

# THE CONTRIBUTION OF IMPROVED CASSAVA PROCESSING -GARI FORTIFIED WITH SOYBEANS AND ITS IMPLICATIONS FOR HOUSEHOLD FOOD ACCESSIBILITY: A CASE OF DAMONGO WEST GONJA DISTRICT GHANA

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**A Research project Submitted to Van Hall Larenstein University of Applied Sciences Wageningen The Netherlands, in Partial Fulfillment of the Requirements for the Award of Degree of Master in Management of Development Specialization in Rural Development and Food Security**

**By**

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**September, 2012.**

## **ACKNOWLEDGEMENTS**

I acknowledge the support received from the Netherlands Government and NUFFIC for providing me the scholarship to pursue a master degree at Van Hall Larenstein University of Applied Sciences. The award came as a special gift to me and I will forever remain appreciative this support.

I would like to thank Eddy Hesselink, Course Coordinator of Food Security, for his support and guidance throughout the whole study. I further thank all teachers, staff, course mates, the Ghanaian community and friends for making my stay in Wageningen pleasant. Special thanks go to Alidu Ewura for assisting me on the field despite your busy schedules. My sincere gratitude goes to my senior Pastor Edward Asika and the Associate Pastors and wife and all the women ministry of Wining Life Chapel for your prayers. To my beloved parents J.J Buwah and Helen Addia Buwah I thank you for your Love and encouragement. I again thank my mother In-law Mathilda Appiah for your love prayer support and prayer support.

I also would want to thank my supervisor Adnan Koucher for his support and guidance throughout the research period.

My gratitude goes to my siblings and my lovely daughter for your love and support. I appreciate you all.

I am indeed indebted to my Lovely husband Evans Yaw Annoh for his love, Support, understanding and prayers for me throughout the entire program. To this I say may God richly bless you my Dear.

**DEDICATION**

I dedicated this work to the Almighty God; my beloved husband and my lovely daughter for their love and encouragement throughout the duration of my study.

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## **LISTS OF ABBREVIATION**

BAC	Business Advisory Centre
DA	District Assembly
GOG	Government of Ghana
GRATIS	Ghana Regional Appropriate Technology Industrial Service
FAO	Food and Agriculture Organisation
MoTI	Ministry of Trade and Industry
MSEs	Medium and Small-scale Enterprises
NBSSI	National Board for Small-Scale Industries
NGO	Non-Governmental Organization
REDF	Rural Enterprise Development Fund
REPII	Rural Enterprises Project Phase II
RFSP	Rural Financial Services Project
RTF	Rural Technology Facility
IFAD	International Fund for Agricultural Development
RTIMP	Root and Tubers Marketing and Improvement Program



## ABSTRACT

This study analysed the contribution of improved cassava processing -Gari fortified with soybeans, and its implications for household food accessibility, in Damongo, West Gonja District Ghana. These improved processing method included the use of fresh cassava and soybeans. The study was carried out in Damongo in the West Gonja District in Northern Ghana. A qualitative research on 20 randomly selected households comprised the population sample used. The main objective was to assess the contribution of improved cassava processed into Gari, on client's household food accessibility. The objective was translated into two specific objectives as follows:

To assess the effects of the improved cassava processing method on household income. To identify factors that influences the adoption of the processing methods among beneficiary clients. The results from the analysis showed that most of the clients involved in the processing of Gari within the study area, are middle aged women who have little or no formal education. However, they cater for large household size of between six to ten members. About 50% of the respondents said the improved method has increased their income levels since the demand for the product is high. The improved processing has also improved drastically the quality of the Gari produced and hence has gain attraction in the market. 100% of respondents said the quality and nutritional content of the Gari has improved since over-fermentation has become the thing of the past. This they said has resulted in the rather high demand for the improved Gari hence increased income generated. Profit realized from the sale of Gari according to respondents is used to buy other food stuff for the household thereby contribution immensely to household food accessibility. 30% of respondents with the intervention reported that they use the profit from the sale of Gari to invest into farming and the farm produce is use in the feeding of the household. The implementation of REPII interventions in the west Gonja district has contributed to higher income among participants as a result of the increased production recorded. The trainings conducted for the processors have positive impact on their operations. The market linkage for the improved cassava processes has contributed to higher demand for Gari fortified with soybeans. Project development interventions as well as policy efforts aimed at enhancing food processing in Northern Ghana should be tailored to meet the needs and constraints of women. These constraints will include the ability of women to call on investment funds required to purchase new technology and the compatibility of the technology to women's physiological conditions. This is particularly important if agro-processing activities are aimed at adding value to the agro processing.

Key words: *Improved Processed Cassava, Gari-fortified, Soybean, Food accessibility, Clients, with and without intervention*

## **CHAPTER ONE: INTRODUCTION**

Cassava is a chief crop in the farming systems of Ghana. It is also a main source of carbohydrates to meet the dietary requirement needs and a regular source of income for most rural dwellers. It contributes substantially 22% to the Agricultural Gross Domestic Product (AGDP).

According to the FAO (2002), cassava, tropical root crop, is the third most important source of calories in the tropics. This is after rice and maize.

Notwithstanding the introduction of cassava in Ghana in the 16th century, and its considerable contributions to the livelihood of the rural populace, the crop has remained in obscurity and neglect. Increasing interest in the crop in current times results from the realization of the potential of cassava as a food security and emergence crop which could generate employment for the rural poor, and serves as a source of foreign exchange for the country. Since 1990, the Government of Ghana, through the Ministry of Food and Agriculture, has demonstrated its determination and commitment to promote cassava for the alleviation of poverty; this is mainly in rural households and communities.

### **1.1 Cassava Processing in Damongo west Gonja District Ghana**

Processing of cassava is essential to get rid of “bitter” cassavas of cyanogenic glycosides (Ekwe, 2004) and to improve taste and palatability. Processing detoxifies the highly toxic tubers of some crop varieties. Conventionally, the techniques in processing cassava hinge on family labour, and are actually exhaustive (FAO, Ministry of Agriculture, Ghana Study, 2004-2006).

Agro-processing activities at the village level are mainly for the preservation and distribution of the bulk of Ghana's agricultural produce, playing a major role in the post-harvest food system. These agro-processing activities are the main occupation of rural women (IFAD 2007) who employ age-old traditional techniques in the processing of root and tuber crops. Traditional methods employed are simple and convenient for their scale of production. The equipment used for the traditional processes are cheaper compared to the requirements for modern high technology processes. However, these traditional technologies are low yielding and time consuming.

Traditional production of Gari from fresh cassava involves the unit operations of peeling, washing, grating, pressing and fermentation, sieving and roasting. Traditionally, peeling of cassava roots is achieved manually with sharp knives. The peels are dried for animal feed. The peeled tubers are washed thoroughly and grated by rubbing on the rough surface of a perforated galvanized metal sheet fixed to a wooden board support. The grated cassava mash is packed into jute bags and the open ends tied securely with rope. The loaded bags are then packed on wooden racks and heavy stones placed on them to press out the starchy juice. This is followed by the fermentation process for a period of about two days. The pressed fermented dough is dried in the sun and sieved by rubbing on a raffia sieve tray to remove roughage. The sieved grains are roasted over fire in open cast iron frying pan with brisk stirring until cooked and crisp. The roasted mass is again sieved to remove lumps, and packaged for storage and marketing.

The outdated peeling and grating methods of cassava into main products such as Gari, flour and dough are totally unproductive with low income, and sometimes harmful to health. Poor processing method results in quality deterioration, storage losses and low prices of their produce. However, these traditional methods are low yielding, time consuming, and labour intensive and give products of moderately low quality (Scott et al., 2002; Westby, 2002; Dziedzoave et al., 1999; Oduro and Clarke, 1999).

The West Gonja District which is located in the Northern Region of Ghana is selected for this study. It shares boundaries in the south with Central Gonja District, Bole and

Sawla-Tuna-Kalba Districts in the West, Wa East District in the North West, West Mamprusi in the North, Tolon Kumbungu District in the East.

The District has a total land area of 8,352sq km. This represents 12% of the total land area of the northern region. The Mole National Park in the West Gonja District is rich in green forest reserve known as the Kenikeni Forest Reserves which occupies 3800sq Km) 30% of the land area of the District.

The major agriculture production system of the district are subsistence and has agro based industries which contributes about 90% of the per capita income of the people in the district. The practicality and efficacy of the factors of production (land, labour and capital) are hardly measured. Production is mainly for subsistence and not commercial purposes. However there are a few commercial based farmers who undertake limited mechanized farming. The normal commercial farm size for most crops in the district ranges between 10-20 hectares. Tractors and chemicals are used as well as hired labour.

Damongo the west Gonja district of Ghana is one of the districts Rural Enterprises Project Phase II (REPII) carries its development interventions among which is to improve cassava processing. The reason for the intervention in cassava processing is because most of the women are into tradition method of cassava processing before the Project intervention.

The area is one of the districts that had the opportunity to train the traditional women processors on the use of soybeans to process Gari as an improved processing method. The aim is to add value and create better prices for their products and also to equip the women with the improved method of Gari processing.

50 women groups were trained in the improved method of Gari processing at the Kanyitiwale No2 Gari Processing Centre in Damongo. The participants were from four different communities. These were Langbanto, Atributo, Alasankura and Hungerline.

This study looked at how clients of Rural Enterprises Project benefited from the fortification of Gari with soybeans which gave it a dual advantage in that protein content was increased while the cyanide content was decreased, resulting in a more nutritive and safer Gari. Like traditional Gari, fortified Gari may be consumed as processed or after cooking. It is suitable for use as in famine relief in Africa because of its convenience. Village level agro-processing activities are responsible for the preservation and distribution of the bulk of Ghana's agricultural produce, playing a major role in the post-harvest food system. These activities constitute the main occupation of rural women (IFAD 2007) who employ age-old traditional techniques in the processing of root and tuber crops. Traditional methods employed are simple and convenient for their scale of production. The equipment used for the traditional processes are cheaper compared to the requirements for modern high technology processes. However, these traditional technologies are low yielding, time consuming, and labour intensive and give products of relatively low quality (Scott et al., 2002; Westby, 2002; Dziedzoave et al., 1999; Oduro and Clarke, 1999)

## **1.2 Research Problem and Justification**

The Rural Enterprises Project phase II (REP-II) is one of the Governments poverty alleviation strategies. The project seeks to contribute to the poverty alleviation in the rural areas by increasing income, employment and thus, improve their living conditions. The project undertakes interventions in employable skills trainings for clients who are already into businesses. Some of the trainings the Project implement to reduce poverty include improved cassava processing into Gari by fortifying it with soy beans.

Cassava processing is one of the trainings undertaken by clients in Damongo in the west Gonja district to improve household income. Fifty (50) women were trained in

improved Gari processing at the Kanyitiwale No2 Gari Processing Centre in Damongo. The participants were from Langbanto, Atributo, Alasankura and Hungerline. The purpose of the training was to equip the women with the improved method of Gari processing. Hence, the women were trained to use Soybeans, and cassava for Gari processing, thus to add value to the Gari. It was also to improve quality and packaging of Gari for better prices and taste. It also seeks at increasing the market value of Gari in the district. The participants are taught how to reduce the unnecessary wastage of cassava when processing Gari.

Cassava processors (processing Gari without soybean) in the West Gonja District experience low food access for household sustenance. This is due to the polygamous system of marriage with larger household sizes which requires higher expenses on food but because of the poverty situation of their household they can afford to feed their household all year round. This was the reason why REPII intervention in improving the Gari the process as source of food and income hence the need for this study to look at the contribution of the Improved cassava processing method and its implication for household food accessibility.

Studies show that the traditional processing method results in quality deterioration, storage losses and low prices of their produce. However, these traditional technologies are low yielding, time consuming, and labour intensive and give products of relatively low quality (Scott et al., 2002; West by, 2002; Dziedzoave et al., 1999; Oduro and Clarke, 1999). The low quality of Gari produced traditional peeling and grating methods of cassava into main products such as Gari, flour and dough are grossly inefficient with low turnover, and sometimes injurious to health. Poor gives the clients low prices for the produce and this affects their access to food.

### **1.3. Objective**

The main objective is to assess the contribution of the improved cassava processing of soybean fortified Gari on clients' household food accessibility.

The above objective is translated into two specific objectives as follows:

- To assess the effects of the improved cassava processing method on the household income.
- To identify factors that influences processors to adopt or not to adopt the improved cassava processing methods among beneficiary clients

### **1.4 Research questions**

#### **Main Research question**

1. To what level has the improved cassava processing contributed to household food accessibility?

#### **Sub questions**

- How has the improved cassava processing contributed to household income?
- What are the challenges faced by beneficiaries in the improve cassava processing method?
- What are the factors that influence the adoption of the improved cassava processing by clients?

## CHAPTER TWO: LITERATURE REVIEW

### 2.1. Food Security in Ghana

According to (WFP, 2009) report, about 1.2 million people, representing 5% of Ghana's population, are food insecure. 34% of the populace are in Upper West region, followed by Upper East with 15% and Northern region with 10%, amounting to about 453,000 people.

The northern region of Ghana including Northern, Upper East and Upper West Regions have been defined as the most poverty troubled and hunger spots in Ghana (GLSS, 2000). The high occurrence of poverty in Northern Ghana has been ascribed to exclusion from trade (Aryeetey and McKay, 2004; ODI and CEPA, 2005) and the stoppage of growth in the staple crop sub-sector. The poverty level of the people living in the northern regions of Ghana is so high that it is difficult to access food which goes to support the results from (UNDP, 2004), which states that, people living in poverty often cannot produce or buy sufficient food to eat and so are more vulnerable to diseases. People who are sick are less able to work or produce food.

The UN Standing Committee on Nutrition further concluded that nutrition is a vital basis for poverty alleviation, and also for meeting Millennium Development Goals related to quality education, gender parity, child death, maternal health and diseases.

World Food Summit 1996 defined food security with four dimensions as follows:

- **Physical Food availability:** which seeks to address the “source side” of food security and by the level of food production, routine levels and remaining trade?
- **Access to food:** is also an element of food security which is the adequate quantity of food at the national or international level and household level food security. Disquiets about inadequate food access have caused a greater policy focus on incomes, expenses, markets and prices in attaining food security objectives.
- **Food utilization:** the way the human body makes the most of various nutrients in the food. Sufficient energy and nutrient intake by individuals is the result of good care and feeding practices, food preparation, and diversity of the diet and intra-household distribution of food. Combined with good biological utilization of food consumed, this controls the nutritional position of individuals.
- **Stability:** of the other three amounts overtime even if your food consumption is sufficient today, you are still considered to be food insecure if you have inadequate access to food on a periodic basis, exposing one to a decline in nutritional status. Bad weather conditions, political instability, or economic factors (joblessness, rise in food prices) may have an impact on your food security status. For food security objectives to be comprehended, all four dimensions must be fulfilled in a simultaneous way.

#### 2.1.2 Household Food Accessibility

Physical food accessibility implies that adequate food is available to everyone, including vulnerable individuals in household, indigenous peoples and ethnic groups, people in rural areas and other disadvantaged groups may need special consideration with reverence to accessibility of food.

According to the Right to Food Glossary, Version 1.0 (December 2009), access to food can be look at as the right to food; in the context of human right to food, suitability of food requires both economic and psychological accessibility: Economic accessibility implies that personal or household financial means to buy food for an adequate diet

should be at a level to ensure that satisfaction of other basic needs are not vulnerable or cooperated. Economic accessibility applies to any attainment or entitlement through which people procure their food.

Food access depends on the ability of households to obtain food from acquisitions, gathering, current production, or stocks or through food transfers from relatives, members of the community, the government, or donors. A household's store of wealth (e.g., savings, liquid assets) is an important determinant of food access when regular livelihood strategies are obstructed or curtailed by disastrous agro-climatic conditions, loss of job; prolong illness, or another food security shock. A household's access to food also depends on the resources available to individual household members and the steps they must take to exploit those resources, predominantly exchange of other goods and services. Intra household distribution of these resources is an important determinant of food security for all household members (Right to Food Glossary, Version 1.0 December 2009).

Furthermore, Maxwell et al (2002) said household food access may not adequately reflect food access for individual household members. Because households are the social institutions through which individuals access food, household-level measures are typically used to determine impact

However, fluctuations of food distribution within the household have been well documented in the literature Bonnard (2001). Food access is a necessary but inadequate condition for appropriate food utilization by all members of a household. Appropriate healthcare practices are critically important.

Food access depends on the income available to the household relative to the price of food. Access depends on how much food a household is able to purchase with a given level of income, which depends on the prices of different food commodities. It is important to consider the price of food even in situations where households produce food for their own consumption.

Moreover, many producers or processors sell one food crop or product in order to purchase another. The relative prices of the two products will determines how much of the desired product or produce can be acquire in exchange for, or with the revenue from, the sale of their produce.

Household assets play an important role in safeguarding households against food insecurity and help to temporarily ease household food consumption. Households build up assets in good years to tide them over during less productive times.

Some households gradually erode their assets over time in an effort to meet food needs and other household necessities. Thus, asset ownership i.e. wealth, is an important element in the measurement.

According to the study conducted USAID, (1992), individuals have sufficient access to food when they have "adequate incomes or other resources to purchase or exchange to obtain levels of appropriate foods needed to maintain consumption of an adequate diet/nutrition level. The study further found out that if households have sufficient resources to provide adequate food for all their members and they spend these resources on food, this does not ensure that each member of the household actually receives and utilizes an adequate diet. Food has to be distributed such that each member receives the appropriate quantity and quality of food in good health and receiving the appropriate care.

### **2.1.3 Market Accessibility**

Market accessibility has effect on the household food accessibility as stated in the USAID (1992) study that food access is influenced by the collective availability of food

in the market and by market prices. The key factors influencing the food security status of households count on market purchases as an important source of food include the availability of food, prices, and income-earning opportunities. Poor market infrastructure and an adverse policy environment may lead to high and variable prices for food and inputs, further undermining agricultural productivity, food supplies, and derived incomes.

#### **2.1.4 Adoption Requirement**

Numerous theories have been advanced by social scientists and other disciplines to explain and measure technology or innovation adoption (Feder et al. 1982; Rogers 1995 and Doss 2003). Much of the literatures on adoption of innovations /improved technologies focus on the long-term rate of adoption, which is usually represented by an S-shaped increasing frequency curve and the factors that influence the adoption choices. Usually, a difference is made between the degree of use (intensity of adoption) and occurrence/level of adoption of an improved technology. The present study will examine the adoption requirement of improved cassava processing carried out by Rural Enterprises Project through interactions with processors and descriptive information/data presented without the use of econometric models. Thus there is very little econometric information on intensity of use (the intensity of adoption referring to the extent of use of a technology/invention by the adoption unit once the decision to adopt has been made) and level of utilization of the improved cassava processing method (referring to the situation where the adopting unit has used or not used the technology/innovation during a reference period) in this study.

Regarding the location of rural producers of a developing and under developed countries like Ghana, adoption of improved cassava processing method which is required to increase the product quality so as to meet the increasing demand for the product (Gari). The adoption of the improved processing method, especially in cassava processing, would be governed by a complex set of factors such as human capital, information, location, resource endowments and institutional support. Within this edge condition, processors decision depends on their needs; costs incurred and benefit accumulating the major motivating factors for the acceptance or rejection of a particular technology (KARKI, 2004).

Some researchers say that there may be personal interests that predispose certain people to adopt innovations and/or adopt them more quickly than others (Agarwal& Prasad, 1998b; Wood & Swait, 2002). Invention features are specific to certain innovation and how easy an innovation is to be used, how the use of an innovation is compatible with the lifestyle of an individual. Finally, appropriate features make up the environment and surroundings of an individual during the adoption process frequently this is the work-based organization, but it also may be the mass media or individuals acting as facilitators of change.

Theories shows that, adoption decision process describes five stages that individuals go through during their evaluation of an innovation. The first stage is when an individual is aware of an innovation. The awareness of an innovation is subjected to personal features (it is alleged that there is a behaviour attribute that encourages change seeking in individuals; Wood & Swait, 2002), socioeconomic factors, and access to change agents like mass media (Bandura, 2001). Stage two, influence, is when an individual gains adequate knowledge about the innovation's relevant characteristics to make a personal judgment, the outcome of which is a favourable or unfavourable view of the innovation. The third stage, decision making has an outcome of an individual's choosing to adopt or reject an innovation. The fourth Stage, involves the implementation, is when an individual acts on his or her decision.

Finally, stage five which is the stage of confirmation, an individual reflects on his or her decision and implementation process and re-evaluates whether to continue or discontinue with the innovation adoption (Rogers, 1995).

The adoption of the improved cassava processing can influence the access to food in the sense that, the aim of improving cassava process is to improve the quality of the Gari for better price and hence increase the income the households.

In Africa, conventionally, cassava is produced on small-scale family farms. Cassava tubers are processed and prepared as a subsistence crop for home consumption and for sale in village markets and shipped to urban centers.

### **2.2.1 Cassava Production in Ghana**

The selected crop for the study is cassava, based on its importance to economic, social development and vulnerability to climate change.

Cassava is a major cultivated crop in Ghana, which is grown by many farmers for home consumption and for commercial use. Tubers are sold fresh or processed into a range of products including Gari, kokonte (dried cassava chips) and agbelima for human consumption and animal feeding. The rural poor individuals depend directly on agriculture for their livelihoods, and there is a need to add value to primary crop production and diversify products in order to reduce poverty and increase food security. According to FAO the tropical tuber crop cassava is the third most important source of calories in the tropics, after rice and corn (FAO 2002). As a food crop, cassava is grown in all the agro-ecological regions of Ghana (Graffham et al 1998). Fresh cassava tubers do not store well because of its high moisture content. Therefore cassava is usually processed to obtain different relatively shelf stable intermediate and final products for various food applications. These products processed from cassava include "Gari", a roasted fermented cassava meal, "Agbelima" which is a fermented cassava mash, and the dried cassava chips known locally as "kokonte" which is further processed into cassava flour. Tapioca is a minor product or by-product from cassava processing. Cassava is processed to obtain starch for industrial use.

Cassava is an important carbohydrate staple crop in Ghana with its per capita consumption recorded as 152.9 kg/year besides being a staple food crop cassava can be used as raw material for the processing of industrial starch and ethanol. In Ghana, cassava is cultivated as a monocrop or intercropped with other food crops, either as the dominant or secondary crop. In relation to the quantity produced, cassava is the most essential tuber crop in Ghana followed by yam and cocoyam, but cassava ranks second to maize in terms of area planted.

### **2.2.2 Improved Cassava Processing**

Cassava processing is one of the trainings undertaken by clients of Rural Enterprises Project in Damongo in the west Gonja district to improve household income. The training in improve method of cassava processing (Gari fortified with soya beans) is to add value to the indigenous Gari.

In addition, the improve method is to solve the problem of malnutrition in its various forms, the need to improve the nutritive quality of our local food through better processing and enrichment. Gari (processed cassava meal) is one of such basic foods worthy of attention.

The improved processing method is the extraction of soybean protein and its fortification with Gari as shown in **Appendix 5 and 8** in order to convert it to a good basic food that is affordable and that can supply the minimal protein requirement of a balanced diet (Boen et al., 2008). The incorporation of the protein extract into Gari gave a good blend with high protein and quality organoleptic parameters. Other parameters



considered in the improved processing include; colour, flavour, texture and adhesibility of the food blend when made into morsels. The permanence of the protein extract under the Gari processing conditions of wet fermentation and high temperature is also examined.

### **2.3 Definition of Terms**

**Food Accessibility:** is also a measurement which is the satisfactory supply of food at the national or international level and household level food security. Concerns about insufficient food access have resulted in a greater policy focus on incomes, expenditure, markets and prices in achieving food security objectives. World Food Summit (1996).

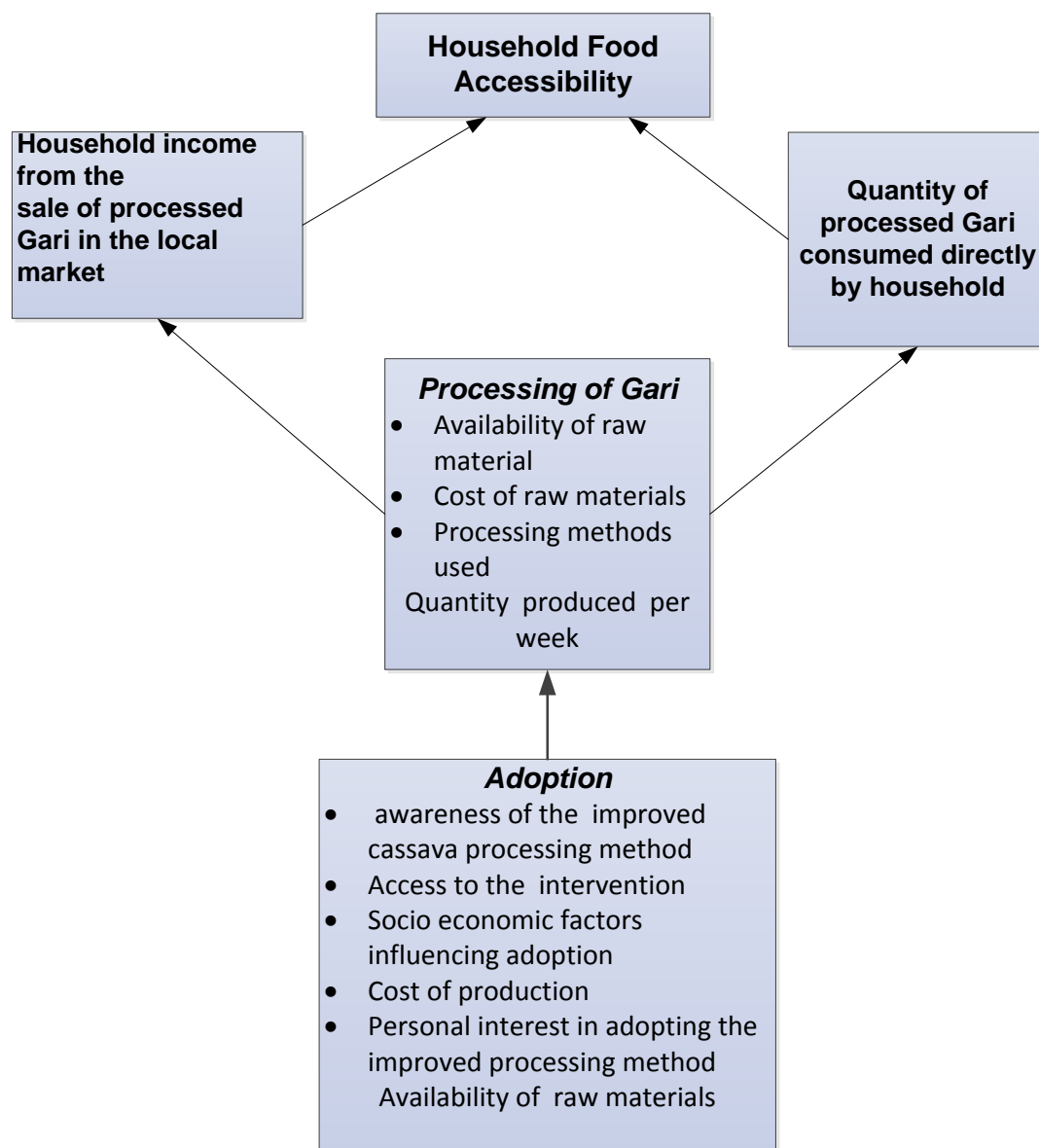
**Gari:** is a creamy-white, coarse flour with fermented flavour and a slightly sour taste made from fermented, gelatinized fresh cassava tubers. Gari is widely known in Nigeria and other West African countries. According to (Ebuehi et al, 2005), Gari is a popular west African granular staple food traditionally made from fermented gelatinized fresh cassava tubers as shown in **Appendix 6**

**Household income** ; the shared gross income of all the members of a household who are 15 years old and older Individuals do not have to be related in any way to be considered members of the same household. Alternatively, household income is the combined income of all members of a household who jointly apply for credit. Household income is an important risk used by lenders for underwriting loans.

### **2.4 Conceptual Framework**

The concept diagram shows the factors that influences food accessibility in cassava processing. This was compiled after a preliminary review of the literature on the contribution of the Cassava processing to household food accessibility. The dimensions and the topics related to this study are identified

**Figure 1.0 Conceptual Framework for Food Accessibility**



## CHAPTER THREE: METHODOLOGY

### 3.1.1 Research Methodology

This research utilised a qualitative approach and used both desk study and a field work data collection.

The study had a qualitative approach and was based on both empirical data and literature through desk study. The data was collected through a case study and observation in order to obtain an in-depth knowledge on the research problem.

The data collection was by the use of interview questionnaire and checklist as showed in **appendix 1, 2 and 3**.

Participatory Rural Appraisal (PRA) techniques were employed in addressing the objectives of this study. Regarding the PRA, a semi-structured questionnaire/checklist addressing the issues raised in the objectives was used to gather informal qualitative data and information in a more interactive manner as shown in **figure 3.1**. The PRA involved individual interviews with key informants and focus group discussions.

***Figure 3.1: Researcher interviewing an improved Gari processor in Alhassan Kura***



A focus group discussion was carried out as shown in **figure 3.2** to get the history of their production and the interventions they have received and this was used as base line information of the processors. Personal observation was used to get information on their past production to compare with their current production.

Participants were asked to list what they perceive as food accessibility requirements and later the list would be pooled for further group discussions on emerging patterns.

**Figure 3.2: Researcher having a focus group discussion at the processing site**



### **3.1.2 Sample Selection**

A purposive sampling procedure was used to identify the project community in the district covered under REP-II and randomly identifying locations of beneficiaries with the help of Business Advisory Centre Head in the district.

A sample size of 20 cassava processors consisting of 10 processors who received the intervention in improved cassava processing and 10 processors who did not received training in cassava processing from REP-II in the three communities covered by the Project.

The checklist and a questionnaire as shown in **Appendix 1 and 2** were used in two (2) communities of clusters of 10 women in each community .Two (2) Project staff at the district was interviewed.

### **3.1.3 Data Analysis**

The data collected by the researcher was transcribed (all interviews and observations) before analysing. Data was clustered into two categories those who received the intervention and those who have not received the intervention. Data was analysed using the Sustainable Livelihood Framework to measure the contribution of improved cassava processing into Gari and its implication for household food access in the west Gonja district. The main focus was to analyse how the processors used the Improved method of cassava processing organised by the Project to improve their access to food at household level, income, saving, credits, assets and market access. For the thematic analysis, the researcher used Braun and Clarke (2006) guidelines. These guidelines are; acquainting with data, generating codes, transcript to immerse in the data, reviewing themes, defining and naming themes. The outcome of all these factors helped to determine the contribution of improved cassava processing into Gari and its implication for household food access in the west Gonja district

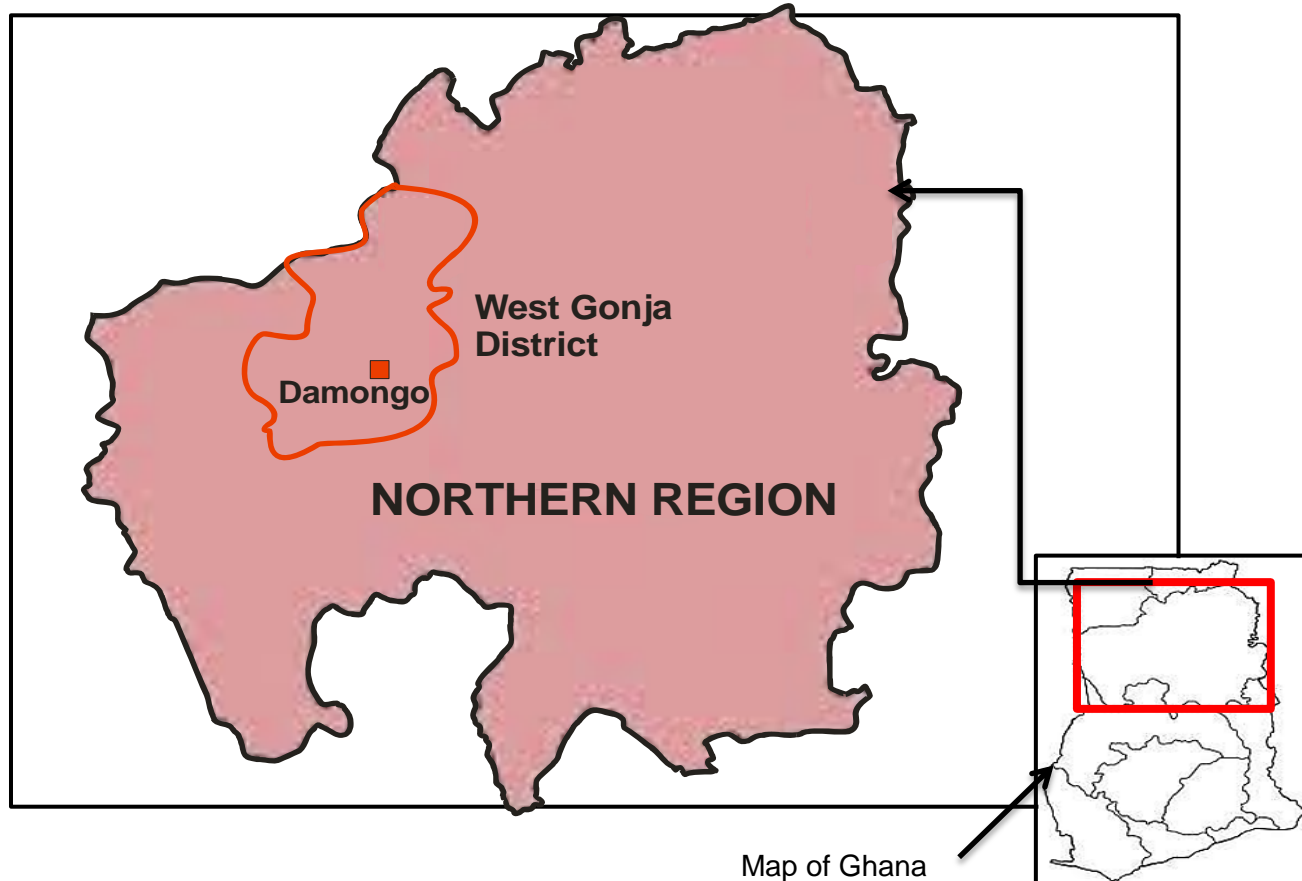
### **3.1.4 Ethical Issues**

In research study, ethical Issues are important to be observed especially when the topic is so sensitive such as exploring income and food accessibility. Participants were all sensitized and made to understand why they are selected to participate. The essence of the research was explained to the participants and were asked if they were willing to voluntary participate in the activity before they signed an informed consent form and further authenticated by a witness to prove that the information collected would only be used for this study .

### 3.2.1 The Study Area

The West Gonja District as shown in **figure 3.1** below is the largest of the 20 districts in the Northern Region of Ghana in terms of land mass. 30% of the district's land is characterised by forest reserves and Mole National Park. In the year 2000's population and Housing Census it was recorded that the district population was 76,702 which gives a density of 8.3 persons per sq. Km. The district population is below the regional of 25.9 persons per sq Km. West Gonja district population growth rate is 3.1% which is higher than the national (2.7%) and the regional (2.8%) respectively.

**Figure 3.1: Map of West Gonja district Northern Region Ghana**



The district is well-known with several tourist attraction centres. The Mole National Park which is the leading tourists centre not only in the district and region but the northern sector as a whole which include the three northern regions of Ghana. The Mole National park has wide variety of wildlife. The national Park which is located about 30km west of Damongo, is the largest in the country and one of the best managed game and wildlife parks not only in Ghana but Africa, south of the Sahara desert. The Mole national park covers an estimated area of about 5500 hectares and is a major tourist attraction in the Northern region of Ghana.

The district has an additional forest reserve called the Kenikeni Forest Reserve having a rich array of flora and fauna.

Farming is the major economic activity undertaken by about 60% of the total labour force. Major crops cultivated are yam, cassava, legumes (cowpea and soya beans) Agriculture is also mainly rain-fed with limited irrigation. Cropping systems follows the land fertility pattern and farmers use either inorganic and organic manure or fertilizer. Tools/equipment used by farmers include hoes, cutlass, animal traction and tractor services are limited in the West Gonja district.

**Table 3.1 Food crop production in the district for 2010**

Crops	AREA (Ha)	PRODN. (Mt)	YIELD (Mt/Ha)
Maize	10,000	20,000	2
Millet	3,500	3,150	0.9
Sorghum	6,000	6,000	1
Groundnut	7,000	6,300	0.9
Yam	8,000	112,000	14
Cassava	18,000	253,800	14.1
Cowpea	3,000	2,700	0.9
Rice	400	1,000	2.5
Soy beans	400	440	1.1

*Source: MOFA, Damongo 2010*

From the table above it shows the area under cultivation of cassava is more than and the yield of cassava is higher than other crops,

### **Household Characteristics of the study area**

Fertility rate which is about (8 children per woman) is high in the district compared with the national average of (4 to 5 children per woman) in normal reproductive life. The average household size is about 8, again larger than the national average of 5 per household. Owing to polygamy and accommodation problems some households have separate cooking and feeding arrangements. The annual average household income is estimated at about GH¢550,000.00 which gives an average per capita income of about GH¢70,000.00/year. This implies that over 80% of the population fall below the poverty line as set by the UNO to be GH¢900,000.00 / year.

### **Poverty Analysis of the District**

Currently, it is projected that 64% of the West Gonja district population fall below the national poverty line which is GH¢900,000.00 per year. (UNDP standard). The main cause of poverty in the district and typical poverty cycle in developing countries i.e. low productivity, low income, high illiteracy rate, high population growth, low investments (capital) and unemployment.

Although the district has a number of natural and human capitals, these are under developed and underutilized. West Gonja district is also one of the least resourced in terms of social services. To mention but a few, roads are bad and majority of roads not motorable during the rainy season, poor access to health, education, employment, clean water and electricity (Sagoe, 2006).

### **Production Technology in the District**

The main tools used in cultivation are the traditional hoe, cutlass, and axes. Equally, simple tools like grinding stones, pestles and frying pans are used to process the crops produced. The major crops cultivated and processed in the district include cassava, maize, groundnuts, rice, cowpea, millet and yam. Manual labour constitutes over 90% in the agro processing activities of the district. Production units in the west Gonja district are family owned and skills are passed down through the parents. Major production and Employment avenues of the district are as follows:

- Food crops production
- Livestock production
- Cassava processing (Gari)
- Cotton spinning and cloth weaving
- Rice milling

- Shea butter and groundnut oil extraction
- Pito brewing
- Cooked food and foodstuff traditional

### **3.3 Rural Enterprises Project Intervention in the study Area**

REP-II is a Project that is part of the development program of the Government of Ghana to create wealth and reduce poverty in rural areas. It contributes directly to the Ghana's Growth and Poverty Reduction Strategy II. The Project is funded mainly by the Government of Ghana (GOG), the International Fund for Agricultural Development (IFAD) and the African Development Bank (AfDB). The project seeks to contribute to the poverty alleviation in the rural areas by increasing income, employment and thus, improve their living conditions.

However, the immediate objective of the project is to build competitive micro and small scale enterprise in the rural areas.

REP-II is mainstreamed into the decentralized administrative and planning system and implemented at the district level through a partnership arrangement with participating District Assemblies, the National Board for Small Scale Industries (NBSSI) and the GRATIS Foundation. The two key district-based implementing units of the Project are the Business Advisory Centres (BACs) and Rural Technology Facilities (RTFs). REP-II is being implemented through the following interrelated components:

- Business development services involving mainly technical and management training through district-based Business Advisory Centres (BACs).
- Technology promotion and support to apprenticeship training through the establishment of Rural Technology Facilities (RTFs) the districts of operation
- Rural financial services provided through mostly rural banks.
- Policy dialogue and partnership building on rural micro and small enterprise development involving stakeholders including donor agencies, public institutions, NGOs, the private sector and Trade Associations

The Project established a Business Advisory Centre (BAC), and enrolled the West Gonja in 2006 under a tripartite agreement between the project, National Board for Small Scale Industries (NBSSI) and the West Gonja District Assembly to undertake the following functions;

- Promotion of Medium and Small-scale Enterprises in the project District
- Facilitating and delivery of project services (training programs)
- Acting as the focal point for District Assembly – led business initiatives in the district by providing commercial information.
- Involvement in the conduct of project studies- Business Orientation Seminars, Baseline studies.

The project through the Business Advisory Centre (BAC) has designed various interventions towards the achievements of its goal and objectives. Some of these interventions include Community Based Skills Training (CBTs), Small Business Management training (SBMT) , Business Orientation Seminar, Marketing training, Group dynamic, and counselling services etc. The project in an attempt to reduce poverty, has undertaken several activities from the 2006 to date with contributions from stakeholders.

The project delivers its interventions through the BAC. The BAC has given some clients some training in income generating activities in the rural areas to undergo some training in how to improve the quality of their products. This will help them enhance the quality of the products and at the same time increase the market value



of their products. Below is a table indicating the training programs organized to that effect.

In addition to this, the BAC has helped some clients who have already been trained and are now into Income Generating Activities in the rural areas to undergo some training in how to improve the quality of whatever they are producing. This will help them enhance the quality of the products and at the same time increase the market value of their products. The table below indicates the training programs organized by the Project.

**Table 3.2: programmes implemented by the project march 2006, to march, 2012**

ACITIVITY	ACTUAL			
	NO.	MALE	FEMALE	TOTAL
Soap making	9	10	228	315
Improved Cassava Processing	6	0	50	50
Start your business	1	12	14	26
Beekeeping	4	118	22	140
Batik tie &Dye	5	12	146	158
Baking & confectionary	2	-	54	54
Pomade	1	4	29	33
Hair food production	1	-	25	25
Modern design	1	-	22	23
Small Bus Mgt	2	34	7	41
Group Dynamic	1	9	17	26
Marketing	2	5	41	46
Leadership training	1	2	27	29
<b>Total</b>	<b>21</b>	<b>196</b>	<b>404</b>	<b>601</b>

*Source: District status report 20011*

Among the training programmes as shown in **Table 3.2** provided by the project, this study will seek to look at the Improved Cassava Processing method carried out by the Project with the objectives of:

- Providing the participants with employable skills
- Equipping participants with the modern skills in Gari production
- Boosting their market shares as a result of the quality of the Gari that will be produced.

Further revamp some producers who could not meet their production cost due to unnecessary wastage of cassava during the production process



## CHAPTER FOUR: RESULTS AND DISCUSSIONS

### 4.1 Introduction

This chapter presents the findings and the discussions of the findings from the field and these findings are the outcome of the study. Interviews were carried out with twenty cassava processors (ten processors who have received the intervention on improved processing method and ten who have not received any intervention) and as well as a focus group discussion with a processing group who have received the intervention. The results will focus on the following sub sections:

- The socio-economic characteristics of cassava processors
- The contribution of improved cassava processing to household food accessibility
- The contribution of improved cassava processing to household income
- Income from the sale of Gari per week
- Quantity of cassava Processed per week
- Amount spent on household food per week
- Challenges of adopting the improved processing method

### 4.2 Socio-Economic Characteristics of the cassava processors

**Table 4.1: Age distribution of respondents**

Item	clients with the intervention	Clients without the intervention
Age		
25-30	1	1
31-35	1	2
36-40	4	2
41-45	3	4
46-50	1	1

*Source: field data 2012*

The results in **Table 4.1** above show that the age categories involved in cassava processing ranges between 25 and 50 years.65% of the cassava processors were between the age categories of 36-45.

From the results presented in **Table 4.1** above, it shows that, cassava processing is a venture or occupation that is participated more by the middle aged. The older people are not attracted to it due its tedious nature and the strength required in doing most of the activities involved. A similar result was obtained by Odebode (1997) who reported that the majority of cassava and soybean processors in Oyo state were in the 31 – 50 years age bracket. This age range can be regarded as the youthful and active age when women can make vital impact in agricultural production, processing and technological development generally. Cassava processing is a domestic business and children help in peeling while the women are mostly involved in the processing. The processing can be bulky, often characterised with low quality, low output per unit of time and drudgery. Adebayo *et al*, (2003a) found that cassava processors willingly adopt improved processing techniques suited to their location.

It was realized that 17 processors representing 85% of respondents were females and 3 representing 15% were males. The results show clearly that women dominate in the cassava processing business. Cassava processing in the study area is seen more to be the work for women because of the perception that anything that has to do with cooking is the role of women. Also this is because the men mostly operated the mills while the women performed such tasks as peeling, sieving and frying the cassava product. This confirms the view that processing is predominantly a female enterprise in Nigeria and indeed, most African societies (Ajayi, 1995; Lewis, 1984) .The principal role

of gender in agricultural development and agro-processing in African is now generally recognised. Women produce 80% of the basic foodstuffs both for consumption and sale in sub-Saharan Africa, yet their key role as food producers and providers and their critical contribution to household food security is only now becoming fully recognised (FAO 2006). In Kenya, women supply 70-75% of agricultural labour and their contribution has been referred to as the backbone of the household production (Spring 2000).

**Table 4.2: Household Size of respondents**

Item	clients with the intervention	Clients without the intervention
<b>Household size</b>		
1-5	0	0
6-10	6	10
11-15	3	0
16-20	1	0

Source: Source: Field data 2012

From **Table 4.2** above, out of the twenty (20) processors interviewed sixteen (16) of the respondents have a household size of (eight) 8 members. Six (6) out of ten (10) of the cassava processors who have received the intervention had an average household size of eight (8) members whiles ten (10) of the respondents who did not receive the intervention had an average of eight (8) members in the household.

The study area recorded a 100% household size ranging between 6-10 members, for respondents without the intervention and 60% for respondents with the intervention. 30% of the respondents with the intervention recorded a household size of 11-15 members and 10% with 16-25 members. The higher numbers of household size is as a result of polygamous marriage and the extended family system practiced in the study area. However, a larger household size may mean availability of labour for both farming and cassava processing activities. It could also have an implication on their food security situation since more household members will mean more food to meet individual food requirements. This result is similar to those of Odebode and Mungong (2001), Bammeké (2003) who reported an average of 6 – 10 people as the modal family size group among rural households.

**Table 4.3: Educational Background of respondents**

Item	clients with the intervention	Clients without the intervention
<b>Educational Background</b>		
None	3	8
Primary school	2	1
J.S.S/ Middle school	5	1

Source: Field data 2012

From **Table 4.3** above, majority of respondents (55%) indicated they had no form of formal education while the remaining 45% said they had primary and middle school education. The results further show that although majority of respondents indicated that they had no formal education, 20% of respondents with the intervention and 10% of those without intervention had primary school education whiles 50% of those with intervention and 10% without the intervention had middle school education.

This shows that the illiteracy rate is relatively high among the processors and this can affect their adoption of the improved processing method. This low educational attainment among women processors has a tendency for low level of technology adoption and this has implications for the use of improved processing techniques by these women cassava processors. This was clearly shown by the findings which established that the illiteracy level amongst the women without the intervention (80%) was higher than those with the intervention (30%).

Education is an important variable that tends to influence adoption of modern technology; it also influences choice of food commodities consumed by individuals and households. This result agrees with earlier findings by Teressa (1997) and Walday (1999) who found adoption to be positively related to the level of education. According to them, the higher the level of education attained the better the chances of understanding and adopting a technology. From these findings it can be concluded that literacy level plays a significant role in adoption of technologies.

In addition, the low level of education among the respondents could have serious implications on their ability to access information, use new technological innovations and even access or obtain credit from formal financial institutions. The tendency is to operate the processing business using traditional methods as was done in the study area.

**Table 4.4: Experience in cassava processing (Gari)**

Item	clients with the intervention	Clients without the intervention
<b>Number of years of processing</b>		
1-5	4	6
6-10	3	2
11-15	0	2
16-20	3	0
21-25	0	0

*Source: Field data 2012*

From the **Table 4.4**, the number of years of experience in the cassava processing was captured and it was realized that, 40% of the processors with intervention had an average of 3 years processing experience, 30% had an average of 8 years of experience and another 30% 18 years of experience. Also 60% of the respondents without the intervention had an average of 3 years of experience, 20% had 8 years of experience, and another 20% 13 years of experience.

It was revealed that, 60% of the respondents with the intervention had over 8 years of processing experience whiles 40% of those without the intervention had over 8 years of experience. This indicates that the number of years of experience provides the ability, courage and understanding to try other improved technologies while still ensuring the profitability of the business.

#### **4.3 The contribution of improved cassava processing to household food accessibility.**

20% of the respondents with the intervention said that their household feed on Gari as one of the main source of food and so they no longer buy rice for their lunch. About 50% of the respondents said the improved method has increased their income levels since the demand for the product is high and they use the profits made from the sale of the Gari to buy food stuff. 30% of them reported that they use the profit from the sale of Gari to invest into farming and the farm produce is use in the feeding of the household.

Again due to the non-seasonal nature of Gari, it makes it available all year round for household members.

About 50% of the respondents said the improved method has increased their income levels since the demand for the product is high. The improved processing has also improved drastically the quality of the Gari produced and hence has gained attraction in the market. 100% of respondents said the quality and nutritional content of the Gari has improved since over-fermentation has become the thing of the past. This they said has resulted in the rather high demand for the improved Gari hence increased income generated. This means that more quantity of Gari is sold after the intervention. Figure 3, shows that the quantities of Gari produced in a week is higher with the respondents with the intervention. Profit realized from the sale of Gari according to respondents is used to buy other food stuff for the household.

***“I can now feed my family all year aside the use of the profit to buy food for the family from processing of the Gari I use the profit I make from the Gari to support my husband on his farm to expand the area of cultivation to sustain the family”. By a cassava processor***

30% of respondents with the intervention reported that they use the profit from the sale of Gari to invest into farming and the farm produce is used in the feeding of the household. All the respondents had husbands who are farmers so they give part of the profit realized from the sale of Gari to them to farm. This confirms the study conducted by Blisard and Stewart, (2007) which says that households make food choices based on numerous factors, such as taste, convenience, nutrition, and price. Lower income households spend a larger share of their income on food than higher income households.

100% of respondents said the quality and nutritional content of the Gari has improved since over-fermentation has become the thing of the past. This they said has resulted in the rather high demand for the improved Gari hence increased income generated.

Meanwhile the respondents who did not receive the intervention said the rate of sale of their Gari has remain same all this years and there has not been any improvement in their income since people switch to the improved Gari.

#### **4.4 Contribution of the improved Processed Gari to household income**

Cassava processors who have received the intervention by REP-II in improved Gari processing method reported increase in income from the sale of the Gari. 100% of the respondents reported that the increase income was as result of the introduction of improved Gari processing (Gari fortified with soybeans).

The increase income reported by processors interviewed in the study was as a result of higher quality, better Gari colour and taste. Hundred percent (100%) Respondents who received the intervention said that the intervention has improved the quality of their Gari and this has caused high demand for the Gari as a result their income from processing has increased.

***According to a respondent “the intervention I received has really improved on my income I can now buy and process one KIA truck of cassava a week”.  
By a cassava processor***

The findings from the district office indicated how the intervention has improved the household income of the clients. The district data base showed that out of the 530 clients who have received the intervention, 243 of the clients' business levels have increased the income levels of the clients as a result of the ready market created for

purchase of their Gari. The district office of REPII plays a significant role in identifying the market outlets and at the same time helping them to identify potential buyers and link them to the clients. They Project organises annual trade exhibition and shows as form of platform where clients showcase their products. The result is in conformity with the view expressed by *Spore (1990)* that once processors are sure of a market they would adopt improved technology.

This further confirms the observation of *Kyiogwon and Gudiji (2002)* that inhabitants in remote rural areas have less contact with urban centres where extension agents and inputs are much available. This could influence their level of adoption negatively and hence the need for the creation of market outlet for these processors.

#### 4.4.1 Income from the sale of Gari per week

Considering the results for the income per week obtained from the sale of the Gari processed per week, it was clearly indicated in **Figure 4.1** below that, the clients with the intervention had more income generated from the sale of Gari per week than those without the intervention. They ascribe the higher levels of income generated to the good sales they make every week due to the improvement in the taste and colour of Gari.

**Figure 4.1 Average income from the sale of Gari per week**

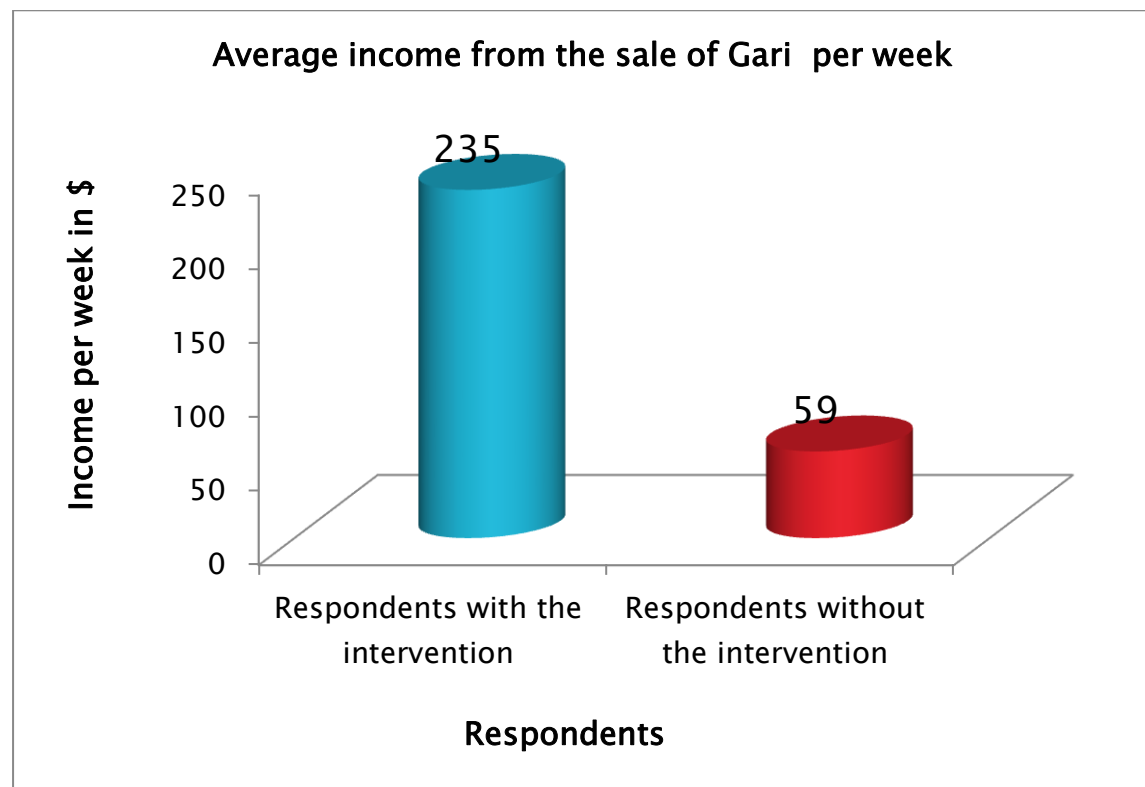


Figure 4.1 above again show the lower levels of income generated in a week by the respondents without the intervention. This can be as a result of the high quality competition the improved Gari brings to the common market. The quality of Gari with respect to its colour and taste influences the decision of the buyer. This accounts for the massive movement of buyers from the ordinary Gari to the improved Gari.

The respondents without the intervention gave their sales and income they made every week and the average income was calculated as represented on the bar chart in **figure 4.1** above. The incomes made are quoted in US dollars.

#### 4.5 Quantity of cassava processed per week

Respondents reported on the quantity of cassava they process into Gari per week. The results from the figure 4.2 below show the quantity of cassava they process. Only 10% of the respondents without the intervention process fifteen (1500kg) of cassava which they said is equivalent to 1 KIA truck. Another 10% could process eight (music) bags which is equivalent to a half KIA truck. The remaining 80% processes smaller quantities of cassava per week. The clients with the intervention said that they have increased their quantity of production since the adoption of the improved cassava processing. 40% of the respondents with the intervention process 1500kg of cassava per week. 10% could process 1000kg of cassava which is a little more than half KIA truck load. The remaining 50% processes cassava within the ranges of 200-400kg per week.

100% of the respondents with the intervention ascribed the higher quantities of cassava processed per week to the improvement in quality of the improved Gari. The improvement in quality has led to high patronage of the Gari within and outside the community therefore given rise to the need for increase in production quantities.

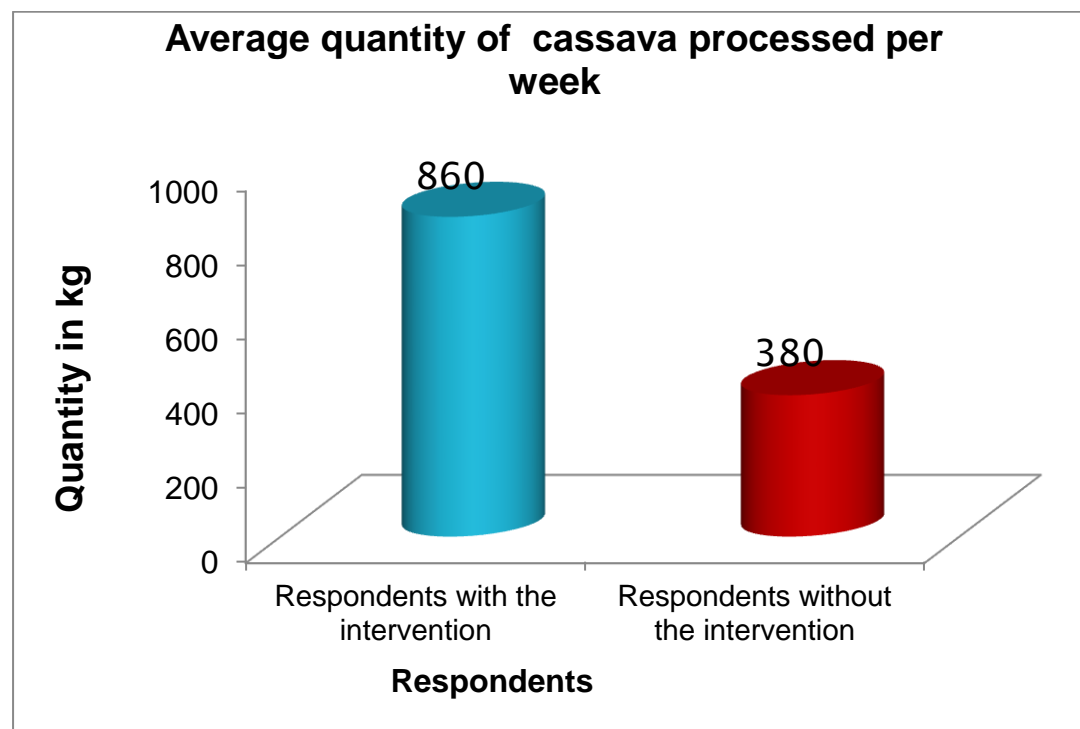
REPII district office in Damongo in collaboration with Root and Tubers Marketing and Improvement Program (RTIMP) and other Non-Governmental Organisations (NGO's) as shown in **appendix 4** assisted the clients with equipment for the processing of their Gari.

They said with the processing equipment available, they can produce the Gari in larger quantities per week.

***“The availability of the processing equipment has really eased the work load in processing the Gari”. By a cassava processor***

As a result of the intervention, some of the women formed groups and had equipment support from Root and Tubers Marketing and Improvement Program

**Figure 4.2: Average quantity of Cassava processed per week**



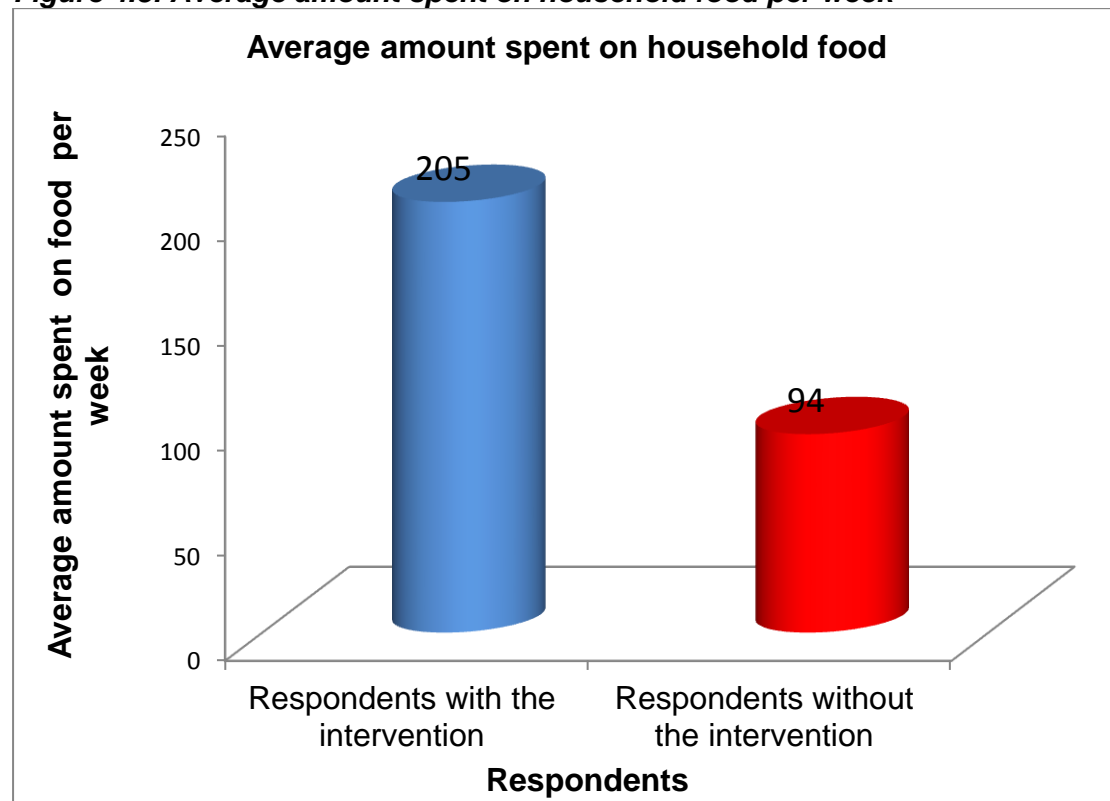
#### 4.6 Amount Spent on household food

From the findings of the focus group discussion some of the respondents who received the intervention yet not adopting indicated that the reason for low adoption is because the production cost is so high. Most of the respondents said that they wish they were processing the improved one because their income is too small to feed the family all year round. Most of them said they take up farm labour jobs and picking of sheanuts to sustain their families.

The result on the amounts respondents spent on household food is depicted in the bar chart below. The clients said they spend on household feeding depended on the income make from their businesses as shown in **figure 4.3**. The clients with the intervention said that their income levels have increased and that has also increased their ability to purchase more food stuffs for their household hence an increase in their household food expenditure. The respondents said they spend on food stuffs like maize, rice, beans, yam, fish and meat.

***“My income level has increased now as a result of the intervention. I can take meat every day and also I crown my dinner with a bottle of quinine tonic and pure water.” By a processor***

**Figure 4.3: Average amount spent on household food per week**

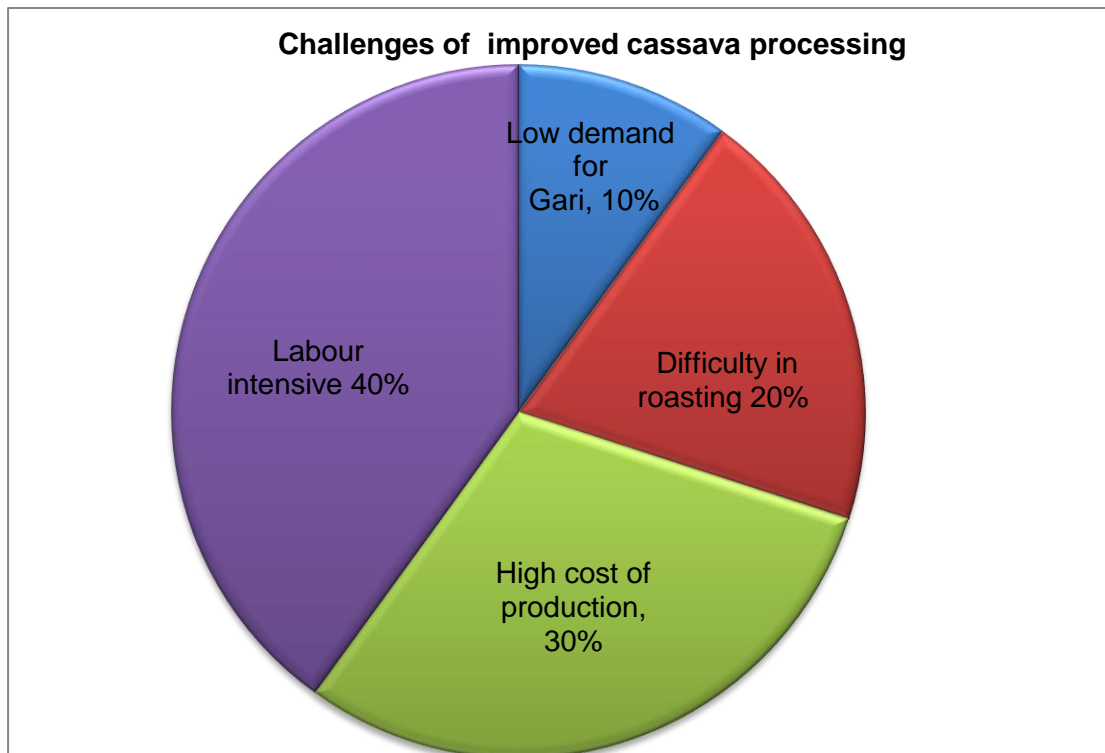


#### 4.7 The challenges of adopting the improved processing method

30% of the respondents shown in **Figure 4.4** below reported that the main challenge they face is the high cost of production as a result of the raw material needed for the processing of the improved Gari.



**Figure 4.4 Challenges of adopting Improved Cassava processing**



Unlike the ordinary Gari where the only raw material needed is cassava, the improved Gari requires cassava, soybeans and butter for its processing. This implies that there is an additional cost of production.

20% said the marketing of the Gari during raining seasons is difficult since some roads are cut-off. The patronage of the improved Gari is spread throughout the three Northern Regions therefore if roads are cut-off during raining seasons due to its bad condition it brings marketing activities to a halt.

40% said they face a problem with peeling the cassava since they do it manually. This challenge of peeling prolongs the man hours used in the processing and also introduces additional production cost since most cases of high production labour must be hired in order to meet contract deadlines 10% said they do not face any problem with the improved processing method as shown in figure 4.4.

Some of the respondents from the focus group discussion said they have not adopted the improved method because of some various reasons such as:

- The cost of production is high, which they said was as a result of the raw materials required in the processing.
- It requires more labour- this they said was because the process takes much time than the ordinary Gari.
- Difficult in roasting- they said this improve method takes more time to dry since the add margarine which delays the processing time and even the time in roasting.
- Low demand in the rural community- some of the respondents said they were coming from communities that were remote and there was no way they could process and sell.



## **CHAPTER FIVE: CONCLUSION AND RECOMMENDATION**

### **5.1 Introduction**

Conclusion and recommendations of the study are drawn from the research results and discussions that came up from the research. The observations made researcher throughout the study have also been used

This study has analysed the contribution of improved processed cassava – Gari fortified with soya beans on household food access and also looked at future intervention. For the researcher to achieve this objective, research questions were formulated with sub-questions which were used to prepare a questionnaire and a check list for the field (see **appendix 1**). The following conclusions can therefore be drawn from the findings from study area presented in chapter four of this work.

### **Conclusion**

The implementation of REPII interventions in the west Gonja district has contributed to higher income among participants as a result of increased Gari production recorded. The trainings conducted for the processors had positive impact on their operations. The market linkage for the improved cassava processes has contributed to higher demand for Gari fortified with soybeans.

The socio-economic characteristics findings collected indicated that majority of participants of the project in the community are women. These women are involved in cassava production, processing and marketing. Participants of this project in the study area have good experience in the cassava processing business and also willing to adopt innovation/intervention that are favourable to their local conditions.

Improving on the quality of the Gari produced by the processors has helped them get better price for their Gari. This has given them the ability to buy other food stuff for their households therefore enhancing household food accessibility.

The Project has potential to contribute to poverty alleviation in the district if it can be sustained and implemented throughout the district.

The major constraints faced by cassava processors are the difficulty in peeling of fresh cassava manually. Also Lack of credit facilities for processors do not encourage some of them with small capital to adopt the interventions considering the high cost of production of these interventions come with. This same lack of fund is what impedes high scale of production by the processors. Some processors are not able to benefit from the intervention training session due to the fact that training sites are situated in the district capital which is far away from their communities.

### **5.2 Recommendation**

The following are recommendations to the Project implementer REPII in Ghana as well as cassava processors.

#### **5.2.1 Recommendations for implementer REPII**

It is evident from the findings, that the improved processed cassava- Gari fortified with Soy beans has been adopted by some participants. There is therefore the need to target some more communities to introduce the intervention to them and as also link them to industries.

REPII in collaboration with RTIMP should assist the communities involved in the cassava processing with additional processing equipment to aid them finish processing their Gari on time.

Provision of peeling machine to reduce the work load and encourage the processors to go more into the venture is very important. Also the peeling machine will reduce the lost they encounter during processing.

Linkage for cassava processors (producers of cassava Gari with Local industries, secondary schools as well as training institutions) is necessary in order to create ready market for cassava Gari processors all year round.

Project development interventions as well as policy efforts aimed at enhancing food processing in Northern Ghana should be tailored to meet the needs and constraints of women. These constraints will include the ability of women to call on investment funds required to purchase new technology and the compatibility of the technology to women's physiological conditions. This is particularly important if agro-processing activities aimed at adding value to the agro processing.

REPII should link the processors to rural banks where they can be assisted with some form of income to expand the scale of production .Since Processors do not meet the market demand of their produce due to low production levels.

### **5.2.2 Recommendations for Improved cassava processors.**

Cassava processors have a duty to take good care of the cassava processing equipment they have been supported with by RTIMP. They should also make use of the credit facility available at the rural banks to expand their businesses.

Cassava processors should always be ready and willing to adopt newly introduced technology since they are all intended to increase their production and ensure high quality of their produce therefore enhancing income which eventually would lead to poverty alleviation and food security.

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## APPENDICES

### APPENDIX 1: RESEARCH QUESTIONNAIRE FOR CASSAVA PROCESSORS (GARI FORTIFIED WITH SOYA BEANS)

**RESEARCH TOPIC:** THE CONTRIBUTION OF IMPROVED PROCESSED CASSAVA-GARI FORTIFIED WITH SOYA BEANS AND ITS IMPLICATIONS FOR HOUSEHOLD FOOD ACCESSIBILITY: A CASE OF DAMONGO WEST GONJA DISTRICT GHANA

#### INTRODUCTION:

The researcher is a Graduate student at the Van Hall Larenstein University of Applied Sciences, Netherlands. This study is conducted as part of the requirement for the award of Master of Management in Rural Development and Food Security. The information will be treated as highly confidential. I assure you that, the result from the study will also be used strictly for academic purposes and for future developmental interventions that will benefit West Gonja district.

Name of community.....Questionnaire number.....Date.....

#### 1.0 BACKGROUND INFORMATION OF PROCESSERS

1. Age of respondent .....sex ..... Household size.....
2. Educational background..... Marital Status.....
3. Processing experience.....
4. Type of processing activities.....
5. Type of ownership of processing equipment.....
6. Type of processing method used.....

#### 2.0 CASSAVA PROCESSORS

1. How long have you been involved in cassava processing? .....
2. What method of processing do you use? .....
3. Where do you get the raw materials for processing?  
.....
4. Where do you buy your cassava from?  
.....
5. At what price do you buy the cassava?  
.....
6. What quantity do you buy?  
.....
7. What are the other items required in the processing?  
.....
8. Where do you get the other items from?  
.....
9. Do you get the Cassava all year round? Yes/No

10. At which period do you get better price of the cassava and the other materials used in processing?  
.....  
.....
11. Do you buy at that period? Yes / No  
  
If no, what are some of the reasons that prevent you from buying your cassava and other raw materials at that period?  
.....
12. During which period are you in business?  
.....
13. How much cassava do you process within a day, week, month/ year?  
.....
14. What quantity of Gari is processed within a day, week or month? (Kg, bowls or bags)  
Day.....Week.....Month.....
15. How long does it take you to process the Gari? (hrs/days)  
.....
16. How many people are involved in the processing of the Gari?  
.....
17. Where do you get your labour from?  
.....
18. If hired labour, how much do you pay a person per day or month?  
.....
19. How is Gari processing done?  
.....
20. What method do you use in processing the Cassava? (*Traditional/ improved method*)  
.....
- Why that method?  
.....
21. Are there alternative ways you can use? Yes/No  
If yes what other alternative.....  
.....
22. How do you get your equipment for processing? a)Hired equipment b) Own equipment  
  
Estimated cost of (hiring/owning) the equipment;  
.....
23. Have you received any training from any organisation on improved Gari processing? Yes/No If yes, which organisations

.....  
.....  
24. Have you been assisted by any organisation with some equipment? Yes/No If yes, which organisation and what are the equipment

.....  
25. Are there any conditions attached to the equipment support?  
.....  
.....

26. Are you practicing the improved Gari processing? Yes/No  
If yes what benefits do you get from it?.....

If No  
why?.....

27. Have there been any improvements in the way you process your Gari over the years? Yes/No If yes, what are the improvements?  
.....

If No  
why?.....

28. What determines the quality of your Gari?  
.....  
.....

29. What is the source of your information on the quality standards required for Gari?  
(Mention the source)  
.....

30. What quantity of Gari was sold in a week or month before receiving the improved Gari processing training?  
.....

31. What quantity of Gari do you sell in a week or month after receiving the improved Gari processing training?  
.....

32. What quantity of Gari is consumed by the household?  
.....

33. How much income were you generating from the sale of the Gari in a day, week or month before the improved Gari processing training?  
Day.....Week.....Month.....

34. How much income do you generate from the sale of the improved Gari in a day, week or month?  
Day.....Week.....Month.....

35. Which period of the year do you get good sales for your Gari?  
.....

36. Do you get regular market for your improved Gari? Yes/No  
How do you sell the Gari?  
a) Local market b) on contract basis c) middle man d) outside the district



37. Which other products do you make from cassava?

.....  
.....

38. Comparing the Gari with these products which of them generates more income and why?

.....  
.....

39. Mention what your household spends its income on and prioritize them?

.....  
.....

40. What are the challenges you face in the Cassava processing method?

Improved Gari method:

.....  
.....

Traditional:

.....  
.....

41. What possible solutions can you suggest?

.....  
.....

42. What can you do to improve your business?

.....  
.....

### **3.0 MARKETING OF GARI**

1. How do you package Gari for sale?

.....  
.....

2. Is the market for the Gari accessible? Yes/No

3. How has the marketing of your Gari improved after receiving the intervention?

.....  
.....

4. What is the distance of the market to the processing site?

.....

5. Does the market distance affect the sale of your Gari? Yes/ No  
If yes how?

.....

6. Are there any quality standards for the Gari at the local and regional market?  
Yes/No If yes, what are the standards?

.....

7. Do your Gari meet such standards? Yes/ No  
If No, why?

.....

8. If yes what determines the quality of Gari?

.....

9. Which organisation certifies the quality standard of your Gari?  
.....  
.....
10. What price do you get for the quality of your Gari?  
.....
11. What are some of the reasons why the Gari processors do not meet the quality standards?  
.....
12. At which level do you sell the Gari? In the same community, other neighboring community markets, or outside home district?  
.....
13. What are the prices at each level of your marketing channel for the Gari?  
At the community market:.....  
Neighboring communities:.....  
Outside home district:.....
14. Are there price variations for the improved Gari and the traditional Gari? Yes /No  
If No why?  
.....
15. How do your customers get to know about your Gari? Any advertisement or marketing methods?  
.....  
.....
16. What has been the price trend over the past years processing? Reasons  
.....

#### **4.0 HOUSEHOLD FOOD ACCESSIBILITY**

1. Do your households have access to food all year round? Yes / No
2. If yes, what are the sources of food to the household?  
.....
3. If no, what are the alternative sources of food to the household?  
.....
4. Which period of the year do you experience hunger in the household?  
.....
5. How long does the household food last?  
.....
6. What are some of the coping strategies used by the household during the hunger periods?  
.....
7. Would you consider the improved processing as an important venture to your household food access? Yes / No  
Why?  
.....

#### **5.0 HOUSEHOLD INCOME GENERATION**

1. What are the sources of income in the household?

- .....
- .....
2. Which household members are involved in the income generating activities?  
.....
3. How is the income managed?  
.....
4. Who has control over the general household income?  
.....  
Why?  
.....
5. What percentage of the household income does income from Gari contribute to?  
.....
6. Who controls the income generated from Gari?  
.....  
Why?  
.....
7. Do you have access to credit? Yes or No
8. What is the source of income?.....
9. How has the credit improved your business?.....
10. Do you have a savings?.....
11. How often do you save your sales?  
Daily.....weekly.....monthly.....

## **6.0 ADOPTION OF THE IMPROVED CASSAVA PROCESSING METHOD**

1. Do you have access to the interventions of REP-II? Yes / No
2. Do you participate in the REP-II interventions? Yes / No  
If No why?  
.....
3. Why are you not part of the REP-II clients?  
.....
4. Which interventions did you participate in?  
.....  
Why?  
.....
5. Are you aware of the improved cassava processing method Yes / No
6. Have you received the improved cassava training? Yes / No  
If yes when.....
7. Have you adopted the improved cassava processing method? Yes / No  
If No why? .....
8. Which economic factors influenced your adoption?  
.....

## **7.0 MAJOR FACTORS THAT MILITATE AGAINST THE IMPROVED CASSAVA PROCESSING**

1. What are the constraints faced in improved cassava processing method?

- .....
- .....
2. What challenges do you face in marketing the processed Gari?  
.....
- .....
3. What are the problems faced in the adoption of improved cassava processing method?  
.....
- .....
4. How dose these constraints affect household income and food accessibility?  
.....
5. What possible suggestion can be used to address these constraints?  
.....

**APPENDIX 2: CHECK LIST FOR RURAL ENTERPRISES PROJECT (REPII)  
BUSINESS ADVISORY CENTRE OFFICE**

**RESEARCH TOPIC:** *THE CONTRIBUTION OF IMPROVED CASSAVA PROCESSING (“GARI FORTIFIED WITH SOYABEANS”) AND ITS IMPLICATIONS FOR HOUSEHOLD FOOD ACCESSIBILITY: CASE OF DAMONGO-WEST GONJA DISTRICT GHANA*

**INTRODUCTION:**

The researcher is a Graduate student at the Van Hall Larenstein University of Applied Sciences, Netherlands. This study is conducted as part of the requirement for the award of Master of Management in Rural Development and Food Security. The information will be treated as highly confidential. I assure you that, the result from the study will also be used strictly for academic purposes and for future developmental interventions that will benefit West Gonja district.

Name of officer..... Position.....Date.....

1. When was the BAC enrolled by REP?  
.....  
....  
.....
2. What activities are carried-out by the BAC?  
.....  
.....  
.....  
.....
3. How does the BAC select the clients for the intervention?  
.....  
.....  
.....
4. What is the total number of clients of the BAC?  
.....
5. What are the training programs conducted by the BAC?  
.....  
.....
6. When did you give the improved Cassava training? .....
7. What was the objective for conducting the improved cassava processing training?
8. How many clients participated in the training?  
.....
9. Do clients adopt the trainings given? YES/NO  
.....  
  
If No why?  
.....
10. How many clients' businesses are improved after the intervention?  
.....
11. What was their business level before the intervention?  
.....  
.....
12. How do you categorize the business levels of the clients?  
.....  
.....  
.....

- .....
13. What role does the BAC play in the marketing of the clients' products?  
.....
14. How many cassava processing clients have supported in the marketing of their products?  
.....
15. Which training programs leads to food accessibility?  
.....  
.....  
.....
16. How is the monitoring of the clients done?  
.....  
.....

17. Who are the main stakeholders of the BAC/REP?

Stakeholder	Key role/functions	Date of collaboration

18. What is the contribution of REP to BAC?  
.....  
.....  
.....
19. What are the types of funds requested by the BAC?  
.....
20. How are the various funds requested by the BAC?  
.....  
.....  
.....
21. What is/are the source(s) of funding for the BAC?  
.....  
.....  
.....
22. What are the challenges the BAC face in the implementation of its activities?  
.....
23. What possible solutions do you think should be put in place to help eliminate or reduce the challenges faced during implementation?  
.....

### **APPENDIX 3: CHECK LIST FOR FOCUS GROUP DISCUSSION**

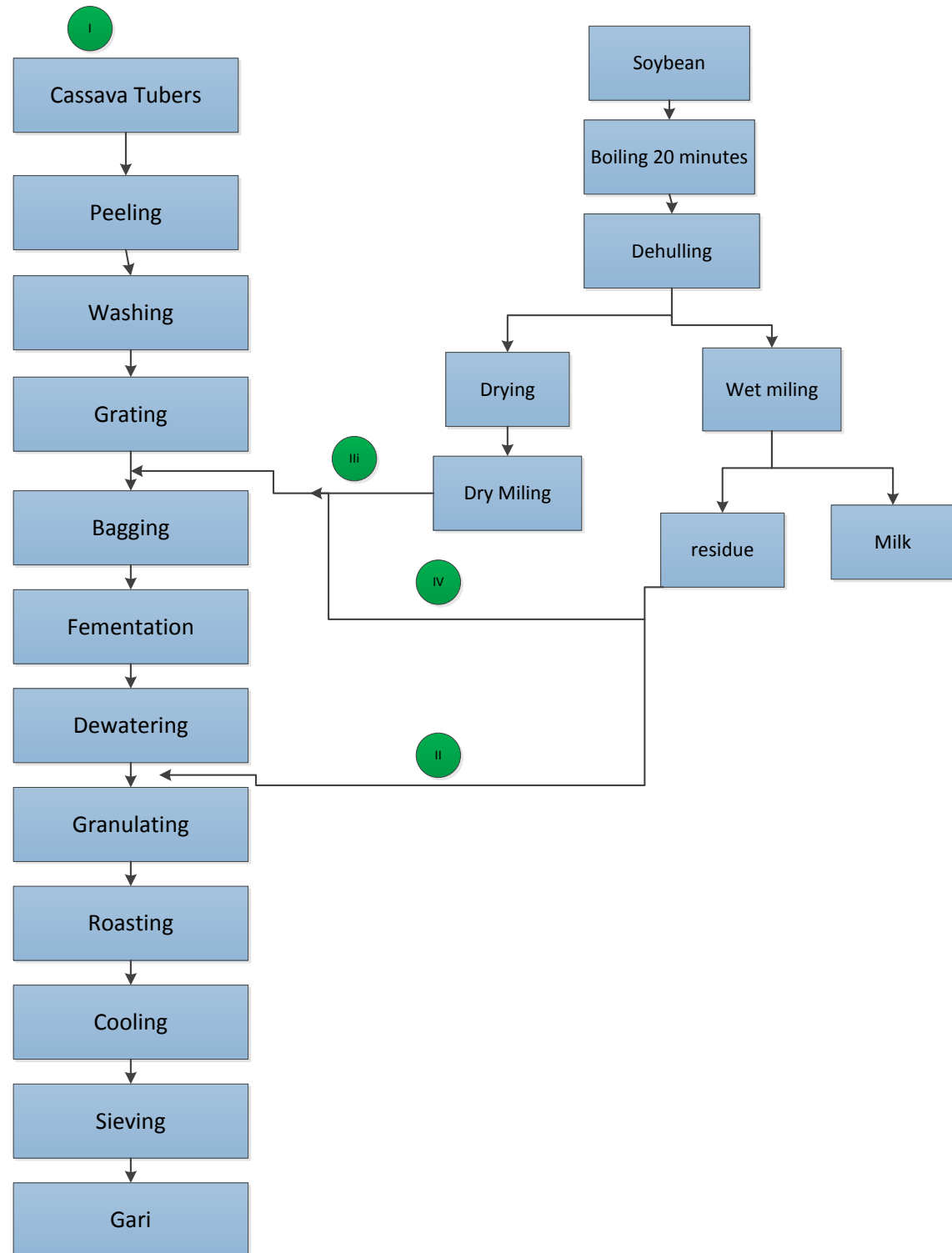
1. Processing of cassava fortified with soy bean
2. Quantity of Gari processed per day
3. Availability of raw materials
4. Market access
5. Sale of Gari
6. Access of market to the processing site
7. Household income
8. Income from the sale of Gari
9. Credits from rural banks
10. Savings
11. Remittances
12. Other income generating activities
13. Household food access
14. Household resources
15. Household food consumption

#### APPENDIX 4: STAKEHOLDER ANALYSIS

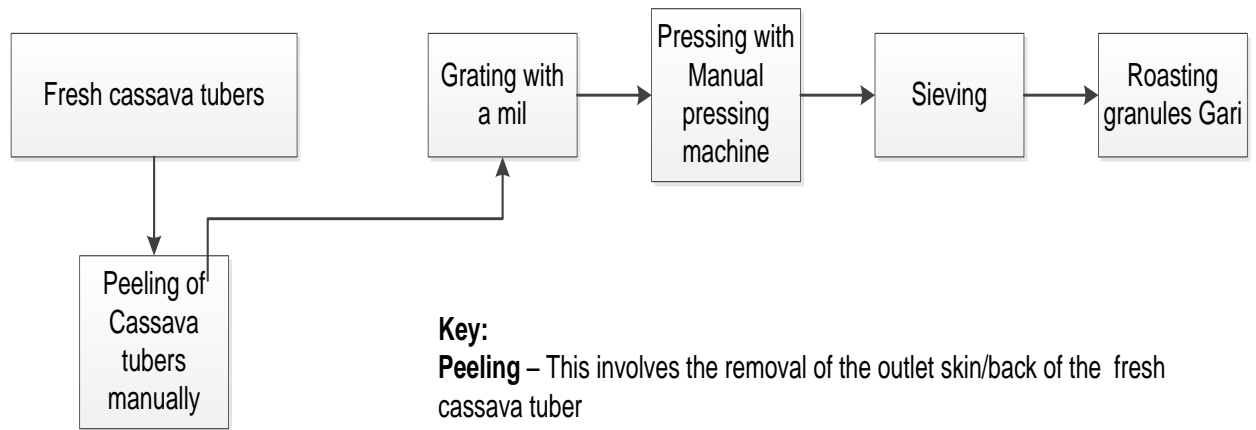
Stakeholder	Key role/functions	Date of collaboration
Root and Tubers Marketing and Improvement Program (RTIMP)	Business development services, value chain processes, facilitation of matching grant funds and equipment support for Project clients	2009
World Vision Ghana	Skills training, capacity building, business development services	2010
Community Based Rural Development Project (CBRDP)	Provision of Service centres, credit facilities	2007



## APPENDIX 5: IMPROVED PROCESSED GARI METHOD OF PROCESSING



## APPENDIX 5: TRADITIONAL GARI PROCESSING



### Key:

**Peeling** – This involves the removal of the outlet skin/back of the fresh cassava tuber

**Grating**- This involves grating of the peeled cassava tubers into smooth pulp using a grater

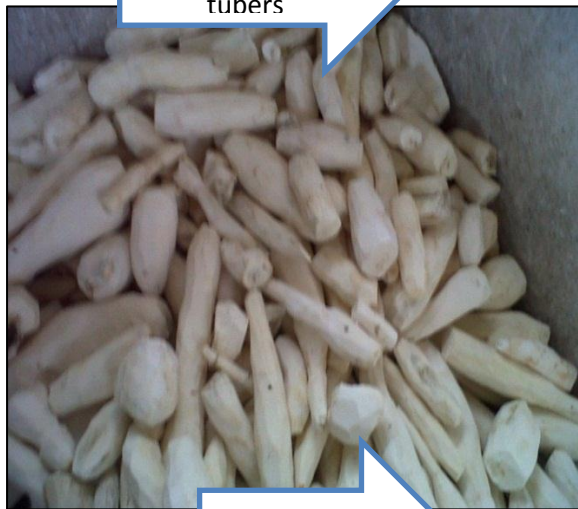
**Pressing**- This involves putting the grated pulp in porous sacks which are weighed down with heavy stones for 3-4 days in order to express the excess liquid from the pulp while it is fermenting. Some times hydraulic jacks are used to express the water

**Sieving**- This involves sieving of the dewatered and fermented lumps into fine pulp.

**Roasting**- This involves frying/roasting the fine pulp in a pan into what is called Gari as known in west Africa

## APPENDIX 6: GARI PROCESSING METHOD

Peeled cassava tubers



Grating peeled cassava



Pressing of grated cassava



Sieving the caked pulp



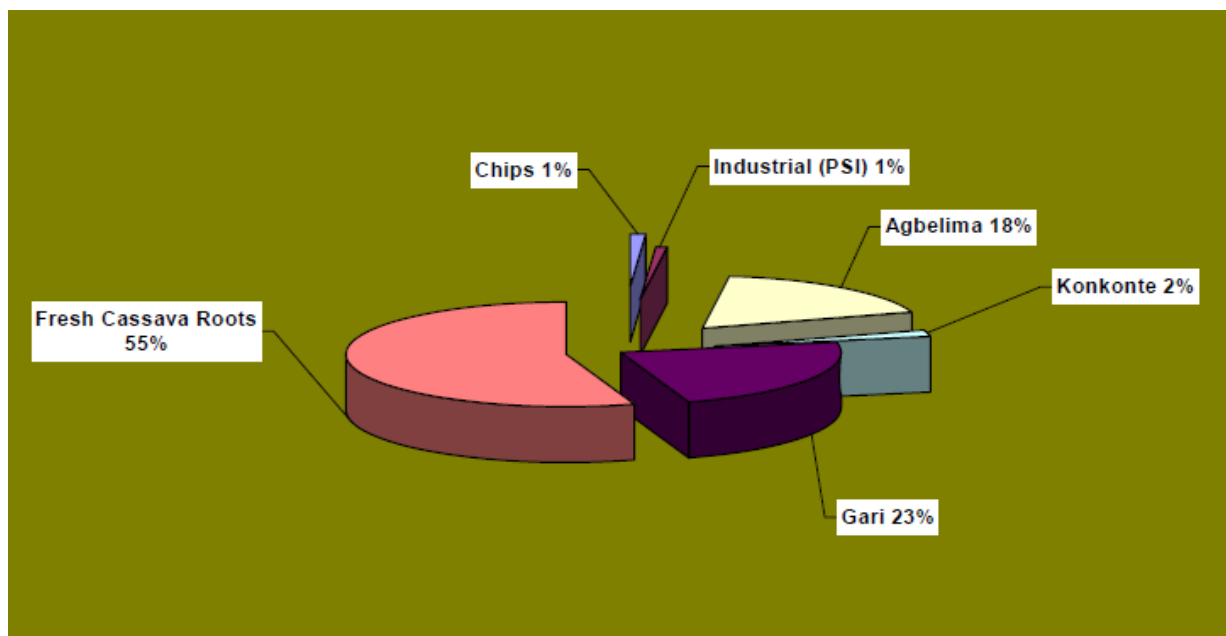
Roasting the fine pulp



Gari ready to be sold



## APPENDIX 7: USES OF CASSAVA IN GHANA



Source: IFAD, 2006