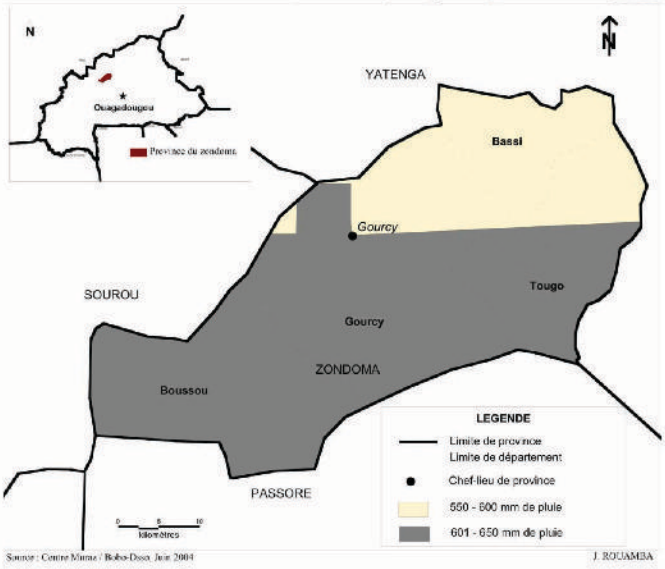
AFRICARE
Burkina Faso

USAID Title II
Zondoma Food Security Initiative Phase II
(ZFSI Phase II)

Baseline Survey

September 15, 2005 (French)
December 15, 2005 (English)



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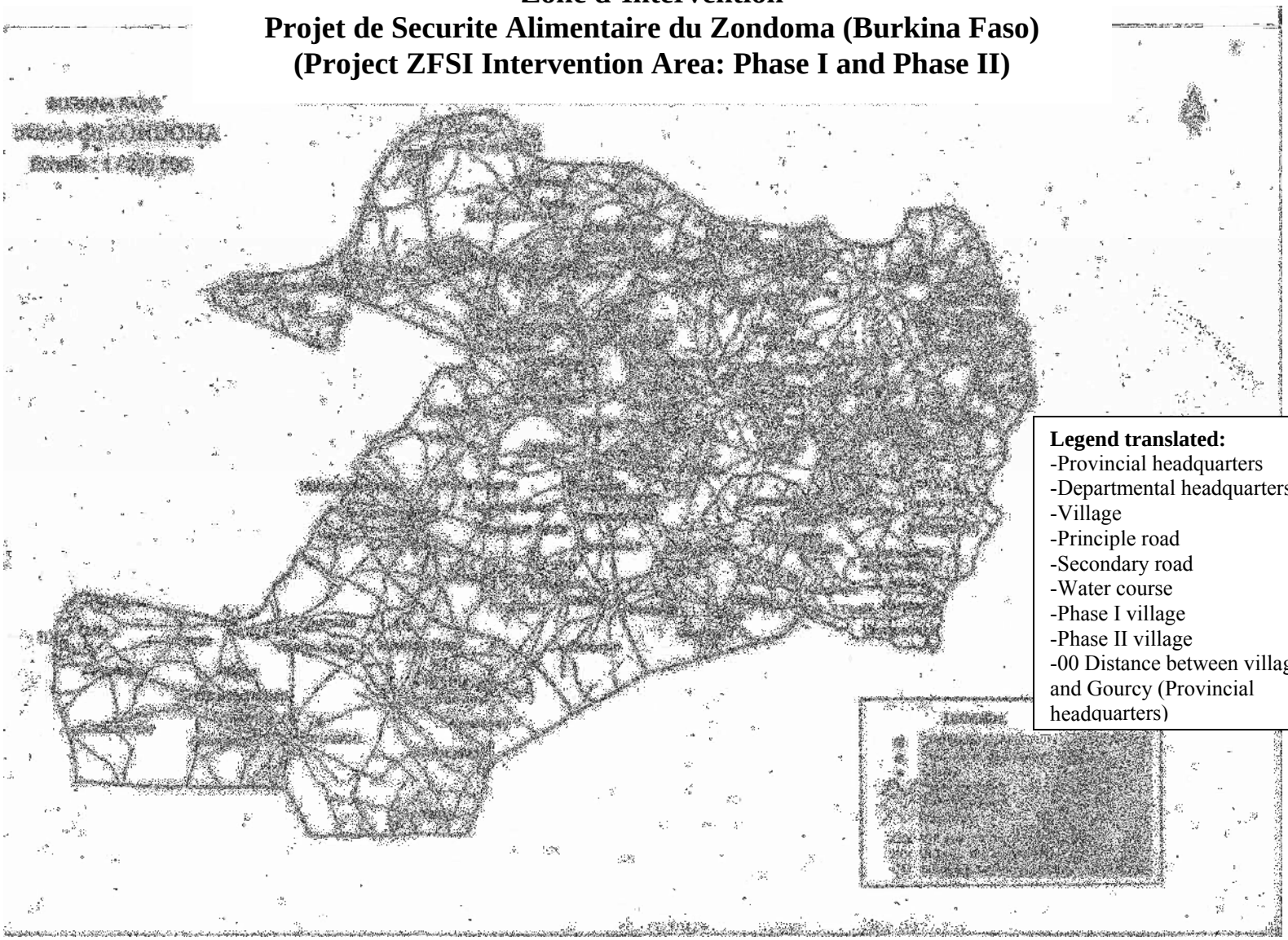
Zone d'Intervention
Projet de Securite Alimentaire du Zondoma (Burkina Faso)
(Project ZFSI Intervention Area: Phase I and Phase II)



Legend translated:
-Provincial headquarters
-Departmental headquarters
-Village
-Principle road
-Secondary road
-Water course
-Phase I village
-Phase II village
-00 Distance between village and Gourcy (Provincial headquarters)

Acknowledgments

Completion of this baseline report would not have been possible without the strong support of several persons and institutions in Washington, as well as in Ouagadougou. Africare Burkina is profoundly grateful to:

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Executive Summary

Context

Between 2000 and 2004, Africare executed a project known as the Zondoma Food Security Initiative in 40 villages of the province of Zondoma in Burkina Faso. Based on the project's successful record in decreasing the number of households categorized as chronically food insecure from 61.7 percent to 38.6 percent in the 40 villages, Africare was asked to expand its core program into 64 new villages in order to cover the entire province starting in 2005. Phase II of the project (2005-2009)--reinforced by a new subgroup of activities focused on HIV/AIDS, a new collaborative credit initiative, and activities to enhance safety nets— is expected to help Zondoma Province anticipate, and hopefully ward off, some of the asset erosion (of livestock holdings, children's education, and health) that might result from the current *Cote d'Ivoire* (CI) and HIV/AIDS crises. It is also intended to create the more diversified crop production and employment opportunities that the area needs to manage future risk.

To achieve these goals, Phase II of the ZFSI project has four Strategic Objectives:

- SO1: Enhancing and protecting livelihood capacities;
- SO2: Building community and household assets needed to buffer the impact of seasonal and inter-seasonal production shortfalls (e.g., resiliency);
- SO3: Improved household health and nutrition; and
- SO4: Enhanced community capacity to manage risks that reduce vulnerability and influence decisions that increase food security.

Objectives

The primary objective of the baseline survey was to establish baseline measures for the major Indicator Performance Tracking Table (Annex I) indicators being used to track the impact of the new project in the 104 project villages for Phase II (40 Phase I villages and 64 new project villages). To collect data on the major indicators, six separate questionnaires were used (Annexes III-VII) to interview.[1]

[1] The sample by strata was 450 production unit heads (PU) and 450 mothers of children aged 0-23 months (a total of 900 PU heads and 900 mothers). A total of 1,364 children aged 0-36 months of age were measured: 675 in the original villages and 689 in the new villages. A total of 787 children (390 in the original villages and 397 in the new villages) aged 24-59 months of age were measured for stunting. A total of 1,971 children less than five years of age were measured: 951 in the original villages and 1,020 in the new villages. A total of 756 subjects aged 15 to 45 years of age (355 subjects in the original project villages and 401 in the new project villages) were interviewed for the KAP (Knowledge, Aptitude and Practice) survey on HIV/AIDS. .A community survey that included the administration of the Africare Food Security Community Capacity Index (FSCCI) was conducted in 26 original and 28 new project villages. Six separate questionnaires packets were used (Annexes III-VII): a production unit (PU) questionnaire, a household questionnaire, an HIV/AIDS questionnaire, an anthropometric questionnaire, and a community questionnaire.

Since the project had been active in the original project villages for as long as four years, it was assumed that there would be some measurable differences between the original and new project villages for some of the most important impact and monitoring indicators. Therefore, this baseline report also focuses on the basis for differences or lack of differences between the original and new project villages. The project was also interested in pilot testing the utility of the Africare food insecurity indicator (MAHFP) and the FANTA (Food and Nutrition Technical Assistance Project)/Cornell questionnaire method as a tool for monitoring the progress of the project in addressing the special needs of the most food insecure groups, who are now a major focus of USAID Title II programs. Thus the baseline was interested in:

- Comparing the baseline measurements for the major indicators for the original project villages with the measurements for the new project villages; and
- Assessing, if possible, the link between chronic food insecurity (as assessed by the Africare food insecurity indicator, Months of Adequate Household Food Provisioning [MAHFP], that was used to measure project impact under S01) and household health behaviors most likely to affect maternal and child health (as assessed by the S03 indicators for health and nutrition).

SO1: Enhancing and Protecting Livelihood Capacities

The survey showed little meaningful difference between the original and new project villages in terms of the average size or structure of the local production units. Contrary to popular belief, land tenure did not appear to be the principal constraint on farm size. Far more important was the area's rampant *striga* infestation (which is strongly linked to degraded soils).

There were, however, two important differences in the natural resource base of the original versus new project villages:

- First, over half the family fields in the original project villages are located on the sandy, gravely, clay soils that are characterized by coarse-texture, low moisture-holding capacity, and low nutrient-holding capacity. With good soil amendment these soils can be very productive in a year of good to average rainfall. They are, however, extremely vulnerable to drought.
- Second, a higher percentage of production units in the new project villages have access to the more drought resistant clay soils in the lower lying *bas fonds* than in the original project villages.

This wide variation in the natural resource base means that, on average, the original project villages are far more drought sensitive than the new project villages.

Despite these differences, the core strategy for increasing crop productivity and the cropping systems resistance to drought in both categories of villages remains the same. Specifically, it requires a combination of rainfed water harvesting/anti-erosion measures and higher yielding inputs (fertilizer, improved seeds). One major impact of the project has been to shift the local development paradigm of government and farmers from a seeds alone solution to a strategy that combines higher yielding seeds with improved agronomic practices. ZFSI's demonstration trials and extension messages emphasize that

in the absence of complementary rainfed water harvesting/anti-erosion measures, the farmers' cash investment in yield increasing inputs (e.g., improved seed and fertilizer) is unlikely to be justified.

The project's extensive effort in extension and crop demonstrations is reflected in:

- The higher number of farmers practicing improved agricultural techniques (water harvesting/anti erosion techniques, mineral or organic fertilizer, improved seed) in the original project villages; and
- A substantial increase in the number of households in the original project villages benefiting from irrigation compared with Phase I baseline. Despite this increase in the average number of households benefiting from irrigation in the original villages, it was still lower than in the new project villages due to the higher number of functioning small-scale irrigated perimeters in the new villages at baseline of Phase II.

This supports the observation that Phase I focused on the poorest villages in the province and Phase II is expanding to villages that are not so disadvantaged at the baseline.

ZFSI Phase I started its livestock activities about two years later than its rainfed and irrigated crop activities. Despite some recorded progress on the introduction of new more intensive livestock production techniques (e.g., improved housing, vaccination and de-worming, and cutting and storing fodder) there is no significant overall difference between households in the original and new project villages.

One of the major conclusions of the gender analysis was that despite extensive involvement in livestock management by female household heads, very few in all the project villages have ever participated in a livestock training program. This highlights a severe weakness in integrating women into the project and non-project sponsored livestock training activities. The same analysis showed, however, that when women were trained, they were more likely to actually practice what they learned than the male PU heads who attended the same trainings in three of the project's priority areas (crop residue preservation and conservation, vaccinations and animal health, and animal housing improvement).

Based on the project's internal monitoring system, the combination of improved technologies did appear to be having a positive impact on yields (for participating farmers) and the number of months of adequate household food provisioning. Especially important, the project showed a recorded decrease in the number of households in the most food insecure households (based on the Africare indicator MAHFP) from 61.7 to 38.6 percent in the 40 villages where it intervened during Phase I. Unfortunately, the baseline study did not show a continuation of this trend due in large part to two successive years of below average and poorly spaced rainfall, which were compounded by a plague of cricket infestations in 2004-2005. These factors had a devastating (and well documented) impact on regional crop production levels in 2004, which the government estimated to cover only 23 percent of the province's needs versus 81 percent coverage in 2003. Specifically the baseline survey data showed:

- A net decrease in the number of months of adequate household food provisioning (using the Africare indicator Months of Adequate Household Food Provisioning [MAHFP]) from 9 (at the Phase I final survey) to 6.5 months (estimation in May 2005); and that
- On average, there were fewer food insecure and more food secure households in the new than in the original project villages;

There were also some slight differences in the average level of food insecurity per household, as well as the percentage of households classified in each category (severely insecure, moderately insecure, secure) depending on which measurement tool (e.g., the Africare MAHFP or the FANTA/Cornell questionnaire method) was used to make the calculation it (Box A).

While the baseline survey did not show major differences between the original and new project villages in terms of average food security or the number of households experiencing three months or more of food insecurity, the study did show that the original project villages had a smaller percentage of households that were considered to suffer from chronic food insecurity (the Cornell/FANTA method's category four—i.e., households that are being forced to mortgage assets, such as children's and mother's health and children's education, in order to survive). The lower percentage of households in this category suggests that the project's deliberate targeting of this group for many types of activities (preferential access to animal traction equipment and improved inputs, preferential inclusion of many vulnerable households [especially female headed] in demonstration trials, and preferential inclusion in livestock activities) is helping vulnerable households build the assets needed to reduce chronic food insecurity and reduce infant stunting and malnutrition. This is a major achievement that will be reinforced by the full execution of the project's proposed safety net programs, which started after the baseline survey in July-September 2005.

Given the critical link between the project's standard indicators of food insecurity (Impact Indicators 1.1 and 1.2) and rainfall (Chapter Two), and the lack of any significant difference between the original and new project villages, the team recommended that:

- The baseline figures for the number of Months of Adequate Household Food Provisioning and the percentage of households in the most vulnerable category (Impact Indicators 1.1 and 1.2) be the same; and that
- Both the FANTA/Cornell questionnaire method (based on the meaning of the questions) and the Africare MAHFP be used to monitor progress on the impact indicator since the former indicator (which is still experimental) offers a better mechanism for monitoring the project's targeting of the most vulnerable, chronically food insecure group (Box A).

Box A. Lessons Learned from Comparing the Levels of Food Insecurity Using the Africare MAHFP Indicator and the Cornell/FANTA Questionnaire Method

The FANTA/Cornell questionnaire method, for example, showed that 54 percent of the households were "secure" using the system of scores compared to 60 percent of the households classified as "secure" using a system that took into consideration the more qualitative picture of food security or insecurity painted by the respondents' answers to the 11 questions in the survey (referred to as the system based on the meaning of the questions). Two major conclusions of the survey were that in term of the overall food security trend, the FANTA/Cornell questionnaire method agreed with the results obtained from using the Africare MAHFP, which showed about 50 percent of the households as being food insecure. Based on this analysis the team recommended that the revised baseline figure for Impact Indicator 1.1 and 1.2 be the same for both the original and new project villages: six months (Impact Indicator 1.1: # of Months of Adequate HH Food Provisioning) and 51 percent (% of PUs severely insecure[2] [>3 months of food insecure]). This later indicator could be compared to the proportion of PUs in the third category of the FANTA/Cornell indicator based on score (total score above eight points), as well as to the percentage of PUs in the third and fourth categories of the FANTA/Cornell classification based on the meaning of the questions.

Based on this analysis the team made a number of recommendations for how the two methods for measuring food insecurity could be improved.

- *Conduct annual measurements*: Given the strong link between rainfall and the rate of cereal coverage in Zondoma Province, the team recommends that the project consider measuring this impact indicator annually rather than only during the baseline, mid-term, and final surveys. Since the recall questions used pertain only to the current year, the responses are thus directly linked to the quality of the harvest.
- *Address questions to men as well as women:* The fact that many of the women interviewed were unaware of the PU head's strategies for dealing with any sudden decrease in food stocks from the main granary is a major weakness of the Africare MAHFP questionnaire. It is therefore recommended that the Africare MAHFP questionnaire incorporate some of the same questions asked to women into the PU questionnaire. This would provide a mechanism for getting the point of view of the PU head on food availability, as well as on his strategies for facilitating access to food if and when there is a major rupture in the main granary food stocks. It is also recommended that the issue of accessibility needs to be given greater emphasis in the MAHFP questionnaire in order to measure it more accurately.
- *Add additional questions to get at food access strategies:* A third recommendation concerns the need for strengthening the MAHFP questionnaire's consideration of food security by giving greater visibility to the issue of accessibility.

To offset the problems that are inherent in each of the two methods and to encourage comparability, the team recommends that the project consider using <u>both</u> the Africare MAHFP and the FANTA/Cornell questionnaire method using the meaning of the questions to measure household food insecurity.

[2] Impact Indicator 1.2. was reformulated from " % reduction in the 3rd Category or food insecurity" to % of PU severely insecure to ease the way of measuring the performance since the percentage of food insecure is known and can be deducted automatically

SO2: Building Community and Household Assets Needed to Buffer the Impact of Seasonal and Inter-Seasonal Production Shortfalls (e.g., resiliency)

Given the baseline survey's strong evidence that rainfall continues to be the critical factor that affects household food security levels, the new project's emphasis on developing more diversified sources of income is given additional justification. Since neither credit nor income generating activities (IGAs) were a major focus of ZFSI during Phase I, it is not surprising that the baseline survey showed very few real differences between the original and new project villages regarding household savings and credit activities. The major observations were that:

- Prevailing rates of savings and credit are equally weak in both original and new villages;
- The existing base of credit opportunities is insufficient to cover the credit needs of the region targeted by ZFSI Phase II; and
- Local populations have insufficient information on credit opportunities and lack the capacity to identify lending sources and prepare competitive loan applications.

The same study showed an extremely weak development of all income earning opportunities in the project area. As a result, most cash revenue continues to come from livestock production, agriculture, and irrigated gardening. There are also very few training opportunities for PU leaders or female household heads. The project will be challenged to increase and diversify these sources of cash revenue through improved training and credit. In addition, the project will need to:

- Promote higher savings rates and greater access to credit through established institutions while, at the same time, promoting traditional savings practices that can reach the most vulnerable households; and
- Reinforce this improved access to credit with the types of training that male and female household heads need to diversify their sources of cash revenue.

SO3: Improved Household Health and Nutrition

The baseline data for the health sector reflected a trend similar to that observed for agriculture in that the original project villages were ranked higher than the new project villages for many positive health behaviors including:

- The percentage of mothers practicing exclusive breast feeding during the first six months and adopting good weaning practices;
- The percentage of mothers adopting the project's recommendations for improved home-based management of the most common infant diseases (malaria and diarrhea);
- The percentage of pregnant mothers attending pre-natal counseling and taking preventive measures against malaria and iron deficiency; and
- The number of children enrolled and actively participating in growth monitoring.

The project has also substantially increased the number of households with access to clean water by means of the 121 new water points it created or rehabilitated during Phase I. As a result of this investment, there is far less differences in potable water access between the original and new project villages.[2]

The net impact of these positive changes appears to be quite positive. Specifically, there was:

- No major change between either the average stunting measurements or for underweight children between the Phase I final survey and the Phase II baseline; and
- The differences between the original and new project villages were not statistically significant for either stunting or underweight children.

This in and of itself is a major achievement given: (a) the fairly dramatic drop in the average Months of Adequate Household Food Provisioning from nine to six months; and (b) the historic underdevelopment of the original project villages vis-à-vis the new villages. Given the lack of any statistically significant differences between the original and new project villages, the baseline measures for both Indicator 3.1 and 3.2 were assessed to be the same for both the original and new project villages.

The survey did show, however, a strong link between household food insecurity (measured in terms of Months of Adequate Household Food Provisioning) and the household's adoption of positive health behaviors. Specifically:

- Fifty percent of the moderately malnourished children are from the most vulnerable (i.e., food insecure) households;
- The percentage of mothers who practice good nutrition during pregnancy and nursing is smaller in the most vulnerable (i.e., food insecure) households; and
- Household vulnerability (as measured in terms of Months of Adequate Household Food Provisioning) was negatively correlated with mothers' positive health practices (i.e., mothers in the most food insecure groups were less likely to follow the recommended practices as closely as mothers in the most food secure group).

Therefore, it is clear that any substantial decrease in the percentage of children classified as underweight or stunted will require the project to:

- Focus a substantial amount of energy on building the assets and access to positive health behaviors by the most vulnerable, food insecure groups in both the original and the new project villages; and
- Strengthen the new cross-cutting set of activities focused on safety nets (food for work, direct distribution of food) that started in July-August 2005, as well as the baseline survey team's recommendation (in chapter one) for strengthening the project's annual monitoring of the MAHFP by the addition

[2] The new project villages appear to have been in a better position regarding access to water than the original project villages were at the start of Phase I. Therefore increasing access to potable water during Phase I in the original project villages has put them in a position similar to that of the new project villages at the start of Phase II.

of the FANTA/Cornell monitoring tool and a more regular (annual or every six months) measurement cycle; and
- Support the S01 recommendation that the project's attempt to develop a more regular system of village level monitoring and evaluation of MAHFP and the FANTA/Cornell questionnaire method as a tool for monitoring the effectiveness of these attempts to better target aid to the most vulnerable groups.

In addition to better targeting, it was thought that the project could increase the effectiveness of its efforts by:
- Better use of village birth attendants in monitoring and counseling of pregnant women and referrals to health centers for assisted births;
- The use of community health agents and village nutrition educators to promote improved practices for community based management of common childhood illnesses;
- Support to the local health district for development of a minimum base of nutrition education activities that can be integrated into its other activities; and
- The use of more participatory approaches to involve the community in training mothers; developing activities for sanitation and nutrition education programs; and identifying workable solutions to health, nutrition, and sanitation problems.

Although HIV/AIDS was not a major project focus under Phase I, the project's efforts to integrate HIV/AIDS awareness into other components seems to account for the slightly higher percentage of respondents in the original than new project villages that report using condom during their most recent sexual encounter. The survey did suggest, however, that a number of cultural communication networks might be better mobilized to change behavior. Specifically, respondents prefer to gain information regarding transmission, diagnosis, and prevention of HIV/AIDS through more anonymous modes of communication (radio and television) or through confidential channels (friends). Based on this evidence, the team concluded that the project was justified in developing a strong HIV/AIDS peer education sub-component into Phase II.

SO4: Enhanced Community Capacity to Mange Risks that Reduce Vulnerability and to Influence Decisions that Increase Food Security

Both the original and new project villages are characterized by a large number of community organizations. The baseline survey concurred with the results of the final survey from Phase II that the project's efforts to build the core organizational capacity of the original project villages was successful. Specifically:
- The average scores for the original project villages were significantly higher than those for the new project villages for three of the variables under this SO that were monitored under the Phase I monitoring and evaluation system using the Africare indicator, the Food Security Community Capacity Index (FSCCI) (e.g., the variables for community organization, analysis, planning, and action, and capacity for individual members of the community);

- Even though the previous project did not have a subcomponent focused on HIV/AIDS, a much higher percentage of the original project villages were considered to have developed an "average" to "excellent" strategy for confronting HIV/AIDS (based on the new variables added to the ZFSI FSCCI to measure this);
- To date, the average score for the new FSCCI variables, which were designed to help both the villagers and the ZFSI project better assess the local communities' ability to analyze and manage risk and shocks, are low for both the original and new project villages.

Although the baseline differences in capacity were less remarkable than what had been anticipated in the DAP IPTT projection (which did not include the nine new indicators that were added to the measurement for the baseline survey), there were still important differences. Based on this information, the team recommended a separate set of baseline, mid-term, and final targets for this indicator for the original and new project villages.

Conclusions:

The baseline survey has shown there are few statistically significant differences between the original and new project villages for many of the project indicators. Therefore, the baseline measures for Phase II for these villages are often the same. This data reflects the tremendous success of Phase I, which focused on the poorest of the poor villages and has raised them to the level of villages that were not as disadvantaged. The data suggests, however, that given the lack of any significant difference between the original and new villages for most indicators, the project needs to rethink its original plan to phase out of the 40 original villages by the end of 2007. It is from here (the position of all project villages being similar in terms of need) that Phase II can further improve the lives of people in Zondoma Province unilaterally.

The team also recommended suppressing two of the IPTT indicators and reworking some of the others to facilitate their measurement. A revised IPTT with the suggested rephrasing of the indicators and revised targets is attached in Annex I.

Four new activities that were not adequately detailed in the original development assistance proposal include:

- Helping to establish a community based system for monitoring food security and nutritional status that is harmonized with the new national health and agricultural information systems being established;
- Strengthening the project's emphasis on hygiene and sanitation;
- Organizing local agricultural fairs that promote locally produced products; and
- Organizing exchange visits and studies to promote improved processing of both rainfed and irrigated gardening food products.

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Acronyms

BMI	Body Mass Index
BTEC	*Banque Traditionnelle d'Epargne et de Crédit*
CI	*Côte d'Ivoire*
CIMCI	Community-based Integrated Management of Childhood Illnesses
CNLS	*Comité National de Lutte contre le SIDA*
CNRLP	*Centre National de Recherche et Lutte contre le Paludisme*
CNTA	National Center for Food Technology and Nutrition
COGES	*Comité de Gestion de la Santé*
CP	*Caisse Populaire*
CR	Country Representative
CS	Cooperating Sponsor
CSA	*Comités de Sécurité Alimentaire*
CSP	Country Strategic Plan
CSPS	*Centre des Soins de Santé Primaire*
CV	*Caisse Villageoise*
CVGT	*Comité Villageois de Gestion des Terroirs*
DAP	Development Activity Proposal
DPAHRH	*Direction Provinciale de l'Agriculture, de l'Hydaulique et des Ressources*
DPEBA	*Direction Provinciale de l'Enseignement de Base et de l'Alphabétisation*
DPECV	*Direction Provinciale de l'Environnement et du Cadre de Vie*
DPV	*Direction de la Protection des Végétaux*
Enc	*Encadreur*
FA	*Formateur Agronome*
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organization of the United Nations
FARN	*Foyer d'Apprentissage et de Réhabilitation Nutritionnelle*
FCFA	The West African Community Franc *(Franc Communauté financière africaine)*
FEA	Female Extension Agents
FFD	Food for Development
FFP	Food for Peace
FFW	Food for Work
FHD	Family Health Directorate
FSC	Food Security Committee
FSCCI	Food Security Community Capacity Index
FSI	Food Security Interventions
FY	Fiscal Year
GDP	Gross Domestic Product
GM	Growth Monitoring
GOBF	Government of Burkina Faso
GP	*Groupement* (Village Extension)
GR	*GénieRural* (Civil Engineer)

GRAAP	*Groupe de Recherche Action pour l'Auto-Promotion des Populations*
GTZ	*Gesellschaft fur Technische Zusammenarbeit*
Ha	Hectare
HD	Health District
HH	Household
HIV/AIDS	Human Immune Virus/Acquired Immune Deficiency Syndrome
HYD	*Hydraulicien* (Water Engineer/Hydrologist)
ICRISAT	International Crop Research Institute for Semi-Arid Tropics
IE	Irrigation Engineer
IEC	Information Education and Communication
IEE	Initial Environmental Examination
IFC	International Finance Corporation
INERA	*Institut National des Etudes et Recherches Agricoles*
IR	Intermediate Result
ISA	Institutional Support Activity
KAP	Knowledge, Aptitude, and Practice
Kcal	Kilo-Calorie
Kg	Kilogram
LIFDC	Low-income Food Deficit Country
LOA	Life of Activity
M&E	Monitoring and Evaluation
MAHRH	*Ministère de l'Agriculture, de l'Hydraulique et des Ressources Halieutiques* (Ministry of Agriculture, Water and Fisheries)
MARP	*Méthode Active de Recherche et de Planification Participative* (Participatory Rural Appraisal)
MASSN	*Ministère de l'Action Sociale et de la Solidarité Nationale*
MEBA	*Ministère de l'Enseignement de Base et de l'Alphabétisation* (Ministry of Basic Education and Literacy)
MECANO/BF	*Mutuelle d'Epargne et de Crédit des Artisans du Nord Ouest/Burkina Faso*
MECV	*Ministère de l'Environnement et du Cadre de Vie*
MKTG	*Spécialiste en marketing et crédit* (Marketing and Credit Specialist)
MOH	Ministry Of Health
MOU	Memoranda of Understanding
MRA	*Ministère des Ressources Animales*
MS	*Ministère de la Santé*
MT	Metric Ton
N	Nutritionist
NGO	Non-governmental Organization
ORS	Oral Rehydration salt
PC	Project Coordinator
PCEE	*Programme Crédit, Epargne avec Education*
PIAHIV	Person Infected and Affected by HIV
PLHIV	Person Living with HIV

PME	*Petite et Moyenne Entreprise* (Small and Medium scale Enterprises)
PPM	Petit Périmètre Maraîcher (Small Irrigated Perimeter)
PNGT	*Programme National de Gestion des Terroirs*
PRA	Participatory Rural Appraisal
PU	Production Unit
PSA-AOC	*Programme pour la Sécurité Alimentaire pour l'Afrique de l'Ouest et du Centre*
RCPB	*Réseau des Caisses Populaires du Burkina*
RECOSA	*Réseau des Comités de Sécurité Alimentaire*
RRA	Rapid Rural Appraisal
RTT	Regional Technical Team
SD	Standard Deviation
SO	Specific Objective
SOPRADEX	*Société de Production Agricole et de Développement des Exportations*
SPAI	S*ous Produitt Agro Industriel* (agricultural by-product)
STD	Sexually Transmitted Disease
TBA	Traditional Birth Attendant
TLU	Tropical Livestock Unit *(Unité Bétail Tropicale or UBT)*
TOR	Terms of Reference
UR	*Union Régionale*
URCPN	*Union Régionale des Caisses populaires du Nord*
USAID	United States Agency for International Development
VAP	Village Action Plan
VNE	Village Nutrition Educator
VWC	Village Water Committee
ZFSI	Zondoma Food Security Initiative

Chapter One

Introduction
Issa Konda

1.1. Zondoma Province

Zondoma Province represents one of the poorest and most food insecure areas in Burkina Faso (see map below). Even in a good year, food production provides only sixty percent of food needs. Households have traditionally coped with food shortages by relying on cash earned from the sale of livestock products and remittances from family members living in satellite communities in *Cote d'Ivoire* (CI) and southwest Burkina. However, labor migration and extensive livestock production are no longer profitable. In addition, many local communities have had to absorb over a million workers and farmers that have been involuntarily repatriated from CI since September 2002. The same economic turbulence and displacement has exposed Burkinabe citizens to HIV/AIDS, and its economic and social consequences, at accelerated rates.

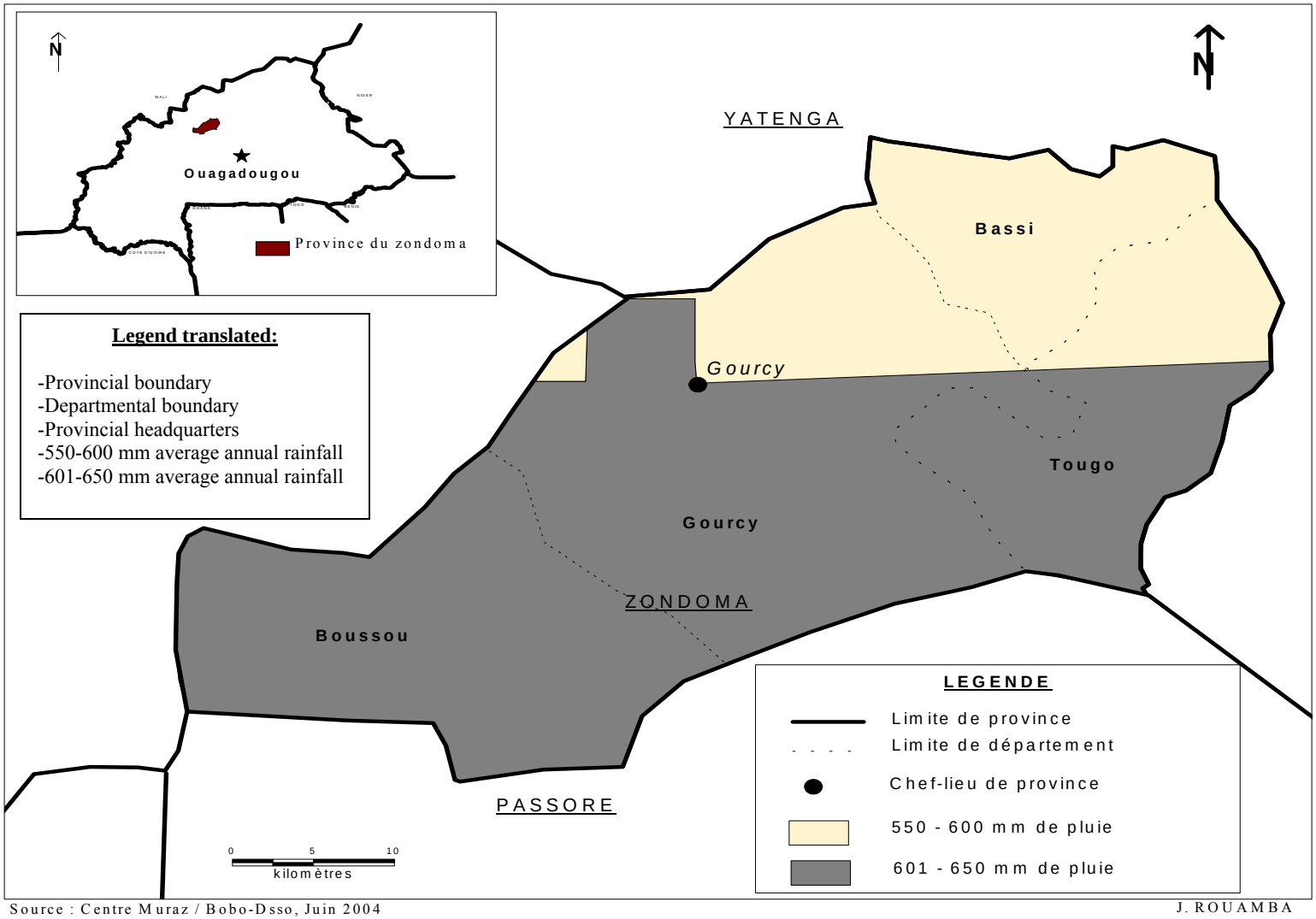
Phase II of the Zondoma Food Security Initiative (ZFSI II) (FY 2005-FY2009) is designed to increase the ability of Zondoma Province to manage these and future risks by building stronger, more diversified livelihood systems based on local resources and demand. To attain this goal, this project has identified four Strategic Objectives (SOs):

- SO1: Enhancing and protecting livelihood capacities;
- SO2: Building community and household assets needed to buffer the impact of seasonal and inter-seasonal production shortfalls (e.g. resliliency);
- SO3: Improved household health and nutrition; and
- SO4: Enhanced community capacity to manage the risks that increase vulnerability and to influence the decisions that increase food security.

The project builds on Africare's highly successful record of reducing the percentage of chronically food insecure households from 62 percent in 2000 to 37 percent in 2003 in the 40 villages (here after referred to as original villages [OVs]) where it intervened during Phase I of the USAID Title II-funded Zondoma Food Security Initiative (ZFSI I) (FY1999-FY2004).

At the request of the government, Africare has expanded Phase I of the Zondoma Food Security Initiative–reinforced by a new subgroup of activities that focus on HIV/AIDS, a new collaborative credit initiative, and activities to enhance safety nets—into 64 new villages (here after referred to as new villages [NV]) in order to cover the entire province under Phase II (i.e., ZFSI II). This new program should help Zondoma Province anticipate and hopefully ward off some of the asset erosion (of livestock holdings, children's education, and health) that might result from the current CI and HIV/AIDS crisis. It is also intended to create the more diversified crop production and employment opportunities that the area needs to manage future risk.

Location of Zondoma Province in Burkina Faso



Source : Centre Muraz / Bobo-Dsso, Juin 2004 J. ROUAMBA

Localisation de la province du Zondoma au Burkina Faso

The project proposal anticipates that most of the physical investments in the villages will be completed by the third year (2007) (Table 1.1). If this timetable is maintained, the final two years will focus on consolidating the capacity of the local beneficiary organizations and technical partners to sustain some of the community based activities after the project closes.

Table 1.1 Current and Projected Beneficiaries of the Zondoma Food Security Initiative (ZFSI) Phases I and II (2000-2009)

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Beneficiaries	**Phase I**					**Phase II**				
Villages	15	40	40	40	40	74	104	104	64	64
Households	2,194	7,322	8,083	8,309	8,542	12,705	20,304	20,873	11,722	12,056
Population	15,886	56,161	57,734	59,350	61,012	90,748	145,029	149,090	83,732	86,076

Sources: 1998 census figures for Zondoma Province adjusted for a 2.8 percent population growth rate between 2000 and 2003; the 2004 administrative census corrected for a 2.8 percent growth rate between 2004 and 2009.

1.2. The Baseline Survey

1.2.1. Goal and Objectives

The principal objective of the present baseline survey was to establish a reference group of baseline data on food security conditions in the area where the ZFSI II project will intervene. A secondary objective was to establish baseline measurements for the project's monitoring and impact indicators. A preliminary list of indicators, with a list of estimated baseline measurements, mid-term, and final targets, was submitted as part of the project proposal to USAID in the form of an Indicator Performance Tracking Table (IPTT) (Africare/ZFSI 2003).

1.2.2. Methodology

To facilitate the use of the study as a training tool for some of the new technical and field agent staff who were not present during the earlier baseline or the final study for Phase I, the project adopted a highly participatory planning, training, research, analysis, and write-up process.

This participatory process is best thought of as a series of six steps (Table 1.2). To encourage impartiality and to enhance training, the project recruited a number of external regional and international experts to backstop specific steps and sub-components (Table 1.2). Agro-Economist Mathias Zigani[3] provided technical assistance with the design and analysis of the crop and livestock production questions under SO1. Nutritionist Simeon Nanama[4] played a critical role in ensuring that the baseline sample frame conformed to

[3] Mathias Lamoussa Zigani, (Ph.D. Rural Economy, University of Montpellier, France) has 22 years experience in development with a special focus on rural economy, food processing, food aid management.
[4] Simeon Nanama (Ph.D. Nutrition, University of Cornell) has co-directed a longitudinal study to improve the various indicators used by FANTA to assess food insecurity impact in collaboration with the AFRICARE/ZFSI project. Prior to working with the Cornell/ZFSI Project, Dr. Nanama worked as a

the FANTA sampling guidelines. He also conducted a two day workshop that trained and retrained the ZFSI extension staff in anthropometric measurements and supervised the data analysis and write-up of the health and nutrition sections of this report. Statistician, Jeremy Kafando[5] oversaw data entry and analysis. Africare/Agadez Monitoring and Evaluation Specialist Rhili Aboubacar[6] assisted with data entry training and oversight. Food Security Specialist Della McMillan[7] helped with survey design, team training, report writing and translation..

In contrast to the conventional model for most Title II baseline surveys, the project supervisors played an active role in survey design, execution, and analysis (Table 1.2). Global leadership was vested in Project Coordinator Issa Konda, and Africare Burkina/Program Coordinator Ambroise Nanema.

1.2.3. Survey Steps

1.2.3.1. Step 1: Pre-Planning

Project pre-planning for Phase II, including the decision to use the baseline survey as a training exercise for new staff, started in January 2005.

1.2.3.2. Step 2: Sampling

A stratified sampling design with random poll in clusters was used. In each stratum, 30 clusters were selected for the survey. The localization of clusters was determined using the method of cumulated totals. The sampling was done at three levels: stratum, cluster, and production unit (Box 1.1).

Given that the definition of stratum is a relatively homogeneous unit from the point of view of the characteristics to be studied, the 104 villages in Zondoma Province were subdivided into two strata. The 40 original project villages were one stratum, and the 64 villages that had not yet benefited from interventions, the second stratum. In each stratum, 30 "clusters" were selected: 30 clusters in stratum one representing 26 original project villages and 30 clusters in stratum two representing 28 new project villages.

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supervisor of the Projet Gestion de la Sécurité Alimentaire (PGSA) in Yako, Burkina implemented by the Canadian International Center of Studies (CECI).

[5] Sottissi Jeremy Kafando, Statistics Engineer(the Ecole Nationale de la Statistique et de l'Economie Appliquée d'Abidjan [ENSEA] RCI) has 14 years experience statistical consulting.

[6] Rhili Aboubacar, Specialist (Maîtrise Es Sciences Economiques Option management of the University of Niamey) is the M&E supervisor of Africare's Title II food security project in Niger.

[7] Della McMillan (Ph.D. Anthropology, Northwestern University) has more than 25 years experience in the design, implementation and analysis of agricultural development programs in francophone West Africa. Since 2000, she has worked extensively with the USAID-funded Title II programs.

Table 1.2 Involvement of Different Actors in the Six Stage Baseline Survey, ZFSI Phase II Baseline, May 2005

Survey steps and activities	Duration	ZFSI II supervisors, coordinator, & Africare/Burkina project manager	External technical assistance				
			National			Africare/WAF	International
			Ag. economist	nutritionist	statistician	Africare Niger	M&E specialist
Step 1. Pre-planning							
Scope of Work	January (25 days)	X		X		X	X
Consultants recruited	January (21 days)	X					
Initial draft revised questionnaires	February (15 days)	X	X	X	X		X
Step 2. Sampling							
Sampling formula/model discussed	April (1 day)	X	X	X	X		X
Choice of clusters	April (1 day)	X					
Step 3. Training and questionnaire development							
Enumerator training	May (4 days)	X	X	X			X
Anthropometric measurement training workshop	May (3 days)			X			
Pre-test and revision of the questionnaires	May (2 days)	X	X	X			X
Supervision of the pre-test	May (2 days)	X				X	
75 Elaboration of the on-screen data entry framework	May (6 days)			X	X		
Step 4. Data collection							
Field-level data collection and supervision	May (12 days)	X				X	

Survey steps and activities	Duration	ZFSI II supervisors, coordinator, & Africare/Burkina project manager	External technical assistance				
			National			Africare/WAF	International
			Ag. economist	nutritionist	statistician	Africare Niger	M&E specialist
Step 5. Data entry and analysis							
Data entry training	May (3 days)				X	X	
Data entry and oversight	May (19 days)	X			X	X	
Initial data clean up [8]	June (3 days)	X		X	X		
Initial data analysis	June (7 days)	X		X	X		
Second data clean up and fusion of forms for analysis	June (2 days)	X		X	X		
Step 6. Document preparation, presentation, and translation							
Final data analysis	June (1 day)	X		X	X		
Draft chapters and analyses completed (by SO teams)	July- August (50 days)	X		X			
Compilation of the chapters, revision of the IPTT	August (25 days)	X	X	X	X		X
Presentation and discussion of the results with major partners	September (1 day)	X					

[8] (First apurement of databases)

Box 1.1 ZFSI Definition of a Production Unit (PU) and Household (HH)

Production Unit (PU) was defined as a group of persons who work on the same field, use the same production means and share farm outputs. A PU can be made of one or several households (HH)

Household (*ménage*) (HH) was defined as a man, his spouse (or spouses), and children.

The number of production units, households, and adolescents to be interviewed in each village were selected as a function of the number of clusters in the village. The production units were randomly chosen based on an exhaustive census of all the production units in the villages that were located in the cluster.

The first step in the sampling process was determining the appropriate size of the sample based on the FANTA-recommended formula (Magani 1997):

$$N=D*(Z_\alpha + Z_\beta)^2 * [P_1(1-P_1)+P_2(1-P_2)] / (P_2 - P_1)^2$$

N = required minimum sample size per survey stratum
D = design effect
P_1 = the estimated level of the indicator measured at the time of the baseline survey
P_2 = the expected level of the indicator at the time of the final survey so that P_2-P_1 given a good prediction of the magnitude of the change that one is expecting to detect
Z_α = score corresponding to the degree of confidence with which it is desired to be able to conclude that the observed change of size (P_2-$P_{1)}$ would not have occurred by chance (α – level of statistical significance)
Z_β = score corresponding to the degree of confidence with which it is desired to be certain of detecting a change of size (P_2-P1) if one actually occurred (β – statistical power)

The second step of the sampling process consisted of choosing which of the indicators in the Indicator Performance Tracking Table (IPTT) would provide the basis for determining the survey sample size. The team chose the indicator: percentage of underweight children 0-36 months of age (W/A <-2SD). This decision was based on the fact that it was an indicator that reflected the impact of all the other indicators and that it permitted the choice of a manageable sample size (based on the project's estimated baseline measurements and those predicted at the end for the indicator).

The final step consisted of determining the magnitude of the expected impact. To calculate P, the team relied on the baseline and Life of Activity (LOA) targets for the 40 original project villages which were respectively 41 and 31 percent for the selected indicator (percentage of underweight children 0-36 months of age). Based on the assumption that this variation could only be attributed to the project, the ZFSI I team decided to use the same baseline and five year LOA targets for the 64 new villages (41 and 31 percent respectively) in the proposal.

For $\alpha = 0.9$ and $\beta = 0.8$ the values of Z are $Z_\alpha = 1.282$ and $Z_\beta = 0.84$, and the minimal number of children 0 to 36 months of age required was 408. Within each randomly selected household, all the children aged 0 to 59 months of age were subjected to anthropometric measurements. Based on the most recent Demographic and Health Survey (*Enquête Démographique et de Santé* or EDS), the average Burkinabe household includes 0.91 children aged 0 to 36 months. Based on this calculation the team identified that they needed a minimum sample of 448 households in order to ensure 408 children who could be included in the household nutrition assessment. By dividing 408 households by 30 clusters, the team obtained an average figure of 15 households per cluster or 450 households per stratum.

Measuring babies for ZFSI Phase II baseline

By simple deduction the number of production units needed for the agricultural survey of the household heads was 450 production units by strata. The number of youth men age 18 to 35 years and women aged 15 to 45 for the KAP (Knowledge, Aptitude and Practice) survey on HIV/AIDS was also 450 individuals per strata.[9]

1.2.3.3. Step 3: Training and Questionnaire Development

Prior to embarking on the study, the coordinators organized an intensive two week period that focused on participatory development of the questionnaires with the local community, enumerator training, supervisor training, orientation of the villages to be surveyed, and selection of the individuals to be interviewed. These activities occurred simultaneously with various discussions and negotiations about the sampling (see section 1.2.3.2) and were reinforced by technical assistance from the economic and nutrition consultants and the Africare M&E consultant (Figure 1.1).

*Questionnaire development***:** A total of six questionnaires were developed based on the questionnaires that were used in the final survey of ZFSI I (Table 1.3).

Enumerator training: A total of 60 enumerators participated in the study: 45 external enumerators (15 of whom had participated in at least one other baseline or final survey of the project) and 25 Africare/ZFSI extension agents. Five temporary agents were recruited to help with data entry. Both the externally recruited enumerators and the project extension agents participated in two to three day training sessions on the data collection techniques needed for their particular questionnaire category (training session

[9] The actual number of male and female subjects 15-45 years of age who were interviewed about HIV/AIDS was 756 (355 in the original project villages and 401 in the new project villages). This was less than expected due to the withdrawal of some respondents who did not wish to discuss HIV/AIDS. Although less than the 900 desired interviews, is was sufficient for this study.

length varied by technical field). The enumerators were subdivided into four sub-groups based on themes (Table 1.2, Figure 1.1). Immediately after the basic training, the evaluation leaders organized a one day pre-test for each of the questionnaires. Based on this initial pre-test the questionnaires were revised.

Identification of persons to be interviewed: While the final questionnaires were being revised and duplicated, several small teams of enumerators visited the sample villages (village cluster) in order to conduct a detailed census of the production units, randomly choose the households to include in the survey and count the number of children that satisfy the two criteria for inclusion in the anthropometric survey, choose the youth to interview, and schedule appointments for the interviews. Each cluster included 15 production units, chosen randomly, and one household from within each production unit.

Table 1.3 Questionnaires Used in the ZFSI II Baseline Survey, ZFSI Phase II Baseline, May 2005

Title/Theme	Persons interviewed	Information collected
Production unit (PU) questionnaire	Production unit (UP) heads	Background information on agricultural and livestock systems, savings and credit practices
Household questionnaire	Mothers of children less than 24 months of age	Information on eating habits, nutrition, and health of mothers and children less than five years of age, as well as women's livestock, savings, and credit activities
HIV/AIDs questionnaire	Adolescents and women 15-25 years of age	Information on knowledge of and practice of behaviors related to transmission of and prevention of HIV/AIDS and other sexually transmitted diseases
Anthropometric questionnaire	Children less than five years of age	Information on the care of children less than five years of age and anthropometric measurements
Community questionnaire	Village leaders and leaders of community-based organizations working with the project	Assessments of community capacity to analyze and find solutions to community-level food security problems using the Africare methodology: Food Security Community Capacity Index (FSCCI)

Source: Annexes III-VII

A production unit (PU) was defined as a group of persons who work on the same field and share farm outputs. A PU can be made of one or several households (HH) or *ménages* (Box 1.1). A household was defined as a man, his spouse (or spouses), and children. One production unit might include several "households." Within each household, the enumerators randomly identified one mother with a child 0-23 months and one male youth 18-35 years of age or one female 15-45 years of age.

At the same time, the enumerators took a census of all children 0-59 years of age. Each child was identified by his name, date of birth, and sex. Whenever possible, the enumerators relied on various administrative documents such as birth certificates, vaccination records, and health records to verify the child's age. When documents were not available, the team relied on other techniques to determine the child's age such as comparison with another child with a recorded birth date or with a local calendar of major events to fix the month. If an exact birth date couldn't be determined, the date was automatically set at the fifteenth of the month once the birth month was determined.

Supervisor M&E training and planning: During the final days of preplanning, Africare organized a one-day monitoring and evaluation workshop for ZFSI II supervisory staff. This workshop coincided with the period when the enumerators were traveling to the villages to set up the interviews without the supervisors. The objective of the one-day workshop was to help staff better situate the baseline study within a wider context. Some of the themes addressed included a brief overview of the 2003 USAID/FFP Strategy Paper; the Title II guidance on monitoring and evaluation; and the relationship between this guidance and the present study. A second day was devoted to developing a detailed table of contents that followed the project's Indicator Performance Tracking Table (IPTT) and SO-specific data analysis plans.

1.2.3.4. Step 4. Data Collection

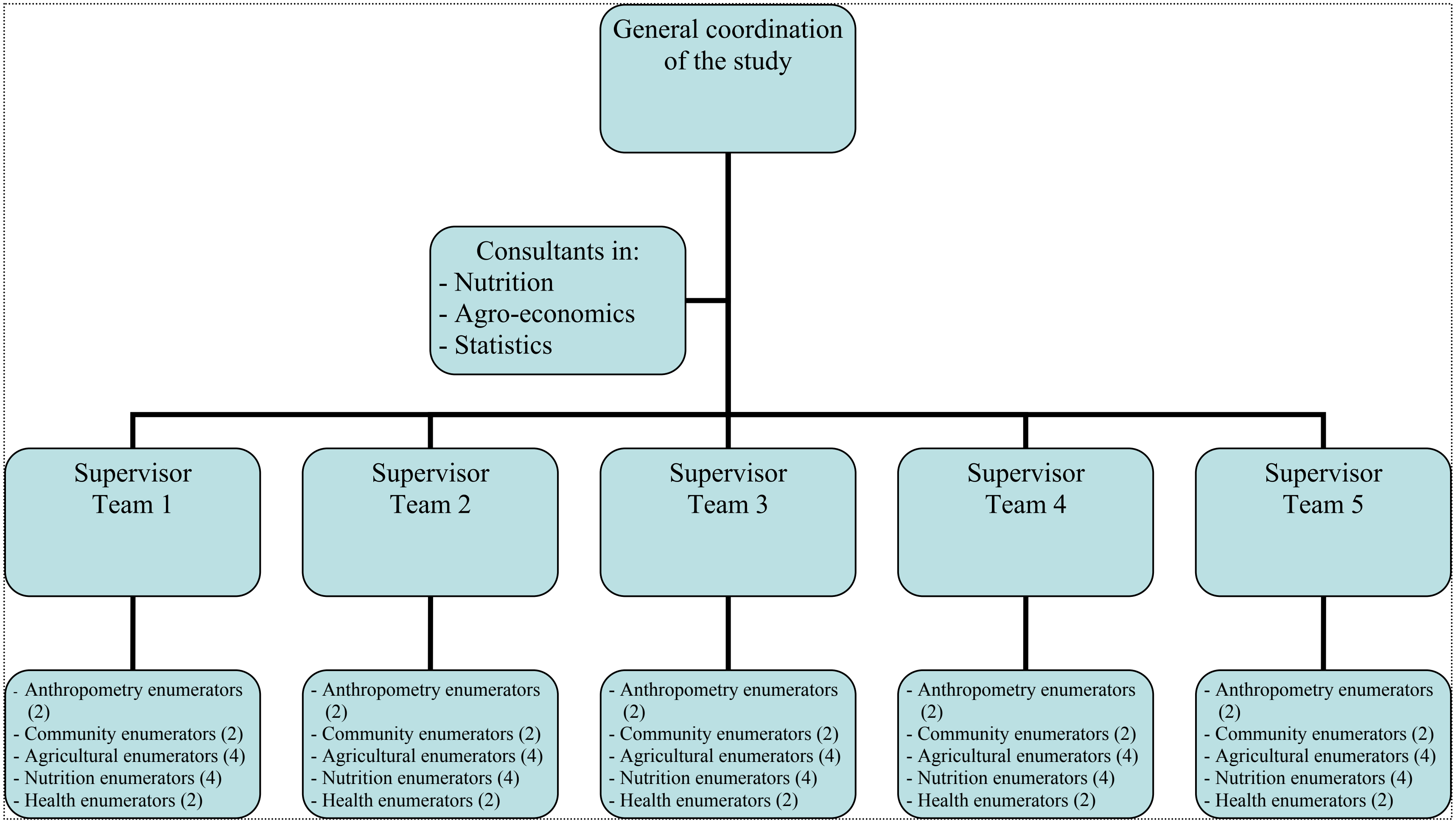
The actual data collection required 12 days of field work. It was completed by five field teams, each of which was composed of a supervisor, four production unit enumerators, four household enumerators, two STD/HIV/AIDS (Sexually Transmitted Disease/Human Immune Virus/Acquired Immune Deficiency Syndrome) enumerators, two anthropometric enumerators, and two community enumerators (Figure 1.1). Prior to leaving a village, each supervisor checked all the questionnaires to ensure that they were completed correctly. Each evening, the completed questionnaires were returned to the survey coordination team at the project headquarters where they were archived.

1.2.3.5. Step 5: Data Entry and Analysis

Six data entry experts were recruited for data entry under the supervision of the statistics consultant, who was assisted by the M&E specialist from Africare/Niger. Prior to starting work, the six agents received a three day training (May 9-11, 2005) which emphasized basic techniques for data entry into SPSS software. One output of the training was the development of a formal training module for the data entry specialists, which Africare intends to revise and adapt for use during the

ZFSI Phase II Baseline Data Analysis

Figure 1.1 Organization of Data Collection Teams, Coordination and Technical Assistance for the Baseline Survey, ZFSI Phase II, May 2005



baseline survey of its new Title II initiative in Niger. Data entry started three days after the field work started and concluded May 27, 2005. After an initial data cleanup period of three days, the team conducted the data analyses to identify data entry problems. In the process the team identified a series of data entry errors that made it impossible to merge different files on the same households. This necessitated a page by page verification of the raw data against the forms, which continued through July.

1.2.3.6. Step 6: Document Preparation, Discussion with Partners, and Translation

Each SO and sector team (agriculture, livestock, health/nutrition, HIV/AIDS, and marketing) prepared its own internal analysis and write-up based on the table of contents and data analysis plans that were developed during the pre-planning step (step 3). The degree of involvement of the external consultants varied with each sector and is acknowledged in the chapter authorship as well as in the acknowledgements of the report. The translation of the draft document into English coincided with the final editing and discussion of the French draft and revised IPTT with the major partners in August-December 2005.

1.2. Organization of the Chapters

To facilitate the comparative analysis of the major indicators (many of which were tracked during Phase I as well) the team adopted a table of contents format that followed the project Indicator Performance Tracking Table (IPTT) (Annex I). With the exception of Chapter Two, each chapter follows a standard formation that:

- Reviews the major systems (livelihood, health/nutrition, community organization) being targeted by the project for the 40 original and 64 new ZFSI villages; and
- Concludes with general "lessons learned" from the survey for the project's monitoring and evaluation system (indicator calculation and targets) and program implementation strategies.

Given the overall focus of the project on reducing food insecurity and the number of people in the most vulnerable groups, an entire chapter (Chapter Two) is devoted to analyzing the baseline information on food insecurity and vulnerable groups. This same chapter compares the standard Africare methodology for assessing vulnerability with a new methodology that was developed through a collaborative research agreement that was executed by the Department of Nutrition at Cornell through a grant from the Title II-funded Food and Nutrition Technical Assistance (FANTA) Project (hereafter referred to as FANTA/Cornell).

This is followed in Chapter Three by a broad description of the rainfed crop, irrigated agriculture, and livestock production systems being targeted by the project's SO1 activities. Chapter Four describes the prevailing patterns for income generating activities and trade that are being reinforced by the project's SO2 activities. Chapter Five describes the household Knowledge, Aptitudes, and Practices (KAP) for nutrition, drinking water, sanitation, and sexual behaviors linked to STD and HIV transmission

being targeted under SO3. Chapter Six describes the baseline community organization in the original and new project villages for the major categories being tracked by the Africare Food Security Community Capacity Indicator (FSCCI).

Chapter Two
Levels of Food Insecurity and Vulnerability in the ZFSI Phase II Project Area

Simeon Nanama and Karim Souli

One of the principal objectives of the Zondoma Food Security Initiative is to reduce the number of households classified as extremely vulnerable in terms of their ability to manage both periodic and acute drought. For this reason, one of the most important tasks of the baseline survey was to obtain a measure for the number of persons classified as extremely vulnerable.

Given the central importance of monitoring the project's impact on the most vulnerable portion of the population, identifying the best method for classifying vulnerable groups and their constraints is critical. This chapter compares and contrasts the results of two different methods for measuring food insecurity levels and vulnerable groups in the ZFSI Phase II project villages. The first method, Months of Adequate Household Food Provisioning (MAHFP), was developed by Africare in the late 1990s as a tool for identifying vulnerable groups and measuring the Title II-funded program's impacts on increasing or diminishing the number of people classified in the most vulnerable groups. One important achievement of the Africare Title II monitoring and evaluation systems has been to introduce this measurement into the official tracking table of every one of Africare's Title II-funded programs. These programs have developed detailed guidance for training field staff and village leaders in the execution of this method and its use as a tool for data analysis and planning.

The second method for identifying food insecurity is relatively new and is questionnaire-based (hereafter referred to as the FANTA/Cornell questionnaire method). It was developed, pilot tested, and validated on the Africare/ZFSI project by a collaborative research agreement between the USAID Title II-funded Food Aid and Technical Assistance (FANTA) project and the Cornell University, Division of Nutritional Sciences.

Section 2.1 of this chapter describes the aggregate levels of food insecurity based on the number of households classified as highly food insecure according to the Africare method of Months of Adequate Household Food Provisioning. This is followed in section two (2.2) by an analysis of food insecurity patterns using the FANTA/Cornell questionnaire method. The strengths and weaknesses of the two methods are compared and contrasted in the conclusions (section 2.3.1). Based on this analysis, the team establishes the official baseline measurements, mid-term, and end of project targets for measuring two of the project's most important (and controversial) indicators:

- **Impact Indicator 1.1:** Number of Months of Adequate Household Food Provisioning; and.
- **Impact Indicator 1.2:** Percent reduction in the most food insecure category.

2.1. Assessment of Household Food Insecurity Based on the Africare Method "Number of Months of Adequate Household Food Provisioning" (MAHFP)

The data used for Africare's measurement, Month of Adequate Household Food Provisioning (MAHFP), was collected as part of the survey packet that was used to interview mothers of children less than 24 months of age (Box 2.1). Since 1999, Africare's field agents have developed an entire participatory process that enables villagers to grasp this concept.[1] Most villagers in the original villages are familiar with the process, which is conducted annually as part of the annual update of the food security community action plans. In order to be able to compare the results of the Phase II baseline with the results of the ZFSI Phase I final survey, the baseline survey was conducted during the same month as the Phase I final survey (May) in 2005. This is a time period when the stores from the previous year's harvest (November) are running low and the demands for agricultural labor for field preparation and planting are at an all-time high. Therefore, it is the time of year when data would reflect the most number of food insecure households.

"The data used for MAHFP was collected as part of survey packets used to interview mothers of children less than 24 months of age". (photo credit: I. Konda)

Box 2.1 Questions Used to Determine the Months of Adequate Household Food Provisioning (MAHFP), ZFSI Phase II Baseline Survey, May 2005

1) How many times per day does your family actually eat?
2) When your family eats, do they satisfy their hunger?
    1. Yes
    2. No

If yes, between now and the next harvest in October, how many months will your family eat enough to satisfy its hunger?

If not, how many months did your family satisfy its hunger (i.e., eat two meals per day) after the last harvest?

[1] See Africare. 2005. How to Measure the Months of Adequate Household Food Provisioning (MAHFP) in Food Security Interventions (FSI). 2nd Edition. February 2005. Washington, DC: Africare. A copy of the actual questionnaire that was used in the ZFSI baseline survey attached in the Annexes.

2.1.1. Average Food Insecurity Levels

2.1.1.1. Current Food Insecurity Levels (May 2005)

Based on the Africare method of MAHFP, one in two mothers (50.4 percent) stated their family was able to "satisfy its hunger" at the time of the baseline survey (May 2005). Based on the local cultural norms, the concept of "satisfying hunger" was defined as eating two meals per day.[2] The proportion of households who reported satisfying their hunger was slightly higher in the new than in the original project villages (53.1 and 47.8 percent respectively).

Out the 50.4 percent of the female household heads who reported that their households were "satisfying their hunger," 31.9 percent stated that they were satisfying their hunger for five months a year, until the October 2005 harvests (Table 2.1). The number of women who stated that their households could "satisfy their hunger" until the next harvest was higher for the new project villages (35.5 percent) than the original project villages (28.1 percent).

Table 2.1 Percentage of Food Secure Households* Reporting Ability to Satisfy Hunger for Specific Number of Months, ZFSI Phase II Baseline, May 2005

Time period during which HHs can satisfy hunger	New villages	Original villages	All villages
< 1 month	51.7	58.1	54.8
5 months	35.5	28.1	31.9
Does not know	12.8	13.8	13.3

Methodology: Africare MAHFP.
*Food secure households for this data are those who reportedly could "satisfy hunger" for household members.

Of the 49 percent of women who responded that their families were not currently satisfying their hunger, a sizable majority (60.2 percent) stated that they were food secure (i.e., able to satisfy their hunger in terms of having two meals a day) for only two to three months after the harvest (Table 2.2).

2.1.1.2. Months of Adequate Household Food Provisioning

Based on the Africare method for determining the MAHFP, the average number of months of adequate household food provisioning for the entire Phase II project area was 6.8 months with a standard deviation of 4 months. The average MAHFP was slightly higher in the new than in the original project villages (Table 2.3). This reported

[2] This question did not specifically dictate the meaning of satisfaction of hunger. In the original project villages, it is assumed that most respondents defined satisfaction of hunger as two meals per day, but it is acknowledged that this may not be a universal definition for all respondents or for respondents in the new project villages. This may have implications for results that compare original and new project villages. In addition, the concept of satisfaction focuses more on quantity and does not preclude quality of food. In other words, it is difficult to distinguish those who link satisfaction to quantity of food from those who think of satisfaction in term of quality.

Table 2.2 Percentage of Food Insecure Households* Reporting Ability to Satisfy Hunger for Specific Number of Months, ZFSI Phase II Baseline, May 2005

Time period during which HHs can satisfy hunger	New villages	Original villages	All villages
< 1 month	11.3	10.0	10.7
2 to 3 months	60.0	60.4	60.2
> 3 months	21.6	22.4	22.0
Does not know	7.1	7.2	7.1

Methodology: Africare MAHFP.
*Food insecure households for this data are those who reportedly could not satisfy their hunger.

difference is not surprising given the fact that the new project villages have far more agricultural resources than the original project villages. The historic impoverishment (and disproportionate development of irrigation infrastructure) of the original villages was in fact one of the main criteria for their being chosen for Africare's intervention during Phase I. A second possible reason why new villages reported less food insecurity than original villages is that, members of the original villages are better trained to assess the actual quality and quantity of their diet than the respondents in the new villages due to exposure to these issues during Phase I (i.e., they have been trained on how to recognize food insecurity in terms relevant to the ZFSI project). The observed difference in MAHFP is not, however, statistically significant (10 percent confidence level). Based on this limited differentiation, the team feels that the overall average for all villages (6.8 months) should be used as the baseline measure for Indicator 1.1.

Table 2.3 Average Number of Months of Adequate Household Food Provisioning (MAHFP), ZFSI Phase II Baseline, May 2005

Location	Number of months of adequate household food provisioning (MAHFP)	
	Mean	Standard deviation
Original villages	6.5	3.8
New villages	7	3.9
All villages	6.8	3.9

Methodology: Africare MAHFP.

It is important to emphasize that the 2004 agricultural season was exceptionally unproductive for Zondoma Province (Table 2.4). Total cereal production was estimated to have been 14,747 tons less than the identified need (29,946 tons). This deficit represents a rate of coverage of the estimated need of only 45 percent compared to 62 percent coverage in 2002 and 81 percent coverage in 2003. The principal factor explaining this dramatic deficit in 2004 was the below average rainfall and uneven spacing of the rainfall. This is a historic trend (Figure 2.1). Since cereals provide the principal source of calories in the diet in this region, these grain deficits are going to directly affect any calculation of Number of Months of Adequate Household Food Provisioning.

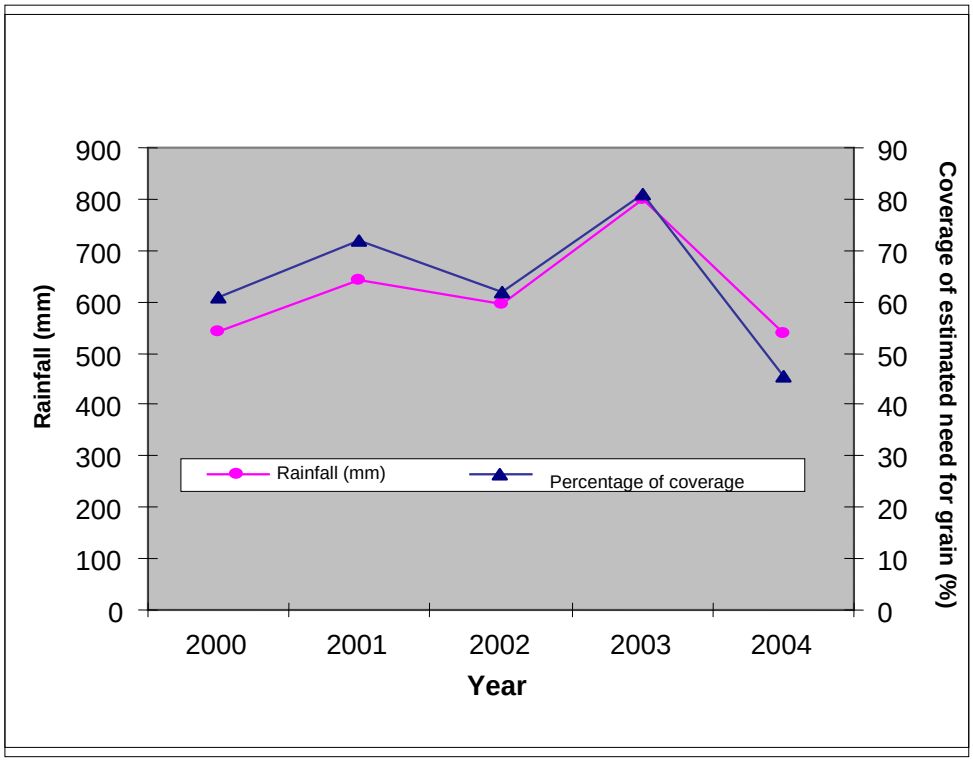
"The 2004 agricultural season was exceptionally unproductive for Zondoma Province". (photo credit: R. Wilson)

Table 2.4 Global Evaluation of the 2003-2004 Grain Production Campaign, Zondoma Province, Burkina Faso, 2004

Department	Area (ha)		Production estimated in tons	Requirements estimated in tons	Food balance estimated in tons
	Pearl millet	Sorghum			
Bassy	1,548	2,974	1,637.5	3,366	-1,912.6
Boussou	3,290	6,416	2,115.5	1,718.5	-1,317.4
Lèba	1,481	1,939	7 99.5	1,780	-839.5
Gourcy	7,681	13,446	5,899.2	10,919.4	-5,015.8
Tougo	3,210	5,438	2,175.4	5,474.18	-3,360
Gourcy Commune	2,896	6,038	1,387.03	4,224.4	-2,304.5
Total for province	**20,279.5**	**34,453**	**13,588**	**29,946.82**	**-14,747.4**

Source: Quarterly Report of the DPAHRH-Z (Oct-Dec 2004).

Figure 2.1 Evolution of Rainfall and the Percentage of Coverage of the Estimated Need for Grain Production in Zondoma Province (2000-2004)



2.1.2. Percentage of Households in Different Categories of Household Food Insecurity

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Based on the households' self-assessment of their food security levels as of May 2005 using the indicator Months of Adequate Household Food Provisioning (MAHFP), the production units (PUs) in the survey can be classified into three categories:

- Category one: "Secure" includes households that report that they anticipate being able to satisfy their hunger for all 12 months (i.e., they do not anticipate experiencing any period of food insecurity through the next harvest);

- Category two: "Moderately food insecure" includes households that anticipate being able to satisfy their food needs for nine months of the year (i.e., that are insecure only three months of the year); and
- Category three: "Food insecure" includes households that are (in 2004-2005) food insecure for more than three months during the past year.

This study found that 18.5 percent of households are classified as secure, 28 percent are classified as moderately food secure and 53.4 percent are classified as food insecure (Table 2.5).

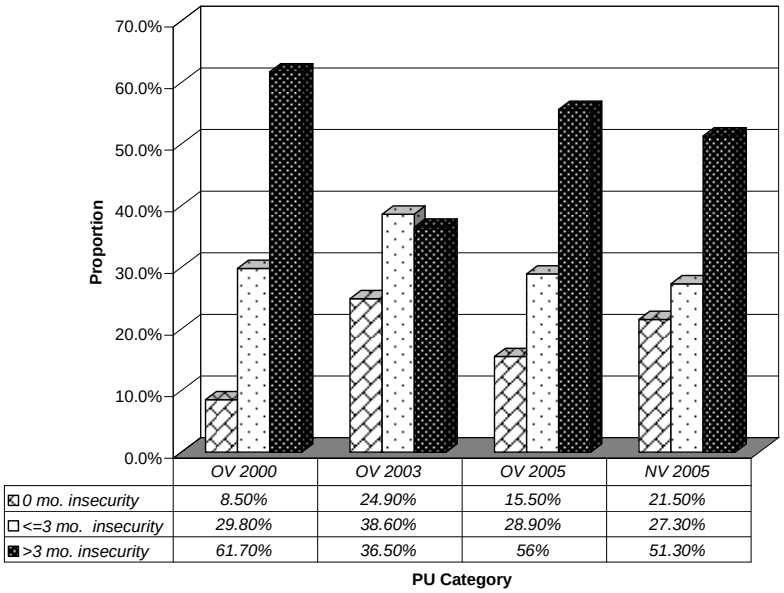
Table 2.5 Percentage of Production Units in Different Food Insecurity Categories Based on the Africare Indicator: Months of Adequate Household Food Provisioning (MAHFP), ZFSI Phase II Baseline, May 2005

Category of food security	Percentage of production units (%)		
	Original villages	New villages	All villages
0 months of food insecurity	15.5	21.5	18.5
< = 3 months of food insecurity	28.9	27.3	28.1
>3 months of food insecurity	55.6	51.3	53.4

Overall, the situation in the new project villages is better than in the original project villages (Table 2.5; Figure 2.2). There was smaller percentage of households classified as insecure (51 and 55 percent in the new and original project villages respectively) and a higher percentage of households classified as secure (21.5 versus 15.5 in the new versus original project villages respectively) in the new versus original project villages. These differences between the original and new villages, however, are only marginally significant ($\chi^2 = 3.508$, p=0.061). Based on this data, the team recommends that a baseline measurement of 53.4 percent (the overall average) for food insecure PUs is justified for both original and new project villages.

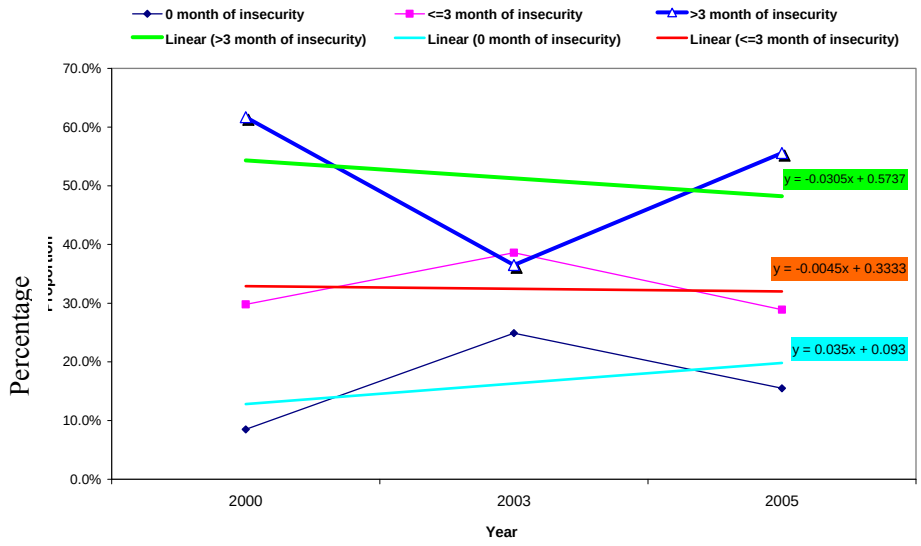
It is important to highlight that, despite the unfavorable food security situation in the original project villages compared to the new project villages, the global trends in terms of reducing the percentage of food insecure households have been very positive. Specifically, a comparison of the current year's figures with the project's Phase I baseline and mid-term survey data shows a net reduction in the percentage of food insecure households and a net increase in the percentage of PUs classified as moderately food insecure and secure (Figure 2.3).

Figure 2.2 Evolution of Average PU Food Security Levels in Original (OV) and New (NV) Project Villages



	OV 2000	OV 2003	OV 2005	NV 2005
0 mo. insecurity	8.50%	24.90%	15.50%	21.50%
<=3 mo. insecurity	29.80%	38.60%	28.90%	27.30%
>3 mo. insecurity	61.70%	36.50%	56%	51.30%

Figure 2.3 Evolution of the Three Categories of Food Insecurity Based on MAHFP in the Original ZFSI Phase I Villages between 2000 and 2005, ZFSI Phase II Baseline, May 2005



2.2. Assessment of Household Food Security Using an Experience-Based Questionnaire Adapted within the FANTA/Cornell/Africare Collaborative Project

To facilitate comparison with the Africare method used to assess food insecurity, Number of Months of Adequate Household Food Provisioning (MAHFP), the baseline survey included the FANTA/Cornell Food Security Questionnaire in the survey packet administered to the male production unit heads.[3] The FANTA/Cornell questionnaire consists of 11 simple questions that assess if and how households experience food insecurity and the strategies they adopt to combat it.

A three step process was used to adapt an experience-based food security questionnaire that had been developed in the United States in the early 90's[4] and that has since been adapted and used in other contexts.[5] The process of adapting the questionnaire to the Burkina context consisted of:

1. A critical review of the leading questions by researchers with a good understanding of the Burkinabe context in order to ensure that the questions were appropriate for the context;
2. Meetings and focus group discussions with local communities to ensure that they understand the questions that would be used in the household interviews (feedback during these meetings enabled researchers to refine the formulation of the questions and better specify the length of time respondents were being asked to recall and to rank the questions in terms of the degree of food insecurity that each of them reveals); and
3. A pretest of the questionnaire in order to ensure a minimum level of variability between responses to each question.

While the initial focus of the research was the ZFSI project, it was expected that the process of adapting the Cornell/FANTA tool to the ZFSI project could provide a model for how a similar exercise could be used to adapt it to other African contexts.

A variable was associated with each of the 11 questions. Each of these variables was scored with a "1" if the response indicated food insecurity and "0" if it did not. Based on the production unit head's responses to the questionnaire, each household was classified in terms of its household food security based on two different systems for assessing food security: one is based on total score of the variables and the other is based on the meaning of the questions[6] to which the household answered affirmatively.

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[3] A total of 892 production units were included in the study. Due to incomplete data on 74 only 818 production units were included in the analysis.

[4] Radimer, K. L., Olson, C. M., Greene, J. C. , Campbell, C. C., & Habicht, J. P. (1992) Understanding hunger and developing indicators to assess it in women and children. J. Nutr. Educ. 24: 36S-45S.

[5] Frongillo, Edward A., Nusrat Chowdhury, Eva-Charlotte Ekström, Ruchira Naved. "Understanding the experience of household food insecurity in rural Bangladesh leads to a measure different from that used in other countries." Journal of Nutrition 133 (2003a): 4158-4162.

[6] "Meaning of the question" refers the qualitative categorization (to represent different levels of food security) of the meaning of the questions to which respondents answered affirmatively.

- *FANTA/Cornell ranking based on scores:* The first system classifies production units into the following three categories based on their total scores for the 11 variables (each variable was scored 0 or 1).
  - *Category 1: Food secure* (with a total score of less than 3)
  - *Category 2: Moderately food insecure* (score between 3 and 8)
  - *Category 3: Highly food insecure* (score greater than 8)

- *FANTA/Cornell ranking based on the meaning of the questions:* The second system classifies production units based on the actual meaning of the question to which the households responded affirmatively. In other words, this system takes into consideration the picture of food security or insecurity painted by the respondents' answers to the 11 questions in the survey.
  - *Category 1: Food secure* (total score=0): Production units having reported no experience of food insecurity.
  - *Category 2: Moderately food insecure*: Production units were classified as moderately food insecure if they expressed concern with food provisioning and discussed having to purchase food and reduced food portion sizes.
  - *Category 3: Food insecure*: Production units were classified as food insecure if they expressed experiencing more severe food insecurity such as reducing the total quantity of food they consumed and eating lower quality foods (i.e., foods they consider less desirable).
  - *Category 4: Extremely food insecure*: This last category represents production units that qualify as severely food insecure in terms of food intake. To be classified in this category, a production unit experienced at least one of the following activities that are considered to substantially compromise the dignity and well being of the family: (a) children are sent to eat elsewhere; (b) seed stock is consumed; (c) family members spent at least 24 hours without eating; and/or (d) family borrowed or requested cereals from a family member or a neighbor. These scenarios are considered unacceptable, compromise their dignity, or erode basic assets needed to manage risk (e.g., health, social networks, children's education, livestock reserves, seed stock).

2.2.1. Average Food Insecurity Levels (based on scores)

Based on the Cornell/FANTA system of ranking by scores, the average food insecurity score was 3.9 for the entire sample (Table 2.6), this average falls within the moderately food insecure category. The average food insecurity score for the original project villages (3.95) is higher than that of the new project villages (3.90), but the difference was not statistically significant (p=0.820).

Table 2.6 The FANTA/Cornell Food Insecurity Indicator Score, ZFSI Phase II Baseline, May 2005

Indicator	All villages	Original villages	New villages
	Average (Std. deviation)	Average (Std. deviation)	Average (Std. deviation)
FANTA/Cornell Food Insecurity Indicator: Score total (n =818)	3.92 (3.18)	3.95 (3.26)	3.90 (3.11)

Scoring system: food secure (with a total score of less than 3), moderately food insecure (score between 3 and 8), highly food insecure (score greater than 8).

2.2.2. Percentage of Households in Different Categories of Household Food Insecurity

2.2.2.1. Based on FANTA/Cornell Questionnaire Method (system of ranking based on scores)

Based on the Cornell/FANTA system of total score for assessing food insecurity (Table 2.7), the percentages of PUs for all the project villages classified as of food secure, moderately food secure, and food insecure were 53.8, 31.5, and 14.7 percent respectively. In the original project villages only, the percentages of PUs in these three categories of food insecurity were 53.9, 30.6, and 15.5 percent respectively. For the new project villages, the corresponding percentages were 53.7, 32.5, and 13.8 percent respectively. The differences in the percentages of PUs in the three different categories of food insecurity between the original and new project villages were not statistically significant ($\chi^2 = 0.093$, p=0.760[7]).

Table 2.7 Percentage of Production Units in Different Food Insecurity Categories Based on the FANTA/Cornell System of Scores

Food security category	Original villages		New villages		All villages	
	Frequency	*%*	*Frequency*	*%*	*Frequency*	*%*
Food secure (PU score<3)	222	53.9	218	53.7	440	53.8
Moderately food insecure (3< PU score< 8)	126	30.6	132	32.5	258	31.5
Food insecure (PU score> 8)	64	15.5	56	13.8	120	14.7

Note: Differences in percentages of PUs per food security category between original and new project villages are not significant.

[7] This is a chi square for trend, which compare all three categories

2.2.2.2. Based on the FANTA/Cornell Questionnaire Method (system of ranking according to the meaning of the questions)

Another analysis of food security for production units was based on the meaning of the questions to which the PU head answered affirmatively (Table 2.8). In other words, this system takes into consideration the picture of food security or insecurity painted by the respondents' answers to the 11 questions in the survey. For the entire sample, 11.9 percent of PUs described no experience with food insecurity and were therefore classified as food secure. Twenty-nine percent of the PUs reported uncertainty and worry about having enough food, which classifies them as moderately food insecure, 34.6 percent reduced their consumption and ate less desirable foods placing them in the food insecure category, and 24 percent were engaged in action that compromise their dignity and their ability to manage risk which placed them in the severely food insecure category. In the original villages, 11.9 percent of the PUs were food secure (no experience with food insecurity), 29.6 percent were moderately food insecure (experienced uncertainty and worry about food), 35.9 percent were food insecure (reduced their consumption) and 22.6 percent were severely food insecure (experiences that compromised their dignity and ability to manage risk). The corresponding percentages in the new project villages are 11.8, 29.6, 33.3 and 25.4 percent for food secure, moderately food insecure, food insecure and severely food insecure categories respectively. Once again, the new project villages appear to have a better food security profile than the original project villages, but the differences were not statistically significant ($\chi^2 = 0.198$, p=0.656[8]).

[8] Chi square for trend

Table 2.8 Percentage of Production Units in Different Categories of Food Insecurity of the FANTA/Cornell System of Ranking based on the Meaning of the Questions, ZFSI Phase II Baseline, May 2005

Food security category	Description	All villages		Original villages		New villages	
		Frequency	%	Frequency	%	Frequency	%
1. Food secure	PUs did not respond affirmatively to any of the questions regarding food insecurity, so they do not appear to be experiencing any level of food insecurity.	97	11.9	49	11.9	48	11.8
2. Moderately food insecure: Experiencing a certain amount of uncertainty or worry about having enough food	PUs are preoccupied about having an adequate food supply. This preoccupation translates into a net reduction in the daily ration for food and by the necessity to purchase at least part of the family's cereal needs.	242	29.6	122	29.6	120	29.6
3. Food Insecure: Reduced consumption or consumed less desirable foods	PUs are experiencing more advanced food insecurity than the preceding category and as a result have reduced the number of meals they eat each day and consume reportedly less desirable foodstuffs.	283	34.6	148	35.9	135	33.3
4. Extremely food insecure: Engaged in actions that compromise their dignity or ability to manage risk (resilience)	PUs suffer severe food insecurity. They are engaged in actions that are considered unacceptable, compromise their dignity, or erode basic assets needed to manage risk (e.g., health, social networks, children's education, livestock reserves, seed stock). Examples of unacceptable behaviors include begging for or borrowing cereals, sending children to other homes to eat, consuming seed stock, or going 24 hours without having a meal.	196	24.0	93	22.6	103	25.4

2.3. Conclusions and Recommendations

2.3.1. Constraints and Opportunities

Each of the two methods (Africare MAHFP and FANTA/Cornell questionnaire) has its strength and weakness as a basis for calculating the two principal food insecurity indicators for the project. The MAHFP requires women to estimate of the quantity of food intake. Since it is not always clear that the women interviewed in the production units use the same criteria for quantity, this is a major source of bias. One source of bias for the FANTA/Cornell questionnaire method stems from the head of the household not being aware of all the survival strategies being adopted (e.g., grain purchases when food stock is exhausted and manipulation of food stocks by women in the household). A strength of the FANTA/Cornell questionnaire method is that it provides a more structured, systematic mechanism for learning about the quantitative and qualitative aspects of food security.

The FANTA/Cornell method using scores classifies food insecurity levels into three categories; the system of ranking by the meaning of the affirmatively answered questions classifies food insecurity levels into four categories. The Africare method of Months of Adequate Household Food Provisioning (MAHFP) results in a continuous variable (number of months) that the project uses to classify the production units into three food insecurity categories. For a wide variety of reasons it is difficult to compare the two classification systems directly. In general, however, there was a high degree of overlap between the most food insecure categories based on the FANTA/Cornell system of ranking by meaning of the question and the most food insecure category using MAHFP (< 3months adequate food provisioning).

One of the major strengths of the FANTA/Cornell classification system was its capacity to highlight the special needs and concerns of the most severely food insecure group (category four in the ranking by the meaning of affirmatively answered questions and score of more than eight in the ranking by score). Another strength of the FANTA/Cornell method of ranking by the meaning of affirmatively answered questions is that it highlights the need for safety nets that can prevent the marginal households in the FANTA/Cornell category three (food insecure) and category two (moderately food insecure) from falling into category four (extremely food insecure) as a result of a personal or local crisis. Once households fall into category four (extremely food insecure), it is unlikely that they can re-emerge without extensive investment in rebuilding basic assets. Unfortunately, the special needs and constraints of this most severely affected group get lost in the more general, and much more expansive, Africare category of "<3 months food insecurity."

2.3.2. Project Monitoring and Evaluation System

Based on this analysis, the team recommends that ZFSI Phase II retain the existing two impact indicators in the project IPTT and the existing Africare method for calculating them (Months of Adequate Household Food Provisioning). For the sake of clarity,

however, the formulation of Impact Indicator 1.2 should be changed from "percentage decrease in the 3rd category of food insecurity" to "percentage of insecure PUs (> 3 months insecurity)" (Table 2.9). This indicator could be compared to category three of the FANTA/Cornell questionnaire method based on scores and, more so, to category three and four of the classification based on the meaning of the questions. It is further recommended that:

- The final survey of ZFSI Phase II "re-execute" the FANTA/Cornell questionnaire as a tool for assessing the project's impact on increasing or decreasing the percentage of households in the most chronically food insecure group (category four), which is less visible under the MAHFP classification system; and that
- Africare consider asking the same questions they asked women (as the basis for measuring the MAHFP) to men as well. This wider base would enable the project to get better information on some of the other issues, such as the key factors that affect food availability through non-market and market exchange, in the event of a food crisis.

Given the fact that neither method (MAHFP nor FANTA/Cornell questionnaire) showed any strong statistical difference between the original and new project villages, the team recommends that the baseline, mid-term and final targets be the same for both the original and new project villages.

Table 2.9 Proposed Reformulation of Impact Indicators 1.1. and 1.2 and Their Targets, ZFSI II Baseline, May 2005

Monitoring and impact indicators	Baseline		FY05		FY06		FY07		FY08		FY09	
	OV	NV	OV	NV	OV	NV	OV	NV	OV	NV	OV	NV
Impact Indicator 1.1. Months of adequate HH food provisioning	6.9						7.5				8.5	
Impact Indicator 1.2. Percent reduction in the 3rd category or food insecure (≤ 3 months) to **Impact Indicator 1.2** Percentage of food insecure PUs (> 3 months food insecurity)	53% MAHFP (58.7) Cornell/FANTA methodology based on the meaning of the questions*)						50%				45%	

*Category 3 and 4 based on the Cornell/FANTA categories based on the meaning of the items. 33.3 category 3 and 25.4 category 4=58.7. See Table 2.8.

Chapter Three
Strategic Objective One:
Enhancing and Protecting Livelihood Capacities

Karim Souli and Abel Abga

Crop and livestock production are the cornerstones of the Zondoma's food production system. Any long-term strategy to improve food access must promote new higher yielding technologies (seed and organic and mineral fertilizers), as well as improved soil management. In the absence of improved water harvesting and soil erosion control, it is unlikely that farmers' investment in new higher yielding technologies will pay off. These activities are inextricably related to livestock production since many of the most useful soil management practices require animal traction. Livestock are also one of the most important sources of recurrent income and on-farm "savings." Irrigated farming is important both as a source of year-round vegetables and counter season produce that can be either consumed or sold for cash, which can then be used to purchase basic cereals.

Given the critical role that rainfed and irrigated crop and livestock production play in determining both the availability and access to of food, the activities supported under Strategic Objective One focus on achieving three Intermediate Results (IRs):

- IR 1.1: Improved agricultural technologies;
- IR 1.2: Improve households' access to water for agricultural production; and
- IR 1.3: Improved livestock production.

3.2. IR 1.1: Improved Agricultural Technologies

One important role of the baseline study was to characterize the local rainfed crop production systems (in terms of labor force, land, and equipment) and to demonstrate the link between these characteristics and agricultural productivity for the original and new project villages.

3.1.1. Characteristics of the Local Production Units

3.1.1.1. Labor Force

The survey results showed little meaningful difference between the original and new project villages in terms of the average size (e.g., number of households [see Box 3.1 for definition]) or structure of the local production units (PU) (Table 3.1). The main distinctions were in terms of:

- A higher percentage of production units in the new project villages reported hosting family members who were (in most cases involuntarily) repatriated from *Cote d'Ivoire* (38.6 versus 31.7 percent), possibly because of the greater overall levels of economic opportunity in these villages; and

- Slightly lower levels of average illiteracy among the production unit heads in the original project villages (76.2 versus 78.5 percent), which was attributed to the ZFSI Phase II village-level literacy programs.

Box 3.1 ZFSI Definition of Production Unit (PU) and Household (HH)

Production Unit (PU) was defined as a group of persons who work on the same field, use the same production means and share farm outputs. A PU can be made of one or several households (HH).

Household (HH) was defined as a man, his spouse (or spouses) and children.

Table 3.1 Characteristics of Production Unit Labor, ZFSI Phase II Baseline, May 2005

Characteristics	Original villages	New villages
Production Unit Characteristics		
Average age of PU leaders	51.1	51.5
Average number of HH per PU	2.2	2.1
Average size of PU (persons)	17.5	16.4
Average number of active persons[1] per PU	7.1	6.8
Ratio of total number of PU residents to number of active persons per PU	2.5	2.4
Average number of active persons per PU who migrated in the last six months	0.7	0.6
Village Characteristics		
Percentage of production units with heads who are illiterate in either French or More	76.2	78.5
Percentage of households that report receiving repatriated family members from *Cote d'Ivoire*	31.7	38.6

3.1.1.2. Land Tenure, Plant Disease, and Soil Quality

The local land tenure system does not appear to be a major limiting factor on production. Eighty-one percent of the PUs reported farming land to which they have land rights (i.e., were not farming "borrowed" land that could be reclaimed); 78 percent of PUs indicated that they have the opportunity to expand the total land area that they farm. The average land area per PU was 9.2 ha in the original project villages and 10.2 ha in the new project villages. Of the 22 percent of PUs that indicated that they did not have the possibility of extending their fields, less than half indicated that this was due to their inability to gain land rights. Other constraints on land area expansion were lack of labor (30-36 percent) and advanced soil degradation (20 percent) (Table 3.2).

[1]For the purposes of the baseline, an "active" person was defined as a person who is able to work an entire day in the fields.

Table 3.2 Percentage of Production Units Citing Different Reasons for their Inability to Extend Farm Area, ZFSI Phase II Baseline, May 2005

Indicators	Type of villages	
	Original villages	New villages
Percent of PUs who cannot extend farm	21.5	22
Reasons for inability to extend farm area		
Lack of property (% of PU)	45.3	51.6
Level of advanced degradation (% of PU)	20.5	20.5
Lack of labor (% of PU)	30.6	38.6

Striga hermontheica: Far more important than land tenure (access) as a constraint were the extensive effects of *Striga hermontheica.* Eighty-eight percent of the PUs reported *Striga hermontheica* on an average of 1.6 ha per PU in the new project villages; on average, PUs reported abandoning 0.7-0.8 ha of land due to *Striga* infestation (Table 3.3).

Table 3.3 Land Condition and Tenure Characteristics of Production Units, ZFSI Phase II Baseline, May 2005

Indicators	Type of villages	
	Original villages	New villages
Percent of Pus who own their collective farm	81.4%	80.9%
Percent of Pus whose farm is affected by *Striga*	88.5%	87.6 %
Total area (ha) affected by *Striga*	628	612
Average area (ha) per PU affected by *Striga*	1.6	1.6
Percent of PU who abandoned their farms because of *Striga*	87.8%	88.6%
Total area (ha) abandoned because of *Striga*	293	287
Average area abandoned (ha) per PU because of *Striga*	0.8	0.7

Soil type: Six native soils types have been identified for the project area. These soils differ greatly in their resistance to periodic drought (Table 3.4). Over half the family fields in the project villages are located on the sandy, gravely clay soils that are characterized by coarse-texture, low moisture-holding capacity, and low nutrient-holding capacity (63 and 57 percent in the original and new project villages respectively). With good soil amendment these soils can be very productive in a year of good to average rainfall. They are, however, extremely vulnerable to drought.

One major difference between the original and new project villages is that a higher percentage of households in the new project villages have access to low land, clay soils that are the most resistant to drought (46 percent versus 37 percent of PUs in the new and original project villages respectively).

Table 3.4 Characterization and Repartition of Soils, ZFSI Phase II Baseline, May 2005

Local name of soil type (Moore dialect)	Soil texture	Characteristics	Percentage of PU reporting soil type	
			Original villages	New villages
Bolley	Silty	Fine-textured, medium moisture-holding and nutrient-holding capacity	47	42
Bessega	Sandy	Coarse-textured, drains easily, lower moisture-holding capacity, lowest nutrient-holding capacity, subject to wind and water erosion	53	42
Zenguendega	Sandy & gravelly clay	Coarse-textured, drains easily, low moisture-holding capacity, low nutrient-holding capacity	63	57
Baogo	Clay	Fine-textured, high moisture-holding and nutrient-holding capacity, poor drainage	37	46
Besbolley	Sandy clay	Coarse-textured, medium moisture-holding capacity	10	13
Kalem kalme	Mixture of all textures	Depends on proportion of constituents	5	10

3.1.1.3. Animal Traction

Access to animal traction equipment is a critical factor that affects the PU's willingness and ability to invest in the types of rainfed water harvesting practices that are needed to build and stabilize yields on the sandy gravely soils that characterize Zondoma Province.

In the new project villages, 85 percent of the PUs in the original project villages have access to at least one traction animal versus 80 percent in the new project villages . Although the ownership of specific types of animal traction animals was greater in the new project villages (Table 3.5), a slightly higher percentage of the PU in the original project villages reported having access to animal traction equipment through direct ownership, rental, or loans (53.7 versus 48.3 percent of PUs in the new villages).[2] This differential "access" was the direct result of project equipment supply and "social" activities (i.e., community capacity building). Phase I of the project distributed stocks of animal traction equipment (ox-drawn plows, hoes, planting rakes, pesticide application equipment) with an understanding that the poorest households would get priority access.

[2] These numbers include borrowing, and renting, however, a small proportion of beneficiaries are producers that own both equipment and animals. Renting and borrowing in this case is done on certain occasions such as group farming or to improve timeliness of certain critical operations. The most vulnerable constitute the majority of the beneficiaries.

Table 3.5 Percentage of Production Units Owning Specific Types of Animal Traction Animals,* ZFSI Phase II Baseline, May 2005

Type of traction animal	Percentage of PU owning at least One Traction Animal of this Type	
	Original villages	New villages
Donkey	67	77.1
Oxen	30.3	31.2
Horse	13	13.7
Camel	2.2	4.5

*Since some PU own more than one animal, the numbers do not add up to 100%.

Table 3.6 Percentage of Production Units Owning Different Types of Animal Traction Equipment,* ZFSI Phase II Baseline, May 2005

Type of equipment	Percentage of PU owning at least with One Piece of Agricultural Equipment of this Type	
	Original villages	New villages
Cart	46	42
Cattle plow	25	19.5
Donkey plow	59.6	69.3
Hoe	12.6	10.5
Compost pit	75.3	70
Planting rake	37	36.5
Pesticide application equipment	5	3.1

*Since some PU own more than one piece of equipment, the numbers do not add up to 100%.

3.1.1.4. Characteristics of the Local Cropping Systems

3.1.1.4.1. Adoption of improved crop production technologies

Any long term effort to improve crop productivity in Zondoma Province requires the investment in a combination of rainfed water harvesting /anti-erosion measures and higher yielding inputs (fertilizer, improved seeds). One major impact of the project has been to shift the local development paradigm of government and farmers from a seeds alone solution to a strategy that combines higher yielding seeds with improved agronomic practices. ZFSI's demonstration trials and extension messages emphasize that in the absence of complementary rainfed water harvesting/anti-erosion measures, the farmers' cash investment in yield increasing inputs (e.g., improved seed and fertilizer) is unlikely to be justified. This emphasize on an "integrated" approach is reflected in the project's methodology for calculating Monitoring Indicator 1.1: Percent of adoption of improved agricultural techniques. A farmer is considered to be practicing "improved agricultural techniques" if, and only if, he/she has met the following three criteria: (1) implements rainfed water harvesting and/or anti-erosion measures, (2) applies mineral or organic fertilizer; and (3) routinely uses improved seeds. Based on this three-pronged definition, the percentage of farmers having adopted improved agricultural techniques is 19.6 percent in the original project villages and 9.6 percent in the new project villages.

Anti-erosion: Anti-erosion land improvements help reduce water run off and permit a better use of the existing water by plants. The most common techniques are rock lines (*cordons pierreux*), *zai,* and half moons (Table 3.7). Other less common techniques

include improved plowing, scarification, plant barriers (tree hedges), and mulching (Table 3.7). Although the data reflect a larger area of land dedicated to these techniques overall in the original than the new project villages, this difference was not statistically significant (5.7 ha versus 5.3 ha per PU) (Table 3.7).

Table 3.7 Average Land Area Dedicated to Specific Anti-erosion Techniques per Production Unit, ZFSI Phase II Baseline, May 2005

Technique	Average area (ha) per PU	
	Original villages	New villages
Rock lines	1.1	1.2
Zaï	2.8	2.6
Half-moons	0.4	0.1
Combination of rock lines and Zaï	1.0	1.2
Combination of rock lines and half-moons	0.2	0.2
Others*	0.2	0.2
Total	**5.7**	**5.3**

* Improved plowing, scarification, plant barriers (tree hedges), and mulching.

Organic and mineral fertilizer: The average use of mineral and organic fertilizer per production unit was slightly higher in the original than new project villages (Table 3.8). This difference is attributed to ZFSI's promotion of organic and mineral fertilizer during Phase I. In either case, the differences are significantly below the recommended levels of 5000 kg/ha of organic fertilizer and 15 kg/mineral fertilizer per hectare per year.

Table 3.8 Average Application of Organic and Mineral Fertilizer per Production Unit, ZFSI Phase II Baseline, May 2005

Type of fertilizer	Average application (kg)			
	Original villages		New villages	
	Per PU	Per ha	Per PU	Per ha
Organic fertilizer	2,963	516.2	2,603	491.1
Mineral fertilizer (NPK*, Urea Phosphate)	65	11.3	48	9.1

* NPK stands for nitrogen, phosphate and potassium

Improved seeds: Reportedly, an average of 0.8 hectors per PU are planted with improved seeds in the original project villages compared to an average of 0.3 hectors in the new project villages. For both the original and new project villages, two of the most widely disseminated new varieties of seeds were peanuts and the *wanki* variety of sorghum. Although rates of adoption of improved seeds were slightly higher in the original than the new project villages, the global rates of adoption were minor (0.8 out of 9.2 ha planted, and 0.3 ha out of 10.2 ha planted in the original and new project villages respectively (Table 3.9). This finding confirms the much stronger emphasis being placed on facilitating farmer's access to improved seed varieties during Phase II of the project. Specifically, ZFSI Phase II is in the process of developing a collaborative agreement with the national agriculture research institute (INERA) to promote the development of small-scale commercial seed producers in the region.

Table 3.9 Average Area of Improved Seed Use per Production Unit, ZFSI Phase II Baseline, May 2005

Type of improved seed	Average area (ha) per PU	
	Original villages	New villages
Sorghum (*Wanki* variety)	0.9	0.3
Cowpea	0.4	0.2
Peanut	2.3	1.5
Sesame	0.1	-
Pearl millet (*Bogoya* variety)	1	-
Other (including okra and red roselle)	0.5	-
Total	**0.8**	**0.3**

3.1.1.4.2. Improved technical production capacity

One major impact of the project's first phase was a substantial increase in the number of PUs in which a family member has benefited from technical agricultural training during the last three years. The two most important sources of the technical training are:

- *Formal group training:* (26.2 and 14.1 percent of PUs in the original and new project villages respectively); and
- On-site training in connection with the project-sponsored demonstration trials of new crop varieties, weed control, anti-erosion techniques, and organic fertilizer) (39 and 22 percent of the PU in the original and new project villages respectively.

Table 3.10 Percentage of Production Units for which Least One Family Member has Benefited from Specific Types of Technical Training, ZFSI Phase II Baseline, May 2005

Training topics	Percentage of PUs trained	
	Original villages	New villages
Anti-erosive techniques	90.6	82.5
Improved land tillage techniques	41.4	34
Crop protection techniques	20.7	29.5
Environment protection techniques	25	14.5
Others	15.4	27.1

*Note: Since many PU have one or several individuals who have attended more than one session, the numbers do not add up to 100%.

These high rates of formal group and on-site training have helped accelerate the rate of technology adoption in the 40 original project villages. This is important since these villages were specifically chosen because they have traditionally been some of the most isolated in terms of technological assistance. Sixty-six percent of the households in the original project villages report that they successfully introduced at least one new agricultural technology during the last three years versus 60 percent in the new project villages. The most successful project- facilitated technologies in the original villages were planting in lines and use of improved seed (Table 3.11).

Table 3.11 Percentage of Production Unit Heads that Report having Introduced a New Agricultural Technology* in the Last Three Years, ZFSI Phase II Baseline, May 2005

Type of technology	Percentage of PUs that successfully introduced technology	
	Original villages	New villages
New variety	14.3	8.5
Anti-erosive technique	46.2	43.3
Soil fertilization	38.3	33.4
Straight line planting	34.5	24.7
Others	5.4	6.1

*Note: Since many PU introduced more than one, the numbers do not add up to 100%.

3.1.1.5. Characteristics of the PU Production Systems

3.1.1.5.1. Field type: Subdivision of the PU production system into individual and family fields

Most production units in the ZFSI project are described as overlapping units of production and consumption that share a residence.

- *Family fields:* Refers to the fields that are under the direction of the head of the PU and are usually farmed by the entire production unit. The head of the PU dictates the types of crops to be cultivated on these fields, the timing of operation, and the use of the products. For example, grain produced on family fields is usually allocated to feed the PU family members. Any monetary income from the sale of food or cash crops from the family fields is usually controlled by the male PU head.
- *Individual fields* (*beolgo*)*:* Refers to fields that are worked by individual persons or the PU's component households.[3] Any crops or money income produced on a private field are under the control of the person responsible for its cultivation, and these crops are stored separately. The food from these individual fields plays an important role in the family food supply as well.

Between 38-39 percent of the average land area per PU was classified as individual fields with the remaining 61-62 percent classified as family fields (Table 3.12).

[3] Every individual in a PU has the right to cultivate a certain amount of land for his/her own personal needs. Wives have the right to farm at least one plot of a food grain, one or two plots of peanuts or *voandzou*, and at least one vegetable patch. Unmarried children usually farm one parcel of grain or a cash crop. Sub-household groups composed of married sons/brothers or widows/divorcees with their children often work a certain amount of food and cash crops separate from the main cooperative fields (see McMillan 1986 for additional references on the subdivision of land tenure and production rights within Mossi households).

Table 3.12 Subdivision of Production Unit fields into Family and Individual Fields ZFSI Phase II Baseline, May 2005

Type of farming	Total area (ha)		Average area (ha) per PU and % of the average total field area per PU	
	Original villages	New villages	Original villages	New villages
Family	2,487	2,808	5.6 (61%)	6.4 (62%)
Individual	1,540	1,618	3.6 (39%)	3.8 (38%)
Total	**4,027**	**4,426**	**9.2 (100%)**	**10.2 (100%)**

3.1.5.2. Crop Production on Different Field Types

Sorghum and millet are grown equally on individual and family fields (Table 3.13); some of the secondary crops, such as cowpea, *voandzou*, peanuts, and sesame are heavily concentrated (but not exclusively grown) on individual fields (Table 3.14).

In spite of the technology advances made during Phase I of the ZFSI Project, total cereal production per PU is still slightly higher in the new project villages than in the original project villages (Table 3.13): 1,620 kg versus 1,490 kg per PU.

Table 3.13 Total and Average Production Unit Cereal Production on Family and Individual Fields, ZFSI Phase II Baseline, May 2005

Type of farm	Total production (kg)		Average production (kg) per PU	
	Original villages	New villages	Original villages	New villages
Collective	497,700	562,700	1,120*	1,270
Individual	160,400	151,800	370	350
Total	**658,100**	**714,500**	**1,490**	**1,620**

Table 3.14 Total and Average Production Unit Production of Other Food Crops on Family and Individual Fields, ZFSI Phase II Baseline, May 2005

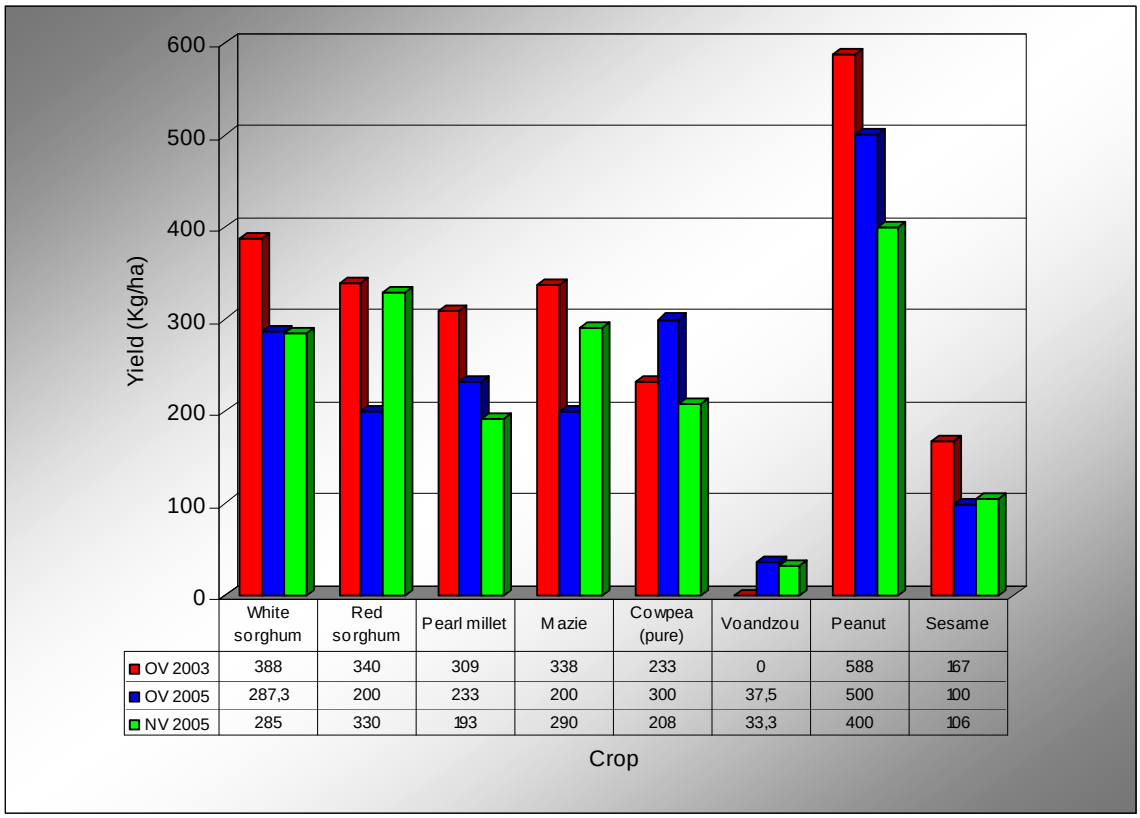
Crop	Total production (kg)		Average production (kg) per PU	
	Original villages	New villages	Original villages	New villages
Collective farm				
Cowpea	84,800	92,221	190	219
Voandzou	110	1,155	37.5	33.3
Peanut	4,560	35,005	100*	80
Sesame	7,630	8,289	20	19
Sub Total	97,100	136,670	348	351
Individual				
Cowpea	47,250	60,936	110	142
Voandzou	2,252	26,260	50	61
Peanut	114,610	116,705	260	269
Sesame	1,310	768	110	100
Sub total	165,422	204,669	530	572
General total	262,522	341,339	878	923

3.1.5.3. Average Yields for the Major Crops

With three notable exceptions—red sorghum, sesame, and maize (corn)—the average yields per hectare that were recorded for the family fields[4] in 2005 are higher in the original than the new project villages (Table 3.15; Figure 3.1). The 2005 yields for the original project villages were also substantially lower than the average yields in 2003 (Figure 3.1).

Small scale irrigated onion cultivation using hand held water cans to distribute water from project created/rehabilitated wells. (photo credit: R. Wilson)

Figure 3.1 Comparison of the Yields of Different Crops in Original Villages (OV) and New Villages (NV) between May 2003 and May 2005



	White sorghum	Red sorghum	Pearl millet	Mazie	Cowpea (pure)	Voandzou	Peanut	Sesame
OV 2003	388	340	309	338	233	0	588	167
OV 2005	287,3	200	233	200	300	37,5	500	100
NV 2005	285	330	193	290	208	33,3	400	106

[4] Average yields were calculated for the family fields only.

Table 3.15 Average Area Planned and Average Yield (kg/ha) of the Rainfed Crops on Family Fields,* ZFSI Phase II Baseline, May 2005

Crop	Average Area (ha) per PU		Average Yield (kg/ha)	
	Original villages	New villages	Original villages	New villages
White sorghum	2.6	3.16	287.3	285
Red sorghum	0.08	0.10	200	330
Millet	1.15	1.27	233	193
Corn	0.26	0.29	200	290
Pure cowpea	0.11	0.13	300	208
Voandzou	0.08	0.09	37.5	33.3
Peanut	0.25	0.20	500	400
Sesame	0.17	0.18	100	106

*Calculations are based on the PU family fields; no individual fields were considered.

3.1.5.3.1. PU head's perspective on the principal constraints affecting crop productivity

Ninety-four percent of the PU respondents stated that their crop productivity was negatively affected by drought in 2005 (Table 3.16). In addition, the new project villages were severely affected by cricket infestations, which attacked the millet crop just as it was flowering, lowering yields (193 kg/ha versus 233 kg/ha in the original villages).

Table 3.16 Impact of Natural Factors and Pests on Crop Production, ZFSI Phase II Baseline, May 2005

Factor	Percentage of PUs affected by the specific factor	
	Original villages	New villages
Drought	94.6	94.2
Pests	8.7	12.1
Lepidoptera larvae	34	23
Coleopteran larvae	37	31
Cantharides (crickets)	22	34
Water-logging	0.9	1.3

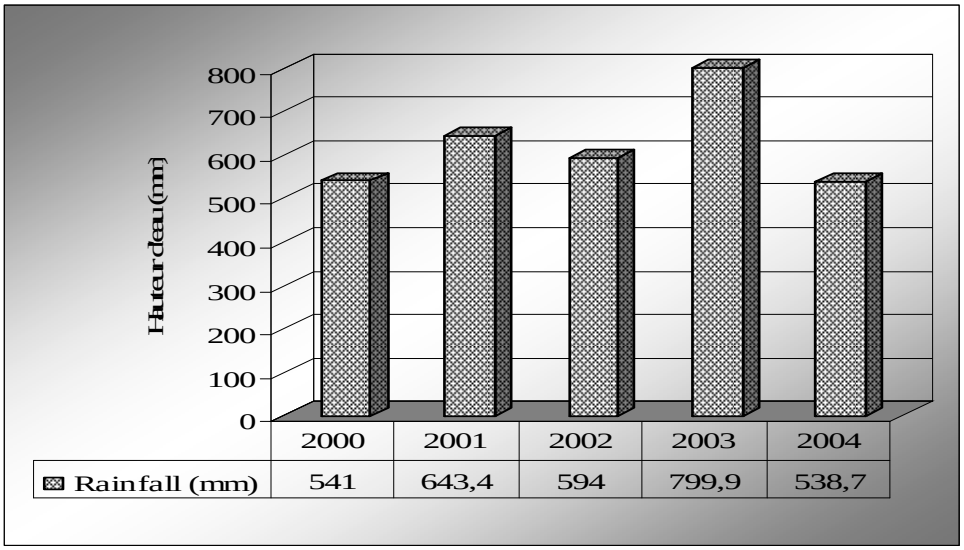
3.1.5.3.2. Link between the PU head's perspective on constraints and regional rainfall data

The PU-level perception on drought being the cause of poor yields coincided with the quantitative data on regional rainfall patterns (Figure 3.2). This data showed that the average rainfall in 2004-2005 was indeed the lowest it had ever been since the project started (Figure 3.2). Nevertheless, it is important to note that rainfall the year before the ZFSI Phase I final survey was only 55.3 mm lower than the total rainfall the year before the ZFSI Phase II baseline, which was 538.7 mm. The difference in rainfall between the two years is not enough to account for the substantial difference in cereal yields and months of adequate household food provisioning between the ZFSI Phase I final survey and the ZFSI Phase II baseline.[5]

[5] The recorded yield in the ZFSI Phase I final survey (May 2003) was 388 kg/ha versus 285 kg/a in the May 2005 ZFSI Phase II baseline; the average number of months of food security was 6.8 months in May 2005 versus 8.4 months during the ZFSI Phase I final survey of May 2003.

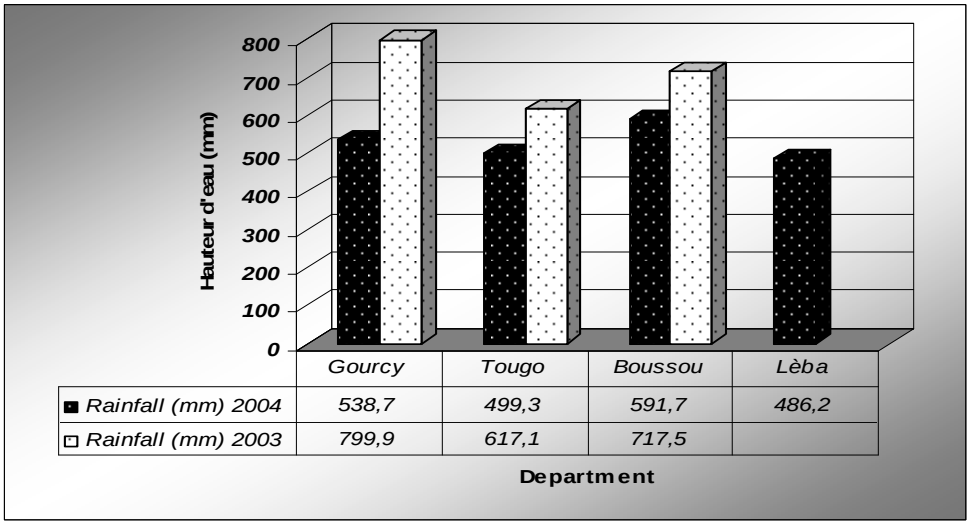
The critical issue in 2004 was not just that the rainfall was lower than normal, but that it was erratically distributed—both between villages (Figure 3.3) and within the season. In certain villages, for example, the rains stopped entirely just as the cereals were flowering. Villages with a higher concentration of drought resistant soils are naturally more resilient. This is the case in the new project villages where 26 percent more PUs have access to drought resistant soils than in the original project villages. Soil conservation strategies that work on one soil type are not necessarily as effective on another soil type. This difference in access to drought resistant soils is a critical difference and needs to be addressed in the design of follow-up extension strategies.

Figure 3.2 Evolution of Rainfall in Zondoma Province during the Last Five Years



Note: *Commas in rainfall (mm) refer to decimal points.*

Figure 3.3 Status of Rainfall during 2003 and 2004 in the Different Departments in Zondoma Province



Note: *Commas in rainfall (mm) refer to decimal points.*

3.2. IR 1.2: Improve Households' Access to Water for Agricultural Production

One important sub-objective of the ZFSI project is to increase households' access to the types of small-scale irrigation that they need to develop mores stable counter-season income earning opportunities from irrigation and lowland cultivation.

3.2.1. Vegetable Gardening Systems

3.2.1.1. Extent of Irrigated Gardening

During the 2004-2005 agricultural season, 16.3 percent of the PU heads in the original project villages and 19.7 percent in the new project villages reported practicing some amount of irrigated gardening. Although a higher percentage of PU heads reported gardening during both the dry and rainy season in the original than in the new project villages (Table 3.17), a higher percentage of households in the new project villages practice irrigated gardening year round (17.8 versus 2.8 percent in new versus original project villages respectively) (Table 3.17).

Table 3.17 Percentage of PUs that Engage in Irrigated Gardening in the Dry and Rainy Seasons ZFSI Phase II Baseline, May 2005

Type of gardening	Percentage of Pus gardening	
	Original villages	New villages
Dry season	88.7	74.4
Rainy season	8.5	7.8
All seasons	**2.8**	**17.8**

These differences can be explained primarily by the hydro-agricultural potential of the villages (Table 3.18). The new project villages have 42.5 ha (11 sites of small irrigated perimeters [PPM or *petit périmètre maraîcher]*) of functioning, small scale irrigated perimeters compared with only 16.3 ha in the original project villages (6 sites). This clearly shows that there are greater opportunities for farmers to practice small scale irrigated farming in the new project villages than in the original project villages.

There are five commercially exploited sites for *bas fond* (lowland) cultivation-the two largest of which (190ha) are located near two original project villages: Tougou and Rassomde (Table 3.18). While this gives the impression that the original project villages have greater access to *bas fond* land this is not the case since both areas are farmed almost exclusively by producers from outside the Zondoma Province.

Table 3.18 Water and Agricultural Potential by Location, ZFSI Phase II Baseline, May 2005

Type of potential	Number of functional units		Total area (ha)	
	Original villages (24)*	New villages (30)*	Original villages	New villages
Small irrigated perimeters (PPM)	11	6	16.3	42.5
Bas fond (lowland) sites being commercially exploited	2	3	190	22

* Number of villages targeted by the survey

3.2.1.2. Irrigated Gardening Production Systems

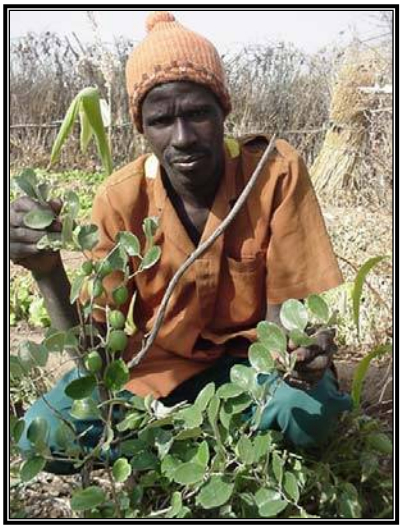
Tomatoes and onions are the most important crops in terms of irrigated area planted (Table 3.19). Onion cultivation is especially important in the original project villages (266.4 m^2 per PU versus 124.8 m^2 in the original versus new project villages respectively). Tomatoes are the predominant irrigated crop in the new project villages (577 m^2 per PU compared to 257 m^2 in the new compared to the original project villages respectively).

Table 3.19 Average Total Area and Area per PU Planted in Different Gardening Crops, ZFSI Phase II Baseline, May 2005

Crop type	Exploited area (m^2)					
	Original villages			New villages		
	# of PUs	Total	Average/PU	# of PUs	Total	Average/PU
Onion	72	19,179	266.4	86	10,730	124.8
Tomato	69	17,743	257.1	85	49,078	577.4
Cabbage	67	3,265	48.7	83	4,590	55.3
Pepper	68	1,785	26.3	82	1,945	23.7
Okra	67	1,060	15.8	82	3,075	37.5
Egg plant	67	795	11.9	82	2,725	33.2
Water melon	67	379	5.6	78	730	9.4
Carrot	67	850	12.7	79	305	3.9
Green beans	67	25	0.4	80	0	0.0
Green pepper	65	75	1.2	80	225	2.8
Potatoes	67	0	0.0	81	1,050	13.0
Lettuce	66	450	6.8	80	175	2.2
Melon	66	0	0.0	80	265	3.3
Total		**45,606**	**653.0**		**74,893**	**886.4**

3.2.2. Fruit Production: Sahel Apples (Grafted Jujube)

Given the extreme climatic variations and rudimentary production technologies that result in lower agricultural yields, it is critical to diversify the crop production systems by encouraging cultivation of drought resistant perennial crops in the higher moisture, lowland areas. One of the best examples of such a lowland crop is the grafted jujube which has become very popular after being introduced in Burkina Faso during the last century. The improved jujube is a variety of fruit tree that was developed through grafting Israeli and Indian varieties onto the local variety—hence the name grafted jujube. Given the project's plans to extend cultivation of this fruit tree under Phase II, the baseline study was interested in assessing the local level of current knowledge about the plant, which is typically planted in the lowland gardens and watered manually. Approximately 31 percent of the PUs in the original



Sahel apples (grafted jujube) introduced by ZFSI during Phase I. (photo credit: R. Wilson)

project villages indicated some basic knowledge of the Sahel apple compared to approximately 19 percent in the new project villages (Table 3.20). The majority of respondents seem to have only heard about the plant; only 3.4 percent of the PU heads in the original project villages and 1.1 percent in the new project villages had actually tasted the fruit. These differential levels of knowledge can be explained by ZFSI's efforts to promote the plant during Phase I through 27 demonstrations in 23 villages and through the organization of many group discussions at the demonstration sites.

Table 3.20 Knowledge of the Sahel Apple, ZFSI Phase II Baseline, May 2005

Level of knowledge	% of PU specific knowledge	
	Original villages	New villages
General knowledge	31.4	19.2
Heard about it	21	16
Seen the plant	16	4.3
Tasted the fruit	3.4	1.1

3.3. IR 1.3: Improved Livestock Production[6]

3.3.1. Average Herd Composition and Size

All but a small percentage of the PU heads[7] raise livestock (2.5 and four percent in the original and new project villages respectively). Poultry are the most common animals (an average of 18-20 head per PU) (Table 3.21). After poultry, the most frequently raised animals are goats, sheep, and cattle. A surprisingly large number of PU heads (69.9 and 79.5 percent in the original and new project villages respectively) reported owning at least one donkey, which is highly desirable as a traction animal. Horses, which are largely considered to be a "prestige" animal (ridden by chiefs) are owned by a small minority (12-13 percent). The total livestock density expressed in TLU (Tropical Livestock Unit) is 6.68 for the original project villages and 7.4 for the new project villages (Table 3.21).

[6] In this section of the report, data were collected from PU heads; however, the survey team suspects that results may reveal data for only the HH of the PU leader since livestock is an ownership system different from agriculture. Each HH has ownership rights to their own livestock and the PU head may not be informed of livestock activities for all component HHs in the production unit. Therefore, all data are analyzed by HH in this section of the report.

[7] These figures are based on interviews with the male production unit heads. Each HH has ownership rights to their own livestock and the PU head may not be informed of livestock activities for all component HHs in the production unit.

Table 3.21 Percentage of PU Heads who Report Owning one or more Head of Specific Types of Livestock and the Average Number of Livestock per PU Head, ZFSI Phase II, May 2005

Animal	Percentage of PU owning one or more head		Average # of livestock units per PU*		# of Units adjusted to tropical livestock unit (TLU) equivalents**	
	Original villages	New villages	Original villages	New villages	Original villages	New villages
Cattle	46.2	47.6	2.64	3.07	2.64	3.07
Sheep	67.1	64.2	6.32	8.79	1.26	1.75
Goat	83.8	86.6	9.58	8.11	1.91	1.62
Swine	10	12.5	0.86	0.84	0.17	0.16
Donkey	69.9	79.5	1.26	1.52	0.50	0.60
Horse	13.6	12.6	0.20	0.20	0.20	0.20
Poultry	82.3	89.9	18.20	20.35	n/a	n/a
Total					**6.68**	**7.4**

* Averages were computes on all PU data
** To calculate livestock density per hectare, the reference animal is a 250 pound bovine. One bovine= one TLU/Tropical Livestock Unit (*Unité Bétail Tropicale* or UBT). Values are adjusted for other animals.

3.3.2. Livestock Management Systems

The analysis of livestock production is based on three levels of technology that are best characterized as extensive, intensive, and semi-intensive (which are based on the level of investment in things such as housing, feed systems and health maintenance). A PU head is considered to have adopted "improved" (e.g., more intensive) livestock technology if he has integrated at least three technologies into his production unit. These three technologies include:

- Improved livestock housing;
- Harvest and storage of animal fodder; and
- Vaccination and de-worming.

With few exceptions, the predominant livestock management systems are extensive. This is equally true for the original and the new project villages and for all animals (Table 3.22).

Table 3.22 Level of Technological Input for Livestock Production, ZFSI Phase II Baseline, May 2005

Animal	Total livestock*		% of the total vaccinated k		% of the total under different management practices l						% of total-de wormed	
					Extensive (% of total)		Semi-intensive (% of total)		Intensive (% of total)			
	OV	NV	OV	NV	OV	NV	OV	NV	OV	NV	OV	NV
Cattle	1,178	1,322	83.9	68.2	46.3	50	48.5	46.9	5.2	3.1	36.6	40.8
Sheep	2,630	2,556	44.3	24.7	57.5	56.2	38.5	40.2	4	3.6	27.9	28.6
Goats	3,182	3,540	30.9	18	61	54.4	37.7	41.6	1.3	4	20.3	18.1
Swine	359	360	17.5	2.7	23.6	55.5	74.4	37.5	2	7	6.6	8.3
Donkeys	504	883	13.8	4.5	52.7	63.5	40.2	32.6	7.1	3.9	28.7	18.2
Horses	73	108	19.1	17.5	43.8	12	43.8	73	12.4	15	28.7	18.5
Poultry	7,489	7,688	59.7	38.3	56.7	62.1	35.3	32.6	8	5.3	16.2	10.7

*Animals identified in the PU interviews

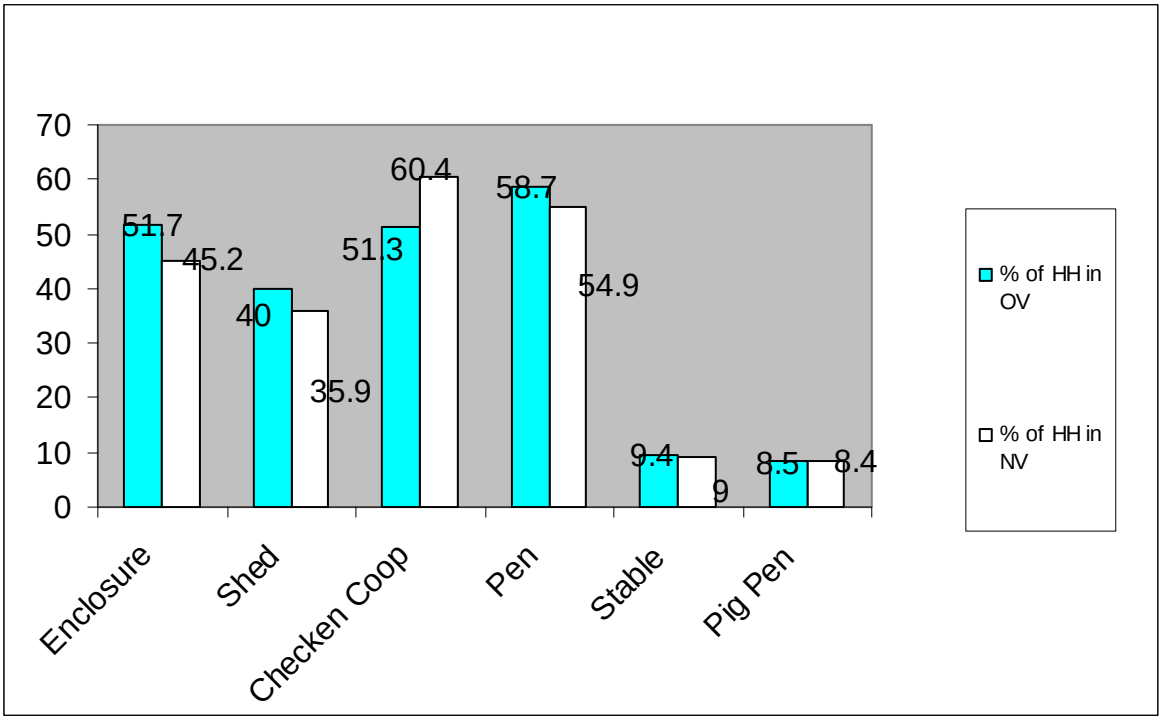
3.3.3. Improved Technology

One role of the baseline survey was to determine the baseline measures for the different livestock technologies related to housing, fodder, and animal health in the original and new project villages.

3.3.3.1. Improved Livestock Housing

The majority of production unit heads reported that they possess some form of livestock shelter (84.9 and 80 percent in the original and new villages respectively) (Figure 3.4). The proportion of PU heads with covered (as opposed to open housing) is substantially higher in the original villages (54 versus 46 percent of PU heads).[8] This higher rate of covered housing is the direct result of Phase I, which made covered livestock housing one of the conditions for having access to the improved livestock technologies that ZFSI promoted during Phase I.

Figure 3.4 Percentage of Production Unit Heads with Specific Types of Livestock Housing, ZFSI Phase II Baseline, May 2005



***Note**: for definitions see footnote below.*

[8] *Enclos*=an area enclosed by a simple fence composed of briars, cut wood, metal fencing or adobe. For the purposes of the study, covered housing (*infrastructure courverte*) is defined any housing with a roof. Improved housing (*infrastructures améliorées*) is defined as housing that corresponds to livestock standards that is covered.

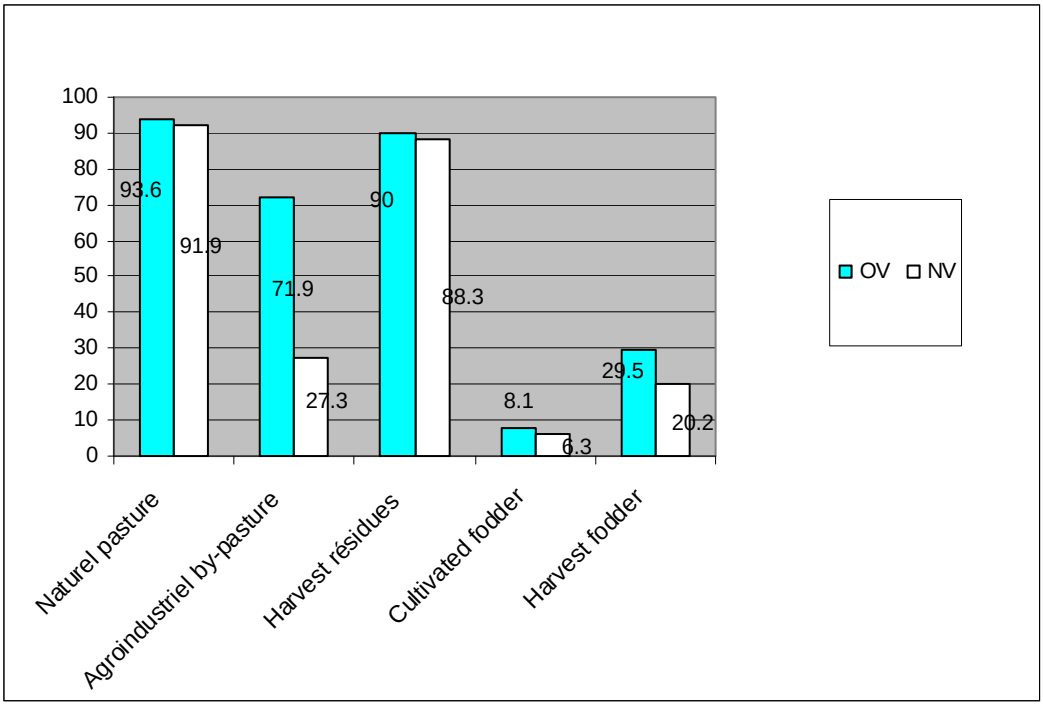
3.3.3.2. Harvest and Storage of Animal Fodder

Improved animal nutrition is critical to the success of improved livestock management. One important activity of the survey was to measure the daily animal feeding practices in order to understanding the available food sources and, therefore, to improve utilization of these food sources through recommendations for sustainable use.

"Improved animal nutrition is critical to the success of improved livestock management." Photo of stall feeding operation in Masbore village. Farmer has received technical assistance and basic materials for building livestock housing. (photo credit: A.Abga)

Natural pasture is the principal source of animal nutrition in both the original and new project villages (Figure 3.5). This is followed, in order of importance, by: harvest residues (e.g., maize and sorghum stalks) (90 and 88.3 percent in the original and new project villages respectively), SPAI (*sous product agro industriel* or agricultural by-products (e.g., cotton seed and sorghum and millet hulls) (71.9 and 27.3 percent respectively), and hay (i.e., harvest fodder) (29.5 and 20.2 percent respectively). The substantially higher rates of agro-industrial by-product use in the original project villages is the direct result of the livestock extension program during Phase I, which emphasized the need for nutritional supplements for cattle.

Figure 3.5 Percentage of Production Unit Heads Using Different Types of Livestock Feed, ZFSI Phase II Baseline, May 2005



Despite ZFSI extension programs to promote the concept, only a few production units reported that they cultivated animal forage (8.1 and 6.3 percent of the PU heads). This was attributed to several factors including:

- Competing demands for labor for food crops during the rainy season;
- Limited access to improved seed due to cost and isolation from the major centers of certified pasture seed production; and/or
- Lack of understanding of the concept.

To address the labor constraint to cultivatng forage crops, the ZFSI project has introduced new technologies for mowing and bailing. These new technologies are currently being used by 10.6 percent of the PUs in the original project villages and 0.8 percent in the PUs in the new project villages.

The fact that many PU heads are still confused about the utility of certain dual purpose varieties (e.g., varieties suitable for food consumption as well as for animal forage) reflects the need for a greater emphasis on extension education to promote fodder production.

The higher rates of fodder collection and storage in the original project villages (53 and 47 percent for the original versus new project villages respectively) is the direct result of the ZFSI Phase I livestock extension program that included promotional demonstrations (Table 3.23).

Table 3.23 Percentage of Production Unit Heads who Ranked a Specific Type of Animal Food as their Principal Source of Feed and Percentage of Households who Reported Adopting One of Three Sources of Animal Food, ZFSI Phase II Baseline, May 2005

Sources of feed	Percentage of households per current feed source	
	Original villages	New villages
Natural pasture	53.7	52.7
Agro-industrial sub-products	3.1	4
Harvest residues	34.9	38.6
Cultivated forage	1.2	0.7
Hay (cut and dried grass)	7.1	4
Total	**100**	**100**
	Percentage of PU who have adopted three sources of animal feed	
Harvest residue, cultivated forage, hay (cut and dried grass)	**53**	**47**

3.3.3.3. Vaccination and De-Worming

Improved access to and use of veterinary services is the third criteria being monitored in the ZFSI system for monitoring adoption of improved livestock management techniques by production units. The proportion of households who reported having "access" to veterinary services in the baseline survey was 62.9 percent in the original project villages and 64 percent in the new project villages. This augurs well for the ZFSI Phase II

programs that will reinforce these services. In addition, there are a number of areas where these services need to be extended to reach a greater number of animals and households.

The current system for livestock health in Burkina Faso renders two levels of services, one managed by the village auxiliary health agents called "village vaccinators" and the other managed by the state veterinary agents (Table 3.24). The baseline survey results suggest that the current levels of attendance are higher for veterinary agents (63 and 64 percent for the original and new project villages respectively) than the village-level vaccinators (37 and 36 percent respectively) (Table 3.24). The lower attendance rates for village level services (compared to veterinary agents) are attributed to an insufficient number of village vaccinators, the government rules that restrict their activities for vaccinating poultry and de-worming other animals, and the remote locations of the village vaccinator veterinary posts. For almost all types of livestock (excluding horses) the highest demand for livestock health services was for vaccination (Table 3.25). In contrast, the priority for de-worming animals varied according to location. The highest demand for de-worming in the original project villages was for sheep, cattle, and goats (24.9, 21.4, and 21.1 percent respectively). In the new project villages the greatest demand was for donkey, cattle, and sheep (24.9, 24.8, and 22 percent respectively).

Table 3.24 Percentage of Production Unit Heads who Use Specific Types of Animal Health Services, ZFSI Phase II Baseline, May 2005

Type of livestock health service	Percentage of households who visit livestock health service	
	Original villages	New villages
Veterinary agent	62.9	64
Village vaccinators	37.1	36
Total	**100**	**100**

Table 3.25 Percentage of Production Unit Heads that Report Vaccinating and De-worming Specific Types of Livestock, ZFSI Phase II Baseline, May 2005

Species	% of households who vaccinate their livestock		% of households in extensive animal husbandry		% of households in semi-intensive animal husbandry		% of households in intensive animal husbandry		% of households who de-worm their livestock	
	OV	NV	OV	NV	OV	NV	OV	NV	OV	NV
Cattle	39.2	34.9	20	21	23.4	23.9	7	5.5	21.4	24.8
Sheep	29	14.7	18.3	36.6	26	26.5	5.6	3.1	24.9	22
Goats	27.1	15.3	52.5	49.6	29.6	32.5	1.9	4.7	21.1	18.1
Swine	2.1	0.9	2.3	5.9	7.5	5.9	0.5	0.7	1.6	2.6
Donkeys	12.1	5.2	32.6	38.3	27.6	32	7.5	6.8	18.6	24.9
Horses	2.1	2.4	4	2.8	6.8	6.8	2.1	2.6	4.2	4
Poultry	53	43.2	50.9	51.2	25.1	29.7	6	3.5	12.6	9.4

3.3.3.2. Training and Capacity Building

A much higher percentage of PU heads reported having been trained in new livestock technologies and management techniques in the original project villages (17.5 in the original versus 4.5 percent in the new project villages). This was almost entirely due to the training programs and on-farm demonstration trials under ZFSI Phase I.

Between seven and 39 percent of the PU heads in both the original and new project villages reported having had some formal training on nine priority themes related to livestock management (Table 3.26). A comparison of the PUs trained with PUs practicing shows that, for certain techniques, there are a larger percentage of PUs practicing than were trained. This suggests that a certain amount of "down stream" farmer to farmer training is taking place. Additional evidence for this farmer to farmer training was revealed when further investigation found that only a relatively small percentage of the farmers who participated in the training courses (ranging from zero to 28 percent) are actually practicing the new technology (right-hand columns, Table 3.26).

Table 3.26 Percentage of Male Production Unit Heads Trained in and Practicing Trained in and Practicing Specific Livestock Production Techniques, ZFSI Phase II Baseline, May 2005

Techniques	% of trained households		% of households practicing		% of households trained and practicing	
	OV	NV	OV	NV	OV	NV
Fattening techniques	28.4	36.8	23	36.8	18.9	15.8
Natural fodder harvesting and storage	26.7	38.9	24	16.7	26.7	27.8
Production of cultivated fodder	23.3	26.3	27.4	31.6	8.2	15.8
Harvest and storage of farm residues	32.4	16.7	20.3	38.9	14.9	22.2
Vaccinations and animal health care	22.2	29.4	27.8	35.3	16.7	23.5
Genetic improvement	12.7	11.8	39.4	52.9	5.6	0
Milk production	7	11.1	40.8	44.4	52.1	0
Egg production	7	11.1	42.3	44.4	2.8	0
Improved livestock housing	31.1	26.3	18.9	36.8	25.7	21.1

3.3.4. Gender Issues in Livestock Production

A high percentage of ZFSI livestock activities during Phase I focused on increasing women's participation in and benefit from more intensive livestock production practices. One major sub-objective of the baseline was to gain a better understanding of what progress had been made for this objective and to extrapolate lessons learned for Phase II.

3.3.4.1. Involvement of Women in Livestock Activities

Part of the livestock questionnaire dealing with women was included in the HH questionnaire that was addressed to women who were mothers of children 24 months of age and under (see Table 1.4 in Chapter One). The data show that 59.2 and 64.8 percent of these female household heads in the original and new project villages respectively reported being actively involved in livestock production.

Women are most extensively involved in the production of short-cycle animals (poultry, sheep, and goats). Their involvement in managing these particular animals is encouraged by the Ministry of Animal Resources, who promotes household revenue development through rapid turnover of small livestock holdings. There is very little difference between the original and new project villages in terms of the types of livestock production in which female household heads are engaged. Poultry are the most frequently raised animals by women (82.6 and 84.5 percent in the new and original project villages respectively) (Table 3.27). Goats are raised by 32.6 percent of the female household heads in the original project villages and 40.5 percent in the new project villages. Sheep are raised by 15.5 percent of female household heads in the original project villages and 14.3 percent in the new project villages (Table 3.27).

Table 3.27 Percentage of Female Household Heads* Involved in Specific Types of Livestock Production, ZFSI Phase II Baseline, May 2005

Species	Percentage of women HH heads involved in livestock	
	Original villages	New villages
Cattle	0.8	1.1
Sheep	15.5	14.3
Goats	32.6	40.5
Pigs	4.7	8.5
Donkeys	0.4	1.1
Horses	1.2	0.7
Poultry	84.5	82.6
Rabbits	1.2	1.8

***Source:** Household questionnaire addressed to women with children 24 months of age and younger as opposed to the production unit questionnaire that was addressed to male production unit heads. The women are referred to as female household heads in the text.

3.3.4.2. Training and Capacity Building

"Despite female household heads' active involvement in livestock production overall, only 4.2 percent and 1.9 percent of the women interviewed…reported benefiting from livestock training." (photo credit: A.Abga)

Despite female household heads' active involvement in livestock production overall, only 4.2 percent and 1.9 percent of the women interviewed in the original and new project villages respectively during the baseline survey reported benefiting from livestock training. Of the women who were trained, a higher percentage of women who received training in the original than the new project villages are actually using the training (Table 3.28). This is especially true for techniques such as vaccination and animal health care (55.6 versus 25 percent in the original versus new project villages respectively), the collection and storage of harvest residues (44 versus 37.7 percent in the original versus new project

villages respectively), and housing improvements (45 versus 10 percent in the original versus new project villages respectively).

A comparative analysis of the training figures for the male PU heads and female household heads highlights that in the original project villages a higher percentage of female trainees reported practicing specific techniques for which they received training than male production unit heads that received the same training. For the original project villages the specific techniques for which this is true follow (Tables 3.26 and 3.28).

- *Animal housing improvements:* Forty-five percent of female trainees reported practicing this technique compared to 26 percent of male PU trainees.
- *Collection and storage of harvest residues*: Forty-four percent of female trainees reported practicing this technique versus 15 percent of male PU trainees.
- *Animal health and vaccinations:* Fifty-six percent of female trainees reported practicing this technique versus 17 percent of male PU trainees.

Table 3.28 Percentage of Female Household Heads* Trained in and Practicing Specific Improved Livestock Production Techniques, ZFSI Phase II Baseline, May 2005

Techniques	Percentage of women trained		Percentage of women practicing		Percentage of women trained and practicing	
	OV	NV	OV	NV	OV	NV
Fattening techniques	22.2	33.3	5.6	22.2	16.7	11.1
Natural fodder harvesting and storage	33.3	33.3	5.6	22.2	27.8	0
Production of cultivated fodder	16.7	37.5	5.6	25	11.1	0
Harvest and storage of farm residues	27.8	65.5	5.6	0	44.4	37.7
Vaccinations and animal health care	11.1	25	11.1	25	55.6	25
Genetic improvement	5.9	25	5.9	12.5	11.8	0
Milk production	11.8	12.5	5.9	25	0	0
Egg production	11.1	25	5.6	25	16.7	0
Improvements in livestock housing	5	20	15	40	45	10

***Source:** Household questionnaire addressed to women with children 24 months of age and younger (as opposed to the production unit questionnaire addressed to male production unit heads).

3.4. Conclusions and Lessons Learned

3.4.1. Major Constraints and Opportunities

Based on this comparative analysis of the prevailing cropping and livestock systems in the original and new project villages, the team developed a number of preliminary conclusions about constraints that had been insufficiently understood or under appreciated in the original design for Phase II.