

## Vulnerability to Drought and Food Insecurity in the Sahel: Preliminary findings from 25 years of human and livestock population dynamics in Western Niger

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Research Brief SUO6-O8-O4-LEAP

May 2008

*Vulnerability to drought and resulting food insecurity have increased within agropastoral communities of Western Niger since 1983. Farmers from several Nigerien villages were selected to participate in a study of livestock husbandry and development in 1983. From 1983 through 1987, 1994 to 1995, and then from 2006 to 2007, members of 56 households, their descendents and their livestock were monitored in two study villages, Sadeize Kwara and Samari. Preliminary analysis of the data from the last 25 years shows the following: (1) increases in village human population; (2) decrease in crop yields per hectare; (3) fewer animals per household and per capita; (4) conversion of grazing land to crop land; (5) increase in migration of villagers for employment and longer periods spent away from the village; and (6) diminished ability of the community to support itself in times of food crises. These preliminary findings indicate that farmers' livelihoods have been seriously altered since the first data collection in 1983. The information gathered provides a baseline for further study and development programs to combat economic vulnerability in agropastoral areas. The changes observed with respect to human demography, livestock-based coping strategies, community resilience, and off-farm sources of income offer a framework for policy-making to mitigate existing food insecurity and its severity in other semi-arid regions.*

### Background

The goal of this research was to address issues related to food insecurity in the Sahel from the perspective of livestock capital. In the Sahel, livestock assets are important for the rural poor in provision of food and income. Farmers rely on livestock to sustain the household during years with normal rainfall while waiting for the next harvest. Livestock are particularly important when crop harvests are insufficient due to inadequate rains and recurrent drought. In recent decades, however, due to increases in the human population (without an increase in the amount or productivity of arable land) and climatic changes (e.g. lower and more variable rainfall), the annual food availability for subsistence farmers has decreased. These changes put more pressure on the livestock sector to provide income and food. This study was conducted to investigate whether raising livestock is a viable coping strategy during droughts and whether animal ownership buffers farmers against food insecurity and economic vulnerability. The goals of this project were to assess the effectiveness of livestock-based coping strategies and to document changes in the vulnerability of agropastoralists and how their adaptation mechanisms have altered.

### Preliminary Findings

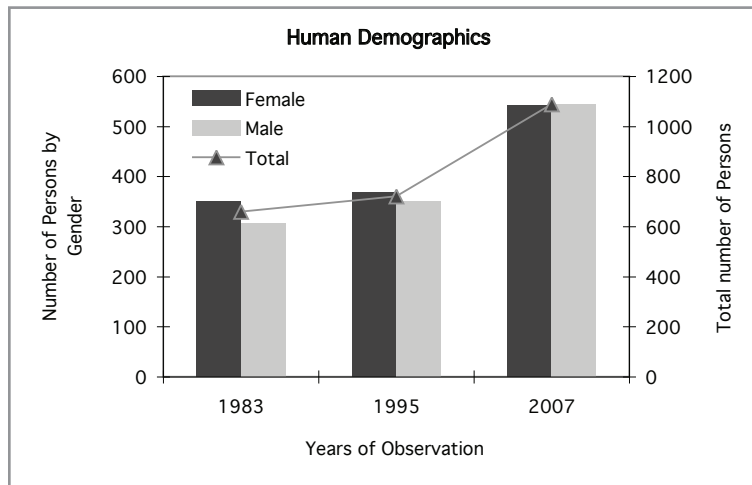
Analysis of data collected during the 2006-2007 field season to update and expand the database originally collected by M.D. Turner and colleagues (Turner, 1999b; Turner, 2000; Turner and Williams, 2002) is in progress.

The preliminary findings of this study are that human population has continuously and drastically increased, while the livestock population did not follow the same trend. At the time of research, the characteristics of livestock ownership had also changed.

**Human Population.** The human population involved in the study has almost doubled in the course of 25 years. The study started in late 1983, and 56 households were selected in two villages to monitor acquisitions and losses of livestock. In 1983, there were a total of 659 people, 352 females and 307 males. When the same villages were revisited in 1994-1995, two households had left the study area. The total human population of the remaining 54 households was 720 people, 359 females and 351 males. By 2006-2007, there were 99 households with a total of 1088 people, 543 females and 545 males. All people involved in the study were at one time members of the original 56 households or their descendents. The change in household numbers documented in 2006-2007 is attributed to the separation of some adult brothers from the family to create individual households. No new additional households were added to the study group that were not derivatives of the original households.

For this study, gross population annual growth rates are 0.08 and 2.3 for the 1983-1995 and 1995-2007 periods, respectively, and they are all below the national average of 3.2. The very low rate of 0.08 for 1983-1995 is believed to be due, in part, to several factors: 1) the absolute number

Figure 1. Human population growth over study period.



of births was higher in the later period, but the difference was small on a percentage basis; 2) the relative percentage of the initial population who joined the population study through in-migration<sup>1</sup> between the 1995-2007 period was twice that of the 1983-1995 period; and 3) there were two famines during the earlier period (in 1984 and 1994), while there was one famine in the later period (in 2005). In addition, the famine of 1984 was the most devastating and caused many people to leave the study area.

This study assumes the minimum age for reproduction to be 12 years for both males and females. Given that females marry outside their initial household, a considerable proportion of women left the study households. Some of these women may have married into other households in the study, but some married outside of study households. Males, however, bring wives from outside their original household to their current household. Some of the new wives came from study households, keeping study numbers steady, while others came from non-study households, so their marriage increased study membership. If we assume that the number of marriages from within the study group did not change between periods, then the effect of marriage on the study population is small.

Resulting human demographic trends are shown in Figure 1. The noticeable difference in the population increase rate

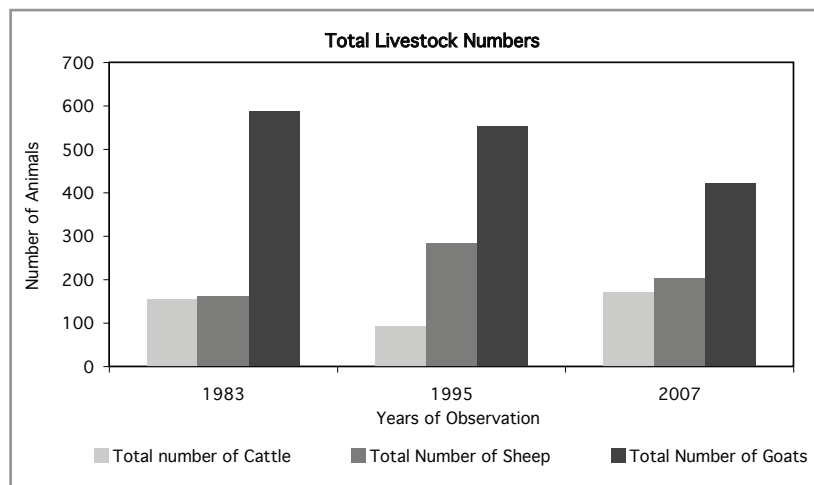
between 1983-1995 and 1995-2007 may be explained by the combination of several factors including: 1) slightly lower birth rate in 1983-1995; 2) increased birth rates within the villages when a high number of females reached reproductive age after 1995; and 3) higher in-migration<sup>1</sup> during 1995-2007 (see box next page).

**Livestock Populations.** The numbers of animals have been fluctuating during the 25 years of the study. Major drops occurred during the regional droughts of 1984, 1994, and 2005 followed by slow recovery. This is especially true for cattle which have a calving interval of about one and one-half to two years. The general trend between 1983-1995 (Figure

2) shows the following: (1) the numbers of sheep increased considerably; (2) numbers of goats decreased slightly; and (3) the cattle population decreased noticeably. Preliminary findings from the data collected during the 2006-2007 field season suggest that between 1995 and 2007 the number of small ruminants (sheep and goats) decreased, while cattle numbers increased. Given that there were droughts of varying severity in 1984, 1994, and 2005, further analysis is needed to distinguish between changes occurring during drought years and those with normal rain.

**Human and livestock population interactions.** Given human population increase over the 25 year period (Figure

Figure 2. Livestock inventories for project period.



1) and the decline in livestock numbers (Figure 2), there are fewer livestock assets per person. Indeed, the changes in total livestock owners followed a trend similar to the changes in livestock numbers. There are, however, some marked changes in livestock ownership by gender and by the

owner's initial livestock assets. Women often exclusively own more small ruminants than men, while men tend to have more cattle than women. Despite the decline in number of goats, however, women nevertheless had more total animals than men. This is due, in part, to the differences in labor requirements for handling and managing small ruminants compared to cattle. Particularly after the famine of 1984, many of the cattle owned by males were lost. By 1995, the

**The difference in the population increase rate between 1983-1995 and 1995-2007 may be explained by the following:**

- The absolute number of births was higher in the later period, but the difference was small on a percentage basis:  
*In 1983-1995, there were 209 births, an increase of 29% over the 1983 population. In 1995-2007, 360 children were born, an increase of 33% of the 1995 population.*
- The relative percentage of the initial population who joined the population study through in-migration between the 1995-2007 period was twice that of the 1983-1995 period:  
*In 1983-1995, the net addition from in-migration was 47 people or 6.46% of the initial population (1983). In 1995-2007, the net addition from in-migration was 135 people or 12% of the 1995 population.*
- There were two famines during the earlier period (in 1984 and 1994), while there was one famine in the later period (in 2005). In addition, the famine of 1984 was the most devastating causing many people to leave the study area.

number of cattle, especially those owned by men, had further decreased. Regardless of the owner's gender, the numbers of sheep increased, and both male and female owners seem to have about the same number of animals. This is probably due to the commercial value of sheep usually fattened for sale during religious festivals. However, although goats owned by women increased slightly, the total number of goats decreased due to a sharp decrease in numbers of goats owned by males. It is worth noting that although the amount of both men and women owning livestock increased, it increased considerably more so for women.

Since 1995, there has been a slow but noticeable recovery of the cattle herd, especially those owned by males. Other changes are related to individual livestock wealth. After 1995, there were more livestock owners who had less than five small ruminants. At the same time, herd sizes decreased for those who own a large number of animals. The number of male owners increased for all species suggesting that there was a redistribution of livestock wealth among the male owners, with fewer large holders and more small holders. The number of women owners declined for all species; but in the case of small ruminants, it remained similar to that of male owners. This suggests a gender-based differentiation in species choice and investment.

### Practical Implications

The direct implication of the continuous human population growth is that more food is required to feed the growing population. Similarly, with the lower level of livestock numbers since 1995, fewer livestock-based coping strategies to withstand drought and resulting food crises are available. During normal years, there is less support available from livestock for food provision and production (sales of animals to purchase food, direct consumption of animal and animal

products, generation of animal manure, draft power and transportation for farm activity as well as of farm income generation activity) than was available in the first years of this study.

According to local customs, in the study villages and in the Sahel in general, household food provision is primarily the responsibility of the household head, commonly the eldest able male. In addition, traditionally, people endowed with relatively more livestock or other resources are expected to assist the more vulnerable. For example, people in distress used to receive livestock loans from relatives or friends to aid in post-drought herd recovery. With the gender-based and livestock asset-based differences in animal species and animal numbers, however, there is potential for more intra-household struggles during food crises since the reduction in animal ownership decreases the potential for this type of community-based assistance.

Both women and men may be less willing to sell from their already diminishing herds to invest into household expenditures, and family members, male and female alike, may be forced into prolonged labor migration.

Given the above-mentioned trends over the past 25 years, the overall vulnerability to drought has increased, livestock-based coping strategies are weakened, and food insecurity has intensified in the two villages of Sadeize Kwara and Samari. In the recent years, these agropastoral communities met their needs from food aid from government and international donors at least one year out of three. If the current trends continue without an improvement in soil fertility, animal husbandry, or without the development of alternative sources of food and income, there is a high likelihood that the members of Sadeize Kwara and Samari will become even more dependent on external assistance.



*Women selling sour milk at the Samari market. Livestock products are sources of income and some are directly integrated into the household alimentation Photo: Chétima, 2006.*

## Footnote

1. In-migration refers to people joining a household in which they were not recorded during a previous survey. For example, a female may be married in a household outside the study population in 1993. But in 1995, after divorce or death of her husband, she might return to her parent's household which is part of the study population. Similarly, a male may have migrated to seek employment during the survey of 1995, but may have returned during the survey of 2007.

## Further Reading

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This study is part of Mamadou Chétima's doctoral research on important livestock issues related to food security in the Sahel. The grant received from Borlaug LEAP program along with other financial, institutional, and logistical support from the International Livestock Research Institute and Cornell University financed fieldwork in Western Niger from September 2006 to September 2007. Data were collected through surveys and open-ended interviews, observations of animal grazing patterns, and collection of pasture samples, rainfall data, and geographic coordinates (GPS). The data analysis and publication portions of this project are on-going.

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The Norman E. Borlaug Leadership Enhancement in Agriculture Program (LEAP) provides fellowships to enhance the quality of thesis research for graduate students from developing countries who show strong promise as leaders in the field of agriculture and related disciplines.

*The Borlaug LEAP fellowships are funded by the United States Agency for International Development and are part of the overall Borlaug International Agricultural Science and Technology Fellows Program sponsored by the United States Department of Agriculture. The program is managed by the University of California, Davis. The opinions expressed herein are those of the authors and do not necessarily reflect the views of USAID or USDA.*

*Design by Susan L. Johnson*