the ability of the experience-based tool to differentiate changes in household food insecurity. Validity was assessed by comparing the food insecurity tool with wealth, dietary, and anthropometric measures and with a measure created by an observer who rated the food insecurity of the households. The results provide strong evidence that the experience-based food insecurity score, calculated from items administered by questionnaire, is valid for determining seasonal differences in household food insecurity, differences among households in food insecurity at a given time, and changes in household food insecurity over time in northern rural Burkina Faso.

This project demonstrates that an experience-based food insecurity tool is valid for determining changes in household food insecurity over time. The food insecurity questionnaire is a simple tool that could be used in this setting by organizations to assess, evaluate, or monitor household food security. This information can also support design, planning, targeting, and implementation of programs by identifying possible interventions, points of entry for services, and subgroups most in need or who might most benefit. The food insecurity questionnaire has advantages over some other methods (e.g., dietary recall, anthropometry) that are often used to evaluate the success of development projects that aim to reduce food insecurity. This research reaffirms the value of gaining in-depth understanding of household food insecurity; this approach (rather than translating questions from other sources) will likely best lead to suitable experience-based measurement tools. Further research is required to understand to what extent an experienced-based questionnaire needs to be developed *de novo* in each setting.

1. INTRODUCTION

Household food insecurity results when food is not available, cannot be accessed in socially acceptable ways, or is not utilized completely. Development organizations and other institutions need to measure household food insecurity for program design, planning, targeting, implementation, monitoring, and evaluation. Existing measures of food availability alone often are inadequate and should be augmented by measures of access to food (Wolfe and Frongillo, 2001). One promising approach to developing such a measure is that used for developing the U.S. Household Food Security Survey Module. This approach develops a direct measure based on understanding of the experiences of food-insecure people obtained from in-depth, qualitative interviews (Wolfe and Frongillo, 2001). Qualitative research methods have been used in a number of instances to gain understanding of food insecurity in particular locations (see review by Wolfe and Frongillo, 2001). Some studies preceding the current FANTA work in Bangladesh by Tufts University (Webb et al., 2003) and in Burkina Faso by us (Frongillo and Nanama, 2003) have focused on understanding and developing a measure based directly on the experience of food insecurity: Radimer et al. (1992), Wolfe et al. (1996, 1998), Hamelin et al. (2002), and Frongillo et al. (2003a), with the last of these studies being conducted in a developing country.

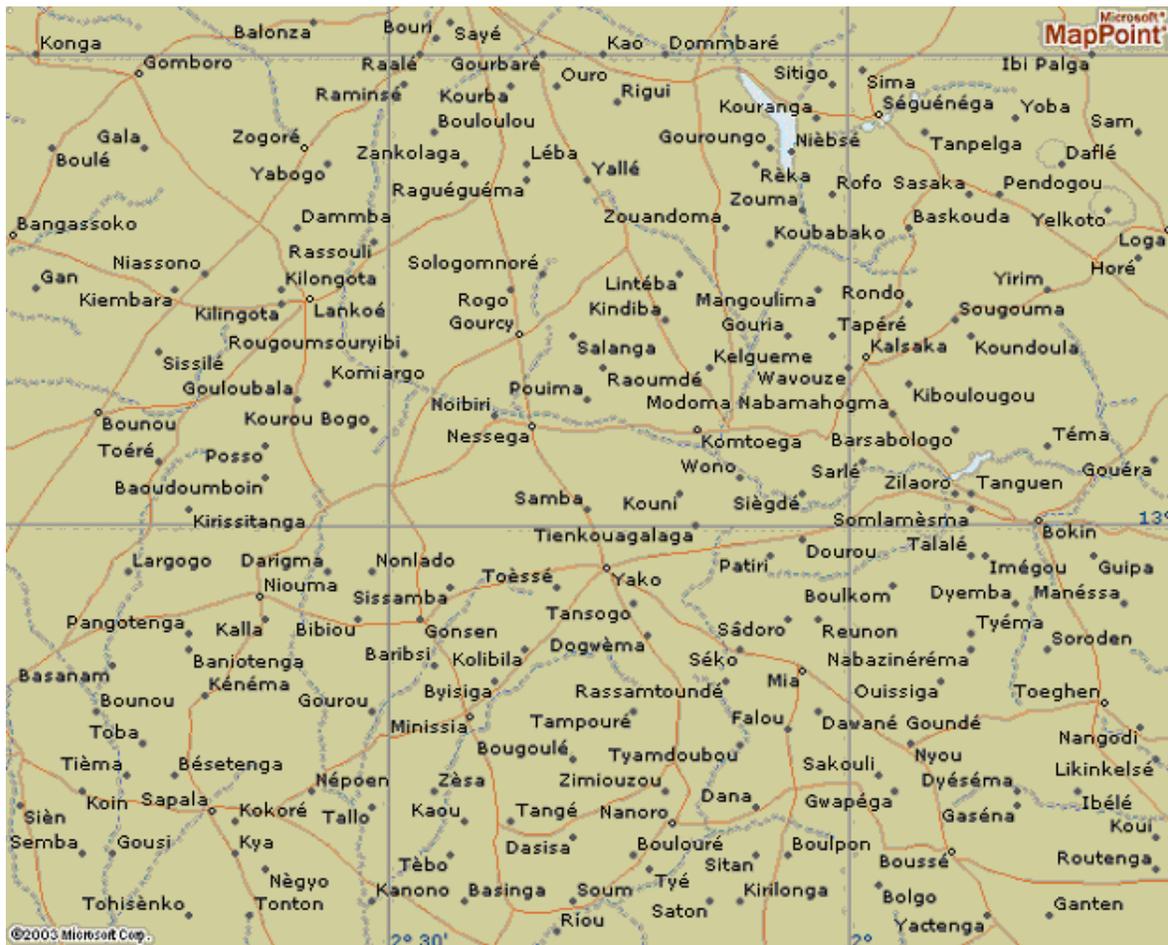
This project aimed to develop and validate a direct, experience-based measure of food insecurity in northern Burkina Faso to measure the components of availability and access to food. This Cornell-FANTA-Africare collaboration was carried out in rural Zondoma province, where the non-governmental organization Africare began implementing the Zondoma Food Security Initiative (ZFSI) in 2000. The ZFSI is a development project that has as part of it an important food security component. The ZFSI is coordinated at Gourcy, the main town of Zondoma province, which is located 140 km north of Ouagadougou, the capital city, between Yako and Ouahigouya, and is implemented in surrounding villages (see maps below).

The project proceeded as three studies. First, a direct tool built on previous understanding of local experiences of food insecurity was created and tested using individual and group interviews; it was then used in a survey by Africare to assess food insecurity of rural production units. Second, an in-depth qualitative study was subsequently conducted with household heads and women; information from this investigation was used to refine the food security items. Third, a longitudinal study of a cohort of households provided quantitative data on changes over time in household food insecurity using this refined measure, household economic situation, household-decision-making about food, intra-household food distribution, adult and child anthropometric status, and related factors. These data were collected across five waves, allowing examination of changes in food insecurity status twice annually across both the best and worst seasons for food. They provide the means to examine the validity of the experience-based household food insecurity measurement tool to capture overall seasonal differences in food insecurity, to differentiate households as to food insecurity status, and to measure changes in food insecurity status by comparing with other measures that are indicative of food insecurity and changes in food insecurity over seasons.

Map of Burkina Faso



Map of Zondoma study area around Gourcy



2. METHODS

2.1. Study 1: Development of the food insecurity items for the Africare baseline survey

Our initial task was to develop for the Africare baseline survey a set of items to directly measure food insecurity of production units. A production unit is a group of households usually from the same family that has a common field where they produce cereals. In some cases, the product from the common field is only used when there is a problem that is of concern to the whole family. Beside the common plot, each household in the production unit has its own plot. The production from these plots is used to feed the household's members most of the year. A household is therefore a more homogeneous consumption unit than a production unit. A production unit usually overlaps with a consumption unit, although the consumption behavior may be very complex for some production units as different households within the production unit may not necessarily eat at all times from what the production unit produced. The development of the items involved activities that were done with production unit heads only and not other sub-groups such as women. How food insecurity of women and households relates to that of the production unit has not been researched.

Because the baseline survey was to be administered in a few weeks from the time we became involved, we adopted qualitative methods that could be implemented in the short time available, proceeding through a series of six steps in March and April 2000. First, preliminary food insecurity items were developed through a review of measures that have been used in many contexts. These were adapted to the study area by Siméon Nanama and Suzanne Gervais who had extensive experience in studying food insecurity in Burkina Faso. Second, an in-depth interview was conducted with four production unit heads to check specific regional wording for some items, leading to a pre-test questionnaire. Third, a pre-test interview was conducted with one randomly selected production unit head in each of the 20 pre-test village compounds to check for difficulties with the questionnaire related to recall of information (i.e., memory) and to understanding the meaning of items. Fourth, after these pre-test interviews were completed, a set of statements in the questionnaire was removed since the statements did not add any significant information and were time consuming. Some items were added that would better capture the experience of food insecurity. The items were further refined based on information obtained from the pre-test. Fifth, a group interview with eight of the 20 production unit heads was conducted to produce a food insecurity intensity scale. This scale showed the sequence of the items and possible answers in terms of the severity of food insecurity as understood by the production unit heads. This scale developed by the production unit heads was similar to what the researchers expected from prior knowledge. Since this scale was produced using only one group interview, however, its reliability was uncertain. Sixth, the final set of items was created, consisting of eleven items and five sub-items. The set of items was administered to 420 male production unit heads in 26 villages in the ZFSI area by Africare staff as part of its baseline assessment of production units during May 2000. Food insecurity varied substantially across and within villages, and was consistently associated with socioeconomic variables like income and livestock and equipment ownership (Frongillo et al., 2001). The same set of items was administered a second time as part of Africare's final ZFSI assessment in May 2003.

2.2. Study 2: In-depth qualitative interviews and refinement of the food insecurity items

Subsequent to the development of the food insecurity items, we undertook a more intensive qualitative study that aimed to give an in-depth understanding of the concept, experience, and dynamics of food insecurity in Zondoma province that would enhance the initial questionnaire. An interview guide was developed during January 2001 drawing from one used previously in Bangladesh (Frongillo et al., 2003a), and also on the qualitative research done by Suzanne Gervais in Yako, Burkina Faso, an area close to Zondoma province. Initially, there was one interview guide with eight themes addressing both women and men. After a pre-test, the initial questionnaire was split into two guides, one addressing household heads and the other addressing household sub-groups, mainly women-children sub-groups. The final version of the guide for household heads had the following eight general themes: 1) identification and demographic information, 2) agricultural production and decisions about production and uses of food, 3) cooking and eating patterns, 4) perception on food quality, 5) daily concerns, 6) income sources and utilization, 7) medium-term strategies to escape from food insecurity, and 8) short-term coping mechanisms. The women's guide had seven general themes: 1) identification and demographic information, 2) agricultural production and decisions about food, 3) cooking and eating patterns, 4) child feeding, 5) daily concerns, 6) income sources and utilization, and 7) coping mechanisms.

Two ZFSI villages (Toubyengo and Baszaïdo) were chosen for this qualitative study. The choice was made with the help of Africare staff, and was based on the fact that the project villages could be grouped in two categories regarding some slight differences in language and culture. In each of the two villages, five households were purposively selected, including secure and insecure, simple and complex (i.e., multiple households per production unit), and polygamous and monogamous households.

The ZFSI field workers have been working in the two selected villages one year before the in-depth study started. Therefore, they had a good knowledge of these villages. With their assistance, we selected three key informants in each village according to these criteria:

- Living in the village for at least than 10 years
- Not be too young (at least 30 years)
- Know most of their village households, including where they live, about how many members they have, where they work (field), and be able to provide information on their food and wealth situation
- Show some sense of confidentiality and would not disclose the content of the interview.

Literacy was not a mandatory condition, but it was an advantage. In each village, we tried to have at least one woman key informant, but this was not possible because in one village there was no woman who could fulfill all the criteria and in the other village women who could potentially serve as a key informant declined to be selected for cultural reasons.

Each informant was asked to independently list and rank the most secure and insecure households in their village. A semi-final list of households was obtained by matching the lists of secure and insecure households from the key informants with the ranking list done during

Africare's initial Rapid Rural Appraisal. Next, again with the key informants, we obtained a brief description of each household. The final selection was then done to get simple, complex, polygamous, and monogamous households. After this final selection, the team went to each household to register the names of all people who should be interviewed (i.e., household head and his wife or wives, any other married man or woman in the household).

Four interviewers were hired to conduct the study. All had at least completed secondary school (i.e., high school). Prior to our study, they had been involved in research with the regional offices for agriculture and livestock and with various non-governmental organizations. After four days of theoretical training on how to administer a semi structured question and take notes, the guide was pre-tested in the field. This pre-test revealed that the initial guide was too long and some themes were irrelevant for women. Therefore, it was split into two different guides. Moreover, the pre-test allowed us to identify the best interviewers, and one of the four initially hired was laid off. He was replaced by the project field director (Siméon Nanama). Subsequently, the interviews were conducted by two teams of two persons each, one guiding the interviews and the other taking notes. The interviews were held in each selected household. At the end of each interview day, each team read their notes and made the necessary completions. After all the interviews were completed, the team took one more day to do some editing and the notes were then typed and stored in Word files.

Along with the interviews, two food insecurity intensity scales were constructed in each of the study villages, one with a group of ten household heads and one with ten women. The selection of the groups for the intensity scales was done in such a way to not include people from the interview sample, unless they had already been interviewed. This information was used to ensure that the ordering of items in terms of severity was in line with the villagers' ranking.

Data analysis was done in six steps. First, a summary of the interviews was done to identify the themes that mostly discriminated between the households regarding their food insecurity status. Second, a summary was created of each interview by household (in each household, more than one person was interviewed). Third, using the household summaries, two researchers independently classified the ten households regarding their current and past food insecurity status; past status can be seen as the status during the months preceding the interviews or as the status during the past years. Fourth, a table was created of food insecurity categories (in rows) versus themes (in columns) with the entries being the level of severity (Annex 1). Fifth, based on this table, items were identified that could be added to the initial questionnaire and also that could be deleted if either redundant or not relevant. Sixth, the answer choices were developed and revised.

The specific themes that discriminated between the food secure and insecure households were: 1) the amount and reduction of the *mondé* (i.e., the daily food ration from the collective store), 2) the frequency and duration of *robi*¹ (i.e., when *mondé* is not given, the food ration from the own stores of the household sub-unit), 3) adult eating pattern (i.e., number of daily meals and meal composition), 4) daily concern (i.e., order in main concern and how acute is the concern about

¹ The *robi* corresponds to periods of the year when women rely on their own food store to feed their dependents. This period varies from one household to the other. In some cases, it may last one, two, or more complete months in a row. In some others, it is spread throughout the year. For instance, it may be one week in April, another week in July, etc.

food insecurity), 5) income sources, 6) utilization of income (both for women and men), 7) food buying (i.e., buying unit, amount and buying period), 8) medium-term management strategies (e.g., use of agricultural techniques), and 9) short-term coping mechanisms. The following specific themes and sub-themes were found to be not relevant to discriminating households: crop production and utilization, perception of the quality of food, child feeding pattern, and cooking pattern. The set of items that resulted from the specific themes that discriminated among households is presented in Table 1.

2.3. Study 3: Quantitative, longitudinal measurement of food insecurity and related factors

2.3.1. Sampling

A multistage sampling method was used to select the study households. The first stage was the purposive selection of the departments. Then, within each department, three villages were purposively selected. Production units were then randomly selected in each village and finally, households were chosen within each production unit.

Zondoma province has five departments: Gourcy, Leba, Bassi, Tougo and Boussou. Three of these (Boussou, Gourcy and Tougo) were chosen for the longitudinal study based on cultural and socio-economic characteristics. Boussou is 35 km from Gourcy and is one of the biggest departments of the province. It has five villages involved in the Africare project. As opposed to the other four departments, Boussou differs in language and religions, having more Catholics and animists. Gourcy is a semi-urban area with an important market and a big health center. It has 15 villages in the Africare project. The distance from these villages to Gourcy is between 8 and 25 km. Therefore, these villages likely have access to more services than others. Tougo is 35 km east of Gourcy. It has nine villages in the Africare project that are as far from Gourcy as the villages of the department of Boussou.

Africare's ZFSI project covered 40 villages, 15 of which entered the project in the first year and 25 in the second year. To account for the duration in the project, one first-year village and two second-year villages were selected randomly in each department.

This study sampled both production units and households. The difference between these is not always clear. In the context of this study, a production unit is a group of households that have a common plot where all members of the production unit work during the agricultural season. The harvest from this common plot is stored in a common granary, and may be used to feed the household members during the agricultural season only, or it may be kept aside and used to solve problems that affect the production unit as a whole but not a particular household in the production unit. These include funerals and weddings. Beside the common field, each individual household has its own plot where the man, his wife or wives, and his children produce cereals. The harvest from these individual plots is stored separately, and, in most cases, is mainly used to feed the household members and to solve problems that are specific to that household. In summary, a household is a more homogeneous consumption unit than a production unit. When there is only one household, then the production unit is at the same time a household.

Production units were randomly drawn from a census of all production units in each village. The main inclusion criterion was that the selected production unit should have children less than 5 years of age. In each production unit, the household of the head of the production unit was included in the sample. If the production unit had more than one household, a second household with children less than 5 years was also randomly selected.

In each selected household, the head of household and his first wife were included in the sample of respondents even if she did not fulfill the inclusion condition of having a child less than 5 years of age. If the household was polygamous, another wife with a child under 5 years was selected in addition.

The rationale for including households with children was that we needed to compare the performance of the food insecurity tool to that of usual indicators of food insecurity such as lack of wealth and low child anthropometry. It was necessary to have enough children less than 5 years of age to ensure adequate power for the comparisons. Given that not all households have children of this age group, we set this condition as a selection criterion. Also, Africare was interested in our data potentially informing them of impact of their programming on outcomes including child anthropometry.

In total, 126 households were selected and were covered by the survey. During the second and fourth waves, two household heads were absent. The first wave took place in July 2001, at the peak of the hungry season, the second wave in January 2002, the third in July 2002, the fourth in January 2003, and the fifth in July 2003. The months of July and January were chosen because we knew from prior experience (i.e., Suzanne Gervais' project in Yako) that it is logistically feasible to work during July (when heavy and crucial activities such as clearing fields and planting are over, and before the heaviest rains have occurred) and January (when people have finished harvesting and have a clear idea of what they have in store). January is also a time when people are available (agricultural work is over and social events such as funerals have not started). We also had information from prior experience that suggested that the January versus July contrast would capture the best and worst periods for food insecurity. January and July fall three and nine months after the harvest. The harvest normally starts in the middle of October and finishes most often by the end of October, although it sometimes extends to the middle of November.

For agricultural production and socioeconomic variables, during wave 1, the recall period was "since the last harvest" which corresponds to an eight-month production cycle (not including July). For waves 2 to 5, questions referred to a six-month production cycle (since our last visit). Wave 1 had a different recall period because it was the first one, and the most meaningful reference period for the respondent was the harvest (not January). After wave 1, we could refer to our last visit given that we visited the households every 6 months (January and July).

For the food security questions, the recall period at wave 1 (July 2001), wave 2 (January 2002), and wave 4 (January 2003) was "since the last harvest". At waves 3 and 5, it was "since our last visit." For wave 1, we used the wording "since the last harvest" for the same reason mentioned above for agricultural production and socioeconomic variables. Food insecurity in Burkina Faso has a strong seasonal pattern. The "hungry" season lasts from June (sometimes from May) to

September and the “food plenty” season lasts from the harvest in October to April. We expected seasonal differences in the answers to the food insecurity questions. Given that we wanted the food insecurity questionnaire to capture these seasonal differences, it was important to set the recall periods in such a way that they did not overlap the two seasons. Therefore, we had different recall periods for the food insecurity questions.

In the field, each respondent and each child had a card on which was written a number. This number combined the village identifier, the production unit identifier, the household identifier, and the individual identifier. At each visit, before interviewing or measuring the subject, the enumerators checked that the number on the card corresponded to the number and to the name in our records.

Every time that a household dropped out, we replaced it by a household that had similar characteristics and living conditions. In that regard, household from the same production units are more likely to have the same living conditions. One household moved between waves 2 and 3, and another household from the same production unit replaced it. At wave 5, two households drawn from simple production units dropped out and were replaced by two other households drawn from simple production units in the same village. Also, two households merged (for both production and consumption) due to the death on the head of one the households.

In cases when someone came home, he was included in the household roster if he had been in the household for more than 3 months. Family members who came back for a short visit and other visitors were not included in the roster. In case of death or long-term absence, we identified the person who is most knowledgeable of the household issues, and asked him to respond to the survey questions.

2.3.2. Data collection

Enumerators were hired to carry out the data collection. The enumerators for the first wave were selected following the procedure described below.

A first selection was made based on examination of the applicants’ biographical information. Education level and experience in conducting quantitative studies were considered in this first step. Then, interviews were conducted with those who passed the first step. The interviews were conducted by the project field director (Siméon Nanama) and the nutrition specialist of the ZFSI who had extensive experience leading similar studies. The interview covered the enumerator’s fluency in the local language (Moré), ability to handle complex situations in the field such as refusal of respondents, sense of confidentiality, etc. Each candidate was asked to simulate an interview using a short section of the survey questionnaire.

Based on anticipated logistical and time constraints, we estimated that we needed nine enumerators to complete the survey in a reasonable time frame. To allow for flexibility in the final selection and to quickly replace enumerators who would drop out in the course of the survey for any reason, we selected twelve enumerators after the interviews. Then, the enumerators were trained on how to sample the households and on how to administer the survey questionnaire. After the training, a two-day pre-test was organized in a village that was not selected for the study. The objectives of the pre-test were (i) to help refine the questionnaire and (ii) to give us the opportunity to observe enumerators in a real situation to make the final choice.

Prior to the selection of the enumerators, two supervisors who hold masters degrees in nutrition were selected to help check the quality of the data. They actively participated in the training and the pre-test. After the pre-test, a feedback was done with all enumerators. It consisted of suggestions to improve the questionnaire, the logistics, and the team living conditions. The final selection was then made by the project field director with the help of the two supervisors.

For the anthropometric measures, four additional enumerators were selected and trained on how to take anthropometric measures. A training manual adapted from the World Health Organization (1983) manual was developed for this purpose. After the training, standardization was conducted on a sample of ten children less the five years of age and ten adults. Based on the results of the standardization and on performances during the pre-test, two enumerators were hired for the fieldwork.

Two teams of five and one team of three were formed. The teams of five had two enumerators for the anthropometric measures and three (one male and two females) for the socio-economic and food security survey. Each team covered three villages. In villages covered by the team of three enumerators, the anthropometric measurements were taken on the last day of the survey in each department, jointly by the two anthropometric enumerators of the two teams of five.

From wave 2 onwards, a dietary component was added to the survey. To account for this, three additional female enumerators were hired following the same procedure described above. Except in some very rare cases, all women in the study sample were interviewed by female enumerators whereas male respondents were interviewed by the male enumerators. In addition, all interviews on dietary intake and diversity were performed with women by female enumerators.

In total, 28 enumerators participated in the study, most of whom had at least completed high school education. Six enumerators participated in all five waves, three in four waves, two in three waves, eleven in two waves, and six in only one wave. On average, each enumerator participated in three waves. This variation in participation occurred because some enumerators had permanent jobs and were not able to participate in all waves except during the July waves that coincide with vacation time.

The survey questionnaire (Annexes 2 to 10) was designed with the assistance of Dr. Coleen McCracken, an agricultural economist working in Burkina Faso. Most topics were asked of both men and women, but some topics were asked of men only or women only, as appropriate.

The questionnaire covered food production and uses, use of new agricultural techniques, money transfer from various places, food transfer, livestock ownership, revenues and sources of income, and gardening. Childcare was not measured in the first four waves because, at the time the study was developed, there was not a reliable and valid measure of childcare and feeding behavior available. We included a few questions adapted from a measure being developed by United Nations Children's Fund (UNICEF) and Cornell (Frongillo et al., 2003b) in the last wave (July 2003). We did not measure housing because, in this context, housing is similar regardless of wealth.

Anthropometric data included child weight, height, and mid-upper-arm circumference (MUAC),

adult weight, adult height at wave 1, and women's MUAC. Adult anthropometry was collected on the same people throughout, except when a person was absent. Child anthropometric data were collected on all children less than five years of age and who depended on the sampled women for their food, health, etc. A list of these children was established at wave 1. At each subsequent wave, newborns and children who joined the units were included.

The experience-based food insecurity questionnaire that was developed from the first two studies was administered to each household head. Questions on household agricultural and socioeconomic issues were asked to the head of the household. Similar questions were asked to women but on what happens within their sub-units, not in the household. In the context of this study, resources are not always shared between the household and the household sub-units such as the mother-children units. Given the complexity of the households and the objective to assess household food insecurity, the household head was in the best position to understand and convey the household's status. Therefore, for this report, we focused on the household-level data and did not analyze data at the level of the mother-children unit. Furthermore, during the qualitative study, both men (head of household) and women were interviewed, and analysis of the qualitative data led to two somewhat different food insecurity questionnaires. One questionnaire addressed the household and was administered to the household head. The other questionnaire addressed the mother-children units and was administered to women. At each wave, both women and men were asked food insecurity questions. For the same reason mentioned above, however, we have only analyzed the household-level data when focusing on household food insecurity. We will later conduct the more complicated, multi-level analysis to compare men and women (i.e., households and mother-child sub-units) and to see household and sub-unit food insecurity are related.

During the second and subsequent waves, dietary data were collected at two occasions per wave, usually on non-consecutive days. The dietary data collected included food frequency data (one-week recall), number of eating occasions during the previous 24 hours, as well as a 24-hour recall on the amount of energy rich food consumed (Swindale and Ohri-Vachaspati, 1999). Also starting with wave 2, a self-reported measure of the amount of food left in the household's common stores was collected from household heads.

An alternative measure intended to be the most accurate possible (i.e., definitive) was developed by having a single observer classify the households as to whether they were food secure, moderately food secure, or food insecure on the basis of his integrated, in-depth knowledge of each household's situation. This method was developed by Frongillo et al. (1997) and has subsequently been used successfully by Hamelin et al. (2002) and Wolfe et al. (1998, 2003). This method was first used in the current study during the period of October 2001 to May 2002. The observer visited each household between three and eight times. These visits were not related to the quantitative data collection. The purpose of the visits was to understand what changes were occurring in the households (e.g., births, deaths, migration) and in the villages (i.e., new well, market, or school). The classification that was done from this first attempt was not completely reliable because of inadequate information, and was not used in analysis. The classification was repeated during the period between waves 3 and 4, after additional visits to the households, and was repeated during the period between waves 4 and 5. These last two classifications were used in analysis.

To ensure the quality of the data and to avoid missing values, a system was set up to check the survey forms at several levels. At the end of each day, each enumerator had to go through his or her form to make sure there were no missing data and to complete information that required conversion or computation. Then, all the forms were given to the team leader who further checked the forms for verification. After the team leader had finished checking the forms, the team supervisor looked carefully at the forms, and, if there were missing data or outliers, he cross-checked with the enumerator who administered the form. When necessary, the enumerator was sent back to the respondent to complete or ascertain the information collected. A final check was then done by the project field director.

2.3.3. Construction of variables

For this report, anthropometric data from individuals were averaged within households separately for adult and children under five years to produce household-level anthropometric variables. Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters. For children, weight-for-age (WAZ), height-for-age (HAZ), and weight-for-height (WHZ) z-scores were calculated using Epi-Info version 6. The 24-hour recall information was converted to adult equivalents of energy per day following procedures in Swindale and Ohri-Vachaspati (1999). We used the energy requirement of an active adult as a reference to compute the adult equivalent without allowance for pregnancy or lactation. The adult equivalent was not recalculated to account for possible changes in activity level with season. If there were a need for such an adjustment, it would be for the waves that took place in January (waves 2 and 3), not for those in July (waves 1, 3, and 5), because people are somewhat less active in January. They are not sedentary in January, however, and it is not clear how such an adjustment should be made.

To score the food insecurity items, each main item received a score of 1 for an affirmative answer and 0 otherwise, and some of the sub-items received a score of 0.5 (Table 1). With this scoring system, the higher the score, the greater the food insecurity. Likewise, the food-frequency items were scored 1 if the household had eaten the food group during the week before the survey and 0 otherwise.

Several variables about wealth, income, and expenditure of the household were calculated from the data collected, in consultation with Dr. Per Pinstrup-Andersen. These are detailed below. The four variables that are bolded are the ones analyzed and reported because they represented the key aspects of wealth.

- **Total assets** was obtained by summation of the value of agricultural assets, including plows, carts and traction animals and the value of non-agricultural assets, i.e., bicycle, motorbikes, and mopeds.
- *Total income* was estimated by the added value of wages in cash and in kind, the value of home produced foods (cash crop, food crop and garden products), the value of pension, the value of private and non-private food and cash transfers to the household and all other income provided by other sources than those mentioned above. In the study context, renting is not a common practice and was therefore, not accounted for in the computation of total income.

- *Net income* was calculated as the differential of total income minus the cost of farm inputs (organic and non-organic fertilizers). In absence of a detailed estimate of total expenditure, net income was used to approximate total expenditure.
- **Net income per capita** was computed using the ratio of *net income* to household size expressed in equivalent adult units. The number of household equivalent adults was calculated using a conversion coefficient based on the energy requirement of each household member given his age and sex, and the energy requirement of an active adult.
- *Food expenditure* includes food consumed from home production plus food bought plus food transferred to the household by private and non-private sources. It does not include seed (included in food store) or animal feed (not common). The question about the amount of each crop consumed was introduced at wave 2. Therefore, the amount of home-produced food consumed was not available at wave 1, and food expenditure, food share, and food store could not be calculated for this wave.
- **Food share** was obtained by the ratio between *food expenditure* and *net income*.
- **Food store** is the difference between the total value of home produced food and the total value of home produced food that was used in various ways including consumption, gifts, sale, losses, etc. That is, food store is the value of food that is still there for the household to dispose of during the months following the survey. This could be computed more reliably for the two January waves than the July waves because for July waves it is given by the difference between food store in January (of the same year) and foods used since the January.

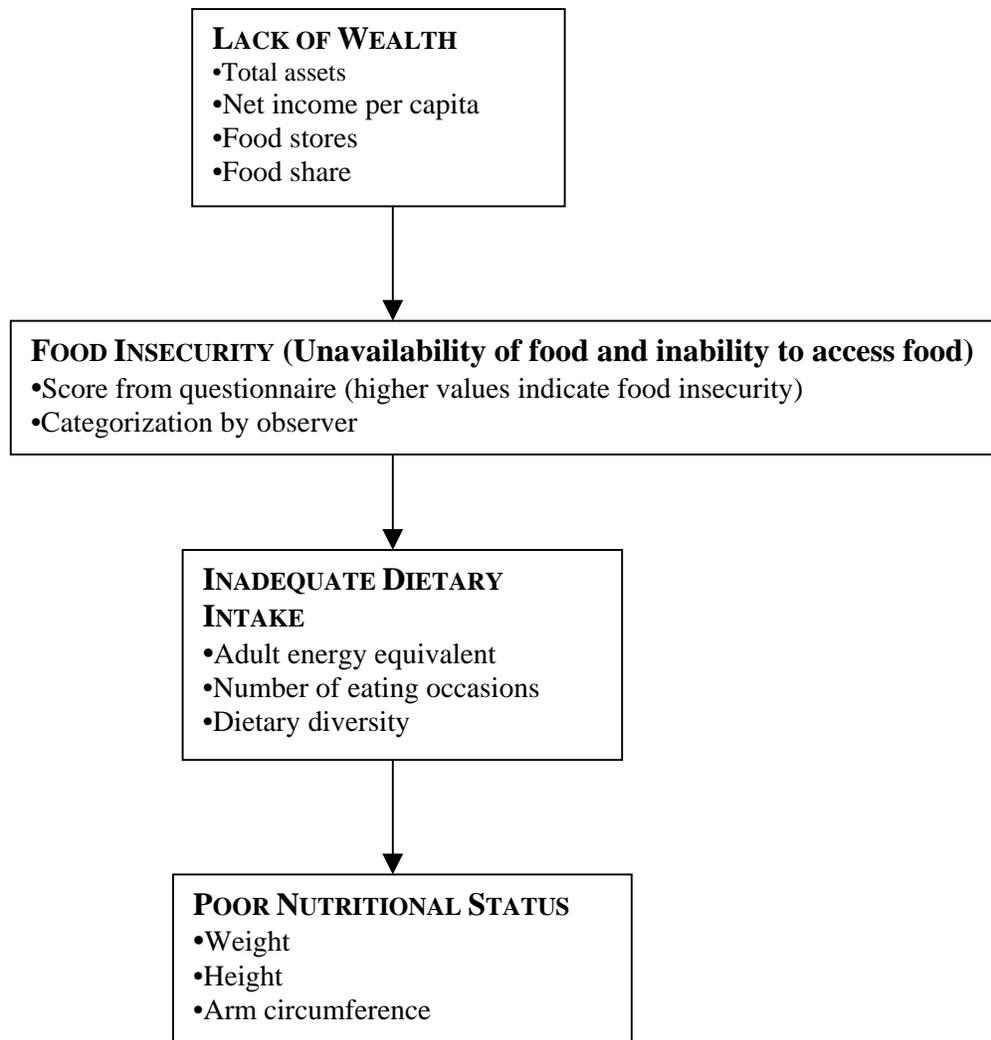
2.3.4. Analysis

Descriptive statistics were run, and paired-sample t-tests were used to compare means between waves. For analyses, total assets, net income per capita, and food stores were transformed using the natural logarithm to account for positive skewness in these three variables.

The analytic strategy to examine the validity of the food insecurity score was based on the criteria developed by Frongillo (1999). In particular, accuracy was assessed by comparing the food insecurity score with comparison measures, these either being expected determinants or consequences of food insecurity, other measures of food insecurity, or the observer measure.

These analyses were based on the conceptual framework presented in Figure 1, adapted from Wolfe and Frongillo (2001). In this framework, lack of wealth leads to food insecurity which, in turn, leads to inadequate food intake and ultimately to poor nutritional status. Wealth was estimated through household income and expenditure data, and household assets. The resultant four variables (i.e., total assets, net income per capita, food stores, and food share) each measure an aspect of wealth, and theoretically influence the ability of a household to access food. The food insecurity score assessed the experience of food insecurity of the households, including the certainty of the household about food provisioning. The outcomes of food insecurity are inadequate dietary intake and poor nutritional status. Based on the conceptual framework, if the food insecurity score accurately reflects household food insecurity, then we would expect that the food insecurity score will be: 1) more related to measured wealth and dietary intake than to measured nutritional status, and 2) more related to measured dietary intake and nutritional status than measured wealth is related to measured dietary intake and nutritional status.

Figure 1. Conceptual model of relationships among lack of wealth, food insecurity, inadequate dietary intake, and poor nutritional status, with constructs (bold) and measures (not bold)



The associations of the food insecurity score with variables for wealth (i.e., a determinant), dietary intake and nutritional status (i.e., outcomes) at each wave were assessed using bivariate Pearson's correlation coefficients. Analysis of variance was used to assess the association of the observational categorization of food insecurity (i.e., definitive measure) with other variables. To further evaluate the performance of the food insecurity score in discriminating among households according to their food insecurity status as classified by the observer measure, multinomial logistic regression models, with the observer measure as the response (i.e., dependent) variable, were run for each of the variables that were significant in the analysis of variance at wave 4 when the observer measure was made. The models were run for each variable alone, as well as for food insecurity score controlling for each of the other variables. Moreover, logistic models were used to estimate how well the variables predicted the classes from the

observer measure using the area under the Receiver Operator Characteristic (ROC) curve. This area ranges from 0.5 to 1.0, with 0.5 meaning that the prediction is no better than chance and 1.0 meaning perfect prediction. The area is interpreted as the proportion of pairs of households that were classified correctly by the model.

The associations between changes in food insecurity score and changes in the other variables over an interval defined by two successive waves were assessed by bivariate correlation and linear regression. In the linear regression models, the response variable was the change in a comparison variable and the predictor variable of interest was the change in food insecurity score. These linear regressions also controlled for the food insecurity score and the comparison variable at the beginning of the interval. These regressions were used to assess the association of change in food insecurity score with change in other variables, accounting for the initial value of the food insecurity score, and were not intended to convey causal relations. Using change in total assets between wave 1 and 2 as an example, the model was as follows:

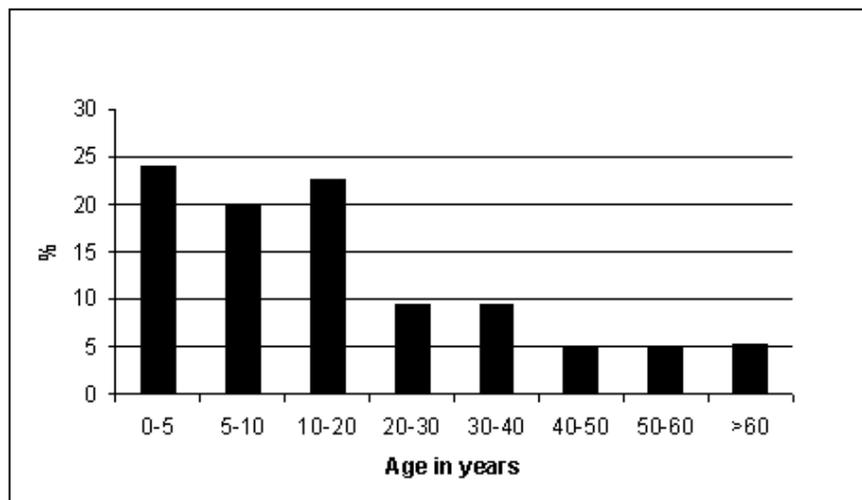
$$\Delta \text{Assets}_{2-1} = \beta_0 + \beta_1 \text{Assets}_1 + \beta_2 \text{FIS}_1 + \beta_3 \Delta \text{FIS}_{2-1}$$

where FIS is food insecurity score, the β 's are regression coefficients, and Δ is the change. The regression coefficient of interest is β_3 . For ease of interpretation, it is reported as a standardized regression coefficient, meaning that it represents the difference in standard-deviation units of the response variable (e.g., $\Delta \text{Assets}_{2-1}$) for a one standard-deviation difference in the predictor variable (i.e., ΔFIS_{2-1}).

3. RESULTS

Data were collected on 126 households from 9 villages. At baseline (July 2001), 51% the selected household were from complex production units, i.e., production units with more than one household. The remaining households (49%) were from simple production units, i.e., production units with one household. The number of households in the complex production units varied from 2 to 5. Household size ranged from 3 to 31 members, with a mean of 9.6 members per household.

The total population from the selected households was 1219 individuals. Of these individuals, 77% were Muslim, 16% were Animists, and 7% were Christians. The age of the selected household member ranged from 0 (less than 1 year) to 82 years, with a mean of 19.7 years. The age distribution of the members of the selected households was:



Fifty-three percent of the members of the selected household were females versus 47% males. Ninety-three percent were Mossi and the other 7% were Samo or Peulh. Educational level was low. Fifty-eight percent of those over 6 years of age had no formal education, and 57% of those over 7 years of age were illiterate.

3.1. Descriptive statistics for changes over seasons

Table 1 shows the food insecurity items, the score for each response choice, and the frequency of affirmative responses for each item at waves 1 to 5. The Cronbach alpha reliability coefficients for the food insecurity score were 0.85, 0.82, 0.84, 0.81, and 0.85 at waves 1 to 5, respectively, indicating adequate reliability. At each wave, each of the food insecurity items contributed about the same to the reliability.

Table 2 shows the means and standard deviations of demographic, wealth, dietary intake, anthropometric, and food insecurity variables at each of the five waves: July 2001, January 2002, July 2002, January 2003, and July 2003. Figures 2 to 7 present the means across waves graphically for many of these variables.

Household size expressed in number of active members and number of adult equivalents increased somewhat across waves. The mean number of active household members ranged from 4.71 in July 2001 to 6.31 in July 2003. The mean number of adult equivalents ranged from 6.79 in July 2001 to 7.97 in July 2003.

The mean value of household total assets was higher in wave 2 (472,000 CFA francs) than in waves 1, 3 and 4, with a rise again at wave 5 (Figure 2). Net income per capita was higher at waves 1, 3, and 5 than at waves 2 and 4, largely because of higher transfers during the July waves (Figure 3). The value of food store was 66,140 CFA francs at wave 2 and 81,660 CFA francs at wave 4; the values of food store at waves 3 and 5 were estimated to be zero and near zero (5.94), respectively. Food share was 0.49 in wave 2, 0.72 in wave 3, 0.65 in wave 4, and 0.67 in wave 5 (Figure 4). This reflects that food insecurity is more prevalent in July than in January.

The mean number of eating occasions was also periodic, being higher in July than in January (Figure 5). The mean energy intake per equivalent adult decreased progressively from January 2002 (2566 kcal) to January 2003 (2113 kcal), and then increased somewhat to July 2003 (Figure 6). Food diversity at wave 2 and 3 were similar (about 11), with both higher than that at wave 3 (9.99) and lower than at wave 5 (11.54).

The average household adult weight was consistently slightly (about 1 kg) higher in January than in July waves. This result is as expected because, not only is July the peak of the hungry season, it is also a period of heavy agricultural work resulting in increased energy expenditure. The household average women's MUAC was similar at each wave. The average adult BMI was higher in January 2002 (20.44 kg/m²) and in January 2003 (20.34 kg/m²) than in July 2001 (19.99 kg/m²), July 2002 (20.24 kg/m²), and July 2003 (19.99 kg/m²). For child anthropometry, all the indices were lower in January than in July (Figure 7).

The mean food insecurity score was higher in waves 1 (10.71), 3 (7.50), and 5 (6.22) than in waves 2 (4.92) and 4 (4.46) (Figure 4). This pattern was as expected, indicating that food insecurity is more severe during the hungry season than during the post-harvest season.

Table 3 presents the data from Table 2 as changes from each wave to the next wave. The p-values indicate that there was sufficient statistical power with the sample size of households to reliably measure overall changes.

3.2. Validity of the food insecurity score at each wave

3.2.1. Association of the food insecurity score with other variables at each wave

One way of testing the validity of the food insecurity score is to examine how it was associated with variables that are commonly used to measure food insecurity. These variables include wealth, dietary intake, and anthropometry. Table 4 presents the correlation coefficients between

Figure 2. Changes in total assets over time across five waves

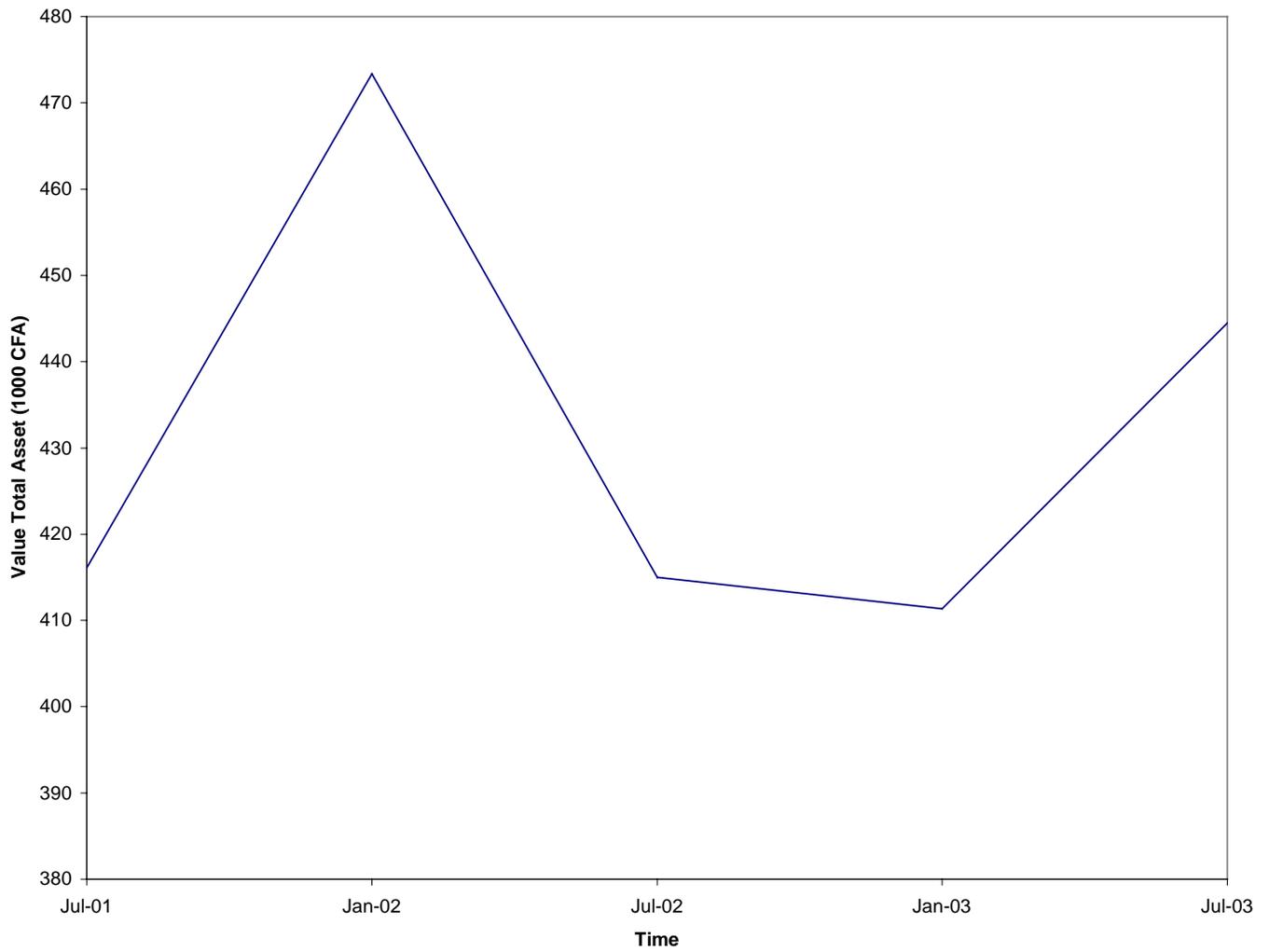


Figure 3. Changes in net income per capita over time across five waves

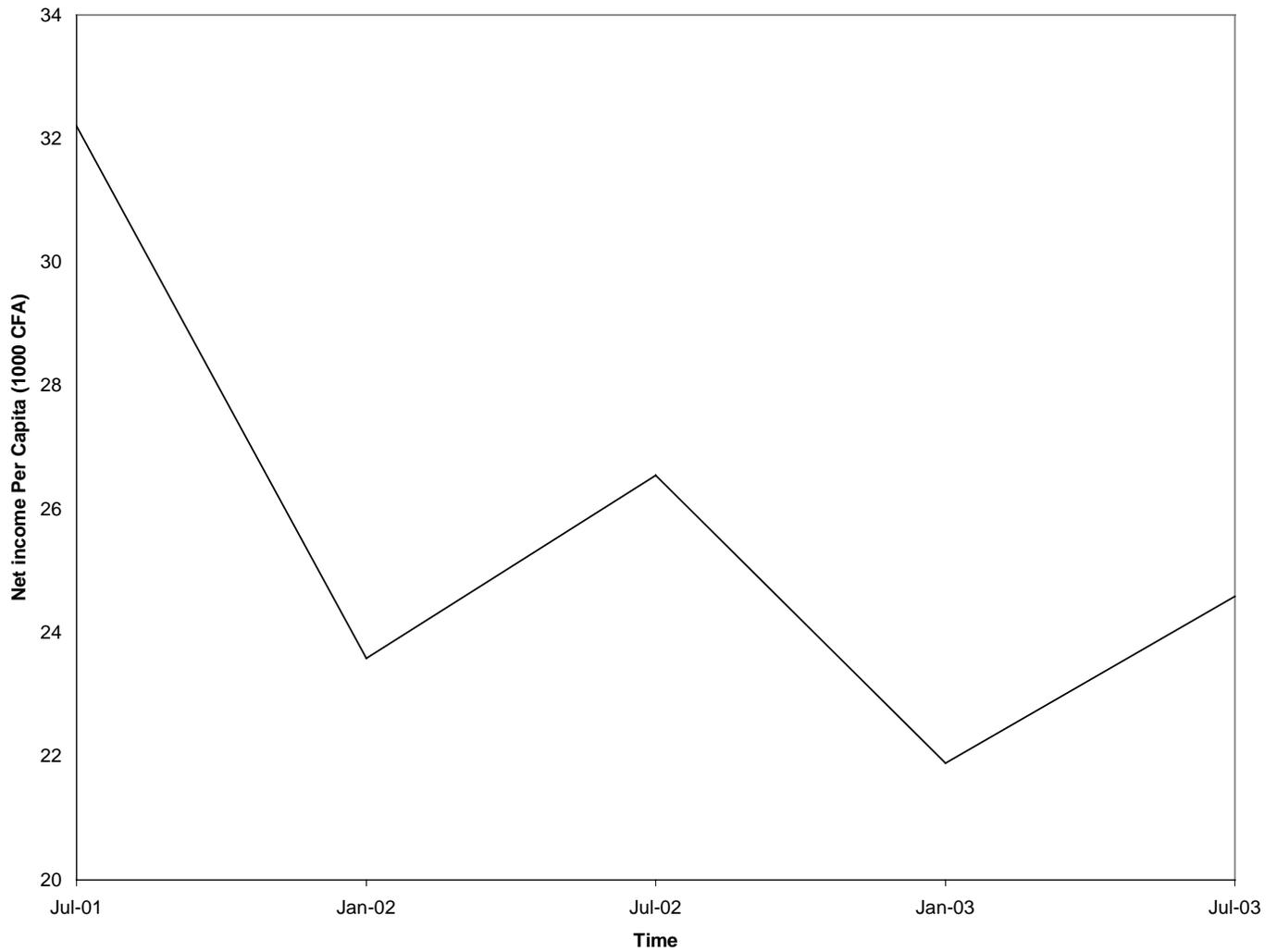


Figure 4. Changes in food insecurity and food share over time across five waves

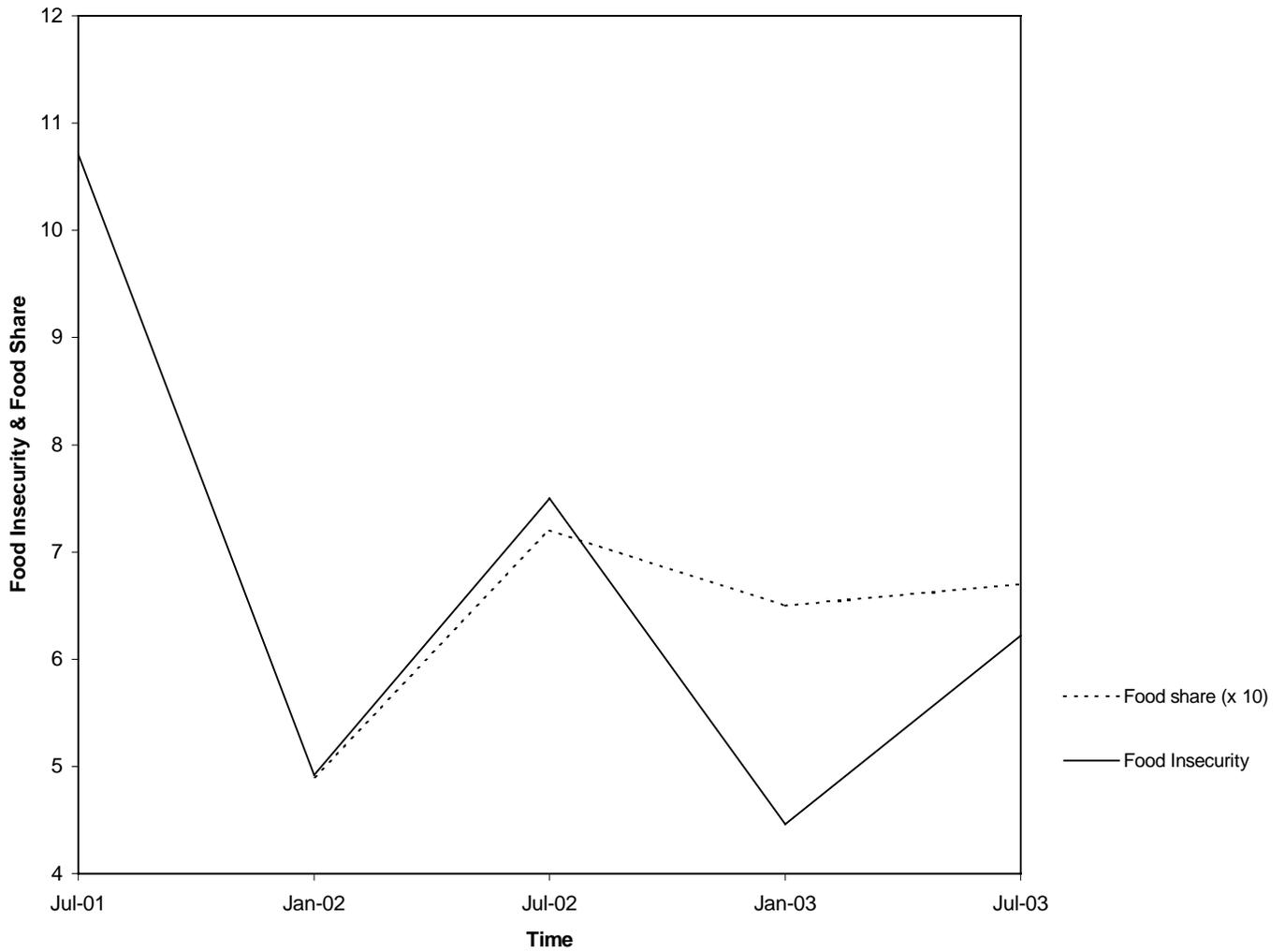


Figure 5. Changes in number of eating occasions over time across five waves

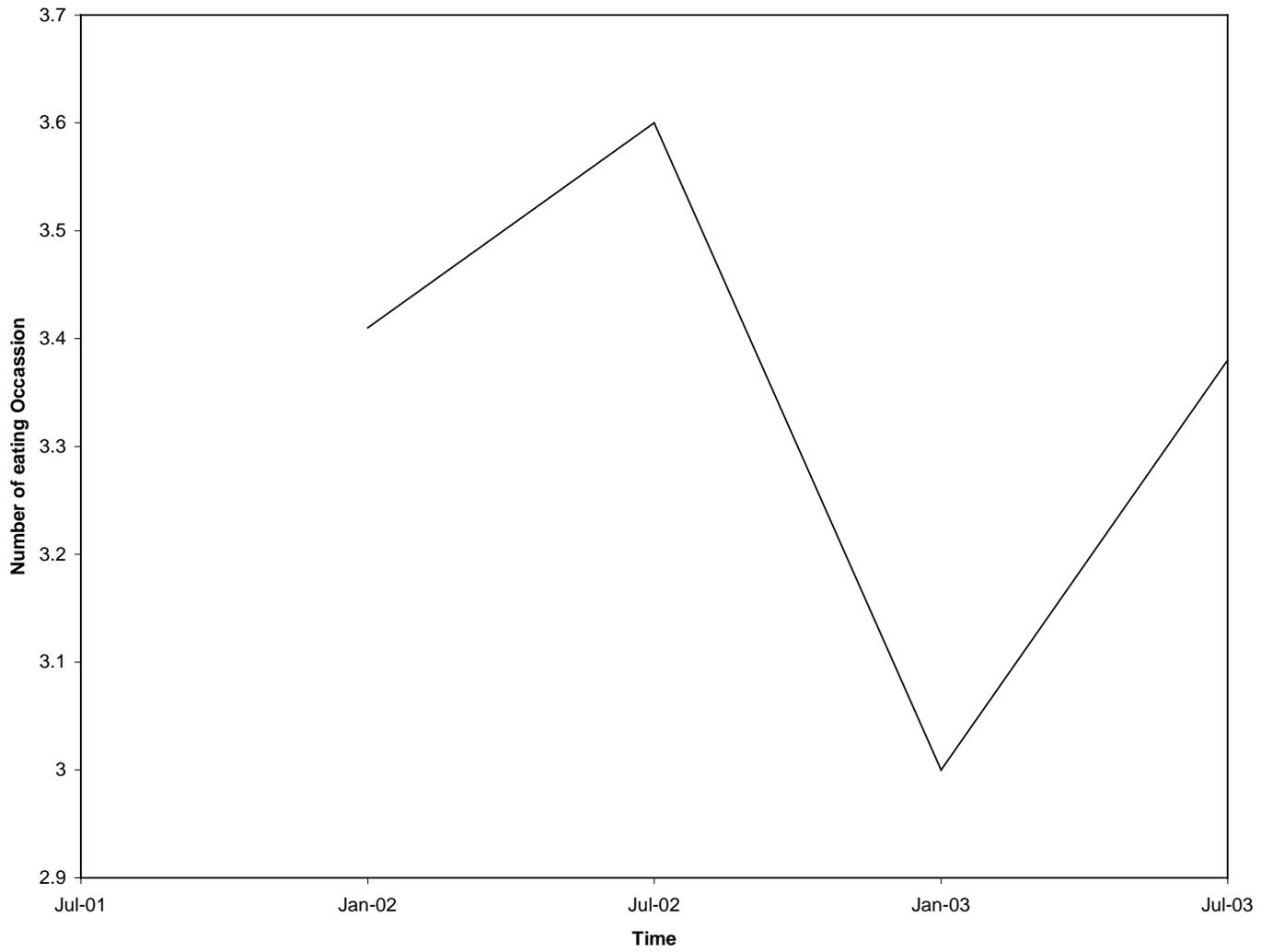


Figure 6. Changes in energy intake per equivalent adult over time across four waves

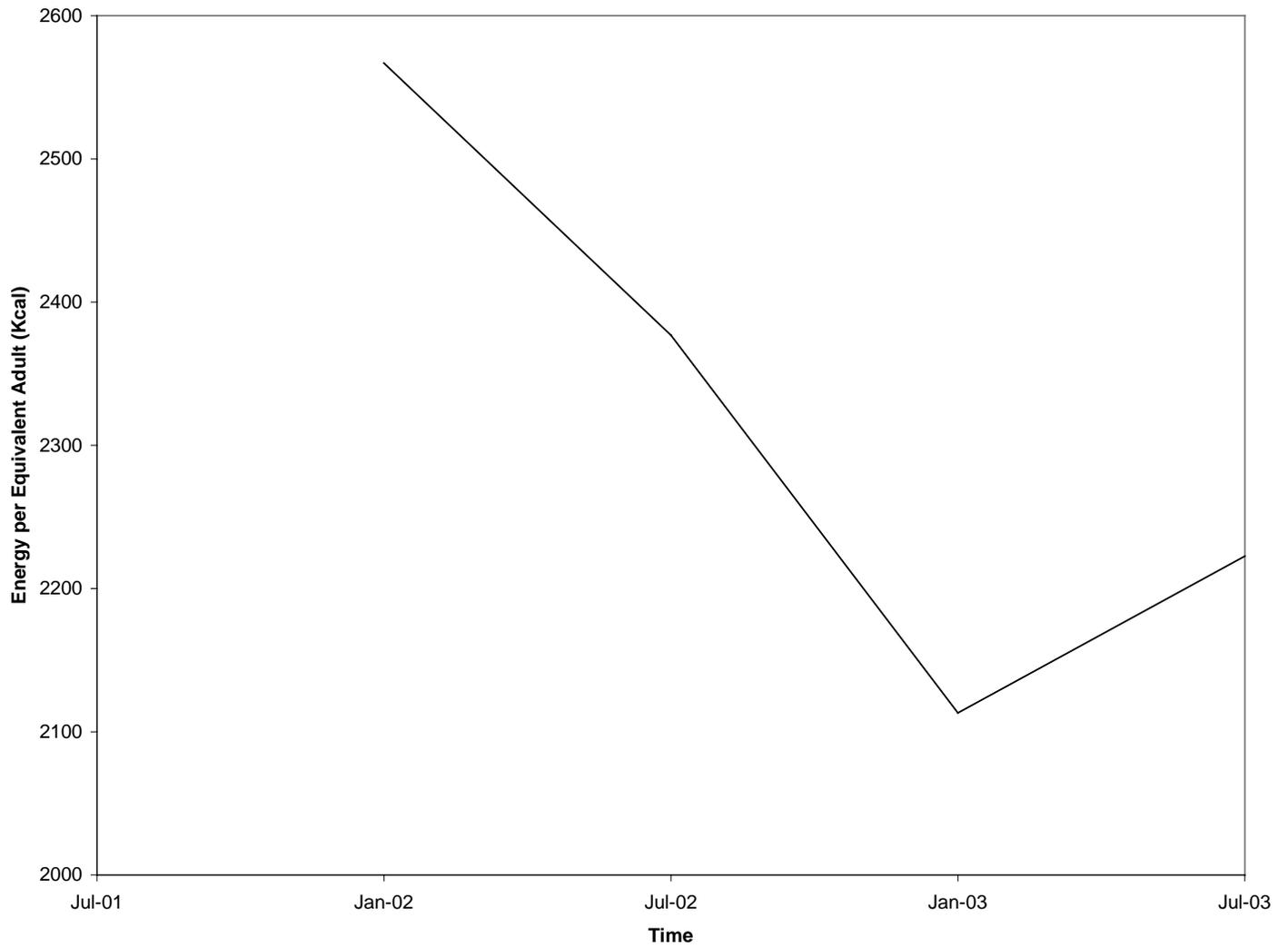
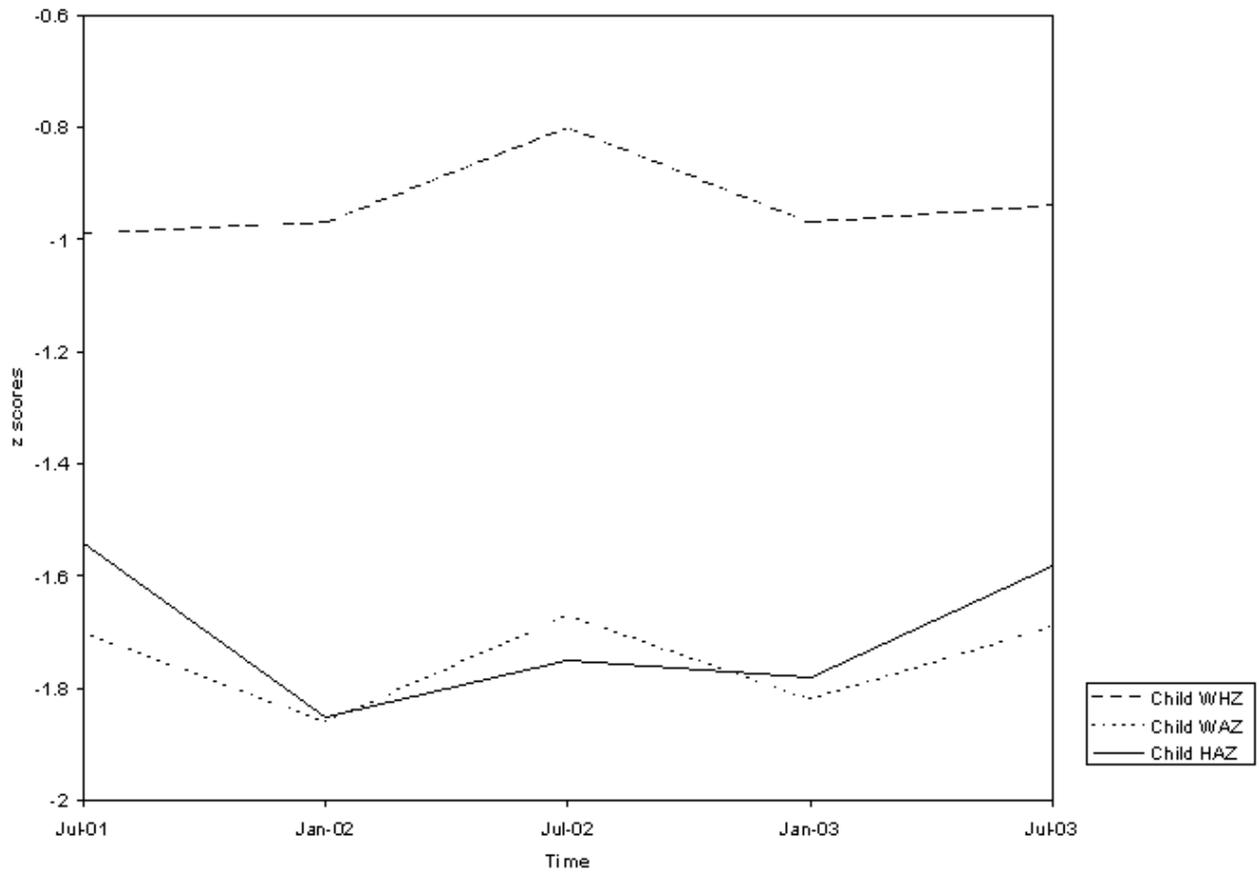


Figure 7. Changes in child anthropometry over time across five waves



food insecurity score and wealth, dietary intake and nutritional variables at each wave. Total assets and net income per capita were negatively and significantly correlated with food insecurity score at wave 1. This association is as expected, indicating that higher food insecurity score was associated with lower assets and net income per capita. Similar associations were observed at waves 2 to 5. Food store was negatively associated with food insecurity score at waves 2 to 5, whereas food share was positively associated with food insecurity score. Here again, the associations were as expected.

The number of eating occasions was negatively and significantly correlated with food insecurity score at waves 2 and 3. Higher food insecurity score was associated with lower number of eating occasions. Energy per adult equivalent was negatively associated with food insecurity score at waves 2, 3, and 5, but not at wave 4. Food diversity was significantly and negatively correlated with food insecurity score at waves 3 to 5, but not wave 2.

Adult weight was significantly and negatively (the expected direction) associated with food insecurity score at waves 1, 3, 4, and 5, but not at wave 2. BMI was significantly and negatively associated with food insecurity score at waves 1, 3, and 5 (i.e., the hungry, pre-harvest seasons). There were no significant associations between food insecurity and women's MUAC at any of the waves. Child anthropometric indices were generally negatively correlated with food insecurity score at the five waves, but few of the correlation coefficients had low p-values.

In summary, the food insecurity score was associated as expected with its proximal determinant, i.e., wealth, and its proximal consequence, i.e., dietary intake (see Figure 1). It was weakly and inconsistently associated with its more distal consequence, i.e., adult and child anthropometry.

3.2.2. Association of wealth variables with dietary intake and anthropometry

Tables 5 to 8 present correlation coefficients and p-values for the associations between total assets, net income per capita, food store, and food share with dietary intake and anthropometry at each wave. The purpose of these analyses was to examine the patterns of correlation coefficients for the associations of these wealth variables with the consequences of dietary intake and anthropometry, and to compare these patterns with the analogous pattern of correlation coefficients for the food insecurity score. According to the conceptual framework displayed in Figure 1, one might expect that the food insecurity score would be more associated with dietary intake and anthropometry than would the wealth variables. Since there are many correlation coefficients tabled, it is helpful to summarize these as averages. The average correlation coefficients across waves of the food insecurity score and wealth variables with dietary intake and anthropometry from Tables 4 to 8 are:

	Food Insecurity Score	Total Assets	Net Income Per Capita	Food Store	Food Share
Dietary Intake	-0.182	0.172	0.041	0.104	-0.062
Adult Anthropometry	-0.125	0.120	0.104	0.107	-0.106
Child Anthropometry	-0.086	0.056	-0.033	-0.024	-0.076

The food insecurity score had, on average, the strongest associations with dietary intake. The food insecurity score and total assets had, on average, the strongest associations with adult

anthropometry. For child anthropometry, the associations, on average, were low for the food insecurity score and the wealth variables. These results provide further evidence of the validity of the food insecurity score because they are consistent with what we would expect if the food insecurity score accurately measures food insecurity.

3.2.3. Comparison of the food insecurity score with the observer measure

An alternate way to test the validity of the food insecurity score is to compare its performance to that of the observer measure. The analysis of variance results in Table 9 indicate that at wave 4 the observer measure was strongly associated with total assets, food insecurity score, and food store. That is, differences among households in the classification of food insecurity by the observer measure were manifested mostly in the total assets, food insecurity score, and food store. Another interpretation of these results is that total assets, food insecurity score, and food store best predict the classification of households as to their food insecurity status by the observer measure. The analysis of variance results in Table 10 indicate that at wave 5 the observer measure was strongly associated with total assets and food insecurity score, but not food store as in wave 4.

The results for wave 4 of the multinomial logistic regression analyses with the observer measure as the dependent variable are presented in Table 11. Column 2 presents the predictor variable(s) in the models. Column 3 presents the chi-square statistic corresponding to the difference in model fit (i.e., the -2 log-likelihood) with the addition of food insecurity score, and column 4 gives the corresponding p-value. Columns 5 and 6 give the estimated odds ratios for the medium secure versus the food secure households and the food insecure versus the medium food secure households, respectively. Columns 7 and 8 present the area under the ROC for each model, when comparing the medium food secure to the food secure households and the food insecure to the medium food secure households. The proportions of pairs of households correctly classified by the food insecurity score were 0.7212 and 0.6813, respectively, less than the corresponding proportions for total assets but greater than those for net income per capita, food share, and food store.

When food insecurity score was added to each model with a wealth variable, the -2 log-likelihood decreased significantly, indicating a better fit of the models with food insecurity score. These results suggest that the food insecurity score discriminated among the food insecurity classes beyond that captured by the wealth variable alone. These results are further confirmed by the change in the area under the ROC. For example, when the logistic regression was run with total assets alone, comparing the medium secure to the secure, the area under the ROC was 0.79, indicating that total assets alone correctly classified 79% of the households between these two food insecurity categories. When the food insecurity score was added to the model, the proportion of correctly classified households increased to 81%. The model that best predicted household food insecurity status as measured by the observer is the one with both total assets and food insecurity score. This model had the best combination of discriminating between the secure and medium secure households (81%) as well as discriminating between the medium secure and the insecure (70%).

The odds ratios in column 5 and 6 indicate that, controlling for total assets, the odds of being classified as medium food secure were 1.22 times the odds of being classified as food secure for a one-point difference in the food insecurity score. Similarly, the odds of being classified as insecure was 1.25 times the odds of being classified as medium secure.

3.3. Validity of the food insecurity score to assess changes in food insecurity across waves

The validity of the food insecurity score for capturing changes in household's food insecurity was tested by comparing the association between change in food insecurity score with changes in wealth, dietary intake, and anthropometric variables. Table 12 reports the results from both bivariate correlation analysis and linear regression analysis. The linear regression analysis is superior because it controlled for the initial status of the food insecurity score and the comparison (i.e., response) variable. Change in food insecurity score were negatively associated with changes in the value of household's total assets for waves 2-1, 3-2, 4-3, and 5-4, with the standardized regression coefficients being -0.458, -0.226, -0.050, and -0.281, respectively. This means, for example, that a one standard-deviation difference in the change in food insecurity score from wave 1 to wave 2 was associated with a -0.458 standard deviation difference in the change in total assets. Change in food insecurity score was associated in the expected direction with change in net income per capita for each of the first three intervals, with change in food share and energy intake for each of the last three intervals, with change in number of eating occasions and women's MUAC for wave 3-2, with change in adult weight for each of the first two intervals, and with BMI for waves 2-1 and 5-4. Change in food insecurity score was associated with changes in child anthropometry for only two of 16 comparisons, and one of these was in the opposite direction from that expected.

4. DISCUSSION

4.1. Validity of the food insecurity score to capture overall seasonal differences

For the food insecurity score to be useful, the simplest application would be to capture overall differences in food insecurity status across the seasons. Based on knowledge of the project area, we expected that food insecurity would be lowest in January and highest in July. The patterns found for the wealth variables net income per capita (Figure 3) and food share (Figure 4) reflect this expectation. The food insecurity score showed marked differences across seasons (Figure 4), consistent with this expectation.

4.2. Validity of the food insecurity score to discriminate among households at each wave

The conceptual framework presented in Figure 1 was used to guide the analysis of the validity of the food insecurity score to discriminate among households at each wave, in conjunction with the six criteria for validity from Frongillo (1999). A method suitable for providing useful analytical measurement for a given purpose and context is one for which:

1. its construction is well-grounded in an understanding of the phenomenon,
2. its performance is consistent with that understanding,
3. it is precise within specified performance standards,
4. it is dependable within specified performance standards,
5. it is accurate within specified performance standards,
6. its accuracy is attributable to the well-grounded understanding for that purpose and context.

Criterion 1 was met because of the in-depth qualitative data collection and analysis that led to the development of the items in the food insecurity score. Criterion 2 was met because the frequency of affirmative responses for the items was as expected, as seen in Table 1. For criteria 3 and 4, the Cronbach's alpha coefficients at each wave indicated that the food insecurity score was reliable (i.e., precise and dependable).

For criterion 5, from the conceptual framework, if the food insecurity score accurately reflected household food insecurity, then the food insecurity score should have been associated with: 1) variables known to be indicative of food insecurity, 2) dietary intake more than with nutritional status (i.e., anthropometry), 3) dietary intake and nutritional status more than wealth was associated with dietary intake and nutritional status, and 4) the definitive measure created by an observer. Overall, the food insecurity score was associated with the variables usually known to be indicative of food insecurity, and was, in general, more strongly associated with dietary intake than with anthropometry. The association between food insecurity score and dietary intake was stronger than that between wealth variables and dietary intake. Furthermore, the food insecurity score was strongly associated with the observer measure. Interpretation of these findings should be made with the recognition that the food insecurity score captures the availability and access components of household food insecurity, and not the utilization component. It is possible that a measure that included utilization would be more strongly related to anthropometry than was the food insecurity score.

For criterion 6, the comparison of the food insecurity score with the observer measure provides evidence that attributes the performance of the food insecurity score to its ability to capture food insecurity status. When the food insecurity score was added to the multinomial model with each of the wealth variables, the -2 log-likelihood was significantly reduced and the area under the ROC curve increased somewhat, indicating that food insecurity score captured some aspects of food insecurity beyond that captured by the wealth variables.

4.3. Validity of the food insecurity score to discriminate changes in households across waves

The results of the linear regression analyses provides compelling evidence that the food insecurity score validly discriminated changes in the food insecurity status of households over waves. The availability of five waves of data allowed identification of persistent patterns and drawing of conclusions about the ability of the food insecurity score to capture changes in food insecurity status. Change in the food insecurity score was associated in the expected direction with changes in wealth, dietary intake, and adult anthropometry for most, but not all, intervals. The evidence for the validity of the food insecurity score across waves, however, is not as strong as that for the validity at each wave for three reasons. First, any unreliability in the food insecurity score and comparison variables was doubled when a change is calculated. Second, it was not possible to create a definitive measure for change in food insecurity. Third, application of the analyses implied by the conceptual framework in Figure 1 for comparing the strength of associations between the sets of variables could not be done in a reasonably simple and interpretable manner for changes across waves. This is a topic for future research and analysis.

4.4. Association of food insecurity score and child anthropometry

Child nutritional status was better in July (when food was limited) than in January (when food was more plentiful). In addition, there was a consistent lack of association between the food insecurity score and anthropometry, especially with child's anthropometry. Several possible reasons could explain this finding.

First, all the variables analyzed had been collected as household-level variables except for anthropometry. Anthropometric data were averaged within households to produce an estimate of household adult and child anthropometric status. This averaging may have obscured a significant association between food insecurity score and individual anthropometry, but it could not have produced better anthropometric status in July than in January.

Second, child nutritional status is determined by not only the access to food, but also by other factors including physiological utilization of food, disease episodes, and the quality of childcare. The morbidity data indicated that the prevalence (as percentage of children) of child fever and cough tended to be higher in January than in July:

	<i>July 2001</i>	<i>January 2002</i>	<i>July 2002</i>	<i>January 2003</i>	<i>July 2003</i>
Fever	41	53	28	44	46
Cough	26	52	14	45	25
Diarrhea	34	39	29	29	33

These results suggest that child illness may explain at least part of the lower anthropometric status at January waves.

Third, as shown in Table 2, the mean age of children increased over the four waves. Although every effort was made to include any newborns in the sample, it is possible that some were missed. This increase could have resulted in an overall trend across the seasons, but not for the seasonal fluctuations that were observed.

Fourth, it is possible that adults in time of food shortage buffer children by giving a high priority to the feeding of children at their own expense. To test for this buffering hypothesis, linear regressions were run, regressing changes in both adults and child anthropometry on dietary intake while controlling for the initial value of anthropometric indices and for the initial dietary intake. If the buffering hypothesis were true, then one would have expected a significant association between dietary intake and adult anthropometry but not with child anthropometry. The regression results (not reported) did not support the hypothesis that children were given higher priority at the expense of the adults.

Fifth, the analysis for this report focused on the assessment of household food insecurity as assessed by heads of households. It is possible that household food insecurity as it was assessed by women will be more related to child anthropometry since women have more responsibility for child feeding and other care.

Further individual-level analyses that stratify by child age group and control for disease status are required to elucidate this issue. In addition, there is a need to understand and measure child caring practices. This was possible in wave 5, as indicators for assessing care and caring capacity were available through an on-going UNICEF-Cornell project; these data are being analyzed.

4.5. Assessment of dietary intake

The mean energy intake per equivalent adult decreased progressively across three waves during which it was measured, increasing somewhat at the last wave. The number of eating occasions had a similar pattern. The explanation for this pattern is not obvious. It could be that over time the households progressively under-reported intake as has been observed in some other studies. Examination of the components of the variability showed that, for waves 2 to 4, the day-to-day variability decreased across the waves, whereas the among-household variability remained constant; both sources of variability increased in wave 5:

<i>Variability</i>	<i>Jan. 2002</i>	<i>July 2002</i>	<i>Jan. 2003</i>	<i>July 2003</i>
Day-to-day standard deviation (kcal)	826.56	762.59	609.18	937.32
Among-household standard deviation (kcal)	610.07	594.25	597.24	736.90
Reliability of average of two days of intake (%)	52	55	66	62

As a consequence, the reliability of the two-day average intake (i.e., the percentage of total variability of the two-day average that was due to among-household (variability) increased across waves. It is possible that the day-to-day variability decreased because of under-reporting of non-usual items or because the quality of data collection increased (i.e., there was less measurement error over time). There is not sufficient information to separate out these possible

explanations. It is important to emphasize, however, that these trends over time do not affect the assessment of validity of the food insecurity score relative to dietary intake for discriminating among households at a given wave or across waves.

4.6. Conclusions

The results from this project provide strong evidence that the experience-based food insecurity score, calculated from items administered by questionnaire, is valid for determining seasonal differences in the availability and access components of household food insecurity, differences among households in food insecurity at a given time, and changes in household food insecurity over time in production units with children under five years of age in northern rural Burkina Faso.

The food insecurity questionnaire is a simple tool that could be used in this setting by organizations to assess, evaluate, or monitor the availability and access components of household food insecurity. This information can also support design, planning, targeting, and implementation of programs by identifying possible interventions, points of entry for services, and subgroups most in need or who might most benefit. The food insecurity questionnaire has advantages over some other methods that are often used to evaluate the success of development projects that aim to reduce food insecurity. Data on dietary energy intake are difficult and time-consuming to collect and analyze, especially in the African context with complex family structure. Anthropometric data are easier to collect and analyze than are dietary data, but anthropometric data tend to not be sensitive or specific to changes in food availability and access.

New analyses using the five waves of data will examine the association of household food insecurity with the food insecurity of mother-child sub-units within complex households in Burkina Faso. Furthermore, analyses will examine the causal relations among determinants and outcomes using the longitudinal data to strengthen causal inferences, and the association of Africare programmatic activities with patterns of food insecurity in the study villages.

This research reaffirms the value of gaining in-depth understanding of household food insecurity. From work done in Bangladesh, Java, and Burkina Faso and other work reviewed, we believe that implementing this approach, rather than translating and adapting questions developed elsewhere, will likely lead to the best direct, experience-based measures for assessing household food insecurity in other countries. Nevertheless, further research to understand the experience of food insecurity in other countries and to compare approaches for constructing local, national, and cross-national measures is warranted. First, we need to study rigorously to what extent questionnaires can be shared across a region or from one location to another, and also to compare the performance of a measure developed in a particular location with ones adapted from other locations. For example, we are working with Africare in multiple francophone West African countries to explore the use of a common core set of food insecurity questions. Second, we have produced a technical guide to aid organizations in carrying out the qualitative research needed to develop an experience-based questionnaire in an efficient manner. As new experience-based food insecurity measurement tools are developed, we will learn more about both the resources required to implement this approach and the similarities and differences in how people experience food insecurity across different locations.

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Table 1. Items on household food insecurity, with scores assigned, and frequency of affirmative responses at waves 1 to 5

Number	Food Insecurity Item	Responses	Score	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5
Q1	Does your household eat until satisfied right now?	Yes	0	35.7	85.5	48.8	84.7	63.2
		No	1	64.3	14.5	50.4	15.3	36.8
Q2	In what form do you usually give the mondé when you do it from your home store?	In grain	0	50.0	27.4	57.9	72.9	56.5
		In ear	1	50.0	72.6	42.1	27.0	43.6
Q3	Since the last harvest, did you reduce the mondé because there wasn't enough food?	Yes	1	73.0	29.0	57.1	18.7	42.4
		No	0	27.0	71.0	42.9	81.3	57.6
Q3.1	If yes, how many times did you reduce the mondé?	1	0	79.3	77.8	81.9	100	83.0
		2	0.5	9.8	8.3	16.7	0	13.2
		>3	1	10.9	13.9	1.4	0	3.8
Q3.2	When (in which month) did the first reduction occur?		NS	--	--	--	--	--
Q3.3	Today's mondé represents:	More than half the initial mondé	0	69.6	64.9	77.8	87.0	90.4
		Half the initial mondé	0.5	21.7	29.7	19.4	13.0	9.6
		Less than half the initial mondé	1	8.7	5.4	2.8	0	0
Q4	Since the last harvest, did you or other adults in your household reduce the number of their daily meal because there wasn't enough food?	Yes	1	65.1	25.0	54.8	15.3	37.6
		No	0	34.9	75.0	45.2	84.7	62.4
Q4.1	If yes which meal(s) did you suppress?	Early morning meal (Breakfast)	0	67.1	74.2	56.5	78.9	78.72
		Day meal (Lunch)	0.5	6.1	12.9	2.9	5.3	0
		Night meal (Dinner)	0.5	20.7	3.2	26.1	10.5	2.1
		Breakfast and Lunch	0.5	0	0	0	5.3	0
		Lunch and Dinner	1	0	0	0	0	0
		Breakfast and Dinner	0.5	6.1	9.7	14.5	0	19.2
Q5	How many times in a month can you afford the following foods for your HH members?	Rice >4	0	7.1	8.1	15.0	19.4	18.6
		Else	1	92.9	91.9	84.9	80.7	81.5
		Meat >4	0	19.0	21.8	18.3	29.0	26.4
		Else	1	81.0	78.2	81.7	71.0	73.6
		Fish >20	0	6.3	16.1	11.9	3.2	8.8
		5-20	0.5	56.4	32.3	57.9	47.2	58.4
		<5	1	37.3	51.6	30.2	39.5	32.8
Q6	What worries more in your daily life?	Health	0	15.1	26.6	20.6	41.9	34.4
		Not having enough food	1	82.5	65.3	76.4	54.0	61.6

		Other	0	2.4	8.1	4.0	4.0	4.0
Q6.1	If “Not having enough food”, do you worry you will lack food for	Next week	1	14.4	2.5	23.2	0	23.4
		Next month	0.5	33.7	7.4	31.6	0	16.9
		In the coming two months	0.5	29.8	11.1	21.1	11.9	29.9
		In three months	0	14.4	24.7	15.8	17.9	22.1
		In four months or later	0	7.7	54.3	8.4	70.1	7.8
Q6.2	Does this concern give you insomnia right now?	Yes	1	92.3	64.2	87.4	77.3	87.0
		No	0	7.7	35.8	12.6	22.7	13.0
Q6.3	If “yes”, how often does this happen in a week?	>3	1	84.5	67.3	31.3	76.9	59.1
		else	0	15.5	32.7	68.7	23.1	40.9
Q6.4	Did you lose weight because of this concern?	Yes	1	92.3	57.5	80.0	41.5	61.0
		No	0	7.7	42.5	20.0	58.5	39.0
Q7	Since the last harvest, did you buy cereals to feed your family because there wasn't enough at home?	Yes	1	77.8	13.7	57.9	12.1	48.0
		No	0	22.2	86.3	42.1	87.9	52.0
Q7.1	If “yes”, when did you start buying cereals (give the season)?		NS	--	--	--	--	--
Q7.2	How much cereal did you buy since then?		NS	--	--	--	--	--
Q7.3	In which selling unit you usually buy cereals?	100 kg bag	0	56.1	17.6	60.3	37.5	55.0
		Tine	0.5	25.5	29.4	15.1	25.0	20.0
		Yoruba	1	12.2	41.2	15.1	37.5	16.7
		Tomato can	1	2.0	0	9.6	0	8.3
		Bol	1	4.1	11.8	0	0	0
Q7.4	Where do you usually get money to buy cereals?	Gift from migrant (mainly in Ivory Coast)	0	23.5	5.9	20.5	0	18.3
		Sale of cow	0	9.2	23.5	9.6	28.6	11.6
		Sale of small ruminants	0.5	41.8	29.4	27.4	14.3	18.3
		Sale of poultry	1	3.1	5.9	0	7.1	6.7
		Income generating activity	0	11.2	23.5	27.4	42.9	30.0
		Other	NS	--	--	--	--	--
Q8	Since the last harvest, did you ever borrow cereals to feed your family because there weren't any cereals left in any form?	Yes	1	11.9	0.8	4.0	1.6	1.6
		No	0	88.1	99.2	96.0	98.4	98.4
Q8.1	If “yes” whom did you borrow from	Uncle	0	13.3	0	0	0	0
		Friend	0.5	33.3	0	40.0	0	50.0
		Direct parents	1	33.3	0	60.0		50.0
Q9	Since the last harvest, did your family ever eat food it didn't want to eat because there wasn't enough or no food at all at home?	Yes	1	33.3	4.8	14.3		13.6
		No	0	66.7	95.2	85.7		86.4
Q9.1	How many times did they eat food they don't want over the past 7 days?	0-2	0	78.6	66.7	35.3		11.8
		3-4	0.5	14.3	26.6	41.1		23.5
		>4	1	7.1	6.7	23.6		29.4

	If "yes", which type of hungry food did they eat?	Bean leaves	0	11.9	66.7	44.4		64.7
		Sorrel leaves	0	28.6	83.3	72.2		47.1
		Lelongo	1	78.6	0	55.6		82.5
		Keguendo	0	83.3	0	61.1		94.1
		Kesga	1	2.4	0	0		0
		Gilgo	1	2.4	0	5.6		17.7

Note: Some items were not scored, and therefore, frequencies are not reported. These items either were needed to interact with the respondents but were not discriminating with regards to food insecurity, or only applied in one season or the other.

Table 2: Means and standard deviations of demographic, wealth, dietary and nutritional variables at waves 1 to 5

Variables	Wave 1 (July 2001)			Wave 2 (January 2002)			Wave 3 (July 2002)			Wave 4 (January 2003)			Wave 5 (July 2003)		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Demographic															
Number of active member	126	4.16	2.47	124	5.05	2.53	126	5.63	2.84	126	4.71	2.47	125	6.31	3.63
Number of adult equivalent	126	6.07	3.22	124	7.29	3.42	126	7.38	3.55	126	6.83	3.18	125	7.97	4.19
Age of children	195	28.80	17.57	193	33.76	19.28	200	36.26	20.07	209	40.93	21.74	235	43.27	23.90
Wealth															
Total assets (1000 CFA)	126	416.11	485.85	124	473.38	522.23	126	414.99	541.80	124	411.35	459.40	125	444.49	574.08
Net income per capita (1000 CFA)	126	32.20	26.66	124	23.59	17.35	126	26.55	18.71	124	21.89	12.46	125	24.59	13.92
Food in store (1000 CFA)				124	66.14	59.33				124	81.66	51.35	123	5.94	10.65
Food share				124	0.49	0.22	125	0.72	0.23	124	0.65	0.26	125	0.67	0.18
Dietary intake															
Number of eating occasion				121	3.41	0.66	126	3.60	0.94	124	3.00	0.60	125	3.38	0.86
Energy (kcal) per adult equivalent				121	2566.87	1020.31	126	2376.76	802.44	124	2113.14	736.59	125	2222.53	991.11
Food diversity score				124	11.15	2.81	126	11.04	2.34	124	9.99	2.85	125	11.54	2.24
Adult anthropometry															
Adult weight (kg)	126	55.24	4.74	123	56.55	5.34	126	55.93	5.53	121	56.30	5.60	125	55.40	5.70
Women's MUAC (cm)	126	25.73	1.78	113	25.79	1.71	121	25.89	1.71	111	25.77	1.64	122	25.86	1.64
Adult BMI (kg/m ²)	126	19.99	1.43	123	20.44	1.49	126	20.24	1.57	121	20.34	1.61	125	19.99	1.53
Child anthropometry															
Child MUAC (cm)	114	14.09	1.17	108	13.80	1.27	108	14.22	1.21	93	13.75	1.07	112	14.39	1.11
Child WHZ	113	-0.99	0.87	108	-0.97	0.83	107	-0.80	0.80	93	-0.97	0.86	112	-0.94	0.71
Child WAZ	114	-1.70	1.02	108	-1.86	0.93	108	-1.67	0.79	93	-1.82	0.93	112	-1.69	0.82
Child HAZ	114	-1.54	1.27	108	-1.85	1.10	108	-1.75	0.96	93	-1.78	0.95	112	-1.58	0.93
Food insecurity score	126	10.71	4.63	124	4.92	3.42	126	7.50	4.06	124	4.46	2.76	125	6.22	4.06

Table 3. Means and standard deviations of changes in demographic, wealth, dietary and nutritional variable between waves

<i>Variables</i>	<i>Wave2 - Wave 1</i>				<i>Wave3 - Wave 2</i>				<i>Wave4 - Wave3</i>				<i>Wave 5 - Wave 4</i>			
	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>p-value</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>p-value</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>p-value</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>p-value</i>
Demographic																
Number of active member	124	0.30	1.42	0.022	123	0.65	1.56	0.000	124	-0.93	1.87	0.000	123	1.64	2.48	0.000
Number of adult equivalent	124	0.43	1.40	0.001	123	0.15	1.79	0.352	124	-0.55	1.92	0.002	123	1.20	2.68	0.000
Wealth																
Total assets (1000 CFA)	124	51.68	244.83	0.020	123	-53.64	291.38	0.043	124	-3.70	237.32	0.863	121	42.88	307.61	0.128
Net income per capita (1000 CFA)	124	-8.668	20.63	0.000	123	3.2	12.52	0.005	124	-4.73	18.69	0.006	123	-55.85	53.72	0.000
Food in store (1000 CFA)													123	-74.55	48.54	0.000
Food share					123	0.25	0.25	0.000	124	-0.08	0.28	0.003	121	0.02	0.25	0.308
Dietary intake																
Number of eating occasions					120	0.18	1.04	0.061	124	-0.61	1.04	0.000	121	0.41	0.86	0.000
Energy (kcal) per equivalent adult					120	-213.77	1288.31	0.072	124	-270.70	1037.84	0.004	121	81.41	1046.94	0.394
Food diversity score					123	-0.13	2.57	0.576	124	-1.04	2.74	0.000	121	1.54	2.71	0.000
Adult anthropometry																
Adult weight (kg)	123	1.31	1.96	0.000	122	-0.75	4.14	0.047	121	0.58	3.57	0.077	118	-1.16	3.27	0.000
Women's MUAC (cm)	113	0.16	0.98	0.092	110	-0.07	1.16	0.554	110	-0.12	0.87	0.125	106	0.15	1.04	0.129
Adult BMI (kg/m ²)	123	0.48	0.72	0.000	122	-0.24	1.32	0.047	121	0.11	0.78	0.128	118	-0.38	0.79	0.000
Child anthropometry																
Child MUAC (cm)	108	-0.31	1.04	0.003	102	0.49	0.95	0.000	92	-0.38	1.02	0.001	91	0.52	1.02	0.000
Child WHZ	107	.007	0.78	0.926	102	0.19	0.71	0.010	91	-0.11	0.77	0.159	91	-0.73	0.79	0.383
Child WAZ	108	-0.17	0.99	0.071	102	0.23	0.67	0.001	92	-0.13	0.73	0.081	91	0.03	0.77	0.691
Child HAZ	108	-0.31	1.11	0.004	102	0.16	0.59	0.006	92	-0.08	0.83	0.354	91	0.15	0.77	0.068
Food insecurity score	124	-5.80	4.28	0.000	123	2.68	3.65	0.000	124	-3.03	3.61	0.000	121	1.67	3.24	0.000

Table 4. Bivariate correlation between food insecurity score and demographic, wealth, dietary intake and nutritional status for waves 1 to 5

<i>Variable</i>	Wave 1 (July 2001)		Wave 2 (January 2002)		Wave 3 (July 2002)		Wave 4 (January 2003)		Wave 5 (July 2003)	
	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>
Wealth										
Total assets	-0.224	0.012	-0.348	0.000	-0.347	0.000	-0.425	0.000	-0.438	0.000
Net income per capita	-0.192	0.031	-0.271	0.002	-0.237	0.008	-0.267	0.003	0.022	0.811
Food in store			-0.239	0.008			-0.511	0.000	-0.288	0.001
Food share			0.377	0.000	0.465	0.000	0.317	0.000	0.317	0.000
Dietary intake										
Number of eating occasion			-0.215	0.018	-0.280	0.001	-0.126	0.166	-0.068	0.450
Energy (kcal) per equivalent adult			-0.160	0.079	-0.185	0.038	-0.049	0.494	-0.235	0.008
Food diversity score			-0.064	0.484	-0.263	0.003	-0.253	0.005	-0.281	0.001
Adult anthropometry										
Adult weight (kg)	-0.198	0.026	-0.014	0.878	-0.171	0.056	-0.200	0.029	-0.182	0.042
Women's MUAC (cm)	-0.031	0.734	-0.054	0.571	-0.094	0.308	-0.095	0.198	0.051	0.573
Adult BMI (kg/m ²)	-0.238	0.007	-0.106	0.247	-0.186	0.038	-0.121	0.187	-0.243	0.006
Child anthropometry										
Child MUAC (cm)	-0.152	0.105	-0.088	0.367	-0.056	0.565	0.043	0.687	-0.105	0.270
Child WHZ	0.031	0.742	-0.148	0.128	-0.012	0.898	-0.089	0.400	-0.054	0.575
Child WAZ	-0.012	0.903	-0.155	0.111	-0.133	0.169	-0.106	0.314	-0.128	0.180
Child HAZ	-0.035	0.714	-0.118	0.228	-0.201	0.037	-0.057	0.591	-0.138	0.146

All wealth variables but food share have been transformed using the natural logarithm.

Table 5. Bivariate correlation between the natural logarithm of total assets with dietary intake and nutritional variables at waves 1 to 5

	Wave 1 (July 2001)		Wave 2 (January 2002)		Wave 3 (July 2002)		Wave 4 (January 2003)		Wave 5 (July 2003)	
	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>
Dietary intake										
Number of eating occasion			0.101	0.269	0.177	0.048	0.158	0.081	-0.019	0.834
Energy (kcal) per equivalent adult			0.058	0.531	0.151	0.091	-0.055	0.550	0.087	0.336
Food diversity score			0.138	0.130	0.227	0.011	0.192	0.034	0.132	0.143
Adult anthropometry										
Adult weight (kg)	0.174	0.051	0.101	0.268	0.146	0.102	0.093	0.314	0.102	0.257
Women's MUAC (cm)	0.082	0.359	0.018	0.850	0.160	0.080	0.141	0.141	-0.041	0.652
Adult BMI (kg/m ²)	0.248	0.005	0.112	0.218	0.211	0.018	0.107	0.247	0.144	0.109
Child anthropometry										
Child MUAC (cm)	0.029	0.757	0.097	0.318	0.030	0.754	-0.028	0.789	0.047	0.622
Child WHZ	0.034	0.723	0.021	0.831	-0.028	0.776	0.014	0.897	-0.111	0.245
Child WAZ	0.095	0.317	0.119	0.221	0.095	0.327	0.063	0.550	0.007	0.940
Child HAZ	0.088	0.354	0.175	0.071	0.184	0.570	0.069	0.513	0.121	0.205

Table 6. Bivariate correlation between the natural logarithm of per capita net income with dietary and nutritional variables at waves 1 to 5

	Wave 1 (July 2001)		Wave 2 (January 2002)		Wave 3 (July 2002)		Wave 4 (January 2003)		Wave 5 (July 2003)	
	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>
Dietary intake										
Number of eating occasion			0.140	0.126	-0.090	0.314	0.142	0.119	0.017	0.853
Energy (kcal) per equivalent adult			-0.086	0.346	0.062	0.489	0.010	0.911	-0.125	0.164
Food diversity score			0.150	0.099	-0.045	0.620	0.256	0.004	0.060	0.504
Adult anthropometry										
Adult weight (kg)	0.150	0.093	0.074	0.418	0.158	0.077	0.047	0.608	0.183	0.042
Women's MUAC (cm)	0.088	0.327	0.052	0.583	0.084	0.361	0.104	0.277	0.045	0.624
Adult BMI (kg/m ²)	0.180	0.043	0.037	0.688	0.143	0.110	0.053	0.563	0.166	0.065
Child anthropometry										
Child MUAC (cm)	-0.145	0.125	0.029	0.764	0.176	0.069	0.060	0.602	-0.072	0.450
Child WHZ	-0.101	0.287	-0.080	0.410	0.121	0.214	0.055	0.602	-0.228	0.015
Child WAZ	-0.189	0.045	-0.053	0.585	0.059	0.542	0.007	0.949	-0.116	0.222
Child HAZ	-0.174	0.063	0.033	0.737	-0.021	0.828	-0.030	0.773	0.014	0.884

Table 7. Bivariate correlation between the natural logarithm of food in store with dietary and nutritional variables at waves 2, 4 and 5

	<i>Wave 2 (January 2002)</i>		<i>Wave 4 (January 2003)</i>		<i>Wave 5 (July 2003)</i>	
	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>
Dietary intake						
Number of eating occasion	0.134	0.142	0.213	0.018	-0.118	0.195
Energy (kcal) per equivalent adult	0.080	0.384	0.116	0.204	0.000	0.997
Food diversity score	0.152	0.095	0.202	0.026	0.157	0.083
Adult anthropometry						
Adult weight (kg)	0.121	0.185	0.096	0.298	0.109	0.229
Women's MUAC (cm)	0.142	0.135	0.112	0.243	0.109	0.237
Adult BMI (kg/m ²)	0.125	0.172	0.022	0.810	0.127	0.163
Child anthropometry						
Child MUAC (cm)	0.027	0.782	-0.121	0.250	0.248	0.009
Child WHZ	-0.158	0.102	-0.070	0.508	0.098	0.309
Child WAZ	0.040	0.685	-0.035	0.742	0.108	0.264
Child HAZ	0.121	0.216	-0.012	0.911	0.040	0.680

Table 8: Bivariate correlation between food share and dietary and nutritional variables at waves 2, 3, 4 and 5

	Wave 2 (January 2002)		Wave 3 (July 2003)		Wave 4 (January 2003)		Wave 5 (July 2003)	
	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>	<i>Coeff.</i>	<i>P-value</i>
Dietary intake								
Number of eating occasion	-0.239	0.008	-0.052	0.562	-0.012	0.896	-0.046	0.608
Energy (kcal) per equivalent adult	0.034	0.708	-0.014	0.875	0.121	0.185	0.046	0.611
Food diversity score	-0.195	0.032	-0.097	0.282	-0.144	0.113	-0.135	0.133
Adult anthropometry								
Adult weight (kg)	-0.038	0.677	-0.207	0.020	-0.142	0.121	-0.262	0.003
Women's MUAC (cm)	-0.018	0.854	-0.048	0.605	-0.017	0.863	-0.036	0.691
Adult BMI (kg/m ²)	-0.079	0.387	-0.058	0.519	-0.175	0.056	-0.197	0.027
Child anthropometry								
Child MUAC (cm)	-0.110	0.262	-0.197	0.042	-0.018	0.863	-0.007	0.943
Child WHZ	-0.198	0.042	-0.125	0.200	-0.044	0.677	0.008	0.932
Child WAZ	-0.196	0.044	-0.138	0.157	-0.031	0.773	0.006	0.952
Child HAZ	-0.106	0.280	-0.062	0.107	-0.010	0.922	0.015	0.875

Table 9: Comparison of wealth and insecurity across categories of food insecurity as rated by a single observer in wave 4

Variables		Sum of Squares	df	Mean Square	F	Sig.
Total assets, wave 4	Between Groups	52.236	2	26.118	26.770	0.000
	Within Groups	118.054	121	0.976		
	Total	170.290	123			
Food insecurity score, wave 4	Between Groups	9.033	2	4.517	14.736	0.000
	Within Groups	37.088	121	0.307		
	Total	46.122	123			
Food store, wave 4	Between Groups	9.852	2	4.926	11.062	0.000
	Within Groups	53.882	121	0.445		
	Total	63.734	123			
Net income per capita, wave 4	Between Groups	2.166	2	1.083	3.308	0.040
	Within Groups	39.609	121	0.327		
	Total	48.844	123			
Food share, wave 4	Between Groups	0.428	2	0.214	3.281	0.041
	Within Groups	7.894	121	0.065		
	Total	8.322	123			

All the variables except food share and food insecurity score were transformed using the natural logarithm.

Table 10: Comparison of wealth and insecurity across categories of food insecurity as rated by a single observer in wave 5

		Sum of Squares	df	Mean Square	F	Sig.
Total assets wave 5	Between Groups	56.377	2	28.188	32.631	.000
	Within Groups	103.663	120	.864		
	Total	160.040	122			
Food insecurity score wave 5	Between Groups	504.400	2	252.200	19.708	.000
	Within Groups	1535.641	120	12.797		
	Total	2040.041	122			
Food store wave 5	Between Groups	27.195	2	13.598	2.730	.069
	Within Groups	597.637	120	4.980		
	Total	624.832	122			
Net income per capita Wave 5	Between Groups	.844	2	.422	1.528	.221
	Within Groups	33.134	120	.276		
	Total	33.978	122			
Food share wave 5	Between Groups	.082	2	.041	1.291	.279
	Within Groups	3.829	120	.032		
	Total	3.912	122			

All the variables except food share and food insecurity score were transformed using the natural logarithm.

Table 11. Changes in the multinomial logistic model fit and changes in the area under the ROC curve of the binary logistic models using the single observer rating of the households as response variable.

	<i>Model</i>	<i>Change in model fit with addition of food insecurity score</i>		<i>Odds Ratio for food insecurity score</i>		<i>Area Under the ROC Curve</i>	
		<i>Chi-square</i>	<i>p-value</i>	<i>Medium secure vs. Secure</i>	<i>Insecure vs. Medium secure</i>	<i>Medium secure vs. Secure</i>	<i>Insecure vs. Medium secure</i>
1	Total assets					0.7937	0.6749
2	Net income per capita					0.5377	0.6300
3	Food share					0.6195	0.5577
4	Food store					0.6391	0.7308
5	Food insecurity score					0.7217	0.6813
6	Total assets + Food insecurity score	11.642	0.003	1.219	1.250	0.8126	0.7024
7	Net income per capita + Food insecurity score	23.401	0.000	1.360	1.242	0.7168	0.6923
8	Food share + Food insecurity score	22.983	0.000	1.314	1.290	0.7187	0.6877
9	Food store + Food insecurity score	13.967	0.001	1.333	1.174	0.7191	0.7454

All variables except food share and food insecurity score were transformed using the natural logarithm.

Table 12. Correlation and standardized regression coefficients and p-values of the changes in food insecurity score as predictors of changes in wealth, dietary intake and anthropometrics between two each two consecutive waves, with the linear regression controlling for the initial values of both food insecurity score and the selected variable.

<i>Variable</i>	<i>Wave 2-1</i>				
	<i>Bivariate correlation</i>		<i>Linear regression</i>		
	<i>Coeff.</i>	<i>P-value</i>	<i>Adjusted R²</i>	<i>Coeff.</i>	<i>P-value</i>
Wealth					
Total assets	-0.135	0.135	0.110	-0.458	0.000
Net income per capita	-0.318	0.000	0.349	-0.392	0.000
Food share					
Dietary intake					
Number of eating occasions					
Energy (kcal) per adult equivalent					
Food diversity score					
Adult anthropometry					
Adult weight (kg)	-0.174	0.056	0.048	-0.252	0.048
Women's MUAC (cm)	-0.114	0.231	0.023	-0.119	0.378
Adult BMI (kg/m ²)	-0.175	0.054	0.066	-0.261	0.038
Child anthropometry					
Child MUAC (cm)	-0.055	0.574	0.079	-0.069	0.614
Child WHZ	0.118	0.229	0.196	-0.019	0.888
Child WAZ	0.256	0.008	0.342	0.070	0.553
Child HAZ	0.274	0.004	0.385	0.124	0.273

Total assets, net income per capita, and food store were transformed using the natural logarithm.

Table 12 (continued).

Variable	Wave 3-2					Wave 4-3					Wave 5-4				
	Bivariate correlation		Linear regression			Bivariate correlation		Linear regression			Bivariate correlation		Linear regression		
	Coeff.	P-value	Adjusted R ²	Coeff.	P-value	Coeff.	P-value	Adjusted R ²	Coeff.	P-value	Coeff.	P-value	Adjusted R ²	Coeff.	P-value
Wealth															
Total assets	-0.167	0.065	0.258	-0.226	0.008	-0.038	0.676	0.091	-0.050	0.723	-0.254	0.005	0.220	-0.281	0.001
Net income per capita	-0.086	0.346	0.365	-0.112	0.150	-0.167	0.064	0.412	-0.264	0.012	0.031	0.734	0.636	0.012	0.829
Food share	0.159	0.081	0.477	0.273	0.000	0.345	0.000	0.283	0.363	0.002	0.140	0.126	0.585	0.160	0.008
Dietary intake															
No. of eating occasions	-0.231	0.011	0.256	-0.307	0.001	-0.027	0.765	0.667	-0.003	0.964	0.051	0.484	0.077	-0.001	0.994
Energy (kcal) per adult equivalent	-0.022	0.813	0.611	-0.146	0.022	-0.041	0.625	0.493	-0.115	0.169	-0.006	0.952	0.250	-0.099	0.223
Food diversity score	0.160	0.080	0.384	-0.073	0.371	-0.104	0.255	0.129	-0.063	0.560	0.033	0.718	0.450	-0.115	0.105
Adult anthropometry															
Adult weight (kg)	-0.061	0.503	0.134	-0.133	0.145	-0.110	0.231	0.073	-0.138	0.223	-0.095	0.311	0.034	-0.107	0.247
Women's MUAC (cm)	-0.185	0.054	0.286	-0.191	0.030	-0.112	0.244	0.140	-0.037	0.743	0.003	0.973	0.105	0.038	0.683
Adult BMI (kg/m ²)	-0.065	0.479	0.171	-0.101	0.255	-0.083	0.367	0.028	-0.087	0.454	-0.157	0.091	0.151	-0.204	0.020
Child anthropometry															
Child MUAC (cm)	-0.078	0.440	0.249	-0.092	0.310	0.062	0.556	0.202	0.200	0.090	0.091	0.394	0.227	0.013	0.889
Child WHZ	-0.226	0.023	0.251	-0.137	0.133	0.008	0.953	0.123	0.082	0.506	0.064	0.550	0.401	0.029	0.724
Child WAZ	-0.080	0.425	0.264	-0.096	0.289	-0.031	0.768	0.038	0.040	0.755	0.114	0.283	0.351	0.024	0.778
Child HAZ	0.146	0.145	0.073	0.072	0.486	0.058	0.588	0.189	-0.078	0.509	0.058	0.586	0.251	-0.014	0.884

Total assets, net income per capita, and food store were transformed using the natural logarithm.

APPENDIX 1: TABLE OF FOOD INSECURITY CATEGORIES (ROWS) VERSUS THEMES, WITH THE ENTRIES BEING LEVEL OF SEVERITY, FROM THE IN-DEPTH QUALITATIVE STUDY

Themes	Food secure HH (HH No. 1.1, 1.2, 2.3, 2.4)	Medium food secure HH ² (HH No. 2.2, 2.5)	Food insecure HH (HH No. 1.3, 1.4, 1.5, 2.1)
Profile of the 'mondé' ³	<ul style="list-style-type: none"> The "mondé" is served in grains The "mondé" is not reduced but is rather increased during the rainy season (intensive agricultural work period). 	<ul style="list-style-type: none"> Give 'Mondé' in grain and not in ear. Some reduce 'mondé' and some others do not. 	<ul style="list-style-type: none"> In post harvest period, when they still cereals in the common granary, the 'mondé' is given in ear. The 'mondé' has been reduced at least once (by 1/3) by time of interview They plan another reduction of the 'mondé' before the rainy season (mainly in May). They usually start consuming new cereals far before they harvest and store them. Some cannot even talk about 'mondé' since they do not have any food left in stores.
Use of individual food stocks	<ul style="list-style-type: none"> In a normal year (good harvest), women usually rely on their own food stores for morning meal In a year of bad harvest (like this year), women rely on their own stock to prepare morning and night meal and do "robi"⁴ for 7 days per month during the post harvest period. 	<ul style="list-style-type: none"> In normal time women rely on their stock for morning and night meals. When the food store starts to be depleted the HH head ask women to totally rely on their stores for pretty long period of time (1 month). 	<ul style="list-style-type: none"> Even in a good year, women do rely on they own stores to feed themselves. In general women eat they own food stores until the HH head realizes that they do not have no more stores. This generally last between 1 and 3 months (usually until the month of the Ramadan⁵).

² These two HH has been classified as medium food secure after the 2 researchers have read the entire interviews notes and revised the classification table..

³ Household daily food ration

⁴ In some HH it often happen that the HH head do not give the monde (the daily food ration from the collective store and the HH sub-unit have to rely one their own stores to feed their dependents. This is called robi. This is a strategy to save the collective food store

⁵ Ramadan is a Muslim feast that is held at the end of the lent.

Appendix 1. Table of Food Insecurity Categories (rows) versus Themes, with the entries being level of severity, from the in-depth qualitative study

Themes	Food secure HH (HH No. 1.1, 1.2, 2.3, 2.4)	Medium food secure HH ² (HH No. 2.2, 2.5)	Food insecure HH (HH No. 1.3, 1.4, 1.5, 2.1)
Adults eating pattern	<ul style="list-style-type: none"> • Adults have three meals per day (morning meals, day meal, night meal). • They do not suppress any of the three meals (do not skip meal), • Can have rice for one the three meals, mainly the morning meal. • They can often manage bean to replace tô for day and night meals. • Eat frequently meat and fish (at least once a week). • Have milk almost every day during the rainy season. • Children have 4 meals per day 	<ul style="list-style-type: none"> • Have three meals per day in normal time (morning, day and night meal). • They can't afford to get rice and meals (day and night meals) are mainly made of tô • Morning meal is either porridge or coffee • Do not reduce the number of meal but. • Reduce meals size when facing food shortage. • Can have pounded fish almost every day but meat is very rare (only during feasts). • Children have 3 to 4 meals per day. • Drink milk every day during the wet season. 	<ul style="list-style-type: none"> • Have 3 or 2 meals per day. • They reduce the number of meal by suppressing first morning meal then the night meal. • By the time of the survey they were having just one meal per day (day meal). • Cannot manage to have rice and the night and day meals are very rarely made of bean. • Can hardly manage to have magi cubes. • Children have 3 meals per day and in some cases this is reduced to 2 meals in time of food shortage • Feasts are the only occasions where they members eat meat. • Can rarely have milk even during the rainy season.
Daily concern	<ul style="list-style-type: none"> • Worry first about health. • Are not too much concerned about what they will eat in the coming days or weeks, but rather about not having enough food during the rainy season. • None of them had insomnia during the survey time. 	<ul style="list-style-type: none"> • Main daily concerns are food and health. • They where having insomnia by the time of the interviews. • Some think they will have to ask for food help before the rainy season. 	<ul style="list-style-type: none"> • In these HH, adults (women and men) worry first about not having food for the coming days. Then comes the health concern • By the time of the survey they were having insomnia and some reported they have lost weight

Appendix 1. Table of Food Insecurity Categories (rows) versus Themes, with the entries being level of severity, from the in-depth qualitative study

Themes	Food secure HH (HH No. 1.1, 1.2, 2.3, 2.4)	Medium food secure HH ² (HH No. 2.2, 2.5)	Food insecure HH (HH No. 1.3, 1.4, 1.5, 2.1)
	<ul style="list-style-type: none"> Women are mainly concerned by: <ul style="list-style-type: none"> ✓ Clothing ✓ Health, ✓ Cooking material ✓ Peace. Most women do never buy food. 		<ul style="list-style-type: none"> Some HH head said they have lost weight. After the concern about food, women worry about clothing, health and their children's health.
Income sources	<p>These HH get income from:</p> <ul style="list-style-type: none"> Livestock sale <ul style="list-style-type: none"> ✓ Goats ✓ Cows ✓ Sheep ✓ Chicken Important amount of money given yearly by parents in Ivory Coast (at least 50.000 CFA) Some do activities like engineering. Women have many income sources and do not rely only on sale of cash crops like bean, peas and peanut. They generally use these crops to start income generating activities like the sale of 'cacahuete'⁶, 'foura', beignet etc. 	<ul style="list-style-type: none"> Own small ruminants (goats and cows) and sometime small number of cows (usually less than 10). Lack important financial help form migrants in coast Ivory Coast (not more than 5000 CFA) 	<p>The main income sources are:</p> <ul style="list-style-type: none"> Livestock sale <ul style="list-style-type: none"> ✓ Chicken and some ✓ Small ruminants (sheep and goats). Do not own cows Rely on activities like weaving, manufacture and sale of straw mats, work for small cash to get money regularly. Do not get support from parents in Ivory Coast.
Utilization of income	<ul style="list-style-type: none"> HH heads use their income mainly to by cereals early in the year. This is especially the case when they get money from migrants or when they sell a cow. 	<ul style="list-style-type: none"> Use income first to buy food and then for health expenses and children school fees. 	<ul style="list-style-type: none"> Income is exclusively used to by cereals and to the reimburse of cereal debts

⁶ Roasted peanut

Appendix 1. Table of Food Insecurity Categories (rows) versus Themes, with the entries being level of severity, from the in-depth qualitative study

Themes	Food secure HH (HH No. 1.1, 1.2, 2.3, 2.4)	Medium food secure HH ² (HH No. 2.2, 2.5)	Food insecure HH (HH No. 1.3, 1.4, 1.5, 2.1)
	<ul style="list-style-type: none"> When they sell small animal (chicken or goats) it is to solve social problems. When they do not have enough money, they choose put money first on health. Women spend their money on clothing and children health. 	<ul style="list-style-type: none"> Women spend their income on clothing, children health and condiments. 	<ul style="list-style-type: none"> In case they have to sell animals to buy food, they choose to sell poultry first (because in time of food shortage these could be easily sold than small ruminants). Women spend their income on clothing, school fees and on cereals in time of food shortage. HH heads buy food even when they feel sick.
Food buying	<ul style="list-style-type: none"> Buy cereals early in the year during the post-harvest season. Buy mostly in bags of 100 kg Buy important quantity (between 4 and 50 sac). Women never buy cereals 	<ul style="list-style-type: none"> Buy cereals early in the year Buy mostly bags When they need money to buy food, they usually sell a cow or a small ruminant. 	<ul style="list-style-type: none"> By cereal when do not nothing left in stores Buy small amount of cereals and in small units like tine and ½ tine
Long term management mechanisms	<ul style="list-style-type: none"> Start agricultural work early (March). Use organic fertilizers Use chemical fertilizer Apply the Zaï technique Own and use weeding cards 	<ul style="list-style-type: none"> Use organic fertilizer Cannot afford chemical fertilizers every year. Some own weeding card and some do not Apply the Zaï technique 	<ul style="list-style-type: none"> Start work early Apply Zaï Use organic fertilizers Can very rarely afford chemical fertilizers Use of weeding cards is rare
Short term coping strategies	<ul style="list-style-type: none"> Buy food early in the year to preserve the common granary Are generally able to manage with this strategy 	<ul style="list-style-type: none"> Reduce ‘mondé’ Reduce meal size Ask women to rely on their own food stocks. Eat wet season hungry food such bean and sorrel leaves. They do eat dry season hungry food (‘lelongo’ and ‘keguendo’), but it is just for fun. 	<ul style="list-style-type: none"> Reduction of the ‘mondé’. Then reduce the size of all daily meals Then they skip meals (morning meal and night meal) this was already the case for most of them by the interview period (February). The have already consumed their planting seeds Borrow food from the village cereal Bank

APPENDIX 2: INTERVIEW GUIDE FOR HOUSEHOLD HEADS

Theme 1: Demographic information

- ✓ Name Surname
- ✓ Sex
- ✓ Age (number of years)
- ✓ Religion
- ✓ Ethnicity (give the sub-ethnic group)
- ✓ Village
- ✓ Quartier
- ✓ Marital status
- ✓ Number of spouses
- ✓ Educational Background (level of formal education or literacy)
- ✓ Type of household (simple vs. complex⁷)
- ✓ Number of sub-units in the household⁸
- ✓ HH size (This is the number of people living in the household, and who depend from the head of HH for their food).
- ✓ Number of active members in the HH (these are household members who participate in the production. During the ZFSI baseline study the minimum age to be considered as an active member was set at 14 years)

Theme 2: Production pattern and decision about the use of the food produced

- ✓ Ask about the number and type of plot the HH has (*explore all types of plots: collective plots, individual plots including women plots and married men's plots*).
- ✓ Who cultivates the collective plots and who does so on individual plots (*for how much time in a day*)?
- ✓ Ask for the type of crops produced on each plot (*white sorghum, red sorghum, millet, corn, groundnut etc.*) and investigate to determine how each type of crop is used (*consumption, sale, use for funerals, gifts etc.*). Which crop is more consumed in the household?
- ✓ How are the products of each type of plot stored? Are products from different types of plot stored together or separately?
- ✓ How is the 'mondé'⁹ given? Explore the frequency and the quantity
- ✓ Explore the reductions (*if any*) of 'mondé' in the course of the year and the raisons for these reductions.

⁷ A simple Household comprises a man, his wife (or wives), his not married sons and/ or brothers who work and share food. A complex household comprises a man, his wife or wives, his married and not married sons and/or brothers who work and share food

⁸ A sub-unit is the unit formed by a woman and her dependents in a simple household. In a complex household, a married man and his dependents is also a sub-unit.

⁹ Cereals ration that the household head gives periodically to women to prepare food for all household members

- ✓ At which period of the year and for how long cereals from the collective granary are used for household consumption?
- ✓ How the decision is made about this? (*Who decides? Does the decision remain constant or does it vary according to the year?*).
- ✓ When should household sub-groups (*married men and their dependents, women and their dependents*) rely on their own stores for consumption?
- ✓ When food is prepared from the collective granary, how is it shared among the household members? (*Ask for the number of eating groups and the type of persons in each group*).
- ✓ Now, when food is prepared from the individual granaries, how is it shared among the household members? (*Investigate all cases, i.e., woman's granary, single men's granary, older married men's granary*).
- ✓ Besides consumption, what are the other uses made with the content of each type of granary.
 - Check-list**
 - *Funerals,*
 - *Weeding*
 - *Sale for cash*
 - *Etc.*
- ✓ Ask to see if there are periods of the year when it is forbidden to sell food crops and who takes the decision?
 - Check-list*
 - *Traditional authorities*
 - *Religious authorities*
 - *Administrative authorities*

Theme 3: Cooking and eating pattern

- ✓ Ask about the main regular meals the household adults take in a day. Explore the likely composition of each meal, the time when each meal is taken, the respondent perception of the importance of each meal as compared to the others.
- ✓ Does this eating pattern change in time of food shortage? Ask about changes related to:
 - *Composition*
 - *Quantity*
 - *Eating time*
- *Number of meal*
- ✓ In time of food shortage, which meal is suppressed first? Which one comes next?
- ✓ When food is prepared, which consumption group is served first and which one next? How is this decided?

- ✓ When you are facing food shortage what do you do first?
 - *Reduction of the quantity of meals*
 - *Reduction of the number of meal*
- ✓ Discuss the size of meal served to each consumption group
 - *Who decide for the quantity to be served?*
 - *On what type of considerations is the decision based?*
 - *When there not enough food, which group meal size, is first reduced?*
- ✓ When there is not enough food for all household members, which eating group skips meal first? Which one comes next?

Theme 4: People perceptions of good and adequate food

- ✓ How do you perceive the quality of the food you usually eat?
When do you consider that you have eaten a good meal? (*Investigate to make a difference between nutritional quality and hygienic quality.*) How often does this happen?
- ✓ How often do your household members eat meat, fish, or drink milk?
- ✓ When you prepare fish or meat (*chicken for instance*), how do you distribute it among the household members? (*For example, do some portions specifically go to some household members?*)
- ✓ Is there any avoidance of these foods? (*For whom and why?*)
- ✓ How do you judge the quality of these food items compared to others (*cereals and legumes*)?

Theme 5: Concern about food security ('yiré', 'Zouloega', 'Yel pakré')

- ✓ What are the things that worry you in the everyday life? (*Try to get the respondent rank these things from the most important to the less important*)?
- ✓ How do you feel when you are not able to feed your family and when you have to rely on other people? (*Investigate how he feels mentally and physically*).
- ✓ Are there moments (*post-harvest season Vs hungry season*) when you worry more about not having enough food to feed your dependents? How does this affect yourself mentally and physically and how does it affect your household as a unit?
- ✓ In your opinion, what are the consequences of not having enough food?
 - *On adults*
 - *On children*

- ✓ In time of food shortage, who loses weight first and why?
Check-list:
 - *Children*
 - *Adult women*
 - *Adult men*
- ✓ Ask about things (*actions or words*) that can indicate that some one is facing food insecurity (*Things that insecure people do and the others do not*)

Theme 6: Income sources and utilization

- ✓ What are your main income sources? (*Do not forget to investigate for money gifts from migrants*). Do these sources change over the year?
- ✓ Among these income sources which one is the most important in term of amount of money it provides?
- ✓ Which one is the most important in term of stability of income?
- ✓ What are the main uses you do with the income you earn? (*Investigate for each source of income. For example: what are the uses you often do with the money you get from migrants? What about when you sell an animal? Etc*). Do these uses change over the year (*investigate for post-harvest and hungry seasons*)?
- ✓ When you do not have enough cash for all your needs, which expense do you choose to do first?
Check-list
 - *Health*
 - *Food*
 - *Clothing*
 - *Children Schooling fees*
 - *Social expenses like weeding, funerals etc.*
- ✓ When you buy cereals to feed your family, in which selling unit do you often buy and why?
 - *Yorba*¹⁰
 - *Tine*
 - *Sac*
- ✓ Discuss the specific case of livestock. In time of food shortage if you have to sell your animal to buy food, which animal do you sell first? (*Have the respondent rank the type of animal*)

Theme 7: Medium term food management strategies

- ✓ What do you do to make sure you will get enough food to feed your family for long time?

¹⁰ Yorba and Tine are cereals selling units used in the area. Six yorba make a tine and six tine make a 100 kg sack

Check-list:

- *Sol conservation activities in your plots*
 - *Use of new agricultural techniques (wedding card, use of chemical fertilizers etc)*
 - *Buying food earlier in the year*
 - *Reducing the daily portion*
 - *Eating food from other HH members*
 - *Etc.*
- ✓ Some people have cereals stored for two years or more and some others do not. What causes this difference? Do the strategies used by the two groups differ?
- ✓ Is there any collective action that you and other people take to ensure you would be able to have enough food for your respective household throughout the year?

Theme 8: Management mechanisms in time of food shortage

- ✓ Ask the respondent to enumerate and rank all things he does in time of food shortage to get food for his household members. (*Ranking should be done starting from the beginning of the food shortage to when it became the most severe*)

Check-list

- *Food buying*
 - *Food borrowing*
 - *Working for the wealthier people*
 - *Request of support from migrants (in this particular case, ask about the type of migration: inside or outside the country)*
 - *Migration*
 - *Sale of the household goods (bicycle, jewelry etc.)*
 - *Etc.*
- ✓ Are there people whom you can ask for help? (*Have the respondent list these persons*) Investigate for the relationship/kinship between the respondent and each of these persons. Among them whom would ask first for help and who would be your very last choice?
- ✓ Ask about foods that are eaten only during time of food crisis (hungry foods). Do people eat these foods even in normal time? Is there any hungry food in the past that is now considered as a normal food?

APPENDIX 3: INTERVIEW GUIDE FOR WOMEN

Theme 1: Demographic information

- ✓ Name Surname of the respondent
- ✓ Name surname of the respondent's husband
- ✓ Sex
- ✓ Age (number of years)
- ✓ Religion
- ✓ Ethnicity (give the sub-ethnic group)
- ✓ Village
- ✓ Quartier
- ✓ Marital status
- ✓ Number of co-wives (if polygamous household)
- ✓ Position within the spouses (if polygamous household)
- ✓ Educational Background (level of formal education or literacy)
- ✓ Type of household (simple vs. complex¹¹)
- ✓ Number of sub-units in the household¹²
- ✓ Sub-unit size (This is the number of people living in the unit and who depend from the woman for their food when the household head does not give the daily ration).
- ✓ Number of active members in the unit (these are the unit members who participate in the production of the unit food stocks).
- ✓ Number of children by age group (all children living with the woman and who depend from her for their food)
 - # Children from 0 to 2 years
 - # Children from 2 to 5 years
 - # Children from 5 to 10 years

Note: if necessary, refer to official documents to determine children age

Theme 2: Production pattern and decision about the use of the food produced

- ✓ Ask about the number and type of plot the woman has (*explore cereals plots and other types of plot*). Investigate for all uses that she does with each type of crop she produces (*white sorghum, red sorghum, millet, groundnut, peas, 'gombo' etc.*)

Check-list

- *Consumption,*
- *Sale,*
- *Use for funerals,*
- *Gifts*
- *Etc*

¹¹ A simple Household comprises a man, his wife (or wives), his not married sons and/ or brothers who work and share food. A complex household comprises a man, his wife or wives, his married and not married sons and/or brothers who work and share food

¹² A sub-unit is the unit formed by a woman and her dependents in a simple household. In a complex household, a married man and his dependents is also a sub-unit.

- ✓ During the rainy season, how is the working time organized. When does she work in the collective plots and when she does so in her own plots?
- ✓ Are there periods when the respondent should rely on her own food stock to feed her dependents? When does this happen, how long does it last? Do these periods change from year to year? How is the decision made about this?
- ✓ Besides consumption, what are the other uses made with the content of each type of granary.

Check-list

- *Funerals,*
- *Weeding*
- *Sale for cash*
- *Etc.*

Theme 3: Cooking and eating pattern

- ✓ Who in the household is in charge of cooking the food for all household members? (*In the case of polygamous household, ask to know how co-wives share this task.*)
- ✓ How many times does this (or these) person cook in a day? (*Make sure the respondent is talking about the number of cooking occasion and note about the number of eating occasions.*)
- ✓ Does this cooking pattern remain constant throughout the year (*post-harvest Vs hungry season or rainy season Vs dry season*) Ask when and for what reasons it changes (*lack of time Vs lack of food*)?
- ✓ When food is prepared from the collective granary how is it shared among the household members? (*Have the respondent describe each eating group. What type of person does each group comprise, who eats with whom?*)
- ✓ Now, when food is prepared from the your individual granary, how is it shared among the household members? (*In how many portion is the food divided? discuss the composition of each eating group*)
- ✓ Ask the respondent to rank eating groups from the group that is first served to the last. (*Which group is served first, which one next etc.*) How the decision is made about this?

Theme 4: child feeding

- ✓ Ask about children's daily number of meals. Does this number of meals vary according the child age? Ask her to describe how it varies. Ask also about the changes in children eating pattern in the course of the year (*i.e. when food is plentiful and in time of food shortage*).
- ✓ What type of food do your children often eat? (*Investigate the composition of each meal they often get*).

Check-list

- Porridge
 - Tô
 - Other type of food
- ✓ What types of food do you think are good for your children to grow well and why? How often can you afford these foods for your children? Can you tell us how often your co-wives' children can get these foods? (*Go further to investigate the reasons for the difference if any*).
 - ✓ How often do your children eat meat, fish, or drink milk (*investigate to determine the frequency for each of these foods*)?
 - ✓ When you prepare fish or meat (*chicken for instance*), how do you distribute it among the household members? (*For example, do some portions specifically go to some household members?*) What are portions often given to children? Is there any avoidance for these foods?
 - ✓ To your opinion how do these foods (*meat, milk and fish*) compare with cereals and legumes based foods (*tô, bean, peas, etc*) in term of quality?

Theme 5: Concern about food security ('yiré', 'Zouloega', 'Yel pakré'¹³)

- ✓ What are the things that worry you in the everyday life? (*Try to get the respondent rank these things from the most important to the less important*)?
- ✓ How do you feel when you are not able to feed your children and other dependents and when you have to rely on other people? (*Investigate how he feels mentally and physically*).
- ✓ Are there moments (*for example during the post-harvest and the hungry season*) when you worry more about not having enough food to feed your dependents? How does this affect you mentally and physically?
- ✓ In your opinion, what are the consequences of not having enough food
 - On adults
 - On children
- ✓ In time of food shortage, who loses weight first and why?
 - Children
 - Adult women
 - Adult men
- ✓ Ask about things (*actions or words*) that can indicate that some one is facing food insecurity (*Things that insecure people do and the others do not*)

¹³ Translation of 'concern' in the local language

Theme 6: Income sources and utilization

- ✓ What are your main income sources? (*Do not forget to investigate for money gifts from migrants*). Do these sources change over the year?
- ✓ Among these income sources which one is the most important in term of amount of money it provides?
- ✓ Which one is the most important in term of stability of income?
- ✓ What are the main uses you do with the income you earn? (*Investigate for each source of income. For example: what are the uses you often do with the money you get from migrants? Etc*). Do these uses change over the year (*investigate for post-harvest and hungry seasons*)?
- ✓ When you do not have enough cash for all your needs, which expense do you choose to do first?

Check-list

- *Health*
- *Food*
- *Clothing*
- *Children schooling fees*
- *Social expenses like weeding, funerals etc.*
- ✓ When you buy cereals to feed your dependents, in which selling unit do you often buy and why.
 - *Yorba*¹⁴
 - *Tine*
 - *Sac*

Theme 7: Medium term food management strategies

- ✓ During the time when you should rely on your own stocks to feed your dependents, how do you get food if do not have any left in stores? Whom you can ask for help?

Check-list

- *Parent*
 - *Friends of your husband*
 - *Uncle*
 - *Co-wives*
- Among these people whom would you ask first and who would be your last choice?
- ✓ During the time when you should rely on your own to feed your dependents what do you do first if you do not have enough food?
 - *Reduction of the meal size*
 - *Reduction of the number of meals*

¹⁴ Yorba and Tine are cereals selling units used in the area. Six yorba make a tine and six tine make a 100 kg sack.

- ✓ If you have to reduce meal size because of lack of enough food, whose portion would be first reduced?
 - *Yours*
 - *Your older kids*
 - *Your small kids*

- ✓ In case you do not have enough food and should reduce the number of daily meals, who will skip meal first?
 - *Yourself*
 - *Your children*

- ✓ Ask the respondent to enumerate and rank all things she does in time of food shortage to get food for her dependents. (*Ranking should be done starting from the beginning of the food shortage to when it became the most severe*)
 - Check-list
 - *Food buying*
 - *Food borrowing*
 - *Working for the wealthier people*
 - *Request of support from migrants (in this particular case about the type of migrants in or outside the country)*
 - *Migration*
 - *Sale of goods like jewelry*
 - *Etc.*

- ✓ Ask about foods that are eaten only during time of food crisis (*hungry foods*). Do people eat these foods even in normal time? Is there any hungry food in the past that is now considered as a normal food?

APPENDIX 4: FOOD SECURITY ITEMS FOR THE HOUSEHOLD HEADS

1. ____ Votre ménage mange-t-il à sa faim **actuellement** ? (1=Oui, 2=Non)
 2. *Si oui*, pendant combien de mois encore va t-il continuer à manger à sa faim ? ____ mois
 3. *Si non*, depuis combien de mois a t-il commencé à ne pas manger à sa faim ? ____ mois
4. ____ Sous quelle forme donnez-vous généralement le 'mondé' quand vous le prélevez de vos propres stocks ?
 - 1=En grain
 - 2=En épi
5. ____ **Depuis la dernière récolte**, avez-vous réduit le 'mondé' **parce que vous n'aviez plus suffisamment de nourriture** ? (1=Oui, 2=Non) **Si non, passez à 9**
 6. *Si oui (Q5=1)*, combien de fois avez-vous réduit le 'mondé' depuis la dernière récolte ? ____ fois
 7. *Si oui (Q5=1)*, **dans quel mois** avez-vous procédé à la **première réduction** du 'mondé' ____ (Inscrivez le chiffre correspondant au mois. Exemple : mai=5).
 8. *Si oui (Q5=1)*,
 ____ Le mondé actuel représente :
 - 1=Plus de la moitié du mondé initial
 - 2=La moitié du monde initial'
 - 3=Moins de la moitié du mondé initial
9. ____ **Depuis la dernière récolte**, est-ce que **le nombre de repas quotidien de vous ou des autres adultes du ménage a été réduit** parce qu'il n'y avait plus suffisamment de nourriture ? (1=Oui, 2=Non) **Si non passez à 11**
 10. ____ *Si oui*, quel(s) repas avez-vous supprimé ?
 - 1=Repas de tôt le matin (petit déjeuner)
 - 2=Repas du jour (déjeuner)
 - 3=Repas de la nuit (dîner)
 - 4=Petit déjeuner et déjeuner
 - 5=Dîner et déjeuner
 - 6=Petit déjeuner et dîner
11. **Actuellement**, combien de fois les **adultes** de votre ménage mangent-ils par jour ? ____ fois
12. **Actuellement**, pendant combien de jours dans un mois pouvez-vous avoir les aliments suivants pour les membres de votre ménage ?
 - a. **Riz** ____ jour(s) par mois
 - b. **Viande** ____ jour(s) par mois
 - c. **Poisson** ____ jour(s) par mois
 - d. **Lait** ____ jour(s) par mois
13. ____ Qu'est ce qui vous inquiète **le plus** dans votre vie de tous les jours ?
 - 1=Santé
 - 2=Manque de nourriture
 - 3=Autre (spécifiez) _____

Si santé ou autre, passez à 18
14. ____ *Si manque de nourriture (Q13=2)*, quand craignez-vous de manquer de nourriture ?
 - 1=Dans une semaine
 - 2= Dans un mois
 - 3= Dans deux mois

- 4= Dans trois mois
5= Dans quatre mois et plus

15. ___ Cette inquiétude (voir Q13) vous empêche t-elle de dormir ? (1=Oui, 2=Non)

16. ___ Si oui, combien de fois manquez-vous de sommeil par semaine ? ___ fois

17. ___ Cette inquiétude (voir Q13) vous a-t-elle fait perdre du poids ? (1=Oui, 2=Non)

18. ___ Depuis la dernière récolte, avez-vous acheté des céréales pour nourrir votre ménage **parce que vous n'en aviez plus assez ou pas du tout à la maison** ? (1=Oui, 2=Non) **Si non passez à 22**

19. Si oui (Q18=1) : **Dans quel mois** avez-vous **commencé** à acheter ? _____ (inscrivez le chiffre correspondant au mois ex : mai=5)

20. Si oui (Q18=1) : **Au total, quelle quantité de céréales avez-vous acheté depuis lors ?**

- a. Nombre _____ b. Unité _____
(Unité : 1=sac de 100 kg, 2=tine, 3=yoruba, 4=BoI, 5=boîte de tomate)

21. Si oui (Q18=1) : _____ En quelle unité de mesure achetez-vous **le plus** souvent ?
(1=Sac de 100 kg, 2=Tine, 3=Yoruba, 4=BoI, 5=boîte de tomate)

22. ___ **Généralement** d'où vient l'argent pour acheter les céréales ?

- 1=Don
2=Vente de bœuf
3=Vente de moutons/chèvres
4=Vente de volaille
5=AGR
6=Autre

23. ___ Depuis la dernière récolte, avez-vous **emprunté ou demandé** des céréales pour nourrir votre ménage **parce que vous n'aviez plus de céréales (ni en grain, ni en épi) à la maison** ? (1=Oui, 2=Non) **Si non, passer à 25**

24. Si oui, où avez-vous emprunté ou demandé ? (1=Oui, 2=Non)

- a. ___ Banque de céréales villageoise
b. ___ Oncle
c. ___ Ami
d. ___ Parents directs
e. ___ Autre (spécifiez) _____

25. ___ Depuis la dernière récolte, est-ce que les membres de votre ménage ont déjà mangé des aliments qu'ils ne voulaient pas **parce qu'il n'y avait pas assez ou pas du tout de nourriture à la maison** ? (1=Oui, 2=Non) **Si non, fin de l'entretien**

26. Si oui, combien de fois cela est-il arrivé au cours des 7 derniers jours ? _____ fois

27. Quel(s) type(s) d'aliments ont-ils mangé sans le vouloir ? (1=Oui, 2= Non)

- a. ___ Feuilles de haricot
b. ___ Feuilles d'oseille
c. ___ 'Lelongo',
d. ___ 'Keguendo',
e. ___ 'Kesga',
f. ___ 'Gilgo'

APPENDIX 5: FOOD SECURITY ITEMS FOR WOMEN

1. _____ Votre unité mange-t-elle à sa faim **actuellement**? (1=Oui, 2=Non)
2. *Si oui*, pendant combien de mois encore va-t-elle continuer à manger à sa faim? _____ mois
3. *Si non*, depuis combien de mois a-t-elle commencé à ne pas manger à sa faim? _____ mois
4. _____ Depuis la dernière récolte, avez-vous fait des robi ('*moinmencé*') parce que le chef du ménage n'a pas donné le **mondé**? (1=Oui, 2= Non)
- Si non, passez à 9**
5. _____ *Si oui (Q4=1)*, quels repas prépariez-vous à partir de **vos stocks**?
- 1=Repas de tôt le matin
2=Repas du jour
3=Repas de la nuit
4=Repas du matin et repas du jour
5=Repas du matin et repas de la nuit
6=Repas de jour et repas de la nuit
7=Tous les repas
6. Si oui (Q4=1), pendant combien de temps cela a-t-il duré? _____ mois
7. _____ *Si oui (Q4=1)*, le 'robi' était-il quotidien pendant cette période? (1=Oui, 2=Non)
8. *Si non (Q7= 2)*, pendant combien de jours avez-vous fait le robi pendant cette période?
_____ jour(s)
9. _____ Depuis la dernière récolte, est-ce que vous avez **réduit la quantité de nourriture** dans le plat des adultes du ménage parce qu'il n'y avait pas suffisamment de nourriture et que le chef de ménage ne pouvait pas s'en procurer? (1=Oui, 2=Non, 3= ne sait pas)
10. _____ Avez-vous **réduit le nombre de repas quotidien des enfants** parce que vous ne pouviez pas trouver assez de nourriture pour eux? (1=Oui, 2= Non, 999 si pas d'enfant du tout)
11. Combien de fois vos enfants (de 2 à 5 ans) mangent-ils actuellement par jour? _____ fois (**mettre 999 si pas d'enfant de 2 à 5 ans**)
12. _____ Depuis la dernière récolte, est ce que vos enfants sont déjà allés au lit sans manger (*n'gand kom*) parce que vous n'aviez pas de nourriture et ne pouviez pas vous en procurer?
(1=Oui, 2=Non, 999 si pas d'enfant du tout)
13. _____ Depuis la dernière récolte, est ce que vos enfants ont déjà passé une journée sans manger (*Sonss kom*) parce que vous n'aviez pas de nourriture et ne pouviez pas vous en procurer?
(1=Oui, 2=Non, 999 si pas d'enfant du tout)
14. _____ Depuis la dernière récolte, est-ce que vous avez acheté des céréales pour nourrir les membres de votre unité parce que vous n'aviez plus de céréales en stock et que le chef du ménage n'avait pas donné le 'mondé'?
(1=Oui, 2=Non)
15. _____ Depuis la dernière récolte, est-ce que vous avez emprunté ou demandé des céréales pour vous nourrir vous et vos enfants parce que vous n'aviez plus de céréales en stock (ni en grain ni en épi)? (1=Oui, 2=Non)
- Si non, passez à 17**
16. *Si oui*, où avez-vous emprunté ou demandé?
- a. _____ Banque de céréales villageoise
b. _____ Parents directs (père, frère)
c. _____ Oncle
d. _____ Ami du mari
e. _____ Co-épouses

17. _____ Parfois, les gens perdent du poids parce qu'ils ne mangent pas à leur faim. **Depuis la dernière récolte, est-ce que un de vos enfants a perdu du poids parce que vous ne pouviez pas avoir suffisamment de nourriture pour lui?** (1= Oui, 2=Non, 999 si pas d'enfant du tout)

/NoVill ____/ No UP ____/No Ménag ____/ No Individ____/
 Nom enquêté _____ No enquêté____/ Type d'UP____ (1=simple, 2=complexe)

Niveau de capacité de l'enquêté

1. ____ Etes-vous ou avez-vous été membre d'une association ou d'un groupement dans le village ou à l'extérieur du village ? (1=Oui, 2= Non) **Si non, passez à 3**

2. ____ Si oui, jouez-vous ou avez-vous joué un rôle de leader dans ces associations ? (1=Oui, 2= Non)

3. ____ Depuis la **dernière récolte**, avez-vous prit part à une session de sensibilisation ? (1=Oui, 2= Non)
Si non, passez à 5

4. Si oui, sur quel(s) thème(s) portaient ces sessions (1=Oui, 2=Non)

- a. ____ Santé de l'enfant
- b. ____ Hygiène de l'eau
- c. ____ Santé de la femme enceinte
- d. ____ Alimentation de l'enfant
- e. ____ Préparation de bouillies
- f. ____ Autres (spécifiez) _____

5. ____ Arrive-t-il que d'autres personnes viennent à vous pour demander conseil ? (1=Oui, 2= Non)

Si non, passez à section 2

6. ____ Si oui, cela arrive-t-il ?

- 1=Très souvent (*Wakat faa*)
- 2=Souvent (*Wakat wakat*)
- 3=Rarement (*yonsgr yonsgré*)

Section 2 : Production Agricole

Production céréalière et des cultures de rente

1. Au cours de la **dernière récolte**, quelles quantités des denrées suivantes avez-vous récolté et quelles quantités avez-vous donné et vendu ? **Posez la question pour chaque denrée listée sur le tableau**

Denrée	Quantité récoltée (sous forme de grain)		Quantité vendue (sous forme de grain)		Quantité donnée et utilisée à des raisons sociales (sous forme de grain)		Quantité perdue à cause des insectes et termites (sous forme de grain)	
	Nombre	Unité	Nombre	Unité	Nombre	Unité	Nombre	Unité
Sorgho blanc								
Sorgho rouge								
Mil								
Maïs								
Riz								
Arachides (décortiquées)								
Haricot (grain)								
Pois de terre								

Unités:
 1= sac de 100 kg
 2=tine
 3=yoruba
 4=bol
 5=boîte de tomate

Rmq: Ici 'raisons sociales' comprend les dons, les dépenses pour des raisons de santé, les funérailles (Don de céréales ou de dolo pour des funérailles ou augmentation de la consommation du ménage due au fait qu'il doit nourrir beaucoup de gens pendant les funérailles et/ou les baptêmes)

/No Vill _____/ No UP _____/No Ménag _____/ No Individ _____/
 Nom enquêté _____ No enquêté _____/ Type d'UP _____ (1=simple, 2=complexe)

Tenure foncière et sécurité des terres cultivables

2. _____ Avez-vous suffisamment de terre pour la culture céréalière et les cultures de rente ? (1=Oui, 2=Non)

3. _____ Avez-vous la possibilité d'étendre vos champs si vous le vouliez ? (1=Oui, 2=Non)

Si non, passez à 5

4. *Si oui*, comment allez-vous acquérir les nouvelles terres ? (1=Oui, 2=Non)

- a. _____ Héritage familial
- b. _____ Emprunt
- c. _____ Location
- d. _____ Achat
- e. _____ Autre

5. _____ (ha) **Au cours de la campagne agricole passée, combien d'hectares avez-vous emblavé autant en céréales qu'en culture de rente?**

6. _____ Est-ce que cette surface correspond à peu près à celle que vous avez emblavé cette année? (1=Oui, 2=Non)

Si oui, passez à 10

7. _____ *Si non*, avez-vous réduit ou augmenté la superficie? (1=Réduit, 2=Augmenté)

Si Augmenter, passez à 9

8. _____ *Si réduit (Q 7=1)*, quelle était la **principale raison** qui a motivé cette réduction?

- 1=On a retiré une partie de mes terres
- 2=J'ai prêté une partie de mes terres à quelqu'un
- 3=Sol dégradé/faible productivité
- 4=Pas de moyens d'exploitation (manque de ressources, manque de main d'œuvre, maladie, vieillesse)
- 5=Autre

9. _____ *Si augmenté, (Q7=2)*, quelle était la **voie principale** par laquelle vous vous êtes procuré de nouvelles terres?

- 1=Emprunt
- 2=De mes propres terres
- 3=Location de terre
- 4=Achat

Application des techniques agricoles et utilisation d'intrants

10. Au cours de la **campagne agricole passée**, lesquelles des techniques agricoles suivantes et quelles quantités des intrants suivants avez-vous utilisé?

Posez la question pour chaque technique et intrant listés sur le tableau

Techniques/intrants	Superficie/quantité	Nombre d'années depuis la première utilisation	Cette utilisation est-elle régulière 1=Oui 2=Non
Zaï	_____ ha		
Diguettes	_____ ha		
Semences améliorées	_____ ha		
Culture attelée	_____ ha		
Engrais organique	_____ charretées		
Engrais chimiques	_____ kg		

/No Vill _____/ No UP _____/No Ménag _____/ No Individ _____/
 Nom enquêté _____ No enquêté _____/ Type d'UP _____ (1=simple, 2=complexe)

Equipement agricole et de transport

Equipements possédés

11. Possédez-vous un des équipements suivants?

Posez la question pour chaque équipement listé sur le tableau

Equipement	Possession 1=Oui, 2=Non	Nombre	L'avez-vous utilisé au cours de la campagne agricole passée? 1=Oui, 2=Non	Depuis combien d'années avez-vous possédé ce type d'équipement pour la première fois?
Charrette				
Charrue				
Semoir				
Tracteur				
Moto/mobylette			*****	
Vélo			*****	

Location et emprunt d'équipements agricoles

12. Avez-vous **emprunté ou loué** un des équipements suivants au cours de la **campagne agricole passée**? *Posez la question pour chaque équipement listé sur le tableau*

Equipement	Location ou emprunt 1=Oui 2=Non
Charrette	
Charrue	
Semoir	
Tracteur	
Moto/mobylette	
Vélo	

Section 3 : Elevage

Stock d'animaux

1. Possédez-vous les animaux suivants?

Posez la question pour chaque type d'animal listé sur le tableau

Animaux	Nombre total	Valeur (FCFA)	Principal mode d'acquisition	Mode d'acquisition 1=Elevage 2=Don 3=Héritage 4=Achat
Animaux de labour				
Cheptel:				
Bœufs				

/No Vill _____/ No UP _____/No Ménag _____/ No Individ _____/
 Nom enquêté _____ No enquêté _____/ Type d'UP _____ (1=simple, 2=complexe)

Moutons/chèvres			
Porcs			
Volaille			
Ane			
Cheval			
Autres _____			

Section 4 : Production maraîchère et fruitière

Production maraîchère

1. _____ Depuis la dernière récolte de céréale, est-ce que vous avez entrepris de la culture maraîchère ? (1=Oui, 2=Non) **Si non, passer à 6**

2. _____ Si Oui, dans quel type de culture maraîchère étiez-vous impliqué ? (1=Individuelle, 2=Associative, 3=Les Deux) **Si associative, passez à 5**

3. Si impliqué dans la culture maraîchère individuelle (Q2=1 ou Q2= 3), quels types de denrée avez-vous produit sur votre exploitation individuelle depuis la dernière récolte céréalière?

Posez la question pour chaque denrée listée sur le tableau

Denrées	Planté 1=Oui 2=Non	Valeur de la quantité vendue (FCFA)	Valeur de la quantité consommée (FCFA)
Tomate			
Carotte			
Choux			
Pomme de terre			
Oignon			
Poivron			
Concombre			
Piment			
Aubergine locale			
Aubergine			
Gombo			
Feuilles pour la sauce			
Autres _____			

4. Si exploitation individuelle (Q2=1 ou Q2=3), depuis la dernière récolte céréalière, combien de francs avez-vous investi dans la culture maraîchère privée ? _____ FCFA

5. Si exploitation associative (Q2=2), combien de francs avez-vous **personnellement** reçu ? _____ FCFA

/NoVill _____/ No UP _____/No Ménag _____/ No Individ _____/
 Nom enquêté _____ No enquêté _____/ Type d'UP _____ (1=simple, 2=complexe)

Production fruitière

6. _____ Avez-vous un verger ou des arbres fruitiers (manguier, goyavier, papayer, etc.) ? (1=Oui, 2=Non)

Si non, passez à section 5

7. *Si oui (Q6=1)*, quelle était la valeur de la partie de votre production que vous avez **vendue** depuis la dernière récolte de céréales ? _____ FCFA

8. *Si oui (Q6=1)*, à combien estimez-vous la valeur de la production que vous avez **consommée** depuis la dernière récolte de céréales ? _____ FCFA

9. *Si oui (Q6=1)*, pour votre production fruitière quelle est la quantité d'argent que vous avez investi dans les intrants et le matériel depuis la dernière récolte de céréales ? _____ FCFA

Section 5 : Transferts

Transferts d'argent

1. **Depuis la dernière récolte**, avez-vous reçu (*dons*) de l'argent d'une des personnes suivantes ?

Posez la question pour chaque origine de transfert listée sur le tableau

Origine du transfert	Montant (en FCFA)	Principale utilisation	Principale utilisation : 1=Achat d'aliments 2=Élevage 3=AGR non agricole 4=Activités agricoles hivernales 5=Problèmes sociaux 6=Santé 7=Frais scolaires 8=Habillement 9=Achat d'ustensile de cuisine 10=Achat de bijoux 11=Autres
Parent/Ami en Côte d'Ivoire			
Parent/Ami résident dans une grande ville au BF			
Parent/Ami dans le village			
Parent/Ami résident en d'autres endroits.			
Organisation (étatique ou non étatique)			

Transferts intra-village d'aliments

2. **Depuis la dernière récolte**, avez-vous reçu (*dons*) les aliments suivants d'une tierce personne à l'intérieur du village ? *Posez la question pour chaque aliment listé sur le tableau*

Transfert	Nombre de fois	Quantité totale en grains		Unité	Unité: 1=sac de 100 kg 2=tine
		Nombre	Unité		
Céréales (mil, maïs, sorgho, riz, blé, etc.)					
Haricot (niébé)					

/NoVill _____/ No UP _____/No Ménag _____/ No Individ _____/
 Nom enquêté _____ No enquêté _____/ Type d'UP _____ (1=simple, 2=complexe)

3. _____ De qui à l'intérieur du village avez-vous reçu (*dons*) **la plus grande quantité** d'aliments ?

- 1=Ami
- 2=Oncle
- 3=Belle-famille
- 4= Autre relation dans la grande famille
- 5=Autre (spécifiez) _____

Transferts extra village d'aliments

4. **Depuis la dernière récolte** avez-vous reçu (*dons*) les aliments suivants d'une tierce personne à l'extérieur du village ?

Posez la question pour chaque aliment listé sur le tableau

Transfert	Nombre de fois	Quantité totale en grains		Unité: 1=sac de 100 kg 2=tine
		Nombre	Unité	
Céréales (mil, maïs, sorgho, riz, blé, etc.)				
Haricot (niébé)				

5. _____ De qui à l'extérieur du village avez-vous reçu (*dons*) **la plus grande quantité** d'aliments ?

- 1=Ami
- 2=Oncle
- 3=Belle-famille
- 4= Autre relation dans la grande famille
- 5=Autre (spécifiez) _____

6. _____ **Depuis la dernière récolte**, avez-vous reçu (*dons*) une aide alimentaire d'une organisation quelconque ?
 (1=oui, 2=non) **Si non passer à section 6**

7. *Si oui (Q6=1), de quel aliment s'agissait-il ?*
Posez la question pour chaque aliment listé sur le tableau

Aliments	Nombre de fois	Quantité totale en grains		leur (CFA)	Unité: 1=sac de 100 kg 2=tine
		Nombre	Unité		
Céréales (mil, maïs, sorgho, riz, blé, etc.)					
Haricot (niébé)					
Conserves		*****	*****		

/NoVill ____/ No UP ____/No Ménag ____/ No Individ____/
 Nom enquêté _____ No enquêté____/ Type d'UP____ (1=simple, 2=complexe)

Section 6 : Sources de revenu

1. Depuis la dernière récolte, avez-vous gagné de l'argent des activités suivantes ?
Posez la question pour chaque source de revenu listé sur le tableau

Sources de revenu	Montant total (FCFA)	Principale utilisation faite de l'argent	Principale utilisation :
Vente de vos animaux			1=Achat d'aliments
Vente de vos produits de rente			2=Elevage
Vente de vos céréales			3=AGR non agricole
Vente de vos produits de la maraîchéculture			4=Activités agricoles hivernales
Vente de vos fruits			5=Problèmes sociaux
Activités non agricoles** (commerce, préparation de dolo, galettes, etc.) **Ici montant fait référence au bénéfice après déduction des dépenses.			6=Santé
Revenu de main d'œuvre dans le village			7= Habillement
Revenu de main d'œuvre hors du village			8=Achat d'ustensiles de cuisine
Pensions (retraite, militaire, etc.)			9=Achat de bijoux
Autres Sources			10= Frais scolaires
			11= Autres

Exemple : le revenu de la préparation des galettes = Prix de vente – (prix de la farine, de l'huile et du bois)

Section 7 : Approvisionnement alimentaire du ménage

- ____ **Juste avant** la dernière récolte, quelle quantité de céréales restait encore dans votre/vos grenier(s)collectif (s) ?
 1=Rien
 2=Pas assez pour nourrir votre ménage pendant un mois
 3= suffisamment pour nourrir votre ménage pendant 1 à 2 mois
 4= suffisamment pour nourrir votre ménage pendant 2 à 4 mois
 5= suffisamment pour nourrir votre ménage pendant plus de 4 mois
- De quels types greniers votre ménage reçoit-il de la nourriture ? (1=Oui, 2=Non)
 a.____ Grenier de l'unité de production
 b.____ Grenier du ménage
 c.____ Grenier des femmes
- ____ En général, duquel de ces greniers le ménage reçoit-il **plus** de nourriture ?
 (1= Grenier de l'unité de production, 2 =Grenier du ménage, 3=Grenier des femmes)
- ____ Depuis **la dernière période de semis**, lequel de ces greniers **approvisionne plus** le ménage en nourriture ?
 (1= Grenier de l'unité de production, 2 =Grenier du ménage, 3=Grenier des femmes)

/No Vill _____/ No UP _____/No Ménag _____/ No Individ _____/
 Nom enquêté _____ No enquêté _____/ Type d'UP _____ (1=simple, 2=complexe)

APPENDIX 7 : AGRICULTURAL AND SOCIO-ECONOMIC QUESTIONNAIRE FOR WOMEN

Village _____
 Enquêteur _____
 Date d'admin. ____/____/2001
 Superviseur _____
 Date de verif. ____/____/2001

Section 1 : Informations démographiques et capacité de l'enquêtée

Informations démographiques

1. Nombre d'années du présent mariage? _____ ans
2. Depuis la **dernière récolte** jusqu'à maintenant, combien de personne des catégories suivantes dépendaient de vous pour leur alimentation? (*inscrivez le nombre de personnes à charge par catégorie*)
 - a. Enfants de 0-2 ans _____
 - b. Enfants de 3-6 ans _____
 - c. Filles de 7-13 ans _____
 - c. Garçons de 7-13 ans _____
 - d. Filles de 14-18 ans _____
 - e. Garçons de 14-18 ans _____
 - f. adultes non actifs _____
 (*vieux ou handicapés*)

Niveau de capacité de l'enquêtée

1. _____ Etes-vous ou avez-vous été membre d'une association ou d'un groupement dans le village ou à l'extérieur du village? (1=Oui, 2= Non) **Si non, passez à 3**
2. _____ *Si oui*, jouez-vous ou avez-vous joué un rôle de leader dans ces associations? (1=Oui, 2= Non)
3. _____ Depuis la **dernière récolte**, avez-vous prit part à une session de sensibilisation? (1=Oui, 2= Non) **Si non, passez à 5**
4. *Si oui*, sur quel(s) thème(s) portaient ces sessions (1=Oui, 2=Non)
 - a. _____ Santé de l'enfant
 - b. _____ Hygiène de l'eau
 - c. _____ Santé de la femme enceinte
 - d. _____ Alimentation de l'enfant
 - e. _____ Préparation de bouillies
 - f. _____ Autres (*spécifiez*) _____
5. _____ Arrive-t-il que d'autres personnes viennent à vous pour demander conseil? (1=Oui, 2= Non) **Si non passez à section 2**
6. _____ *Si oui*, cela arrive-t-il ?
 - 1=Très souvent (*wakat faa*)
 - 2=Souvent (*wakat wakat*)
 - 3=Rarement (*yonsgr, yongré*)

/No Vill _____/ No UP _____/No Ménag _____/ No Individ _____/
 Nom enquêté _____ No enquêté _____/ Type d'UP _____ (1=simple, 2=complexe)

Section 2 : Production Agricole

Production céréalière et des cultures de rente

2. Au cours de la **dernière récolte**, quelles quantités des denrées suivantes avez-vous récolté et quelles quantités avez-vous donné et vendu? *Posez la question pour chaque denrée listée sur le tableau*

Denrée	Quantité récoltée (sous forme de grain)		Quantité vendue (sous forme de grain)		Quantité donnée et utilisée à des raisons sociales (sous forme de grain)		Quantité perdues à cause des insectes et termites (sous forme de grain)	
	Nombre	Unité	Nombre	Unité	Nombre	Unité	Nombre	Unité
Sorgho blanc								
Sorgho rouge								
Mil								
Maïs								
Riz								
Arachides (décortiquées)								
Haricot (grain)								
Pois de terre								

Unités:
 1= sac de 100 kg
 2=tine
 3=yoruba
 4=bol
 5=boîte de tomate

Rmq: Ici 'raisons sociales' comprend les dons, les dépenses pour des raisons de santé, les funérailles (Don de céréales ou de dolo pour des funérailles, ou augmentation de la consommation du ménage due au fait qu'il doit nourrir beaucoup de gens pendant les funérailles et/ou les baptêmes)

Tenure foncière et sécurité des terres cultivables

2. _____ Avez-vous suffisamment de terres pour la culture céréalière et les cultures de rente? (1=Oui, 2=Non)

3. _____ Avez-vous la possibilité d'étendre vos champs si vous le vouliez? (1=Oui, 2=Non)

Si non, passez à 5

4. *Si oui*, comment allez-vous acquérir les nouvelles terres? (1=Oui, 2=Non)

- a. _____ Emprunt
 b. _____ Location
 c. _____ Achat

5. _____ (ha) Au cours de la campagne agricole passée, combien d'hectares avez-vous emblavé autant en céréales qu'en cultures de rente?

6. _____ Est-ce que cette surface correspond à peu près à celle que vous avez emblavé cette année? (1=Oui, 2=Non)

Si Oui, passez à 10

/No Vill _____/ No UP _____/No Ménag _____/ No Individ _____/
 Nom enquêté _____ No enquêté _____/ Type d'UP _____ (1=simple, 2=complexe)

7. _____ Si non, avez-vous réduit ou augmenté la superficie? (1=Réduit, 2=Augmenté)

Si Augmenté, passez à 9

8. _____ Si réduit (Q7=1), quelle était la **principale raison** qui a motivé cette réduction?

- 1=On a retiré une partie de mes terres
- 2=J'ai prêté une partie de mes terres à quelqu'un
- 3=Sol dégradé/faible productivité
- 4=Pas de moyens d'exploitation (manque de ressources, manque de main d'œuvre, maladie, vieillesse)
- 5=Autre (spécifiez) _____

9. _____ Si augmenté (Q7=2), quelle était la **voie principale** par laquelle vous vous êtes procuré de nouvelles terres?

- 1=Emprunt
- 2=Location de terre
- 3=Achat
- 5=Autre (spécifiez) _____

Application des techniques agricoles et utilisation d'intrants

10. **Au cours de la campagne agricole passée, lesquelles des techniques agricoles suivantes et quelles quantités des intrants suivants avez-vous utilisé?**

Posez la question pour chaque technique et intrant listés sur le tableau

Techniques/intrants	Superficie /Quantité	Nombre d'années depuis la première utilisation	Cette utilisation est-elle régulière (1=Oui 2=Non)
Zai	_____ha		
Diguettes	_____ha		
Semences améliorées	_____ha		
Culture attelée	_____ha		
Engrais organiques	_____charretées		
Engrais chimiques	_____kg		

Equipement agricole et de transport

11. Pour la **campagne agricole passée**, est-ce que vous avez **utilisé** un des équipements suivants? (1=Oui, 2=Non)

- a. _____ Charrette
- b. _____ Charrue
- c. _____ Semoir
- d. _____ Tracteur

12. **Possédez-vous** un des équipements de transport suivants? (1=Oui, 2=Non)

- a. _____ Vélo
- b. _____ Moto/mobylette

/No Vill _____/ No UP _____/No Ménag _____/ No Individ _____/
 Nom enquêté _____ No enquêté _____/ Type d'UP _____ (1=simple, 2=complexe)

Section 3 : Elevage

Stock d'animaux

1. Possédez-vous les animaux suivant?

Posez la question pour chaque type d'animal listé sur le tableau

Animaux (Cheptel)	Nombre total	Valeur (FCFA)	Principal mode d'acquisition
Bœufs			
Moutons/chèvres			
Porcs			
Volaille			
Autres _____			

Mode d'acquisition
 1=Elevage
 2=Don
 3=Héritage
 4=Achat

Section 4 : Production maraîchère et fruitière

Production maraîchère

1. _____ Depuis la dernière récolte de céréale, est-ce que vous avez entrepris de la culture maraîchère? (1=Oui, 2=Non) **Si non, passez à 6**

2. _____ Si oui, dans quel type de culture maraîchère étiez-vous impliquée? (1=Individuelle, 2=Associative, 3=Les Deux) **Si associative, passez à 5**

3. Si impliquée dans la culture maraîchère individuelle (Q2=1 ou Q2= 3), quels types de denrée avez-vous produit sur votre exploitation individuelle depuis la dernière récolte céréalière?

Posez la question pour chaque type de denrée listé sur le tableau.

Denrées	Planté 1=Oui 2=Non	Valeur de la quantité vendue (FCFA)	Valeur de la quantité consommée (FCFA)
Tomate			
Carotte			
Choux			
Pomme de terre			
Oignon			
Poivron			
Concombre			
Piment			
Aubergine locale			
Aubergine			
Gombo			
Feuilles pour la sauce			
Autres _____			

/No Vill _____/ No UP _____/No Ménag _____/ No Individ _____/
 Nom enquêté _____ No enquêté _____/ Type d'UP _____ (1=simple, 2=complexe)

4. Si exploitation individuelle (Q2=1 ou Q2=3), depuis la dernière récolte céréalière, combien de francs avez-vous investi dans la culture maraîchère privée _____ FCFA

5. Si exploitation associative (Q2=2), de combien de francs avez-vous **personnellement** reçu? _____ **FCFA**

Produits fruitiers

6. _____ Avez-vous un verger ou des arbres fruitiers (manguier, goyavier, papayer, etc)? (1=Oui, 2=Non)
Si non, passez à section 5

7. Si oui (Q6=1), quelle était la valeur de la partie de votre production que vous avez **vendue depuis la dernière récolte de céréale**? _____ FCFA

8. Si oui (Q6=1), à combien estimez-vous la valeur de la production que vous avez **consommée depuis la dernière récolte céréalière**? _____ FCFA

9. Si oui (Q6=1), pour votre production fruitière quelle est la quantité d'argent que vous avez investi dans les intrants et le matériel depuis la dernière récolte de céréales? _____ FCFA

Section 5 : Transferts

Transfert d'argent

1. Depuis la dernière récolte, **avez-vous reçu (dons) de l'argent d'une des personnes suivantes?**
 Posez la question pour chaque origine de transfert listée sur le tableau

Origine du transfert	Montant (en FCFA)	Principale utilisation	Principale utilisation: 1=Achat de nourriture 2=Elevage 3=AGR non agricole 4=Activité agricole hivernale 5=Problèmes sociaux 6=Santé 7=Frais scolaires 8=habillement 9=Achat d'ustensiles de cuisine 10=Achat de bijoux 11=Autres
Parent/Ami en Côte d'Ivoire			
Parent/Ami dans une grande ville au BF			
Parent/Ami dans le village			
Parent/Ami résidant en d'autres endroits			
Une tierce personne au sein du ménage			
Organisation (étatique ou non-étatique)			

/No Vill _____/ No UP _____/No Ménag _____/ No Individ _____/
 Nom enquêté _____ No enquêté _____/ Type d'UP _____ (1=simple, 2=complexe)

Transferts intra village d'aliments

2. Depuis la dernière récolte, **avez-vous reçu (dons) les aliments suivants d'une tierce personne à l'intérieur du village?** Posez la question pour chaque aliment listé sur le tableau

Transfert	Nombre de fois	Quantité totale en grains		Valeur (en FCFA)	Unité: 1=sac de 100 kg 2= tine 3=yoruba 4=bol 5=boîte de tomate
		Nombre	Unité		
Céréales (mil, maïs, sorgho, riz , blé, etc.)					
Haricot (niébé)					

3. _____ De qui à l'intérieur du village avez-vous reçu (dons) **la plus grande quantité** d'aliments?

- 1=Père/Frère/Oncle
- 2=Ami du mari
- 3=Coépouse
- 4=Autre (specifiez) _____

Transferts extra village d'aliments

4. Depuis la dernière récolte, **avez-vous reçu (dons) les aliments suivants d'une tierce personne à l'extérieur du village?**

Posez la question pour chaque aliment listé sur le tableau

Transfert	Nombre de fois	Quantité totale en grains		Valeur (en FCFA)	Unité: 1=sac de 100 kg 2= tine 3=yoruba 4=bol 5=boîte de tomate
		Nombre	Unité		
Céréales (mil, maïs, sorgho, riz , blé, etc.)					
Haricot (niébé)					

5. _____ De qui à l'extérieur du village avez-vous reçu (dons) **la plus grande quantité** d'aliments?

- 1=Père/Frère/Oncle
- 2=Ami du mari
- 3=Coépouse
- 4=Autre (specifiez) _____

6. _____ **Depuis la dernière récolte, avez-vous reçu (dons) une aide alimentaire d'une organisation quelconque?**
 (1=Oui, 2=Non) **Si non passer à 8**

7. *Si oui (Q6=1), de quel aliment s'agissait-il?*
 Posez la question pour chaque aliment listé sur le tableau

/No Vill ____/ No UP ____/No Ménag ____/ No Individ____/
 Nom enquêté _____ No enquêté____/ Type d'UP____ (1=simple, 2=complexe)

Aliments	Nombre de fois	Quantité totale en grains		Valeur (en FCFA)	Unité: 1=sac de 100 kg 2= tine 3=yoruba 4=bol 5=boîte de tomate
		Nombre	Unité		
Céréales (mil, maïs, sorgho, riz, blé, etc.)					
Haricot (niébé)					
Conserves		*****	*****		

Transferts intra ménage d'aliments

8. _____ Depuis la dernière récolte, avez-vous reçu (*dons*) des céréales de la part d'un membre du ménage? (1=Oui, 2=Non) **Si non, passez à section 6**

9. Si Oui (Q8=1), quelle en était la quantité?

a. _____ Nombre b. _____ Unité
 (1= Sac de 100kg, 2= Tine, 3= yoruba, 4= bol, 5=boîte de tomate)

Section 6 : Sources de revenu

1. Depuis la dernière récolte, avez-vous gagné de l'argent des activités suivantes?
 Posez la question pour chaque source de revenu listée sur le tableau

Sources de revenu	Montant total (en FCFA)	Principale utilisation faite de l'argent	Principale utilisation: 1=Achat de nourriture 2=Elevage 3=AGR non agricole 4= Activité agricole hivernale 5=Problèmes sociaux 6=Santé 7=Frais scolaires 8=Habillement 9=Achat d'ustensiles de cuisine 10= Achat de bijoux 11= Autres
Vente de vos animaux			
Vente de vos produits de rente			
Vente de vos céréales			
Vente de vos produits maraîchers			
Vente de vos fruits			
Activités non agricoles** (commerce, préparation de dolo, galettes, etc). ** Ici, montant fait référence au bénéfice après déduction des dépenses			
Revenu de main d'œuvre dans le village			
Revenu de main d'œuvre hors du village			
Pensions (retraite, militaire, etc)			
Autres Sources _____			

Exemple, : le revenu de la préparation des galettes = prix de vente – (prix de la farine, de l'huile et du bois)

/No Vill _____/ No UP _____/No Ménag _____/ No Individ _____/
Nom enquêté _____ No enquêté _____/ Type d'UP _____ (1=simple, 2=complexe)

Section 7 : Approvisionnement alimentaire de l'unité Femme-enfants

1. _____ Avez-vous un champ individuel de céréales? (1=oui, 2=non)

Si non passez à 3

2. _____ **Juste avant** la dernière récolte, quelle quantité de céréales restait encore dans votre grenier (le grenier de l'unité femme-enfants)?

- 1=Rien
- 2=Pas assez pour nourrir votre unité pendant un mois
- 3=Suffisamment pour nourrir votre unité pendant 1 à 2 mois
- 4=Suffisamment pour nourrir votre unité pendant 2 à 4 mois
- 5=Suffisamment pour nourrir votre unité pendant plus de 4 mois

3. De quels types de greniers votre unité reçoit-elle de la nourriture? (1=Oui, 2=Non)

- a. _____ Grenier de l'unité de production
- b. _____ Grenier du ménage
- c. _____ Greniers des femmes

4. _____ En général, duquel de ces greniers votre unité reçoit-elle **plus** de nourriture?
(1= Grenier de l'unité de production, 2=Grenier du ménage, 3=Grenier des femmes)

5. _____ Depuis la **dernière période de semis**, lequel de ces greniers **approvisionnent plus** votre unité en nourriture?
(1= Grenier de l'unité de production, 2=Grenier du ménage, 3=Grenier des femmes)

Condiments

6. _____ Avez-vous acheté des condiments **au cours des 7 derniers jours**? (1=Oui, 2=Non).

Si non passez à 8

7. _____ *Si oui*, d'où venait **la majeure partie de l'argent** que vous avez investi dans les condiments?

- 1=Don
- 2=AGR non agricole
- 3=Vente d'animaux
- 4=Vente de produits agricoles
- 5=Emprunt
- 6=Autre (specifiez) _____

8. _____ Comment vous êtes-vous procuré **la majeure partie des principaux condiments** au cours **des 7 derniers jours**?

- 1=Achat
- 2=De mes stocks
- 3=Emprunt
- 4=Cueillette
- 5=Don
- 6=Autre (specifiez) _____

9. **Au cours des 7 derniers jours**, avez-vous utilisé un des condiments suivants? (1=Oui, 2=Non)

- a. _____ Poisson sec
- b. _____ Cube maggi
- c. _____ Soubala (*kalgo*)
- d. _____ Bicalga (*kando*)
- e. _____ Viande

APPENDIX 8: FOOD DIVERSITY FORM

Consommation des divers groupes d'aliments		
<p>Nous aimerions maintenant parler des différents types d'aliments qui ont été consommés dans le ménage (par tous les membres du ménage ou par une partie des membres du ménage au cours des 7 derniers jours). Citez les aliments qui appartiennent à chaque groupe et dès que l'enquêtée reconnaît que un seul de ces aliments a été consommé dans le ménage au cours de la dernière semaine (7 jours, ou deux marchés), inscrivez 1 dans la dernière colonne. Exemple: Si l'enquêtée dit que dans le ménage quelqu'un a consommé du sésame soit cru soit dans de la sauce, vous devez inscrire 1 pour le groupe des oléagineux même si elle ne mentionne pas de consommation d'arachide ou graines de coton.</p>		
Groupes d'aliments	Aliments de chaque groupe (aidez -vous de ces listes pour aider l'enquêtée à se souvenir des aliments consommés. Pour cela citez les)	1= Oui, 2 = Non
Céréales locales	Petit mil, Sorgho blanc, Sorgho rouge, Maïs, Fonio	
Céréales étrangères	Riz, Blé ou produits de blé (pain, bulgur, "bour massa", spaghetti,etc.)	
Légumineuses	Haricot, Pois de terre (suma, sumoaga), Lentille (lamboaya)	
Oléagineux	Arachide graine ou pâte (nagouri, suma, sumkaam), Sésame (siini), Graine de coton (goro biisi, goro bi zôm)	
Condiments traditionnels locaux	"Soumbala", "Bicalga", Levure (rabilé)	
Huiles et graisses	Huile (d'arachide, de coton, de sésame, de palme, etc.), Beurre de karité, Graisse d'animaux	
Racines et Tubercules	Patates douces, Pomme de terre, Igname, Taro, Fabirama (pessa), Manioc, "Youngna"	
Sucre et miel		
Oeufs		
Lait et produits laitiers		
Viande		
Poisson et fruits de mer		
Fruits riches en vitamine A	Mangue, Papaye, Pastèque, Courge (yôgré)	
Autres fruits	Orange, Goyave, Fruits de cueillette (wêda, toédo, muguna, etc.)	
Légumes de jardin riches en Vitamine A	Tomate, Carrote, Feuilles fraîches vertes de jardin (oseille, feuille de haricot, salade, etc.)	
Autres légumes	Choux, aubergine, légumes (feuille de cueillette)	
Autres aliments	Piment, sel, cube maggi, etc.	

CD1: 1= Petit déjeuner (Zibou) 2=Entre petit déjeuner et déjeuner, 3= Déjeuner (Windg riibo), 4=Entre déjeuner et diner (repas du soir), 5= Diner (Young riibo), 6=Après le diner

CD2 : 01=tô, 02 = sauce, 03= sorgho bouilli, 04= mil bouilli, 05 = riz, 06= haricot, 07=pois de terre, 08=couscous, 09=ragout de tubercule, 10= tubercule bouillie, 11=café, 12= bouillie, 13= Zom Kom, 14= Dolo 15=fruits, 16=arachide, 17=bourmassa, 18=soupe, 19=galette, 20=pain, 21=gonre, 22=tourteaux d'arachide, 23=beignet, 24=boussi, 25=biscuit, 26=boule d'akassa (foura), 27=lait, 28=basssi, 29=guelgoma (zomgula).

CD3 voir fiche jointe

CD4 : 1= millilitres, 2=gramme, 3= petite taille, 4= moyenne taille, 5= grande taille

1=avant le prt déjeuner (Zibou)2=Zibou3=entre le zibou matin et le repas du jour (windg riibo)4=windg riibo 5=entre le windg riibo et repas de de la nuit (young riibo)6= Young riibo7=après le young riibo

01=tô 1=ml
02=sauce 2=gr
05=riz 5= grande taille
06=haricot
07=pois de terre
08=couscous
09=Ragot de tubercules
12=bouillie
13=Fruits