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Cash(ew) for Food

Cashew Production's Impact on the Livelihoods of Rural Cashew Farmers in Central Benin

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Abstract

Cashew is a trending cash crop among many West African smallholders. The aim of my research was to investigate how the livelihoods of cashew farmers in central Benin are impacted by cashew production. I have selected a case study research strategy, using a mixed methods approach. Findings and analysis were based on four focus group discussions with cashew farmers from central Benin, and a quantitative data set which was issued and implemented by the African Cashew Initiative (ACI). Impact on livelihoods was examined in terms of the direct impact on household capital and the individual, and in terms of how the rise in cashew production influences regional food security, as an external factor acting upon the household, on the example of two districts in Central Benin. While cashew production was found to increase individuals' access to capital, the entry barriers to cashew production cause inequitable benefits across the community. The regional food security is menaced in terms of the stability of the food supply, but increasing cashew production did not seem to be the leading cause of this development. It is rather climate volatility and soil degradation which have greater impacts on the stability of the regional food supply.

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List of Abbreviations

ACI	African Cashew Initiative
FENAPAB	Fédération Nationale des Producteurs d'Anacarde du Bénin
GAP	Good Agricultural Practice
LVI	Livelihoods Vulnerability Index
NGO	Non-Governmental Organization
NORC	National Opinion Research Center at the University of Chicago
RLF	Rural Livelihoods Framework
YS	Yield Survey 2015 Benin

Contents

1. Introduction

Cashew is a trending cash crop among many West African smallholders. A high value export tree crop, cashew grows very well in high salt-content grounds like the Sahel (Dendena and Corsi 2014: 2). Cashew has swept across the rural regions of countries like Nigeria, Guinea Bissau, Ghana, and Benin, while the economic integration and ecological impact was more successful in some regions than in others. Benin is a good example of the middle ground, where cashew production has intensified over the past 20 years, especially in its central regions, and the country has now gained a reputation for producing high quality cashew (ACI 2015a).

Development organizations and cashew experts have framed cashew production as an effective way of reducing poverty among farmers – men and women alike. However, academic research does not unanimously support this claim. Scholars have raised concerns about the profitability of cashew in relation to the market structures and transaction costs, its impact on food security, and ecological impacts of intensive cashew production. While shedding light on the dichotomy between these different views, the aim of my research is to investigate how the livelihoods of cashew farmers in central Benin are influenced by cashew production.

As the geographical area of my study, I have selected the central region of Benin (for a map of the districts my study refers to, please see appendix A). Despite the rapid intensification of cashew production in Benin, the impact on the individual households as well as the food crop production of the

region has not been investigated academically. This country context becomes especially important, considering that the central region of Benin can be classified as a food insecure region, in that at least a third of the population has a low daily calorie intake for at least three consecutive months of each year (NORC 2011: 2). Embedded within this investigation is not only the concept of the sustainable rural livelihood, but also that of food security, and the interaction between cash crop production and food crop production. Therefore, these concepts will guide my analysis of the following overall research question:

How does cashew production influence the livelihoods of farmers in central Benin? Leading up to answering this question, I will use a mixed methods approach to the three following sub-questions:

1. How does cashew production affect the household's access to capital?
2. What are the implications of any differences in access to capitals between male and female cashew farmers?
3. How is regional food security in the two central district of Benin developing and what is the role of cashew production in influencing regional food security?

In order to investigate and conceptualize improved livelihoods, I will use both the individual, and the household as a unit of analysis. The distinction between the household and the individual is important because of possible discrepancies between them, especially when investigating gender relations. Intra-household bargaining theories have shown that a researcher should neither assume complete unison and agreement among different members of the household, nor assume complete disarray.

The following chapters will shed light on the methodology I have employed for addressing the research questions, a review of academic studies related to cashew production and cash cropping in Benin, and the theoretical framework of my analysis. My findings and analysis are integrated in two chapters, of which the first focuses on cashew production's impact on the household and the individual, while the second chapter investigates cashew production's interplay with regional food security and hence the external influences on the household.

2. Methodology

2.1 Research Design

I have selected a case study research strategy, since a case study comprises sites and participants, which are selected based on commonalities, meaning a common program, the experience of an event, or common activities (Creswell 2007: 122). My case study thereby comprises smallholder farmers who produce cashew and are part of the agricultural extension network of the National Federation of Cashew Producers of Benin (FENAPAB). As detailed by Silverman (2013: 270), a case study is suited for emphasizing quality rather than quantity. My case study is a mixed methods study, though the majority of findings and analysis is drawn from qualitative data.

Even though convenience sampling could affect the representativeness and the credibility of the research, it is more feasibly in terms of efficiency and financial resources needed (Creswell 2007: 127). Except with regards to the participants' ties to FENAPAB, participants' gender, and their region of

residence, I had little control over sampling. Nevertheless, my samples for the qualitative and the quantitative portion of the research are somewhat varied, showing wide age ranges and variance in gender representation, farm sizes, and income ranges. Variety in the sample is valuable in that different sections of society are represented, so that different experiences can be reflected. One characteristic in which participants differ very little, both in the quantitative and qualitative data, is social capital, since all participants have links to FENAPAB, and market access, since the villages from which participant were samples are connected to a good infrastructural network, so that I could access them for my field research.

2.2 Methods

2.2.1 Methods of Data Collection

For my statistical analysis, I have used the Yield Survey data set 2015, Benin (YS), which was issued and implemented by the African Cashew Initiative (ACI). It is a comprehensive data set designed to offer information on the cashew yield, farm size, productivity, tree age, and application of good agricultural practices of 300 cashew farmers in central Benin. Since the data set is comprised of over 500 variables, much of the data which it comprises offers an insight into the overall livelihood of the individual farmers, their access to capital, and gender dynamics, even though the data set is not directly geared at livelihoods research.

Additional qualitative data from focus group discussions and observations provided me with much more depth on the dynamics and processes constituting each household's livelihood. As Vaughn and Turner (2016: 42) point out, one of the advantages of qualitative research is the complexity that it captures about research participants and the research topic; a complexity with which it can complement quantitative research. I conducted four focus groups in two central regions of Benin, namely Tchaourou and Nikki (please reference appendix A). Each group of 9-12 participants was conducted such that one group of men and one group of women were sampled from adjacent villages, meaning from the same region of production and possibly from the same social network. Two of the focus groups consisted of only women – one group consisted of only men, and one group consisted of mostly men.

2.2.2 Methods of Data Analysis

In order to combine these different types of data, I have used thematic coding techniques. Primary to conducting the focus groups, I disseminated themes from the YS by going through the survey questionnaire. Vaugh and Turner (2016: 45) suggest the technique of identification of thematic categories, for connecting and bridging the qualitative analysis and the statistical analysis. Once the themes had been distinguished, I selected those which were connected to rural livelihoods dynamics, in terms of capital access, gender, and food security. Based on the compilation of livelihoods information, the qualitative portion of the research was designed to make up for what was lacking in the YS data set. In order to clearly identify the codes, I developed a code dictionary (please see appendix B), as defined in purpose by Vaughn and Turner (2016: 45) to be aimed at linking themes, codes, and data consistently, and to clearly define the meaning of the codes that were chosen.

In order to measure vulnerability, I created the Livelihoods Vulnerability Index (LVI) comprising variables from the YS data set. What contributed to the individual components of the LVI were findings

from the focus group discussions, where different influences on vulnerability emerged, including (1) access to production inputs, (2) vulnerability to fire, animal intrusion, and environmental factors, and (3) social capital. These categories were translated into variables from the YS data set and added to form the LVI (constituents of the LVI are listed in appendix C).

In order to receive different abstractions and representations of focus group participants' productions, I conducted two visual exercises in each focus group (examples in appendix D). These visual exercise findings were disseminated from the responses of 22 women and 21 men. Even though these findings are not based on larger scale statistical analysis, they still show general tendencies of production preferences. During the spatial exercise, I asked participants to estimate the ratio of the surface of fields cultivated by the respondent, which the respondent uses to feed his/her family. In order to analyze this exercise, I estimated the ratio portrayed in the visual exercises by participants in numeric form.

During the second exercise, I asked participants to create a timeline of production on their fields since they started to cultivate independently, detailing pure cash crops (crops intended only for sale), pure food crops (crops intended only for household consumption), and mixed purpose crops (crops intended both for household consumption and for sale). In order to further interpret the timeline exercise, I created a food crop-cash crop coefficient, by counting the number of pure cash crops and subtracting the number of pure food crops which each farmer cultivates. The coefficient indicates the following: the more cash crop-oriented the production, the higher the magnitude of the positive coefficient; the more food crop-oriented the production, the higher the magnitude of the negative coefficient. Mixed purpose crops were analyzed separately.

2.3 Validity, Reliability, and Limitations

Since the focus groups were carried out in local languages, the quality of the transcripts was highly dependent on the process of discussion between me and the focus group facilitators – a process during which the transcripts were completed in French. Therefore, the validity of my findings is not only threatened by participants' subjectivity (Ragin and Amoroso 2010: 48), but also by the gatekeepers' interpretation of participants' statements. In order to mitigate these weaknesses, my method of qualitative analysis is not word by word coding but rather coding by meaning, since the process by which the transcripts were compiled was guided by identifying common meaning in different participants' answers rather than a word by word account. This process of data compilations mimics opinion formation and representation in reality, in that the voices of participants are heard, but they are layered by voices of gate keepers, including village chiefs and agricultural extension agents, who were the focus group facilitators. Opinion formation is often not an individual process but rather a group process, in which individuals with social authority play an important role.

Furthermore, gender dynamics during the focus group discussions were such that female participants may have been treated differently or spoken to differently than male participants, based on my observations. This different treatment may have interfered with the compatibility of men's and women's focus groups. In a discussion I had with focus group facilitators after the first women's focus group, they directly expressed they believe women are not as qualified to discuss agriculture as men, and women therefore give less valuable answers. Even though some of the gender dynamics may have been interfered with in the first women's focus group, during the second women's group, I took great

care to make sure, the facilitator understood why the women's answers are as valuable to me as the men's.

2.4 Ethical Considerations

Even though I have conducted my research as independently as possible, I have been associated with ACI throughout my data collection, where the focus group facilitators, as well as the participants were accessed through the partner organization FENAPAB. However, I attempted to mitigate this association by explaining to participants why ACI is interested in this research in contrast to why I am interested in this research. While my association with ACI was beneficial for me in practical terms, it also provided for access to communities which were already part of ACI interventions, and hence are neither remote rural locations nor low on social capital. This is relevant to both qualitative and quantitative data. I am eager to investigate what the data indicates with regards to my research aim, and I will share my results publically. However, the outcome of my study is in no way swayed by the interests of ACI.

An ethical dilemma, described by Silverman (2013: 273f.) is that of remuneration of participants. I decided to pay each focus group a small token collectively, which participants shared amongst themselves for refreshments or other needs. I believe, because I took up participants' valuable time by conducting my study that at least a small payment was indispensable. The payments were made after the focus groups ended, so that there was no possibility that this gesture could have been mistaken for a bribe. I value the confidentiality of the participants highly, which is why I clearly informed all participants of their right to confidentiality at the beginning of the focus groups, and why I do not use any names or attributes by which participants can be recognized. I focus my analysis primarily on the essence and the dynamics of the discussions, rather than any statements made by individuals.

3. Literature Review

My study is situated within literature on poverty reduction and cashew production, literature on gender and access to resources, as well as debates on cash crops and food security. Similar studies, considering the impact of cashew on the household and the community, and to some extent on a regional level, have been conducted in different countries in West Africa. However, the region of Central Benin, where cashew production has increased most intensely, has not yet been examined in terms of cashew production's impact. Furthermore, the effects of cashew on food security have not yet been investigated in West Africa. My study aims to address these issues, offering an initial analysis, on which further studies can be built.

3.1 Cashew Production and Poverty Reduction

Considering cashew production for poverty reduction, dimensions of analysis which have been considered in academia include ecological impacts, market dependency and cash crop-food crop debates, but also the local cultural and customary context in which the crop is embedded. A number of scholars have found negative effects of cashew production. Termudo and Abrantes (2014: 228) argue that the main disadvantage of a significant increase in cashew farming is that farmers who previously were self-sufficient are now dependent singularly on cashew revenue and the market for their food supply, based on their findings in Guinea Bissau. Degla's (2012: 294) analysis found that cashew

production in the two villages examined in the study in northern Benin is not profitable since production costs are higher than transaction costs. The primary factor influencing this lack of profitability, according to Degla (2012: 294) is the lack of organization of farmers. Evans et al. (2015), in their study on the strongest cashew producing region in Ghana, found that cashew is problematic at the local and household level because it incites gender as well as generational conflicts within families.

3.2 Gender and Crop Choice

Gender conflicts and gender differences in farming have been found to include women's less prominent role in cash crop production as well as women's access to capital. When controlling for access to production inputs and plantation size, studies found time and time again that there is no difference in agricultural productivity between men and women (deBrauw 2015: 477; Udry et al. 1995; Udry 1996; Hill and Vigneri 2011: 7). In reality it is due to women's lower access to production inputs that their productivity is lowered (Hill and Vigneri 2011: 28). Where studies have found significant differences in farming is the choice in crops farmed by women versus men. Doss (2002: 2) argues that one problem with cash crop development initiatives has been that they target primarily male-headed households and men. Hill and Vigneri (2011: 5) have argued that because of the high transaction cost of producing and selling cash crops, women are usually less able to do so. This is due to lack of the necessary negotiation skills or education, social capital or buyer network, means of transport, and mobile phone access (ibid). These intra-household cropping dynamics can have a significant impact on household food security.

3.3 Regional Food Security

Cropping choices on a regional rather than gender level influence regional food security. A study from 2008, carried out by the NORC research institute, investigates household food security in Benin. The study found that a large part of study participants experience a severe hungry season annually (NORC 2011: 2). At the same time, almost all of those farmers reporting the experience of a hungry season stated that cashew revenue had reduced the length and severity of this hungry season (ibid). The study refers to household food security rather than regional food security. Following up on these findings, my dissertation is seeking additional information in terms of cashew's impact on regional food security.

Concerning climate change, which is an additional factor affecting possible changes in regional food production, the effects on and adjustment strategies of rural households need to be considered. Previous studies have investigated effects on individual households and their coping strategies in response to both climate change and changes in the quality of natural capital. Oyekale (2013: 5501) states that because of the fragile access to resources and changing climate conditions in the Sahel, the region is prone to food shortages and very unvaried diets, leading to high chronic malnutrition. Sonneveld et al. (2012: 575) classify the effects of climate change on farming in Benin as not overall negative on farm incomes, as long as cropping patterns are adjusted and prices increase, even without policy interventions. Sanchez et al. (2012: 570) found that communities are prevented from adopting new adaptive approaches due to the lack of credit available, improved planting material, and information.

3.4 Linkages between Cash Crops and Food Crops

In academic literature, the commercialization of agriculture and household food security have been linked through household income considerations, household expenditures, household labor allocations, and household resource allocations (Babu and Sanyal 2009: 55). Strasberg et al. (1999: vi) argue that the effects of commercialization of agriculture on food security can be positive given certain market pre-conditions, and though commercialization has a positive effect on household productivity, regional food security is impacted differently depending on the case context. In contrast, Anderman et al. (2014: 542), studying cash crop production in rural Ghana, found that each dimension of food security is negatively related with the intensity of cash crop production by quantity and area cultivated in the households studied.

Theriault and Tschirley (2014), studying cotton production in Sub-Saharan Africa, investigated underlying assumptions of cash crop supporting development initiatives instead of food security. They point out that though the assumption is that higher income for smallholder farmers means they have higher capacity to purchase inputs for food crop production, it remains a riddle how the access to these inputs will be improved for the smallholder farmers (ibid: 298). Subsequent policy initiatives are needed to provide for livelihood improvement. Theriault and Tschirley (2014) argue that the access to these inputs is not merely dependent on purchasing power, but that social and political circumstances also need to be enabling, thereby questioning the positive impact which cash cropping has on rural households.

Janssen and Perthel (1990) examined the seasonality of agricultural production by analyzing the sales patterns of farmers in Benin. Their analysis reflects rural livelihoods strategies in that the first season of transactions is devoted to household food security, while the second season is devoted to cash crops. The natural seasonality of cashew, which grows in the traditional agricultural off-season, when farmers have no fresh food crops, is congruent with this transactional seasonality found by Janssen and Perthel (1990). Wendland and Sills (2008) investigated what influences a household's decision to cultivate pure cash crops rather than food crops, on the example of soy beans in Benin. They found that factors primarily affecting this decision include household preference, resource endowment, and the level of risk and uncertainty, but furthermore intra-household dynamics and experience with the crop (ibid: 39).

When considering food security, not only cash crop and food crop dynamics and decision making need to be considered. Vihotogbe-Sossa et al. (2012: 22ff.) found when analyzing cropping choices on green leafy vegetables in Benin, that cropping choices are based primarily on socio-cultural customs and their associated food habits, the availability of the leaves, traditional believes, and distribution of ground nutrients. This implies that choices on the type of food crops grown have historic roots and vary between regions in Benin. Within a single household, decisions about cash crop cultivation are rooted in livelihoods foundations and assets. M'barek et al. (2005: 365) state that resource availability, influencing agricultural production patterns and cropping choices, is correlated with socio-economic factors based on their study in Benin.

Furthermore, conditions in nature will influence the growth patterns, cropping choices, and overall livelihoods decisions of rural households. Maliki et al. (2012: 9) in their study of Benin, considered one of the chief concerns in agricultural research, how to increase food crop yields. They

state the soil nutrient levels and their relationship with a crop over time to be the chief factor which needs to be addressed in Benin, in order to address, for example, the falling yam production (ibid).

4. Theoretical Framework

4.1 Defining Improved Livelihoods

Improved livelihoods as a concept in a rural context can be defined and measured using rural livelihoods frameworks (RLF). RLFs are models, aimed at informing policies and development initiatives, which visualize the inter-linkages between rural household's capabilities and assets, outside influences on the household, and the resulting livelihood strategies and outcomes. Dfid's (1999) Sustainable Livelihoods Framework is simple, yet comprehensive, and takes into account the intricate linkages of different factors (for a visual depiction of the framework, please refer to appendix E). In order to measure or characterize the state of the household, the Dfid (1999: 1) Sustainable Livelihoods Framework uses capital assets as a unit of analysis, including natural, financial, physical, human, and social capital. The state of the household in turn interacts with the vulnerability context, policies and institutions, which all mediate the usage of capital assets.

These dynamics between acting and being acted upon is what defines RLFs. Prowse (2010: 222) states that livelihoods approaches, when based on a sequence of quantitative and qualitative strains of analysis, can particularly highlight the interplay between the micro, meso, and macro levels, meaning the individual, institutions, and the state. Hence, my analysis will be twofold – investigating both the actor, and external influences.

When using "improved livelihoods" as a conceptual guideline, it has to be defined what "improved" means. Livelihoods framework scholars, including Chambers and Conway (1992: 6) and Scoones (2009: 183), highlight the need to classify wellbeing and to articulate one's normative position on livelihood outcomes. In many livelihood frameworks, livelihood outcomes are not clearly defined as to whether they are goals defined by the particular household or whether they are assumed to be universal for all households. Within this dissertation, participants' own perception of a livelihoods improvement was used as a measure.

4.2 Conceptualizing a Livelihood

When addressing the livelihood of an actor, this can refer both to a household as well as an individual. I will use both units of analysis. The household needs to be regarded because it forms an economic unit in terms of sharing assets, vulnerabilities and shocks, and profits at the household's disposal. However, beyond the livelihood of the household, I will separately address effects on individuals within the household, focusing on gender.

4.2.1 Distinguishing Interests of the Individual and the Household

It is indispensable to not regard the household merely as a single unit with common interests. Jeffrey Sachs (1983 in Curry 1996: 151) introduced the idea of women as invisible farmers, linked to women's lack of control over production decisions and production inputs, such as land – stressing that women are not only reproducers but also producers. Collison's (1989 in Curry 1996: 152) analysis reflects that of many feminist scholars: "male-biased institutions have produced male-biased programs", which is why

simple capital or technological inputs will not lead to development. As Kevane and Grey (1999: 3) stress, reduced land rights and lack of bargaining power increase the lack of access to production inputs.

Intra-household studies have emerged as a way of investigating gender relations, within the household. Whitehead and Kabeer (2001) argue that gender relations within the household are a major factor restraining women's productivity in African agriculture, leading to allocation inefficiency. Urdy et al. (1995: 408), like many other scholars including Whitehead and Kabeer (2001) and Doss (2013), contest the assumption that households' interests can be viewed as the interest of a single individual. Though these differences may exist due to cultural traditions, they are not universal and take on unique forms of gender roles, which need to be investigated (Okali 2012). In order to investigate possible different effects on different household members, cashew production for male and female cashew farmers was investigated separately, in order to give insights into possible intra-household discrepancies.

4.2.2 Measuring Improved Livelihoods

In order to measure what an improved livelihood is, I will focus on how to categorize the state of a household's or individual's livelihood. Dfid's (1999: 6) five capital assets are depicted in a pentagon in figure 1, so that if the actor's capacity in one capital category increases, others may also be affected positively. Different forms of capital are seen as enablers to improve one's livelihood by increasing one's assets, decreasing one's vulnerability, and improving one's ability to use existing external structures to one's advantage (Dfid 1999: 6). Each of the five capitals will be defined as follows in this dissertation:

- Natural capital is the amount and quality of natural resources to which one has access, or over which one has control (ibid: 11). It can therefore be an important distinction whether the assets are owned by an individual or if the owner is letting the individual use the assets.
- Physical capital in contrast is the amount of producer goods and the infrastructure at the individual's disposal, for example transport, shelter, sanitation, energy, and information (ibid: 13).
- Financial capital in turn is the stock of finance as well as regular inflows of finances available to an individual or a household (ibid: 15).
- Human capital is defined as the knowledge and skill to use other forms of capital in order to improve one's livelihood, not only acquired through education but also transmitted between individuals or acquired from media and observation (ibid: 7).
- Social capital refers to the amount of social relationships which increase one's capability of improving one's livelihood, including trusting relationships in the form of memberships in organizations, and vertical and horizontal connectedness (ibid: 9).

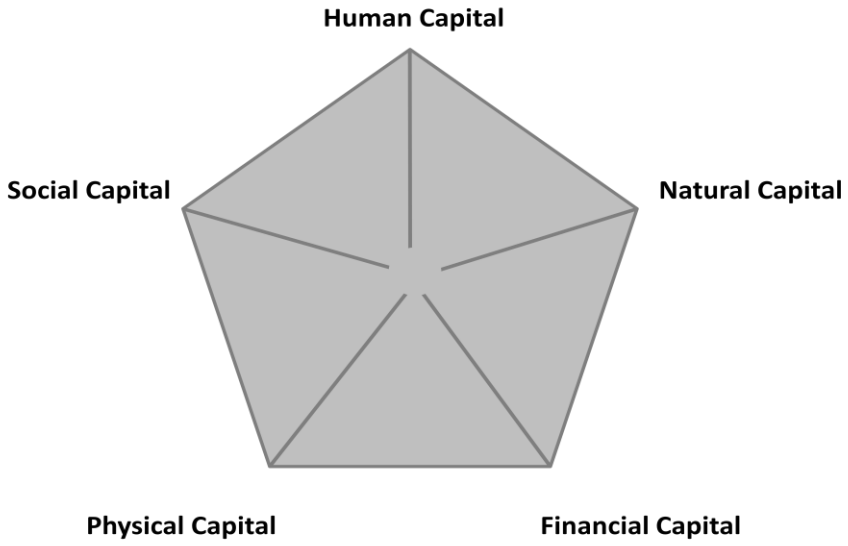


Figure 1: Capital Assets Pentagon (adapted from FAO 2002)

4.3 Dynamics External to the Household

Within the Dfid framework, this internal household classification by assets is of course linked with external factors in several ways. External linkages include the vulnerability context of the household through which capital assets are created as well as destroyed (Dfid 1999: 7). Vulnerability is defined as the state of having inadequate means to respond to shocks (ibid: 3). Further external dynamics include institutions and policies which mediate whether and how successfully the household can use the capital assets (ibid: 7). One significant way in which vulnerability, policy, and institutions interact to influence rural livelihoods is the regional food market. This dissertation uses the term regional to refer to the districts studies through focus group discussions.

4.3.1 Regional Food Security

Staatz et al. (1990: 1314) state, when measuring regional food security, one is measuring aggregate food production within a given district, meaning whether there is a shortage or surplus in production in this given district. In contrast, when investigating household food security, the focus of analysis lies on whether the majority of households experience food security within a given region (ibid). Investigating regional food security rather than household food security, as will be done in the second chapter of this dissertation, is important because regional food security determines household vulnerability. If there is a lack of regional food security, then household resilience to shocks (such as a bad harvest) will be lowered, since the household has fewer options outside the household to access food.

FAO (2006) defines food security in terms of four sub-dimensions by which it can be measured, namely availability, access, utilization, and stability. Measurement systems for food security are very complex and require incorporating multi-dimensionality (Jones et al. 2013: 488; FAO 2006: 1). Based on my data, I can address the dimensions of availability and stability. Availability is concerned with the supply of food of adequate quality and whether or not it meets the demand, whereas stability is concerned with the availability of food at all times, even at times of sudden shocks (FAO 2006: 1).

Addressing merely two out of the four measures will not paint a complete picture of the status of food security. However, some tendencies will become visible. The dimensions of availability, and stability, which I will address, are both dimensions which characterize the regional food markets as well as household responses to the market, whereas the other two dimensions of accessibility and utility, to which my data does not cater, are concerned with only household food security. Therefore, in terms of regional food security, the broader characteristics of availability and stability of food supply can give significant indications.

Factors which could have adverse effects on food security include market mechanisms such as whether or not the market is functional for the goods sold by each household, and whether or not there is a functioning capital market through which households can respond to climate shocks or others (Staatz et al. 1990: 1314). Furthermore, ecological and climate factors could adversely affect regional food security, by creating shocks in household food access experienced by several households in the region at the same time (FAO 2006: 2).

4.3.2 Interplay Between Food Crop and Cash Crop Production

Regional food production can be characterized by the amount of food crops and cash crops produced and sold by farmers within the region, and considerations about whether or not the crops produced locally reach the regional market. The cash crop versus food crop debate in development incorporates debates about food security (Maxwell and Fernando 1989, Von Braun 1995, Babu and Sanyal 2009). Advocates of cash crop and export crop production have argued that production of cash crops will make use of the region's comparative advantage, thereby raising farm incomes and improving nutrition (Babu and Sanyal 2009: 39). On the other hand, opponents of cash crop production argue that the resources used for cash crop production could reduce malnutrition drastically if they were used for food crop production (ibid). Three basic dimensions, along which cash crop-food crop linkages are analyzed, have emerged in theory, including: (a) whether cash crop production threatens food security, (b) whether cash crop production threatens equity of distribution, and (c) whether cash crop production actually contributes to growth (Maxwell and Fernando 1989: 1677).

Maxwell and Fernando (1989: 1692) refute the arguments of scholars who oppose cash cropping, and argue that cash crop production has not been shown to cause a decline in food security. Overall, Von Braun (1995: 188) argues that cash cropping increases the household's capability for growth, and increases the flow of rural capital. Both prominent articles were written within the neo-liberal tradition of development. Therefore, their positive inclination toward the effects of cash crops may be biased by study findings framed within this scholarly tradition.

Some more recent scholarship, like Naylor (2014: 21), highlights the tensions between the needs of smallholder farmers in food insecure regions and the import demands of high and middle income economies, concerning export cash crops – arguing that agricultural production follows the global demands and pricing. Essentially, those crops will be cultivated which give the highest profit rather than those crops which ensure food security (ibid). Naylor (2014) argues there has recently been higher global growth of non-food production, animal feeds, and bioenergy. This affects the rural poor in food insecure regions in terms of diets and land use.

5 Analysis of Household Dynamics

5.1 Overall Impact of Cashew Production on Household Capital

5.1.1 Financial Capital Affecting Vulnerability

One impact which cashew production has on households is the increase in revenue which is at the households' disposal from cashew sales. Both male and female cashew farmers in the YS data set were found equally likely to invest their cashew revenue in food crops (for quantitative results, see appendix F). Approximately half of the households in the survey buy food with their cashew revenues. This indicates that the financial capital earned through cashew production offers households access to food and thereby is used to improve household food security in the region. In congruence with my finding, Janssen and Perthel (1990) argue that cash crop production can decrease vulnerability because of the existence of investment seasons, where farmers invest in cash crops during one season and during the other, invest in household food security.

However, the large proportion of households which buy food from the market with their cashew revenue could also be interpreted as a negative effect in views of Termudo and Abrantes' (2014) study, in which they argue that cashew production raises the farmers' dependency on the market for food, where farmers were previously self-sufficient in food production. In the Nikki and Tchaourou regions of Benin, however, many households were found to be food insecure, regardless of whether they grow cashew or not (NORC 2011: 12). Therefore, the financial capital from cashew production does in fact give households better access to food from the market, since the farmers in this study cannot be considered food self-sufficient from the start. Even though cashew production establishes a certain dependency on the market, it decreases the vulnerability of previously food insecure households. The investment of this supplementary financial capital in livelihood strategies lowers vulnerability and thereby improves the household's livelihood.

Babu and Sanyal (2009: 55) found that men spend more of their income on food security enhancing systems, and therefore are more likely to invest in health and education, and technological inputs, whereas women are more likely to invest directly in food. Their findings are partially reflected in the YS data set. Besides investments in food, answer categories for investment of cashew revenue included investments in cash crop production, in health expenditures, in education of their children, and "other". Men were found slightly more likely to invest in health, where 79% of men spent their revenue on health expenditures, but 68% of the women did so. However, for all other answer categories, including education and other, women and men were found equally likely to invest.

Within the YS data set, total income is positively correlated with the LVI, where total income is an estimation of the farmer's income made by the farmer him-/herself and hence a proxy for financial capital. Despite the correlation being relatively weak, it indicates that financial capital is an important asset for achieving higher livelihood security, which means, the greater the household's access to capital, the greater the household's capacity to respond to shocks. This is of immense importance on a local level when considering the current process of unfinished decentralization in Benin, as addressed by M'barek et al. (2005). M'barek et al. (2005: 372) argue that the reason why socio-economic factors, including wealth, have such a high impact on household access to resources is the way the resource

availability of water and land is managed by the elites and the wealthy in each community, rather than democratically.

YS data also indicates that cashew productivity, measured in both kg per ha and kg per tree, is positively correlated with the LVI. These correlations reinforce the positive correlation of financial capital with household security, but they also show specifically the positive correlation with household security of producing more cashew. Findings indicate that high productivity could lower a farmer's vulnerability, likely because higher productivity entails higher revenues, which raises the farmer's capacity to respond to external shocks.

However, the question poses itself for why the correlations between productivity and the LVI are higher than the correlation between total income and the LVI. Within considerations of productivity, many other factors are involved which influence whether all cashew produced can be translated into revenue, such as in kind payments and external shocks. Furthermore, social and human capital acquired through cashew is not measured by the variable total income, and hence the correlations between productivity and the LVI may be stronger.

Not only the increase in financial capital, but also the way this financial capital is used, affects vulnerability. Based on the YS data set, whether or not a farmer invests in food crop production is correlated with the LVI. Farmers who invest their cashew revenue in food crops are less vulnerable than farmers who do not, though the correlation is weak. This implies that farm management choices, such as an investment in food security, influence the vulnerability of the household. This finding is congruent with the finding that farmers who intercrop maize in their cashew plantation were found less vulnerable than others. Maize is an important food crop in the region. Presumably household food security is raised by cultivating maize, and with rising household food security, vulnerability lowers.

Vulnerability considerations of Termudo and Abrantes' (2014) study recur, since they argue that a household which covers its own food demand with its own production is less dependent on the market and hence less vulnerable than other households. Agricultural extension agencies in Benin also define intercropping of food crops within cashew plantations as one of their good agricultural practices in training materials (ACI 2015b: 36ff.). Production of food crops within cashew fields can therefore lower household vulnerability.

Overall, the increased access to financial capital through cashew production enable these households, participating in the YS, to access other capitals, such as health services and education, thereby improving the household's human capital. This indicates that the income generated through cashew has strong potential of raising the household's standard of living, as long as factors external to the household also enable the household to access other forms of capital.

5.1.2 Translating Financial Capital into other Assets

There was a congruence of opinions about cashew cultivation among participants of all four focus groups. Cashew's relation with household food security was raised in three out of four groups. Some participants stated that they see cashew as somewhat of a back-up crop or a choice of 'security for the household', so the family can eat even if the food crop harvest is bad. Furthermore, many participants agreed that cashew income raises the household's standard of living, because one can afford improvements to one's house, means of transportations, and health and education expenditures for one's children.

Some participants in the Nikki region also raised the fact that cashew production was a cause for them to join a farmers' association which gave them access to trainings. This statement reflects Strasberg et al.'s (1999: 27) finding that the introduction of cash crops encourages the organization of farmers into associations and unions. Focus group participants who have cultivated cashew for more than five years also agreed that cashew cultivation has raised the wealth of their household. Therefore, based on focus group participants' experience, cashew offers households greater access to not only financial capital, but human capital, and in turn to natural, physical, and even social capital.

Another advantage which cashew production is perceived to have over other cash crops, according to some focus group participants in all four groups, is that cashew is more profitable than other crops, as well as easier to cultivate because less labor is needed and the trees grow without much outside input. This way of expressing cashew's advantage is interesting because it implies that access to financial capital through cashew is easier than through other means. Especially labor inputs were stated to be lower than for other crops, according to the cashew farmers in the focus group, which raises cashew's overall productivity in contrast to other cops.

A study by Degla (2012) in northern Benin indicated that cashew production in the two villages of the study is not profitable, mostly because of a lack of access to the markets and the therefore high transaction costs. In the regions of Tchaourou and Nikki, this does not seem to be the case, based on both the YS data set and the focus group discussions. Both regions have access to an active agricultural extensions network and the social capital measure from the YS data set is generally high, where 90% of participants score .5 or above (see appendix E).

One qualitative finding in particular puts the very positive perception of cashew by focus group participants into perspective. In three focus groups, a category of meaning was found which is linked to judging the resilience of the household – the threshold capital associated with cashew. Statements by focus group participants indicated that a household must have a certain entry level wealth when beginning to cultivate cashew. Entering cashew production was associated by focus group participants with some level of risk, and some participants stressed that not everyone has the means to cultivate cashew. In one of the men's groups, the need for a threshold capital was addressed in terms of land, or natural capital, after discussing whether tensions and conflicts over land in the village are increasing. Some of the men expressed that only those blessed with enough land can grow cashew and only if they own the land can they grow cashew, because tree planting requires ownership. Households which can afford to cultivate cashew are therefore likely not to be struggling for basic existential needs.

Within discussions about what participants invest their revenue in, the first investments listed were always construction and means of transport, and secondarily education, health, more land and physical capital for production, and if need be food. Even though, participants expressed cashew investments to be dependent on the household's wealth, it seemed that the focus group participants use cashew revenue for improvements of their standard of living beyond basic existentialism. However, those participants whose households experience food insecurity may not have been comfortable to express this within a group setting.

Wendland and Sills (2008: 39) investigated what motivates households to cultivate pure cash crops, and found that, above all, the household's resource endowments, intra-household dynamics and experience with the cash crop influence whether or not a household is likely to take up or continue cash crop production. This finding also implies a certain entry barrier to cash cropping, which decreases for

other household members once the household has taken up cash cropping (ibid). Furthermore, the focus group findings, especially considerations about access to land, reflect M'barek et al.'s (2005: 365) argument that access to natural resources is strongly linked to a farmer's socio-economic background in Benin. Not all members of the community have the capability of cultivating cashew. There are entry barriers in terms of land ownership, threshold financial capital, and social capital for accessing improved planting material. Therefore, those entering into cashew production are not the poorest section of society.

In summary, cashew affects cashew-producing households by increasing the capitals at the household's disposal. Primarily financial and social capital is increased directly through cashew production, due to the revenue earned from cashew and the membership in organizations and participation in trainings by active NGOs in the region. Through financial and social capital, the cashew producing households also have higher capacity to increase their human capital, their natural capital and their physical capital. By acquiring all of these capitals, household food security is increased, while it depends on household preference whether this is done through food purchases or through investments in food production or changes in their farm management. Furthermore, qualitative findings made it clear that participants attribute improvements in their livelihoods to their successful cashew production.

Previous studies, however, have often found negative impacts of cashew on the community or the individual, such as Degla's (2012), Termudo and Abrantes' (2014), and Evans et al.'s (2015) studies. It becomes apparent, therefore, that the impacts of cashew production are highly contextual and are guided by a myriad of external factors. In the case study of the northern region of Benin, high transaction costs which negatively impacted the profitability of cashew could maybe be remedied by social networks and support structures for producers (Degla 2012). In the Ghana case study, conflicts arising from cashew could equally be interpreted as societal change which comes along with economic change, therefore presupposes the reader to make a value judgment on each interlinked component of change (Evans et al. 2015). What classifies the case investigated by Termudo and Abrantes (2014) in Guinea Bissau is a rapid, large-scale increase in cashew production among virtually all farmers in the region. Furthermore, they point out that cashew is the only cash crop the farmers in their study grow (ibid).

All of these factors do not apply in Tchaourou and Nikki within central Benin. Some of the factors which fuel the positive impact of cashew on the household in this case include the existence of agricultural extension services which offer information and support for cashew producers in particular, the existence of farmers' unions for strengthening the access to the market, general crop diversity within the region, and initial land abundance lowering the likelihood of intra-community land disputes. In the coming sections, the dimension of gender and intra-household bargaining, and furthermore external dynamics of food security will be investigated in order to shed light on other dimensions of cashew's influence on the producers.

5.2 Intra-Household Gender Considerations

5.2.1 Gender, Capital, and Vulnerability

Being involved in cashew production seems to have caused change in the lives of male and female focus group participants alike. However, in the women's focus group discussions, the dimension of gender differences was raised by participants. A few women expressed that they experience their cultivation of cashew as freeing and positive because they earn their own money which they control, and hence they gain independence from the husband or patron. This experience was met with agreement by other female focus group participants. Furthermore, it was discussed in the women's groups that when the husband cultivates cash crops, then the wife does not get much of the revenues. Therefore, the participants agreed, that cashew gives them financial independence which they value highly. Some participants expressed contempt for having to 'beg for every penny' from their husbands. Female participants voiced their financial independence as a positive change independently within focus group discussions, and not as a response to any question specifically geared at this theme.

Within the two women's focus groups, gender narratives emerged, where the female participants expressed, how their production and their situation differ from that of their husbands' or male household members'. In one women's group, participants explained they started growing cashew only after their husbands or other male family members had started to grow cashew many years prior. Only if the husband had already begun to grow cashew and built an income base, then the wives could enter cashew cultivation. Some women in the other focus group confirmed this statement and stated that they only entered the cashew market when it was known to be profitable, meaning when other household members had tested cashew. This shows that the women's entrance into cashew cultivation in the household was secondary.

There are significantly fewer women producing cashew than men. This difference is not due to a sampling bias but rather due to the fact that within ACI's project activities and outreach, there are significantly fewer female farmers who control cashew production than there are male farmers controlling cashew production. Babu and Sanyal (2009: 56) argue that only through policy can women be encouraged to enter cash crop production, and policy should pave the way for them to do so, especially in terms of access to natural and physical capital. Female farmers experience additional barriers to entering cashew production compared to male farmers, due to land ownership systems in the patrilineal region, according to focus group participants. Only the owner of the land can decide to plant trees, which means, female farmers always need the owner's permission before being able to cultivate cashew, whereas a land owner can decide himself to cultivate cashew. Because of female farmers' lack of access or secondary access to natural capital, it is much more difficult for women to enter and control cashew production. Despite this, the participants stated that they have control over their own production and decide which crops other than tree crops to grow on the fields they were given. It became clear from the discussion that women access natural and sometimes physical capital through male household members.

Among the YS participants, there are significant differences in human capital between women and men. The variable of schooling received is used as a proxy for human capital in this context. Men were found more likely to be higher educated than women. This difference in education becomes very apparent when considering that 88% of female participants have no education, while 49% of male

participants have no education. Only 5% of the female participants have a primary education and a further 5% have a middle school education. In contrast, 27% of male participants have primary education and a further 17% have a middle school education.

This vast difference in schooling between men and women, and the overall low education among both men and women is important to consider since it may influence the vulnerability and knowledge of market dynamics which participants possess. My observations of participants during the exercises in the focus groups reflect the low literacy level among participants. Many were uncomfortable with the exercise, and some were even uncomfortable holding a marker. It could be argued that because of the general lack of primary education among women in contrast to men, more women than men are likely to experience trouble with farm management techniques and market linkages due to a lack of even basic education.

One surprising bivariate correlation is that between gender and productivity, where the female farmers in the YS data set have higher productivity both per hectare and per tree, though the correlations are weak. At the same time, the female farmers also have smaller plantations on average. According to the bivariate correlation analysis of gender and plantation size of the YS data set, women's plantations tend to be smaller than men's, where women's plantations are on average 1.4 ha smaller than men's, though the correlation is weak. Female farmers also tend to have less cashew trees per ha, which is considered a good agricultural practice – giving trees more light and nutrients as well as improving the conditions for intercropping (ACI 2015b: 8ff.).

Therefore the difference in productivity could be influenced by the tendency of smaller fields and more spacing between trees to cause for more productivity of cashew plantations. These types of plantations are more easily managed and this type of plantation provides for more soil nutrients per tree (ACI 2015b: 8ff.). It is also possible that because cashew is the only or one among few cash crops for most women, that more labor and inputs are invested into cashew production as opposed to other crops. There have been many studies investigating whether men and women in agriculture are equally productive, controlling for production and labor inputs. A vast majority of recent scholarship have found no difference between the productivity of male and female farmers (deBrauw 2015: 477; Udry et al. 1995; Udry 1996; Hill and Vigneri 2011: 7). Importantly enough, in this correlation, even without controlling for production and labor inputs, female farmers are more productive than male farmers.

Contrary to findings of other scholars in academia, women and men participating in the YS were found to be equally vulnerable, based on a bivariate correlation analysis of gender and the LVI (Sig.: 175). This is consistent with the finding that there is no detectable farm gate price difference between sales made by men and sales made by women. Therefore, in terms of profit per kg, the genders are equal. However, this quantitative finding contradicts the qualitative findings from the women's focus group discussions, where the female participants expressed self-perceived vulnerability, especially in terms of time poverty, access to financial and natural capital, and vulnerability to animal intrusion. It is important to note that the YS surveyed women and men who are cash crop producers, who control the profit from that production to some extent, and who have access to production resources. Therefore, the sampling of the survey may already influence the lack of difference in vulnerability of individuals with different genders. Furthermore, the LVI is not sensitive to differences in access to natural and financial start-up capital, so that differences in vulnerability due to access to capital cannot be detected.

However, both qualitative and other quantitative findings presented above indicate that there are gender differences in access to capital and hence in vulnerability.

5.2.2 Gender and Cropping Choices

As indicated by findings on intercropping and crop investment in the YS data set, male and female study participants tend to cultivate different crops. Even though both men and women are equally likely to intercrop, the participants' production differs in the choice of intercrops to cultivate with cashew. Men were found less likely than women to intercrop cotton, whereas women were found less likely than men to intercrop maize, cassava, yam, and sorghum, which are all principal food crops in this region, meaning these crops are sold on a larger scale on the local market. There are furthermore differences detectable in the types of food crops in which men and women invest their cashew revenue. Men are less likely than women to invest in beans and millet, while women are less likely to invest in yam and groundnuts. This does not mean that these crops are exclusively grown by either men or women, and it does also not mean that these crops are purely considered either men's or women's crops, but rather that there is a detectable tendency that crop choice and intercrop choice differs between men and women.

A study by Doss (2002: 8) in Ghana, investigating men's crops and women's crops, found that even though no single crop can be classified clearly as only a men's or only a women's crop, male-headed households and female-headed households are likely to grow different crops. At the same time, though crops like cocoyam are disproportionately grown by female-headed households, cocoyam is disproportionately grown on plots where men keep the revenue, and this dynamic is similar for other cash crops (ibid: 10). My quantitative findings from the focus group timeline and spatial exercises similarly support the finding that the farmers of central Benin also tend to cultivate different crops and manage different types of production based on their gender.

Findings on the food crop-cash crop coefficient, which I calculated based on the results of the timeline exercise in the focus group, indicate that across three focus groups, female farmers are more likely to have a food crop-focused production than male farmers. Among those with a more food crop-focused production, there are 11 women and 5 men. The 11 women have a food crop focus with magnitudes between 2 and 4, while the men have a food crop focus with magnitudes between 1 and 2. This shows that the female participants are more inclined toward a food crop focused production. Among those with a more cash crop-oriented production, there are 12 men, and 1 woman. The female participant has a cash crop-focus magnitude of 2, while the men have cash crop focus magnitudes between 1 and 6. This indicates that the male participants are more inclined toward a cash crop focused production than the female participants. There are also 5 participants, all of whom male, who have a neutral focus of production with a magnitude of 0. The fact that the vast majority of the women are food crop-focused with a magnitude above 1, and there are no female representatives in the neutral category, indicates that the female participants have a strong inclination towards a food crop-focused production.

Furthermore, the female participants tend to cultivate more mixed purpose crops, meaning crops that are both for sale and for feeding the family, than male participants. On the other hand, male participants tend to cultivate more pure cash crops on average. The clearest difference in cultivation tendency is visible in the cultivation of pure food crops, where the women tend to cultivate on average 3.83 pure food crops, while the men tend to cultivate on average 1.13 pure food crops. If men and

women tend to cultivate different crops and at different ratios, their productions are inherently different, meaning, the conditions of cultivation and the role played by cashew differs. Furthermore, Hill and Vigneri (2011: 25) found that women are less likely to engage in value addition for cash crops, and hence more likely to make less profit. Thereby the effects of their lower likelihood of cultivating cash crops are intensified by even lower value addition and less profit ratio.

Based on findings from the second focus group exercise across four focus groups, women estimate a larger field surface necessary for feeding the family than men. Female participants estimated an average surface ratio of 66% (median of 75%) of their fields is necessary to feed their family, while male participants estimated 48% (median of 50%). Five participants estimated the surface needed to feed their family at above 75%, all of whom were female. These findings relate to a study by Oyekale (2013: 5510) which found that higher involvement of women in cash crop production led to fewer household food shortages.

This estimation difference could reflect the cash crop focused production of men versus the food crop focused production of women. At the same time, the tendency could either be due to traditional division of tasks within the family or it could be due to the fact that women cultivating cashew tend to come from a different household, often poorer, so a more food crop focused production may be necessary. Hill and Vigneri (2011: 6) state that the dynamics of which household is more likely to grow which crop change over time as gender norms change. Vihotogbe-Sossa et al. (2012) found that in Benin, cropping practices are most of all rooted in socio-cultural traditions, but also based on soil nutrient levels and considerations of what grows where. Therefore, the fields attributed for cultivation to different household members may also determine what each farmer grows.

In summary, there are differences in women's versus men's productions in terms of whether the production is food crop or cash crop-focused, in terms of how much of the land is needed to feed the family versus how much can be sold for profit, and in terms of access to capital. Because of lack of other sources of revenue, the female participants seem to be much more dependent on the cashew revenues. Decisions about whether or not to cultivate cashew are determined by male patrons of female farmers. The differences are reflected in literature, where both the difference in access to resources has been investigated, as well as the differences in crop choice (Hill and Vigneri 2014, Doss 2002).

Furthermore, there is a pattern of differences in cropping between men and women. These differences are likely cultural and wider spread in the region, because of their congruence with studies conducted in other sub-Saharan countries. Though cropping patterns are not assumed to be explicit rules of society, clear tendencies can be distinguished. Cultivation for the majority of the female cashew farmers in the central region of Benin is fundamentally different from male cashew farmers' cultivation, so that different development approaches of interventions may be appropriate.

6. Regional Food Security and Cashew Production

6.1 Availability and Stability

6.1.1 Farm Management Characteristics as Indicators

Honfoga and van den Boom (2003: 168) classify the food crop production in West Africa as inadequate and unstable, due to unsuccessful policy. In order to investigate whether regional food security is menaced, proxies will be used to distinguish tendencies in the availability and security of food in the local/regional markets. The first proxy is farm management characteristics of focus group and YS participants, because farm management characteristics can be indicative of whether the household is employing coping strategies against regional food shortages. One indication from the YS data set is that participants are less likely to invest their revenue in cash crops, than to invest their revenue in food crops, health, and the education of their children.

While 67% invested in food crop production, 13% of participants invest their revenue in cash crop production, and 51% have bought food with their cashew revenues. This indicates that the majority of participants are not further expanding their cash crop production, or in other words, most of those who are already cultivating cashew do not tend to increase their cashew production at the moment. On the other hand, the vast majority of farmers are intensifying their food crop production. Based on these findings, the cash crop to food crop ratio seems to be decreasing on a regional level, meaning cash crop production is remaining constant while food crop production is intensifying. When interpreting this farm management choice as a coping mechanism, it seems farmers are responding to a food insecure market, either in terms of the availability of food or in terms of the stability.

Another farm management characteristic, indicating cash crop and food crop production ratios is the practice of intercropping. Intercropping refers to the practice of cultivating more than one crop on a single plantation. In the case of cashew, intercropping is seen as best practice by development practitioners because cashew as a tree crop leaves much soil to be used for ground crops (ACI 2015b: 36ff.). Cashew is seen as a cash crop that does not intensely menace food security because of its suitability for intercropping. Therefore, when regarding cashew production in terms of the cash crop – food crop debate of cash crop production taking resources away from food crop production, this should not apply to cashew in terms of land. Both women and men are equally likely to intercrop, though the overall percentage of YS participants who intercrop is below 50% (M: 49%, F: 41%).

This low prevalence of intercropping was reflected in the focus group discussions where there was disagreement on the practices of intercropping, determined by personal preference. Some participants expressed that a cashew farmer should intercrop in the cashew plantation in order to make the field more profitable or to ‘not waste land’. Furthermore, some focus group participants who have received several trainings and who intercrop described the intercropping process as a cycle, during which intercropping is practiced while the trees are young, but as the trees grow bigger, there is too much shade to intercrop. Participants went on to explain, the trees are cut down at some point when their productivity falls and new ones are planted, so the cycle starts again. There was general disagreement among farmers how long intercropping is possible, where some voiced for 3 to 5 years, while others said 10 years, and some even said they intercrop always and there is no cycle. These differences have much to do with the spacing of the trees and how much farmers prune their trees.

Both quantitative and qualitative results indicate that the prevalence of the practice of intercropping is medium, meaning in many cases, the cashew plantations do take up fields which could otherwise be producing food crops. Even among those farmers who do intercrop, many farmers do not follow this practice consecutively or for very long in the cashew production cycle. Overall, cashew production may have the potential to support food security, but many farmers adhere to different practices than presumed by agricultural extension agencies.

When interpreting this farm management choice as a response to regional food security, it seems that half of the farms have potential of increasing their food crop production through intercropping, while for the other half the farm space for food production seems to be saturated. This reinforces NORC's (2011) findings that a large proportion of households are on the brink of food insecurity. However, this food insecurity on a household level is a problem of accessibility from the household's side, rather than food availability on a regional level. This is congruent with Honfoga and van den Boom's (2003: 171) finding that food availability is increasing while population growth is slowing down.

A third proxy of farm management characteristics, linking to regional food security, is the ratio of farm field surface used to produce food crops for feeding the family versus the farm field surface used for producing market crops – both food and cash crops. In the spatial exercise conducted with all four focus groups, the overall average farm field surface needed to feed the family estimated by participants is 57%. This estimation above half of the farm field surface lies relatively high and is consistent with the repeated statement throughout all focus groups that the first priority is to feed one's family. Furthermore, in discussions about this priority of feeding the family, many participants agreed that they produce a lot of food crops, estimated at more than the family needs, in case bad weather or a bad harvest strikes.

While these statements indicate high or stable availability of food crops, they equally address the stability of food crop supply. In case of an external shock, the household food security is priority, so that less food crops will be sold in the market. It is therefore interesting whether the ratio of cash crop to food crop production increases or decreases over time. In relation to the finding that farmers' cash crop production does not tend to increase at the moment, food production in the region is still strong. However, remarks of focus group participants on the need for security against weather and environmental shocks also stress the interdependency of food availability and stability. Even though the land and inputs used for staple food production may be high, the outcome is vulnerable to climate and weather conditions.

Judging from farm management characteristics in my data, cashew production and cash crop production overall does not seem to be increasing drastically in the region, while food crop production is rising. Food availability on a regional level should not be seriously menaced if production continues as it does. At the same time, few farmers intercrop food crops within their cashew plantations. Therefore, it seems cashew production is not furthering food security, even though it has the potential to do so. The low prevalence of intercropping alone, however, does not mean that the availability of food is lowering on the market. It could rather be interpreted as possible space where food crop production can be expanded if need be. The way in which farmers estimate how much of their farm space is needed for feeding the family shows tendencies of a high food crop production ratio, which farmers use to secure the family food needs against external shocks. The availability of surplus food crops to be sold in the

market seems to be incorporated firmly into each household's farm management plans, but the stability of the food crop supply may be problematic. Honfoga and van den Boom (2003: 167) explain that despite imports of food crops, the food availability in West Africa is still highly dependent on the weather conditions.

6.1.2 Farmers' Perceptions of Regional Food Security

The second component of my analysis of whether or not the region is growing more food insecure, are perceptions of local cashew farmers based on the focus group discussions. Focus group participants disagreed strongly on whether or not regional food security is threatened. Participants who voiced that regional food security is menaced also tended to be those who estimated the farm surface ratio in the spatial exercise to be 50% or higher. This could mean that those, who perceived regional food security to be menaced, come from more vulnerable households or households with smaller overall farm size. The statement of threats to regional food security may reflect threats perceived by these individuals to their household food security.

Within a women's focus group, some participants expressed that they see food security directly menaced by a rising occurrence of animal intrusion, through which a significant amount of the food crop harvest is destroyed. The women even expressed that they find household food security seriously menaced because of this development in combination with the less frequent rain falls and longer hot seasons. These concerns about food security can be interpreted as concerns about the stability of food supply since they relate to outside shocks and strains. Especially for female producers, it seems, that the stability of staple food crop production is threatened by this development, since the female participants expressed that they have less time to be in the field, protecting their crops, and less means to construct protective measures against animal intrusion.

Furthermore, considerations of availability were voiced by participants. There was an awareness and experience noticeable among older participants with regards to cash crop-food crop linkages and food insecurity. In one particular focus group, the topic of food security came up when discussing cotton. Some older participants expressed that a long time ago, when cotton was the primary cash crop and production rose rapidly, groundnut fields were sacrificed and there was a shortage in groundnuts, which is an important staple in the region. Furthermore, participants generally agreed that it is a negative development when too many cash crops are produced, and that a famine is possible if cash crop production rises too much.

The awareness of possible adverse effects of cash crop production on regional food crop production indicates that considerations about a cash crop-food crop balance play a role in farm management decisions of some participants. A worst case scenario of excess cash crop production is elaborated by Anderman et al. (2014: 550), who found that the local food market was unable to supply sufficient food quantities, so that the increase in cash income which households experienced did not raise household food security. Thereby sufficient food crops could neither be accessed from the market nor from the cash crop producers' own farms. In this case study, however, based on focus group discussions, farmers still produce a large amount of food crops and can access the market, and are aware of possible worst case scenarios.

Some participants in one men's focus group expressed trust in the production's responsiveness to the market demand. Generally, the participants agreed that there is still enough food on a regional

level, and there is still enough land to grow food on. One participant estimated that the production of food crops for sale is still higher than the demand. Therefore he found that now is the time to produce cash crops. However, others stated that everyone needs to take care to not cultivate too much cashew, and all agreed. Focus group participants are the ones who sell their products on the market, which is why their perception of the food supply still being higher than the demand is valuable when investigating food availability.

Within these discussions, I noticed that the concept of conceptualizing space was different from what I had assumed based on literature, where scholars investigate if cash crops take the space of food crops (Maxwell and Fernando 1989, Von Braun 1995). Crop rotation is for example a factor, which participants brought up in discussion when asked if they have abandoned any crops. Most said that crops are not abandoned but merely move to a different field. In one men's focus group, participants discussed the issue of crop abandonment, and some came to the conclusion, if one grows yam on less space than before, that does not mean less yam is produced, if for example the soil and the inputs are better than before. Therefore, it seems that mere considerations of space on which crops are produced are not relevant to the final size of the harvest and the productivity of the land. Conceptualizing the cash crop-food crop linkage as one replacing the other is problematic and this premise used by some theorists should be re-evaluated.

In summary, the different factors which influence the judgment on whether or not the region is food secure, according to the discussions of focus group participants, include shocks and strains (animal intrusion, climate change, bad weather, soil degradation, natural disasters) and the cash crop to food crop production ratio. Based on some quantitative indications and focus group discussion, my findings indicate that regional food security in terms of food availability is not menaced at present, but that the dimension of stability of food supply is rather weak. It is difficult to measure the availability and stability of food security based on my data, as for example one would also have to consider the rise in urban agriculture in Benin (Yadouléton et al. 2010).

However, a few inferences can be made and the tendency is still shown. Interpreting the stable tendency of both food crop and cash crop production, the availability of food crops in the local and regional markets seems stable. The focus group participants do not see the developments of food production as alarming but many rather perceive the market as overly saturated with food crops. Interpreting the experience of many households of an increasing amount of shocks, the stability of this food supply is much less stable.

6.2 Underlying Reasons for Food Insecurity

6.2.1 Role of Environmental Factors

The introduction of a new crop into a region can have massive impacts. From my discussion with cashew farmers in central Benin, it became obvious that early adopters' experiences with cashew's profitability and the rising opportunity in cashew production spread fast and swept across the region, so that a very rapid change in land usage was observable. Not all farmers can be reached through agricultural extension and Good Agricultural Practices teaching programs. Therefore, as analyzed in the sections above, not all premises which agricultural extension agencies make with regards to cashew production's

positive impact on a regional level apply to all farmers. It is worth investigating, whether any trends of declining food security may be due to cashew. Based on findings from the previous sections of analysis, within central Benin, food security in terms of availability of the food does not seem to be threatened. However, the stability of food supply seems to be worsening. When considering, which factors influence this change in stability, based on focus group discussions, environmental and climate change factors were raised repeatedly by participants.

Environmental trends were discussed within the focus groups, especially when discussing trends in yam cultivation. For most farmers in the focus groups, yam is a very popular intercrop and many expressed that their cashew plantations were established in former yam fields. It is important to note at this point that in all focus groups, it was expressed that yam no longer grows as well as it used to, due to soil degradation, which participants expressed as 'the earth does not give anymore'. However, participants stated to have observed this declining yam development before cultivating cashew in the same field, so that it is unlikely that cashew intercropping has a negative effect on yam productivity.

Deforestation in Benin had been a trend to give families more land for cultivation with the rise in population, which was reflected in participants' description of the large scale deforestation in their communities over time (Maliki et al. 2012: 10). In many West African regions, including Benin, yam is used as the "virgin crop" on the land after a forest has been cut down, where in Benin an immense increase in yam production was due to an increase in land acquisition for agricultural production (Maliki et al. 2012: 10). Maliki et al. (2012: 10) explain that even though the yam production has been very intensive, no nutrients are given back to the soil, so there are serious soil fertility challenges on much of the agricultural land in Benin nowadays.

Sonneveld et al. (2011: 575) found in their study on climate change in Benin that the effects of climate change on farming in Benin are not overall negative if cropping patterns are adjusted, and the farmers' adaption mechanisms were found in this study to compensate negative effects of climate change. Similar adoption patterns to environmental conditions can be observed in my focus group data. I have drawn the conclusion, that due to the alarmingly low productivity of yam and some other food crops, like cassava, an alternative crop was searched so the farmers can increase their resistance to shocks and decrease their vulnerability (with both less yam to eat and to sell). Therefore cashew production does not seem to be the cause of the decrease in food production but rather a response to the decrease in food production.

Further reinforcing problems with soil nutrient levels, participants in two focus groups described today's agricultural production as highly input intensive, especially in terms of fertilizer. This development destabilizes food crop production in that, the lower the soil fertility the more the farmers need financial capital, social capital, and human capital in order to access the necessary inputs for producing crops efficiently. Both the availability and the stability dimensions of food security are threatened by soil degradation. Generally lower yields of many staples, especially yam, are linked to the change in the nature of agriculture in the region. Farmers are dependent on fertilizers and other production inputs, and often high labor input, so that productivity in turn lowers for those farmers who do not have access to all these inputs. The capitals each individual possesses influence how productive they can be. Therefore higher entry barriers into agricultural production of all kinds also lower the stability of food security.

Theriault and Tschirley (2014) stress, that it is not only financial capital which increases access to agricultural production inputs, but social capital and the policy infrastructure to supply farmers with needed inputs is equally important. If the pathways for resources to each smallholder farmers are inadequate across the board, then a mere increase in household income will not affect the food crop productivity of the household (Theriault and Tschirley 2014: 308). Sanchez et al (2012: 125) also found that besides the lack of financial capital, farmers are also prevented from adopting new strategies to cope with natural and climate changes, due to a lack of access to natural capital, such as improved planting material, and a lack of access to human capital, especially information.

Nowadays, as participants expressed, climate change and soil degradation pose a big threat to livelihoods, some even say to food security of the households. Focus group participants expressed they observe a rising vulnerability to the weather and the soil conditions of households within their community. This is significant because it implies that households are increasingly faced with the need to change their livelihood strategies. Participants described cashew production as an easy, not labor-intensive way of accessing financial capital, so that cashew production became a prominent new livelihood strategy to respond to environmental and climate factors, which are also responsible for causing the stability of regional food supply to decline. Scholars such as Sonneveld et al. (2011: 575), in their climate change study of Benin, have found that, with the rising effects of climate change, the yield of some crops will improve, whereas for other crops, including important staples like maize and yam, the yields will decrease. This is congruent with the observations of focus group participants on the effects of climate change on household food security. Based on my focus group findings, it seems that climate change, deforestation, and soil degradation caused increased vulnerability of households, which in turn led to increased cashew production as a livelihood strategy for coping with the vulnerability context. Food supply to the regional market from local farmers is definitely subject to some volatility.

6.2.2 Role of Cashew

Focus group participants expressed that cashew plays the role of a safety net within their livelihoods and defended the crop against my speculations that it might lead to the abandonment of other crops previously cultivated by the farmers. In one of the women's focus groups, participants all agreed that they did not abandon any crops in order to grow cashew, which may be circumstantial to the fact that these participants are all growing cashew in new fields, where nothing was previously cultivated. Rather, participants expressed that new food crops have been planted as intercrops within the cashew field, so that more food can be produced. In another focus group, participants similarly expressed that crops which are no longer intercropped on the cashew field just move to other fields but are never abandoned, unless they are not profitable. The participants did not link cashew negatively to food security but rather kept pointing out that since food crop production is menaced, both due to animal intrusion and climate factors, that even on a household level they do not have enough food. But cashew helps them to buy food when their own harvest fails.

In all four groups, the discussion of whether or not crops have been abandoned sparked much discussion. However, the individual participants tended to answer that on their farm, they have not abandoned the cultivation of any crop, but rather the crops have moved from one field to another. An exception was cotton, which many participants in the Nikki district stated to have abandoned. In the men's group, it was discussed heavily how cashew production began and how it was decided, where

those participants which used already existing fields, stated that they wanted to test cashew in fields where another crop was already growing as to not waste the field. Furthermore, some participants explained, the ratio of what is grown is decided yearly, based on the previous years' experience, and based on what the household needs.

When deciding to cultivate less of a crop which was formerly farmed intensely, some farmers indicated that they base their decisions primarily on crop productivity. For example in a women's group, participants expressed that yam is being replaced as a crop because it is not seen as needed as much anymore and it is not growing so well now. On the other hand, when deciding to grow cashew, participants considered that cashew is easier to grow, than for example cotton, very few production inputs are needed, and it is easy to sell. Hence the decision making of abandoning any crop or cultivating less of a food crop is rather linked with the market dynamics in the region than with the introduction of a single cash crop, such as cashew.

Decisions about land usage, as emerged from focus group discussions, are based on considerations about the profitability of the land. Land management and land distribution within the family can be seen as a livelihoods strategy, as was indicated by some participants in one of the women's groups. They stated that decisions of crop choice are based on what the person is good at growing and there are certain fields where these crops grow better, so therefore, fields are divided up. The value of production per unit of land needs to be considered and optimized (Strasberg et al. 1999: 25). Especially because the population is growing, but the land availability is saturated, so that increased land productivity is the only option to supply sufficient food for a growing number of people (ibid).

The interest of the individual farmer is not in regional food security primarily, but in the profitability of his or her own production. Taking this into considerations, a rise in food crop prices could be considered a positive development to motivate the increased production of food crops by farmers in the region. Dimavo and Gbakou (2013: 194) found positive effects of the rise in food crop prices on the next-to poorest households, and no effects on the poorest households, while middle income households were slightly negatively affected. This dynamic reflects the production of food within the household and possibly the type of production which raises a household's income will also make the household more dependent on the market. However, Strasberg et al. (1999: 11) point out the contradiction of the rise in food crop prices, since farmers who are net sellers of food crops benefit, however those who are net purchasers of food crops – including vulnerable sections of society – will suffer from this rise in prices.

In summary, the focus group discussions indicate that any change in regional food security that may be detectable in central Benin is not caused by the increase in cashew production. My results reinforce Strasberg et al.'s (1999: 25) finding that if the regional food market is efficient and reliable, then cash crop production has either no effects, or positive effects on food security. Rather, a change in the natural conditions, including soil fertility, deforestation, changing rainfall patterns, and increasing occurrence of heat waves, as well as animal intrusion are the factors which affect food security adversely. However, increasing production of cashew is part of the overall trend since cashew production is a household level coping mechanism to lower vulnerability. The simultaneous regional trend incorporates decreasing stability of food crop production. This consideration about possible adverse effects of cashew production for the region is particularly important for development

organizations and projects, national agencies and ministries supporting cashew production, and regional agricultural extension agencies who work within rural livelihoods dynamics.

7. Conclusions

Cashew production in central Benin has replaced other cash crops as well as added to the production of existing cash crops in a way which is widely perceived as positive by producers of cashew, development practitioners, and agricultural extensions agencies. The agricultural landscape has been influenced by cashew production in that it induced intensification in cash cropping and land usage. Whether cashew production is improving the livelihoods of those who farm it has been examined on two scales, namely the household and individual level, as well as the regional level and hence the household vulnerability context.

In the first chapter of analysis, both statistical and qualitative findings indicated that while cashew production has consistently improved households' access to capital, it also firmly ties households to the market and makes them dependent on market mechanisms as well as the market characteristic of food availability to some extent. Furthermore, the experience of cashew production and the role it plays in each farmer's life has been found to be different based on gender in that access barriers for male farmers are fewer than for female farmers. Cashew production was found to play a bigger role for the majority of female farmers than for a large proportion of male farmers, since female farmers were found to tend to cultivate fewer cash crops, making them more dependent on cashew revenues. Therefore, it can be said that on a household and individual level, cashew improves the producers' livelihoods, although the ability to enter into cashew production is not equitable in terms of gender and wealth. It is likely that cashew production within the region widens the gap between poor farmers and middle or high income farmers. However, this is not clearly supported by my findings. Dependency on the market also makes interventions necessary to stabilize and build the market in order to reduce market volatility.

In the second chapter of the analysis, primarily qualitative findings, supplemented with statistical analysis, indicated that food availability on the market in the two districts investigated in central Benin does not seem to be threatened, while the stability of the food supply is volatile. My findings have also indicated that cashew production neither increases nor decreases food security on a regional level, though it may increase household food security for some farmers. Developments of regional food security need to be examined further as the process of political decentralization and cash crop intensification keep shaping the economic reality for smallholders. My findings confirm that cashew is an example of a cash crop which complements food production while effectively reducing the vulnerability of households and individuals alike.

Yet, whether or not cashew production has a positive impact on individual households, communities, and entire regions, was also found to be highly contextual. In contrast to studies, which have found a negative impact of cashew production, the case study context of cashew production in central Benin shows several factors which mitigate possible adverse effects. These factors include the existence of a strong cashew farmers' federation, which increases farmers' social and buyer networks, the moderate increase of cashew production, providing for continuous crop diversity in the region, and the profitability of production among the well-networked and trained farmers.

Further research is necessary in order to paint a fuller picture of regional food security in central Benin, beyond the districts examined in my dissertation, and based on considerations of not only availability and stability, but also accessibility and utilization. Ways of increasing equity and lowering the cashew production entry barriers for poor farmers and female farmers should also be investigated. In order to address concerns of food security on a regional level in more detail, the stability, diversity, and access to the market, access to credit, and access to production inputs are factors which should be researched.

References

ACI, (2015a), "The Beninese Cashwe Sector", *African Cashew Initiative, GIZ*, Accessed on: 29 April 2016, Accessed at: http://africancashewinitiative.com/index.php?lang=eng&history=9&page=32

ACI, (2015b), "Bonne Pratiques de création d'un nouveau verger d'anacardiers", *African Cashew Initiative, GIZ*, Accessed on: 27 April 2016, Accessed at: http://africancashewinitiative.com/imglib/downloads/burkina_faso_bonnes_pratiques_creation_nouveau_verger_anacardiers.pdf

Anderman, T L, Remans, R, Woodd, S A, DeRose, K, DeFried, R, (2014), "Synergies and tradeoffs between cash crop production and food security: a case study in rural Ghana", *Food Security 2014*, 6: 541–554.

Babu, S, Sanyal, P, (2009), *Food Security, Poverty and Nutrition Policy Analysis*, Statistical Methods And Applications, Burlington: Academic Press.

Chambers, R, Conway, G, (1992), *Sustainable Rural Livelihoods: Practical Concepts For The 21St Century*, Brighton : Institute of Development Studies, University of Sussex

Creswell, J.W., (2007), *Qualitative Inquiry & Research Design, Choosing Among Five Approaches*. Thousand Oaks: Sage.

Curry (1996) "Gender and Livestock in African Production Systems: An Introduction." *Human Ecology 24*, 2.

deBrauw, A., (2015), "Gender, control, and crop choice in northern Mozambique", *Agricultural Economics (United Kingdom) 46,* 3: 435-448.

Degla, P. K. (2012), "Transaction Costs in the Trading System of Cashew Nuts in the North of Benin: A Field Study", *American Journal Of Economics & Sociology 71*, 2: 277-297.

Dendena, B, Corsi, S, (2014), "Cashew, from seed to market: a review", *Agronomy for Sustainable Development 34*, 4: 753-772.

Dfid, (1999), "Sustainable Livelihoods Guidance Sheets", Department for International Development, Online Publication Accessed on 4 March 2016, Accessed at: http://www.eldis.org/vfile/upload/1/document/0901/section2.pdf

Dimova, R, Gbakou, M, (2013), "The Global Food Crisis: Disaster, Opportunity, or Non-Event? Household Level Evidence from Côte d'Ivoire", *World Development 46*: 185–196.

Doss, C., R., (2002), "Men's Crops?Women's Crops? The Gender Patterns of Cropping in Ghana", *World Development 30*: 1987-2000.

Doss, C., (2013), "Intrahousehold Bargaining and Resource Allocation in Developing Countries", *The World Bank Research Observer 28*, 1: 52-78.

Evans, R., Mariwah, S., BarimaAntwi, K., (2015), "Struggles over family land? Tree crops, land and labour in Ghana's Brong-Ahafo region", *Geoforum 67*: 24-35.

FAO, (2002), "Improving Access to Natural Resources for the Rural Poor", *FAO Corporate Document Repository*, Accessed on: 5 May 2016, Accessed at: http://www.fao.org/docrep/006/ad683e/ad683e03.htm

FAO (2006), "Food Security", Food and Agriculture Organization, *Policy Brief Issue 2*, June 2006, Accessed on: 11 April 2016, Accessed at: http://www.fao.org/forestry/13128-0e6f36f27e0091055bec28ebe830f46b3.pdf

Hill, R., Vigneri, M., (2011), "Mainstreaming Gender Sensitivity in Cash Crop Market Supply Chains", *Gender In Agriculture*: p. 315.

Honfoga, B, van den Boom, G, (2003), "Food-consumption patterns in central West Africa, 1961 to 2000, and challenges to combating malnutrition", *Food And Nutrition Bulletin 24*, 2: 167-182.

Janssen, M., Perthel, D., (1990), "Seasonal and Regional Differences in Agricultural Supply Response in Benin", *European Review Of Agricultural Economics 17*, 4: 407-420.

Jones, A, Ngure, F, Pelto, G, & Young, S n.d., 'What Are We Assessing When We Measure Food Security? A Compendium and Review of Current Metrics', Advances In Nutrition, 4, 5, pp. 481-505.

Kevane, M., Grey, L. C. (1999), "Gender and Land Rights in Burkina Faso." *Feminist Economics 5,* 3: 1–26.

Maliki, R., Toukourou, M., Sinsin, B., Vernier, P., (2012), "Productivity of yam-based systems with herbaceous legumes and short fallows in the Guinea-Sudan transition zone of Benin", *Nutrient Cycling In Agroecosystems 92*, 1: 9-19.

Maxwell, S, Fernando, A, (1989), "Cash Crops in Developing Countries: The Issues, the Facts, the Policies", *World Development 17*, 11: 1677-1708.

M'barek, R., Behle, C., Mulindabigwi, V., Schopp, M., Singer, U., (2005), "Sustainable resource management in Benin embedded in the process of decentralization", *Physics And Chemistry Of The Earth 30*, Integrated Water Resource Assessment: 365-371.

Naylor, R L, (2014), "Global Agriculture and Land Use Changes in the Twenty-First Century – Achieving a Balance between Food Security, Urban Diets, and Nature Conservation", *The Evolving Sphere of Food Security,* Published to Oxford Scholarship Online.

NORC (2011), "Summary of Key Results From the ACi Focus Group Discussion and Mini- Survey in Benin, Part II: Food Security", National Opinion Research Center at the University of Chicago, *Published byAfrican Cashew Initiative, GIZ,* Online Publication accessed on: 13 October 2015, Accessed at: http://www.africancashewinitiative.org/index.php?lang=eng&page=39&cid=2

Okali, C., (2012), "Gender analysis: engaging with rural development policy and agricultural policy processes", *Future Agricultures Working Paper, 26*.

Prowse, M., (2010), "Integrating reflexivity into livelihoods research", *Progress In Development Studies 10*, 3: 211-231

Oyekale, AS, (2013), "Gender Role in Agriculture, Climate Change and Food Security in the Sahel Belt of West Africa: Application of Poisson and Negative Binomial Regression", *Gender & Behaviour 11*, 2: 5499-5511.

Ragin, C.C., Amoroso, L.M., (2010), *Constructing Social Research, The Unity and Diversity of Method*. Thousand Oaks: Pine Forge Press.

Sanchez, A., Fandohan, B., Assogbadjo, A., Sinsin, B., (2012), "A countrywide multi-ethnic assessment of local communities' perception of climate change in Benin (West Africa)", *Climate And Development 4*, 2: 114-128.

Scoones, I., (2009), "Livelihoods perspectives and rural development", *The Journal of Peasant Studies 36*, 1: 171-196.

Silverman, D., (2013), *Doing Qualitative Research: A practical handbook,* 3rd edition. LA: Sage.

Sonneveld, B., Keyzer, M., Adegbola, P., Pande, S., (2012), "The Impact of Climate Change on Crop Production in West Africa: An Assessment for the Oueme River Basin in Benin", *Water Resources Management 26*, 2: 553-579.

Staatz, J, D'Agostino, V, Sundberg, S, (1990), "Measuring Food Security in Africa: Conceptual, Empirical, and Policy Issues", *American Journal of Agricultural Economics 72*, 5: 1311-1317.

Strasberg, PJ, Jane, TS, Yamano, T, Nyoro, J, Karanja, D, Strauss, J, (1999), "Effects of Agricultural Commercialization on food crop input use and productivity in Kenya", *MSU International Development Working Papers 71*, Accessed on: 18 April 2016, Accessed at: http://fsg.afre.msu.edu/papers/idwp71.pdf

Temudo, M P, Abrantes, M, (2014), "The Cashew Frontier in Guinea-Bissau, West Africa: Changing Landscapes and Livelihoods", *Human Ecology 42*: 217–230.

Theriault, V, Tschirley, D L, (2014), "How Institutions Mediate the Impact of Cash Cropping on Food Crop Intensification: An Application to Cotton in Sub-Saharan Africa", *World Development 64*: 298–310.

Udry, C., Hoddinott, J., Alderman, H., Haddad, L., (1995), "Gender Differentials in Farm Productivity: Implications for HouseholdEfficiency and Agricultural Policy", *Food Policy 20*, 5: 407-423.

Udry, C.,(1996), "Gender, Agricultural Production, and the Theory of the Household",*Journal of Political Economy 5*: 1010.

Vaughn, P., Turner, C., (2016), "Decoding via Coding: Analyzing Qualitative Text Data Through Thematic Coding and Survey Methodologies", *Journal of Library Administration 56*, 1: 41-51.

Vihotogbe-Sossa, C., Akissoe, N., Anihouvi, V., Ahohuendo, B., Ahanchede, A., Hounhouigan, D., Sanni, A., (2012), "Endogenous Knowledge of Four Leafy Vegetables Used by Rural Populations in Benin", *Ecology Of Food And Nutrition 51*, 1: 22-39.

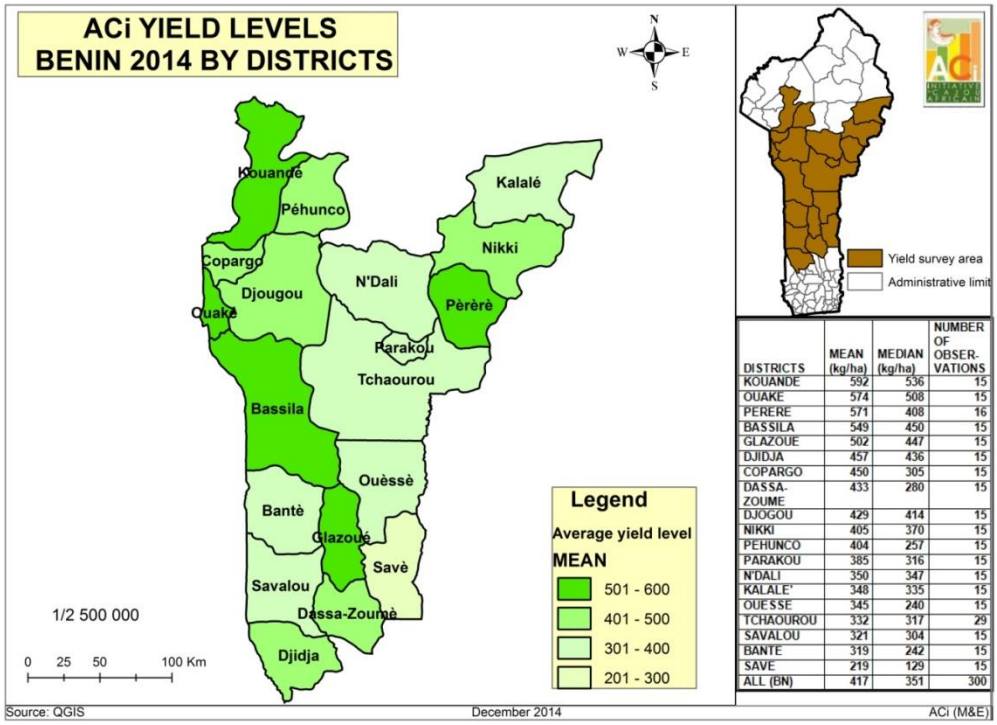
von Braun, J, (1995), "Agricultural Commercialization: Impacts on Income and Nutrition and Implications for Policy", *Food Policy 20*, 3: 187-202.

Wendland, K., Sills, E., (2008), "Dissemination of food crops with nutritional benefits: Adoption and disadoption of soybeans in Togo and Benin", *Natural Resources Forum 32*, 1: 39-52.

Whitehead, A., Kabeer, N., (2001), "Living with uncertainty: gender, livelihoods and pro-poor growth in rural sub-Saharan Africa", *IDS Working Paper 134*, Institute for Development Studies, University of Sussex.

Yadouléton, A., N'Guessan, R., Asidi, A., Osse, R., Padonou, G., Akogbéto, M., Allagbé, H., Boko, M., Kindé, G., (2010), "The impact of the expansion of urban vegetable farming on malaria transmission in major cities of Benin", *Parasites And Vectors 3*, 1.

Appendix A – Data Collection



DISTRICTS	MEAN (kg/ha)	MEDIAN (kg/ha)	NUMBER OF OBSER-VATIONS
KOUANDE	592	536	15
OUAKE	574	508	15
PERERE	571	408	16
BASSILA	549	450	15
GLAZOUE	502	447	15
DJIDJA	457	436	15
COPARGO	450	305	15
DASSA-ZOUME	433	280	15
DJOGOU	429	414	15
NIKKI	405	370	15
PEHUNCO	404	257	15
PARAKOU	385	316	15
N'DALI	350	347	15
KALALE'	348	335	15
OUESSE	345	240	15
TCHAOUROU	332	317	29
SAVALOU	321	304	15
BANTE	319	242	15
SAVE	219	129	15
ALL (BN)	417	351	300

Figure 2: Map of Districts Represented in the Quantitative Data Set Set (ACI Internal document, YS 2014 Benin)

Table 1: Focus Group Overview

District	Village	Participating Men	Participating Women	Spatial Exercise	Timeline Exercise	Facilitated by
Nikki	Serekali		9	Yes	No	Village chief
Nikki	Kassakpere	10	2	Yes	Yes	Head of FBO
Tchaourou	Tchalla	12		Yes	Yes	Village Chief and FENAPAB extension agent
Tchaourou	Borone		9	Yes	Yes	FENAPAB extension agent

Appendix B – Code Dictionary

Table 2: Code Dictionary

Categories of meaning	Associated Terms and Phrases from Focus Group Transcripts
vulnerability to climate (origin: Serekali W group, Boroné W)	bad weather, little rain, less rain
vulnerability to environmental factors	buffalo destruction, animal destruction, animals come and destroy crops
Deforestation; Soil degradation (origin: Kassakpere M)	the earth does not give anymore, the ground has changed, the earth is not like it used to be
decision making and control (origin: Serekai W group, Boroné W)	the owner's decision, my decision, decide, the owner can plant trees, decide on own cultivation, field was attributed by, women ask for land
financial independence	keeping the revenues, getting the revenues, having one's own income, asking others for money, hard work gives independence, begging the husband for money
farm management (origin: Serekali W group, Boroné W)	profitable, profitability, waste of money, waste of space, waste of time, household chores and tasks, there is no time
Focus of production	priority, feeding the family, growing cash crops, growing new crops
Efficient production (origin: Kassakpere M)	waste of fields, waste of earth, profitable
Intercropping (origin: Kassakpere M)	intercropping, using the field, my crops
Profitability of land	waste of fields, waste of earth, profitable
Using unused land (origin: Tchalla M)	waste of fields, waste of earth, utilization, new fields, bad earth
Household food security (origin: Kasakpere M)	feeding the family, enough to eat, struggle to eat, selling crops
Threats to food security (origin: Serekali W group, Boroné W)	animal intrusion, weather, climate, cash ccrops, food crops, struggle
Regional food security	famine, supply and demand, the market, response to the market
Wealth associated with cashew (origin: Serekali W group, Boroné W)	risk, invest, security, land usage

Generational change (between cash crops) (origin: Serekali W group, Boroné W)	long ago, in my time, in my parents' time, no longer, nowadays
From subsistence to commercial agriculture (origin Tchalla M)	for sale, cash crops, food crops, nowadays
Cotton (origin: Kassakpere M, Serekali W)	cotton, profitability, abandonment of crops
Colonialism (origin: Kassakpere M)	white people, the white man, long ago, introducing cash crops, cotton
NGO/Governmental agencies	trainings, planting material, fertilizer, farmer's organization, FENAPAB, ACI
Cash crop	crop for sale
Ideal farm	the ideal farm, the perfect farm
Concepts that the participants do not share with my premises	cultivating more space means more production; mere food crops don't exist anymore; if I grow yam on less space than before, that does not mean I get less yam

Appendix C – Livelihoods Vulnerability Index

Composition of the LVI

Vulnerability can be disseminated as a theme from the transcripts, both as self-expressed vulnerability, and as foreign-perceived vulnerability. These findings on the importance of vulnerability to external factors, such as climate and animal intrusion, were the reason why component 2 was included in the LVI, measuring the respondent's vulnerability to fire, animal intrusion, and environmental factors. Component 1 of the LVI measures access to production inputs. Component 3 of the LVI measures social capital by comprising variables which measure membership in farmers' organizations and unions, each individual farmer's access to trainings on good agricultural practices, and each farmer's access to a buyer network or the market.

Table 3: Components of the LVI

Component	Variable	Original Scale	New Scale
Component 1: Access to Production Inputs			Max: 1 Min: -1
	Profit and Loss from Cashew	Numeric (Min: -200000 FCFA)	-200,000 through -70,000 recoded to -0,5

			-70,000 through -1 recoded to -0,25 0 recoded to 0 1 through 70,000 (median) recoded to 0,25 Above 70,000 recoded to 0,5
	Cost per hectare	Numeric	if anything above 50,000 was spent, then the data point was recoded to +0,5 (except for respondents who had an overall loss and zero profit from cashew); all else became 0
	Whether GAPs can be applied	Reasons for why GAPs have not been applied include the options: (a) too expensive (implying too little access to capital; (b) farmer was too busy with other crops (implying too little access to labor)	If either of these two options was chosen, the data point was recoded to -0,5; all else was recoded to 0
Component 2: vulnerability to fire, animal intrusion, and environmental factors			Max: 1 Min: -1
	Protection against bush fires	Yes, No	Yes and Yes: -0,25 Yes and No: 0.5 No and Yes: -0.5 No and No: 0.25
	Destruction due to bush fires	Yes, No	
	Protection against animal intrusion	Yes, No	Yes and Yes: -0,25 Yes and No: 0.5 No and Yes: -0.5 No and No: 0.25
	Destruction due to animal intrusion	Yes, No	

Component 3: Social Capital			Max: 1 Min: -1
	Membership in NGOs and FBOs	Yes No	0,25 -0,25
	Trainings received	0 1 2 or more	-0,5 0,25 0,5
	Knowledge of Buyers' Criteria for Quality of Nuts	Yes No	0,25 -0,25
LVI = Component 1 + Component 2 + Component 3		Min: -3 Max: 3	Min: 0 Max: 1

Quality of Scale

The quality of the scale of the LVI was examined using Cronbach's alpha coefficient in SPSS. The value of the coefficient lies at 0.351. This indicates that the individual components are positively correlated with each other and that the correlation is of medium strength. The scale of the LVI ranges from 0 to 1, where 0 is the most vulnerable and 1 is the least vulnerable. Participants scored on average 0.53 on the LVI, with a standard distribution of 0.19. The distribution of scores approaches a normal distribution.

Table 4: Distribution of LVI Scores

Statistics

Livelihoods Vulnerability Index _ Scale from 0 to 1 _ excl. B1

N	Valid	301
	Missing	0
Mean		,5320
Median		,5086
Standard Deviation		,19493
Range		1,00
Minimum		,00
Maximum		1,00

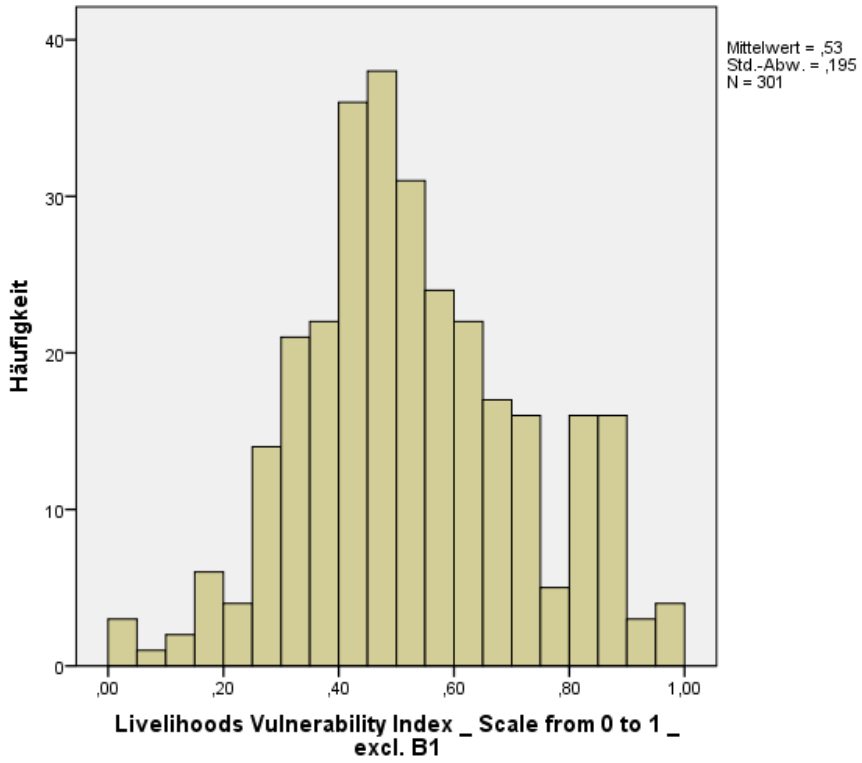


Figure 3: Histogram Depicting the Distribution of LVI Scores

Appendix D – Examples of Visual Focus Group Exercises

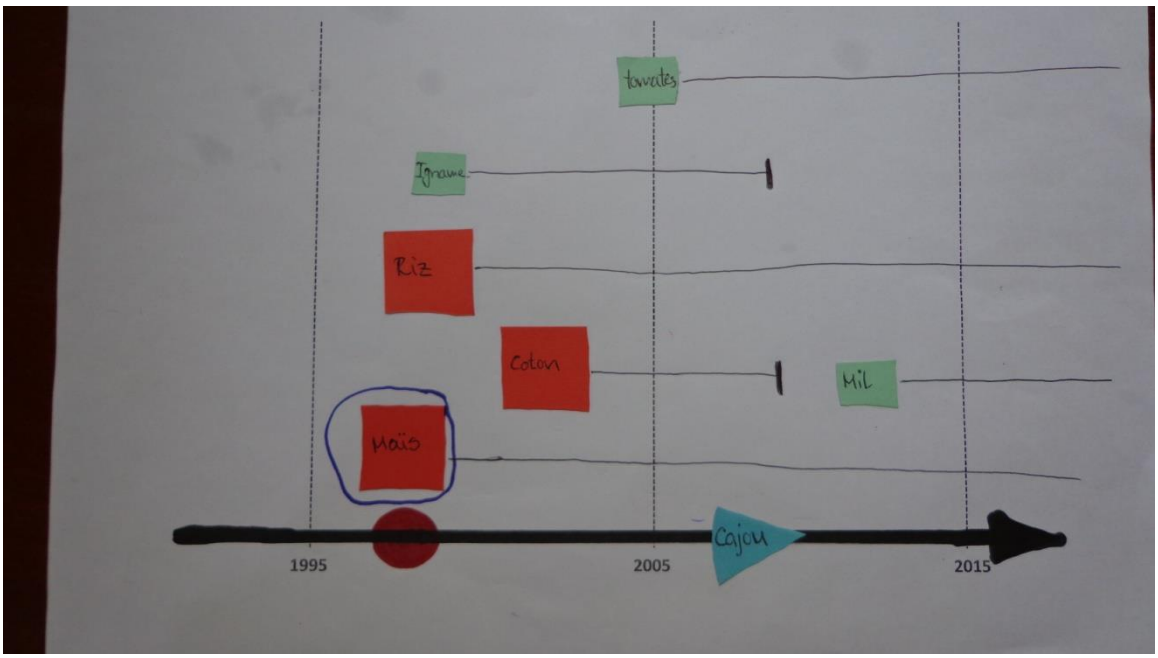


Figure 4: Example of the Spatial Exercise

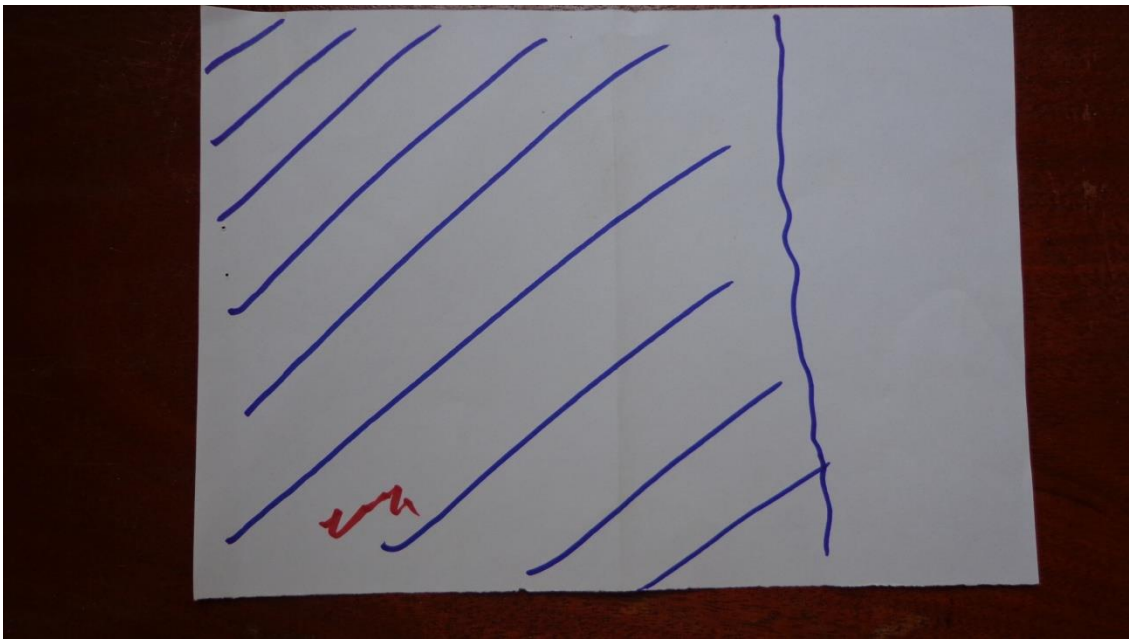


Figure 5: Example of the Timeline Exercise

Appendix E – Dfid Rural Livelihoods Framework

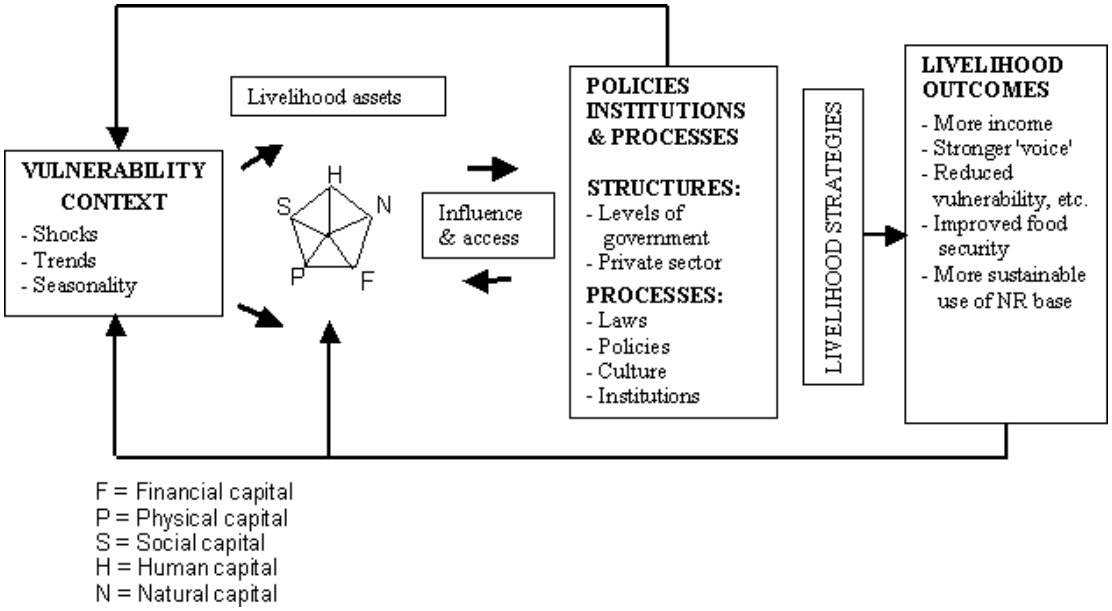


Figure 6: Dfid Sustainable Livelihoods Framework (FAP 2002)

Appendix F – Quantitative Results

Table 5: Bivariate Correlations with the LVI

x-variable	Bivariate coefficient	Significance
Whether the farmer intercrops maize	Eta: 0.111	0.054
Whether or not the farmer invests in food crops	Eta: 0.277	0.000
Gender	Eta (x is categorical and y is numerical): 0.078	ANOVA: 0.175
Education	Eta: 0.117	0.389
Tree density in trees/ha	Pearson's r: -0.053	0.370
Plantation size	Pearson's r: -0.055	0.359
Whether the farmer intercrops cassava	Eta: 0.080	0.167
Whether the farmer intercrops yam	Eta: 0.087	0.138
Whether the farmer intercrops groundnuts	Eta: 0.080	0.166
Whether the farmer intercrops cotton	Eta: 0.095	0.098
Whether the farmer intercrops sorghum	Eta: 0.003	0.959
Whether the farmer intercrops soy	Eta: 0.095	0.100
GAP Index	Pearson's r: 0.001	0.983
Results Food Crop Investment	Eta: 0.034	0.892
Household Size	Pearson's r: 0.001	0.981
Members participating in cashew production	Pearson's r: 0.020	0.733
Revenue from cashew	Pearson's e: 0.000	0.994
Whether or not the farmer invests in cash crops	Eta: 0.039	0.489
Whether or not the farmer invests in health	Eta: 0.031	0.594
Whether or not the farmer invests in children's education	Eta: 0.053	0.358

Whether or not the farmer buys food with cashew revenues	Eta: 0.047	0.419
Number of cashew plantations	Pearson's r: 0.058	0.313
Region of origin	Eta: 0.233	0.005
Productivity in kg/ha	Pearson's r: 0.300	0.000
Productivity in kg/tree	Pearson's r: 0.228	0.000
Total Income	Pearson's r: 0.160	0.006
Age	Pearson's r: -0.103	0.077

Table 6: Spending Cashew Revenue by Gender

Investment Category	Overall percentage of farmers who invested in this	Percentage of female farmers who invested in this	Percentage of male farmers who invested in this
Food crop production	67%	62%	69%
Cash crop production	13%	16%	12%
Health	76%	68%	79%
Education	84%	81%	84%
Purchasing food	51%	56%	50%
Other	30%	30%	30%
Practiced Intercropping	48%	41%	49%

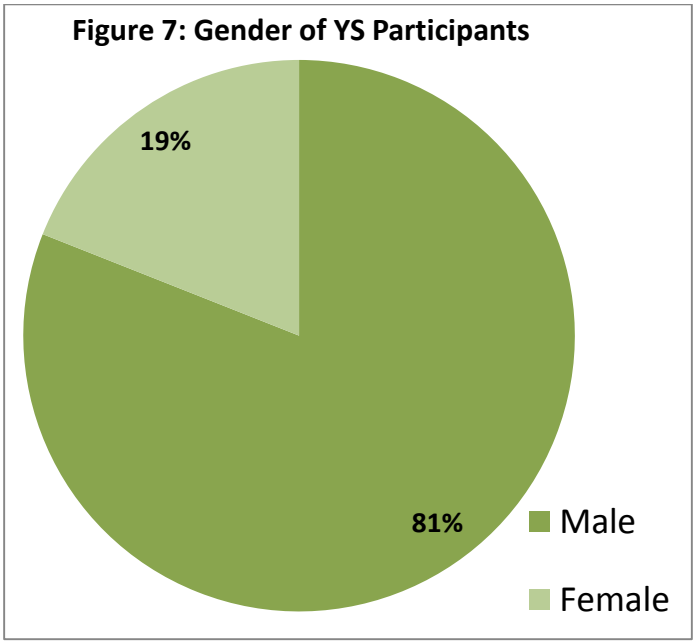


Table 7: Bivariate Correlations with Gender

x-variable	Bivariate coefficient	Significance
Years of schooling	Eta: 0.317	Sig: 0.073
Productivity in kg/ha	Eta: 0.110	Sig: 0.062
Productivity in kg/tree	Eta: 0.109	Sig: 0.064
Plantation size in ha	Eta: 0.158	Sig: 0.008

Table 8: Focus Group Timeline Exercise

	Mixed purpose crops	Cash crops	Food crops
Female farmers	2.83	4.00	1.13
Male farmers	2.45	4.73	3.83

Table 9: Cash Crop - Food Crop Coefficient by Gender

Gender	Cash Crop - Food Crop Coefficient
F	-4
F	-4
F	-4
F	-3
F	-3
F	-3
F	-3
F	-3
F	-3
F	-2
F	-2
M	-2
M	-2
M	-1
M	-1
M	-1
M	0
M	0
M	0
M	0
M	0
M	1
M	1
M	1
M	1

F	2
M	2
M	3
M	3
M	3
M	3
M	3
M	5
M	6

Table 10: Spatial Exercise

	Average surface estimated	Median surface estimated
Female farmers	66%	75%
Male farmers	48%	50%