

HOW DO HOUSEHOLDS IN NIGER MAINTAIN THEIR LIVELIHOODS AFTER
A PRODUCTION SHOCK?
A COMPARATIVE STUDY OF COPING STRATEGIES USED BY TWO
NIGERIEN VILLAGES

A Thesis

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ABSTRACT

It is argued that Sahelian livelihoods have become more vulnerable since the “great drought” of the 1970s. Increasing rural impoverishment of the economy and the natural resource base in dryland areas across the Sahel are increasing livelihood vulnerability. In areas where crop production no longer meets annual food needs, the accumulation of buffers against shocks is no longer possible, creating an annual food gap and forcing people to seek alternative activities to subsist. In many areas, this has created an annual cycle of subsistence and coping (Davies, 1996).

Based on the premise that people who live in marginal environments develop a variety of mechanisms to cope with chronic food insecurity, this study investigated how households in two villages in south central Niger coped with an extended food gap triggered by a locust infestation and early end to the rainy season in 2004. A survey was implemented to investigate how coping strategies differed between households and years within and between these two villages and used contextual information to account for these variations.

Through this research, it was discovered that in both villages more coping strategies were used by more people in 2005 than in 2006, confirming that 2005 was a more stressful year for most households in these villages. Although some employed strategies did not overlap, the majority of strategies were used in both villages, implying either increased availability, ease of entry or reasonable return of these strategies. Although there were asset disposal strategies (also called erosive strategies) employed, which are used by some nongovernmental organizations as an

indicator of a food crisis and for intervention, these strategies were used most often by the most vulnerable group, indicating that they were closer to experiencing a food crisis than the other groups (vulnerable and least vulnerable groups). The most vulnerable group employed more strategies than the other groups showing that they were most affected by the crisis, that their livelihoods are more vulnerable to production shocks than wealthier households and that there are multiple coping strategies available to them. This stratification of groups confirms that regions, communities, nor villages can all be assumed to react the same way to stress and therefore, interventions and policy must understand why households do what they do in the face of a crisis to be effective.

BIOGRAPHICAL SKETCH

Erica Phillips grew up outside of Washington D.C. After receiving a Bachelor of Arts in Political Science from Pennsylvania State University, she was accepted into the United States Peace Corps and was sent to Niger, West Africa, where she served for over two and a half years. While working as a Community Health Educator in one of the poorest and hottest places on the planet, she discovered that in an agrarian based society, one can not teach health or nutrition without understanding people's primary activity – agriculture. She then began a journey that included weeding millet, picking cowpeas and harvesting peanuts in the sandy fields with her Nigerien friends. Upon returning home to the United States, eager to learn more about food systems in America, she worked on diversified organic vegetable farms. Seeking to merge the lessons from her various international and agricultural experiences, she joined the International Agriculture and Rural Development M.P.S. program in 2005.

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LIST OF ABBREVIATIONS

CDC	Centers for Disease Control
CFA	Financial Community of Africa*
CILSS	Permanent Inter-State Committee Against Drought*
CSFVA	Comprehensive Food Security and Vulnerability Analysis
DGCD	Directorate-General for Development Cooperation Belgium
EWS	Early Warning System
FAO	Food and Agriculture Organization
FEWS NET	Famine Early Warning Systems Network
FEWS	Famine Early Warning System
FFW	Food for Work
GAM	Global Acute Malnutrition
GDP	Gross Domestic Product
GON	Government of Niger
HKI	Helen Keller International
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
INRAN	National Agricultural Research Institute*
MSF	Medecins Sans Frontieres (Doctors without Borders)
MT	Metric Tons
NGO	Non Governmental Organization
PAD	Decision Assistance Project*
PPP	Purchasing Power Parity
SIMA	Agricultural Market Information System*
UNDP	United Nations Development Program
UNICEF	United Nation's Children's Fund
USAID	United States Aid for International Development
WFP	World Food Program
WHO	World Health Organization

* translated from French to English

CHAPTER 1

BACKGROUND ON NIGER AND THE 2005 CRISIS

Niger has the objectionable distinction of being ranked the least developed country (177 out of 177) by the United Nations Development Human Development Report in 2006¹ (UNDP, 2006). The Human Development index takes into account three dimensions of human development: “living a long and healthy life (measured by life expectancy), being educated (measured by adult literacy and enrolment at the primary, secondary and tertiary level) and having a decent standard of living (measured by purchasing power parity (PPP) and income)”. Reviewing these numbers, it is understandable why Niger ranks last on the list. Life expectancy at birth is 44.6 years, the adult literacy rate is 28.7 percent and the gross domestic product (GDP) per capita is 779 (PPP USD) (UNDP, 2006).

In July 2006, the population of Niger was estimated to be 12.5 million people, with an annual growth rate of 3.3 percent compared to 2.8 percent for Sub Saharan Africa. In rural areas, 63 percent of the population is considered poor and 36 percent are extremely poor. Ninety percent of Nigeriens rely on agriculture and livestock for their livelihoods and over eighty percent of Nigeriens live in rural areas. Agriculture consists of 39 percent of the GDP. Niger is rich in uranium deposits, however since the “Uranium Boom”² ended in the mid 1980s, Niger’s economy has stagnated, the

¹ “The HDI provides a composite measure of three dimensions of human development: living a long and healthy life (measured by life expectancy), being educated (measured by adult literacy and enrolment at the primary, secondary and tertiary level) and having a decent standard of living (measured by purchasing power parity, PPP, income)”.
http://hdr.undp.org/hdr2006/statistics/countries/country_fact_sheets/cty_fs_NER.html

² The “Uranium Boom” refers to the period in the 1960s and 1970s when Niger earned substantial export earnings and rapid economic growth from the export of uranium to countries like France and Japan for nuclear power.

GDP has fallen and poverty rates have increased. With few other internal sources of revenue, almost half of the national budget comes from foreign donors (World Bank, 2006).

Niger became an independent country in 1960. Except for a brief period in the 1990s, for almost its first 40 years, Niger had single party or military rule. Following a coup in 1999, democratic rule was returned to the country, but in the process, many aid agencies and donors withdrew from Niger, deepening the country's economic crisis.

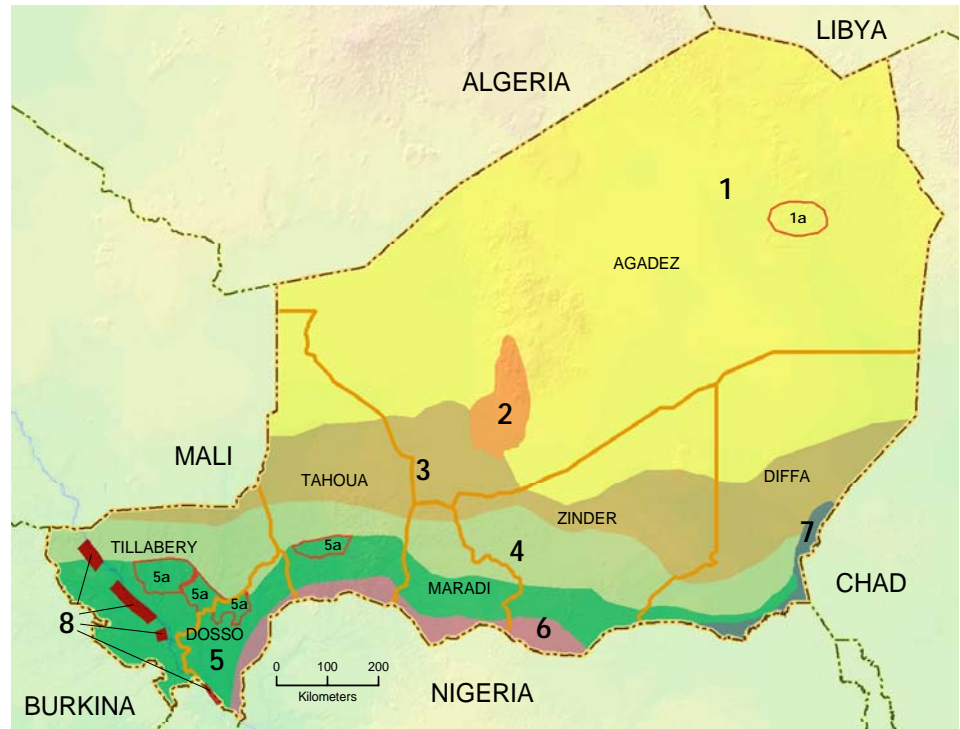
Livelihoods

The climate and geography of Niger varies greatly from north to south and each region's climate and rainfall level has a large influence on the population's activities and livelihoods. The northern four-fifths of Niger is semi desert or desert making pastoralism or agropastoralism more feasible than pure agricultural subsistence strategies, as it receives below 400 mm of rain a year³. The pastoral zone borders the desert—its northern limit is the Sahara Desert—and its southern limit is the northern edge of the agropastoral zone. The agropastoral zone is climatically unpredictable, receiving between 200 and 400 millimeters (mm) of rain annually, bordered by the pastoral zone to the north and the settled, rainfed agriculture zone to the south.

The majority of the population of Niger consists of sedentary Hausa and Djerma farmers, who live in the rainfed agriculture zone, which receives between 400 and 600 mm of rain a year and allows for rainfed cereal growth and livestock rearing. In parts of the most southern areas of the country, which share a long border with Nigeria, cultivation of cash crops, such as tobacco and onions is common.

³ Pearl millet, the most widely grown crop in Niger requires between 250 and 700 mm of rainfall.

Figure 1—Livelihood Zones of Niger/Food Economy Zones



Ref: NR_C02_Country

- | | |
|--|--|
| Zone 1 – Sahara Desert | Zone 5a – Subzones at high out-migration for work |
| Zone 2 – Air mountain cultivation zone | Zone 6 – Southern irrigated cash crop zone |
| Zone 3 – Pastoral zone | Zone 7 – Komadougou River and Lake Chad cash crop zone |
| Zone 4 – Agropastoral zone | Zone 8 – Niger River irrigated rice zone |
| Zone 5 – Rainfed agriculture zone | |

Source: FEWSNET 2005, p. 12-13

Using the United States Aid for International Development’s (USAID) funded Famine Early Warning Systems Network’s (FEWS NET) Livelihoods/Food Economy Zone classifications, the villages in which this case study was conducted are located in the

Southern Irrigated Cash Crop zone (Gabi) and the Rainfed Agricultural Zone (Zermou)⁴. The Livelihood/Food Economy zone classifications were chosen because this not only account for geographic or agro-ecological differences between populations, but also accounts for the multitude of factors that contribute to food security or insecurity, such as income earning activities and sources, agricultural production systems, hazards to food or cash sources, and market access of each zone (FEWS NET, 2005).

Following the 2004 rainy season, the agropastoral zone and its population was reported to be the most food insecure in the country, with the highest numbers of food insecure people located in the departments of Dosso and Tahoua. The World Food Program's (WFP) Comprehensive Food Security and Vulnerability Analysis (CFSVA) performed in April-May 2005 estimated that 2.4 million of the 3.6 million living in agropastoral areas were highly vulnerable to food insecurity and that 874,000 people faced extreme food insecurity conditions (2005). While the plight of the agro-pastoral populations received the most media attention during the crisis, and their situation after the 2004 harvest was the most dire due to a loss of forage and cultivated crops, this paper focuses on the livelihood zones in which I worked, the Rainfed Agriculture Zone and the Southern Irrigated Cash Crop Zone. The overall impact of the 2004 crisis in these areas might not have been as devastating overall, but within these zones there remain patches of high vulnerability.

⁴ Using geographic classifications, the CFSVA places Gabi in the Medium Savanna Zone and Zermou in the Dry Savanna Zone. Where specific data cannot be found using livelihood zones, I will use these categorizations.

Rainfed Agriculture Zone

The rainfed agricultural zone stretches east-west across the entire country. In this zone, most people rely on “a typical Sahelian millet/sorghum-plus livestock economic base” for survival (FEWS NET, 2005, p. 14). A typical plot in the South West of Niger cultivates 58 percent Pearl millet (*Pennisetum glaucum*), 20 percent cowpea (*Vigna unguiculata*), and 14 percent sorghum (*Sorghum bicolor*) (Graef and Stahr, 2000). In this zone animal raising is part of the farming system and is most often done by smallholders for consumption and as a form of income and savings. The main livestock are cattle, sheep and goats. The majority of people that live in this region are poor, and do not grow enough food to last an entire year, relying on labor to survive. In fact, because the rainfed agriculture zone is inhabited by the most people in the country, it is also home to the highest number of poor people (FEWS NET, 2005). The main sources of income in this zone are cash crops, typically cowpeas, peanuts (*Arachis hypogaea*) and tigernuts (*Cyperus sculentus lativum*), trade, casual labor and livestock.

Poor households in this zone only grow enough to feed the household for three months⁵. Caught in a destructive cycle, many of these households are forced to sell some of their agricultural production after the harvest when prices are lowest in order to have cash. When market prices rise around April, these households are forced to begin buying. Throughout the year, it is estimated that the poor in this zone purchase almost 60 percent of their food needs. Middle-income or richer households in this region may sell surplus crops or cash crops up through February, and may begin to

⁵ “Poor”, “Middle” and “Better-off” households are classified in this report as the amount of land owned and planted and the amount and variety of livestock owned. Poor in this zone plant on 1-2 hectares, own no cattle, but do own 2-5 goats or sheep. The poor comprise 40-45% of the population in this region.

buy from the market (if at all) in August (FEWS NET, 2005). These wealthier groups buy about 10-15 percent of their food needs. In terms of cash income, the poor rely on a mix of migrant labor, sale of crops and local labor. The middle and better off groups rely almost equally on crop sales (just above 50 percent), with the remaining mix of petty trade, livestock sales, and migrant labor, specifically for the middle group.

Southern Irrigated Cash Crop Zone

The Southern irrigated cash crop zone is similar to the rainfed agricultural zone, although with slightly higher and more regular rainfall and/or seasonal riverbeds, cash-cropping is common. The livestock and main food sources are the same for the rainfed agricultural zone, but cash crops in this region not only include cowpeas, peanuts and onions but tobacco as well. This region contains the densest rural population in the country. The “poor” in this group have between 0.5-1 hectare of rainfed land with no cattle and 4-5 goats or sheep. As in the rainfed agricultural zone, the poor comprise about 45 percent of the population.

Unlike in the rainfed agricultural zone, the poor in this zone rely on their own production for about 40 percent of their consumption, supplementing with 40 percent from the market and payments in kind. The middle group relies on their own crops for about 45 percent of consumption, whereas the wealthy group produces enough for almost $\frac{3}{4}$ of the year. The middle income group relies heaviest on the market the market for about 45 percent of its consumption. The main income sources vary drastically between the poor and middle and better off groups. The poor earn about 15 percent of their cash from crop sales and about 60 percent from local labor and the other two groups earn over 60 percent of their income from crop sales with the

remaining amount a mix of migrant labor for the middle group and petty trade for both groups (FEWS NET, 2005).

Seasonal Variation

In both of these zones, there are three seasons a year: the rainy season, cold season and hot season. These seasons drive the agricultural calendar, which begins in March with land preparation. When the rains begin in June, planting takes place, and until the harvest begins in late September, there are usually two rounds of cultivation. The harvest can run until early November. Rainfall varies from one region to another and its distribution is often erratic. Rainfall levels fall sharply as one moves northwards in the country. The cold season, which includes the south west Harmattan winds, lasts from November to February, when low temperatures drop to 60 degrees F. Hot season runs from March to June, when high temperatures typically exceed 105 degrees Fahrenheit.

Figure 2 – Seasonal Calendar for Gabi and Zermou

Month	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	
Climate	Dry Season - Cool		Hot Season			Rainy Season			Dry Season - Hot		Dry Season - Cool		
Agricultural Activities			Field Preparation			Planting	Cultivation	Harvest		Field Cleaning/Grass			
Market activities	Sale of grains			Staple Food Purchases							Sale of grains		
Hunger Season			Human Hunger Season										
			Livestock Hunger Season										

For many agriculturalists, the period just before the harvest is the most stressful time of the year, called the “soudure”⁶, “lean season” or “hungry season”, as food stocks

⁶ “Soudure” is the French word for “welding” commonly used in Francophone Africa to describe the hunger season

from the previous year are limited or have run out, access to income sources are restricted and food prices increase. In Hausa, the “Lean Season” is called “rani” which is also the name of the hot season that precedes the rainy season. Seasonal climate and activities are represented in figure 2.

Challenges to Agriculture and Livelihood Zones

After reviewing the literature on agricultural production in Niger and the Sahel, a reader can become overwhelmed by reasons why Niger’s agricultural production has stagnated in the past ten years. Some analysts claim that lack of water, erratic rainfall and recurrent droughts are the biggest constraints to Sahelian agriculture. Others point to poorly structured and sandy soils with nutrient deficiencies, including nitrogen and phosphorus, as main limitations (Bley, 1990; Payne et al., 1990 as cited in Graef, 2000). Poor access to inputs such as improved seed or fertilizer and “poor farming practices”, desertification, wind and water erosion and minimal additions of organic matter are also factors that restrict optimum yields. It seems impossible to point to one aspect restricting agriculture, but that there are a multitude of dynamic factors that inhibit Nigerien farmers from being able to meet annual food needs.

As a result of the rapidly increasing population, land pressure is often implicated as one of the most important factors affecting Nigerien households’ food security. Since 1970, the area of land used for agricultural purposes has risen, half of the forests have disappeared and erosion has increased. Nigerien farmers traditionally relied on a traditional bush fallow system for soil fertility and regeneration. In the last 10-15 years, due to increasing population pressure, that number has been reduced to less than 5 years (Wezel and Buerket, 2000). This has led to increased soil degradation and decreased yields per hectare. Chemical fertilizers are rarely used due to their high

prices. Addition of animal manure and crop residues is the most common strategy to manage soil fertility and these are most often applied to fields closest to the village (Greaf and Stahr, 2000). Use of crop residues on fields can increase soil fertility by reducing water and wind erosion, however there are insufficient quantities to be universally implemented or they are needed by households for other purposes.

According to Davies, primary activities of households in the Sahel can no longer guarantee annual food needs in most years (1996). In the past, however, they met food needs and supplied buffers against production failures. Now livelihoods have been replaced by a cycle of subsistence and coping each season with little room for accumulation of surplus. According to her, “livelihood systems have become more diversified to spread risk, but diversification is itself becoming less effective” (1996, p. 284). Livelihood systems have also experienced increased market dependency, which can be dangerous due to the highly variable nature of both the terms of trade and transaction costs. Households are now forced to adopt market participation strategies, which take up both a significant amount of cash income and household labor (Davies, 1996).

Niger’s 2005 Food Crisis

The months of hardship for hungry Nigeriens in 2005 have been labeled everything from a “famine” by the media, a “food crisis”, “a severe but localized food security crisis”, an “emergency of access”, “a humanitarian crisis” to a “nutritional emergency” by various nongovernmental organization (NGOs) and aid donors (FEWS NET, 2005, WFP, 2005, UNICEF, 2005). These different titles, however, may reflect motivations or objectives of these institutions more so than an attempt to define the situation in terms which reflect Nigeriens’ needs. Semantics hardly seem to matter when people

who suffer chronic food insecurity continue to suffer from hunger, poverty and rates of chronic malnutrition of 40 percent of children under age five, even in a non-crisis year (UNICEF, 2005). From performing my research in Niger and speaking to hundreds of people in Maradi and Zinder, it is clear that the 2005 lean season started earlier than normal. Many people said that they had “never seen a year as bad as last year (2005)” and that 2005 was the “worst year they can remember” in terms of experiencing hunger and not having means to access food. The WFP stated that the 2005 Niger crisis “challenges the traditional view of Sahelian crises and obscures the distinction between structural and short term crisis” (2006, p. 7). They instead chose to call the situation in Niger a “permanent emergency”, pointing to a lack of effective solutions to the structural problems underlying the crisis (2006, p. 3). Famines were previously associated with acute starvation, severe hunger and excess mortality. The more current views, however, recognize that “famine is a long process, the outcome of which includes erosion of people’s livelihood, destitution and social disruption, but does not necessarily include excess deaths” (Young & Jaspars, 1995, p. 33). Many famine victims see famines not just as starvation or a unique event, but as a continuation of normal processes. According to these definitions, it is not surprising that chronic food insecurity resulted in a crisis.

In this paper, I will refer to the situation simply as the “2005 crisis” OR “the crisis”. Although these terms may be vague, I believe that they cover a range of causes and outcomes of what was no doubt a crisis. Although crude mortality rates may not have been elevated indicating a “true famine” scenario according to certain donors (although under 5 mortality rates did), if people are hungry, livelihoods are threatened and livestock are sold in distress, then it is a crisis to those forced to take desperate actions.

These titles and definitions suggest that a more in depth analysis and discussion of the nuances of coping strategies in Niger following the 2005 crisis are essential. What were the actual causes of the 2005 crisis and was this situation unusual for Nigerian farmers? Was the food security situation in 2005 simply a discreet event resulting from a large shock to agricultural production or it is the result of high rates of poverty combined with high rates of vulnerability? Was the food insecurity experienced in 2005 any different from a “difficult” lean season and if so is this an indicator of declining livelihoods or increased vulnerability of rural livelihoods? The following section addresses these questions by looking at access and availability to food during the 2005 crisis and the structural and underlying causes of the crisis. Before dissecting the facts of the 2005 crisis, however, a historical look at food security in Niger is necessary.

Sahel famines of 1974 and 1984

Food shortages and drought are not new phenomena to the Sahel. There have been three major droughts in this century (1910-1916, 1941-1945), followed by a period of below average rainfall that began in the late-1960s and into the 1980s (Batturbury & Warren, 2001). The period of poor rainfall in the 1970s led to an extended period of hardship for farmers and pastoralists, with a famine in 1973. In 1983 and 1984, many weather stations recorded absolute minimum rainfall levels (Batterbury & Warren, 2001). Farmers that I interviewed compared the severity of the 2004-2005 crisis to the famines of 1973 and 1984. The food shortage of 2004-2005 was referred to in Zermou as “Tazerchi” in Hausa, which is “something that has returned that you haven’t seen in a long time”.

Two of the largest droughts this century (1968-73 and 1980-84) each impacted 16 and 14 countries in the Sahel respectively. Between 1968-73, rainfall deficits were 15-40 percent and led to a decline in grain harvests by 600,000 tons, a 15-percent loss of the average annual yield (Leisinger, Scmitt, & ISNAR, 1995). It is estimated that the drought caused 100,000 deaths (Batterbury & Warren, 2001) and that more than 80 percent of the livestock in the Sahel perished during this period (Leisinger et al., 1995).

The 1980-84 drought resulted in a shortage of grain of 300,000 MT. Again, livestock in many regions were decimated, and livestock/grain terms of trade made acquiring food difficult if not impossible for herders. Reinforcing the idea that famines are not new occurrences to these regions and that in some ways they have become part of the culture, I discovered that all famines or severe hunger seasons are given local names. In Zermou, a group of village elders told me that the famine in the early 1970s was referred to as “Korna/Korjaja”, “mola kanche”- because people ate these plants in severe times of hunger. The famine of 1984 was called “el bahari” or “bangabanga”, which can be loosely translated from Hausa as “all at once” or “an event that covered/swept up whole land and left no food” (personal communication with village elders).

The 2005 Crisis

The following section reviews access and availability to food during the 2005 crisis as well as structural and underlying causes of the crisis. As will be discussed in chapter 2, modern understanding of food security recognizes that there are underlying as well as proximate factors that lead to food crisis, not simply a lack of food production. In the case of the 2005 crisis, loss of production and income-earning opportunities, high

food prices (WFP, 2005) as well as severe poverty, irregular rains and locust damage to crops are all cited as causes of the crisis (FEWS NET, 2005).

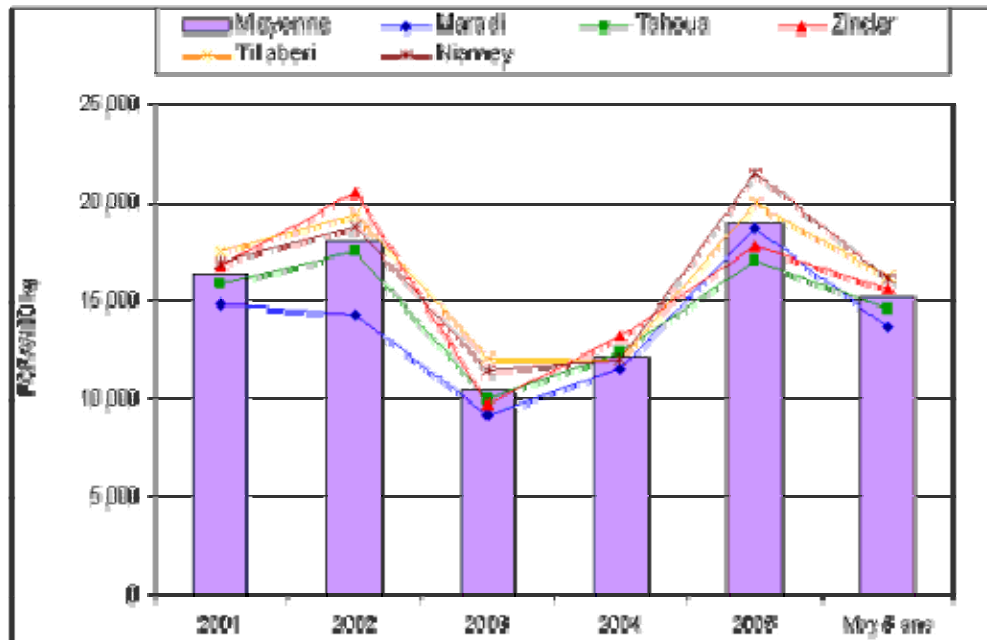
Access

Describing the situation as an “emergency of access” by some analysts acknowledges that the increase in millet prices, which skyrocketed during the early part of 2005, exacerbated the crisis. As total grain production in the country was 11 percent below the five year average, this left an import requirement of 315,000MT (FEWS NET, 2005). At the national level, grain shortages are typically mitigated by imports from neighboring countries, varying from between ten to forty percent of domestic production (WFP, 2005). In most years, Niger imports cereals from surplus Nigeria, Burkina Faso and Mali. In 2005, however, each of these countries imposed restrictions on exports because of fear of famine and grain shortages in their own countries. In the first 5 months of 2005, food imports to Niger were about half of the normal amount.

Due to the reduction in domestic production and reduced imports, SIMA (translated into English as the Agricultural Market Information System) reported that average prices increased 37 percent for millet, 25 percent for sorghum, and 23 percent for maize compared to levels of the previous season, making acquisition of grains difficult for many poor households (FEWS NET, 2005). In more remote areas, cereal prices in July 2005 were 75-80 percent above the previous five year’s average. Prices climbed higher in 2005 than they did in the last bad harvest year, 2000-2001. In Gabi and Zermou, market prices for millet were reported to be much higher in 2005 than other years (personal communication). In Zermou, prices were as high as four times more

per measure during the 2005 lean season than after the harvest of that year (250 CFA⁷ compared to 750-1,000 CFA/measure), and as high as double that of the following lean season (450 CFA/measure in the 2006 lean season). Some people reported switching to less preferred foods, such as rice or pasta, whose prices hovered at 350 CFA/kilogram. In Gabi millet prices were reported to be as high as 900 CFA/measure in 2005 and fell to 350 CFA/measure in 2006 at the time of interviews.

Figure 3 - September Millet Prices at Major Markets



Source: FEWS NET, 2005

All of this combined to make access to food difficult for the majority of people who rely on the market to fill their food gap. According to the Permanent Inter-State Committee Against Drought (known by its French acronym CILSS), a compounding factor affecting access was that high prices for millet and sorghum in neighboring countries drew Sahelian grain south, further increasing prices in Niger.

⁷ 250 CFA=.49 USD and 1 USD = 510 CFA as of June 1, 2006

As discussed in the section on livelihoods, the majority of the population of the two livelihood zones that I worked in depends on buying grain from the market for at least part of the year, making grain prices critical for those populations. Therefore, depending on the length of their annual food gap, market prices for basic grains, more than their agricultural production, influences their household food security. According to the Comprehensive Food Security and Vulnerability Analysis (CFSVA) performed by the World Food Program in April and May 2005, 86 percent of the population of Niger was dependent on market purchases for their millet consumption due to reduced household production and stocks.

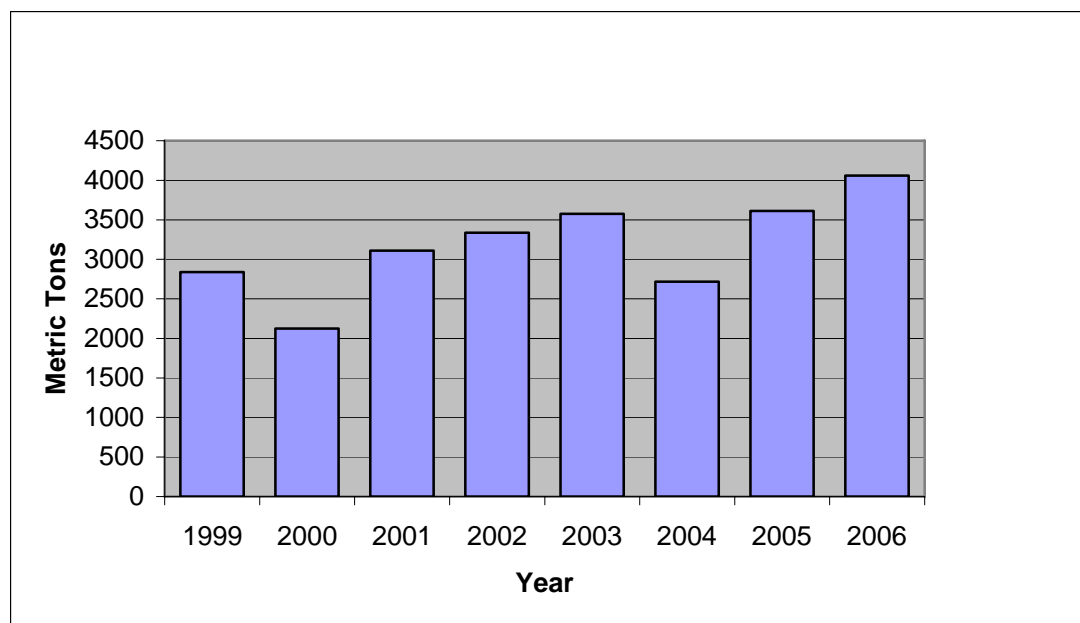
With reduced agricultural outputs (staple crops as well as cash crops), many lacked cash to buy food with. The poor in these regions rely heavily on labor opportunities for income from the middle and wealthier income groups. The middle income group and the wealthier group rely heavily on agricultural sales for cash. With a decrease in production of basic crops and cash crops and poor terms of trade for livestock, the middle income group and wealthier groups could not afford to hire as much labor as usual following the 2004 harvest. With the poor dependant on these sources of income, they had few alternatives for cash. The alternatives they did have included selling productive or non-productive assets, selling crops for cash soon after the harvest, only to be left in debt and being forced to buy food later in the year when the prices were higher, and becoming trapped in a vicious cycle.

Availability

Long term production rates of cereals from 1985 to 2004 shows that the growth in yields was 2 percent below the population growth rate (markets). In 2004, Niger's

production of millet, sorghum, maize and rice fell by eleven percent of the national five year average to 2.6 metric tons (MT), which represented a sixteen percent per capita decrease in the domestic supply of all cereals and a 23 percent decrease in millet production, with certain regions, mostly in the north, experiencing as high as a ninety percent decrease per capita (WFP, 2005). Over half of the thirty three rural districts reported a decrease in production (WFP, 2005).

Figure 4 - National Cereal Production



Sources: 1999-2004 -WFP from Ministry of Agriculture, 2005-2006 - CILSS/AGRHYMET/FEWS NET

Average to good rains were experienced during the June-September 2004 rainy season in most areas, but the rains ended early, reducing yields. However, grain production in 2004 was still 22 percent above production in 2000, but there was no crisis then. In a typical year, surplus grain from the Maradi and Zinder regions are exported to other zones. Around January, domestic supply runs out and cereals are imported from neighboring countries (WFP, 2005). As mentioned in the previous section, imports in

2005 decreased by more than half the amount during the same period in 2004, from 390,00MT in 2004 to 14,000MT in 2005⁸. The amount imported represents less than the amount of the deficit that Niger experienced after the 2004 harvest.

In July 2005, it was reported that all markets visited as part of WFP's Analysis of Cereal Markets in Niger had at least some quantities of cereals for sale. It is possible that markets all had cereals for sale because prices were too high for people to purchase grains. Traders interviewed by the WFP also reported having millet, although in smaller quantities than in previous years. Smaller markets reported difficulty sourcing millet at affordable prices due to higher transport costs and inaccessibility.

Given that the majority of rural districts reported a decrease in production, and that many poor and middle households rely on the market in an average year, it follows that there was a sharp increase in demand. Not only could this have driven up prices higher than normal, but given the reduced production and reduction in imports, supply was lower than normal. It appears that the amount of cereals in all markets was less than normal in 2005. Reduced supply coupled with higher than usual market demand fed into a problem of access.

Structural and Underlying Reasons/Seasonal

Along the lines of determining the factors leading to poor agricultural performance, every organization or report identifies a long list of structural elements leading to the crisis. According to the GON, Centers for Disease Control (CDC) and UNICEF

⁸ Since much of the grain imported into Niger occurs informally, the quality of import data is questioned (markets).

National Nutrition and Mortality Survey conducted in October 2005, long term and structural causes, including unequal distribution of land, poor soil quality and erosion, lack of knowledge of good agricultural practices, recurrent drought, animal diseases and improper animal husbandry, low education levels and poor infrastructural development as well as high rates of malnutrition as the primary causes of the food crisis. The WFP cites “weakness in development policies on agriculture and animal resources, the limitations of social policies – health, education, access to drinking water – the lack of nutrition policy and, generally speaking, the weakness of investments and development aid” (2006, p.18). Other reports cite malnutrition, poor sanitation, lack of employment and opportunities for income as underlying causes of the crisis. As Niger is one of the poorest countries in the world, it is undeniable that all of the above problems exist and had some impact on the outcome of the crisis. I will focus my analysis, however, on the health and nutritional impact of the crisis, as it is one of the most direct links to food security and it was well-documented in 2005.

Malnutrition and Health in Niger

One of the best studied effects of the crisis was the impact on malnutrition rates in children under five, as many large organizations such as Medecins Sans Frontieres (MSF), Helen Keller International (HKI), the United Nations Children’s Fund (UNICEF) and the World Food Program (WFP) conducted large scale nutritional surveys in 2005. According to the Comprehensive Food Security and Vulnerability Analysis forty percent of children are affected by stunting. A nutrition survey performed by WFP and HKI in Maradi and Zinder (the regions in which I worked) in January 2005 showed a global rate of wasting at over thirteen percent with severe acute malnutrition rates between 2.2-2.7 percent (as cited in WFP). These two regions also showed higher rates of under-five child stunting than the national rates (61

percent as compared to 40 percent). These malnutrition rates are comparable to those typically found in conflict areas or emergencies. Under-five mortality rates reported during 2005 were elevated in Maradi (2.2/10,000 day and Tahoua 2.4/10,000 day)⁹. The results of both of these surveys support 8 nutrition surveys performed between 1996-2005, all of which showed that the regions of Maradi, Zinder and Tahoua, have persistently high rates of Global Acute Malnutrition (GAM) and, therefore a “structural malnutrition problem”(FEWS NET, 2005).

Due to MSF’s heavy presence in Niger in 2005, their record keeping, and their contact with the media, MSF admission records to feeding centers have been used to support malnutrition data. MSF records for admissions to feeding centers and hospital nutrition units showed dramatic increases in admissions during 2005 compared to the previous three years. In 2005, the admissions began to increase in January/February, which is much earlier than the typical seasonal peak of June and sharply increasing in June of 2005 (cited in FEWS NET, 2006). Their records showed that admissions to MSF feeding centers were four times that of 2004 admission levels. Alarming as this is, it did not trigger media or donor attention because admission to feeding programs is not typically an accepted indicator of crisis. MSF treated over 60,000 severely malnourished children in 2005. Peak admission was September/October 2005.

Some analysts of the 2005 crisis argue that there is typical seasonal fluctuation in nutrition status and that malnutrition rates rise every year during the lean season, implying that the 2005 season followed a typical pattern of elevated malnutrition during that time and that these numbers needed to be interpreted with caution. They

⁹ Under 5 Mortality Rates equal to or above 2/10,000/day indicate a serious emergency according to WHO

argue that the lean season presents the most cases of malnutrition, even in a “good” year in the Southern agrarian populations in Niger. Prevalence of acute malnutrition can increase as much as 10 percent during the lean season (Loutan and Lamotte, 1984 as cited in FEWS NET, 2005). While this argument is valid, one cannot ignore that the GAM rates in Maradi fall into the category of malnutrition in an emergency zone¹⁰. Although rates of malnutrition may rise annually to dangerous levels, this should not mean that these numbers do not justify a short term humanitarian and long term development response.

The UNICEF framework for malnutrition conceptually shows that malnutrition’s underlying causes include not just inadequate access and availability of food but also inadequate care for mothers and children, insufficient health services and an unhealthy environment. Even a brief glance at social and health indicators for Niger support the fact that underlying causes of malnutrition strong. Life expectancy at birth is 41.5 years and there are 3 physicians per 100,000 residents (WHO, 2004). Infant mortality is 152/1000 for live births and under 5 mortality is 259/1000, which are some of the highest in the world. Malaria is endemic in the southern regions with prevalence rates as high as 42 percent in under five year olds. The percent of mothers who exclusively breastfeed children under four months old is 2 percent.

Long Term Effects

In the fall of 2005 (the harvest following the crisis), post harvest estimates of cereal production were estimated at 3.6 MT, showing a surplus of 21,000 MT (FEWS NET, 2006). However, the World Food Program estimated that 3.2 million people would still remain severely or moderately food insecure in 2006 due to reduced food stocks

¹⁰ Defined by WHO as global acute malnutrition over 15 percent

and having to repay debt (WFP, 2006). The harvest of 2006, two years following the poor 2004 harvest, grain production was 11 percent better than the previous season and 24 percent better than the average for the five previous years with an estimated harvest of cereals of 3,972,000MT. According to UNICEF-Niger, the regions that were the most hard hit by the 2005 food crisis and had the highest rate of acute malnutrition in 2005 registered the most significant drop in acute malnutrition. The rate of GAM in Maradi and Zinder, dropped from 16 percent and 16.1 percent in November 2005 to 6.8 percent and 9.7 percent in November 2006 respectively (UNICEF, 2005). Although Niger received external aid after the 2005 crisis, 5 out of 8 regions of the country still report GAM levels above 10 per cent (UNICEF, 2005).

CHAPTER 2

LITERATURE REVIEW OF COPING STRATEGY CONCEPTS

Household Food Security

Risks to household food security in arid or semi-arid areas such as Niger are frequent. As these risks are often recurrent, they are anticipated and strategies to cope are carefully planned. Theoretical frameworks designed to understand the factors contributing to household food insecurity and the coping strategies used to manage that food insecurity can provide an understanding of the dynamic nature of the relationships between people and their livelihood systems. In some cases, these coping strategies have been incorporated into famine early warning systems (FEWS) to help predict impending crises and to find entry points for policy or relief interventions. As coping strategies are employed when livelihoods or household food security is threatened, I will briefly discuss the evolution of thought on household food security and livelihood systems, which parallels the evolution of the understanding of coping strategies. Additionally, I also explore the literature on coping strategies and analyze the role of social indicators such as coping as part of FEWS.

The most widely used definition of food security today originated from the World Food Summit in 1996 which states that “Food security exists when all people at all times have physical and economic access to sufficient, safe, nutritious food to meet their dietary needs and food preferences for an active and healthy life”. Paradigms over the past 30 years have shifted from a “food first” to a “livelihood perspective”, a shift in focus from the global and national levels to considering the household and individual levels, and a switch from objective indicators to subjective perception of food insecurity (Maxwell, 2001).

Sen's essay, *Poverty and famines: an essay on entitlement and deprivation*, was a dramatic departure from the prevailing supply side focus of famine and food insecurity. Sen's seminal work on access to food through entitlements and a person's resource bundle shifted the thought from food *production to acquisition* of food, highlighting that access to food at the household or individual level is as important as production and availability at a national and level. Even in the absence of "Food Availability Decline", if the value of people's production and work activities declined relative to the cost of food, people will go hungry. Entitlement theory is credited with having offered more entry points for policy interventions and meaningful early warning indicators to predict famine (Swift and Hamilton, 2001).

Embellishing Sen's entitlement theory, Swift (1989) adds a component focusing on "the role of investments, stores and social claims" in determining household vulnerability to famine. When households are able to generate a surplus above their basic food requirements, excess resources are then appropriated as investments, stores and social claims, which can be resorted to in times of crisis. A household's "bundle" then determines its vulnerability; the poorest households with the fewest assets are the most vulnerable. The importance of this addition to Sen's work is that it considers not only questions of immediate entitlements, but also how assets determine the ability to buffer against a crisis, both of which will determine a household's vulnerability to hunger.

The "Sustainable Livelihoods Approach" to food security is premised on the complexities of rural livelihoods, looking at how people use resources to build a livelihood. This incorporates "the capabilities, assets (including both material and

social resources) and activities required for a means of living” (Scoones, 1998, p. 5). He considers a livelihood sustainable when it can “cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base” (1998, p. 5). This approach considers the contexts in which people act (policies, history, the political environment and agro-ecology), livelihood resources (natural, economic, human and social capital), institutional processes and livelihood strategies, all of which lead to livelihood outcomes (Scoones, 1998).

Coping Strategies and Adaptation

While the definitions of ‘coping’ and ‘coping strategies’ differ widely, the aim of coping mechanisms is universal: “to maintain the various objectives of the household, including livelihood security, consumption, health and status, thus ensuring individual and/or collective well-being” (Adams et al, 1998). In studies examining African food security, the terms “adaptation to”, “risk aversion”, “coping with” and “surviving” are often used. Definitions of coping strategies, however, vary from encompassing strategies to handle short-term crises to managing chronic, seasonal food stress. Another set of authors consider coping strategies as an incorporated and intrinsic part of rural livelihood systems which are always present to some degree which are drawn upon when needed.

Coping strategies can be defined strictly as short-term measures or as “the bundle of producer responses to declining food availability and entitlements in abnormal seasons or years” (Davies, 1996). In other words, coping begins when a household is forced to mobilize resources in order to respond to crisis (Adams, Cekan & Sauerborn, 1998). Ellis (1998) defines coping strategies as actions that are invoked following a decline in

'normal' sources of food, and which are regarded as involuntary responses to disaster or unanticipated failure in major sources of survival.

However, the term "coping" is also used to refer to the ways in which people deal with chronic or seasonal food stress. Chen (1991) states that rural households, especially those in arid or semi-arid areas, routinely plan for and manage uncertainty associated with regular seasonal fluctuations and periodic drought-induced crisis, concluding that this planning for seasonal fluctuation should be considered coping strategies, since they assist households in mobilizing resources and opportunities. Lilongwe (2003) stresses the importance of recognizing local knowledge developed in response to food stress, arguing that societies construct their livelihood systems in response to constraints and opportunities and that the ability to cope with changing conditions over time implies that there is local knowledge built around these factors. In other words, households form expectations of periodic crisis and adapt their resource management strategy taking that risk into account (von Braun, Teklu & Webb, 1998). This idea is supported by Reardon, Malton and Delgado (1988) who demonstrated that populations living in more marginal environments are often better equipped to cope with periods of food stress than those accustomed to more secure conditions.

The distinction between chronic and transitory food insecurity is important as the strategies that people develop to cope with each type of insecurity is different. The World Bank defines chronic food insecurity as a household that is continually at risk of an inability to meet its food needs. On the other hand, transitory food insecurity is a temporary decline of short, but perhaps intense, duration. The two are inextricably linked, as households suffering from chronic food insecurity are most vulnerable to the shocks that create transitory food insecurity. In Niger, many populations suffer from

chronic food insecurity as evidence of the annual food gap, but this structural insecurity in rural areas makes households more vulnerable to transitory food insecurity, which must be taken in to account when evaluating coping strategies.

Coping versus Adaptation

Davies (1993) distinguishes between “coping” and “adaptation” activities. She defines “coping” as a short-term response to “an immediate and inhabitual decline in access to food” and “adapting” as a “means of permanent change in the ways in which food is acquired, irrespective of the year in question” (1993, p. 60). This notion suggests that as livelihood systems change, so do people’s means of accessing food. Coping strategies invoked following a crisis can also lead to new livelihood patterns, although that does not assure economic or environmental sustainability; if “erosive” coping strategies are employed, the use of these activities have the potential to trap people in cycles of food insecurity (deWaal, 1989). Alternatively, Campbell (1990), an anthropologist, writes that coping can not be separated from other actions integral to rural livelihoods. He argues that coping strategies are not only resorted to in times of stress but are elements that exist at all times and assume greater importance under difficult conditions. He compared the response to drought among farmers and herders in Kenya during two droughts – 1972-1976 and 1994-1995 – and concluded that responses to recurrent drought-related food insecurity are dynamic and are determined by the complex interactions between exogenous and local political, economic, social and demographic, and environmental processes. As the local population is influenced by these factors, so are their coping strategies for dealing with food insecurity (1999).

The Continuum of Coping

Coping takes place along a continuum of responses that runs from long-term risk minimization to damage containment to household dissolution if coping results in failure (von Braun et al., 1998). Responses to risk or shocks vary according to factors such as time, place, gender, age, household characteristics, objectives and their endowment base, the nature of the crisis, the intensity and duration of stress, access to community support and access to public interventions, (vonBraun et al.,1998; Campbell, 1990; Toulmin, 1986). Pottier argues that periodic or chronic food stress does not cause all members of a population to be similarly or equally affected (1993). Although dryland areas may share common characteristics and the population may be exposed to similar shocks, household and individual responses differ.

Objectives and Trade Offs

Food insecure populations are often faced with complex choices and trade-offs between acquiring food, selling and retaining assets and maintaining some aspects of a valued lifestyle and between immediate and future needs (deWaal, 1989, Devereux, 1993a). Coping with adversity is based on careful calculations and trade-offs between immediate and long-term objectives (Devereux, 1993a). Objectives for the household can be maintaining consumption, protecting health, preserving household assets and livelihood, and/or preserving social status. Previous research shows that households and individuals purposefully evaluate the costs and consequences associated with different coping strategies and that maximizing consumption is not always a household's priority (Adams, 1992 and Devereux, 1992 as cited in Adams et al., 1998; Swift, 1993). Trade-offs are often made between and within different strategies or on their effects on different members of the household.

According to Maxwell and Frankenberger (1992), equilibrium is strived for between concern for current consumption and capacity to recover economically when crisis has ended. Trade offs also exist between erosive (non-sustainable) and non-erosive coping strategies (Rahmato, 1991). Certain coping strategies have a cyclical nature, which if erosive, can lead to more vulnerable (less resilient) livelihoods. For example, consuming crops before maturity due to hunger satisfies an immediate need of consumption, but jeopardizes longer term consumption or the use of that crop for seeds or exchange. Borrowing money or food can establish a cycle of recurring debt, where one pays back a debt after the harvest when prices are low and limiting the amount of food or money for the household for future, harder months. Households impoverished from previous episodes of food security may have fewer strategies and their timing and flexibility changes. Coping strategies may be repeated, but the stages of food insecurity can occur in quicker succession as people move faster down the sequence of available strategies or start at a lower point in the sequence (Young & Jaspars, 1995).

Sequencing

A much analyzed aspect of the coping literature is the sequence of coping strategies, hypothesized to correspond to increasing levels of distress (Watts, 1983, Rahmato, 1988; Corbett, 1988; Webb et al., 1992). These studies have looked at behavior patterns associated with the onset, progression and climax of severe famine and food shortages and conclude that although there is variation among populations and that conditions vary locally, there are, in fact, significant patterns underlying people's response to crisis. These three stages are the initial use of established insurance mechanisms, the gradual disposal of key productive assets once the insurance

mechanisms have been exhausted and a terminal stage of destitution and distress migration (Corbett, 1988).

Subsequent studies of household behavior have showed other nuances as well- that there is a continuum of increasing stress that exists within clusters of strategies, i.e. selling small ruminants before productive livestock (Devereux, 1993a), that multiple strategies can be undertaken at the same time and under varying intensities (Adams, 1992, Devereux, 1992 as cited in Adams et al., 1998) and that the same range of strategies may not be economically or environmentally sustainable or available from one crisis to the next (Davies, 1993; Gray & Kevane, 1993).

Risk Minimization and Diversification

Millions of smallholders in semi-arid environments face the threat of shocks in production and consumption patterns and risk management is therefore an essential element of long-term coping strategies. Swift and Hamilton (2001) argue that in food insecure areas in dryland Africa, uncertainty is the key constraint to which farmers or herders must adapt. Successful households, therefore, are those who are able to diversify economic activities, ecological niches, economic contexts, social networks and political jurisdictions. Livelihood diversification is widespread in Africa, performed in order to increase and protect household income and security (Swift & Hamilton, 2001). Reardon et al. (1988, p. 1072) call diversity in income generating activities to support food security “the secret of greater Sahelian food security in bad years”, as they found that three-quarters of the average household income in Burkina Faso comes from non-cropping sources. This diversity was done to ensure consumption security in the face of drought-induced production shortfalls. Their study found that households spread income risk across occupations and locations. In

order to protect food consumption levels, Sahelian households are dependent on off-farm income in order to ensure “purchasing power” i.e. access to food in the risk of varying cereal prices (Davies, 1988). Supporting this, Webb (1992) found that rural Nigerien households attained sixty percent of their income from non-farm sources.

Why Study Coping Strategies?

Adams et al. (1998, p. 263) argues that if programmers and policy makers better understood how rural households “households mobilize and allocate resources in times of crisis”, then “the design, delivery and sustainability of a broad range of rural development policies and programs would be improved”. Complementary to this is understanding how livelihoods change over time so that activities can be understood in modern and evolving contexts (Davies, 1996). Additionally, recognizing the different stages of coping strategies that households use can indicate the level of food security at the household or community level, which is required for effective timing and type of interventions. The evaluation of coping strategies has ranged from analysis of economic and environmental sustainability, the motivation for the strategy, costs and benefits of particular strategies, the timing of the activity to resilience vs. labor requirement (Davies, 1996; deWaal & Whiteside, 2003). Utilizing a context specific framework for evaluating coping strategies can lead to better understanding their usage and effects.

One of the most direct and potentially useful applications of the study of coping strategies is part of famine early warning systems (FEWS). Most famine early warning systems were created in response to the African famines in the 1970s in order to prevent future drought-induced food shortages. EWS typically rely on traditional indicators, such as rainfall and crop production. However, mirroring the progression

of thought on household food security, EWS systems also began with a supply side focus, shifting in the 1980s towards socio-economic concerns, such as to food and purchasing power. In response to this shift, analysis of EWS become more “people oriented”, recognizing that local people employ coping strategies in the face of food insecurity (Buchanan-Smith, 1997).

Now that EWS recognize coping strategies as a way of explaining how poor households handle food stress, there has been debate about how coping strategies can reliably be incorporated into EWS. As coping strategies are specific to time, place and groups of people, sweeping inferences about regional or national food security based on coping is impossible (Young & Jaspars, 1995). This is why the study of coping strategies to understand the type, timing, succession and rational behind strategies is essential – to effectively target vulnerable populations and find means to protect and reinforce their livelihoods before they enter a crisis.

CHAPTER 3

PROJECT DESCRIPTION

My research was performed in collaboration with the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT), Niger as part of the Decision Assistance Project (known as PAD in French). PAD is a five year project (2003-2008) funded by the Directorate-General for Development Cooperation Belgium (DGCD). The project's activities and its eleven field partners are coordinated by ICRISAT, Niger. The goal of PAD is to improve livelihoods in the Sahel through the development and implementation of household level bio-economic decision support systems. The project aims to provide appropriate and integrated information for decision-making at the household level in order to increase household incomes and reduce the dependence of Sahelian rural populations on climate and market fluctuations. Project activities take place in four areas:

- Study of agro-ecosystems – developing a better understanding of Sahelian agro-ecosystems, their short and long term dynamics and farmer decision making process in response to climate fluctuation and increased land use pressure
- Development of “decision support systems”
- Technology transfer - appropriation of the most promising crop and animal production technologies by farmers
- Development and reinforcement of farmer organizations – these groups can become empowered by improved access to information and decision-making aid

PAD works in three villages Fakara, located in the Department of Tillaberi outside of Niamey, Gabi in the Department of Maradi and Zermou in the Department of Zinder. Due to time constraints, my research was performed in two of these three villages – Gabi and Zermou. Logistical support was provided by ICRISAT Niamey with help from two field partners, INRAN, the National Agricultural Research Institute in Maradi and AQUADEV in Zinder. INRAN coordinates the project in Gabi in partnership with the Food and Agriculture Organisation (FAO) and AQUADEV coordinates the Zermou site as well as operates an integrated rural development project in the Zermou area.

Research Questions

Based on the premise that people who live in marginal environments develop a variety of mechanisms to cope with food shortages, my research investigated how households in Gabi and Zermou coped with an intensification of food insecurity triggered by a locust infestation and early end to the rainy season in 2004.

My research sought answers to the following questions:

1. How do coping strategies differ between households and years in these two villages and what accounts for these variations?
2. Does the availability of coping strategies vary between the two survey villages and if so how and why?
3. Is there a connection between certain household characteristics and strategies selected?

Coping Strategy Framework/Definitions

In order to better understand the meaning of coping strategies and how useful they can be for FEWS, project interventions or policy design, this paper classifies coping strategies in three ways. The first determines whether a strategy is an adaptive or coping strategy, which is helpful in interpreting the meaning of these activities. Second is whether the strategy is an insurance strategy or asset disposal strategy, corresponding with the MSF guidelines, which helps indicate the level of food security a household is experiencing. Finally, these activities are organized by the potential risk and return, which can help determine how effective or potentially harmful a strategy can be in the short and long term.

I define coping strategies similarly to Davies (1993) - as short-term measures taken by a household in response to food stress. However, recognizing that adaptation strategies are typically incorporated into livelihood activities as a permanent response to chronic or cyclical food insecurity, I argue that these adaptation strategies can also be performed in the short term as a coping strategy, depending on its duration, frequency or intensity. Because livelihood diversification is widespread in Africa, many activities are performed in order to increase and protect household income and security (Swift & Hamilton, 2001). Young and Jaspars (1995) argue that the coping strategies used in communities which face an annual food gap (as in southwest Niger) make it difficult to determine the true intention of a strategy, as over time they become more integrated into annual activities and discerning their meaning becomes difficult.

I have therefore included adaptive strategies in the survey, most often including them under the umbrella term “coping strategies”. One way to distinguish the difference between the two is based on the frequency of certain activities; I define an adaptive

strategy in relative terms - as an activity performed by two thirds the number people in 2006 as in 2005. If less than two thirds the number of respondents performed the activity in 2006 as compared to 2005, then it is classified as a coping strategy.

Coping strategies can be used to categorize households into levels of food security (individually) or of crisis (collectively). Table 1 is adapted from MSF's nutrition guidelines and classifies coping strategies by their sequential use, characteristics of a strategy and the related stage of a household's food security. While the availability and intention of some of the following coping strategies vary by village and household, this chart is a preliminary step towards placing these strategies in categories that can be used to determine effective interventions.

Table 1 - Stages of Food Insecurity and Corresponding Strategies at the Household Level

Sequential Use of Strategies	Characteristics of strategies	Stages of household Access to Food/Livelihood Security
Stage 1- Insurance strategies	<ul style="list-style-type: none"> • Risk minimizing • Preservation of productive assets • Low commitment of resources 	Seasonal or cyclical food insecurity or anticipation of food insecurity/ Fragile
Stage 2 - Disposal of Productive Assets	<ul style="list-style-type: none"> • Entering crisis strategies • Less resilient strategies • Threatening future livelihood • High commitment of domestic resources 	Food crisis/ Failing
Stage 3 - Destitution	<ul style="list-style-type: none"> • Starvation and death • No more coping mechanisms 	Famine & death/ Failed

Adapted from: Corbett, 1988, Revised MSF Nutrition Guidelines, 2001 and Davies, 1996

Finally, coping strategies can be evaluated by their potential risk and return, which can determine how effective or potentially harmful a strategy can be and its long term viability. As trade-offs are inherent in any coping strategy, the return on a strategy may be known to be low, but if the associated risk is low, it might be a feasible trade-

off. Additionally, a low risk and low return strategy, such as gathering wild crops, does little to affect the resilience of livelihoods. However, a strategy with high risk and low return, such as sale of productive assets can decrease a household's resilience. Coping strategies with high return and low risk are the strategies which could be the most successful as they are the least damaging to a household. The most potentially damaging strategies are those which have low return and high risk.

Village Backgrounds

Gabi, located in thirty kilometers south of Maradi, the third largest city in Niger, is comprised of 370 households with a population of about 3,200 residents. Gabi is located on a well-maintained dirt road running between Maradi and Nigeria. It was selected to be in the PAD Project due to its good secondary data, land use pressure, good access to markets in Maradi and Nigeria, and the current trend of agricultural intensification. Gabi receives about 550mm of rain a year¹¹. Gabi has “fadama” or seasonal riverbed fields and “traditional fields”. According to interviewees, *fadama* fields retain water longer and “have more nutrients”¹², allowing farmers to grow late maturing varieties, tobacco, or vegetables in these fields. Additionally, there is a large market hosted each week in Gabi.

Zermou is located about fifty kilometers northeast of Zinder, the second largest city in Niger. It has about 5,000 residents dispersed in 315 households. It was selected to participate in the PAD Project due to its high climatic risk and low exposure to extension services, and therefore less adapted technology. Access to markets is poor

¹¹ Pearl millet, the most widely grown crop in south central Niger requires between 250 mm to 700 mm of rainfall

¹² According to local farmers, this land is more valuable because it is more fertile and retains water better than other fields

due to weak infrastructure in the area. Zermou receives about 300 mm of rain a year. There are 42 villages with chiefs in the canton of Zermou with 5 neighborhoods in Zermou proper. There is a market held in Zermou every Friday. Both villages have access to clean water sources, although in Zermou there are often long lines and water shortages at the pump.

The Survey

To answer my research questions, I designed and implemented a survey at the household level reaching a total of 80 households, 40 in each Gabi and Zermou. The survey consisted of five sections, relying on recall to provide data for the last two years. The first section of the survey included basic demographic information about the household, including the number of children and adults, education levels, occupations, and income sources. The second section contained questions about livestock ownership from the end of the 2004 rainy season through June 2006. The third section incorporated questions regarding possession of other productive assets, such as motorcycles, wheeled carts and sewing machines from the end of the 2004 rainy season through June 2006. The fourth section inquired about agricultural inputs and output for the 2004 and 2005 farming seasons, and finally, section five asked about coping strategies used by each household between the 2004-2005 harvest and the 2005 harvest and at the time of the interviews (June-July 2006) and, followed by detailed follow-up questions related to these coping mechanisms. A copy of the survey is in Appendix 1 and variable definitions are in Appendix 2.

Sampling Methods

In both villages, the interviewed households were selected at random from the census book and stratified into three categories as defined by the mayor and village elders in

Gabi and local project collaborators in Zermou. These categories were designated “very vulnerable”, “vulnerable” and “least vulnerable”. Fifteen names were placed in each category and thirteen to fourteen names were chosen at random from these lists to interview. The definitions of these categories were broadly defined by the following criteria: the amount of time that people experience a food gap, the variety of income sources people have and how many fields people own. The least vulnerable group was considered to have sufficient fields, access to a variety of income sources and little or no food gap. The vulnerable group was considered to have around a six month food gap, sufficient fields and a possible diversity of incomes and the most vulnerable group was considered to have a food gap of over six months, insufficient fields for their production needs and limited options for income diversity. These criteria mirror those of organizations, such as the FAO, use for their household food security classifications, as well as number of livestock owned, whether cash crops are grown and possession of productive goods.

Conducting Interviews

Both men and women were interviewed in both villages. In all cases, we spoke to the male head of the household or one of the wives of the head of the household¹³. Due to women’s busy work schedules, it was difficult to ask for more than a half hour of their time or to speak with them without the permission of their husbands. Interviews performed with women who do not participate in agricultural work did not know the agricultural production of the household’s fields, so we returned to those households to speak with the main agricultural decision maker, usually the oldest male of working

¹³ Head of household is defined as the person in charge of making critical decisions about the family and is socially charged with caring for its members. Since Niger is patriarchal society, the oldest working male of the household (around 25-50 years old) is typically considered the head of household unless there is no male of working age. In that case, the designation would go to a younger, married child or first wife of the former head.

age in the household. In both villages, almost thirty percent of the respondents were women, including seven households headed by women in the two villages. Only one potential interviewee in Zermou declined to speak with us.

A facilitator and I performed the interviews in both villages. I performed about two thirds of the interviews in each village in Hausa and the facilitator performed the other third. For interviews that were conducted by the facilitator, I listened, recorded information, and assured that all of the questions were asked and responded to. The facilitator and I traveled to each household to conduct interviews. This was done in the early morning before people left their homes or in the late afternoon when people returned from their daily activities. Interviews took place either inside people's homes, in the vestibule of the home (sometimes done because my male facilitator could not enter another's home without the permission of the male head of household), in front of homes, or occasionally at a "public gathering spot", where men will often gather to socialize and drink tea. Even if held in a public place, most interviews were performed out of earshot from other villagers to respect privacy. Interviews generally lasted between 30-50 minutes in Gabi and 20-35 minutes in Zermou. The difference in time is a reflection of the amount of assets and agricultural production in each village.

In addition to formal interviews, I spoke informally to village elders in both villages to learn more about the 2005 food security situation. I posed questions ranging from, "What is the lean season?", "How did last year's lean season compare to previous seasons or famines?" and inquired about local names for different aspects of the food shortage.

Restrictions/Scope

Since the survey relied on participants remembering events or numbers from as far as two years prior, there is the possibility that some information might be inaccurate.

Recognizing that this might be a problem, the survey consisted of consistency checks, especially for livestock ownership throughout the three year period. In each section, questions were asked first for 2004-2005 and then for 2005-2006. At each break in time, it was emphasized which year we were focusing on.

The interviews took place between May and July of 2006. The rainy season, which typically begins around the beginning of June, was off to an erratic start and seeding had not yet taken place in either village during the time of the interviews. This translated to at least a month delay in the 2006 harvest, which did not occur until late October in many areas (FEWS NET, 2006). Therefore, it is reasonable to state that the most difficult part of the lean season lay in the months after the interviews took place and that coping strategies reported in June/July would have changed or shifted by the end of the lean season. For this reason, the timing of the interviews makes it difficult to compare 2005 responses directly to those for 2006 since the latter year was not yet complete at the time of the survey.

Since the interviews covered only the past two years it was not possible to study previously employed coping mechanisms during prior periods of food stress, how they have shifted over time, been used, altered or discarded, or which coping strategies have proven to be successful and which ones have failed over time.

Finally, throughout the course of performing interviews, I discovered other coping strategies that I did not inquire about, but would have like to if I had discovered them early enough. These include changes in the quality of food consumed (described as

not being able to eat luxury foods or eating “poor man’s foods”), changes in certain planting practices, such as using multiple varieties of seeds or spatial dispersal of fields.

CHAPTER 4
RESULTS AND INTERPRETATION

Village Demographics

The sample population consisted of 40 people in each village. Table 4 is a summary of the basic demographic information for both Gabi and Zermou. In Gabi there were 28 men and 12 women interviewed, including one female headed household. The average number of adults in a household ranged from 1-13 with a median of 4. The average number of children in a household ranged from 0-29 with a median of 8. Almost 23 percent of heads of household had attended Koranic school, 45 percent had not received any formal education, 23 percent attended primary school and 10 percent attended government schools beyond the primary level.

Table 2 –Summary of Survey Sample

	Gabi	Zermou
Median number of adults	4	4
Median number of children	8	6
Percent attended primary school	23	10
Percent literate	10	28
Number of “most vulnerable”	12	14
Number of ”vulnerable”	15	12
Number of “least vulnerable”	13	14
Most frequently reported primary revenue sources	Agriculture (excluding tobacco production) - 45% Tobacco trade – 18%	Agriculture - 30% Small Trade - 23%
Most frequently reported secondary revenue sources	Agriculture - 33% None – 20%	Agriculture - 48% None - 23%
Percent of women who perform small income generating activities	87%	78%
Percent of women who perform agricultural labor	50%	40%

In Zermou, 29 men and 11 women were interviewed, including 6 households headed by women. The average number of adults in a household ranged from 1-18 with a median of 4. The average number of children in a household ranged from 1-39 with a median of 6. Almost 50 percent of heads of household had attended Koranic school, 20 percent had not received any formal education, 10 percent attended primary school and 13 percent attended government schools beyond the primary level.

Residents of both villages reported agriculture as a primary and secondary source of revenue. However, agriculture as the primary source of income in Zermou is less than that of Gabi, probably due to less average annual rainfall leading to less overall agricultural output in Zermou, forcing residents to rely on other, more reliable sources of income, with the added burden of buying food due to less output. In Gabi, the cultivation and trade of tobacco, including wholesaling, packing and transporting, provides a primary source of income for about 18 percent of the population – an advantage that Gabi has due to its geographic location next to a river bed and partially due to roads leading to markets. Both villages have about 20 percent of the population who report no secondary income, relying fully on agriculture for income and food supply, bringing increased vulnerability in a drought year.

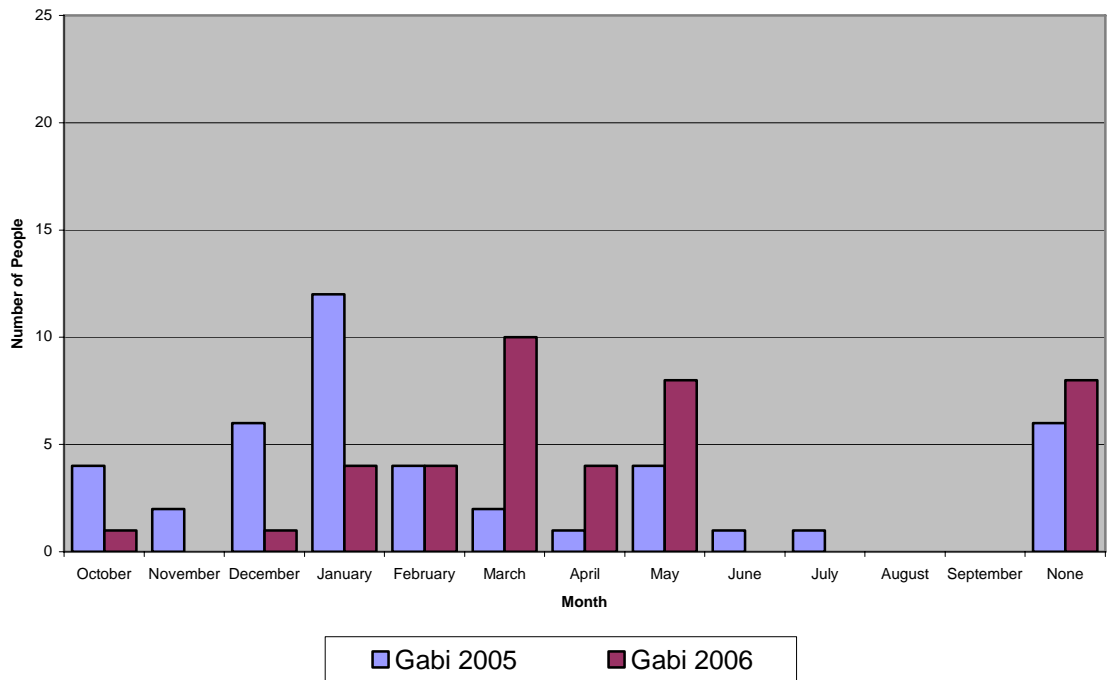
Analysis of the vulnerability groups for income sources shows that the most vulnerable groups in both villages rely more on agriculture as a primary income source than the other groups and conversely, the least vulnerable group relies on agriculture more as a secondary income source. The least vulnerable group has more diversified sources of income – tobacco traders and growers in Gabi and people participating in trade and services in Zermou. In Zermou, more reliance on agriculture by the most vulnerable group, coupled with high variation of rainfall sets up a scenario of high

vulnerability. Less of a reliance on agriculture as a primary income source appears to be a more stable income source.

The Lean Season

In both years, more people reported perceiving a lean season which began earlier in Zermou than in Gabi. On average residents of Zermou reported that the lean season started four months earlier than residents of Gabi in 2005 (Figs. 5, 6). Because this question is subjective, conclusions may be difficult to draw, however, it is clear that over half of the respondents in Zermou perceived 2005 as an extremely difficult year, since they replied that the lean season started right after the harvest’s end, compared to only 1 person in Gabi.

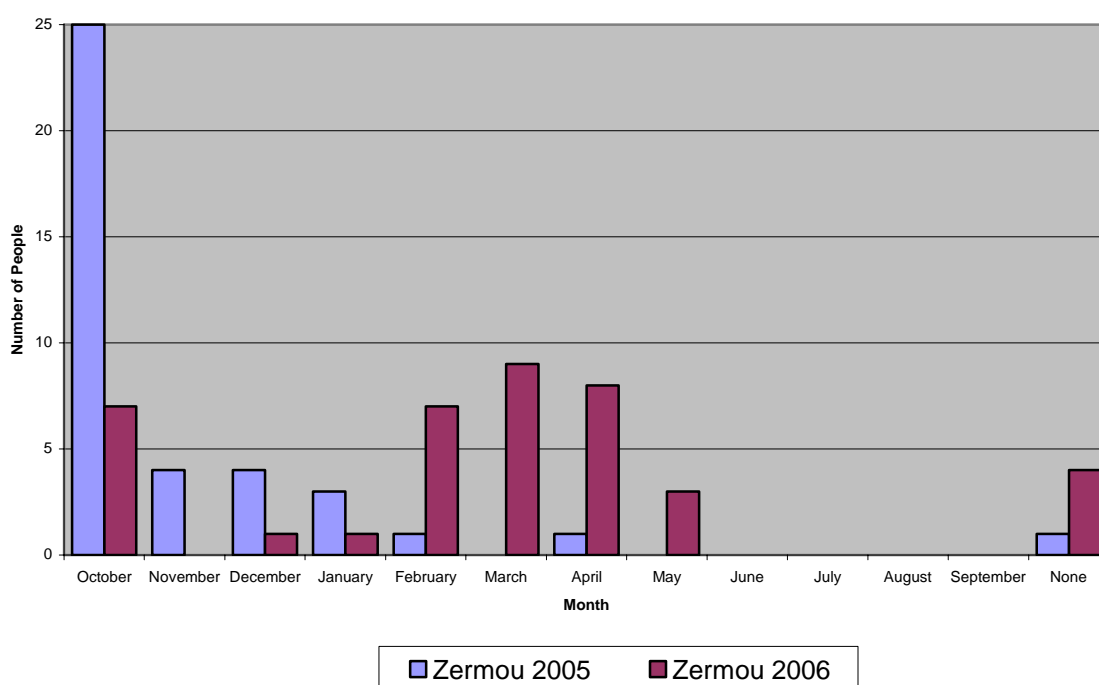
Figure 5 - Reported Start of Lean Season in Gabi¹⁴



¹⁴ The end of September through October is the harvest for most crops in the southwest region

As about 75 percent of people in Gabi and about 70 percent in Zermou reported that the lean season started later in 2006 than in 2005, it can be stated that the majority of households perceived 2005 as a relatively difficult year. This is supported quantitatively by agricultural outputs in both villages. Based on crop outputs, this is not surprising, but does it highlight the relative fragility of Zermou’s livelihoods.

Figure 6 - Reported Start of Lean Season in Zermou



Livestock and Other Productive Assets

In Gabi in 2004, 38 respondents owned some kind of livestock and in 2006, that number increased to 39. The number of livestock sold in Gabi increased by 29 percent between 2004-2005 and 2005-2006. Between 2005-2006, half of the number of livestock owners sold at least one animal and between 2004-2005, 45 percent sold at least one animal. The largest decrease of the mean number of all animals was between 2004 and 2005 for sheep and goats and 2005-2006 for cattle.

In Zermou in 2004, 32 respondents owned some kind of livestock and in 2006, that number increased to 36. Between 2004-2005, 55% of respondents sold no livestock, and 43% sold 1. The largest decrease of the mean number of all animals for sheep was between 2004 and 2005 and for cattle was between 2005-2006, although there was an increase of the number of goats between 2005 and 2006. Table 5 summarizes livestock and asset ownership for each village.

Table 3 - Summary of Productive Assets and Agricultural Activities

Variable	Gabi	Zermou
Average Number Livestock 2004	10.36	8.75
Average Number Livestock 2005	8.85	6.45
Average Number Livestock 2006	7.92	5.10
Average Number Total Assets 2004	2.40	.60
Average Number Total Assets 2005	2.38	.73
Average Number Total Assets 2006	2.50	.70

Average livestock numbers include sheep, goats and cattle. Average total number of assets includes horses, donkeys, poultry, bicycles, carts and motorcycles.

Most residents of both villages have at least one kind of livestock (between 80-98 percent in both villages for all years). As the numbers of all livestock (except the average number of goats owned in Zermou) decreased steadily from 2004-2006, it indicates that households were forced to sell livestock as they needed cash, presumably to buy food. The increase in goats might be explained by a project in Zermou that loaned goats to households as part of an income generating development project. The average amount of cattle owned was less between 2005-2006 than 2004-2005 in both villages, indicating that households held on to larger livestock longer since they are more valuable and are used in farming and therefore have more value as they generate income or food.

As less people sold more livestock in Gabi between 2005 and 2006, it could indicate a few things. Possibly, the effects of the drought in 2004 were more widespread, causing more households to contend with its effects and therefore sell an animal for cash. The most vulnerable group sold on average more livestock than the other two groups in 2006, but not in 2005, possibly indicating that poorer households continued to suffer effects from 2004/2005 and were again forced to sell livestock in 2005/2006 to maintain household objectives. This can also be viewed as an adaptive or protective strategy where people raise livestock in anticipation of chronic food insecurity.

Contrary to Gabi, in Zermou, there were more animals sold between 2004-2005 than between 2005-2006. As 95 percent of those in Zermou who sold livestock between 2004-2005 sold one animal, it can be assumed that the cash needed to buy food was met through the sale of one animal, even though the terms of trade were weaker in 2005 than in 2006¹⁵. Between 2005 and 2006, only 10 people sold animals in Zermou (as compared to 18 in 2004/05), indicating less of a need to sell livestock for cash through May of 2006. The 25 percent of respondents who did sell livestock in Zermou support the idea that this is an adaptive strategy, in anticipation of food insecurity. Ownership of sheep was higher in Zermou than in Gabi for each year, and likewise of goats and cattle in Gabi. Corresponding with ownership, sales of sheep were higher in Zermou and sales of goats and cattle were higher in Gabi.

The median number of productive assets in Gabi other than major livestock (including horses, donkeys, poultry, bicycles, carts, motorcycles and other) was 2. The most frequently owned items were poultry, carts and bicycles, all owned by over half of

¹⁵ One male goat could be sold to buy 100kg of millet in June 2005 and 300kg of millet in 2006 (FEWS NET, 2006).

respondents. The mean number of productive assets other than major livestock in Zermou (including poultry, bicycles, carts, motorcycles and sewing machines, as no one owned a horse or donkey) varied between .62 in 2004 and .75 in 2006 (as compared to 2.5 in 2004 and 2.38 in 2006 in Gabi). The most frequently owned items were carts and poultry.

Swift argued that a household's mix of investments, stores and claims determines its vulnerability and the poorest households with the fewest assets are the most vulnerable (1989). As ownership of productive assets was higher in Gabi both years, this can help explain why sale of assets was higher in Gabi, as well as the increased availability of selling assets as a coping strategy. Over half of respondents in Gabi have carts or bicycles, whereas less than one third of the population of Zermou owns either one. Therefore, this data points to Zermou as being more vulnerable to shocks.

Agricultural Inputs and Production

Millet is the staple crop of southern Niger and is not usually sold, making millet output a strong indicator of a household's food security for the year. In a traditional rural diet, millet is consumed at every meal, either as a porridge or boiled into a paste. The millet output in both villages in 2004 was about half that of 2005, a drastic reduction when chronic food insecurity exists even in a "good year". Each village utilizes different measurements for land area planted and output of cereals. The only consistent measure is for the output of the two main cash crops, cowpeas and peanuts, which are measured by small containers called "measures" which are universal sized bowls that hold one kilogram of most cereals. Therefore, the variation within each village can be analyzed.

Table 4 - Summary of Agricultural Activities

Variable	Gabi	Zermou
Percent of Millet Output – 2004 vs 2005	55%	63%
Millet Output 2004	74 (in “bundles”)	10 (in “baskets”)
Millet Output 2005	163 (in “bundles”)	27 (in “baskets”)
Cowpea Output 2004	30 (in “measures”)	6 (in “measures”)
Cowpea Output 2005	62 (in “measures”)	31 (in “measures”)
Proportion of Cowpeas Sold 2004	.21	.80
Proportion of Cowpeas Sold 2005	.15	.44
Proportion of Peanuts Sold 2004	.40	.86
Proportion of Peanut Sold 2005	.42	.59

Cowpea output in Gabi was almost half in 2004 than in 2005 and in Zermou the 2004 output in 2004 was one fifth of the output in 2005. For both crops in both years, the mean in Gabi exceeds the mean in Zermou. For cowpea output in 2005, the mean in Gabi was double that of Zermou and for peanuts the mean in Gabi exceeds that of Zermou by over 500 percent. Zermou’s production in 2005 was even less than that compared to Gabi’s in 2004. Because tobacco is an important cash crop in Gabi, tobacco output has important implications for household status. The average production of tobacco was 435 “mats” in 2005 and 325 “mats” in 2004.

In Gabi, 33 people sold a crop in 2005 and 28 people sold a crop in 2004. Only 8 people sold a crop in 2004 in Zermou, as compared to 25 in 2005, due to minimal production. The most widely sold crop in Gabi was tobacco, sold by 28 of the 30 people who grew it in 2005 and 28 out of 28 in 2004. The two people who had not sold tobacco at the time of the interviews were probably waiting to sell it at its highest price during the lean season. In Zermou, the most widely sold crop was cowpeas, sold by 21 of the 38 people who reported planting cowpeas in 2005 and 7 out of 37 in 2004. Of the people that sold crops, the mean amount sold was higher for cowpeas and peanuts in Zermou for both years and higher for cowpeas in Gabi in 2004 but the

proportion was slightly lower in Gabi for peanuts in 2004. This vast difference in cash crop production, as well as the higher number of crops sold in Gabi in both years, supports the idea that cash revenue in Gabi is higher and creates ways of accessing food from the market, thus avoiding having to employ other coping mechanisms. Finally, the vulnerability groups in Gabi show that the least vulnerable groups had double the millet output than the vulnerable group, who had double the output than the most vulnerable group in both 2004 and 2005 (Table 5). Interestingly, the difference between millet output for the least vulnerable group between years was almost none, while for the two other groups was about half in 2004 than 2005. In Zermou, all groups suffered similar percentages of reduced output in 2004 compared to 2005. The difference between output of all groups is dramatically less in Zermou than in Gabi, but it does support the relationship between increased millet output and decreased vulnerability.

Table 5 – Comparison of Agricultural Output by Vulnerability Groupings

	Gabi		Zermou	
	Millet Output 2004 (reported in “bundles”)	Millet Output 2005 (reported in “bundles”)	Millet Output 2004 (reported in “baskets”)	Millet Output 2005 (reported in “baskets”)
Most Vulnerable	33.50	34.42	8.15	19.21
Vulnerable	69.36	108.47	13.08	34.42
Least Vulnerable	115.54	343.92	10.29	30.00

Although predicted that the use of agricultural inputs would be reduced in 2005 due to lack of cash to buy these inputs, there appears not to be any large changes in fertilizer usage and seed source. In Gabi, the source of seeds was consistent between years, however in Zermou 10 percent less people reported using stored seed, likely because

they were forced to eat it. The main difference between fertilizer application between villages is that in Zermou, between 13-18 percent of respondents both years reported not applying any fertilizer, whereas in Gabi, everyone reported applying at least some organic fertilizer. This could be due to higher livestock ownership in Gabi (except for sheep) as well as the ownership and use of cattle and carts in Gabi to transport manure from homesteads to fields.

There is very little difference in both villages between the amount of land planted in 2004 and 2005. In Gabi, the source of seeds was consistent between years, however in Zermou 10 percent fewer people reported using stored seed in 2005. Slightly more people in Gabi used chemical fertilizer in 2005 than 2004 and in Zermou slightly more people used organic fertilizer in 2005 than in 2004. The main difference between fertilizer application between villages is that in Zermou, between 13-18 percent of respondents reported not applying any fertilizer either year, whereas in Gabi, everyone reported applying at least some organic fertilizer.

Conclusion About Villages

The World Food Program uses seven variables to classify food insecure households into three categories - food secure, moderately food insecure and severely food insecure. Four of these variables were included in my survey, including the length of food gap, the principal sources of revenue, the possession of productive goods, and the possession of small ruminants. Using these criteria as well as the number of assets owned and crop outputs for both 2004 and 2005, it is possible to broadly conclude there are more severely food insecure households in Zermou than in Gabi. In fact, the analysis of the vulnerability groups within each village shows that the most vulnerable

group in Gabi is slightly more food secure than the least vulnerable group in Zermou. Appendix 3 contains tables comparing groups using the aforementioned variables.

Coping Strategies

Distribution

The difference in distribution of coping strategies shows that more strategies were used in 2005 than in 2006 in both villages. Table 6 shows that the mean number of coping strategies employed in Gabi was less than in Zermou in both years. In both villages, the mean number of coping strategies employed in 2005 was about 65 percent higher than in 2006.

Table 6 - Distribution of Coping Strategies

	Gabi*	Zermou
Mean Number of Coping Strategies Used in 2005 with Standard Deviation	6.05 (2.91)	7.93 (2.38)
Mean Number of Coping Strategies Used in 2006 with Standard Deviation	3.68 (1.94)	4.78 (2.11)
Difference of Means	3.37	3.15
Range 2005	11	8
Range 2006	7	7
Significance	.000	.000

*There are 9 missing values in 2005 for consumption of millet chafe and 7 for 2006. These were not included in the total number of coping strategies used in each household.

Zermou residents were forced to use more strategies in both years to cope with food insecurity, indicating that there was more of a need to seek ways of increasing food security in Zermou both years, supporting the idea that Zermou has more food insecure households. It also points to a surprising availability of various strategies, contradicting the notion that vulnerable populations have little recourse in the face of food insecurity.

Figures 7 and 8 represent the distribution of total coping strategies used in each village in both 2005 and 2006. In Gabi, the distribution of the number of coping strategies used in 2005 was more dispersed than in 2006. Even though in 2006 the number of coping strategies used by village residents was less variable, in both years there appears to be a handful of households using higher than average coping strategies.

Figure 8 shows that the number of coping strategies used by residents of Zermou was more variable than Gabi both years. In 2005, it appears as though there was a normal curve of coping strategy use. In 2006, however, it appears that the population was more divided between high and minimal use of coping strategies.

Figure 7 – Total Number of Coping Strategies Used in Gabi

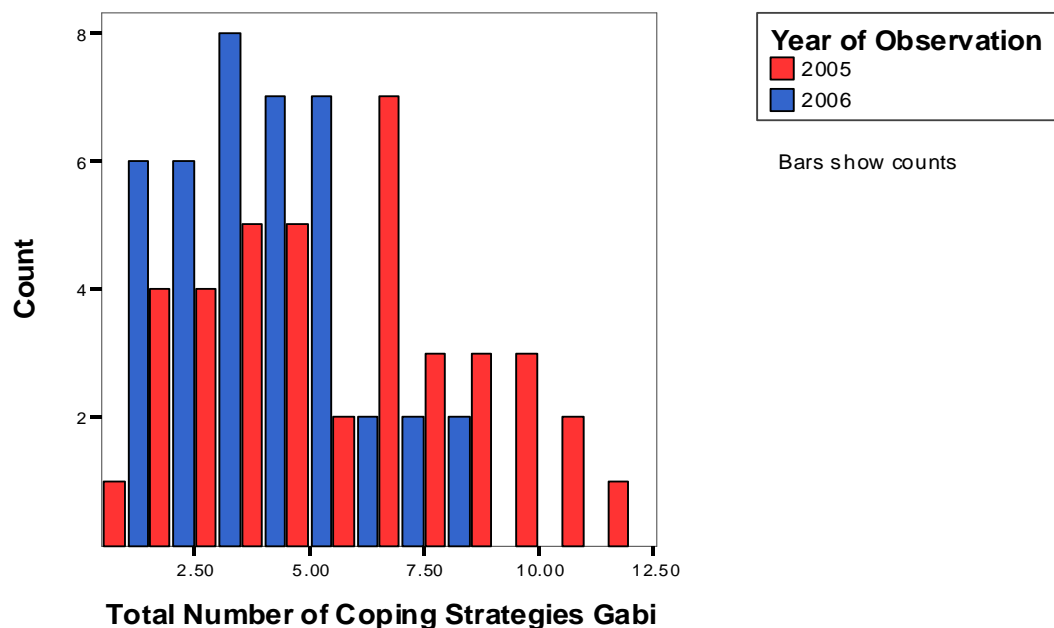
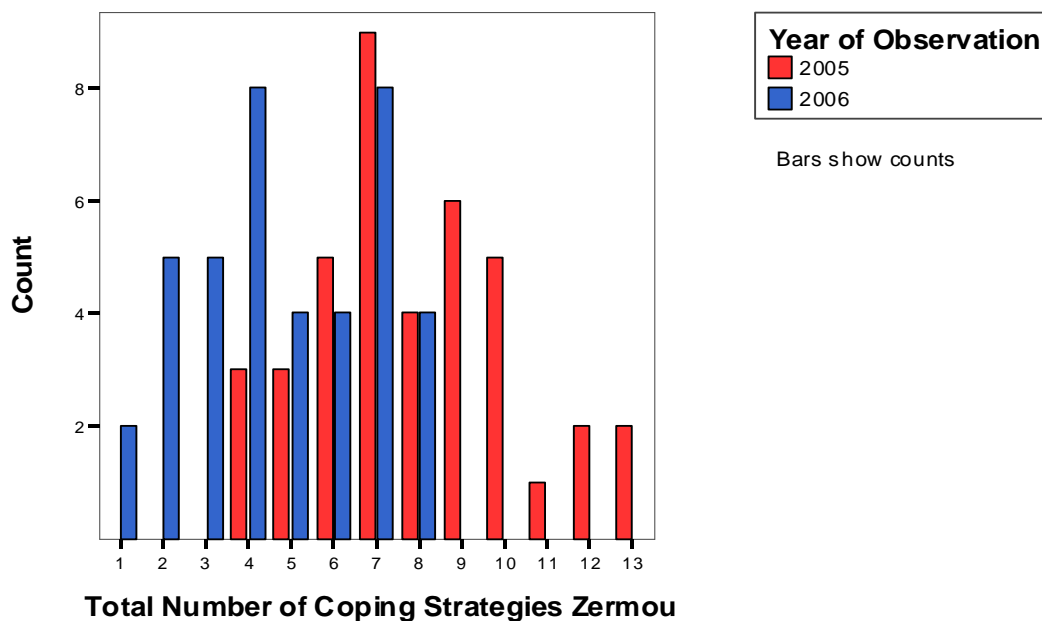


Figure 8 – Total Number of Coping Strategies Used in Zermou



Frequency of Strategies by Activity

Consumption Related Activities

The number of people who reduced the frequency of meals each year within each village was about the same. However, the absolute number of people who reduced the frequency of meals was higher in Zermou than in Gabi. The numbers of households reporting reduced quantity of meals were similar across years and across villages

Table 7 – Frequency of Consumption Related Activities

	Gabi 2005	Gabi 2006	Zermou 2005	Zermou 2006
	n=40	n=40	n=40	n=40
Consumption Related				
Reduced Frequency of Meals	16	14	11	10
Reduced Quantity of Meals	21	17	22	20
Ate Millet Chafe	16	3	0	0
Consumption of Wild Crops	26	8	31	10
Consumption of Premature Crops	17	n/a	32	n/a

As discussed in Chapter 2, previous research shows that maximizing consumption is not always a household's priority, and that consumption is often a trade-off made while attempting to maintain other household current or future objectives (Adams, 1992 and Devereux, 1992 as cited in Adams et al., 1998; Swift, 1993). In other words, part of coping is to become undernourished (Corbett, 1998). Most households in both villages altered their consumption somehow, either in frequency, quantity, quality of consumption or eating foods not typically preferred.

More residents of Gabi reduced frequency of meals in both years in Gabi. This is surprising due to the relative stability of food security of Gabi compared to Zermou, but can possibly be explained by a lower norm of consumption in Zermou (inferred from cowpea and peanut crop production), allowing less buffer for the reduction of frequency of meals without serious nutritional or health effects. Reduced quantity of meals appears to be an adaptive strategy as it was performed in both years in both villages by between 40-55 percent of respondents, most often by the least vulnerable group.

Households who selected one consumption altering strategy rather than another often scoffed at the alternative strategies as too difficult. Others who did not positively report either strategy emphasized that it was "difficult to be hungry and productive", therefore suggesting that they sought other means of accessing or acquiring food. Although reduced quality of meals was not included on the survey, most people mentioned that meat or oils are only consumed in "wadata" or "times of plenty", either following a good harvest or during celebrations.

Millet chafe was reported consumed only in Gabi, not in Zermou. In 2005, residents of Gabi were five times as likely as in 2006 to report eating millet chafe. In Gabi, drinking millet chafe porridge, which is nutritious but is normally fed to animals, was described as “not a nice thing to do” and only consumed when necessary. This porridge is never consumed in Zermou, which is a cultural difference.

In both villages, residents were more than three times as likely to consume wild crops in 2005 as in 2006. However, in both villages 20-25 percent of respondents reported consuming wild crops in 2006. More people reported consuming wild crops in Zermou than in Gabi both years, possibly indicating that this is a stronger adaptation¹⁶ activity in that area or because production levels are reduced in this area, people are forced to eat wild crops to fill in the food gap. In both villages, all three vulnerability groups reported performing this activity (although in 2005, more vulnerable residents did), suggesting that people harvest and consume these crops to complement to other foods, not strictly out of need. The consumption of premature millet crops could only be asked for 2005 since the 2006 agricultural season had not yet begun. Finally, almost double the amount of people in Zermou harvested millet prematurely in 2005 than in Gabi, showing that more residents were in immediate need of food in 2005.

Altering Sources of Food/Income for Food

The most commonly used coping strategies in this category are exchanging food with neighbors or family, relying on remittances, borrowing money and sale of assets, both productive and non-productive. Exchanging food with neighbors or family was reported by everyone in Zermou in both years and by over 75 percent of respondents in Gabi. Exchanging money or food with neighbors or family is called “hadin kai” in

¹⁶ A table of all coping strategies classified by their evaluation criteria is in appendix 3

Hausa, literally meaning “united heads”, or solidarity. Even in difficult times of food insecurity, this practice is continued.

Table 8 – Frequency of Altering Sources of Food/Income for Food

	Gabi 2005	Gabi 2006	Zermou 2005	Zermou 2006
	n=40	n=40	n=40	n=40
Sources of Food/Income for Food				
Relied on Gifts for money/food	0	1	3	1
Exchange of food or money	33	32	40	40
Borrow	11	5	23	11
Relied on Remittances	8	7	19	18
Sale of Productive Assets	22	14	21	8
Sale of Non-Productive Assets	6	1	19	6
Ate livestock	5	2	0	0

Reliance on remittances was dramatically higher in Zermou than in Gabi both years and the number of people who employ this strategy was constant in both villages in both years. As Gabi is closer to the Nigerian border, where most emigrants go in search of work, it is surprising that Zermou relies more on remittances. Young men from Zermou, however, have become bakery apprentices in Nigeria and upon returning to Zermou, they continue baking and selling bread, explaining the three large bread ovens in a small village. This social network currently established in Nigeria might explain the higher number of emigrants from this area. Additionally, since more people in Zermou leave their region in search if work, it can also be inferred that there are less local opportunities for employment in that region.

In both villages, double the amount of people reported borrowing money in 2005 than in 2006 and in both years, the number of people in Zermou who borrowed money was

double that of respondents in Gabi. Higher numbers in Zermou can be partially be explained by the lending program through a local NGOs micro-credit program. Although some people said that they did not borrow money from someone else in the village because it was shameful, others said that they did not have a choice in 2005. Generally, people reported paying back their loan right after the following harvest, which could have jeopardized some households' food security the following year as well, as they reduced their stocks early in the year when prices are the lowest, only to be left later on with less food and higher market prices. In Gabi, no one reported being in debt from a loan in 2005, but two people out of five who reported borrowing money are still in debt. In Zermou, 3 people out of 23 and 6 out of 11 people who borrowed money in 2005 and 2006 respectively reported still being in debt. Because the 2006 harvest had not yet taken place, it can explain why people were not able to pay back their loans at the time of the survey. Two of the people in Zermou who were in debt in 2005 reported being in debt in 2006, possibly suggesting that they are trapped in a negative cycle.

Very few people in either village reported relying on gifts for food or money. The sale of productive assets was about the same in both villages in 2005 (about 50 percent of respondents) but was almost double in Gabi in 2006 than in Zermou. The sale of non-productive assets was three times less in Gabi in 2005 and 6 times less in 2006. Consumption of own livestock was reported in Gabi by only about 13 percent of respondents in 2005 and 5 percent in 2006. It was not reported at all in Zermou.

The heavy reliance on the market economy in Zermou can possibly explain why three coping strategies are more common in Zermou than in Gabi – the sale of productive and non-productive assets and “weighing”. In both villages, the numbers of people

selling non-productive assets in 2005 was over 3 times higher than the following year, suggesting that this was an attempt to earn cash for food, as access was a problem. However, numbers the larger number of people selling non-productive assets in Zermou in 2005 suggest that people might have been doing so for cash to buy food from the market, even in a “good” year. The strategy of “weighing” was identified as one that is performed in Zermou, but was not referred to in Gabi. This strategy is called “awo” or “weighing” in Hausa, describing how households set aside their crops immediately after the harvest, buy from the market when the prices are lowest, and when prices begin to climb out of reach they consume their own crops. This appears to be an adaptive strategy, as 30 percent of respondents reported “weighing” both years.

Livelihood Impacts/Adaptive Strategies

Migration to local towns or to neighboring countries was very low in both 2005 and 2006. Only 2 people in Gabi reported a migrating member leaving for the first time in 2005 and one in Zermou for the same year. As there are between 20 to almost 50 percent of respondents in both villages that reported relying on remittances, it is reasonable to expect that a handful of people leave the village each year in search of work. As previous studies have indicated as well, emigration to other countries in West Africa has high risks, is expensive and losses can be great if not successful (Hampshire, 2002). Since 2005 was a difficult year, households might not have had enough money to support a risky venture, preferring to rely on more reliable strategies.

In both villages in both years, the number of people that perform wage labor was relatively stable; the number of people in Zermou who performed wage labor was three times that of Gabi. The higher percentage of respondents who perform wage

labor in Zermou is possibly due to less reliance on agricultural output for income and a higher reliance on buying food from the market, requiring more cash. Most of the wage labor reported in Zermou included carrying water to homes, clearing fields and sweeping the marketplace. In both villages in both years, the number of people that participated in wage labor was relatively stable, indicating that this is a longer term adaptive strategy, which was performed more by the most vulnerable group than the others.

Table 9 - Frequency of Livelihood Impacts/Adaptive Strategies

	Gabi 2005	Gabi 2006	Zermou 2005	Zermou 2006
	n=40	n=40	n=40	n=40
Livelihood Impacts/Adaptive Activities				
Migration to City/Foreign Country	2	0	1	1
Wage Labor	6	7	18	17
Petty Trade	3	3	2	2
Collection of Grass/Firewood	3	3	17	15
“Tchimi/”Set Aside Reserve”	16	17	9	12
“Awo”/ “Weighing”	0	0	12	12

The number of people reporting petty trade as a coping strategy was low in each village for both years. The collection of firewood and grasses for sale was fairly consistent within each village for both years. Between villages, however, there was a dramatic difference between the numbers of people who perform this activity – 3 each year in Gabi as opposed to 17 in 2005 and 15 in 2006 in Zermou. This is again possibly because of the need for cash in Zermou, which relies more heavily on the market and the fact that it has become an adaptation strategy.

Setting aside a reserve, or rationing food, is a common strategy in Gabi. About 40 percent of people both years reported leaving some cereal in their granaries for

difficult times or for the agricultural season when people need to eat more to expend more energy. This strategy is fairly less common in Zermou, with less people reporting being able to reserve food (due to lower production) in 2005. As one respondent balked, however, “you have to *have* food in order to set it aside”, and the vulnerability group stratifications in Gabi show that it is performed by a higher percentage of the least vulnerable than the other two groups.

Projects/External Aid

There were no FFW programs in or near Gabi either year. In Zermou, there were 8 people in 2005 who reported participating in a FFW program, but only 1 in 2006. This can be explained by the timing of the interviews and the fact that a large FFW program was about to start in the area a few months after the survey was performed.

Reliance on either seed banks, farmer organizations, or programs such as “warrantage” fluctuated, but were generally relied on more heavily in 2005 than in 2006. This fluctuation can be explained by either the variation of availability or timing of these programs since they are sponsored by outside projects.

Table 10 – Frequency of Projects/External Aid

	Gabi 2005	Gabi 2006	Zermou 2005	Zermou 2006
	n=40	n=40	n=40	n=40
Projects/External Aid				
FFW Program	0	0	8	1
Seed Bank/ Farmer Organization/Warrantage	10	7	23	5
Feeding Center/Health Clinic	21	6	6	2

All three of these project models rely to some extent on the wealth of the household or member to be able to benefit from the project. For example, selling a crop into the warrantage program indicates that a household can survive from the time of harvest to the time of recuperation from the crop in June without either the income that the crop would earn or without the consumption of that crop. Additionally, a farmer organization can only function to distribute fertilizer or seeds to its members if the members are able to contribute to the group during the year. After the 2004 harvest, many farmer group members reported that their group disbanded due to lack of capacity to contribute.

The number of people who brought children to a feeding center (in Gabi) or health clinic (in Zermou) was higher in both villages in 2005 than in 2006. In Gabi in 2005, 21 people reported bringing their child to a feeding center as opposed to 6 in 2006. The number of children admitted into a feeding center (in Gabi) or health clinic (in Zermou) was higher in both villages in 2005 than in 2006. In Gabi in 2005, 21 people reported their child admitted into a feeding center as opposed to 6 in 2006. Medecins Sans Frontieres - France set up a treatment center in Gabi in February of 2006. Before then, mothers brought their children to a MSF feeding center about 10 kilometers away. The MSF clinic admitted children under 5 years old below 80 percent of median weight for height into the feeding center. Once admitted, they received counseling, were monitored weekly, given supplies, such as ready to use therapeutic food (RUTF), Unimix (a corn/soy flour blend used for porridge), oil and soap. According to many villagers, receiving these supplies became motivation to bring children (healthy and malnourished) to the center. The government Health Center in Zermou did not have special treatment operations for malnourished children in 2005 or 2006, explaining the lower number of children reported being brought to a center.

Coping Between Years

Table 11 - Proportions Test for Statistically Significant Strategies ¹⁷

Coping Strategy	Gabi Prop 2005	Gabi Prop 2006	Z value	Significance level	Zermou Prop 2005	Zermou Prop 2006	Z value	Significance level
Ate Millet Chaff	0.400	0.075	3.415	0.0003	0.000	0.000	-	-
Consumption of Wild Crops	0.650	0.200	4.071	0.0000	0.775	0.250	4.697	0.0000
Borrow	0.275	0.125	1.677	0.0468	0.575	0.275	2.714	0.0033
Sale of Productive Assets	0.550	0.350	1.797	0.0361	0.525	0.200	3.023	0.0012
Sale of Non-Productive Assets	0.150	0.025	1.978	0.0239	0.475	0.150	3.135	0.0009
FFW Program	0.000	0.000	-	-	0.200	0.025	2.476	0.0066
Seed Bank/ Farmer Organization/Warrantage	0.250	0.175	0.819	0.2061	0.575	0.125	4.219	0.0000
Feeding Center/Health Clinic	0.525	0.150	3.546	0.0002	0.150	0.050	1.490	0.0680

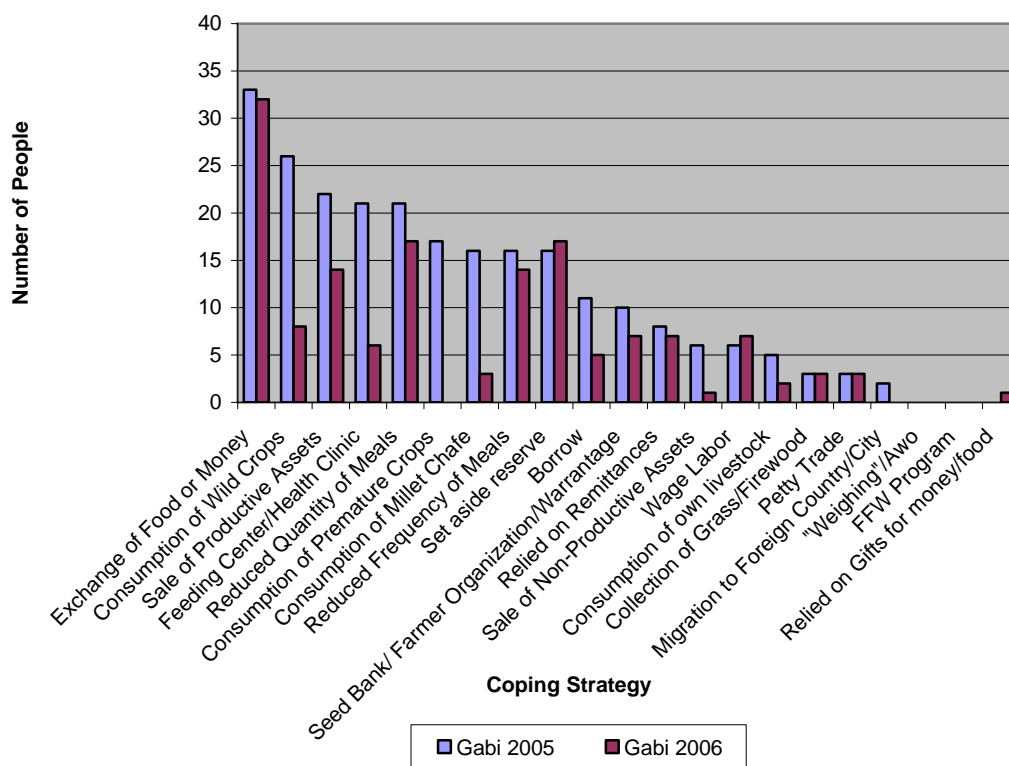
Proportions testing using a T-test was performed for all coping strategies. Table 11 displays the coping strategies with a statistically significant¹⁸ difference between years in Gabi include consumption of millet chafe, consumption of wild crops, borrowing money or food, sale of productive and non-productive assets and visiting a feeding center. Because the interviews took place between May and July of 2006, consumption of wild crops for the 2006 season would not have reached its peak, so yearly comparisons are nor possible to make. Additionally, because a feeding center was established in February 2006 in Gabi and because the months following the interviews are generally the months of highest admission to feeding centers, a true comparison is hard to make between years. This leaves four strategies - the consumption of millet chafe, borrowing of food or money and sale of productive and

¹⁷ The proportions test was performed using a T-test to test proportions at a probability level of .05 or below

¹⁸ "Statistically significant" in the following discussion refers to strategies whose estimated coefficient was significant at a 5% level or lower in the proportions test

non-productive assets – that can be considered statistically significant or the most relied upon strategies for coping with food insecurity in 2005.

Figure 9 – Coping Strategies by Year in Gabi

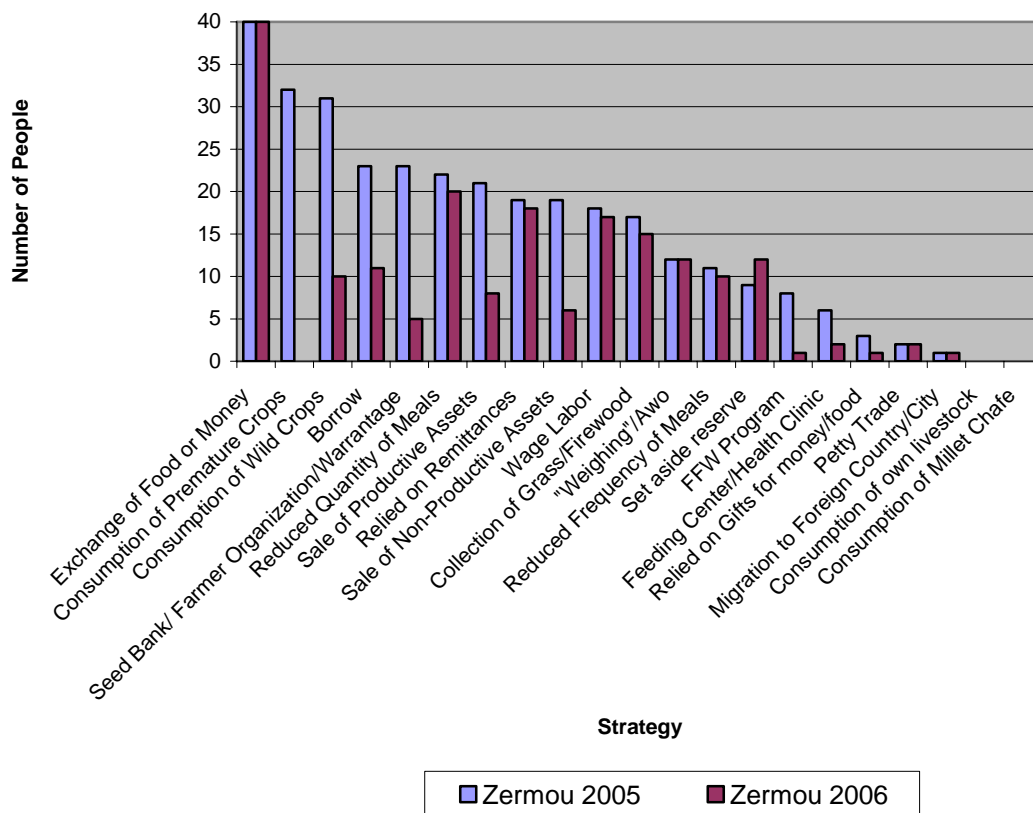


In Zermou, the statistically significant coping strategies between years include consumption of wild crops, borrowing money or food, sale of productive and non-productive assets, participating in a Food for Work program and participating in a seed bank, farmer organization or warrantage program. Similar to Gabi, the consumption of wild crops is not possible to compare between years.

Additionally, comparisons between seed banks, farmer organizations and warrantage programs are difficult to compare due to variation in availability and the seasonal

nature of the seed bank as described above. Interestingly, with different agro-ecological and socio-economic situations, four out of the six statistically significant strategies in Zermou overlap with those of Gabi, indicating that these strategies are either the most available strategies, are the most effective at achieving household objectives, and/or less damaging to household objectives.

Figure 10 – Coping Strategies by Year in Zermou



Two of these statistically significant strategies in both villages are considered “crisis” (by MSF) or erosive strategies– the consumption of crops prematurely and the sale of productive assets. However, based on this information alone, it is difficult to conclude the level of food insecurity households who performed these activities experienced.

Firstly, assuming that they did this in desperation would disregard the fact that food security is anticipated and planned for. While the raising and sale of livestock could be a crisis strategy it can also be considered an integrated component of long term food security strategies. Second, one person's coping strategy can be another's annual activity, such as migration. Knowing more about the motivation of these strategies is necessary before making judgments about food security status.

Strategies by Vulnerability Groupings and Type of Strategy

Recognizing differences between vulnerability groups can lead to better understanding of different stages of food insecurity and distinguishing between types of strategies can help interpret the meaning of coping strategies within these stages. If a household's "bundle of assets", including natural, physical, human, social and financial assets, determines its vulnerability then the households with the fewest assets are the most vulnerable. I anticipated that the most vulnerable group, while being the most affected by the drought, would have the least amount of strategies available to them to cope. However, my research does not support this. If the vulnerability groupings can be relied upon, the most vulnerable group in both villages employed more overall coping strategies in 2006 than the other groups. In 2005, the most vulnerable group in Gabi used over 30 percent more coping strategies than the other two groups. In Zermou, however, the most vulnerable group and the vulnerable group used the same overall number of coping strategies in 2005, but for certain erosive strategies such as borrowing food or money and the sale of productive assets, a higher percentage of the vulnerable group employed these strategies than the most vulnerable group. Appendix 3 contains tables showing the proportion of members of each vulnerability group engaged in each coping strategy in 2005 and 2006.

More of the most vulnerable group in Gabi performed both more adaptive and coping strategies, including the statistically significant strategies discussed above – consumption of millet chafe, wild crops and premature crops, selling productive and non-productive assets and borrowing money in 2005. The only statistically significant strategy that did not follow this trend in 2006 was the consumption of wild crops, which the middle and least vulnerable group ate more of, possibly indicating that this is done by some groups every year as a diet diversification strategy or that the least vulnerable households have more labor available to harvest these crops. The biggest differences between vulnerability groups in Gabi are in consumption related activities, where almost double the percent of people in the most vulnerable group performed these activities than the other groups in both 2005 and 2006. The more frequent use of both adaptation and coping strategies by the most vulnerable group indicates that there are multiple coping strategies available to this group and that their activities are most diversified, possibly out of necessity.

In Zermou, deciphering the meaning of coping strategies employed by vulnerability groups is less obvious. The only coping strategies that follow a strict order of use corresponding with vulnerability groups (the poor use more and the wealthy use less) in 2005 and 2006 are reduced quantity of meals, consumption of premature crops, collection of grass or firewood and wage labor. This can either mean that the groups were not well selected or because household food insecurity is higher in Zermou, even the wealthy were forced to employ some of the coping mechanisms that the wealthy in Gabi were not forced to do. Possibly threshold effects prevented the most vulnerable group from using more strategies, as they would have suffered more losses than benefits if employed. For example, a smaller percentage of the most vulnerable group reported buying food from the market when the prices were low, allowing them to

save food produced in their own fields for the lean season when cereal prices increase. This lack of ability to buy from the market when prices are lowest means that these households are consuming their own food for as long as possible, but are not able to supplement when their supplies run out, explaining the need to reduce consumption more than other groups in both years.

Admittance of a child into the MSF feeding center in Gabi took place in all three vulnerability groups. In 2005, the rates were highest for the most vulnerable group, but almost 25 percent of the least vulnerable group also brought children to the feeding center and that number was the same for the least vulnerable group through May 2006. Given the incentives to bring a child to the feeding center (primarily food supplies), it is not surprising that so many parents took advantage of this opportunity. As the treatment was free, financial considerations did not determine who visited the center. One could argue that the wealthy were better informed about health services and therefore had high attendance rates. Either way, the admittance levels show that malnutrition affects all household vulnerability groups, pointing to malnutrition being caused by inadequate care and dietary practices, not wealth. A corresponding need to target all households in nutrition education is therefore imperative.

A higher percentage of the most vulnerable group in both villages employed some asset disposal strategies, including selling productive assets at high rates in 2005 and consuming premature crops. More poor in both villages ate premature crops – none of the least vulnerable group in Gabi did so although in Zermou all groups did in high numbers. The majority of insurance strategies were performed by the least vulnerable group more often as well, indicating their need to diversify to meet household objectives, possibly due to more reliance on agriculture as a primary income source

coupled with less agricultural production and less income from crop sales.

Additionally, as many of the strategies employed are low risk/low return strategies, this points to a need to employ more strategies to capture more return. Appendix 3 contains a table of all coping strategies classified by type (i.e. coping vs. adaptation, insurance vs. crisis and risk vs. return).

Explanations for the distribution of coping strategies employed by both villages could be that as Gabi is more food secure, the wealthier groups in that village did not need to cope as much due to higher agricultural output or more secure income sources. This is somewhat surprising however, considering that it was the least vulnerable group in both villages that endured the largest difference between millet output in 2004 and 2005. The poorer households, however, have less overall assets to act as buffers needed to manage food insecurity. The fact that the most poor in Zermou did not use the most number of coping strategies in the harder year points to threshold effects for the most vulnerable group. The vulnerable group did have to cope more in 2005 and had strategies available to them without suffering negative effects from their use. Again, the fact the Gabi residents employed on average fewer coping strategies than Zermou residents, points to more general food security.

Logistic Regression

Thirteen logistic regressions were run to determine the household characteristics that contribute to the use of selected strategies employed in 2005 using data from both villages with the following covariates: the village resided in, the number of adults and children in the household, the household vulnerability level, the education level, whether the primary income source was agricultural, and whether the household had a secondary income. Strategies with 20 or more positive responses were included in the

regression. Therefore, participating in petty trade, consuming livestock, participating in a food for work program and migration were excluded from the regression.

Tables 12-14 display the results of the logistic regression analysis, displayed by connection to selected variables, the strongest of which are having most vulnerable group status and village resided in. The “B” column displays the estimated coefficient. A positive estimated coefficient also results in a positive odds ratio. In this case, a positive number in the B column means that a coping strategy was *more* likely to be performed given the selected variable and a negative number means the *less* likely a household was to perform that strategy. Variables with a significance below the .100 level (as opposed to strictly the .05 level) were included in the discussion to give a broader idea of the links between coping strategies and variables. If the Wald statistic is significant then the parameter is useful to the model. The odds ratio (Exp(B)) is the predicted change in odds for a unit increase in the predictor. If the odds ratio is less than 1, increasing values of the variable correspond to decreasing odds of the event's occurrence. When Exp(B) is greater than 1, increasing values of the variable correspond to increasing odds of the event's occurrence. For example, one of the strongest indicators of performing wage labor is having most vulnerable status. In this case, the estimated coefficient, Wald and odds ratio were relatively “high” at 2.063, 7.314 and 7.870 respectively and the significance was well below the selected .100 cutoff, at .007.

The variables with the most frequent significance below the .100 level with highest odds ratios are 1. having most vulnerable status and 2. the village resided in, each associated with eight strategies. The ownership of livestock in 2004 is also strongly connected to alterations in consumption patterns and the number of adults in the

household is strongly linked to adaptive strategies Agriculture as the primary revenue source, having a secondary income and the education level also had some associations to coping strategies used, although with less frequency and lower odds ratios.

Supporting the findings of the previous section, the more vulnerable the household the more likely it was to consume premature crops, performing wage labor, reduce the quantity of meals, reduce the frequency of meals, sell non-productive assets and collect grass or firewood (listed in decreasing order of odds ratio). Most vulnerable status is strongly connected with a reduced participation in seed banks or farmer organizations and being able to set aside a reserve.

Table 12 – Strategies Whose Use is Most Strongly Connected to Most Vulnerable Status¹⁹

Variable	Consumption of Premature Crops				Reduced Quantity of Meals				Reduced Frequency of Meals			
	B	Sig	Wald.	Odds Ratio	B	Sig	Wald.	Odds Ratio	B	Sig	Wald.	Odds Ratio
# Positive Responses	49				43				27			
Most Vulnerable Status	2.024	.006	7.523	7.569	1.744	.012	6.364	5.722	1.259	.041	4.189	3.520
Number of Adults	.199	.121	2.405	1.220	.063	.597	.280	1.065	.023	.848	.037	1.023
Number of Children	-.066	.290	1.121	.936	.038	.524	.406	1.039	.038	.521	.412	1.039
Education Level	-.288	.389	.742	.750	.224	.475	.510	1.251	-.125	.707	.141	.883
Primary Cash Revenue Agricultural	.081	.903	.015	1.085	-1.010	.116	2.476	.364	-.202	.745	.106	.817
Receives a Secondary Cash Revenue	.167	.823	.050	1.182	-1.260	.111	2.534	.284	-.362	.604	.270	.696
Number Livestock in 2004	-.036	.249	1.329	.965	-.136	.008	6.959	.873	-.099	.041	4.187	.906
Village Resided In	2.174	.001	10.255	8.792	-.255	.669	.183	.775	-.576	.326	.966	.562

¹⁹ For all strategies, degrees of freedom is 1

As these households own the least amount of assets, they have fewer buffers against food insecurity corresponding with their need to use more coping and adaptive strategies and less of an ability to perform insurance strategies. Table 12 displays coping strategies whose strongest connection is to most vulnerable status. Seventy six observations were used in each regression, as four respondents could not recall the exact number of livestock they had in 2004.

The village resided in has a strong connection to five coping strategies and three adaptive strategies. All of these strategies, except visiting a feeding center, were more likely to be performed in Zermou than in Gabi. These results support earlier discussion of the increased food security in Gabi relative to that of Zermou corresponding with a more of a need to cope in Zermou in 2005. Reduced agricultural output and heavier dependence on the market for food can explain more of a need to reduce consumption and sell non-productive assets in Zermou as well as participating in activities to generate income, such as collecting grass or firewood for sale and performing wage labor. Explanations of other village specific strategies partially include projects (a lending project in Zermou or the MSF feeding center in Gabi) available in one village and not the other. Table 13 displays results of strategies more likely to be performed depending on village resided in.

Revenue sources had an influence on setting aside a reserve and participating in a seed bank or farmer group. Having a secondary source of income allows households to purchase from the market, allowing them to set aside a reserve not to be consumed until market prices rise. A primary income source that is not based on agriculture means that people are less likely to participate in a seed bank or farmers organization.

Table 13 – Strategies Whose Use is Most Strongly Connected to Village Resided In

# Positive Responses	Collected Grass or Firewood				Wage Labor				Sold Non-Productive Assets			
	20				20				25			
Variable	B	Sig	Wald.	Odds Ratio	B	Sig	Wald.	Odds Ratio	B	Sig	Wald.	Odds Ratio
Most Vulnerable Status	1.380	.068	3.336	3.973	2.063	.007	7.314	7.870	.964	.134	2.249	2.622
Number of Adults	.232	.085	2.965	1.261	.280	.039	4.240	1.323	.096	.405	.694	1.100
Number of Children	-.057	.387	.748	.945	-.072	.277	1.182	.930	-.028	.634	.226	.973
Education Level	-.507	.242	1.371	.603	.749	.056	3.641	2.115	.364	.277	1.184	1.439
Primary Cash Revenue Agricultural	-.270	.716	.132	.763	-.105	.887	.020	.900	.239	.708	.141	1.271
Receives a Secondary Cash Revenue	.859	.315	1.009	2.360	.016	.985	.000	1.016	-.896	.193	1.694	.408
Number Livestock in 2004	-.071	.076	3.139	.932	-.055	.139	2.191	.947	-.011	.694	.155	.989
Village Resided In	2.554	.002	9.334	12.860	1.773	.013	6.117	5.886	1.590	.011	6.413	4.904

Table 13 cont.

# Positive Responses	Borrow Food or Money				Relied on Remittances				Feeding Center			
	34				27				27			
Variable	B	Sig	Wald.	Odds Ratio	B	Sig	Wald.	Odds Ratio	B	Sig	Wald.	Odds Ratio
Most Vulnerable Status	.781	.187	.187	2.184	-.618	.330	.948	.539	.189	.790	.071	1.208
Number of Adults	.058	.583	.583	1.060	.165	.142	2.160	1.180	.207	.114	2.498	1.230
Number of Children	-.009	.869	.869	.991	-.055	.335	.930	.947	.003	.964	.002	1.003
Education Level	.323	.282	.282	1.381	-.385	.235	1.410	.680	.043	.903	.015	1.044
Primary Cash Revenue Agricultural	.302	.609	.609	1.353	-.235	.697	.152	.791	.999	.157	2.006	2.716
Receives a Secondary Cash Revenue	.292	.654	.654	1.340	-.346	.602	.272	.708	.531	.479	.502	1.701
Number Livestock in 2004	-.020	.448	.577	.981	-.017	.498	.459	.983	.020	.505	.444	1.020
Village Resided In	1.301	.019	5.497	3.675	1.205	.041	4.172	3.337	-1.809	.007	7.185	.164

The more adults in the household, the more likely a household was to perform some adaptive activities, such as collecting grass or firewood and performing wage labor. This could be because more adults in the household makes it more feasible to release adults to work outside of the household. Table 14 shows the results of coping strategies with mixed correlations.

Interestingly, the sale of productive assets was the only coping strategy used in the regression that was not connected to any of the selected household characteristics. As this strategy was a statistically significant strategy in both villages in 2005, it can mean that households, regardless of the village, vulnerability status or even the number of livestock owned used this strategy to meet household objectives. Possibly this strategy is overall the most effective for all respondents or as previously mentioned, this strategy is an insurance strategy used to plan for uncertainty.

Table 14 - Strategies Whose Use Has Mixed Correlations

# Positive Responses	Set Aside Reserve				Seed Bank/Farmer Group			
	25				20			
Variable	B	Sig	Wald.	Odds Ratio	B	Sig	Wald.	Odds Ratio
Most Vulnerable Status	-2.197	.010	6.623	.111	-1.489	.128	2.313	.226
Number of Adults	-.002	.984	.000	.998	.268	.062	3.480	1.307
Number of Children	.008	.885	.021	1.008	-.102	.136	2.225	.903
Education Level	-.055	.861	.031	.947	-.010	.979	.001	.990
Primary Cash Revenue Agricultural	.166	.800	.064	1.181	-2.292	.005	7.857	.101
Receives a Secondary Cash Revenue	1.525	.080	3.068	4.595	1.199	.246	1.346	3.317
Number Livestock in 2004	.002	.920	.010	1.002	-.019	.646	.210	.981
Village Resided In	-.680	.270	1.217	.507	1.214	.124	2.369	3.367

Table 14 cont.

	Consumption of Wild Crops				Sold Productive Assets			
# Positive Responses	27				43			
Variable	B	Sig	Wald.	Odds Ratio	B	Sig	Wald.	Odds Ratio
Most Vulnerable Status	.392	.006	7.523	1.479	.258	.646	.211	1.295
Number of Adults	-.046	.121	2.405	.955	.138	.191	1.709	1.148
Number of Children	.034	.290	1.121	1.035	-.076	.149	2.080	.927
Education Level	-.236	.389	.742	.790	.224	.434	.613	1.251
Primary Cash Revenue Agricultural	.110	.903	.015	1.116	-.418	.454	.560	.658
Receives a Secondary Cash Revenue	.326	.823	.050	1.386	-.346	.569	.324	.708
Number Livestock in 2004	.794	.038	1.746	.941	.019	.392	.732	1.019
Village Resided In	.815	.186	.724	2.213	-.376	.475	.511	.687

CHAPTER 5

CONCLUSIONS

This study investigated how coping strategies and their usage differs between households and years in Gabi and Zermou villages in Niger and what accounts for these variations as well as the connections between certain household characteristics and strategies selected. The study or use of coping strategies in context is most often used to determine the level of food security households or communities experience and to initiate emergency interventions once a certain level of insecurity has been reached. However, it is necessary to consider agroecological and socioeconomic differences between villages and how this influences access and use of different coping strategies.

In 2005 there were more coping strategies used in both Gabi and Zermou by all vulnerability groups than in 2006. This need to diversify activities shows that households in both villages were under more stress to achieve livelihood goals in 2005 than in 2006. Based on higher ownership of productive assets, higher agricultural production, less of a reported food gap and more crops sold, it can be concluded that Gabi is, overall, more food secure than Zermou and/or that the 2005 crisis was less acute in this area. The comparison between the vulnerability groups showed that the most vulnerable in Gabi are slightly more food secure than the least vulnerable in Zermou. The substantial difference in cash crop production, as well as the higher number of crops sold in Gabi in both years, supports the idea that cash revenue in Gabi is higher, which creates ways of accessing food from the market, possibly avoiding having to employ other coping mechanisms and explaining fewer overall coping strategies used in Gabi. Additionally, as Zermou residents produce less of their own

food, they are forced to be more market dependent, but with less means to generate the income to actually purchase from the market. This contributed to more food insecurity in Zermou than Gabi when millet prices rose in 2005.

The higher number of coping strategies employed in Zermou than Gabi in both years, indicates that there was more of a need to mitigate food insecurity, while simultaneously highlighting a surprising availability of various strategies. This contradicts the notion that vulnerable populations have little recourse in the face of food insecurity. Of course, the most vulnerable might have been forced to employ multiple strategies if the strategies available to them have low returns or are destructive, potentially reducing their ability to cope with future shocks. Diversity, therefore, could have been used as an insurance mechanism in an unpredictable environment or can be a necessity in the face of immediate food insecurity.

Statistical analysis was used to determine which coping strategies were significantly more important during the food crisis than in the more “normal” year included in this data set. Each village had six statistically significant strategies between years and four of those were shared between the two villages - the consumption of wild crops, borrowing of food or money and sale of productive and non-productive assets. As most of the statistically significant strategies overlapped between villages, it points either to the availability, ease of entry or the attractiveness of these strategies or the lack of alternative strategies in both of these villages. All of these shared strategies are not particularly dependent on agroecological conditions, and might be “universal coping” strategies regardless of certain regional features.

Even if the strategies are universal, however, the use of strategies in Zermou might differ from Gabi's, in terms of the timing, motivation and intensity of the coping strategies. For example, more residents of Gabi reduced the frequency of meals in both years. Although Gabi is more food secure than Zermou, if Zermou has a lower baseline of consumption, households might have been prevented from further restricting consumption without suffering severe health effects. Perhaps the frequency of performing certain strategies was higher in Gabi, but in Zermou people started consuming less earlier in the year and ate half of what the residents of Gabi did.

More clarity about the intensity, timing, frequency or intention of these strategies could help determine exactly what the level of food insecurity households experienced in 2005. According to MSF guidelines, the most vulnerable group employed more asset disposal strategies than other groups, meaning that the most vulnerable group was closer to the MSF definition of suffering a food crisis. Additionally, according to these guidelines, two "food crisis" strategies were employed in both villages at statistically significant rates in 2005 - selling productive assets and eating premature crops (eating premature crops is also strongly related to residing in Zermou).

Although the use of these erosive strategies could help indicate appropriate timing of intervention, it must be recognized that in most parts of the Sahel, uncertainty is anticipated and planned for through household activities. As the smaller number of livestock owned in 2004 was connected to consumption reduction strategies, the raising and sale of livestock could be one of the most reliable strategies employed in the face of food insecurity, which is integrated into households' long term food security planning. This is supported by the fact that the most vulnerable in Gabi sold on average more livestock than the other two groups in 2006, but not in 2005.

Although this group appeared to suffer more long term effects of the drought, households in all categories employed this strategy in 2005. Without more of an understanding of why people did what they did and who, when and why, it is difficult to broadly conclude, using MSF or any other guideline, what level of food insecurity households experienced in 2005 and only very rudimentary conclusions can be made. This does not mean that coping strategies can or should not be used in emergency situations to evaluate food security, but that great care has to be made in understanding a community's context.

The events of 2005 convinced many development agents and donors that the crisis was not a discrete event and that without more coordinated effort to reduce poverty and increase development, the threat of future impoverishment and food crises lurks permanently. To prevent further food crises, interventions can attempt to preserve assets and incomes rather than solely focusing on nutrition status and feeding programs (Young & Jaspars, 1995). This approach can help protect people from future emergencies by allowing for economic viability while coping strategies will not be exhausted in responding to the immediate problem and lead to increased vulnerability. This is especially important for the most vulnerable group, given that they had the highest use of coping strategies. Interventions or policies that reinforce insurance strategies or low risk and high return strategies are ideal as well as interventions which include investment in and reinforcement of primary or secondary activities or income sources, which is farming for over three-quarters of the population in both villages.

Possible avenues for future research to better understand the implications of coping and the trajectory of southwest Nigerien livelihoods includes:

- The long and short term effectiveness of the most employed coping strategies on households' food security
- How decision making at the household level affects coping strategies and their impacts on individuals as well as the household
- How the future efficacy of these strategies will be affected in a changing environment, considering that some analysts claim Sahelian livelihoods are becoming more vulnerable and climate fluctuations are becoming more severe
- Strategizing precise interventions for specific vulnerability groups that would support livelihoods and reduce the need to employ destructive coping strategies
- Determining the sustainability of cash crop production in Gabi, both market wise and environmentally, given the reliance on these crops for income
- Exploring appropriate government and NGO roles in the implantation of interventions to support livelihoods

APPENDIX 1
SURVEY OF COPING STRATEGIES

Date _____ Village _____ Neighborhood _____

Section 1 - Demographic info

Name of interviewee _____

Relationship to HH Head	Age/Year born	Primary Occupation	Education level	Literacy	Primary cash revenue source last 12 mos	Secondary cash revenue source last 12 mos	Other
1-Head 2-Wife 3-Ado 4-Child 5-Other dependent 6-Relative 7-Elder		1-Farmer 2-Small Trader 3-Housewife	1-Koranic School 2-Primary School 3-Secondary School 4-Bach 5-Adult education	1-Yes 2-No 3-Partial	1-Agriculture 2-Petty Trade 3-Sale of Prepared Food 4- Collection of firewood/grasses 5 - Gardening 6- Other	1-Agriculture 2-Petty Trade 3-Sale of Prepared Food 4- Collection of firewood/grasses 5 - Gardening 6- Other	

HH Access to H2O
 Traditional Well _____
 Cement Well _____
 Pump _____

Women Work in Fields
 Yes _____
 No _____

Section 2 – Livestock

Animal	Current #	Number at 2005 end of Rainy Season	Number Sold between 2005 end of Rainy Season and today	Births	Loss (theft/death/ consumed)	Number 2004 End of Rainy Season	Number Sold between 2004-2005 End of R.S.	Births	Loss (theft/death/ consumed)
Sheep									
Goat									
Cow									
Chicken/ Guinea Fowl									
Donkey									
Other									

Section 5 - Coping Mechanisms

Coping Mechanism	2005	2006	Details				
Dietary Change							
Reduced frequency of meals							
Reduced quantity of meals							
Eating of non typical foods (dusa)							
Gathering of wild crops							
Consumption of premature crops							
Reduction of "Luxury foods"							
Resources used to acquire food							
Relied on gifts for food/money							
Exchange food/money with family/neighbors							
Borrow							
Relied on remittances							
Sale of Productive Assets							
Sale of Non-productive							
Begging – 1							
Livelihood impacts							
Migration to city - 1, 7, 3,4							
Migration to other country							
Ag wage labor							
Petty trade							
Collecting and selling of firewood/grasses							
Formal Aid Network							
FFW Program							

Food aid							
Cooperative scheme (seed bank, OP)							
Went to hospital/feeding center							
Rationing/Reserve							
Warrantage							
Other?							

Section 6 - Closing

What other impacts of the drought haven't we talked about, either for you, your neighbors or your community?

Do you have any questions for me?

APPENDIX 2
DEFINITION OF SURVEY VARIABLES

Section 1 Demographic Info	Definition	Gabi	Zermou	Notes
Designated Category	Defined as number of fields, length of food gap, variety of income sources	1- Most Vulnerable 2- Vulnerable 3 - Least Vulnerable	Same	
Gender		1- Male 2 – Female	Same	
FHH	Defined as households where no male of working age is present and women provide the majority income, perform the majority fieldwork	0 - No 1 – Yes	Same	
Neighborhood		1- North 2 - South 3 - East 4 - West	1 - Fada 2 - Kofalyamma 3 - Angoladua 4 - Gadenmarie 5 - Maidenmarie	
Number of Adults in Concession	Number of people above marriage age (about 20 for men and 15 for women)	Numeric	Same	
# of Kids in Concession	Number of people below marriage age	Numeric	Same	
Primary Occupation	Trade = selling food, bricks, store owner Services= water carriers, masons, market sweepers, chauffer, pump repair, wagon, drivers Other = animator for NGO, takes bulls to market, wood worker Herder= raises animals for self or others Teacher = government worker Marabout = Islamic	0 - None 1 - Agriculture 2 - Trade 4 - Services 6 - Herder 7 - Other 8 - Teacher 9 - Marabout 10 – Tobacco grower 11 – Tobacco trade	0 - None 1 - Agriculture 2 - Trade 4 - Services 6 - Herder 7 - Other 8 - Teacher 9 - Marabout	The way that people define their occupation was not always where their primary revenue came from, making primary cash revenue more of a critical indicator

	religious leader Tobacco trade = involved in the organized tobacco market			
Primary Cash Revenue	Same as above	Same as above	Same	
Secondary Cash Revenue	Same as above	Same as above	Same	
Highest Education Level of HHH attended	Highest level of schooling was counted, not whether or not they completed that level. If Koranic education was reported in addition to formal schooling, formal schooling was counted as “highest level” since the Roman Alphabet corresponds to the majority of official languages in Niger.	0-None 1 - Koranic 2 - Primary 3 - Secondary 4 -Specialty School 5 - Adult Education	Same	There are both primary and secondary schools in Gabi and Zermou.
Literacy	“Yes” was defined as being able to read and write confidently. “Partial” (Including Koranic) was defined as being able to read and write some characters, but with overall difficulty.	0-No 1 – Yes 2 - Partial	Same	
Preferred Access to Water		1 - Modern Well 2 - Pump 3 – All	Same	
Women Work in Fields		0- No 1 – Yes	Same	
Women Small Income Generating Activities	Most often includes preparing food for sale, making peanut oil and braiding hair	0- No 1 – Yes -888 – N/A for female headed households	Same	Female headed households were not included as performing income generating activities; their activities were

				included in primary or secondary cash revenue.
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Section 2 – Livestock Info	Gabi	Zermou
Current Number of Sheep/Goats/Cattle (2006)	Numerical Value	Numerical Value
# Sheep 2005	Numerical Value	Numerical Value
2005-2006 Sold	Numerical Value or -1 for not applicable	Numerical Value or -1 for not applicable
# Sheep 2004	Numerical Value	Numerical Value
2004-2005 Sold	Numerical Value or -1 for not applicable	Numerical Value or -1 for not applicable
Currently Own Poultry/Ducks/GF	0 – No 1 - Yes	0 – No 1 – Yes
Owned Poultry/Ducks/GF 2005	0 – No 1 - Yes	0 – No 1 – Yes
Owned Poultry/Ducks/GF 2004	0 – No 1 - Yes	0 – No 1 – Yes

Section 3 – Productive Assets	Gabi	Zermou
Bike_06 Current # of Bicycles Bicycles are mostly used for transport	Numerical Value	Numerical Value
Bike_05 # Bicycle 2005	Numerical Value	Numerical Value
Bike_04 # Bicycle 2004	Numerical Value	Numerical Value
Cart_06 2006 # of carts	Numerical Value	Numerical Value
Cart_05 # Carts 2005	Numerical Value	Numerical Value
Cart_04 # Carts 2004	Numerical Value	Numerical Value
Moto_06 2006 # Moto	Numerical Value	Numerical Value
Moto_05 # Moto 2005	Numerical Value	Numerical Value
Moto_04 # Moto 2004	Numerical Value	Numerical Value
PA_06 2006 # Other Prod Assets (Sewing Machine, Horses, Donkeys)	0 – No 1 – Yes	0 – No 1 – Yes
PA_05 2005 # Other Prod Assets (Sewing Machine, Horses, Donkeys)	0 – No 1 – Yes	0 – No 1 – Yes
PA_04 2004 # Other Prod Assets (Sewing Machine, Horses, Donkeys)	0 – No 1 – Yes	0 – No 1 - Yes

Section 4 – Agricultural Output	Gabi	Zermou	Notes
Total hectares/plots Planted 2005	In hectares 1 hectare can provide 30-60 bundles depending on soil and variety	Number of plots (residents were not familiar with hectares) In Zermou, it was reported that there is a shortage of land, so families often pool labor, and at the end of the harvest the output is	Women sometimes have small plots that they cultivate on their own. These were not counted as part of household output due to the difficulty of being able to access all the women of the household during interviews and the small sizes of these

		distributed according to the need of each family and seniority. An average distribution is 125-160 “measures” of millet. If this was reported, either the reported average was counted as output or if the exact amount of amount divided output was remembered, that was reported.	plots. The proportion of food produced on these plots was considered a very small proportion of the “family fields”.
Total hectares/plots Planted 2004	In hectares	In number of plots planted	Plot sizes reported in Zermou vary, however, so this can only be used to compare number of plots planted each year for each household and as a rough estimate for output.
Millet Output 2005/2004	Given in bundle sizes and converted to “measures” by estimate given in village (1 bundle = 5-8 measures, depending on variety). I multiplied bundles by 6.5 to reach measures. millet In order to drink millet porridge and to eat millet “pate” (the staple meal) each day. If consuming millet exclusively, a family of 7 people would need two measures of millet per day or 730 measures/year.	Given in baskets or “tshanhos”. A tshanho is a woven basket made of grasses used to transport and measure millet. Each basket contains about 8 “measures”. One tshanho measure is counted after hulling. About 60 tshanhos (240 measures) can provide enough millet for “pate” for a family of 7 for a year	Output was taken for all crops, not yields. It would have been too time consuming to figure out intercropped fields, which is often done. Output is important for knowing how much food people had compared to family size and for yearly comparisons. 40 tiyas/”measures” = 1 boohoo/”sac”, which are the measurements used at market. In terms of home consumption, 5 people can drink millet porridge from 1 bundle and ¼ of a “measure” for a more water down version of porridge (kunnu).

			For the “pate” staple, a family of 7 needs about 2 tiya/day (quoted from Zermou)
Sorghum Output 2005 /2004	Given in bundle sizes and converted to “measures” by estimate given in village (1 bundle = 5-8 measures). I multiplied bundles by 6.5 to reach measures.	Given in baskets. Each basket contains about 8 “measures”.	
Sale of Sorghum Crop 2005/2004	-1 – n/a 0 – No 1 – Yes	-1 – n/a 0 – No 1 – Yes	
Amt Sold	In “measures”	In “measures”	For all crops sold. If respondent reported selling “all of the crop but seed, I deducted 3-5 measures for amounts under 100 measures and 10 measures sold for amounts over 100 measures sold.
Corn Output 2005/2004	In “measures”	In “measures”	
Sale of Corn 2005/2004	-1 – n/a 0 – No 1 – Yes	-1 – n/a 0 – No 1 – Yes	
Amt Sold	In “measures”	In “measures”	
Bean Output 2005/2004	In “measures”	In “measures”	
Sale of Bean Crop 2005/2004	-1 – n/a 0 – No 1 – Yes	-1 – n/a 0 – No 1 – Yes	
Amt Sold	In “measures”	In “measures”	
Peanut Output 2005/2004	In “measures”	In “measures”	
Sale of Peanut Crop 2005/2004	-1 – n/a 0 – No 1 – Yes	-1 – n/a 0 – No 1 – Yes	
Amt Sold	In “measures”	In “measures”	
Planted Vegetable/Sesame crop 2005/2004	-1 – n/a 0 – No 1 – Yes	-1 – n/a 0 – No 1 – Yes	
Sale of Sesame/Vegetable Crops 2005/2004	-1 – n/a 0 – No 1 – Yes	-1 – n/a 0 – No 1 – Yes	
Source of Millet Seed 2005/2004	1 - Stored 2 - Market 3 - Traded 4 - Gift 5 - Farmers' Organization	1 - Stored 2 - Market 3 - Traded 4 - Gift	
Fertilizer Usage 2005/2004	1- Organic	1- Organic	Organic includes all

	2- Chemical 3 – Both 1 and 2 0 – None	2- Chemical 3 – Both 1 and 2 0 - None	household livestock waste, typically carried to fields in the dry season. Chemical includes any synthetic fertilizer bought on the market.
Perceived Start of Lean Season 2006/2005	1-Jan 2-Feb 3-Mar 4-Apr 5-May 6-Jun 7-Jul 8-Aug 9-Sep 10-Oct 11-Nov 12-Dec 14-None If “all year” was reported, October was recorded since October is the harvest		

Section 5- Coping Strategies	Definition/Description Gabi	Definition/Description Zermou	Notes
			All variables in this section are coded 0 = No, 1= Yes All questions were prefaced with, “Did you perform this activity due to hunger? Coping strategies were read through twice – first for 2006 and the second time for 2005.
Reduced Frequency of Meals	Reported as reductions in the amount times a day people eat or drink porridge	Same	
Reduced Quantity of Meals	Reported as 1. smaller measurements used to prepare food with while preparing for the same number of people, 2. instead of all women in a household cooking for	Same	

	<p>their immediate family, only 1 or 2 women cook to serve the same number of people, 3. drinking porridge instead of food or 4. more people eating together using the same amount of food</p>		
Reduced Quality of Food	<p>Reported as being forced to water down porridge to make it last all day long, eating wild greens or eating reconstituted cassava, known as A'poor man's food" with few nutrients</p>	Same	
Reduction of Luxury Foods	<p>Reported as restricting oil and meat consumption, considered "luxury" or sometimes "celebration" foods".</p>	Same	
Consumption of millet chafe	<p>This was only performed in Gabi. Millet chafe is usually fed to animals, but in time of hunger, it is eaten by people. One person described eating millet chafe not as shameful but as "not being (a) nice" thing to do.</p>	<p>Not performed. Reported as "not done here".</p>	
Consumption of Wild Crops	<p>Most often reported leaves collected include Moringa Olifera, tamarind and Zizifus Mauritania. This is often done often in normal years as well as years of stress and was counted if people ate any wild greens between 2004 and 2006.</p>	<p>Most often reported leaves collected include Moringa Olifera, and plants with local names including "tafasa" and "ganye". This is often done often in normal years as well as years of stress and was counted if people ate any wild greens between 2004 and 2006.</p>	
Consumption of Premature Crops	<p>Millet crops cut before optimum yields were attained for the purpose of consumption instead of waiting for them to mature and achieve higher yields.</p>	Same	<p>Not applicable in 2006 since crops had not been planted at time of interviews.</p>
Relied on Gifts for	<p>Received money or food</p>	Same	

money/food	with no arrangement for payback and not part of typical, neighborly exchange		
Exchange of food or money	Called “digiya” in Gabi. People report doing this throughout the year with some people responding “more” and some responding “less” during the lean season. All frequencies and amounts of trade were included as a positive answer.	Simply called “trading with neighbors” or “hadin kai” (heads together) for solidarity	
Borrow	Borrowed food or money from family, neighbors or community lending operation	Same	There is a community lending operation in Zermou organized by AQUADEV.
In debt from loan	Have not yet returned loan to borrower.	Same	Most loans are repaid after harvest, which would have been after interviews were conducted in 2006, possibly accounting for higher numbers of people still in debt for 2006.
Received Remittances	Counted if family member sent or returned with money from migration activities	Same	
Sale of Productive Assets	Including livestock, carts, bicycles, and sewing machines. This includes selling of productive assets specifying that they were sold for hunger, weddings, sickness and celebrations.	. Same	Farm equipment was not included as a productive asset in either village since early in the data collection it was determined that all residents of Gabi and most in Zermou have basic agricultural tools.
Consumption of own livestock	Consumption of any animal belonging to the household due to hunger	Same	
Sale of Non-Productive Assets	Includes sale of radios, cookware, jewelry,	Same	

	clothing or cloth for cash to meet household needs		
Migration to City/ Foreign Country	Only counted migration as a coping strategy if it began in 2005 or 2006. If people began migration before 2004 and continue to migrate in 2005-2006, it was not counted as migration, but rather as “relying on remittances” (if money was sent).	Same	If local migration was reported, it was most to their regional capital – Maradi in the case of Gabi and Zinder in the case of Zermou. For foreign migration, most respondents in both villages reported migration to Nigeria.
Wage Labor	Mostly included brick making, clearing of fields and weeding for others	Same	
Petty Trade	Sale of sugar, mangoes, cloth, kola nut or any other commodity traded during lean season or throughout the year.	Same	
Collection of Grass/Firewood	Counted as collection of these items for sale or for home use	Same	
FFW Program	Counted if a family member participated at least once in a formally organized food for work program	Same	Near Gabi, FFW projects were reported in Dan Issa, a village about 40 km away from Gabi. Near Zermou, there were multiple villages with FFW programs reported within 10 km.
Government/Outside Assistance	All families reported receiving food aid from government	Same	Residents of both villages reported receiving quantities of rice, millet, sugar, milk, beans and oil. Because this was given to every household, I did not include it in the data or the discussion of coping strategies.

<p>Farmer Organization/Seed Bank/"Warrantage"</p>	<p>If people reported receiving assistance from a farmer organization (such as free seeds, fertilizer or crops from a jointly operated field) that they belonged to, it counted as a positive response.</p> <p>If people reported buying or selling any crops or seeds as part of an organized seed bank or "warrantage" program, it was counted as a positive answer.</p>	<p>Same</p>	<p>"Warrantage" is a program sponsored by local NGOs that buys certain crops (millet, peanuts and beans) from farmers at the market price and holds onto it in storage until the first rain, when farmers can buy it back at the same rate that they sold it for.</p> <p>Zermou has a seed bank operated by the NGO AQUADEV that hadn't opened at the time of interviews 2006. It was scheduled to open in August, after the rains had started.</p>
<p>Feeding Center/Health Clinic</p>	<p>Medecins Sans Frontieres France set up an emergency feeding center in Gabi in February of 2006. If a child was taken to the MSF clinic and diagnosed with malnutrition, it was counted as a positive response. If a child was taken but not admitted, it was not counted as a positive response.</p>	<p>This is a government Health Center in Zermou. If a child was taken to the clinic and diagnosed with malnutrition, it was counted as a positive response. If a child was taken but not admitted, it was not counted as a positive response. The health clinic did not have any special treatment operations for malnourished children in 2005 or 2006.</p>	<p>Before February 2006, mothers in Gabi brought their children to a MSF feeding center about 10 kilometers away. Children under 5 years old at 80% of median weight for height were admitted to the feeding center.</p> <p>The health clinic in Zermou did not have any special treatment operations for malnourished children in 2005 or 2006.</p>
<p>Set aside reserve</p>	<p>A rationing strategy where food is left in granaries for the lean season or "set aside in</p>	<p>Same</p>	

	house” to be consumed during the farming season. Also marked as a positive response for one family who purchased food and rationed it.		
“Awo” (“Weighing” or “measuring” ie at market)		Farmers in Zermou reported storing their millet after the harvest when market prices are low and buying from the market until prices are too high to afford or cash runs out.	Not reported as a strategy in Gabi.

APPENDIX 3
RESULTS BY SURVEY SECTION

Section 1 - Demographics

Gabi - Perceived Start of Lean Season 2005

		Frequency	Percent	Cumulative Percent
Valid	January	12	30.0	30.0
	February	4	10.0	40.0
	March	2	5.0	45.0
	April	1	2.5	47.5
	May	4	10.0	57.5
	June	1	2.5	60.0
	July	1	2.5	62.5
	October	4	10.0	72.5
	November	2	5.0	77.5
	December	6	15.0	92.5
	None	3	7.5	100.0
	Total	40	100.0	

Gabi - Perceived Start of Lean Season 2006

		Frequency	Percent	Cumulative Percent
Valid	January	4	10.0	10.0
	February	4	10.0	20.0
	March	10	25.0	45.0
	April	4	10.0	55.0
	May	8	20.0	75.0
	October	1	2.5	77.5
	December	1	2.5	80.0
	None	8	20.0	100.0
	Total	40	100.0	

Zermou - Perceived Start of Lean Season 2005

		Frequency	Percent	Cumulative Percent
Valid	January	1	2.5	2.5
	February	7	17.5	20.0
	March	9	22.5	42.5
	April	8	20.0	62.5
	May	3	7.5	70.0
	October	7	17.5	87.5

	December	1	2.5	90.0
	None	4	10.0	100.0
	Total	40	100.0	

Zermou - Perceived Start of Lean Season 2006

		Frequency	Percent	Cumulative Percent
Valid	January	3	7.5	7.7
	February	1	2.5	10.3
	April	1	2.5	12.8
	October	25	62.5	76.9
	November	4	10.0	87.2
	December	4	10.0	97.4
	None	1	2.5	100.0
	Total	39	97.5	
Missing	System	1	2.5	
Total		40	100.0	

Sections 2-4 - Livestock, Productive Assets and Agricultural Data

Gabi	N	Range	Mean	Std. Deviation
	Statistic	Statistic	Statistic	Statistic
Current Number of Sheep	40	15	3.30	3.473
# Sheep 2005	40	12	4.00	3.397
2005-2006 Sold	32	8	1.38	2.121
# Sheep 2004	38	30	4.74	6.521
2004-2005 Sold	26	20	2.15	4.433
Current Number of Goats	40	8	2.30	2.483
# Goats 2005	40	9	2.30	2.785
2005-2006 Sold	21	5	1.43	1.777
# Goats 2004	39	20	3.26	5.215
2004-2005 Sold	20	15	2.75	4.423
Current Number of Cows	40	20	2.33	3.230
# Cows 2005	40	33	2.55	5.218
2005-2006 Sold	26	13	.73	2.554
# Cows 2004	40	33	2.45	5.144
2004-2005 Sold	28	4	.32	.905
Current # of Bicycles	40	3	.53	.679
# Bicycle 2005	40	2	.50	.599
# Bicycle 2004	40	2	.50	.599
Current # of carts	40	1	.60	.496
# of carts 2005	40	1	.60	.496

# of carts 2004	40	1	.58	.501
Current # Moto	40	2	.28	.506
Moto 2005	40	1	.25	.439
Moto 2004	40	1	.25	.439
Current # Other Prod Assets (Sewing Machine)	40	1	.13	.335
# Other Prod Assets (Sewing Machine) 2005	40	1	.15	.362
# Other Prod Assets (Sewing Machine) 2004	40	1	.15	.362
Total Hectares Planted 2005	38	18	5.85	4.439
Total Hectares Planted 2004	38	18	5.80	4.506
Millet Output Bundles 2005	40	2441	162.78	379.719
Millet Output Measures 2005	40	15867	1058.04	2468.171
Bean Output 2005	34	400	62.38	76.732
Amt Bean Sold 2005	34	80	9.56	22.101
Sorghum Output 2005	33	500	46.00	87.418
Sorghum Output 2005	33	3250	299.00	568.216
Amt Sorghum Sold 2005	0	0	0	0
Corn Output 2005 - Measure	13	400	111.15	114.349
Amt Corn Sold 2005	13	0	7.69	27.735
Peanut Output 2005	27	4077	409.04	801.373
Amt Peanut Sold 2005	27	4080	262.96	779.605
Taba Output 2005	30	3000	424.53	595.880
Amt Taba Sold 2005	26	2990	471.70	610.686
Planted Vegetable crop 2005 planted	11	0	1.00	.000
Millet Output 2004 Bundles	39	195	73.72	53.038
Millet Output 2004 Measures	40	1268	469.44	345.818
Bean Output 2004	33	160	29.94	38.813
Amt Bean Sold 2004	32	75	7.97	19.669
Sorghum Output 2004	34	100	17.71	24.268
Amt Sorghum Sold 2004	34	0	0	0
Corn Amount	10	400	98.00	117.927
Amt Corn Sold 2004	10	0	0	0
Peanut Output 2004	24	680	157.96	159.706
Amount Peanut Sold 2004	23	665	71.78	144.874
Taba Output 2004	28	4000	325.18	769.724
Amt Taba Sold 2004	28	4000	325.18	769.724

Gabi - Proportion of Cash Crops Sold 2004/2005

	N	Mean
Proportion of Beans Sold 2005	34	.1535
Proportion of Beans Sold 2004	32	.2661
Proportion Corn Sold 05	12	.0691
Proportion Corn Sold 04	8	.0000
Proportion of Peanut Sold 05	27	.6428
Proportion of Peanuts Sold 04	23	.4544

Gabi - Livestock Owned and Sold

		# Live Sold 06	# Live Sold 05	# Livestock06	# Livestock05	# Livestock04
N	Valid	40	40	40	40	40
	Missing	0	0	0	0	0
Mean		.7750	.6000	2.9500	2.7750	2.6750
Median		1.0000	.0000	3.0000	3.0000	3.0000

Gabi - Prod Assets excluding Major Livestock

		Total_Prod_Assets_06	Total_Prod_Assets_05	Total_Prod_Assets_04
N	Valid	40	40	40
	Missing	0	0	0
Mean		2.3000	2.2250	2.2500
Median		2.0000	2.0000	2.0000

Gabi - Variety of crops Planted and Sold

		Num crops planted_05	Num crops planted_04	Num crops sold_05	Num crops sold_04
N	Valid	40	40	40	40
	Missing	0	0	0	0
Mean		4.7750	4.3250	1.4750	1.0750
Median		5.0000	4.5000	1.0000	1.0000

Zermou	N	Range	Mean	Std. Deviation
	Statistic	Statistic	Statistic	Statistic
Shp_2006	40	10	3.90	3.264
Shp_2005	40	26	5.35	6.375
Shp_sold_05_06	29	18	1.66	4.002
Shp_2004	40	46	7.33	9.102

Shp_Sold_04_05	27	11	2.96	3.524
Goat_2006	40	4	.70	1.159
Goat_2005	40	6	.43	1.107
Goat_sold_05_06	8	2	.75	.886
Goat_2004	40	8	.45	1.584
Goat_sold_04_05	4	1	.25	.500
Cat_2006	40	2	.50	.679
Cat_2005	40	4	.68	1.047
Cat_sold_05_05	17	2	.35	.606
Cat_04	40	8	.98	1.928
Cat_sold_04_05	16	2	.25	.683
Bike_06	40	2	.15	.427
Bike_05	40	2	.13	.404
Bike_04	40	1	.08	.267
Cart_06	40	2	.38	.540
Cart_05	40	2	.35	.533
Cart_04	40	2	.30	.516
Moto_06	40	1	.03	.158
Moto_05	40	0	.00	.000
Moto_04	40	0	.00	.000
Oth_Prod_06	40	1	.08	.267
Oth_Prod_05	40	1	.10	.304
Oth_Prod_04	40	1	.08	.267
Plots_05	38	5	2.26	1.245
Plots_04	38	5	2.37	1.239
Millet_Tshnaho	36	75	29.58	19.040
Millet Measure 2005	39	555	205.44	143.325
Millet Tshanho 2005	32	50	12.09	14.313
Millet Measure 2004	39	400	81.59	108.536
Bean Output 2005	37	240	30.30	46.139
Bean Output 2004	37	20	6.00	7.356
Amount Bean Sold 2005	37	390	59.07	83.456
Amount Beans sold of all people who planted 2004	37	20	1.57	4.688
Amount Bean Sold 2004 (of people that sold)	8	18	11.00	7.690
Sorghum Output 2005	33	29	9.30	7.002
Sorghum Output 2004	34	30	4.99	6.965
Peanut Output 2005	26	400	84.58	82.277
Peanut sold 2005 of people that planted	26	390	59.07	83.456
Peanut sold 2005 of people that sold	17	382	93.82	88.622
Peanut Output 2004	28	160	29.86	40.960
Peanut sold 2004 of people that planted	28	75	8.69	19.986
Peanut sold 2004 of people that sold	7	70	36.00	26.777

Zermou - Proportion of Cash Crops Sold

	N	Mean of only sellers	Mean of all people planted
Prop_B_Sold_05	37	.4448	.4448
Prop_B_Sold_04	8	.7979	.0266
Prop_P_Sold_05	25	.5925	.6983
Prop_P_Sold_04	7	.8631	.2910

Zermou - Number Livestock owned and sold

		Variety Live 06	Variety Live 05	Variety Live 04	Num_Liv_Sold_06	Num_Liv_Sold_05
N	Valid	40	40	40	40	40
	Missing	0	0	0	0	0
Mean		1.6250	1.5750	1.3500	.4000	.4750
Median		1.0000	1.0000	1.0000	.0000	.0000

Zermou - Assets owned excluding major livestock

		Total_Assets_06	Total_Assets_05	Total_Assets_04
N	Valid	40	40	40
	Missing	0	0	0
Mean		.7000	.7250	.6000
Median		.0000	.0000	.0000

Zermou - Variety of crops Planted and sold

		Variety Crops Planted 05	Variety Crops Planted 04	CropsSold05	CropsSold04
N	Valid	40	40	40	40
	Missing	0	0	0	0
Mean		4.4000	4.4500	1.0000	.3750
Median		5.0000	5.0000	1.0000	.0000

Section 5 - Coping Strategies

Proportion of Coping Strategies Employed by Vulnerability Group - Gabi

	2005			2006		
	Most Vulnerable	Vulnerable	Least Vulnerable	Most Vulnerable	Vulnerable	Least Vulnerable
Consumption Related						
Reduced Frequency of Meals	75%	27%	15%	67%	27%	15%
Reduced Quantity of Meals	83%	47%	23%	75%	33%	23%

Ate Millet Chafe	75%	20%	0%	17%	7%	0%
Consumption of Wild Crops	92%	47%	15%	8%	33%	15%
Consumption of Premature Crops	67%	33%	0%	0%	0%	0%
Sources of Food/Income for Food						
Relied on Gifts for money/food	0%	0%	0%	0%	0%	0%
Exchange of food or money	92%	80%	77%	83%	80%	77%
Borrow	50%	13%	0%	33%	7%	0%
Still in debt from previous year	0%	0%	0%	17%	0%	0%
Relied on Remittances	25%	13%	15%	25%	13%	15%
Sale of Productive Assets	58%	53%	23%	42%	40%	23%
Sale of Non-Productive Assets	33%	7%	0%	8%	0%	0%
Ate livestock	8%	13%	0%	8%	7%	0%
Livelihood Impacts/Adaptive Activities						
Migration to City/Foreign Country	8%	7%	0%	0%	0%	0%
Wage Labor	33%	7%	8%	42%	7%	8%
Petty Trade	8%	13%	0%	8%	13%	0%
Collection of Grass/Firewood	17%	0%	8%	17%	0%	8%
Set aside reserve	0%	53%	54%	17%	53%	54%
Awo	0%	0%	0%	0%	0%	0%
Projects/External Aid						
FFW Program	0%	0%	0%	0%	0%	0%
Seed Bank/ Farmer Organization/Warrantage	17%	33%	8%	17%	27%	8%
Feeding Center/Health Clinic	58%	33%	23%	8%	13%	23%

Proportion of Coping Strategies Employed by “Vulnerability” Group - Zermou

	2005			2006		
	Most Vulnerable	Vulnerable	Least Vulnerable	Most Vulnerable	Vulnerable	Least Vulnerable
Consumption Related						
Reduced Frequency of Meals	29%	33%	21%	29%	25%	21%
Reduced Quantity of Meals	64%	58%	43%	64%	50%	36%

Ate Millet Chafe	0%	0%	0%	0%	0%	0%
Consumption of Wild Crops	71%	75%	86%	43%	8%	21%
Consumption of Premature Crops	100%	67%	71%	--	--	--
Sources of Food/Income for Food						
Relied on Gifts for money/food	7%	17%	0%	7%	0%	0%
Exchange of food or money	100%	100%	100%	100%	100%	100%
Borrow	57%	67%	50%	29%	25%	29%
Still in debt from previous year	7%	0%	14%	14%	17%	14%
Relied on Remittances	29%	75%	43%	21%	75%	43%
Sale of Productive Assets	50%	67%	43%	21%	17%	0%
Sale of Non-Productive Assets	50%	50%	43%	14%	8%	21%
Ate livestock	0%	0%	0%	0%	0%	0%
Livelihood Impacts/Adaptive Activities						
Migration to City/Foreign Country	7%	0%	0%	7%	0%	0%
Wage Labor	57%	28%	21%	57%	50%	21%
Petty Trade	7%	8%	0%	7%	8%	0%
Collection of Grass/Firewood	57%	50%	21%	57%	33%	21%
Set aside reserve	14%	25%	29%	29%	17%	43%
Awo	14%	33%	43%	14%	33%	43%
Projects/External Aid						
FFW Program	14%	42%	7%	0%	8%	0%
Seed Bank/ Farmer Organization/Warrantage	0%	75%	86%	14%	0%	21%
Feeding Center/Health Clinic	0%	25%	21%	7%	8%	0%

Summary of Coping Strategy by Classification

	Adaptive/Insurance Strategies	Coping	Stage 1 Insurance Strategies	Stage 2 Disposal	Risk	Return
Consumption Related						
Reduced Frequency of Meals	X		X		H/L	L
Reduced Quantity of Meals	X		X		H/L	L
Consumption of Millet Chafe		X	X		L	L
Consumption of Wild Crops		X*	X		L	L
Consumption of Premature Crops		X*		X	H	L
Sources of Food/Income for Food						
Relied on Gifts for money/food	X		X		L	L
Exchange of food or money	X		X		L	L
Borrow		X	X		H	H/L
Relied on Remittances	X		X		H/L	L
Sale of Productive Assets		X		X	H	H/L
Sale of Non-Productive Assets		X	X		L	L
Ate livestock		X		X	H	L
Livelihood Impacts/Adaptive Activities						
Migration to City/Foreign Country	X			X	H	L
Wage Labor	X		X		L	L
Petty Trade	X		X		L	L
Collection of Grass/Firewood	X		X		L	L
Set aside reserve	X		X		L	L
Awo	X		X		L	L
Projects/External Aid						
FFW Program		X	X		L	L
Seed Bank/ Farmer Organization/Warrantage	X**	X**	X		L	L
Feeding Center/Health Clinic		X	X		L	L

* can not compare between years due to timing of interviews

** different between villages (Gabi – adaptive, Zermou – coping)

L-Low, H-High

Gabi – Vulnerability Grouping Descriptive Statistics

		Designated Category		
		Most Vulnerable	Vulnerable	Least Vulnerable
Number of Adults in Concession	N	12	15	13
	Mean	3.50	5.07	6.92
# of Kids in Concession	N	12	15	13
	Mean	6.92	9.53	12.15
Number of Coping Strategies Used in 2005	N	12	15	13
	Mean	8.0000	5.0000	5.4615
Number of Coping Strategies Used in 2006	N	12	15	13
	Mean	4.7500	3.6000	2.7692
NumLivestock06	N	12	15	13
	Mean	2.0833	3.0667	3.6154
NumLivestock05	N	12	15	13
	Mean	1.7500	3.0667	3.3846
NumLivestock04	N	12	15	13
	Mean	1.6667	2.8000	3.4615
Num_Liv_Sold_06	N	12	15	13
	Mean	.8333	.8000	.6923
Num_Liv_Sold_05	N	12	15	13
	Mean	.3333	.4000	1.0769
Num crops planted_05	N	12	15	13
	Mean	4.0833	4.7333	5.4615
Num crops planted_04	N	12	15	13
	Mean	3.6667	4.2667	5.0000
Num crops sold_05	N	12	15	13
	Mean	.8333	1.6000	1.9231
Num crops sold_04	N	12	15	13
	Mean	.8333	1.0000	1.3846
Number total assets 2006	N	12	15	13
	Mean	1.3333	2.5333	3.5385
Number assets 05	N	12	15	13
	Mean	1.1667	2.4000	3.4615
Number assets 2004	N	12	15	13
	Mean	1.2500	2.4667	3.3846
Proportion of Beans Sold 2005	N	10	12	11
	Mean	.1000	.2556	.0909
Proportion of Beans Sold 2004	N	8	6	9
	Mean	.1250	.3333	.2153
Proportion of Peanut Sold 05	N	5	10	12
	Mean	.0000	.6341	.4093
Proportion of Peanuts Sold 04	N	4	7	10
	Mean	.2500	.5000	.3990

Zermou – Vulnerability Grouping Descriptive Statistics

		Designated Category		
		Most Vulnerable	Vulnerable	Least Vulnerable
Number of Adults in Concession	N	14	12	14
	Mean	3.00	6.50	6.21
@#of Kids in Concession	N	14	12	14
	Mean	4.43	9.83	12.21
Variety Live 06	N	14	12	14
	Mean	1.1429	2.0000	1.7857
Variety Live 05	N	14	12	14
	Mean	1.0000	1.9167	1.8571
Variety Live 04	N	14	12	14
	Mean	.9286	1.6667	1.5000
Num_Liv_Sold_06	N	14	12	14
	Mean	.2143	.2500	.7143
Num_Liv_Sold_05	N	14	12	14
	Mean	.3571	.6667	.4286
Variety Crops Planted 05	N	14	12	14
	Mean	4.1429	4.7500	4.3571
Variety Crops Planted 04	N	14	12	14
	Mean	4.1429	4.8333	4.4286
CropsSold05	N	14	12	14
	Mean	.5000	1.5000	1.0714
CropsSold04	N	14	12	14
	Mean	.1429	.5833	.4286
Total_Assets_06	N	14	12	14
	Mean	.4286	.9167	.7857
Total_Assets_05	N	14	12	14
	Mean	.4286	1.0000	.7857
Total_Assets_04	N	14	12	14
	Mean	.4286	.5833	.7857
Number of Coping Strategies Used in 2005	N	14	12	14
	Mean	7.4286	9.2500	7.2857
Number of Coping Strategies Used in 2006	N	14	12	14
	Mean	5.2143	4.6667	4.4286
Prop_B_Sold_05	N	12	12	13
	Mean	.3000	.5767	.4566
Prop_B_Sold_04	N	1	3	4
	Mean	1.0000	.8389	.7167
Prop_P_Sold_05	N	4	11	10
	Mean	.3667	.6553	.6139
Prop_P_Sold_04	N	0	4	3
	Mean		.8073	.9375

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