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HOW MARKET GARDENS CAN ALLEVIATE SAHELIAN SMALL HOLDER FOOD INSECURITY CASE OF AFRICARE IN ABECHE – CHAD

Introduction

Chad, a landlocked country is Africa's fifth-largest country. It is among the world's poorest and least-developed nations. Currently the UN Human Development Index ranks Chad 167 out of 177 countries. About 80 percent of the population survive on agriculture - subsistence farming, fishing and herding livestock. The country is regularly subject to climatic disturbances and natural disasters (drought, floods, and locusts) that lead to food shortages (World Food Program 2005). The most recent occurrence is the entry of refugees from the war-ravaged Dafur region in Sudan.

Through its West Africa Food Regional Security Initiative project Africare has been funded by USAID/FFP to implement two Development Activity Programs (DAP -1997-2002 and 2003-2007) in Chad. These programs are currently being supported through Title II food monetization. Commodities are monetized by Africare in Chad and proceeds are used

to implement development activities in the departments of Ouaddai and Assongha. Africare Chad's food security program activities include: rural community capacity building, agricultural production, health and nutrition, which are targeting the most vulnerable groups – food insecure households, women, and children. Market garden activities are among Africare's agricultural development program interventions in the Ouaddai department.

This work is a continuation of the women's vegetable gardening activities impact assessment studies initiated by the Regional Food For Peace office in West Africa. The purpose of these studies is to provide a better understanding of women's gardening activities and its role in household food security in the Sahel region. This paper responds to the needs of three client groups: the Government as a policy maker, Non Governmental Organizations (NGOs) and International donors who are promoting women gardening activities as a food security strategy to alleviate rural poverty.

Context

Africare's first intervention in the study area was initiated 20 years ago to assist with the resettlement of Chadian refugees¹. Since then, Africare has supported the Ouaddai's community through food security and related development initiatives. Africare's approach is based on capacity building and participatory development at the community level. From 1997 to 2002, Africare implemented its first Title II Food Security Initiative in Chad. This project has had positive results by promoting community capacity building, diversifying agricultural production, increasing value added and improving nutrition.

Africare Chad's actual gardening activities are in 41 of the 90 villages covered by the project. Of the 12,832 farmers identified in FY 2003 as vegetable crop producers, 58% were women. Around 450 hectares of vegetable crop land are cultivated for an average surface land per producer of 3.5 acres. Depending on water availability, this land can be cultivated 3 times a year.

Objectives and Methodology

The general objective of this study is to provide a better understanding of women's gardening activities in Chad in general and in particular the Ouaddai and Assongha Departments and its impact on food security.

The methodology used here has been tested with ADRA/Guinea's Title II food security project in Siguiri (Guinea). It can be adapted to any Title II food security project with gardening activities.

The RFFP/Senegal office designed a three-page questionnaire based on previous studies conducted in Guinea. It has been modified by Africa/Chad staff to reflect the Chadian conditions. The questionnaire was made as simple as possible to allow the NGO field staff to administer it without any particular survey preparation. The data collected concerns vegetable crop production, input/output market information, and household food security. Out of the 90 villages currently participating in the project activities, 41 of them have access to gardening or off season crop production resources. A sample of 25 villages was randomly selected from the 41 villages that practice gardening. Similarly, the number of women carrying out vegetable gardening was listed for each village and a sample of five (5) women per village was randomly selected. Thus a total of 125 women were interviewed for the survey by Africare Chad's field agents.



Dam constructed by Africare for recession irrigation in Abéché using a backhoe frontloaded.

¹ In 1984, thousands of Chadian refugees crossed into Darfur, escaping a severe drought and potential famine as well as border clashes between Chadian and Libyan forces.

Findings

Socio-economic characteristics of women participants

The average age of women participants was 32 years. The majority (54%) of these women were young, between 20 -30 years. Ten percent of women sampled were non-unmarried, while 9% were considered widows (2-3% of the general population is estimated to be widowed in the region), 3% were divorced women living with small children. About 13% of these women are household heads. Nearly all women respondents (98%) are illiterate (cannot read and write in French).

A mean of 3 children, of whom one is under-five years old, live with each woman. The average is 6 children per woman in Siguiri²- Guinea. In the Ouaddai area, the under-five child mortality rate computed from the collected data is estimated at 190 per 1000. This rate was 198 per 1000 in 2000 in Chad (Earth trend 2003) and 175 per 1000 in Africa. An analysis of this problem reveals that 31% of married women have lost at least one child under- five years old. The mortality rate for under-five children increases with the age of the woman. For instance, in this study, 50% of women over the age of 45 have lost at least 2 children under-five years.

School attendance is very low in the survey area; with only 32% of married women having at least one child in school. Only 54 out of 236 children over the age of

² It is one of Guinea's food insecure areas where the under-five children's mortality rate is very high (249 per 1000). In Siguiri ADRA/Guinea is implementing a Title II Food security project. It was the first area of the case studies.

6 attend school, according to the survey. More than 70% of these school children come from three out of 9 surveyed cantons. The ratio of school attendance is 1 girl for 3 boys.

Women participants in vegetable crop production systems

Land tenure

In the study area, women cultivate 1-3 garden plots. Among surveyed women's garden plots, 55% are owned by women themselves, 16% are plots belonging to their husbands or other family members, 16% are borrowed plots and 16% rented plots. The rent paid by women varied from 1,500 to 10,000 F CFA - \$3-\$20 per plot of 3 Ares³ depending on land quality.

Production system

Two crops – onion and garlic - dominate the vegetable crop production systems in the study area. They represent 95% of the total vegetable crop surface cultivated by the women interviewed. Vegetable gardens are manually irrigated from hand-dug wells in the Ouaddai district. The average size of individual plots of land is 580 m² per woman. This size is 250-300 m² per woman in Siguiri (Northern Guinea) area and 119 m² in Zondoma⁴ (Burkina Faso). The variation of the average surface of land grown by a woman in the Sahel region depends on the type of irrigation system used. In Ouadai, vegetable crops are cultivated on recessional lands using a traditional irrigation technique -

³ One Acre is 1/100 of a hectare

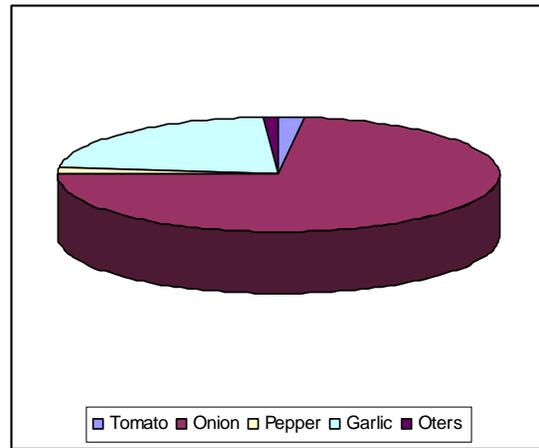
⁴ Africare is running a Title II food security project in the northern region of Burkina Faso. Women are using hand dug wells (10 – 20m deep) to irrigate gardens.

SHADOUF⁵. While in the northern regions of Burkina Faso, NGOs are promoting hand dug wells (10-20 meters of deep) with watering-cans for off season vegetable crop irrigation. In Siguiri, irrigation wells are 1-2 meters deep.

Vegetable crop seeds remain the main farm input used by women

The use of chemical inputs (fertilizer, pesticide) in vegetable crop production is very limited in the study area. Only 16% of the women interviewed used fertilizers during 2003. The low use of chemical input can be explained by many factors, but the most important is the lack of a strong input supply/distribution system as it has been pointed out by women interviewed previously. The vegetable crop seed system in the study area is dominated by a traditional seed distribution system. The majority of women interviewed bought their vegetable seeds from the market. These seeds are produced by local seed producers with no guarantee in quality. However, the most important feature of this system is that seed that is available in the local market is affordable.

Graph 1: Distribution of Interviewed women's cultivated surface according to crop types



The vegetable crop yields recorded by interviewed women are relatively low compared to the yield level in the region.

Although rigorous statistical measurements⁶ were not applied to evaluate the Ouaday women's vegetable crop yields, information available reflects the level of technologies used by these women. In general, the vegetable yields recorded by the women surveyed are very low compared to the average vegetable crop yields in Chad and in the Sahel region. However, these yields are acceptable if one considers the nature of technology used by women (no chemical fertilizers or pesticides, hand dug well irrigation system). The yield analysis has focused on onion and garlic, the two most important vegetable crops grown by women (95% of cultivated surface).

The weighted (by land surface) average yield of onion is about 18 metric tons per hectare for participant women (yield computed from 104 women plots). The onion and garlic yields recorded are

⁵ A method of supplying land with water by means of channels leading to a central water source (hand dug well)

⁶ Cultivated area and total production have been estimated by women, not measured by the surveyor

extremely variable (standard deviation = 41 for onion and 53% for garlic) especially when compared to those obtained in the region. The average onion yield varies from 13 to 30 metric tons depending on Cantons in the study area. For women using fertilizers, the average onion yield is estimated at 20 metric tons per hectare against 18 metric tons for those who are not using fertilizers. Onion yield varies from 20 – 35 metric tons per hectare in the Sahel region. For the FAO, the average yield of onion was 28 metric tons in Niger in 1998⁷. On average, the women interviewed are producing 13 metric tons per hectare of garlic.

Women Respondents are mainly relying on family labor for their gardening activities.

At the 95% significance level, there is a positive correlation (0.188*) between women's gardening income and the number of workers used for this activity. In other words, the higher the number of people working on a plot, the higher the income per plot. Although, only 7 women in the sample hired extra labor, the majority of them used family labor. Women respondents (27%) benefited from their husband's help for garden land reparation. Almost 66% of participants used their children (37% for girls, 29% for boys) for vegetable crop production in this study area. This work by children might explain in part the low school attendance rate, and could be a major factor discouraging women from sending these free labors to school.

Profitability of the Ouaddai's women gardening activities

The average gross revenue per woman was computed from women beneficiaries' declaration regarding the total quantity of vegetable products they sold during the 2003 dry season and the sales prices. For most women, the declared gross revenue does not include the value of vegetable crop quantity consumed by the household. It includes all vegetable products grown and sold by women in 2003. The average computed gross revenue is estimated at 289 000 F CFA (\$525) per woman in the study area (CV= 61%).

The costs associated with these activities are input charges (seeds, organic manure), hired labors and product transportation costs. These expenses do not include family labor remuneration. On average, each woman participant spent 22,608 F CFA (\$41) as total variable costs for gardening activities in 2003. Seeds represent 78% of variable costs, and 13% of these costs is for production transportation (from villages to markets) cost. Hired labor costs represent 5% of total costs.

The average net income computed (weighted by the surface of land) is about 259,000 FCFA (\$472) per woman participant in a 3 to 6 month period. This net income is highly variable (standard deviation 165,142 F CFA). It is twice higher than the Chad GDP per capita (\$216 in 2002) and 6 times higher than women's net revenue for gardening in Siguiri (Guinea) and Zondoma (Burkina Faso). In Siguiri, the ADRA's beneficiary women's vegetable net revenue was about 44,996 FCFA (\$82) per woman in 2003. In Zondoma (Burkina Faso) with Africare's food security project, the women's off

⁷ ÉTUDE SUR LA FACILITATION DU COMMERCE COUVRANT LES FILIÈRES AGRICOLES- Niger

season gardening net revenue was 40,606 FCFA (\$74) per woman in FY 2003.

This average net income which is a central tendency measure should not hide the income disparity among the interviewed women in the Ouaddai district. For the first lowest income group (1st quartile), the average net income is about 62,650 F CFA (\$114) while for the highest income group (4th quartile), the average net income per woman is 402,870 F CFA (\$732). The two middle class income groups (2nd quartile, 3rd quartile) present respectively an average net income per woman of 134,667 F CFA (\$245), and 184,350 (\$335). Furthermore, in 5 Cantons out of 9 selected for the study, 40-50% of interviewed women are in the lowest income group (average income equal to \$116).

This income dispersion might be explained by vegetable production constraints that the Ouadaai women face. These constraints include non-availability of farm input, lack of financial services, vegetable product storage and/or conservation etc.



Women's vegetable gardening activity and household food security

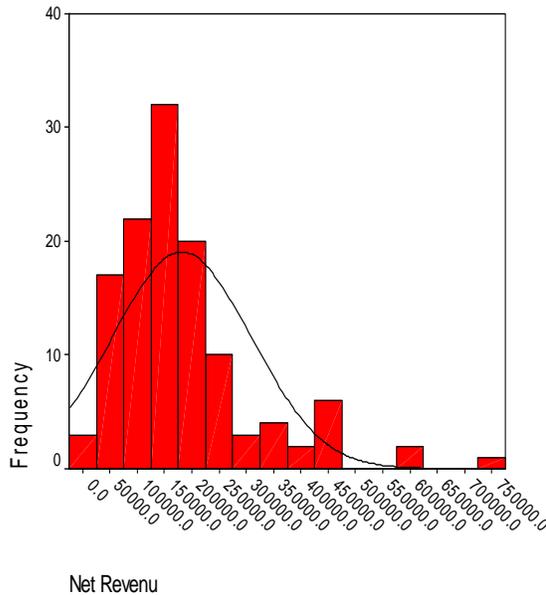
In a vulnerable and fragile environment like the Sahel region exacerbated by the consequences of structural adjustment programs, the Sahelian men's contribution to household food security is clearly insufficient to cover basic needs. This is

compounded by a large family structure with several wives and a large number of children. The women must make up for this income insufficiency by devoting a greater number of hours to working in the field or undertaking new income generating activities. In a Sahelian polygamous household, in case of a lack of resources of man, each woman is responsible for feeding her children, and paying their schooling costs. This is true in rural areas as well as in towns.

The Ouaddai women work in their gardens 10 hours per day during 3-4 months. Their vegetable income is used to cover the basic needs of the household. However, their self identified priorities vary according to these basic needs level. Almost all women respondents (94%) said their gardening income was used to provide condiments (fish, meat, salt etc.) for the family. Eighty two percent (82%) of women used gardening income to cover the costs of children's clothing. Eighty five percent (85%) of women surveyed said they spent part of their income to buy cereal for their household during the hungry season. However, the collected data did not permit an analysis of the factors that determine women's decision to contribute to the household's cereal needs and health care cost.

Fifty-seven percent (57%) of women respondents saved part of their 2003 vegetable income. These savings consisted of buying small animals (33%) for breeding, or jewelry (24%) -- gold in some cases. These savings protect women against income and environmental shocks. They might reduce women's vulnerability by providing means to cope with emergencies (droughts, deaths) needs and other events that require resources from women.

Graph 2: Distribution of Interviewed Women according their net income (in CFA)



More than two thirds of women respondents contributed to their household's cereal consumption from their gardening income in 2003.

On average, women bought 152 kg of cereal (millet, sorghum, rice, wheat flour) valued at 18,500 F CFA (\$37) per woman with money earned through gardening activities. Depending on their household's food security conditions, and their income level, women spent between 2,000 and 56,000 F CFA (\$4 – \$102) for cereal. The quantity of cereal bought covered around 2 months (58 days on average) of household food needs. Globally, 12,832 vegetable crop producers have been identified in the Ouadadi department of which 7,444 are women. Based on the information above on expenses on cereal, these women have bought 962 metric tons of cereal for a total value of 117 million of F CFA (or \$212,789) with money earned through gardening.

Ten to fifty percent of women's vegetable production is for household consumption

In Ouaddai, women grow vegetable crops mainly for household consumption. However, more and more of this activity has become market oriented. Thirty to fifty percent (35%-50%) of traditional vegetables produced are consumed by the household. For marketed vegetable crops only 10 – 20% of production is used for household consumption. For example out of an average onion production of 876 kg per woman, the household consumes 97 kg. For garlic, women respondents consumed on average 57 kg from a total production of 298 kg per woman.

Conclusion

This study found that women's gardening activities are a profitable enterprise in the Ouaddai department in Chad. This activity has in general a positive impact on the welfare indicators of the target population, such as women's income levels, asset accumulation, and consumption. It also contributes to empowering women to be more independent. In the Ouaddai district, on average, women's gardening income (three to four months income) is twice as high as the Chad National GDP per capita and six times higher than the Zondoma (Burkina Faso) and Siguiiri (Guinea) women's gardening income. As previously stated, this high average net income should not hide the income disparity among the women respondents. At least 25% of women interviewed earned less than 100 000 F CFA (\$180). Other than social expenses, a majority of women (85%) used their gardening income for household cereal purchases during the hungry season. More than 75% of women respondents were involved in some type of income savings (buying animals or jewelry) that could protect them against income and environmental shocks. The system seems to rely mainly relying on children's unpaid

labor, which can prevent them, especially young girls from going to school (this finding has to be verified in another study). The study indicates a possible negative relationship between women's gardening activity and the number of under-five children and the number of school children that women have. These relationships will be further analyzed to determine the impact of women's gardening activities on the nutritional status of children under-five years and on school attendance. Despite the existence of a favorable natural environment (highly fertile recessional lands, existence of a regional market) for vegetable crop production, the Ouaddai women vegetable producers face some constraints which are: weakness of farm input distribution system, lack of structured financial services, problems of conservation of vegetable products and a lack of research for activities such as integrated pest management activities, use of micro doses of fertilizers, testing of improved seeds, and market research. Access to fertile land seems to be the main factor of categorizing women respondents. Only 56% of women own the lands they cultivate.

Policy recommendations

Given the extensive character of the Ouaddai vegetable garden production system, which is mainly relying on land and family labor, the project should:

- Intensify women's vegetable crop production system by increasing the productivity of the two main production factors (land and labor);
- Prioritize women's access to irrigated (water harvesting system) land in any land distribution program;

- Implement a sustainable input (improved seeds, fertilizer, and pesticide) distribution system. Special emphasis must be put on vegetable seed quality control;
- Encourage the creation of a sustainable rural credit system (credit for input distributors and for vegetable crop producers, especially, women). A microfinance program could be a good possibility that would take savings from higher income producers to support the lowest income class. In the future, this program should support poor people outside the project area;
- Put in place a marketing program that will support vegetable crop intensification activities.

Based on preliminary findings on the possible impact of women's vegetable gardening on school attendance, and the nutritional status of children under five, Africare should consider the following activities:

- Implementation of a special child nutritional program directed to women involved in vegetable crop production;
- Encourage and strengthen the capacity of local women's organizations for the creation of community based services such as schools, pre-schools for their children under-five, and adult literacy program for women producers. Africare has had experience with community school activities in Mali funded by USAID that can be replicated the project.

For more information on the full study, contact Dramane Mariko dmariko@usaid.gov or Carolyn Hughes chughes@usaid.gov

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