BASELINE SURVEY REPORT
HOUSEHOLD FOOD SECURITY, AGRICULTURE, HEALTH AND EMERGENCY PREPAREDNESS AND RESPONSE IN MOPTI AND GAO REGIONS OF MALI

Consortium for Food Security in Mali (CFSM)
"Nema" Program

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LIST OF ABBREVIATIONS

AE: Agro-enterprise

ARI: Acute Respiratory Infection

CRS: Catholic Relief Services

CEWS: Community-level Early Warning System

DHS: Demographic and Health Survey

EWS: Early Warning System

FANTA: Food and Nutrition Technical Assistance Project

FAO: Food and Agriculture Organization

FFP: Food for Peace

GoM: Government of Mali

HAZ: Height for Age Z-score

HDDS: Household diet diversity score

HIV: Human Immunodeficiency Virus

HKI: Helen Keller International

IPTT: Indicator Performance Tracking Table

Kcal: Kilo-calorie

M&E: Monitoring and Evaluation

MAHFP: Months of adequate household food provisioning

MOH: Ministry of Health

MYAP: Multi-Year Assistance Program

NCHS: National Center for Health Statistics

PPS: Probability Proportional to Scale

PVO: Private Voluntary Organization

SAP: Système d'Alert Précoce

SPSS : Statistical Package for the Social Sciences

SYAP: Single-Year Assistance Program

TBA: Traditional Birth Attendant

USAID: United States Agency for International Development

US-FSSM: United States - Food Security Survey Module

WAZ: Weight for Age Z-score

WHO: World Health Organization

WHZ: Weight for Height Z-score

EXECUTIVE SUMMARY

A baseline survey was conducted in the Douentza (Mopti) and Bourem (Gao) Circles of Mali prior to the program intervention of Catholic Relief Services (CRS), Helen Keller International (HKI) and Save the Children's multi-year assistance program (MYAP). The general objective of the baseline survey was to assess the household food security situation of households in the targeted areas. The specific objectives were to assess the food security situation of the households, households' agricultural livelihoods, including access to and use of financial services, the health and nutritional status of under five children and their mothers, the factors associated with the nutritional status of the under five children, and households' ability to prepare for and respond to natural and man-made shocks.

Data collection was conducted between October 10 and November 12, 2008. The study collected data from a cross-section of households in randomly selected MYAP and non-MYAP villages in Douentza (Mopti) and Bourem (Gao), including children aged 0-59 months. Focus group discussions with village members were also conducted to provide more information on community infrastructures related to agriculture, education and health, as well as community response mechanisms to prepare for and respond to natural and man-made shocks. A classic two-stage cluster sampling design was used to collect the data used in this survey and to cover most of the indicators to the level of precision required. Strategic objective one (SO1) data was collected by household questionnaire, 1070 of which were completed in total, including 723 MYAP households. With regard to health and nutrition, the total sample size was 1766 children aged 0-59 months across 977 households in 43 villages in two regions (33 in Mopti and 10 in Gao). Data collection included several methods such as: household questionnaires, interviews of mothers with children less than five years of age; anthropometry assessments (weight and height) of children between 0 and 59 months; and a village-level focus group discussion. Villages were randomly chosen by agro-ecological zone in each district. Within each village, households were randomly chosen to participate in the interviews. If several women had children less than 59 months in the household, then the mothers were also randomly chosen. Interviews were carried out by trained enumerators in the respondents' houses.

The characteristics of the communities differed according to the two regions (Mopti and Gao). In general, however, the communities were isolated and were poorly provided with

basic services. Communities in Douentza (Mopti) were located in one of two agro-ecological zones: on hilly or mountainous terrains or in open plains. All communities had difficult access to potable water, with limited access to markets, agricultural and financial services. Only 12 percent of communities had access to a paved road, with the average distance to a paved road at 43 km. Access to health services was also poor.

In general, households are characterized by low levels of education, with the primary income sources including small-scale (subsistence) farming, livestock-raising and casual labor. In general, housing structures were temporary (straw) and semi-permanent (*banco*), with low levels of household assets. Wells are the primary source of drinking water, which was reported by 37.2% of households. The proportion of households reporting using private or community latrines was 48.4%.

Eighty-one percent of all households in the sample reported that they had at least one month between October 2007 and October 2008 during which they were unable to meet the food needs of the household. The number of months of adequate household food provisioning (MAHFP) between October 2007 and October 2008 was 8.83 months across all villages. This was slightly higher among households in MYAP villages as compared to those in non-MYAP villages, but the difference was not statistically significant at conventional levels. The most difficult months for a majority of households were July, August and September, coinciding with the "hungry season" *(soudure*) in Mali. Nevertheless, it is important to note that the 2007 harvest was considered to be the third consecutive "good" year experienced by both regions. Therefore, the MAHFP suggests that, even during good years, a majority of households suffer from seasonal food insecurity.

The average household dietary diversity score (HDDS) was 6.3 for all households, suggesting that household members consumed at least 6 of the 12 food groups in the previous 24 hours. There is not a statistically significant difference between MYAP and non-MYAP villages.

There were 1,763 children less than five years old involved in the study. Among the children aged 6-59 months old across the MYAP program area, the prevalence of wasting and stunting was 18.3%, and 35.6%-- respectively. For children aged 0-59 months, the prevalence of underweight was 32.2% – varying by age group. The rate of malnutrition appears lower among the youngest children from 0 to 6 months old. The prevalence of acute respiratory infections -- measured as cough, difficult breathing, and short/rapid breathing-- was 13.6%,

2.5%, and 1.2% respectively. Twenty-five point one (25.1) percent of children had suffered from diarrhea in the previous seven days, and 28% of mothers in the survey area went to the health center to treat the illness. Twenty-two point four (22.4) percent of children aged 0-6 months were exclusively breastfed and 31.4 percent of mothers introduced complementary foods in a timely manner.

The primary staple food crops in the area are millet, sorghum and rice, with rice playing a more important role in the Bourem (Gao) region. The primary cash crops are cowpeas and groundnuts. Average production levels for all crops are higher in the MYAP (as compared to non-MYAP) villages, although the difference is not statistically significant for most crops. Sixty-eight percent (68%) of all households use at least three (3) sustainable agro-enterprise technologies, although this is primarily concentrated on organic manure, animal vaccination and storage, rather than improved seeds, fertilizers, phytosanitary treatment or irrigation. Of these, 70.2 percent of all households surveyed use market information before they decide to sell, but this is primarily for livestock; only 14.6 percent of households collect market information for cash crops.

Ninety-four point one (94.1) percent of villages surveyed had been affected by a shock (natural or man-made) over the course of the past year, with the highest percentage of these shocks being drought and pest infestations. Fewer (13%) villages were affected by floods. The coping strategies used by households when confronted with such shocks include migration and livestock sales, followed by village-level solidarity and the sale of labor. A smaller number of households sell non-productive assets and consume "famine" foods. About 50 percent of villages have community-level mechanisms in place to respond to such crises, with most of these either part of the early warning system (EWS), the community-level early warning system (CEWS) and the *brigade anti-ravageur* (anti-pest brigade). However, many of these structures are not functional. Only the *brigade anti-ravageur* collects data on trigger indicators for pest infestations.

CHAPTER I

INTRODUCTION

1.1 Background of the Baseline

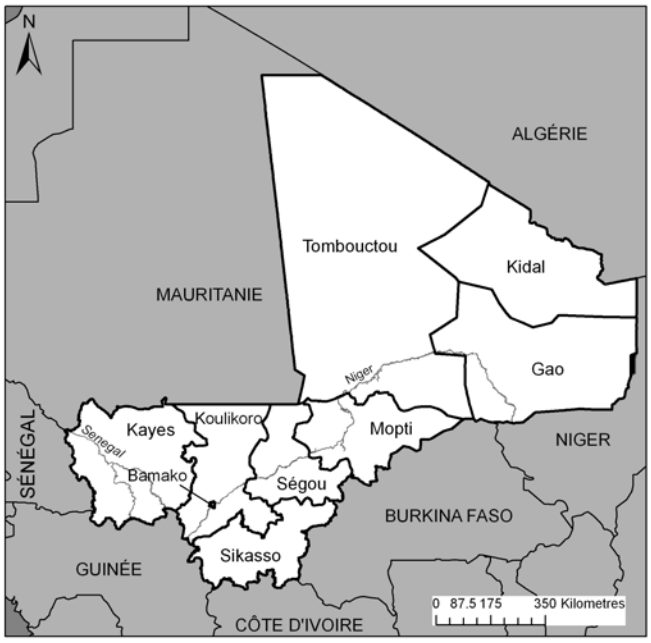

Figure 1.1 Administrative Regions of Mali

Mali is a landlocked country located in the Sahelian region of sub-Saharan Africa, covering 1,241,248 km^2 and approximately two times the size of Texas. The country is bordered by seven countries: Algeria to the north, Niger to the East, Burkina Faso to the Southwest, Ivory Coast and Guinea to the South; and Senegal and Mauritania to the west (Figure 1). It is situated between 11 and 25° latitude. Most of the country is located in the river basins of two major rivers: the Niger and the Senegal. However, the country consists of five primary agro-ecological zones:

- The Saharan zone to the north, with rainfall inferior to 200 millimeters (mm) per year and covering 25 percent of the country
- The Sahelian zone, with average rainfall between 200-700 mm per year and covering 50 percent of the country
- The northern Soudanian zone, with 700-1300 mm of rainfall per year, covering 18 percent of the total surface area of Mali
- The southern Sudano-Guinean zone, covering approximately 6 percent of the national territory and with precipitation between 1300-1500 per year
- The Niger River delta in the heart of the Sahelian region, with flooded plains.

Rainfall is unimodal, with one rainy period between May and September. The terrain is primarily savannah (in the South), rolling plains and high plateaus, mountains or hills (primarily in Dogon area of Mopti) and deserts. Arable land suffers from soil fertility problems, with average annual nutrient depletion of soils estimated at 30-60 kg/hectare.[1]

The population of Mali in 2003 was estimated at 13 million inhabitants, with an average population density of 9 persons per km^2.[2] The country is divided into eight geographic regions (Figure 1). A majority of the population is sedentary (99 percent), with 90 percent Muslim, 5 percent Christian (Catholic) and 5 percent holding traditional beliefs. Mali's population encompasses a number of sub-Saharan ethnic groups, most of which have historical, cultural, linguistic, and religious commonalities. The Bambara are by far the largest single ethnic group. Collectively, the Bambara (36.5 percent), Soninké (8.8 percent) and Malinké (6.6 percent), all part of the Mande language group, constitute more than 50 percent of Mali's population. Other significant groups are the Fulani, or Peuhl (13.9 percent), Sénoufo (9 percent), Dogon (8 percent), Songhai (7.2 percent), Diola (2.9 percent), and Bobo (2.4 percent). In addition, Mali has significant numbers of Touareg (1.7 percent) and Moors (1.2 percent). The primary ethnic groups in the Mopti region are the Dogon, Peuhl and Songhai, whereas the primary ethnic groups in Gao are the Songhai and Touareg.[3]

Agriculture and livestock-raising are the dominant economic activities in the Mopti and Gao regions. The majority of agricultural products in these regions are for household consumption or local sales, including millet, sorghum, rice, cowpeas, cassava and sweet potatoes. *Bourgou*, a wild grain primarily used for animal fodder, is also produced. Production of corn, groundnuts, gombo and oseille is more limited. According to the poverty profile, approximately 78% of the population in Mopti and 48% in Gao live on less than one dollar a day, defined by the World Bank as the threshold for extreme poverty.[4]

Malnutrition among children under five years of age remains a major health problem in Mali. According to the Demographic and Health Survey (DHS), 38 percent of children under 5 suffer from stunting (low height-for-age), with 27 percent of children classified as underweight (low weight-for-height) and 15 percent of children suffering from low weight-for-age[5].

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[1] Hanao, J. and C. Baananante (1999). "Nutrient depletion in the agricultural soils of Africa." *2020 Brief No. 62*, Washington, D.C.: International Food Policy Research Institute,
[2] World Resources Institute (2006). *Earth Trends: Mali*. http://earthtrends.wri.org
[3] US Department of State, *International Religious Freedoms Report: Mali*, 2008.
[4] Government of Mali. 2006. *Profil de pauvreté du Mali 2001*.
[5] DHS, 2006.

Women's literacy rates in Mopti are below the national average (7.5 percent, as compared with 12 percent), while the rate in Gao (14%) is slightly above the national average.[6]

Catholic Relief Services (CRS), Helen Keller International (HKI) and Save the Children are implementing a five-year (2009-2013) Multi-Year Assistance Program (MYAP) in the Douentza (Mopti) and Bourem (Gao) regions of Mali, funded by the United States Agency for International Development (USAID) through Food for Peace (FFP). The program will focus on increasing household access to food through improved agro-enterprise activities, including access to financial services; improving maternal and child nutritional status, including access to potable water and health services; and assisting communities to prepare for and respond to shocks. The goal of the program is to reduce the food insecurity prevalence in vulnerable populations in the targeted villages, with strategic objectives related to improved livelihood strategies, improved health and nutritional status and increased capacity to manage shocks.

The general objective of the baseline survey was to assess the baseline conditions of the population prior to the start of the program, with a particular focus on the indicators included in the MYAP project proposal. In addition, a variety of data on confounding household and community-level factors were also collected. These data will be used to measure progress in the program against targeted outcomes, as well as to make any needed adjustments to the program's implementation design in relation to the baseline situation.

This report presents the results of the baseline survey conducted in the Douentza (Mopti) and Bourem (Gao) *cercles* of Mali between October 10 and November 12, 2008. A total of 977 households and mothers of children under five were interviewed on issues ranging from household food security status, agricultural production and agricultural practices, emergency preparedness and response, and health and nutrition behaviors. Forty-three (43) villages from the two *cercles* were selected to represent the population of the targeted community, including both MYAP and non-MYAP villages.

This report consists of four chapters. Chapter One explains the scope and background of the study, the food security conceptual framework and the methodology for selecting the 130 MYAP intervention villages in Douentza and Bourem prior to the baseline survey. Chapter Two explains the methodology used in the survey. Chapter Three presents the general results emerging from the baseline with respect to community characteristics, household characteristics and aspects related to agriculture, health and nutritional status and emergency preparedness and response. Chapter Four summarizes the findings and general conclusions.

[6] Government of Mali. Enquête malienne sur l'évaluation de la pauvreté (EMEP). 2001.

1.2. Food Security Conceptual Framework

Figure 1.2. provides the food security conceptual framework provided in USAID/FFP's 2006-2010 strategic plan. The model is a modification of the conceptual model outlined in USAID's *Food Aid and Food Security Policy Paper* (1995). As can be seen from this diagram, the USAID/FFP Expanded Food Security Framework is at once a conceptual framework (exploring an issue – food security – and showing the complex relationships between various factors) and a results framework (outlining a hierarchy of interventions and outcomes that lead to an overall goal – food security). The shaded section of the framework represents the part for use in analyzing and understanding the factors related to food security. The food security outcomes in this framework are the same as the three components that have traditionally been used to analyze food security: availability, access, and utilization. However, in USAID/FFP's 2006-2010 Strategic Plan, USAID/FFP developed an expanded conceptual framework to take into account the risk that vulnerable countries, communities, and households have towards food insecurity. This emphasis on risk – implicit in the definition of food security ("at all times") - means that programs aiming to reduce food insecurity must identify potential shocks or hazards and understand how these will impact food insecure households and their ability to cope.

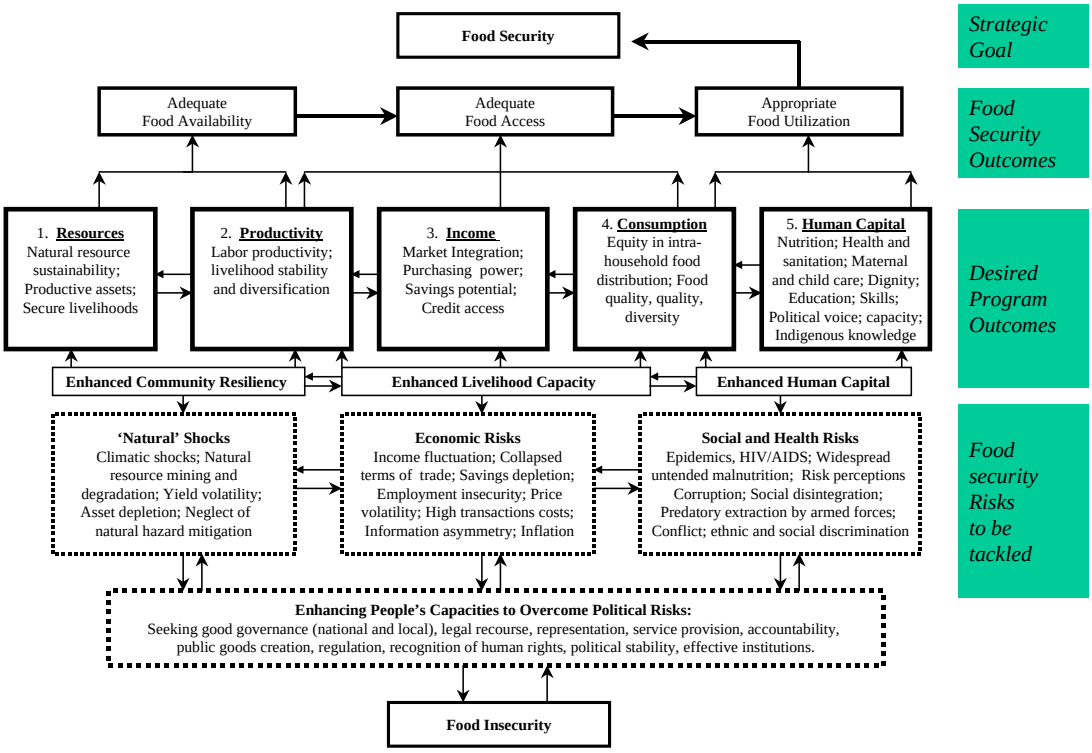

Figure 1.2. USAID/FFP Expanded Conceptual Framework

Ensuring **adequate availability** of food includes production of food, raising livestock, and gathering food that is directly consumed by the household. Food availability is directly influenced by land (including land size and fertility), labor, and other farm inputs (tractors, hoes), and knowledge of effective farming techniques. These, in turn, are influenced by factors such as health status, access to financial services, and education levels. And finally, these factors are influenced by basic social, political and natural factors, including rural infrastructure, the land tenure system, access to agricultural services, and the natural environment.

Increasing **physical and economic access** generally refers to the individual or household's use of its assets to generate income and obtain food, water, and health services. This can include purchase, trade, and barter. Access therefore depends on a household's or individual's purchasing power, which is determined by income levels and prices. These are affected by a household's income-generating activities and remuneration for such activities, in addition to consumer prices. These, in turn, are influenced by factors such as land, labor, access to financial services, health and education status, and intra-household resource allocation and responsibilities. Finally, these are influenced by basic social, political, and natural determinants, including rural infrastructure, microfinance institutions, government policies (such as marketing boards) and road networks.

Improving **utilization** refers to the individual's ability to use food and water in good health. Utilization depends on the stage of life, such as infancy, pregnancy, lactation or presence of illness such as those that inhibit nutrient absorption (such as human immunodeficiency virus [HIV] or intestinal parasites) and those that affect the appetite (such as diarrhea, malaria, HIV, or tuberculosis). Health status is immediately determined by infant and young child feeding practices, the environment, access to safe drinking water, health behaviors and access to basic health services. These, in turn, are affected by factors such as inadequate investment in health and sanitation infrastructure, cultural norms, and ethnomedical belief systems.

Underlying these three components (near the bottom of the diagram) are **natural shocks and economic, social and health, and political risks**. Thus, risk becomes a critical and underlying pillar of food security. While these shocks and risks can negatively impact availability, access, and/or utilization, if they are identified and mitigation or prevention actions are undertaken, these managed risks can actually protect and strengthen food security.

1.3. Selecting the Villages Participating in the Nema Program

Prior to the implementation of the baseline survey in October 2008, CRS, HKI and Save the Children engaged in a participatory process with technical staff, local partners, and governmental representatives to identify and select the 130 villages that would participate in MYAP activities (the "Nema" project) between 2009 and 2013.

Before selecting the villages, the MYAP consortium staff consulted the criteria outlined in the approved Title II project proposal as a basis for selection, including: 1) location in a highly vulnerable commune, as determined by the Government of Mali (GoM); 2) high rates of malnutrition; 3) identified gaps in service provision; 4) proximity to a functional health center; 5) proximity to a source of potable water (or commitment by a complementary agency to provide it); and 6) level of motivation of village committees. In addition, the private voluntary organizations (PVOs) considered whether the community had already received support from CRS, HKI or Save the Children from a previous project, in order to build upon existing investments. The Consortium members also included additional criteria for the village selection process, including: the village population; potential for agro-enterprise activities; and village accessibility (a question both of terrain and security concerns).

A list of all villages in the Douentza and Bourem *cercles* were made, and data were collected for each village on each one of the criteria outlined above. The data were included in a matrix, and points were allocated for each criterion. The number of points for each village (in terms of whether they fulfilled the criteria or not) were calculated. The villages were then ranked according to these points.

On September 17-18, 2008 the Consortium members hosted a workshop in Douentza with more than 30 representatives from the GoM, including local authorities, technical services, and national-level representatives from the *Commissariat à la Securité Alimentaire* (Annex 1). Participants reviewed the criteria, examined the initial ranking of all villages and then engaged in a process of validation. This process was used to identify the final list of 130 intervention villages for the MYAP, with 100 villages in Douentza and 30 villages in Bourem (Annex 2).

CHAPTER II

BASELINE SURVEY METHODOLOGY

The study is based on survey data collected by CRS, HKI and Save the Children, in collaboration with the external consultants from Tufts University (USA) and the University of Bamako (Mali) for the implementation of the baseline survey. Data was collected between October 10 and November 12, 2008. Intense preparation for the survey took place in the weeks preceding the data collection phase and involved discussions about the common questionnaire, the type of study design; design of the sampling methodology; design of field instruments and survey logistics.

2.1. Study Design and Population Under Study

There are four types of evaluation designs that can be used in the baseline and final evaluations of Title II Programs. These evaluation designs appear in Table 2.1.

Table 2.1. Types of Design Approaches for Title II Programs[7]

Table 1: Types of designs	No Control Groups	Control Groups
Determinants and Confounding Factors not considered	Type I (Adequacy, Pre-Post)	Type II (Plausibility)
Determinants and Confounding Factors Considered	Type III (Plausibility)	Type IV (Plausibility)

The approach of the data collection for this MYAP baseline (and hence the final evaluation) is Type II, a "pre-post evaluation" with control groups and without confounding factors. Consequently, the baseline collected data on MYAP indicators in both MYAP and Non-MYAP villages. This approach implies that the same villages and perhaps populations will also be surveyed at the end of the project.

2.2. Study Area

The study was conducted in the *cercles* of Douentza (Mopti) and Bourem (Gao) regions of Mali, in which the MYAP will be active in 130 villages. The study's universe consisted of a total of 285 villages in both cercles, which had met the criteria for participation in the MYAP during the village selection process at the start of the project. Of these 285 villages, 130 were ultimately selected

[7] Food and Nutrition Technical Assistance (FANTA) Project, 2006.

for participation in the project, based on a ranking and participatory selection process which took place before the baseline survey began.

2.3. Sampling

A classic two-stage cluster sampling design was used to collect the data used in this survey. Primary clusters were villages, selected using Probability Proportional to Size (PPS). Secondary units were households within the villages. To determine the sample size for the baseline, the survey team addressed the following questions:

- Step 1. What is to be measured? Variables and indicators
- Step 2. At what level of precision?

The first step in determining the sample size consists in selecting a variable on which to base the sample size calculations. A list of the outcomes was made and the key indicators that are most demanding from the sampling point of view and most important from the project's point of view were selected. Then the most feasible from logistical and cost standpoints were chosen from the indicators with largest number. This ensures that the sample size will be adequate for the key indicators, and that the best possible estimations for the more demanding indicators will be ensured, taking available resources into account (Magnani 2002).

The indicators selected on which to base the sampling calculations were the nutrition indicators for children between 0-59 months: stunting (height-for-age), wasting (weight-for-height), undernutrition (weight-for-age) and exclusive breastfeeding. The final calculation was primarily based upon the wasting indicator. This choice is appropriate as: 1) malnutrition rates among young children in the population is arguably the highest-level outcome that may be affected by a food security project; and 2) this indicator puts relatively high demands on statistical proof, resulting in a sample size that is much higher than other comparable indicators. In other words, the choice of this indicator ensures that the demands made by most other outcomes will be satisfied by the final sample, while maintaining costs at an acceptable level, since sampling for stunting remains within reasonable bounds.

The second step in deciding the sample size is to use the following formula to compare two proportions:

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

Where $z_{1-\alpha/2}$ is the Z-score for level of significance in a two sided test, $z_{1-\beta}$ is the Z-score for power of the test, P_1 is estimated proportion at baseline, P_2 is estimated proportion of the indicator at some point in the future, and P is average proportion of baseline and end line. The level of significance used in this study was 95%, thus the score of $z_{1-\alpha/2} = 1.645$ and the power of the study was 90% ($z_{1-\beta}$ is 1.282).

There are several pieces of information required to calculate the sample size based upon this formula. This includes: 1) the number of measurement units in the target population; 2) the initial or baseline level of the indicator; 3) the magnitude of change or comparison group differences expected to be reliably measured; 4) the level of statistical significance, and; 5) the degree of statistical power.

Based upon the original Indicator Performance Tracking Table (IPTT) included in the Title II proposal document, the program expects a reduction of at least 4 percentage points in the prevalence of stunting and 4 percentage points in the prevalence of undernutrition among children 6-59 months (from 35.2% to 31.2% for stunting and 30.8% to 26.8% for underweight) over the five years of intervention programs implementation. The calculation of sample size based upon nutritional status indicators is summarized on Table 2.2.

Table 2.2. Sample Size Calculations Using Nutritional Status Indicators

No	Indicator	$z_{1-\alpha/2}$	$z_{1-\beta}$	P1	P2	Sample size of children under 60 months
1	Stunting	1.645	1.282	0.37	0.33	2556
2	Underweight	1.645	1.282	0.34	0.30	2445
3	Wasting	1.645	1.282	0.28	0.24	2161

The above computations let us know how many sample elements (children) need to be contacted to measure changes/differences in key indicators. As can be seen from the calculations in Table 2.2., the sample size required for the nutritional status indicators ranges from 2,161 children (if the wasting indicator is used) to 2,556 children (if the stunting indicator is used). In light of the time frame of the baseline survey (immediately after Ramadan and prior to the annual harvest, when food security and nutritional patterns change considerably) and cost considerations for the survey, the NGOs opted to use a lower sample size, targeting approximately 2,161 children under the age of 60 months.[8] However, because not all households will have a member who fits into the category

[8] These calculations were made using the IPTT in October 2008. Since that time, the PVOs have made modifications to the IPTT.

indicated in the indicator (e.g., children under 60 months), the number of households will differ from the number of children. The next step, then, is to convert the sample size requirements expressed in terms of elements into a sample size expressed in terms of households. Based upon the demographic structure of Mali, a household conversion factor of .6 was used. This leads to a total sampling size of approximately 1,400 households and 2,445 children.[9]

Based upon this sampling frame, 43 villages (MYAP and non-MYAP) were chosen across the Douentza and Bourem circles, with thirty-three villages in Douentza and ten villages in Bourem. The list of these villages is provided in Table 2.3.

[9] It should be noted that the key sample size for consideration is the number of children under 60 months (0-60 months), since the indicator is based upon nutritional status. The number of households (based upon a household conversion ratio) is a benchmark for achieving the number of required children. However, the benchmark of 1,400 households depends upon a variety of factors, including household fertility and the number of children under 5, timing of the survey and cost considerations (FANTA 1998). The final sample size was 1,070 households and 1763 children, slightly below the target sample size using the underweight indicator. However, this falls within the range for the nutritional status sample size calculations.

Table 2.3. List of Districts, Communes and Villages in the Baseline Survey

	Commune	VILLAGE	MYAP or non-MYAP
Douentza (Mopti)	**Dallah**	Barkoussi	MYAP
		Boumbam	MYAP
		Siguiri	MYAP
		Torobani	MYAP
	Debere	Débéré	MYAP
		M'Boundoukoly	MYAP
	Koubelwel Koundia	Mougui	MYAP
	Dangol Boré	Boré Bambara	MYAP
		Doumbara	MYAP
		Adioubata	MYAP
		Amba	MYAP
	Haïré	Pringa	Non-MYAP
		Banaga	Non-MYAP
		Toupere	MYAP
		Nissinata	MYAP
		Tabi	MYAP
		Tega	MYAP
	Dianweli	Beni	Non-MYAP
	Gandamia	Kikara	MYAP
	N'Djaptodji	Ségué	Non-MYAP
		Samanguiré	Non-MYAP
		Pédia	Non-MYAP
		Sénoré	Non-MYAP
		M'Béba	Non-MYAP
		Zoumboutta Sidibé	Non-MYAP
		Kossiné	Non-MYAP
		Tambeïni	Non-MYAP
		N'Gouma	MYAP
	Korarou	Goui	MYAP
	Kerena	Kerena	MYAP
	Douentza	Koumbena	MYAP
	Petaka	Alabengouma	Non-MYAP
		Petaka	MYAP
Bourem (Gao)	**Téméra**	Téméra	MYAP
		Chéoui	MYAP
		Gaminakoïra	Non-MYAP
	Bamba	Kermachoué	MYAP
		Bamba	MYAP
		Bahondo	MYAP
	Bourem	Baria	MYAP
		Malahia	Non –MYAP
		Kouroumina	Non-MYAP
	Taboye	Ouani	MYAP

The villages were first separated into agro-ecological zones and MYAP and non-MYAP zones for each region. Villages were then randomly selected using a random table. Twenty-five households within each village were chosen to participate in the survey, also by random selection.

2.4. Indicators, Survey Tools and Questionnaire Design

One particular feature of this survey is that three PVOs – including CRS, Save the Children, and HKI – are together implementing the same program with funding support from USAID in two separate regions of Mali. As such, the baseline survey was carried out during the same period of time in the program areas, and a joint survey instrument was developed in order to compare the impact results across regions at the end of the program cycle.

In preparing the MYAP program document, the three PVOs agreed to a set of common indicators for the strategic objectives related to livelihoods, health and nutritional status and emergency preparedness and response. These indicators are provided in the final version of the IPTT in Annex 2.

In 2007, USAID/FFP issued two Information Bulletins (FFPIB 07-01 and FFPIB 07-02) on monitoring and reporting requirements for new Title II proposals (Single-Year Assistance Programs [SYAPs] and MYAPs).[10] One of the most important elements of these Information Bulletins was the mandatory use of standard impact and monitoring indicators for specific sectors in MYAP project proposals. The relevant sectors include health and nutrition, household access to food (agriculture, agroentreprise, microfinance), early warning and response systems, physical infrastructure, safety nets and capacity building.[11]

Based upon the indicators included in the MYAP proposal document, the evaluators held a three-day workshop with CRS, HKI, Save the Children and Caritas/Mali in Bamako, Mali to discuss the indicators, the data that needed to be collected and the types of survey instruments to use. The workshop participants decided to use four different survey tools across four groups in the targeted areas. These included a household survey questionnaire, a questionnaire for mothers with children

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[10]Information Bulletin FFPIB 07-01 summarized the M&E reporting requirements for MYAPs. This includes FFP/Washington's Performance Management Plan (PMP) indicators, USAID Mission indicators, including indicators for the President's Initiative to End Hunger in Africa (IEHA), and the "F" indicators. Only the PMP indicators are required in the MYAP project proposal as part of the country program's IPTT. However, these indicators have already been incorporated into the required standardized indicators outlined in FFPIB 07-02. Country programs can ensure that they are meeting these reporting requirements by using the standardized indicators and by working with the local USAID missions while developing the MYAP proposal.

[11] USAID/FFP. (August 2007). Information Bulletin FFPIB 07-02. *Memo on New Reporting Requirements for FFP.* http://www.usaid.gov/our_work/humanitarian_assistance/ffp/fy08_ffpib_new_reporting.pdf

under five, a village-level focus group questionnaire, and anthropometric measurements of children aged 0 to 59 months. A summary of these instruments is provided in Table 2.4.

Table 2.4. Variable Indicator Matrix of the Study

No.	Variable	Indicator	Methods of assessment	References
1	Socio-economic & demographic condition	Demographic condition includes: number of household members, no. of children under five years of age in the household, head of the household, educational level and composite index of socio-economic status, which include: type of housing, ownership of good	Household questionnaire	Gross et al, 1997
2	Food security	HDDS and MAHFP	Household questionnaire	FANTA 2006, FANTA 2007
3	Agricultural production and techniques	Levels of agricultural production Agroenterprise techniques used Financial resources Financial assets	Household questionnaire	
4	Environmental condition & personal hygiene	Availability of safe drinking water Availability of latrine facilities Usage of latrine Hand washing practices Households using community or private latrines Safe point use of water	Mother questionnaire	Gross et al, 1997
5	Nutritional status	WAZ, WHZ and HAZ-score for children <5 yrs *Stunting among children 6-59.99 mo* *Underweight among children 0 -59.99 mo*	Anthropometric measurement	Gibson, 2005
6	Health services & Health seeking behavior	Availability of health services The use of health service Antenatal care	Mother questionnaire	Gross et al, 1997
7	Shocks	Types of shocks Types of coping strategies used Type of physical infrastructure to mitigate shocks	Household and focus group questionnaire	Bickel et al, 2000
		Community-level early warning systems Community-level monitoring of trigger indicators	Focus group questionnaire	Usfar, 2002

The instruments were initially prepared in French, with key terms discussed in Peuhl, Songhai, Dogon and Tamashek. The instruments were then field-tested in Douentza with all three PVOs and partner staff, including Caritas/Mali and Tassaght. Several reviews were conducted by PVOs and partner staff prior to the finalization of the questionnaire to ensure that it was applicable to use in different areas of the country where program activities would be carried out. The final set of the questionnaires used is included in the Annex of the report.

2.5. Structure of Field Operations

Staffing. To minimize costs and maximize efficiency, the baseline survey used a combination of external researchers, PVO staff, local partner staff, and temporary staff. Two external consultants worked closely with CRS and Save the Children staff to develop the sampling methodology and questionnaires, train enumerators, conduct field-tests, provide field coordination, analyze the data and write the reports. Experienced team supervisors from CRS and Save the Children oversaw the fieldwork in Douentza and Bourem. The CRS/Mali and Save the Children Monitoring and Evaluation (M&E) Managers were also present during all phases of the survey to ensure coordination between field sites. Ten temporary recruited staff (who were experienced with similar surveys) were trained in survey techniques and hired as enumerators and as anthropometric measurers.

The training of enumerators lasted four days. The enumerators and supervisors were trained in all aspects of the survey and the mechanics of taking standing height and recumbent length measurements and the weight of children. The field supervisors were also trained on the anthropometric procedure. There were several practice sessions at the training site during which standardization tests were performed on standing heights and weights. Field trials were conducted on the last day of training. These field trials gave the team the opportunity to simulate the survey under field conditions and also provided data used to fine tune instruments and procedures.

Logistics. Each enumerator was theoretically expected to complete five interviews per day on average. The supervisors checked all completed questionnaires on a daily basis. The supervisors were also in charge of completing the community module. The external researchers spent time in each survey area working with the coordinators and supervisors to ensure overall coordination and data quality.

2.6. Procedure of Data Collection

Data collection included several methods as described below:

1. Interviews with household heads

A structured, pre-tested questionnaire was used during the interview. It included questions on social demographic characteristics, socio-economic conditions, environmental conditions, agricultural production, household assets, agricultural practices and coping strategies. Interviews were carried out by trained enumerators in the respondents' houses.

2. Assessment of food security status

Household food security status was assessed by using the standardized questions for household dietary diversity score (HDDS) and months of adequate household food provisions (MAHFP). This questionnaire was attached to the core household questionnaire.

3. Interviews of mothers of children under five years of age

A structured, pre-tested questionnaire was used during the interview. It included questions on personal hygiene, feeding care, health status of children under five years of age and health seeking behavior. Interviews were carried out by trained enumerators in the respondents' houses.

4. Anthropometry assessment

Anthropometry assessment included measurement of body weight and height (or length for children < 2 years old) children under five years of age. The measurement was carried in the individual's house or in a meeting place in the village. The measurement procedures were as follows:

Weight was measured by using the electronic SECA 770 flat form scale. The scale was positioned on a flat surface and the starting point was set to zero. Children who could stand on the scale were asked to stand in the center of platform (without slippers and with light clothing), look straight ahead and stand relaxed but still. The body weight was recorded to the nearest 0.1 kg. Children who could not or did not cooperate to stand on the platform were weighed by weighing the mother first and then the weighing scale was re-set up to zero and mothers were asked to hold the child. Then the child's weight was read on the scale (Gibson, 2005).

Height was measured by using microtoise. The head-bar then was raised above the height of the subjects. Subjects took off their shoes and stood on a flat surface below the point of attachment. They stood straight with their head positioned so that the Frankfurt plane is horizontal, feet together, knees straight, and heels, buttocks and shoulder blades against the wall. Their arms were hanging loosely at the sides with palms facing the thighs. The head-bar was then lowered until it touched the crown of the head and compresses the hair. A direct reading of height to nearest 0, 1 centimeter was obtained[12].

Length. The length was measured for children less than two years or children who could not stand on their own by using wooden length board. It was set on a horizontal flat surface and

[12] Gibson, 2005.

the child was laid down with the head positioned exactly against the headboard facing upward. The subject's feet were without shoes, the knees were kept straight, and toes pointed directly upward. The movable footboard contacted firmly with the heels and the measurement was read to the nearest 0.1 cm[13].

5. Focus Group Discussion (FGD)

Focus group discussions were carried out in all villages in the study area. FGDs covered topics on food security such as the problem of food availability and how mothers perceived the food aid program, sanitation and hygiene, breast-feeding and complementary feeding and also the access and usage of the available health services. FGDs were moderated by the principal and co-principal investigators and the data served to complement and enrich the information obtained from the quantitative data. Data used to calculate indicators for SO3 were based on these focus group discussions, which explains the large 95% confidence intervals that can be found on the IPTT.

2.7. Statistical Analysis

Data entry and analysis were performed by using SPSS. Anthropometric data was transformed into Z-scores (weight for age [WAZ], height for age [HAZ] and weight for height [WHZ]), with the z-scores of the children compared to the National Center for Health Statistics (NCHS) reference and the WHO Child Health Standards. Table 2.5 shows the cut-off criteria for classification of nutritional status.

Table 2.5. Cutoff Criteria for Classification of the Nutritional Status of Children < 5 Years

No.	Variable	Classification	Cutoff point	Reference
1.	WAZ (Weight-for-Age Z-score)	Normal	≥ -2 SD of standard	WHO (2005)
		underweight	< -2 SD of standard	
2	HAZ (Height-for-Age Z-score)	Normal	≥ -2 SD of standard	
		Stunting	< -2 SD of standard	
3	WHZ (Weight-for-Height Z-score)	Normal	≥ -2 SD of standard	
		Wasting	< -2 SD of standard	

[13] Gibson, 2005.

The data analysis was carried out after data was cleaned. Normality of data was checked by visual inspection and the Kolmogorov-Smirnov test. For the analysis, the continuous variables were described by central tendency (mean or median) and their deviation (standard deviation or minimum to maximum value), while categorical variables were described by frequency distribution. Relationship between variables (bivariate analysis) was done using several tests such as Chi-square or Fisher's exact test for categorical variable.

CHAPTER III

RESULT & DISCUSSION

3.1. Community Characteristics

A total of 33 villages were visited in Douentza and 10 villages in Bourem, including MYAP and non-MYAP villages in each region. The topography of villages varied from one village to the other, ranging from plains, flooded plateaus, hilly terrain and semi-desert.

Community access to public services was low. Only 12 percent of villages were accessible by a paved road; the rest were accessible via rural trails or laterite roads. The average distance to a paved road (for those villages without access) is 43 km, ranging from 1 to 240 km. This varies considerably by Douentza and Bourem; average distance to a paved road was 24 km in Douentza whereas average distance in Bourem is 110 km.

Only 18 percent of villages in the survey had a market in the village; the average distance to the nearest market was 9 km, ranging from 1 km to 34 km. The average distance implies that households would need to walk 1.5 hours to reach the nearest market. Unlike the distances to the nearest paved road, distances to the nearest market were only slightly longer in Bourem (11 km) as compared to Douentza (8.7 km). The distance to the market affects households' access to a diversified food supply, as well as farmers' ability to sell their crops in the market.

The general level of community services was also poor. Only 40 percent of villages had a school, with 27 percent having a literacy center. Twenty-seven (27) percent of villages also had a functional health center. However, specialized health services were much further away; most hospitals and private doctors were available only in capital cities of the district and the immediate surrounding areas.

Only 13 percent of villages had access to radio reception, either from their own village or a nearby village. However, 70 percent of villages reported having cell phone coverage. Villages in Bourem had much higher cell phone coverage (85 percent) as compared with Douentza (67 percent), although access to radio reception was fairly equal across both regions.

These findings showed that the villages in Douentza and Bourem are generally isolated and were poorly provided with basic services. Most communities were located in hilly or mountainous terrains where water was difficult to get. Access to commercial (i.e. market) and agricultural services was insufficient, with distance compounding the poor road access. Access to health services was also poor. Access to communication services (radio) was fairly low, although increasing in terms of cell phone coverage, with much higher access in Bourem.

3.2. General Description of the Survey Population

Based upon the sampling frame, the team sought to weigh and measure approximately 2,445 children from the ages of 0 to 59 months. In the final sample, there were 1,763 children 0 to 59 months from among 1070 households. Approximately 1/3 of the households sampled from each district were from non-MYAP villages.

3.2.1. Characteristics of the children

Table 3.1. shows the general characteristics of the children by *cercle* (Douentza and Bourem). In general, there is no statistically significant difference in the distribution of children's ages across the *cercles*.

Table 3.1. General Characteristics of the Children

Characteristics of the children	Douentza		Bourem		Total
	MYAP	Non-MYAP	MYAP	Non-MYAP	
Gender/sex (%)					
Male	46.2	49.9	48.4	46.0	47.3
Female	53.8	50.1	51.6	54.0	52.7
age (months)					
Median	26	26	26	25	26
min-max	1 - 59 months	1 - 59 months	1 - 59 months	1 - 54 months	1 - 59 months

3.2.2. General characteristics of the households

Most of the households in the sample areas were male-headed households, with female-headed households averaging 5 percent. The mean number of household members was 11.13, with slightly larger households in Douentza (12) as compared with Bourem (10). Household sizes were slightly higher among Dogon households, with an average household size of 13.2 members. The number of children under five years of age in each household ranged from 1 – 3 children; in both regions, 20 percent of the population consists of children under 5. Approximately 25 percent of household heads had received some type of education, with a large and statistically significant difference between Bourem and Douentza; approximately 43 percent of household heads in Bourem had some type of

instruction, as compared with 14 percent in Douentza. However, among those who had some level of instruction, the level of education was fairly low; over 40 percent did not complete primary school (less than three years of schooling) and 35 percent attended Koranic school. Only 3.6 percent of household heads had attended literacy training. The UNESCO definition states that a minimum three years of uninterrupted schooling is required for a person to achieve a sustainable level of reading and writing ability[14].

Table 3.2 Household Socio-Demographic Characteristics[15]

Household Characteristics	Douentza	Bourem	Total
Female-headed household (%)	4.5	10.0	5.0
Household size	12.1	10.2	11.6
Ethnicity (%)			
Peuhl	40.0	2.8	31.0
Dogon	33.0	0.0	26.0
Songhai	9.0	85.0	25.0
Rimaibe	12.0	1.0	9.5
Tamashek	0.5	10.0	2.3
Bella	2.5	0.5	2.0
Bambara	2.9		2.0
Other	0.5	0.5	1.0
% of population children under 5	19.8	19.5	19.8
Household head with some education (%)	14.8	43.0	25.2
Level of education of household head (%)			
Coranic school	33.4	40.4	37
Primary school (incomplete)	47	33.6	41
Primary school (complete)	8.5	13.2	10.6
Secondary	4	4.7	4.3
Superior	0.7	0.7	0.7
Literacy course	4.5	2.5	3.6
Total number of villages	33	10	43
Total number of houseolds	730	231	961

3.2.3. Socio economic characteristics of the households

[14] Gross, et al., 1997.

[15] The categories of "*Rimaibe*" and "*Bella*" are officially considered to be part of the Peuhl and Toureg ethnic groups, respectively. Both groups are former slaves within these broader ethnic groups. However, during the household interviews, Rimaibe and Bella households considered themselves to be a distinct group. In addition, the Rimaible have different and distinct livelihood strategies as compared with the Peuhl ethnic group. For this reason, these two classifications are included separately in Table 3.2.

Agriculture is the primary income-generating activity for most household heads in the area (30.3 percent), followed by livestock-raising (26.6 percent) and commerce (11.5 percent). Few household heads obtained their revenues from artisanal work, remittances, or as public servants (all less than 5 percent). The source of revenues was similar across Douentza and Bourem, except in two areas: a higher percentage of household heads were engaged in commerce in Douentza (12.2 percent in Douentza, as compared with 8.8 in Bourem). In addition, more household heads were engaged in fishing in Bourem (9.3 percent, as compared with 4 percent in Douentza).

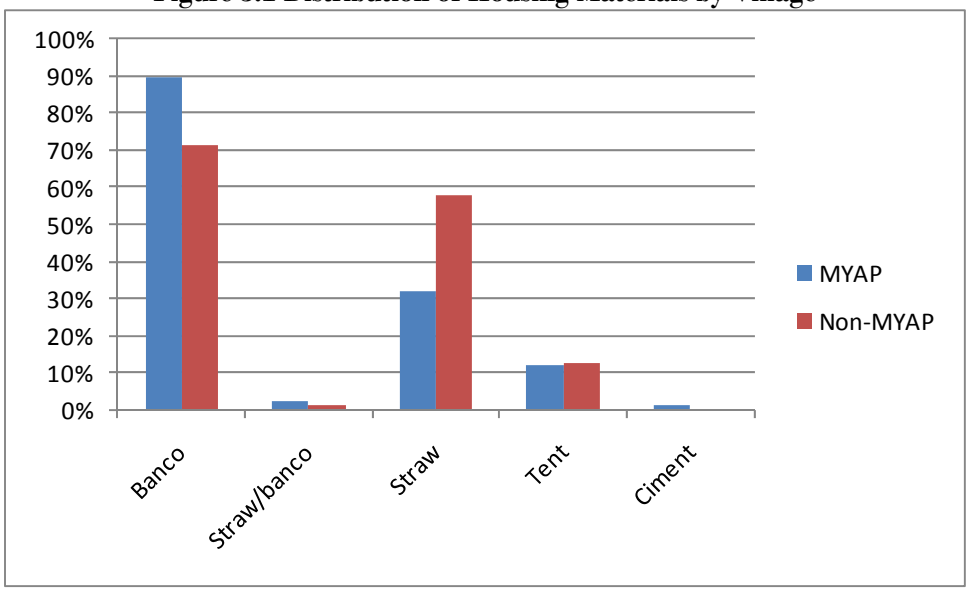
Twenty-six point seventy-five (26.75) percent of households stated that agriculture was a primary source of revenue for other household members, followed by livestock (22 percent), commerce (12 percent), paid domestic work (6 percent) and remittances (4.75 percent). Eight percent of households in the survey had at least one family member who had migrated in the course of the past twelve months, with a slightly higher percent in Bourem (10.7 percent) as compared to Douentza (7.3 percent).

Portable telephones, one of the luxury items assessed during the survey, were owned by 32 percent of the households in the sample, with a higher percentage in MYAP villages. Approximately 65 percent of households owned radios, 35 percent owned bicycles and 35 percent owned animal carts. Motorbikes were only owned by 14 percent of the population, with a higher percentage in MYAP villages. Other electronic appliances – such as televisions or solar batteries -- were not common in the survey area. This was easily understood, as very few villages had access to electricity.

Table 3.3. Proportion of Ownership of Household Goods

Household Goods	MYAP	Non-MYAP	Total
Telephone	33%	26%	32%
Radio	67%	61%	65%
Bike	46%	8%	36%
Motorbike	18%	4%	14%
Cart (donkey, horse, etc)	39%	25%	35%
Television	7%	6%	7%
Total number of households	704	273	977

Figure 3.1 Distribution of Housing Materials by Village



A majority of the houses in the survey area are made of *banco* (83 percent), followed by straw (38 percent) and tents (11 percent). Very few households had houses made completely of straw or cement (less than 2 percent each). Figure 3.1 shows the distribution of housing materials by MYAP and non-MYAP villages. A higher percentage of houses in non-MYAP villages were made of straw, whereas a higher percentage of houses in MYAP villages were made of banco. These differences are statistically significant, although there was no statistically significant difference in the percentage of households living in tents. The average number of houses per household was 1.75, ranging from a minimum of 1 to a maximum of 4. House ownership was not statistically different across MYAP and non-MYAP villages.

3.3. Food Security Situation of the Households.

Food security is an essential, universal dimension of household and personal well-being. The deprivation of basic needs represented by food insecurity and hunger are undesirable and lead to nutritional, health and developmental problems. Monitoring food security can help to identify and understand these basic aspects of well-being of the population and to identify population subgroups with unusually severe conditions. Traditional income and poverty measures do not provide clear information about food security.

Based upon USAID/FFP's 2007 guidance, the baseline collected data on two food security indicators: MAHFP and HDDS. The guides developed and field-tested by the Food and Nutrition Technical Assistance Project (FANTA) include a set of food security questions in a core module in

order to develop two food security indicators. The MAHFP is expressed as the number of months during which the household had adequate food over the course of the past 12 months (from any sources, not just from own agricultural production); it therefore ranges from 0 to 12. This question was asked of the household interview respondent (male or female). The HDDS is a score (also ranging from 0 to 12) that summarizes the number of food groups (out of 12) that the household consumed over the course of the previous 24 hours[16][17]. This question was posed to any individual (male or female) in the household who had prepared the meals for the household in the previous 24 hours. The modules for these indicators are provided in the questionnaire; additional information on calculating these indicators is provided by FANTA.

Table 3.4. Number of Months of Adequate Household Food Provisioning and Household Dietary Diversity[18]

Indicators	MYAP		Non-MYAP		All	Differen Means
	Mean	S.D.	Mean	S.D.	Mean(s.d.)	Coef
Were there months in 2007/2008 where your household didn't have enough to eat? (% reflect "yes" answers)	79%	0.41	86%	0.4	81%(.39)	7.4%
Number of months of adequate food provisioning (MAHFP)	8.96	2.77	8.54	2.67	8.83(2.75)	.42
HDDS	6.51	2.09	6.04	1.86	6.36(2.03)	.46

Note: * implies that there is a statistically significant difference between the MYAP and non-MYAP groups (last col

The reference period for these indicators is similarly important. For the MAHFP, households were interviewed about the number of months of adequate household food provisioning (from all sources) *for the previous 12 months* (October 2007-October 2008). This marketing year (2007/2008) was the third consecutive year of adequate rainfall and relatively high production levels in the Douentza and Bourem regions. As household food security and agricultural production is strongly dependent upon rainfall, we would expect the baseline indicators related to household food security and agricultural production to be relatively high, as compared to years of normal or below-average rainfall (i.e., 2004/2005).[19]

[16] FANTA, 2006.
[17] FANTA, 2007.
[18] Corresponds to IPTT impact indicator 1.1 and 1.2.
[19] FEWSNET (2008). *Mali Food Security Outlook January to September 2008.* Washington, D.C.: USAID/FEWS NET.

Despite this situation, 81 percent of households in the survey area reported having difficulty in meeting their food needs at least during one month of the previous year (Table 3.4.). This was higher in non-MYAP villages (86 percent) as compared with MYAP villages (79 percent), with a statistically significant difference between the two.[20] The most difficult months for a majority of households between October 2007 and October 2008 were July, August and September, when stocks from the previous harvest were depleted (most commonly known as the *soudure*, or the hungry season). In looking at the number of months, households experienced difficulty in meeting their food needs during approximately 3 months out of the year, with a slightly higher level in non-MYAP villages; this difference is not statistically significant at conventional levels. However, some households only experienced difficulty during one month of the year, and others experienced difficulty during the entire year.

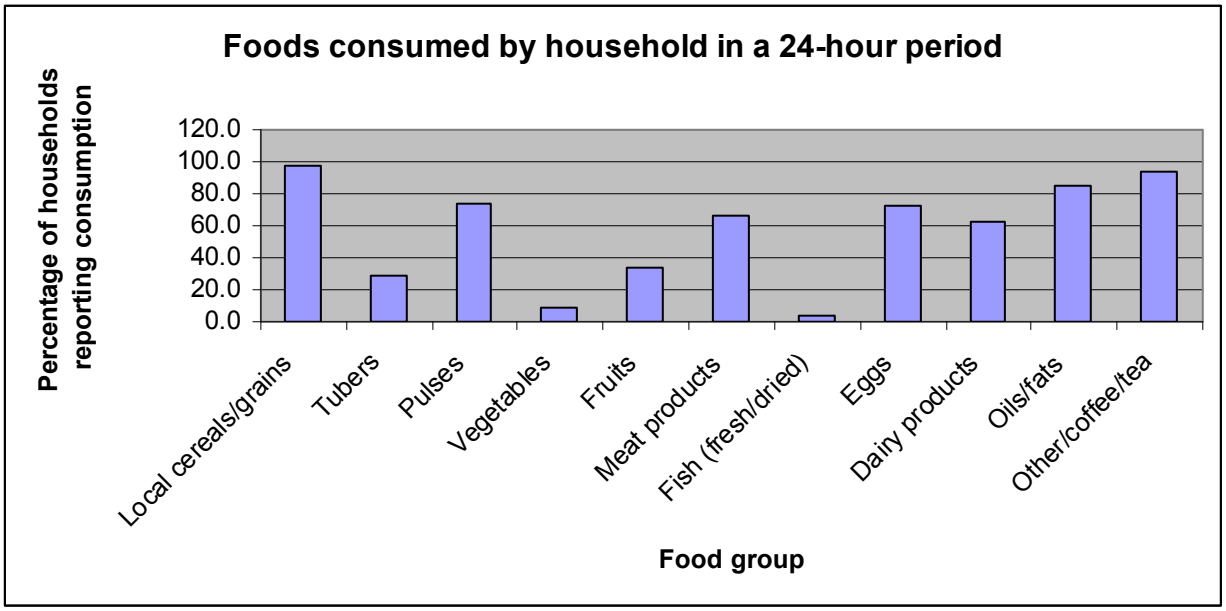
Household Dietary Diversity Score[21]

The HDDS paints a somewhat different picture of household food security in the region, focusing not only on *quantity of food* but the *quality*. Households only consumed 6.4 food groups of the 12 groups included in the survey in the previous 24 hours (October 2008), implying a mean HDDS of 6.3. There was no statistically significant difference between MYAP (6.51) and non-MYAP (6.04) villages. The standard deviation for this indicator was slightly higher in MYAP villages, however, suggesting that there was more variation among households in the MYAP villages (ie, more people who consumed fewer and more food groups).

The chart below provides a summary of the types of foods consumed in the project area, and the percentage of households surveyed reporting consumption in the past twenty-four hours. Overall, the vast majority (97.7%) of study participants consumed some sort of local grain the previous day. Sources of protein varied, from meat (65.7%), eggs (72.6%), dairy products (62.4%), and fish (4%). The majority of respondents (85.3%) also reported oil and fat as an energy source. The survey did not specify who in the household consumed the goods, so it is possible that there are nutritional discrepancies within the households in the project area. Differences in responses by commune can be attributed to the variety of environments that make up the study site.

Figure 3.2. Foods consumed in a 24-hour period by households in survey area

[20] Nevertheless, the standard deviation – which reflects the degree of variability – was higher in the MYAP villages, suggesting that there were more households that fell between two extremes.
[21] Corresponds to impact indicator 1.2 in the IPTT.



3.4. Household Livelihoods: Agricultural Production and Income-Generation

3.4.1. Agricultural production

Most households in the survey area rely upon agriculture and livestock-raising as their primary sources of income. The primary staple food crops produced by household vary according to *cercle,* as reflected by Figure 3.3. (Douentza data is on the left, Bourem on the right.) The primary cash crops are cowpeas and groundnuts, though they are much more cultivated in the Douentza *cercle* than in Bourem (34.8% to 4% for cowpeas and 33.2% to 0% for groundnuts), whereas tobacco and market gardening are more important in Bourem. Other important differences between Douentza and Bourem to note include the following: while millet is an important food crop in both circles (97.1% in Douentza and 52.4% in Bourem), rice is much more important in Bourem (with almost 88.8% percent of households producing rice) as compared with Douentza (20.1%), presumably along the Niger River. Similarly, sorghum is produced infrequently in Bourem, but more heavily in Douentza.

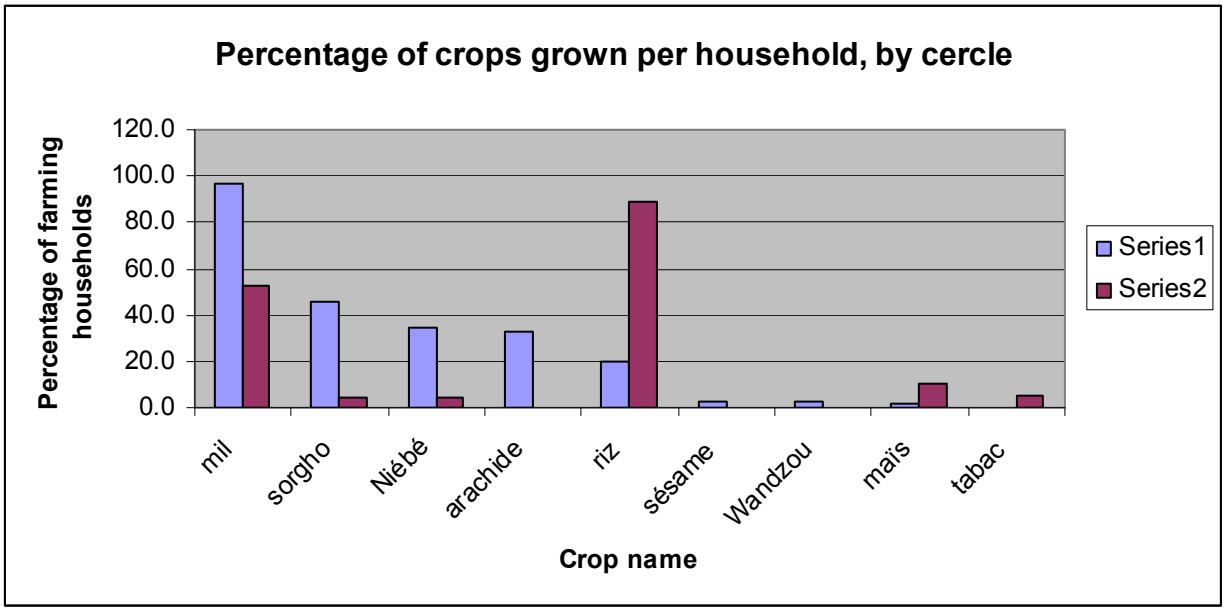


Figure 3.3. Percentage of Households Producing Specific Crops, By Region

In terms of production *levels*, millet is produced much more intensively as compared with the other staple food crops. Average production of millet was estimated at 1,673 kg per household during the October 2007 harvest (Table 3.6.). This was followed by rice (534 kg/household per year, and sorghum (330 kg/household/year) and corn (220 kg/household/year). In terms of cash crops, among those households that produced groundnuts, average production was 152 kg/household/year, followed by cowpeas (99kg/household) and *vouandzou*[22] (92 kg/household). Average production levels for all crops were higher in MYAP (as compared to non-MYAP) villages, with the exception of *borgou*.[23] However, these differences were not statistically significant, even at the 10 percent level; the only exception was for millet, where the difference was statistically significant at the 10 percent level.

Table 3.5 also breaks down the average production levels for each group by geographic region (Douentza and Bourem) and by MYAP and non-MYAP villages. This is important in light of the different production systems in both regions. In general, average levels of household millet and cowpea production (in kg) is higher in Douentza, although rice production is higher in Bourem.

[22] *Vouandzou* is also known as the Bambara groundnut or earth pea, and used for both human consumption and animal fodder. Burkhill, HM. The Useful Plants of West Tropical Africa, Vol. 3, Royal Botanical Gardens, Kew, 1995.

[23] *Bourgou* is a wild grain grown in the floodplains of Mali that is primarily used as animal fodder. It is primarily produced in the Bourem region, as it is a wild grain grown in the floodplains of Mali, and primarily used as animal fodder. National Research Council. 1996. *Lost Crops of Africa: Volume I (Grains)*. National Academy Press. Washington, D.C.

Tobacco is only produced in Bourem, and corn, groundnuts, sesame and *vouandzou* are only produced in Douentza.

In looking at the difference between MYAP and non-MYAP villages *within* each region, there is no statistically significant difference between MYAP and non-MYAP villages for any crop reported.

Table 3.5. Agricultural Production (kg/household/year) by Crop

	Douentza		Bourem		Average production (kg/household)		
Crops	**MYAP**	**Non-MYAP**	**MYAP**	**Non-MYAP**	**MYAP**	**Non-MYAP**	**Total**
Millet	1801	1411	400.00		1,782.56	1,382.11	1,673.92
Sorghum	334	330			329.3	330.4	329.55
Cowpea	101	83	50	70	100.84	82.83	99.08
Rice	561	440	537	574	548.84	492.74	534.21
Corn	269	25			269.58	25	220.66
Groundnuts	55	161			161.7	55.49	152.78
Sesame	31.18				31.18	.	31.18
Vouandzou	101.28				101.28	0	92.84
Tobacco			174		174.67	.	174.67
Sweet potato	75	266			383.33	266.67	325
Cassava	531	600			600	531.25	550
Bourgou			5,622.00	13,280.00	5,622.22	13,280.00	8,357.14
Gombo	81	62			81.02	62.5	80.22
Oseille	58	33			58.81	33.33	57.89
Piment	50				50	50	50

3.4.2. Agroentreprise practices

As the Mali MYAP concentrates on improving households' access to food via improved livelihoods, an important component of the MYAP focuses on agroenterprise (AE) activities. AE, in general, is defined as activities that link small rural farmers to expanding markets, so that they develop sustainable livelihoods in the rural sector. In the Title II proposal document, the PVOs defined "AE techniques" as: 1) the capacity to organize into functional AE groups with a defined organizational structure and capable of undertaking market assessments (such as market chain analysis, etc.) and planning; 2) the use of improved market information systems; and 3) the ability to apply improved production techniques which respond to existing market needs.

As a result of this definition, the PVOs discussed the types of improved production techniques that might be promoted over the course of the MYAP. As the specific crops/production had not yet been chosen – which is a first step in the MYAP activities – it was decided to focus on households' use of general improved production techniques that could be applicable to a variety of crops or production for purposes of this study. These were included in Sections 4.2 and 4.3 of the questionnaire, and included questions regarding households' use of improved seeds, organic manure,

animal vaccination, storage, fertilizers, phytosanitary treatment, and irrigation (Section 4.2). In addition, the questionnaire asked whether household used market information systems, and if so, for which goods. Finally, the questionnaires asked whether households were members of AE-oriented associations. The combination of these three categories of questions will be used to show households' behavioral change in AE from the baseline to the end of the project.

The results of the analyses for production techniques are available in Table 3.6. The techniques most frequently used by farmers in the survey areas are primarily focused upon applying organic manure and deworming and vaccinating animals, rather than more traditional production techniques – such as using improved seeds, mineral fertilizers, phytosanitary treatment or irrigation. Seventy (70) percent of households use organic manure, 63 percent vaccinate their animals, 55 percent use *déparasitage* and 33 percent use forage. Smaller percentages of respondents reported use of phytosanitary treatment (24%), improved seeds (26.3%), or irrigation (12%). There are statistically significant differences between MYAP and non-MYAP villages in the use of these techniques, but this varies by the technique, and can be seen in the table below.

In looking at the number of techniques used, households use an average of 2.78 techniques, varying from no techniques to 7 techniques. Eighty-five (85) percent of households in the survey area use at least two (2) production technologies, with a slightly higher percentage of farmers using these techniques in MYAP villages (88% as compared to 79%). Additionally, 68 % of households are using at least three techniques, with MYAP villages reporting higher use than non-MYAP villages (72% to 59%), which is a statistically significant difference.

Table 3.6. Adoption of Agroentreprise Production Techniques by Farm Households[24]

1.1.1 % of Title II producers using at least 3 sustainable agro-enterprise technologies

	MYAP		Non-MYAP		All	Difference i
Technique	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean(s.d.)**	**Coeff (**
Improved seeds	20%	0.40	7%	0.01	26.3%(.36)	12%**
Irrigation	15%	0.4	6%	0.2	12%(.33)	9%**(
Mineral fertilizers	2%	0.2	12%	0.3	8%(.28)	9%***
Organic manure	76%	0.4	58%	0.5	70%(.46)	18%*(
Phytosanitary treatment	26%	0.4	22%	0.4	24%(.43)	3.8%(
Déparasitage	54%	0.5	59%	0.5	55%(.49)	4.2%(
Animal vaccination	64%	0.5	63%	0.5	63%(.48)	1.1%(.

[24] Corresponds to impact indicator 1.1.1 in the IPTT. However, the figures in this table are for a population based sample. The IPTT indicator will be measured annually using a Title II target beneficiary based sample once the agro-enterprise beneficiaries, products, and technologies are identified.

Forage	31%	0.5	39%	0.026	33%(.47)	8%(.0
Number of techniques used	2.9	1.5	2.5	1.6	2.78(1.53)	.42(.
% of producers practicing at least two techniques	88%	0.3	79%	0.4	85%(.36)	.12***
% of producers practicing at least three techniques	72%	0.5	59%	0.5	68%(.47)	12%**

Note: *, ** or *** signifies that the difference between the MYAP and non-MYAP sample is statistically significant. number of techniques is included in the first part of the table (seeds, irrigation, fertilizers, manure, phytosanitary trea *deparasitage*, vaccination, forage.

Using and following market information is an important AE skill, and one that can help farmers obtain better prices for their agro-pastoral products. Of all the households, 70.2 percent of households stated that they obtained market information, with fairly equal percentages across Douentza and Bourem. The percentage of households was slightly higher in MYAP (76%) as compared to non-MYAP villages (70%). It should also be noted that this difference is statistically significant.

Most households followed market information for livestock (70 percent). In addition, 39 percent of households follow prices for staple food crops (millet, sorghum, corn), 14.6 percent of households follow prices of cash crops (cowpea, groundnuts, sesame, etc), 9.6 percent follow prices for market gardens, and 9.8% follow other prices, including fish, *nattes,* and other artisanal goods. This type of price information is crucial for AE techniques. This suggests that there is a high opportunity for the MYAP to increase producers' access to and use of market information for staple food crops, cash crops and market vegetables to improve the price that they receive.

In addition, the way in which farmers obtain this price information – regardless of the product – is often quite expensive in terms of transport costs and the opportunity cost of their time. Eighty-six percent (86%) of farmers obtain price information by traveling to the market (each week or month), and 50% ask a contact in the village. Five percent (5%) of farmers also report listening to the radio and 6% report using a telephone to obtain market data. Research has shown that farmers who use cell phones to obtain price information obtained higher sales prices than their non-cell phone counterparts[25].

While the percentage of households reporting the use of MIS to obtain price information is high, most of the information being sought by households is on local market prices, and thus represents a system of market research with limited capacity and reach. The project zone will benefit from

[25] Aker, 2008.

interventions which will build the capacity of beneficiaries in obtaining market information from beyond their local markets as a source of market-led opportunities.

Overall, 65.3% percent of households in the survey area are members of community-based organizations. Among the respondents who claim association in a community organization, 38.3 percent are members of producers' associations, 38.9 percent are members of women's associations, 34.1% belong to youth associations, 17.2 percent are members of savings-credit associations, 5.7 percent are members of fishing associations, and an additional 13.3 percent of respondents cited membership in other types of organizations. Specifically, for purposes of this study and this project, membership in AE associations is defined as membership in savings or credit associations, farmers' association or fisherman's associations.

The results from MYAP targeted areas show a high level of engagement and activity by the population and a basic foundation for the agro-enterprise work that the MYAP project will implement in the region. However, given the continued difficulty in the population's ability to meet their needs with regard to food production, there remains work to be done in building the capacity and effectiveness of community structures to increase agricultural production and transformation to better meet market and household food and revenue needs. Thus the project will be tasked with not simply expanding the reach of AE techniques, but ensuring their improved effectiveness through improved and expanded MIS, functional and profitable AEGs, and technically sound and responsive production techniques.[26]

3.5. Emergency Preparedness and Response

3.5.1. Shocks at the community and household level

As the two MYAP regions are located in the Sahelian and Sahelo-Saharan regions of Mali, households are subject to a variety of natural and man-made shocks. Ninety-four point one (94.1) percent of households reported shocks in their village over the past five years. Three point one (3.1) percent reported no shocks, and 2.8 percent declined to respond to the question. The primary types of these shocks affecting villages in the survey area are natural shocks: plant infestations – insects or disease (87.2%), drought (71.9%), epizootic diseases (28.3%), and flooding (13.1%).

[26] Corresponds to monitoring indicators 1.1.1, (production) ,1.2.5 (MIS), 1.2.6 (AEG membership) all of which will be measured annually using a Title II target beneficiary based sample once the agro-enterprise beneficiaries and products are identified.

3.5.2. Household-level strategies

The individual questionnaires and focus-group discussions revealed that households use a variety of coping strategies to deal with shocks. Commonly employed coping mechanisms include migration of one household member (55.8%), migration of more than one household member (25.1%), livestock sales (67.3%), solidarity (52.3%), the sale of household labor (34.0%). Several households also made changes in their dietary habits: 25.6% reported consuming "famine" foods, such as wild fonio, 22.5% reduced the quantity or quality of meals, and 19.0% reduced the number of meals. Other, less often cited, coping mechanisms include selling off jewelry (9.1%), wood cutting (14.4%), or land sales (1.6%). An additional 17.2% of households reported strategies not included in this list. In looking at MYAP and non-MYAP villages, there were no statistically significant differences in the strategies used.

3.5.3. Community-level early warning systems

Note: The data below reflects findings based on focus group discussions that were held in each village. As such, the sample size used to calculate this data was relatively small.

Only fifty (50)[27] percent of villages reported having community-level mechanisms in place to respond to natural or man-made shocks.

Of the 50 percent of villages with such structures, most of the structures were either part of the government's early warning system (EWS, or *système d'alerte précoce* [SAP]) or the community-organized "*brigade de lute anti-ravageur*"; few villages had a community-level early warning system. Nevertheless, there are questions as to whether or not these structures are functional in terms of whether they have the capacity to prepare for and respond to crises. The focus-group discussions revealed that a majority (76 percent) of the community-level structures do not undertake any activities to manage these crises. Of those that do engage in such activities, they focus primarily on collecting and sharing data about such crises.

Table 3.7. shows the number of community groups that are actively tracking trigger indicators for such crises. A slightly higher percentage of villages reported that they were tracking trigger indicators, even if they did not have a formal community-based mechanism for responding to food crises. Sixty-two (62) percent (23 out of 37) of villages in the sample were tracking trigger indicators for shocks, as is evident below, 17 MYAP villages (out of 26 in the sample) were tracking trigger

[27] Corresponds to impact indicator 3.1 in the IPTT, however given the low level of functionality reported of these groups, the program will begin with an assumed 0 baseline in MYAP villages for functional EWGs.

indicators, as compared with 6 non-MYAP villages (out of 11) mainly for drought, floods and animal and pest infestations. A higher number of MYAP villages are tracking these indicators as compared to non-MYAP villages. In terms of such data collection, the primary community-based organizations collecting such data were the "*brigades de lute anti-ravageur*".

	Non-MYAP Villages		MYAP Villages		Total	
	No.	%	No.	%	No.	%
Drought	3	27.27%	4	15.38%	7	18.92%
Epizotie	0	0	2	7.69%	2	5.41%
Floods	0	0	1	3.85%	1	2.70%
Pest infestations	3	27.27%	10	38.46%	13	35.14%
Total	6	54.55%	17	65.38%	23	62.16%

Table 3.7. Number of Villages Tracking Trigger Indicators[28]

3.5.4. Community-level infrastructure

As part of the community-level focus group questionnaire, the baseline asked questions about the types of hydro-agricultural infrastructure in the village. This included dams, trenches, half-moons, canals, lakes, market gardening areas, market gardening wells, planted trees and irrigated perimeters. Among the villages surveyed, 100% of villages had had at least one type of hydro-agricultural structure, ranging from a minimum of 1 to 6 structures. The mean number of structures was slightly higher in Bourem (2.6 structures per village, as compared with 1.8 in Douentza).

One of the key indicators in the MYAP is the *percentage of villages with improved access to infrastructure to mitigate the impact of the shock*. As every village has some type of infrastructure, it is instructive to look at the infrastructures by type. A high percentage of villages in both MYAP and non-MYAP areas have lakes (75%), market gardening perimeters, *digues de retenue* (35%) and tree planting (32%). However, few villages have market gardening wells (16%), irrigated perimeters (5%) and *demi-lunes*, the last of which is extremely important for retaining the topsoil after rains and retaining soil fertility.

Table 3.8. Percentage of Villages with Types of Infrastructure

[28] Corresponds to monitoring indicator 3.1.2 in the IPTT.

Types of Infrastructures	Non-MYAP Villages	MYAP Villages	Total
Dams	0.0%	30.8%	21.6%
Digues de retenue	18.2%	42.3%	35.1%
Demi- lunes	0.0%	11.5%	8.1%
Canals	9.1%	11.5%	10.8%
Lakes	100.0%	65.4%	75.7%
Tree planting	18.2%	38.5%	32.4%
Market gardening perimters	27.3%	38.5%	35.1%
Market garden well	9.1%	19.2%	16.2%
Irrigated perimeters	0.0%	7.7%	5.4%
Total number of villages	11	26	37

3.6. Health and Nutritional Status

3.6.1. Environmental conditions

3.6.1.1 Access to clean water

For the area covered under the survey, it can be estimated from national data that 33.9% of the households have access to potable water. This low percentage is due to the high number of households in Mali using unprotected and surface water as their main source of drinking water. Table 3.9 provides further information about access to potable water, with a break down by MYAP and Non-MYAP villages (and confidence intervals calculated for MYAP villages).

Table. 3.9. Access to Potable Water[29]

	Access to potable water (%)[30]
Total Area	33.9%
MYAP	37.5% (33.3, 40.6)
Non-MYAP	23.6%

Table 3.10 provides information about the source of drinking water for the survey area, by MYAP and Non-MYAP Villages. "Potable water" was defined as household faucets, public taps and fountains, and wells with manual pumps. This data shows that, in general, most households used wells and public taps/fountains for their drinking water needs (36.9% and 32.5% respectively).

[29] Monitoring indicator 2.2.4 in the IPTT.
[30] Drinking water was defined as household faucet, public taps/fountains, and manual pumps.

Table 3.10 Source of Drinking Water in All Villages Surveyed [31]

Zone	Household faucet	Public taps/fountains	Water sellers	Wells	Pond	Rain water	River/canal	Manual pump
MYAP	1.5%	35.8%	1.3%	38.1%	10.1%	6.6%	13.8%	0.3%
Non-MYAP	0.4%	23.2%	0.4%	33.3%	10.1%	1.5%	13.9%	0%
Total	**1.2%**	**32.5%**	**1.1%**	**36.9%**	**10.1%**	**5.4%**	**13.8%**	**0.2%**

3.6.1.2 Access to latrines

Thirty-five point nine (35.9) percent of the caregivers surveyed reported having latrines in their household. In comparing Bourem and Douentza, 57.1% of the households had latrines in Bourem and only 29.6% in Douentza. Of those who did not have their own latrines, an additional 12.5% of those surveyed in both areas reported that they had access to other latrines in the village. Table 3.11 provides a detailed breakdown of the data from the program area.

Table 3.11 Access to Latrines

Table 3.11a: Access to Latrines – Overall Survey Area

	Environmental Hygiene	
CERCLE	Access to own latrines (%)	Access to other latrines in the village (%)
Douentza	**29.6**	**7.8**
Bourem	**57.1**	**33.0**
Total	35.9	8.5

Table 3.11b. Access to Latrines – MYAP Villages Only[32]

	Access to own latrine	Access to other latrine	Total surveyed with access to latrine	Confidence interval
Yes	40.1%	14.4%	54.5%	50.7 - 58.2
No	59.9%	85.6%	--	--
Total	**100.0%**	**100.0%**		

The above table was used to calculate monitoring indicator 2.2.6 on the IPTT. The baseline percentage of 54.5% of caregivers practicing use of latrines was derived by adding the percentage of those with access to their own latrine (40.1%) plus those with access to another latrine (14.4%). Utilization of these latrines is implied, as there were no questions on the baseline survey concerning access plus proper usage.

[31] Due to multiple responses per mother surveyed, total percentages surpass 100%.
[32] Monitoring indicator 2.2.6. in the IPTT.

Of those who did not have access to latrines for defecation in the MYAP zone, the majority reported defecating in the bush (41.5%), followed by in local fields (17.8%), in the river (0.5%) and a certain percentage of those asked did not respond to the question. A main difference between the two cercles appears to be the use of fields as a place for defecation, which is much higher in Douentza than in Bourem, and highlights an added challenge for health workers in the area. Further details on this question are provided in Table 3.12. As with the drinking water table, numbers do not add up to 100% because of multiple responses in some cases and lack of responses in others.

Table 3.12: Place of defecation

Place of defecation	Bourem		Douentza		Total
	MYAP	Non MYAP	MYAP	Non MYAP	
Bush	34.4%	59.0%	41.3%	43.2%	41.5%
Fields	4.0%	8.2%	21.4%	22.7%	17.8%
River	1.3%	0%	0.6%	0%	0.5%

3.6.2. Child health and nutrition

3.6.2.1 Child nutritional status.

Improved child nutrition is a key outcome targeted by the Mali MYAP. The nutritional situation in the study areas was examined with regards to stunting, wasting and underweight. Those are the indicators most commonly used to describe the extent of malnutrition among a population.

Stunting is a reflection of low height-for-age (for children ≥ 2 years) or low length-for-age (children < 2 years) and is an indication of past growth failure.[33] Stunting may be caused by a slowing in the growth of the fetus, resulting in a failure to achieve expected length as compared to healthy, well-nourished children in the same age. Stunting is also associated with chronic insufficient protein and energy intake, frequent infection, sustained inappropriate feeding practices and poverty[34].

Underweight is a reflection of low weight-for-age, meaning that a child's weight is significantly lower than expected for a child of the same age.[35] This indicator is less specific than height-for-age and weight-for-height. Low weight-for-age does not differentiate between the past and/or current under-nutrition.[36]

[33] Gibson, 2005.
[34] Cogill, 2003.
[35] Gibson, 2005.
[36] Cogill, 2003.

Wasting reflects a low weight-for-height. A brutal reduction in food intake is accompanied by a rapid weight loss reflecting itself by a fall of the index weight-for height. This indicator is a good measure of recent insufficient food consumption caused by illnesses or natural shocks.

Data on all three anthropometric parameters -- weight-for-age, weight-for-height, and height-for-age -- were presented for children under five years of age with specified ages 0 to 59.99 months, and defined as Z-score <-2SD of the reference population, as per WHO growth standards.[37] Since each of the three child anthropometric indicator is fully determined by the two others,[38] two of them are sufficient to report anthropometric measurements. Due to this reason, wasting, and stunting are usually retained to demonstrate the nutritional status of a population. In the context of the MYAP program and associated indicators, underweight and stunting will be primarily used to show long-term impacts on malnutrition. Nevertheless, taking in account the extent of malnutrition in the targeted zone, it is essential to use the indicator wasting (weight-for-height).

It must also be noted that the ages of the children in the study are based on mothers' estimates in many cases, and may not be entirely accurate, though the most extreme outlier data was identified and excluded from the analysis.

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The latest results of the national DHS IV (2006) for Mali shows that 15% of children under five years of age are wasted (with 6% suffering from severe wasting), 38% are stunted (with 19% suffering from severe stunting), and 27% are underweight (with 10% severely affected children). Severe wasting, stunting, and underweight are defined by <-3 SD from the mean. Eighty-one (81) percent of the children aged 6 to 59 months suffer from anemia, while the prevalence of anemia in women is 60%[39]. Severe anemia during pregnancy may place the woman's life at risk during childbirth. The DHS survey also shows that under 5 child mortality rates remain high (191 ‰) despite improvements from the previous DHS results (242 ‰). It is estimated that more than 50% of the child deaths are attributed to malnutrition.

Table 3.13. Comparison of National and Baseline Area Figures for Malnutrition in Children Under 5 Years

	National Average	Survey Area Total	95% confidence intervals	Douentza	Bourem

[37] WHO, 2005.
[38] KELLER, FILLMORE, 1983
[39] DHS IV, 2006

Underweight (0-59 months)	27%	32.2	(29.7, 34.3)	32.9	29.1
Wasting (6-59 months)	15%	18.3	(16.4, 20.1)	19.2	14.4
Stunting (6-59 months)	38%	35.6	(33.0, 38.1)	36.0	33.7

Table 3.13 compares the DHS malnutrition rates with those found in the baseline survey. The analysis of baseline data took into account data from 1,763 children. Data classified as extreme outliers were not included in this analysis, as concerns were raised about the inaccuracy of certain measures or estimations of age of certain children. The baseline data from the sampling universe for this study zones show a higher prevalence of underweight and wasting in children under five years than the national average, providing support for the targeting of these areas. The prevalence of stunting in the total bseline survey area is slightly below the national average, though WHO emergency thresholds for both wasting (more than 15%) and underweight (more than 30%) are exceeded in the Douentza *cercle* (19.2% wasting and 32.9% underweight), and the rates of wasting and underweight in the Bourem *cercle* (14.4% and 29.1%, respectively) are not much lower than WHO emergency thresholds. Rates for stunting in both *cercles* (36.0% in Douentza and 33.7% in Bourem) are slightly lower than the national average (38%), and below the WHO emergency threshold of 40%.

Table 3.14 Comparison of Malnutrition Rates in MYAP/Non-MYAP Villages[40]

	MYAP	**Non-MYAP**
Underweight (0-59 months)	30.8 (27.5, 32.5)	35.8
Wasting (6-59 months)	17.2 (14.95, 19.05)	21.2
Stunting (6-59 months)	35.2 (32.4, 37.6)	36.6

Table 3.14 shows the comparison of malnutrition rates in MYAP and non MYAP villages, as shown by the data collected by the survey team. In general, there is not a statistically significant difference between the malnutrition rates in MYAP and non-MYAP villages. 95% confidence intervals are given on the IPTT. A z-test for proportions was calculated at a 95% confidence interval

[40] Impact indicators 2.1, 2.2, 2.3 in IPTT.

for the two study areas surveyed (MYAP and Non-MYAP) which showed no statistically significant difference between the two groups for all three indicators (wasting, stunting, and underweight).

Table 3.15 below studies the distribution of malnutrition by age for children under five years in the project area. From the data, we observe that the malnutrition prevalence in the entire baseline area, taking into account data from both MYAP and non-MYAP villages, is distributed as follows:

- Children between the ages of 0 and 6 months are more affected by underweight (31.1% than they are by stunting (19.2%) and wasting (19.2%);
- Children between the ages of 7-36 months are most affected by underweight (37.5%) than they are by wasting (24.7%) and stunting (36.2%). This age group has the highest prevalence of wasting out of the three age groups.
- Children between 36-59.99 months old are more affected by stunting (40.8%) than are children in the other two age groups. They are more affected by stunting than they are by wasting (7%) or underweight (24.3%).

Table 3.15. Distribution of Underweight, Wasting, and Stunting Prevalence by Age Group in MYAP and Non-MYAP Zones

Age group (in months)	Wasting	Stunting	Underweight
0 to 6 months	19.2%	19.2%	31.1%
7 to 36 months	24.7%	36.2%	37.5%
37to 59 months	7.0%	40.8%	24.3%
Total	18.5%	36.2%	32.7%

The above data indicates that there is no age group in the targeted 0-59 month range that is exempt from malnutrition, though some are affected more than others by the various types. From the anthropometric indicators in the above table, it is possible to hypothesize about the nutritional situation of the area studied. The cumulative increase of the prevalence of stunting (from 19.2% among children 0-6 months to 40.8% among children 37-59 months) provides evidence of the long-term consequences of chronic malnutrition in the study area.

It is necessary to revisit WHO emergency threshold standards by age group. Children 0-6 months and 7-36 months exceed the 15% level with regard to wasting and also the 30% threshold for underweight. As discussed above, the rates for stunting in the overall population studied were below the national average as well as the WHO threshold, but this analysis reveals that while children 37-59

months are less affected by wasting and underweight, their rate for stunting (40.8%) places them above the WHO threshold of 40%.

The tables below provide a more specific breakdown of rates of moderate and severe wasting and stunting. The low prevalence of severe wasting (4.6%) was tagged as suspicious by the project consultant following the second data analysis, calling into question whether some of the data identified as outliers may have been, in fact, extremely severe cases. Subsequent activities and surveys in the project area will provide information to clarify the prevalence of severe wasting. According to the DHS IV (2006), the national average for the prevalence of severe wasting, as defined by weight for height less than three standard deviations from the mean, is 5.9%.

Table 3.16. Distribution of Severity of Wasting in MYAP and Non-MYAP Area

WHO Classification Acute Malnutrition (Wasting)	Frequency	%	95% Confidence Interval	
			lower limit	Upper limit
MNA Sévère	81	**4.6**	3.6	5.5
MNA Modérée	242	13.7	12.1	15.3
MNAG	323	**18.3**	16.4	20.1
Risque de MNA	462	26.2	24.1	28.2
Normal	976	55.4	53.0	57.7
Obèse	2	0.1	No sig	
Total	1763	100.0		

Table 3.17. Distribution of Severity of Stunting in MYAP and Non-MYAP Area

WHO Classification Chronic Malnutrition (Stunting)	Frequency	%	95% Confidence Interval	
			lower limit	Upper limit
MNC Sévère	222	12.8	11.2	14.3
MNC Modérée	405	23.4	21.4	25.3
MNCG	627	**36.2**	34.0	38.4
Risque de MNC	492	28.4	26.3	30.5
Normal	615	35.5	33.3	37.7
Total	1734	100.0		

On both of these tables, the total number of children measured does not equal the total number of children involved in the survey. This is due to data that was either missing from the survey forms or to that which was rejected from analysis due to extreme outlier status.

3.6.2.2. Child health status.

The results showed high rates of illness and disease for children under five years of age in Bourem and Douentza districts. In the context of this study, diarrhea was defined as having three or more watery stools per day. Among children 6 to 59.99 months, 25.1% children were reported to have suffered an episode of diarrhea in the seven days prior to data collection. In general, children 6-11.99 months have the highest risk of having diarrhea since this period is the time when children start receiving complementary foods.

Table 3.18. Reported Illness in Previous 7 Days for Children Under 5 in Baseline Area

Reported Illness in Previous 7 Days for Children Under 5	Baseline zone (%)		
	C. Douentza	C. Bourem	Total
• Fever	32.9	26.9	31.5
• Malaria	12.0	18.9	13.5
• Convulsions	7.4	3.3	6.5
• Diarrhea	24.2	28.3	25.1
• Cough	12.2	18.4	13.6
• Short/rapid breathing	0.9	2.4	1.2
• Difficult breathing	2.3	3.3	2.5

3.6.3 Child feeding practices

Appropriate infant and child feeding practices are essential to the health and nutritional status of the children. The provision of adequate energy and nutrients in a child's diet allows for proper growth and development. Moreover, children fed appropriately are able to establish defenses against infection and disease.

Current international guidelines for infant and child feeding recommend that children should be exclusively breastfed from birth up to six months of age. Breastfeeding should be initiated within one hour of delivery so that nutrient-rich colostrum is fed to the infant. Beyond six months of age and through two years, the infant should continue to be breastfed frequently, and on demand. Starting at the age of six months, complementary foods, in addition to breast milk, should be provided. In general, the frequency of daily complementary feeding and quantity of food provided at each feeding should increase with the increasing age of the child. For the average healthy breastfed

infant, meals of complementary food should be provided two to three times per day for children 6-9 months of age and three to four times per day for children 9-12 months and 12-24 months. In addition, nutritious snacks should be offered to children 6-24 months one or two times per day[41][42].

Adequate food group variety is important to ensure that the child's minimum nutrient requirements are met. The nutrient content of complementary foods should be high for all age groups. Meat, poultry, fish or eggs should be eaten daily, or as often as possible. Vitamin A rich fruit and vegetables should be eaten daily and adequate lipid content should be included in the child's food intake[43].

3.6.3.1 .Exclusive breastfeeding

Exclusive breast-feeding is widely recognized as the optimal means of feeding and caring for young children[44], since it prevents infectious diseases such as gastrointestinal infection, respiratory infection, and otitis media[45] and protects the child from developing food allergies[46]. Exclusive breastfeeding for children 0-6 months means that from birth until six months of age, the child should receive breast milk only; no other liquids or foods should be fed to the child. However, infants are allowed to have drops of vitamins, minerals or medicines.

Breast feeding practices

Table 3.19 shows mothers' behaviors relating to child feeding, as well as prenatal and post natal care. The table shows the following:

- **Early breastfeeding practices:** The proportion of mothers that practiced early breastfeeding is 87.4% in MYAP villages, 93.3% in non-MYAP villages, with an average of 88.9% for the entire study area. This was indicated by the number of women who reported starting breastfeeding immediately after giving birth or one hour after giving birth. The national health policy in Mali is for women to begin breastfeeding within 30 minutes after giving birth, while the international standard is one hour after giving birth. This means that those children that are breastfed immediately after delivery (within 1 hour) benefit from the first breast milk that contains colostrum. The national average for early breastfeeding is 45.9% (DHS IV, 2006).

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[41] PAHO/WHO, 2002.
[42] Dewey and Brown, 2003.
[43] Dewey and Brown, 2003.
[44] Brown, et al., 1995.
[45] Marshall and Marshall, 1980; Gussler, 1987, Motarjemi et al., 1993.
[46] Whitehead, 1985.

- **Exclusive breastfeeding practices**: The proportion of mothers that practiced exclusive breastfeeding is 22.6% in the overall baseline area, with 21.6% of mothers in the non-MYAP villages and 22.8% of mothers in MYAP villages. The average for the project area and the study area is lower than the national average of 38%[47].
- **This is of interest to the study because,** in many cases, when exclusive breastfeeding practices are not followed, inappropriate introduction of complementary foods can cause malnutrition among breastfed children.

Table 3.19. Breastfeeding Practices for Children (0-59 months)

	MYAP	**Non-MYAP**	**Total**
Exclusive Breastfeeding Practiced	22.8% (18.8, 25.1)	21.6%	22.6%
Early Breastfeeding Practiced			
Immediately after giving birth	48.5%	41.4%	46.7%
1 hour after giving birth	38.9%	51.9%	42.2%
Other	12.6%	6.7%	11.1%

3.6.3.2. **Complementary feeding practices:**

The appropriate age for the introduction of complementary foods recommended by the WHO (WHO, Unicef 2001) is 6 months, as beyond this age breastfeeding alone is not sufficient to ensure optimal infant growth. Table 3.20 below shows mothers' practices regarding the introduction of new and complementary foods other than breast milk. MYAP villages overall are compared to non-MYAP villages, and rates are also listed for individual communes within the project area. Overall, only 31.4% of mothers have practiced the timely introduction of complementary foods. This percentage is lower in N'Djaptodi (11.1 %), Débére (11.4%), and Dianweli (11.8%), all located within the *cercle* of Douentza. Kéréna, also located in the Douentza *cercle* reported the highest percentage of mothers introducing complementary foods in at timely manner (72.2%), but in this case, only one village in the commune was sampled. The second highest rates of appropriate complementary feeding come from the *cercle* of Bourem, with Bamba (70.3%). In the *cercle* of Bourem, nearly twice the

[47] DHS IV, 2006

percentage of mothers introduced complementary food in a timely fashion (46.8%) compared to the percentage of the mothers in the Douentza *cercle* (27.1%).

In the MYAP villages, a higher percentage of mothers introduced complementary foods in a timely fashion (34.8%) as compared with non-MYAP villages (22.0%). In general, only 31.4 percent of mothers in the study area introduced such foods at the six-month mark. Several mothers in the survey introduced complementary foods before the age of six months -- 28.3% introduced other foods in less than one day after the child's birth. This may cause vulnerability among children less than six months due to infections and/or diarrhea which may subsequently lead to malnutrition. Additionally, breast milk alone does not provide sufficient calories for young children after the age of six months. Benefits and types of complementary foods have been discussed earlier in this report.

Table 3.20. Introduction of Complementary Foods

	Timely introduction of complementary foods, 0-59 months		
	Bourem	**Douentza**	**Ensemble**
MYAP	48.8	30.8	34.8
NON MYAP	40.9	17.0	22.0
TOTAL	46.8	27.1	31.4

As was shown earlier in the report with regard to household dietary diversity, food consumption by families in the project area and the study area includes mainly carbohydrates and fats for energy and not enough of the protein necessary for the promotion of children's growth and development.

As Table 3.21 illustrates, the level of post partum vitamin A supplementation in the study area is lower (35.9%) than the national level (41.2%, DHS IV, 2006). It is however higher in the MYAP villages (37.9%) than in non-MYAP villages (29.1%). The rate of postpartum vitamin A administration is much higher in the Bourem cercle (55.9% overall, 63.9% MYAP villages) than it is in the Douentza cercle (28.8% overall, 29.1% MYAP). Vitamin A supplementation is strongly recommended for women after they have given birth as one dose after giving birth and another two weeks later, if given to women, increases the content of vitamin A in breastmilk. Vitamin A is also essential to child development, and early and exclusive breastfeeding is a good source of vitamin A for infants. However, from six months, young children need additional vitamin A intake, which can be derived from appropriate introduction of complementary foods.

Tab: 3.21. Vitamin A Supplementation

	% Mothers Receiving Vitamin A after Delivery		
	MYAP	NON MYAP	Ensemble
Cercle Douentza	29.1	27.8	28.8
Cercle Bourem	63.9	32.4	55.9
TOTAL	37.9	29.1	35.9

3.6.4 Care-seeking practices for childhood illnesses

3.6.4.1 Mothers' pre- and post-natal visits and health behaviors

The health care seeking behaviour of mothers is an important determinant of child health and nutritional status. Table 3.22 shows the percentage of mothers attending pre-natal visits and from this information it is observed that there are vast disparities between women completing at least three prenatal visits between the *cercles* Bourem (34.4% of women in all villages surveyed) and Douentza (9.2% of women in all villages surveyed). The overall percentage of mothers completing at least three prenatal visits was also low (15%) for the entire study area.

Disparities in prenatal visit attendance also exist between the various communes surveyed, which may be attributed to the factors discussed in the introduction of this report, such as distances to paved roads, distances to health centers, and access to transportation.

Table 3.22 Mothers Completing at least 3 Prenatal Visits[48]

	Completed at least 3 prenatal visits		
	MYAP	NON MYAP	Total
Cercle Douentza	10.1%	6.3%	9.2%
Cercle Bourem	37.1%	27.9%	34.4%
Total	**16.2%**	**11.8%**	**15.0%**
CI	**13.23, 18.77**		

The DHS IV (2006) measures post-natal visits as those which take place 1-2 days, 3-6 days, or 7-12 days after birth, specifically for those mothers who gave birth outside of a health center

[48] Monitoring indicator 2.1.8 in IPTT

(établissement sanitaire). On average, in Mali, 72.2% of women did NOT receive any type of post-natal consultation.

In general, 70.3% percent attended post-natal visits in the in the overall study zone, higher than the national average, with 75.9% in the MYAP villages, and 54.7% in Non-MYAP Villages reporting having completed at least one post-natal visit

Table 3.23 Mothers Completing at Least One Post-natal Visit[49]

MYAP	Non MYAP	Total
75.9% **(71.73, 78.27)**	**54.7%**	**70.3%**

3.6.2.4 Mothers' health seeking practices

Concerning health seeking practices, 28.0% of mothers in the survey area sought advice at a health center (CSCOM) for the correct treatment of a sick child (Table 3.23). Overall, mothers in the Bourem area (65.1%) exhibit much higher percentages of health seeking behaviors than mothers in the Douentza area (16.7%). These data reflect behaviors of mothers in both MYAP and non-MYAP communes.

Table 3.24: Mothers' Health-Seeking Practices Total Baseline Area

	Mothers' health-seeking practices for children 0-59 months	
	Sought advice in a correct treatment of sick child	
	% who sought help at CSCOM	N
Cercle Douentza	16.7	117
Cercle Bourem	65.1	138
Total	**28.0**	**255**

Table 3.24 shows the places where mothers have sought treatment advice. In MYAP villages throughout the project area, 31.8% percent of mothers sought advice from health professionals (CSCOM and Matrons).

Table 3.25. Places Where Mothers Sought Treatment Advice for Children's Diarrhea (MYAP only)

CSCOM	Pharmacist	Matron	Marabout	Traditional healer	Parents	Other

[49] Monitoring indicator 2.1.7 in IPTT

28.1%	3.0%	3.07%	9.3%	19.2%	20.0%	2.5%

Table 3.25 below looks at the treatment practices of mothers when their children are suffering from diarrhea. Based on data from MYAP-only villages, it is observed that:

- 65% of sick children are breastfed by their mothers. The frequency of breastfeeding varies: 48% of mothers breastfeed as usual, 18.3% breastfeed more frequently, and 33.7% breastfeed less frequently.
- 27.2% of children with diarrhea are given water to drink by their mothers, 38.9% as often as usual, 41.8% more often, and 19.3% less often.
- Seventy-nine point two (79.2)% of mothers gave food to children with diarrhea.

Table 3.26. Feeding practices during diarrhea (MYAP only)

% of mothers who breastfed a child sick with diarrhea	
Yes	65.5%
No	34.5%

Frequency of breastfeeding for children with diarrhea.	
As often as usual	48.0%
More often than usual	18.3%
Less often than usual	33.7%

% Mothers who give child with diarrhea water to drink	
Yes	27.2%
No	72.8%

Frequency of giving water to children with diarrhea	
As often as usual	38.9%
More often than usual	41.8%
Less often than usual	19.3%

% Mothers who give child with diarrhea food to eat	
Yes	79.2%
No	20.8%

Frequency of giving food to child with diarrhea	
As often as usual	30.8%

More often than usual	13.3%
Less often than usual	55.8%

3.6.5 Personal hygiene and sanitation

The three PVOs in the consortium agreed on proxy indicators to determine the status of personal hygiene behaviors linked to four specific areas:

1. Personal hygiene, as indicated by hand washing practices
2. Food hygiene, as indicated through the proper washing of kitchen utensils
3. Water hygiene, as indicated by the proper conservation of drinking water
4. Environmental hygiene, as indicated by the increased use of latrines by caregivers

Hand washing at key periods[50]:

The percentage of individuals in MYAP villages that wash their hands with soap at key periods including: before eating, after leaving the toilet facilities and after cleaning a child after a bowel movement is 11.2% (confidence interval 8.6, 13.3), and is reflected on the updated IPTT, calculated by taking the average of the frequencies of the aforementioned behaviors.

Kitchen utensils washing[51]:

The percentage of caregivers reporting proper washing of kitchen utensils in the study area is relatively high with 78.6% in MYAP villages (confidence interval of 74.8, 81.1), and 62.1% in Non-MYAP villages. While the prevalence of proper utensil washing varies by commune, baseline data shows that the practice of washing kitchen utensils is a normal behavior in the study area. Nevertheless, caretakers in some communes can still benefit from interventions to improve food hygiene practices.

Proper conservation of drinking water:

In order to determine the proper conservation of drinking water in the households participating in the survey, the team looked at three indicators: the container used for transporting water, the type of container used for storing drinking water, and whether the container was open or closed while storing drinking water. The survey results showed a high prevalence of proper conservation of water in the MYAP area households, with 97.9% of households in Douentza reporting a closed container and 91.4% in Bourem.

[50] IPTT Monitoring indicator 2,2,1
[51] IPTT Monitoring indicator 2.2.2

The majority of the households in the study area reported using canaries, or pottery water jugs to store their drinking water with 97.6% in Douentza and 89.4% in Bourem. Transportation of water from the source to the home showed a much lower level of care for the protection of the drinking water from possible contamination. The majority of MYAP households reported transporting the water from the source to the home in open pails or buckets (91.2% in Douentza and 88.4% in Bourem) with jerrycans as a second alternative (4.2% in Douentza and 6.8% in Bourem).

The IPTT has also been updated to reflect the large differences between prevalence of proper transport of water (very low in the project area) and the proper conservation of water (very high). The new indicator only measures protected transport of water. Because conservation of water in a clean and covered container is already high, educational interventions will focus primarily on transport of water from the source to the home, and changes in behaviors related to transport only will be used to track performance.

Table 3.27 Transport and Conservation of Water

	Douentza		Bourem	
	MYAP	NON MYAP	MYAP	NON MYAP
Transport of water				
Bidons	4.2	10.2	6.8	23.0
Bols/marmites/tasses	0.2	0.6	0.7	3.2
Seaux	91.2	86.9	88.4	70.5
seaux/bidons/jarres	4.2	2.3	4.1	3.3
Conservation of water				
Bidons	0.3	1.1	2.0	16.4
Jarres	97.6	98.3	89.4	60.7
bassines/marmites/barriques	0.4			3.3
jarres/bidons/seaux	1.3	0.6	6.6	3.3
Seaux	0.4		2.0	6.5
Outres				9.8

Table 3.28 Type of Recipient Used During Transport of Drinking Water[52]

Type of Recipient	MYAP	Non-MYAP	TOTAL
Closed	**14.9% (12.3 , 17.7)**	17.7%	15.6%
Open	85.1%	82.3%	84.4%

Latrine use:

The percentage of caregivers reporting having their own latrines is 35.9%, while an additional 8.5% reported access to another latrine in the community. MYAP-only data is only slightly

[52] IPTT monitoring indicator 2.2.3.

different, with 40.1% reporting access to their own latrines, with another 14.4% reporting access to another latrine in the community. This data was discussed in more detail in an earlier section of the report.

3.6.6. Health services

Access of health services is reflected by the number health centers in the project zone and the attendance frequency of mothers of children under 5 years. In the area covered by the baseline survey, most communes were covered by a functional community heath center which is capable of providing treatment and management of child health issues. Only three Communes are without functional community health centers: Debere, Koubelwel Koundia, and Petaka. The Commune of N'Djaptodi is covered by the community health centers of Dialoube, Ngouma, and Tarabe. Access to health services for children under 5 and their mothers including as pre- and post-natal consultation, activities, is not guaranteed since the quality of care depends on the quality and accessibility of health services in these Communes.

CHAPTER IV
CONCLUSIONS AND RECOMMENDATIONS

Recommendations:

- **Measuring Food Security.** The food security indicators (MAHFP and HDDS), if possible, should be collected during the baseline, midterm and final evaluations from the same MYAP and non-MYAP villages, and perhaps the same households. In addition, by collecting data from non-MYAP villages, the PVOs will be able (in part) to determine whether the observed changes in food security are due to the program (as opposed to other factors).
- **Measuring Food Security and Agricultural Indicators in the MYAP.** Food security and levels of agricultural production in Mali depend heavily upon the annual rainfall. Therefore, the food security and agricultural production indicators will depend heavily upon the agricultural situation during a particular year. If rainfall is poor during a particular year (ie, the midterm or the final), this will have a strong impact on the results achieved. This can be minimized by collecting data from non-MYAP villages; ie, production in these villages during that year will show what would have happened in the absence of the MYAP program. Nevertheless, for the MAHFP, HDDS and agricultural production indicators, the PVOs should not only focus on the *average but also* the standard deviation (variability).
- **Agroenterprise activities.** Agroenterprise (AE) activities in Douentza, based upon current production and livelihood systems, should ideally focus on cowpea, rice, groundnut, sesame, gombo and market gardens, depending upon the results of the agroentreprise market chain analysis. For Bourem, such activities could focus upon rice, tobacco and market-gardening, as well as some small livestock-generating activities.
- **Market information systems.** While a majority of households collect market data, this is primarily focused on livestock. A smaller percentage of households collect data for food crops, cash crops, and vegetables. In addition, those that collect market information do so by traveling to the market. Given the long distances to such markets, this is an important cost for farmers. As having market information is crucial for deciding when, where and how to sell – and improving farmers' incomes – this should be a primary focus of the AE activities. In particular, the MYAP should ensure that farmers' groups either have access to or develop market information systems. With the expansion of cell phone coverage in Mali – especially

in Bourem – the PVOs should consider developing and/or linking to MIS via mobile phone networks. Examples of this exist in Ghana.

- **Literacy activities.** Literacy activities will be an important part of the MYAP in future years. Literacy data was not collected during the baseline, but a literacy baseline (ie, pre-literacy tests) should be conducted in MYAP villages prior to the beginning of these interventions.
- **Responding to child malnutrition.** The poor and aggravating nutrition status of children 0-5 years, shown in by the analysis of survey data, and backed by the latest DHS data, needs appropriate and sustainable response. This means that we should tailor a successful response to prioritizing the treatment of children suffering from moderate acute malnutrition to save them from severe acute malnutrition and death, through community participation and local food resources.
- **Preparing for and responding to shocks.** A high percentage of communities had an infrastructure to prepare for shocks. However, the functionality of these centers is in question and their ability to quickly respond to shocks. Based upon the most important shocks affecting these communities, the MYAP should identify (with communities) the most important early-warning indicators, as well as ensure that local early warning systems are well-integrated into the national-level early warning systems. In addition, the MYAP should consider working with information technology (cell phones) to send and receive information on such indicators.

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