CASSAVA PROCESSING TECHNOLOGY USAGE AND LIVELIHOOD OF WOMEN PROCESSORS IN NORTH CENTRAL NIGERIA

BY

ADENIYI, VICTORIA ABOSEDE

(19PGAB000046)

B.Agric, M.Sc (Ilorin)

A Thesis submitted to the Department of Agricultural Economics and Extension, in partial fulfillment of the requirements of the Degree of Doctor of Philosophy, Landmark University, Omu-aran, Nigeria.

AUGUST, 2022

DECLARATION

I, ADENIYI, Victoria Abosede, a Ph.D. student in the Department of Agricultural Economics and Extension, Landmark University, Omu-Aran, hereby declare that this thesis entitled "Cassava Processing Technology Usage and Livelihood of Processors in North-Central, Nigeria" submitted by me is based on my original work. Any material(s) obtained from other sources or work done by any other persons or institutions have been duly acknowledged.

Adeniyi, Victoria Abosede

19PGAB000046

Signature & Date

CERTIFICATION

This is to certify that this thesis has been read and approved as meeting the requirements of the Department of Agricultural Economics and Extension, Landmark University, Omu-Aran, Nigeria, for the award of Ph.D. in Agricultural Extension and Rural Development.

__________________________ __________________________

Prof. J.A. Akangbe Date

(Supervisor)

__________________________ __________________________

Dr. E.A. Kolawole Date

(Co-Supervisor)

__________________________ __________________________

Dr. O.O. Alabi Date

(Head of Department)

__________________________ __________________________

(External Examiner) Date

DEDICATION

This Thesis is dedicated to My Big Daddy, The Almighty God, *Arugbo ojo, Adagba matepa, Adagba maparooye, Alagbada ina, Alawotele oorun, Eru gbomonija somodaje*, my friend and Father of all time, the one who was, who is and who is to come. Thank you, Lord Jesus.

ACKNOWLEDGEMENT

I sincerely appreciate my Big Daddy, The Almighty God, for bringing me this far, I have heard of you with the hearing of the hear Lord, but now, I have seen you, thank you Daddy, for your unfailing Love, Thank you for your mighty hand over me. I am forever grateful.

I appreciate my supervisor, Prof. J.A. Akangbe, thank you for being more than a supervisor, thank you for being a friend and a father, who has remained a great motivator since I have been in contact with him. Thank you for your understanding and for taking me just the way I am, as your days are, so will your strength be in Jesus name.

I also deeply appreciate my co-supervisor, Dr. E.A. Kolawole for his immerse contribution and support. Thank you for your timely response, for always being there and for allowing God to use you for me at this time, I celebrate the grace of God over your life. The oil on your head will not dry and all your heart desires will be granted in Jesus name.

I appreciate specially all my Lecturers in the Department and in the College at large. Prof. O.M. Bamiro, thank you for being a father, Thank you for the Love and for the support and encouragement. Dr. A.G. Adeyonu, our very own Mummy in the Department, thank you for your love and support Ma. Dr. A.O. Owolabi, Dr. B.O. Ajiboye, Dr. K.S. Obaniyi, Dr. D. Akerele, Dr. Ogunjimi, Dr. Ajala, Dr. Odefadehan, Dr. I. E. Olayiwola, Dr. A.O.C. Ologbon, Dr.O.O. Alabi, Mr. E.T. Awe, Mrs. O.A. Oriade, Mr. S.O. Solaja and Mr. Ayojimi, I thank you all for your contributions to my work and for your love and support, You will not lack help in Jesus name.

I appreciate specially Dr.M. Ayeni, for his help at the time it seems I was at a cross road, you came at the right time. Doors open unto you on their own accord in Jesus name and you are highly favoured on all sides. I sincerely appreciate the emeritus scholar, Dr.Abiodun Joseph of the Crop and Soil department and our very own Postgraduate coordinator for proofreading this project and for your technical support, you are the supervisor that I never had, thank you for your help and support, before your ask, heaven will answer in Jesus name.

I appreciate my family and friends for their help and support. Mr & Mrs. Oye, Adeniyi and my lovely Ben and Beloved, thank you for your Love my people, I appreciate you. Dr. & Dr (Mrs). Olorunfemi, thank you for you Love and encouragement. Prof. J.G. Adewale, thank you for your help at the beginning of this Programme and thank you for always checking up on me. Prof. Adeniyi Olayanju, thank you for giving to the Lord in the course of this work. Bisola darling, thank you for your prayers and support. Temilade, thank you for your prayers and support. Mr & Mrs. Okoro, thank you for being more than friends.

I appreciate my mother, you are the best Mother in the world. Thank you for your prayers, thank you for all your help, she can smell when I am not Ok even when she is miles away. You will live long "momma" and you will enjoy the fruit of your Labour. I appreciate my siblings, from the baby of the house, Moses dear, I hope you know how much I Love and appreciate you, thank you for being of great help at this time, Feranmi, Ademola, Yinka and Aliyah, thank you for you love, prayers and support.

My utmost thanks goes to my darling husband, Engr. Adeniyi Olaotan Martins, thank you for all your help and support sunshine, thank you for filling in for me, thank you for all the typing and all the sleepless nights, thank you for all your prayers and support. I hope I can make it up to you, the hands of the Lord will continually be upon you in Jesus name, I LOVE YOU COMPLETELY.

My princes, Olufela and Oludayo, thank you for your understanding, Thank you for all the sacrifices, thank you for loving me the same. I love you guys to the moon and back.

Finally, if I have ten-thousand tongues and if I am allowed two-hundred pages, it will not be enough to thank everyone that contributed in one way or the other to the success of this programme. I enjoyed the gift of men throughout this programme and for this I am grateful. I am grateful to God, I am grateful to you all.

ABSTRACT

Inadequate technologies decreased rural processors' outcomes and limit their production capacity. Adoption of improved technologies could enhance extraction process, reduce the time and labour required at production, resulting in increase in total productivity, improved income, quality of life and food security of processors. The current study described the socio-economic characteristics of cassava processors, identified the cassava processing technologies used, identified the occupational hazards associated with the technologies, examined the impact of cassava processing technologies on the livelihood of women processors, their contribution to household welfare and constraints associated with the processing technologies.

A three-stage sampling technique was used to select respondents in Kogi and Kwara States. The first stage involved purposive selection of two Agricultural Development Projects (ADPs) zones out of four in the two states while the second stage involved proportionate selection of 35% of members of improved technology users (ITU), giving 205 respondents. Followed by random selection of 205 conventional technology users (CTU) in the same zone, giving a total of 410 respondents. Data were analyzed with descriptive statistics, livelihood indicators and inferential statistics.

Majority of ITU (89.2%) and CTU (97.1%) had one level of education or the other. A little above average (ITU53.7%:CTU50.2%) had medium household sizes and average annual income of ITU :N528,654 and CTU:N294,610. The traditional processing technologies include the use of peeler, grater, press, local fryer and basket sieve while the improved include mechanized peeler, grater, grinder, sieve, hydraulic press, tray fryers and dryer. Majority of CTU are exposed to more occupational hazards compared to ITU. Majority of the respondents contributed 50% and more to children's school needs (ITU85.9%:CTU79.5%), family food consumption

(1TU85.8%:CTU80.5%), hospital bills (ITU85.9%:CTU80.5%), personal needs (ITU82.9%:CTU60.0%) and children clothing (ITU80.5%:CTU85.4%). The cumulative percentage scores of ITU to CTU were food availability and consumption (75.25:52.50), housing condition (77.93: 53.75), water facility (64.17:60.26), health situation (70.93: 69.45), sanitation (68.54:54.20), participation in social activities (73.61:61.35), freedom in cash expenditure (64.09:62.69). Improved technology users had a very high livelihood status (70.65) while CTU had a medium livelihood status (59.17) which indicated that improved technology users exhibited better livelihood compared to conventional technology users. The major constraints faced by cassava processors include lack/scarcity of spare parts (ITU1.91:CTU1.60), high cost of processing equipment (ITU1.87:CTU1.67), high maintenance and operational cost (ITU1.88:CTU1.65), and lack of credit and funds (ITU1.77:CTU1.84). Results of multivariate regression analyses shows that there was a significant relationship between some socio-economic characteristics and the livelihood of processors. T-test result reveal a significant difference (p=.000) between the livelihood status of improved and conventional technology users. Results of regression analyses shows a significant relationship between technology use and livelihood of cassava processors. This suggests that the use of improved technologies in cassava processing is a strong predictor which influences the livelihood of processors.

The use of improved technologies enhanced women contribution to household welfare, improved housing condition, food availability and consumption. The study recommends that cassava processing interventions be continued in these states and even extended to non-beneficiary areas. Government should invest heavily in subsidized cassava processing machinery. ADPs should organize sensitization programme on occupational hazards.

Keywords: Livelihood, Cassava processing, women processors, improved technologies, conventional technologies

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

FAO -	Food and Agriculture Organisation of the United Nations
RTEP -	Root and Tuber Expansion Programme
ADP -	Agricultural Development Programme
UTAUT-	Unified Theory of Acceptance and Use of Technology
PE -	Performance Expectancy
EE -	Effort Expectancy
SI -	Social Influence
FC -	Facilitating Conditions
CBAM-	Concerns-Based Adoption Model
SoCQ -	Stages of Concern Questionnaire
CLSSS-	Development of a cumulative livelihood status score
IWFPS-	Individual women Farmer's percentage score
IWFFS-	Individual women Farmer's Field score
IWFPMS	Individual women farmer's possible maximum score
CPS -	Cummulative percentage score
SDGs -	Sustainable Development Goals

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

Forty-five percent of the world's population, or about 3.1 billion people, reside in rural areas (FAO, 2011). Around 2.5 billion of them rely primarily on agriculture for their survival. 500 million peasant women, who do not own any land and only receive 5% of the agricultural resources, make up a percentage of this total. About half of the agricultural workforce is made up of women, who are change makers and promoters of resilience (FAO, 2011). However, there is still a wide gender disparity in food and agriculture. In every region of the world, women are more likely than men to be food insecure as consumers, and as producers, rural women face even larger barriers to accessing necessary productive resources and services, technology, market intelligence, and financial assets than their male counterparts (FAO, 2017).

Twenty-five percent of the world's population and, on average, 43% of the workforce in developing nations are made up of women who reside in rural areas. This proportion varies from 20% in South America to 50% in South-East Asia and sub-Saharan Africa. It is in these rural areas specifically that women and girls experience the greatest disparities and challenges (FAO, 2017).

Rural women are the key that holds families and rural communities together. In agriculture, food security and nutrition, land and natural resource management, and rural enterprises, rural women play a critical role. According to Xiong, Ukanwa and Anderson, (2020); rural Nigerian women are expected to provide for their families' livelihoods in addition to bearing and caring for their children. Many rural families depend on the food, clothing, and education that women give. According to Nagler and Naudé (2014), women often contribute more to family welfare than males do and play a significant role in covering home expenses. In certain circumstances, women made a greater financial contribution to their families' needs and spent less on themselves than did males.

In other instances, the mother's income rather than the father's was more closely tied to the children's dietary needs, medical expenses, and general household food expenditures while males looked for profits (Mbah & Igbokwe 2015). This is because, according to Oladeji, Olujide, and Oyesola (2006), women typically prioritize the welfare of their families and only spend money on personal items if the requirements of the family have been addressed. In rural areas, the majority of women are in charge of the family's health, nutrition, and education (Oladeji et al., 2006).

The role of women is vital in the highly labour-intensive processing activities through which they provide for and improve household food security as well as creating employment in the rural community. In particular, Compared to men, women are more likely to allocate the money and abilities at their disposal to enhance the welfare of their families in terms of nutrition and health (Elmasoud, 2001; Kabir, Xuexi , Rahima , Wang & Lijia , 2012).

Through increased access to and control over their resources, women participation in development activities is anticipated to have an impact on their lives in the personal, social, and economic spheres. Attempts to promote sustainable agriculture, rural development, and food security must not disregard or alienate women, who make up more than half of the rural population (Kabir et al, 2012).

In Nigeria, Cassava (Manihot esculenta Crantz) is a significant staple crop that employs over four million farmers and feeds over 100 million people (FAOSTAT 2016), because Nigeria is the world's largest producer of cassava and cassava processing is one of the vital agricultural businesses that provides household income and may serve as a catalyst for reducing poverty in

Nigeria (Ijigbade, Fatuase, & Omisope, 2014). Comparing cash crops to other staples, cassava provides the most households with cash income (Ijigbade et al., 2014).

Nigerian cassava production, processing, and commercialization are dominated by women (Enete, Nweke & Tollens, 2002). In Nigeria, women perform the majority of the labour involved in growing and processing cassava (Forsythe, Posthumus, & Martin, 2016). Cassava is therefore considered to be a "women's crop" in some ways (Ijigbade et al., 2014). Cassava is crucial to ensuring food security in the home, which is frequently the responsibility of women. Cassava is a low-risk and low-input crop that is especially important for women because they face more severe barriers to accessing agricultural inputs than males do (Kiriti & Tisdell, 2003).

Due to the crop's poor storageability and the necessity to decrease, if not completely eliminate, the poisonous chemical that renders it unfit for ingestion (cyanide), processing has been a crucial component of cassava utilization (Ehinmowo & Fatuase, 2016). People have developed methods for processing cassava into storable goods including tapioca, starch, fufu (wet), Lafun (Dry: cassava flour), High quality cassava flour (HQCF) and “garri” in areas where it is a major staple food. In North central Nigeria, cassava is processed majorly into *garri* (cassava flakes). Utilizing technology to transform cassava tubers into various products necessitates the use of various tools and techniques (Fatuase, Mogbojuri & Anyaeche, 2019). The combined small-scale processing represents Nigeria's by far the largest cassava food product production (Onyenwoke & Simonyan 2014).

The value adding technologies in cassava possessing has enormous potentials to increase cassava consumption, diversifying its uses, and utilizing it to improve farm families' livelihoods by creating employment opportunities; micro-agro-enterprises, income generation and strengthening rural households' economies; (Okebiorun & Jatto, 2017).

Although Nigeria has remained the global leader in cassava production, the benefits are far from being optimized by cassava processors and the country in general. Outputs of processed products are very low, and product qualities are highly compromised. This is because cassava processing is mostly done by traditional methods, and the critical mass of processing machines and equipment required are in great lack (Achem, 2017).

In cassava processing, agricultural machineries, machines, equipment and tools are applied in carrying out unit operations in the day-to-day activities of processing cassava in order to increase output and quality of cassava products (Folaranmi, 2011). Cassava processors utilize tools, equipment and machines in processing operations related to washing, cleaning, sorting, peeling, grating, pressing, pulverizing, frying, cutting, slicing, dicing and chipping. It also involves drying, sieving (sifting), grading and packaging. According to Adetan, Adekoya and Aluko (2003) and Quaye, Gayin, Yawson and Plahar (2009), the majority of these procedures are still carried out manually and are typically labour-intensive, difficult, and time-consuming due to, among other drawbacks, their limited output capacity.

Without a doubt, mechanization of cassava processing activities will be crucial in eradicating the drawbacks of conventional processing methods and advancing timely, extensive, hygienic processing of the tubers. The demand for improved cassava processing technology has increased due to the continuous rise in output to absorb the increases, produce diversification and high-quality cassava products suitable for industrial use and export. Mechanized processing will increase post-harvest management of cassava crop output and guarantee effective preservation and utilization of cassava for food security (Achem, 2017).

Several initiatives have been launched by the government of Nigeria, international donors and other non-governmental organizations to develop the cassava sector, and these efforts have produced excellent results (FAO, 2008), with the Cassava Multiplication Programme (CMP), which was implemented in 1987, the International Fund for Agricultural Development provided financial assistance when the Federal Government sought it, Nigeria saw its first significant involvement in cassava production (IFAD, 1999). The programme's overarching goal was to spread and advocate for 350,000 farmers were given access to improved cassava varieties in an effort to increase their output and revenue. With an annual output of about 30 metric tons, the initiative was discontinued in 1997, it was effective in making Nigeria the world's top producer of cassava (IFAD, 1999).

In July 2002, the Presidential initiative for Cassava Production, Processing, and Export was launched. The initiative's main goal is to help Nigeria produce enough cassava for domestic food and industrial needs while also the export of dried cassava products such chips, pellets, flour, and adhesives generates USD 5.0 billion annually (Federal Ministry of Agriculture and Water Resources, 2007).

In Nigeria, between the years 2001 to 2009, in 25 States, the Root and Tuber Expansion Programme (RTEP) was put into effect. Increased production of by-products and root and tuber crops by small-scale farmers, especially cassava is the primary goal of RTEP. This will boost the nation's food security, rural households' access to income, and the nation's food self-sufficiency. Value addition (processing) through a range of processing options and marketing is the program's primary focus.

Processing and locating new markets for greater production are essential to Nigeria's upcoming cassava transformation. However, small-scale processors continue to process cassava using straightforward/traditional methods for both traditional meals and industrial products. A commercialization strategy for cassava production and processing is required in order to make wise investments in the industrial growth of the cassava sector. Cassava may be transformed into a variety of products that could help Nigeria develop its industrial sector, produce income, and create job opportunities (Abali, Ifenkwe & Emerhiri, 2014).

1.2 Statement of the problem

It is important to recognize the important role that women play in the processing of cassava. In Nigeria, 67 percent of all agricultural labour is performed by women (FAO, 2004; Onyemauwa, 2012). Inadequate technologies decreased the outcome of rural processors limiting the production capacity of cassava products. Adoption of improved technologies may have substantial economic effect, including: enhancement of the most wearisome aspects of extraction, reduction of the time and labour input required at production, increase in total productivity and in turn improve income, the quality of life and food security of women cassava processors household.

Research has shown that availability of appropriate cassava processing machines and equipment has the tendency to make tremendous impact in increasing the output of processed cassava products as cassava processing in Kogi and Kwara State are characterized by traditional methods of processing which is inefficient, time consuming, labourious and compromised product quality (Okorji, Eze & Eze, 2003).

It is unlikely that cassava processors and business owners will profit from new market prospects until Africa's inadequate manufacturing capacity for cassava processing equipment is increased (FAO, 2012). A huge gap still exist as majority of processors do not have good access to high-capacity equipment such as mechanical graters, motorized sieves, rotary and flash dryers, convenient and low-cost drying facilities, high quality durable presses and mechanical peelers. There is therefore a need for improved technologies in the processing of cassava in order to improve the livelihood and living condition of processors and reduce rural poverty as cassava processing has been one of the major income generating activities of women in Kogi and Kwara States for several years.

The study focuses on the fact that women often make less money than males, but they tend to spend more of it on household food purchases and cater for other pressing household needs. Cassava processors are restrained in how much they can actually contribute to the family. The need to get more out of their cassava processing endeavors necessitate adoption of improved practices and cassava processing technologies which will in turn results in a better livelihood and living condition.

There are many studies on cassava processing technologies used by processors (Abdoulaye et al., 2014; Abdoulaye and Sanders, 2002; Alene et al., 2000; Akinola et al., 2010; Awoyemi, 2020; Bamire et al., 2002; Oluoch-Kosura et al., 2001; Shiferaw and Holden, 1998 & Zeller et al., 1998) Literatures have shown that cassava processing enterprise is profitable and has capacity of improving the livelihood of cassava processors (Awoyemi, 2020). However, there exists a gap in literature on empirical data on the difference in influence of the usage of improved and conventional technology on the livelihood of cassava processors.

There is therefore a need to bridge the existing gap in literature in order to provide empirical data capable of influencing policy change aimed at improving cassava processing technology accessibility, and livelihood of the processors.

1.3 Research Questions

In view of these, this study seeks to answer the following questions:

1. What are the socio-economic characteristics of cassava processors in the study area?
2. What are the cassava processing technologies and tools used in the study area?

3. What are the occupational hazards associated with the technologies being used in the study area?
4. What are the impact of cassava processing technologies on the livelihood of women processors in the study area?
5. What are the contributions of women processors to household welfare in the study area? and
6. What are the constraints associated with the use of cassava processing technologies in the study area?

1.4 Objectives of the Study

The main objective of the study is to assess cassava processing technologies and the livelihood of women cassava processors in Kogi and Kwara States, Nigeria.

The specific objectives are to:

1. describe the socio-economic characteristics of cassava processors in the study area;
2. identify cassava processing technologies being used in the study area;
3. identify the occupational hazard associated with cassava processing technologies used in the study area;
4. examine the impact of cassava processing technologies on the livelihood of women processors in the study area;
5. examine the contributions of women processors to household welfare in the study area; and
6. examine the constraints associated with the use of cassava processing technologies in the study area.

1.5 Hypotheses of the Study

H_{01}: There is no significant relationship between some selected socio-economic characteristics of women cassava processors and their livelihood outcomes in the study area.

H_{02}: There is no significant difference in the livelihood of cassava processors using improved technologies and conventional processing methods in the study area.

$H_{03:}$ There is no significant relationship between the use of improved processing technologies and livelihood outcome of processors in the study area

$H_{04:}$ There is no significant relationship between the use of conventional processing technologies and livelihood outcome of processors in the study area

1.6 Significance of the Study

The use of improved technology has improved the women cassava processing significantly to the extent that the women that has adopted and used the technology had increase in production and made a lot of income that have impacted the livelihood of the women and has caused satisfaction on the job. Income earning, from cassava processing activities involved in by rural women, contributes to maintain food supply for the home and enhance its welfare.

The findings of this study will help augment earlier studies on the livelihood of women and help the government and other stakeholders address the issues and constraints militating against women involvement in agripreneurship and other livelihood activities for household wellbeing. The study will further assist the Agricultural Development Programmes (ADP's) and other government parastatal to develop more interest in empowering women, especially in the rural setting through adequate funding, thereby enhancing household livelihood, reducing rural poverty and gender inequality.

This study will have policy implications for government (Federal and States) in Sharpening their area of focus in the development of the cassava sub-sector and in planning programmes that are women sensitive. Although billions of dollars have been spent on development projects, there is growing concern that relatively little is known about the overall effectiveness of most of these initiatives. An extensive impact analysis of the project is necessary to provide solid knowledge with policy implications. This can give a knowledge base on what works and what does not work as well as contribute to the building of a critical body of evidence on the impact of development interventions. Making informed decisions regarding where, when, and how to invest will be made easier with the help of this information. Organizations that provide funding, such as the World Bank and the International Fund for Agricultural Development (IFAD), African Development Bank (AfDB), United State Agency for International Development (USAID) e.t.c will therefore be interested in the outcome of this study for their interventions. Also, Non-governmental Organizations (NGOs), private and corporate investors and other initiatives interested in cassava development.

Also, through the findings and recommendations of this study, intervention programmes on cassava processing technology usage for women cassava processors will be properly planned in the study areas as well a Nigeria as a whole so as to improve cassava processors' productivity, increase their income which will in turn better their livelihood.

This study will contribute to the body of existing knowledge, and thus become significant to students, scholars and other researchers.

1.7 Definition of Terms used in the Study

Processing: Any activity related to transforming cassava roots to other forms.

Traditional/Conventional technologies: These are processing methods used to transform cassava into garri, Lafun and other products by women with the use of simple or age-long machineries.

Improved Technologies: This refers to the processing of cassava with the use of modern technologies such as mechanized graters, sifter, hydraulic presses e.t.c

Livelihood: A person's method of providing for their fundamental needs (food, water, shelter, and clothing) is referred to as their livelihood (derived from the word life-lode, "way of living"). A collection of daily tasks carried out over one's lifetime is referred to as one's livelihood. These tasks can involve obtaining water, food, fuel, medication, shelter, and clothing. A person's livelihood depends on their ability to purchase the aforementioned essentials in order to meet their basic needs and the needs of their household.

CHAPTER TWO

2.0 REVIEW OF LITERATURE

2.1 Introduction

The value of women in boosting rural economies and reducing poverty is beyond question. As farmers, wage workers, small-business owners, and caregivers for the old and young, they play a variety of important responsibilities. Rural women have the power to end poverty in their homes and communities. They are hindered, nonetheless, by enduring gender disparities that restrict their ability to attain decent employment, which they require as a means of achieving economic empowerment, social advancement, and political involvement (FAO, 2010). In Nigeria, the informal agriculture sector accounts for the majority of women's contributions to rural development. However, the majority of governments rarely put women at the forefront of development agendas for policies and programs. Statistics differ, but the prevalent perception is that women participate very little in public rural development programs (Damisa & Yohanna 2007, Ogunlela & Mukhtar 2009). This chapter reviewed literature related to the study.

2.2 Rural Women in Perspective

In order to produce money, improve overall well-being, and ensure their family and communities have access to food and nutrition, rural women play a critical role in these areas. By promoting agriculture and rural industries, they aid regional and global economies. As a result, they actively contribute to accomplishing the Sustainable Development Goals (SDGs). However, rural women and girls around the world are constantly constrained by structural barriers that prohibit them from properly exercising their human rights and stifle their efforts to better their own lives as well as the lives of those around them (Adeyonu and Oni, 2014). They are a significant target population for the SDGs in this regard.

The cornerstone of rural development in underdeveloped countries is women, however the vast majority of rural development strategies and programs do not adequately reflect them. O-Toole and Macgarvey (2009) stated that while women's selfless contributions to the welfare of the traditional economy has not been considered to be a part of rural communities, the conventional economy does contain paid labour, the operations of enterprises, and the generation of profit.

In Nigeria, the informal agricultural sector accounts for the majority of women's contributions to rural development. However, the majority of governments rarely put women at the forefront of development agendas for policies and programmes(Damisa & Yohanna 2007, Ogunlela & Mukhtar 2009).

Rural areas in Nigeria lack essential infrastructure such as functional roads, hospitals, schools, credit systems, and markets. Rural women are still organized on a subsistence basis, with agriculture serving as their primary source of income. Any attempts made to increase the capacity of rural women are undermined by the lack of basic infrastructure. Traditional barriers, such as lack of ownership and inheritance rights, discrimination based on gender when seeking chances etc., complicate the absence of critical infrastructures (Adeyonu, 2012). Priority should be given to developing rural areas, while essential infrastructure should be put in place to connect rural women with opportunities and markets in cities. These will undoubtedly result in significant rural women's empowerment and capacity building, placing them in a position to effectively contribute to the rural areas' development.

Nseabasi (2015) also made the argument that Nigerian rural women cannot be seen as a monolithic group. Important distinctions include class, age, marital status, race, ethnicity and religion. In rural communities and homes, the men and women's labour distribution in regard to agricultural and other occupations is firmly ingrained. In terms of possibilities to participate in activities that can generate cash, this generally discriminates against women and girls.

Most domestic chores are completed by women, who are also not as likely to take part in decision-making. Rural women are left with a plethora of domestic responsibilities, including child care, animal care, food preparation, cleaning, and possibly even daily battles for residential water supplies and involvement in farm work. In Nigeria, rural women work primarily unpaid jobs. Rahman (1987) had also noticed a similar situation among rural Pakistani women. Women have limited time for extracurricular activities like self-improvement and professional objectives as a result of these traditional responsibilities. The primary obstacle facing rural women is cultural tradition, according to research. In rural areas, all women have a busy and continuous day that starts early in the morning, often even before the sun rises, and they are the last to go to bed at night according to Kaur and Sharma (1991), referenced by Nseabasi, (2015). Additionally, household tasks are often carried out by one person with little or no mechanical assistance.

The involvement of women in job-creating activities is crucial for Africa's economic success. More importantly, rural women are undoubtedly the most powerful untapped natural resource in the world, yet usually going unnoticed, unheard, and unappreciated. Recognizing and promoting this is crucial for the advancement, expansion, and fulfillment of women's economic potential (Yusuf, Balogun & Falegbe, 2015).

The majority of low-income women play significant and useful roles in their families as well as in society. Additionally, they are engaged in the production of agricultural raw materials for our industries. In actuality, women handle the majority of agricultural production, marketing, and animal care tasks. It appears that there are many women working in rural farming, processing, and marketing. Women are incredibly important in rural development and household sustainability processes because of these income-producing informal economic activities that they engage in (Adeyonu, 2012). Because women make educational investments for their kids, which boosts the economies of their nations, the emerging trend is that most men are unable to support their families on their own and must thus rely on their spouses (Kristof & Wudunn, 2009). More so than ever before, according to Fapohunda (2012), there is pressure on women to provide for the family's financial needs. This is especially true for spouses who have lost their jobs in the formal sector due to the rationalization and privatization of public enterprises, as well as for households dealing with other economic difficulties.

2.3 The Role of Cassava

Cassava (Manihot esculenta) belongs to the Euphorbiaceae family (Philips, 1983), for its edible starchy tuber roots. In the tropical and subtropical areas, it is frequently farmed as an annual crop. Cassava ranks third among all sources of carbohydrate meal in the world. (Linley et al., 2002). Because of its remarkable resilience and flexibility in a variety of ecological situations, it has continued to be produced in sub-Saharan Africa for many generations (Adebayo, 2006). The slaves who returned from America introduced cassava to Nigeria (Nwibo et al., 2011). Nigeria is now the world's leading cassava producer as a result of how well it has done in the nation (FAO, 2006).

It's impossible to emphasize the importance of cassava. More than 70 million Nigerians depend heavily on cassava as a commercial crop for urban consumption and a staple food for rural areas (FAO 2003). Compared to other staple crops, the starchy roots of cassava produce more calories and nutrients per unit of land. Dry cassava roots have a higher concentration of carbs than maize or any other cereal. The largest production of food energy per farmed area among agricultural plants, with the possible exception of sugar cane, is produced by cassava plants. According to O'Hair (2009), it meets around 40% of Nigerians' calorific needs. According to data from FAO (2003), Nigeria's cassava consumption per person grew by 40% between 1961 and 1965, when it was 88 kilograms per person per year, and 2003, when it was 120 kilos per individual annually (1994 -1998). The cassava commodities system directly involves around 350,000 agricultural families in either production, processing, or marketing. Cassava is an important source of industrial raw materials (such as those producing starch, textiles, fuel, confectionery, and other goods) and a significant source of revenue for rural communities (Dixon, Nweke & Lynam, 2009).

Nigeria's cassava production, which presently stands at over 40million metric tons (MT) per annum, is unquestionably the largest in the world; it produces three times as much as Brazil's and nearly twice as much as Indonesia's and Thailand's combined production (IFPRI, 2010). This is about 20 percent of the global market share (FAO, 2011). From projections based on various cassava initiatives, Nigeria's cassava production was expected to have double as at 2020, thus helping to sustain Africa's leadership in cultivating 62 percent of total world production (ECP, 2010). However, Nigeria does not rank among the top 10 exporters of cassava in the world and in 2011 it only exported fresh/dried cassava production is about 0.55 million tonnes (Tijaja, 2010).

In contrast, cassava processing in Thailand is heavily industrialized, and the majority of the crop is shipped to China and Europe as dried chips for animal feed. These nations have several cassava processing companies with large production capacity that produce high-value cassava products like starch, pellets, and chips. Because of the high level of mechanization of cassava processing in these countries, there are numerous cassava processing factories with high production capacities turning out high value products like starch, pellets, and chips. These products are directed to large international and regional markets. Contrary, due to the low level of mechanization and traditional method of cassava processing, around 80 percent of the cassava cultivated in Nigeria is consumed in the form of human meals – fufu, lafun , garri, tapioca and starch (Dada, Ali, Afolabi & Siyanbola 2010). This is also contrary to what obtains in Asia and Latin America where below average of cassava produced is eaten as food.

The largest production of food energy per farmed area among agricultural plants, with the possible exception of sugar cane, is produced by cassava plants. Nearly 40% of Nigerians' daily caloric needs are met by it (O'Hair, 2009). In 1972, 57% of all tropical roots and tubers came from cassava, making it the sixth most significant source of staple foods in the world. Its by-products can be used for a variety of things. It provides 38.6% of Africa's caloric demands, 11.76% of Latin America's, and 6.76% of the Far East's.. Around 260 million people were thought to rely mostly on cassava for their nutritional needs in 1970 (Okigbo, 1980).

2.4 Need to Process Cassava

Cassava roots that have just been harvested cannot be kept for too long since they decay after 3 to 4 days. They are heavy and have a moisture level of roughly 70%, making transportation challenging and costly. While the uncooked cassava tubers and leaves seem unappealing, they do contain different quantities of cyanogenic glycosides, which are poisonous to both humans and animals. To make the products last longer, enable marketing and shipping, reduce the cyanide contained in it, and make it palatable, cassava must be processed into a variety of forms. (Lukuyu, Okike, Duncan, Beveridge & Blümmel, 2014). Cassava processing is essentially any agro-industrial activity involving the modification of the root crop in order to change its physical, chemical, and rheological properties and consequently increase its value (Olomo, 2006). Cassava processing has several goals, including improving edibility and nutritional quality, reducing perishability and toxicity, use it for several purposes, preserving the item for storage, and ensuring higher incomes by ensuring price stability for farmers.

Processing the obtained cassava roots right away is required due to their bulkiness and high perishability. Cassava roots start deteriorating 24 hours after harvest. Processing therefore becomes necessary in order to reduce toxicity (cyanides), reduce perishability, facilitate the transportability of processed products, improve the nutritious value and edibility, modify for various purposes, stabilize the goods for storage, and ensure stable pricing for farmers to ensure more profit (Nweke, 2002). Although Nigeria continues to be the world's top producer of cassava, a projected yearly production of about 38 – 40 million metric tonnes (IITA, 2010), the benefits are far from being optimized by cassava processors and the country in general. Outputs of processed products are very low, and product qualities are highly compromised. This is because cassava processing is mostly done by traditional methods, and the critical mass of processing machines and equipment required are in great lack. Consequently, Nigeria doesn't actively trade in cassava on the global markets because the majority of her cassava is intended for the domestic food market (Oni, 2013). If Nigeria must catch up in the current globalization of cassava trade, and increase the income of processors, it must overcome the present method in which most of the unit operations in the processing chain are traditional. This can be achieved by providing adequate and appropriate cassava processing machines and equipment for every stage in the process flow.

Research has shown that availability of appropriate cassava processing machines and equipment has the tendency to make tremendous impact in increasing the output of processed cassava products. For the majority of small-scale processors, acquiring basic processing equipment for their businesses is frequently out of their price range (O'Hair, 2009). This has greatly constrained cassava processors to adopt traditional methods of processing which has been criticized as grossly inadequate , inefficient, time consuming, labourious and compromised product quality (Okorji et al, 2003).

The need to mechanize processing of cassava is massive. Traditional cassava processing comes with a number of negative characteristics. that has drawn the attention of agricultural engineering to minimize the drudgery, labour intensities that are involved in traditional manual operations, and enhance commercial quality of the products. Most unit operations in the processing value chain are characterized by lack of appropriate processing machines and equipment by processors; for instance peeling, which aims at preparing the root for processing is carried out manually. The procedure is labour-intensive, difficult, and results in over 6% loss of cassava (Akosua & Bani, 2007). This is contrary to what obtains in countries advanced in cassava processing like Thailand and Brazil where abrasion technology removes the roots outer skin with minimal loss of viable cassava flesh. Size reduction machines and equipment, especially graters though available in processing centres for custom services, are short in supply and very expensive. The phase is a particularly labour-intensive link in the value chain where grating is not automated (Haggblade, Peter, Hazell & Thomas, 2007). Cassava processors depends primarily on sun drying as they could hardly afford the more efficient flash and rotary dryers, bin type artificial dryers and solar dryers. For cassava products, particularly flours, fufu (wet), lafun (Dry), and non-traditional goods like high quality cassava flour (HQCF) and starch drying is particularly essential. Long drying times as obtains mostly in rainy season indicate that the product commonly develops mold, making it a possible source of mycotoxins. Consequently, according to Achem (2011), there is no consistency in the supply of dried cassava products (because of seasonality), coupled with low output and products that fail to meet the specifications of international markets.

Lack of mechanization in cassava processing is one major obstacles to cassava production in Africa amongst other, because of the low capability for producing high-quality cassava processing equipment in Africa, it is unlikely that cassava farmers and business owners will take advantage of these new market prospects (FAO, 2012). A huge gap still exists as majority of processors do not have good access to locally fabricated high-capacity equipment such as motorized sieves, mechanical graters, rotary and flash dryers, convenient and low-cost drying facilities, high-capacity, durable presses and mechanical peelers.

The efficiency of labour would significantly rise if cassava processing and usage procedures were mechanized, make transportation easier, and raise marketing opportunities. Processing also makes it possible to upgrade the nutrition value of the products through fortification with other protein-rich crops (Nweke, Spencer & Lynam, 2002).

The two main categories of cassava processing activities are primary operations and secondary operations (Norman, Brighton, Elijah & Raymond, 2012). Prior to storage, sale, or additional processing, the commodity is only slightly altered during primary processing, which is primarily done at the farm level. Example is converting cassava roots into chunks and drying them on the farm. Secondary processing techniques involve enhancing the commodity's nutritional or commercial worth, and the commodity's physical form or look is frequently completely altered from the original. Such example includes converting cassava roots into high quality cassava flour (HQCF) (Adetunji, 2022).

Cassava is mostly grown in Nigeria for consumption as garri (ground cassava roots), but it may also be made into other foods such fufu, tapioca, chips, and cassava flour. Starch, ethanol, and pellets are among the non-edible cassava derivatives. Waste from the processing of cassava can also be converted into animal feed, glue, and pharmaceutical ingredients (Adetunji, 2022).

2.5 Cassava Production and Processing in Nigeria

Cassava is a significant contributor to the food security of rural populations due to its capacity to grow and produce in poor soil conditions and its drought resistant quality (Ezedinma et al., 2006). A little more than 85% of the cassava grown in Nigeria is used for industrial purposes, with the remaining 15% going to agricultural uses. It is used in animal feed (chips), syrup concentrate for soft drinks, and processed into high-quality cassava flour for use in sweets and biscuits, dextrin starch used in glues, starch for medicines, and in the manufacture of seasonings. (Kormawa and Akoroda, 2003).

Cassava roots and products are in high demand and expanding swiftly. The subpopulation region's population is growing geometrically, nevertheless, and the amount of food produced at the moment is hardly enough to meet their needs (Poverty, Oxford and Human Development Initiative, 2017; and FAO, 2018). Nigeria is currently the largest cassava producer in the world, however the yield performance trend (output per hectare) is continuing downward. The ineffective production resource management and subpar agronomic practices are to blame for this low output. The literature has vigorously contested this line of thinking (Tadele and Assefa, 2012; and Fakayode et al., 2008). According to Moyo (2016), sub-Saharan Africa's (SSA) ability to produce food sustainably has continually been hampered by inadequate management of agricultural areas. Even though more than 60% of Nigeria's population works in agriculture, this has greatly contributed to the agricultural sector's poor performance in efficient use of resources (Denning et al., 2009; and Tadele and Assefa, 2012). The developing agro-allied businesses and industries that depend on cassava as a vital component, however, are raising worries that cassava products for Nigerian families could become much less accessible (Mgbenka et al., 2016; and Moyo, 2016). Juma (2015) promoted a novel technique to agriculture and the production of food (cassava) in light of this.

This is a strategy to safeguard the environment, prevent the waste of useful resources like land, and explore the soil to increase food production in order to eventually end poverty.

Because of the need for food security as well as the growing demand for cassava as a food crop, cassava is becoming more important among the crops farmed in Nigeria (FAO, 2018). Products made from cassava are a staple cuisine in Nigeria and other Sub Sahara African nations. There are 200 million people living in Nigeria, and seven out of ten of them consume some kind of cassava product every day (Njoku & Muoneke, 2008). These goods, which are made from cassava roots, include cassava flour, *garri* and cassava paste (fufu/Akpu).

It is commonly regarded as a favourite energy food for the more than 600 million cassava consumers worldwide (Hershey et al., 2001; and FAO, 2015). Its hectare-based energy production is somewhat higher (1 tonnes/ha) (El-Sharkawy, 2003). This might have won it the favour of both farmers and consumers directly. Hot water is used to transform the cassava products (paste and flakes) into solid meals that may be consumed with soup of choice. People in the southwest and southeast of Nigeria commonly consume this root, which has a high carbohydrate content. In addition, the leaves make ideal soup ingredients. It has been discovered that cassava contains vitamins B and C, calcium and other essential nutrient elements (Montagnac et al., 2009). The nutrient content in cassava is nonetheless influenced by the cultivars, harvesting age, soil characteristics, climatic factors, and other environmental factors (Cock, 1982; IITA, 2010).

Recent scientific advances have demonstrated that a combination of some cassava cultivars enriched with deficient micronutrients (for example, vitamin A) can be beneficial (Okwulehie et al., 2014; and Howe et al., 2009).

The satisfaction qualities of cassava have been indescribably improved by the deployment of clear-cut technology in the production of various types and processing of cassava products. As a result, cassava products, which were previously associated with the impoverished, are now more widely accepted by customers of all income levels. This has the implication that if cassava supply does not increase at a rate that matches cassava demand, the equilibrium of the cassava market will be disrupted, and as a result, prices for products made from cassava will inevitably change as necessary.

Akwa Ibom, Benue, Cross River, Ondo, Imo, Kogi, Rivers, and Kwara are the states in Nigeria that produces the most cassava (Daniels et al., 2011). Due to its well established production and processing methods, experts contend that cassava cultivation is one of Nigeria's most advanced agricultural products. For industrial application, cassava may be processed into a wide range of goods, including food and starch. The International Institute of Tropical Agriculture (IITA) claims that growing cassava is quite convenient. It can grow well on poor soils, requires little labour, may be intercropped with other crops, and matures between six and three years after sowing, to name a few. The cassava plant prefers precipitation with an annual rainfall of 1000 mm or higher, according to Hauser et al. (2014). This suggests that the average monthly rainfall of 50 mm over the course of six months will be sufficient to cover the cassava plant's need for water. The plant does exceptionally well in pulverized soils rich in aluminum and manganese but cannot withstand excessively clayey, sandy, salt-affected, shallow or waterlogged soils. Despite this, cassava can endure a wide range of rainfall and other irregular weather conditions (El-Sharkawy, 2003).

Evidence from different States in Nigeria shows that the government's improvements to the cassava industry have increased output and strengthen the rural economy. Local cassava processing has considerably boosted the rural economy in sub-Saharan Africa's (SSA) by generating employment opportunities for numerous rural women and local fabricators. The market for agricultural input supply has also been impacted. As a result, it aids in capital generation and helps Nigeria's agroindustry secure markets. However, it is still a major question if the existing output (supply) of cassava can meet the rising demand for the root in both the food and industrial sectors. The cassava-related business in Nigeria is ready to swoop in and take advantage of cassava, the least expensive and most accessible food for the poor, if nothing is done to sustain or increase per capita production.

In Nigeria, the traditional way of processing predominates, according to Nwokoro and Aletor (2007). Because traditional processing is labour-intensive and economical, women predominately perform it, and it is viewed as unsuitable for women (Odebode, 2003). It is also physically demanding and linked to poor productivity. According to the Food and Agricultural Organization (2008), Nigeria was the largest producer of cassava but the smallest exporter of the root vegetable. This was ascribed to the fact that many people lacked understanding regarding how to prepare cassava for export (FAO, 2008).

2.6 Cassava Processing Technologies

According to literature, availability of appropriate cassava processing machines and equipment has the tendency to make tremendous impact in increasing the output of processed cassava products as cassava processing especially in Kogi and Kwara State is characterized by traditional method of processing which is inefficient, time consuming, labourious and compromised product quality (Okorji et al, 2003). Lack of improved technologies decreased the outcome of rural processors which limits the production capacity of cassava products. Adoption of improved technologies may have substantial economic effect, including: enhancement of the most wearisome aspects of extraction, reduction of the time and labour input required at production, increase in total productivity and in turn increase the quality of life, income, and food security of women cassava processors household.

It is unlikely that cassava processors and business owners will profit from new market prospects until Africa's inadequate manufacturing capacity for cassava processing equipment is increased (FAO, 2012).

Traditional methods for processing cassava are labour-intensive, ineffective, time-consuming, and inefficient. These challenges come when grating and draining the starchy liquid from the cassava dough because the currently used standard methods entail lengthy, labour-intensive procedures. When very large quantity needs to be produced, the issue gets worse (Le An, 2012). Cassava producers frequently find themselves unable to process the collected roots and are forced to sell their crops at extremely low prices to middlemen who can and will get to them (Fatuase et al, 2019). Production, harvesting, and processing must be automated in order to save costs and prevent waste.

Millstones, grinding stones, pestles, and mortars are examples of traditional equipment used in the preparation of garri. These techniques are not very productive or hygienic. Due to these issues, machinery that can quickly and efficiently grate high-quality cassava and lessen human labour was designed and built. Among the equipment are grater, hammer mill, bar mill, and roller crushing mill. Product quality varies from one operator to the next and occasionally from one batch to another (Adekanye, Ogunjimi, & Ajala, 2013). New technology and numerous equipment types have been created and built to improve the processing of cassava into garri and other goods. These processing equipments consists of fryers, mills, sifters, cassava harvesters, cassava graters, and cassava pressing machines (Ibrahim & Wa, 2020).

2.7 Cassava Processing Operations and Machineries

To produce a certain food or product, cassava roots must go through a variety of unit processes. Even though all unit operations can be automated, the majority of them are still carried out by hand at the village level. Aside from the arduousness and high labour intensity of manual processing, the surroundings are typically filthy, unclean, and unhealthy. As a result, the items' quality is erratic and unreliable. As a result, it is imperative that efforts be made to create adequate equipment for the various unit processes in order to reduce tedium, enhance the sanitary conditions of the process, and maintain wholesomeness by developing straightforward quality control techniques (Odigboh, 1985). Basically, the unit operations and machines/equipment used is determined by the nature of the product and processing method adopted, either traditional or modern.

2.7.1 Peeling

The first major operation in cassava processing is peeling. The peeling operation essentially involves removing the cortex which contains very high concentration of hydrogen cyanide (HCN) responsible for cassava toxicity. According to Olukunle and Jimoh (2012), the most commonly used tool is the manual peeler, and they include the local knife fabricated by blacksmiths, welders and artisans. Manual peeling is labourious, time wasting and leads to substantial loss of root during peeling (Akintunde et al, 2005). According to Akosua and Bani (2007), an average of 6.1 percent of the usable cassava was lost when using traditional methods of peeling. Manual cassava peeling tool has been designed by NCAM, IITA, ARCEDEM to substitute the local knives. The hand peeling tool, similar to a potato peeler, allows increased output, less loss of root flesh and reduction of the risk of injury. It is affordable for smallholder processors.

The present information of cassava, and hence its globalization demands critical unit operation should be mechanized. Aniedi et al (2012) noted that mechanization of cassava peeling has the ability to encourage higher cassava growth and produce products with high hygienic standards, product quality, efficient processing, minimal tuber loss, and increased processing rate. The mechanical cassava peeler has been developed by NCAM, PRODA, Haningha Ltd, IITA, and FUTA but they are beyond the purchasing power of an ordinary processor and their efficiency is generally low, mechanical peelers can remove up to 2,400–2,500 kg of skin per hour with a 30–40% wastage rate, compared to 22 kg per hour for manual peeling and a 20–25% wastage rate (Kamal and Oyelade, 2010). Most research work carried out on cassava peeling technology (Ezekwe, 1979; Itodo, 1999; Olukunle et al, 2010; Edeh, Onwuka, Chukwu & Nwankwojike, 2022) agreed that of all the cassava processing operations, peeling remains a serious global challenge to process engineers because of the irregularity of cassava configuration and thickness of the cortex which differ from specie to specie.

2.7.2 Washing

After peeling, the cassava tubers are sliced and sand was totally swept away. Getting rid of all sand residue required that tubers should be cleansed both before and after peeling. Traditionally, cassava roots are washed with hands in basins or troughs where peeled tubers rub against each other, thus removing dirt. This method according to Igbeka, (1996) is most commonly used by processors, and it is very labourious and time consuming.

2.7.3 Grating

After peeling the cassava roots, grating is the next significant unit process. For the preparation of dried cassava roots and granulated goods, grating turns fresh cassava roots into mash. Traditional processing does not require sophisticated equipment. Traditionally, cassava is grated by using a mortar and pestle to pound it, turning it into a wet pulp. This method evolved over time to hand-manual grating which is done by rubbing the peeled cassava root flesh into mash (Quaye et al., 2009). The efficiency of hand grater is very low, and users often sustain hand injuries. Manual grating is tiresome, time-consuming, and frequently results in finger scratches and bleeding injuries. The manual grating of cassava results in non-uniform grated particles, is unsanitary, and causes significant losses because it is difficult to grasp small pieces of cassava tubers for grating.

Mechanical grating involves the use of machines powered by internal combustion or tiny electric motors. The COSCA study (2000) found out that cassava graters can be fabricated by local artisans, blacksmiths, welders and mechanics using even scrap metals and old engines. The grater is one of the most available processing equipment for cassava processors, and the mechanical grater's components can be altered so that the engine can sift and grind the cassava mash simultaneously. (Akinwumi & Adegboye, 2003). The use of mechanical grater has significantly boosted the profitability of the processing industry by reducing labour costs by 50%. cassava processing enterprises (Nweke, 2004). The impact of mechanical grating of cassava was reported by Alyanak (2007) where he noted that the old method's inherent waste or loss of usable tuber meat is eliminated, and the ensuing mash is produced with far higher quality and an enormously higher level of wholesomeness. As a result, the mechanical grater produces far more than the conventional approach.

2.7.4 Pressing/Dewatering

Since cassava contains a lot of water (about 70%), different techniques have been developed to remove the water during processing. When processing cassava, dewatering entails exerting pressure on the pulped gratings to lower their moisture content. The particles are constrained while the liquid is free during the dewatering of cassava mash. The characteristics discovered by Kolawole, Agbetoye and Ogunlowo (2007) include pressure applied, depth variations, time, moisture content, material volume, and material particle size. There are numerous techniques used to dewater cassava mash. Traditionally, grated cassava pulp was placed in a basket, wrapped in leaves, and crushed with a heavy item for three to five days to drain the effluent (Diop, 1998). The fermentation process happened simultaneously. Manual techniques include the use of stones or logs, sticks, a parallel board, a tree stump, a chain or string, and a screw jack (Kolawole, et al 2007).

The mechanical presser is a straightforward hand-operated device made of hardwood plates that applies pressure using a screw jack or car jack. In the key regions of commercial cassava cultivation, entrepreneurs from the same village run and maintain mechanized pressers. The industrialization of pressing cassava mash includes the use of hydraulic presses with pressures as high as 25 kg/cm2 (FAO, 2004). The presser has the advantage of eliminating the fermentation step in addition to removing the effluent in a matter of hours or minutes. With a hydraulic press, the pressing process can be completed in as little as 15 minutes, however it can take up to 4 days or longer when using stones.

A dewatered mash should quickly reach the required moisture content range of 40 to 45 percent on a wet basis. However, grating, pressing, sifting, and pulverizing reduce HCN content to safe levels, therefore fermentation is not required for the removal of cyanogens in the manufacture of key cassava food products, according to Ikpi and Hahn (2009).

(a) Improved Press (b)Conventional press

Sources:(a)https://www.afrimash.com/shop/agricultural-equipment-section/agricultural-equipment/cassava-presser retrieved September, 2021

(b) Steem it images: retrieved from https://agro4africa.com/cassava-processing-how-to-process-raw-cassava-into-garri/ September, 2021

2.7.5 Pulverization and Sifting

One of the biggest challenges and a crucial step in the production of cassava food items, especially garri, is sifting or sieving. The coarse particles are separated during sifting in order to achieve a homogenous product. The aim of sieving is to eliminate fibrous contaminants, and achieve fine granules (Abubakar et al., 2015). Odigboh and Ahmed (1984) reported that the peasant processors do this by rubbing the dewatered cake against sieves of wire mesh or raffia mat, this produces a coarse grain wet mass by separating the majority of the fiber and unground lumps. The main disadvantage of the raffia sieve is that it requires bending and stretching while being used, which can cause back strain and can lead to injury to the person using it (Ajav & Akogun, 2015). To promote effective heat transfer during the frying process, pressed mash must be ground into a fine powder and dewatered mash or lumps must be sieved (OAU, 1998). The conventional processing method achieves simultaneous pulverization and sifting of the mash. The traditional method of sifting and pulverization is very tedious, time consuming, and have very low output produced.

The mechanical method of sifting and pulverization requires an electric motor powered by electricity or diesel/ petrol powered engines. Machines have been designed at various speeds to perform lumps breaking and sieving with efficiency of up to 97 percent and produce about 125kg/hr (Uthman, 2011; Ikejiofor & Oti, 2012 and Ahiakwo, 2015).

(a)Mechanized sieve (Improved) (b) Manual Sieve(Conventional)

Sources: (a) https://www.afrimash.com/shop/agricultural-equipment-section/agricultural-equipment/garri-sieving-machine-garri-processing-equipment/ retrieved September, 2022.

(b)Field Survey, 2022

2.7.6 Frying (Roasting)

Frying or roasting is mostly applicable to garri and other gelatinized cassava products. The roasting or garrification process involves a slight dextrination which improves influence on its digestibility. Frying or garrification is a method that combines simultaneous cooking and drying. Garrification is not a simple drying process, even though it is a dehydrating process. The product is initially boiled while still containing moisture, followed by dehydration and cooling to a moisture content of roughly 12%. Garri is traditionally fried over a wood fire by women using cast iron pans made of shallow earthenware (agbada), while frying, the operator sits sideways by the fireplace, which is uncomfortable owing to the heat and the position.

Additionally, during frying, a calabash used to push the mash on the hot pan's surface needs to be swiftly scraped off and stirred continuously to keep the substance from burning until frying is finished. The procedure takes between 30 and 40 minutes, and the end product has a reduced moisture content of roughly 18%. This is a really difficult task (Maduabum, 2012).

There has been relative improvement on the traditional method using large fabricated steel, flat bottom set in a cement lock fire chamber with a smoke pipe. Stirring continued until gelatinized or toasted grains are formed (Onu, Jack, & Nwangwu, 2020).

A mechanical system for frying and drying has recently been created in the form of a drum made of stainless steel, with a rotational conveyor and paddles placed along the conveyor to spin more slowly around the drum's axis (Maduabum, 2012). The machine produces dried garri at a rate of roughly 50 kg per hour as opposed to less than 10 kg per hour when utilizing the conventional frying process.

a. Mechanized Fryer (Improved)

b. Tray Fryer(Conventional)

Source: Field Survey, 2022

2.7.7 Milling

Milling converts dried cassava chips or chunks into flour products. The appropriate milling of cassava has become a very important issue due to the Federal Government's policy of requiring confectionery baking to contain 10% of high-quality cassava flour (HQCF). In our rural areas, making cassava flour traditionally or indigenously involves crushing the dried chips with a pestle in a mortar and then filtering them through a screen. The output from this method is generally low, and product quality is highly compromised.

Due to their multipurpose nature, mills have been mechanically engineered to lower the time needed to crush materials to the size of the screen in order to create cassava flour with a consistent grind and reduce contamination of the cassava flour, especially in non-specialized manufacturing processes (Nwaigwe, Nzediegwu & Ugwuoke, 2012). Mechanized mills are owned, operated and maintained by rural processors who locate them in common places (markets and centres) where they provide milling services to farmers, processors and homemakers for a fee per unit of quantity.

2.8 Cassava Processing and Occupational Hazard Associated

Large amounts of cyanogenic glucosides are present in both the thicker, leatherier parachymatrous inner covering and the outer covering of cassava's expanded roots (Oyewole, 2002). Cassava's hydrolytic compounds, such as hydrocyanic, which when ingested in big quantities, can be harmful to both people and animals, rather than the glucosides, are what makes it toxic (Oyewole, 2002). The various processing procedures that result in the food products made from cassava are linked to attendant dangers originating from cassava processing; peeling, grinding, pressing, fermenting, frying or drying, and lastly bagging for sale are some of the stages (Oboh, 2004). It has been determined that the peels and effluents, the two primary wastes generated during the processing of cassava, result in significant economic harm to structures and vegetation (Oyegbami, 2004).

The small-scale garri producers typically face a number of occupationally hazardous situations as a result of these crucial processing processes, as well as the ineffective accompanying management procedures of the by-products (such as the peels and spent liquid waste). Smoke and cyanide inhalation are among these health risks (Frca & Frca Fficm, 2015). Cuts from peelers, ergonomic risks, irritation of the eyes, exposure to extreme heat, and smoke inhalation were all listed by Adenugba and John (2014) as additional occupational hazards connected with processing cassava into *garri*.

One of the main issues is the creation of spent liquid waste, which is a by product of the dewatering process used to transform cassava into *garri*. This discarded liquid generated is typically permitted to run into small dugouts close to the processing sites at most cassava-to-garri processing centres without any deliberate treatment and/or redirection. This constant and indiscriminate discarding could have disastrous effects on the environment (Obueh & Odesiri-Eruteyan, 2016).

Garri producers in Nigeria are frequently exposed to significant quantities inhalation of hydrogen cyanide (HCN) evaporating during cassava grits frying and work in poorly ventilated sheds (Oyinkan et al., 2016). There have been reports of skin irritation (itchiness) brought on by cassava's cyanide coming into touch with the processors' skin (Adenugba and John, 2014). According to Graham and Traylor (2020), cyanide exposure prevents human cells from using oxygen, which causes the cells to die. Additionally, the smoke from the fire hurts the processor's nose, eyes and throat (Juntarawijit & Juntarawijit, 2019), making breathing difficult (Neghab et al., 2017). Additionally, the intense heat makes people more irritable and impairs their ability to focus and perform mental tasks (CCOHS, 2014).

The unrestricted release of cassava effluent is linked to environmental issues. These include the eutrophication of still water, which kills aquatic life and depletes oxygen levels (Omotosho and Amori 2015). Zea mays, Sorghum bicolor, and Pennisetum americanum have all been documented to have their seed germination and seedling growth inhibited by cassava effluent, and these plants have also been known to die when released continuously into the environment (Akpokodje et al., 2018). If poorly or dangerously disposed of, with little regard for safety precautions, this effluent from mash cassava could expose and predispose processors and the environment to health concerns.

Additionally, they cause insect infestations, which can eventually result in the transmission of diseases to both humans and livestocks. The most popular method which is the traditional method has also contributed to a number of pathologies, including generalized body aches, pains, and fatigues, as well as elevated body temperatures brought on by the smoke in the roasting environment.

2.9 Cassava Processing Interventions in Nigeria

The broad desire to improve the socioeconomic situation of rural impoverished households can be interpreted as a concern for enhancing the standard of living for Nigerian rural women. Numerous initiatives to enhance the standard of living for Nigeria's rural women have been funded by both the national government and foreign organizations. It is important to note the launch of the Family Economic Advancement Programme (FEAP) initiative under Mariam Abacha, the first lady of Nigeria from 1993 to 1997, and the Better Life for Rural Women (BLW) program in 1987, both under the late Mariam Babangida, who was the country's first lady at the time. Both programs were intended to have a tremendous impact on rural women's social and economic standing in Nigeria. (Zaid & Popoola, 2010)

The quality of life for women living in rural areas has been the focus of some non-governmental organizations' increased efforts as a result of the failure of previous government efforts. The Country Women Association of Nigeria (COWAN), for instance, was founded in 1982 in the Nigerian state of Ondo (Modupe, 2008). However, because rural women, for whom these programs were intended, are behind in the area of socioeconomic growth, the majority of these programs have not been able to improve the work and living situations of rural women.

Momodu (2002) argues that this is because Nigerian rural women have created a culture of complacency, resignation, and silence. The author emphasized that Nigeria women are not destined to be impoverished or ill-informed. Instead, they are blessed with abundant mineral resources, lush terrain, and a large, virulent labour force that can be used to produce goods and services. The weak link, however, has been the absence of an effective information system pattern for motivating and encouraging individuals to take action in order to improve their quality of life.

The Nigerian government, international funders, and other non-governmental organizations have all initiated various programs to strengthen the cassava subsector, and these have been quite successful (FAO, 2008). These projects include but not limited to the following:

2.9.1 The Cassava Multiplication Programme

The Cassava Multiplication Programme (CMP), which was implemented in 1987 after the Federal Government requested and received financing support from the International Fund for Agricultural Development, Nigeria saw its first significant involvement in cassava production (IFAD). The International Institute for Tropical Agriculture (2010) states that establishing and improving cassava multiplication systems and developing effective and long-lasting methods of getting superior varieties to farmers are the objectives of cassava distribution and multiplication.

To encourage cassava use as a commodity-based solution against food insecurity, the Federal Government of Nigeria and the International Fund for Agricultural Development (IFAD) together developed the cassava multiplication initiative in order to increase cassava production in Nigeria (Adeniji, 2000). The Cassava Multiplication Program aims to increase farmer income while reducing poverty. In order to simplify its execution and ensure the growth of farmers, this program has received both people and material resources.

The program's overarching goal was to spread and advocate finding better cassava varieties among 350,000 farmers to increase their output and revenue. With an annual production of about 30 metric tons, the venture was discontinued in 1997, it was effective in making Nigeria the world's top producer of cassava (IFAD, 1999).

2.9.2 The Presidential Initiative on Cassava Production, Processing and Export

In July 2001, the President's Initiative on Cassava Production, Processing, and Export (CPPE) was launched. The initiative's main goal is to help Nigeria produce enough cassava for domestic food and industrial needs while also the export of dried cassava products such pellets, chips, flour and adhesives generates USD 5.0 billion annually (FMA & WR, 2007).

Nigeria, Ghana, and the Democratic Republic of the Congo are among the recipients. The program ran from 2001 to 2007 for six years. The CPPE concentrated on cassava since it is grown as a staple crop in the beneficiary nations by the vast majority of farmers. Nigeria's CPPE sought to:

(1) increase cassava output and productivity by expanding farming by 5 million acres with the aim of yearly harvesting 150 million tonnes of cassava tubers;

(2) organizing the cassava and processed cassava export is a business that generates income;

(3) producing for the domestic and international markets 37.5 million tonnes of processed cassava products;

(4) producing $5 billion a year or more from the export of value-added cassava goods (Sanogo & Adetunji, 2008).

The interventions were appropriately included into the activities of the federal ministries to build the cassava value chain. Several parties, including public and governmental organizations, were involved in carrying out the different CPPE activities.

The Standards Organization of Nigeria (SON), the National Centre for Agricultural Mechanization (NCAM), the Central Bank of Nigeria (CBN), the Nigerian Expo, the Federal Ministry of Agriculture and Water Resources (FMAWR), the National Bureau of Statistics (NBS), the Federal Ministry of Commerce and Industries (FMCI), the Nigerian Stored Products Research Institute (NSPRI), the National Center for Agricultural Mechanization (NCAM), The NEPAD Pan African Cassava Initiative (NPACI) Secretariat, the Raw Materials Research and Development Council (RMRDC) and the International Institute of Tropical Agriculture (IITA) are a some of the assisting organizations. Cassava growers' associations, processors' associations, manufacturers of equipment, traders of cassava, bakers and transporters of cassava are among the private organizations participating (Sanogo & Adetunji, 2008).

The National Root Crops Research Institute (NRCRI) created two seed farms through the CPPE, one on 80 ha to generate 32,000 bundles of foundation stock and one on 60 ha to produce 24,000 bundles of breeding stock. To generate 59,000 bundles of certified stock, state ADPs planted 148 hectares. From 43 varieties assessed as part of the Pre-emptive Management of Cassava Mosaic Disease (CMD) program, five improved varieties were made available to farmers. In addition to training 21 artisanal equipment manufacturers in the design, building, and production of processing equipment such cassava peelers, chippers, and manual harvesters, NCAM also taught 500 extension agents from the north-central, south-west and south-east (Ohimain, 2015; Sanogo & Adetunji, 2008).

2.9.3 Root and Tuber Expansion Programme

The Federal Government of Nigeria (FGN) and the International Fund for Agricultural Development (IFAD) collabourated on the Root and Tuber Expansion Programme (RTEP), a project that aims to solve a variety of issues, including those related to cassava processing and marketing. The Cassava Multiplication Programme (CMP), which was carried out between 1987 and 1997 and effectively established Nigeria as the world's largest cassava grower, served as the foundation for RTEP (RTEP, 1999).

The major goal of RTEP is to increase small-scale cultivation of root and tuber crops, especially cassava, as well as associated by-products. in order to ensure national food independence, enhance household food security, and raise rural household incomes. The programme's main focus is value addition (processing) through marketing and a variety of processing choices. RTEP began as a loan in 2001 and closed in 2009 after a 9-year term. It consisted of five primary parts, with processing and marketing being the biggest and most important, receiving a little over 60% of the project's initial basic cost (IFAD, 1999).

The FCT and 25 states were included in the program. 35 million people are anticipated to live in the project area's rural areas, and the program will directly help around 560,000 households. The Federal Government of Nigeria (FGN) received a credit from the International Fund for Agricultural Development (IFAD) in December 1999 totaling 23.05 million US dollars for RTEP.

The programme's primary goal was to build on progress gained under the Cassava Multiplication Program (CMP) in order to boost national food security and disadvantaged farmers' earnings (PIM, 2001).

The RTEP implementation manual (PIM, 2001) states that given the high cost of inputs and small-scale farmers' restricted access to financing, the initiative focuses on readily available low-cost technologies that can be generally adopted by poor farmers, such as improved yam, sweet potatoes, cassava and cocoyam varieties, as well as enhanced cultural practices. The project's goal is to introduce farmers to improved methods for growing and processing root and tuber crops that can be incorporated into Nigeria's current root and tuber-based agricultural systems.

The programme intends to enhance the living conditions, incomes, and food and nutrition security of subsistence farmers households in the project area through the cultivation of RTEP crops, as well as the processing and sale of their completed product. (PIM, 2001). The target population in Nigeria is made up of around 5.2 million small landowners who own between two and three hectares of land per household. This is approximately 200,000 small holdings for each participating state (PIM 2001).

The program's long-term goal is to commercialize the production of roots and tubers in order to better the living circumstances, financial situation, food security of the program's lowest smallholder families. Small-scale farmers with less than 2 hectares of land per household are the target population in particular. The initiative introduces enhanced root and tuber varieties as well as better growing methods through the utilization of the current extension service infrastructure. The initiative promotes women to take part in research trials and demonstrations since they are crucial to the production, processing, and marketing of food crops like cassava and other crops. According to PIM (2001), specific program goals include:

- improving planting materials,
- increasing the output of enhanced root and tuber production technologies, developing processing methods and marketing strategies, and
- working with NGOs to train farmers.

The program has increased product processing and marketing, as well as the accessibility to new varieties of planting materials. In order to broaden the range of demand for root and tuber products, and cassava in particular, it develops trade policies. Additionally, it aids the targeted communities in purchasing processing equipment. The Root and Tuber Expansion Programme's processing division prioritizes women. The processing arm of the RTEP focuses on women. Women processors groups were formed in Kwara and Kogi state, processing machines were purchased and trainings conducted for the groups. This empowerment programme was conducted mainly to improve the livelihood and living condition of the target population and reduce food insecurity in Nigeria (PIM 2001).

2.10 Rural Women and Household Livelihood

The division of labour in patriarchal rural countries is based on gender, and women often receive little support from their significant other (Amine and Staub, 2009). In addition, these very same social structures that socially construct the acceptability of "women's jobs", restrict prospects for gainful employment. One remedy for what is sometimes called the "feminization of poverty" is to start a microbusiness (Chant, 2014). Women are encouraged to start their own businesses, but they must balance childcare, housework, and production with their household responsibilities. Additionally, rather than being empowered (Chant, 2016), they frequently lack the tools and skills necessary to support themselves.

However, there is evidence that rural women are inventive, coming up with something from nothing to provide for their families' fundamental requirements (Nwoye, 2007; Ajani, 2012; Mbah & Igbokwe, 2015). However, their options are limited by poverty (Anderson & Obeng, 2017). Typically, there is minimal institutional or government assistance, technology, training, or financing to support the operation of these businesses (Singh & Belwal, 2008). The poor may be excluded from efficient marketplaces by poverty and distance (Anderson & Lent, 2017). Rural women business owners must concentrate on the immediate objective of "putting food on the table today" due to practical considerations.

Thus, women start businesses primarily to provide for the necessities of their families. The idea of expanding the business is still secondary (Brünjes & Diez, 2013), even though such goals might increase the business' productivity. Because women combine family responsibilities with their limited resources, poverty promotes adaptive micro enterprises with little risk (Fletschner, Anderson, & Cullen, 2010). (Nwoye, 2007). Since many impoverished women operate small businesses in traditional rural settings, this issue is not trivial, residual, or marginal.

In fact, Nagler and Naudé (2014) talk about how important non-farm businesses are for rural development. Additionally, the contribution of these farms to the income of rural households has increased rather than diminished, contrary to predictions. According to recent surveys, women-owned companies a significant share of rural jobs and income (Mbah & Igbokwe 2015). Ajani (2012) asserts that businesses owned by women in rural areas have a significant role in their ability to generate income.

According to Dasgupt (2009), the burden on families is reduced by a rise in women's market incomes, allowing for greater household production of commodities. Consequently, the household decision-making unitary model provides a foundation for thinking that giving women more opportunities to make a living may also increase their wellbeing, but it does not ensure that this would be the case. In fact, higher status or negotiating power for women does not necessarily follow from increasing access to employment and income. Instead, engaging in economic action is a requirement for achieving gender equity in the marketplace.

This, however, is insufficient in and of itself because not all economic activities empower women, and extra steps must be taken to advance gender parity in other spheres including the political and legal (Masika & Joekes, 2009). More specifically, women's trading improves housing, health, nutrition, and family care. In the end, this results in the welfare of household members. Petty trade, in accordance with Mbisso (2010), ensures a stable means of subsistence if the profits are sufficient to cover the women's and their household's essential needs. Women who engage in trading are significantly more likely than males to invest their earnings in bettering the lives of their children, including their education, nutrition, healthcare, clothing, and housing (Kristof & Wudunn, 2009).

Ibnouf (2009) states that revenue from income-generating activities helps to maintain the food supply and general well-being of households. The results of the survey showed a considerable disparity between men and women's spending habits (amounts spent on food and non-food goods). Women tend to have lesser wages than men do, but they tend to spend more of their income on family food purchases, whereas males frequently designate a portion of their budget to other products.

He came to the conclusion that while males frequently use their cash earning for other purposes, women typically use practically all of their income to meet the household's food demands. Men typically reserve money for themselves, and on average, they only contribute between 50% and 70% of their total salary to the home. According to the study, women's participation in money-generating activities has higher relevance than only raising their own or their home's income because it also enhances household welfare, child nutrition, and educational opportunities. The study noted that women spend a larger portion of income they earn on children and family needs than males, notwithstanding the diversity and complexity of research on household incomes.

2.11 Empirical review

2.11.1 Socio-economic characteristics of women involved in cassava processing

Socioeconomic factors continue to have a significant impact on the level of agricultural output. Not only are output levels influenced, but so are commercial enterprise management practices, which emphasize the socioeconomic features of farmers and processors, particularly in agribusiness (von Braun and Mirzabaev, 2015). Research has indicated that if crop producers in producing sites are to be supported, their basic characteristics should be studied in order to completely grasp their needs for need-driven assistance. A variety of socioeconomic, physical, and technical aspects of processors influence technology adoption and utilization. In Nigeria, women play critical roles in cassava production and processing. They work in the cultivating, harvesting, processing, marketing, sales and processing. Women perform cassava processing tasks such as peeling, grinding, fermenting, pressing, frying, boiling, and milling (Taiwo and Fasoyiro, 2015).

Achem, Akangbe, and Animashaun (2013) found that the majority of cassava processors were between the ages of 41 and 50. According to the authors, this shows that cassava processors were getting older, implying a requirement for engaged and successful adolescents to become increasingly involved in processing of cassava. According to the survey, the bulk of the processors had fewer than ten years of cassava processing experience. According to the study's findings, the majority of the processors of cassava in the area were married. They also stated that the majority of responders had only a primary education. The majority of respondents (50 percent of RTEP processors) had 6-8 individuals in their households, whereas there were more than 8 members on 47.5% of non-RTEP processors. This shows that the families of cassava processors were very large. They said that the large residence would allow for more family labor to be available for cassava processing, reducing the cost of hiring workers.

In addition, in their study on "Factors Influencing Adoption of Improved Cassava Processing Technologies," Asadu, Agwu, Chah, and Enwelu (2014) said the mean age of the respondents was 51 and that 40% of the respondents were between the ages of 40 and 49.. This demonstrates that the majority of the women were still in their active years. According to the authors, this benefits higher investment, improved technology usage, and hence innovativeness. According to the study's findings, the majority (77%) of respondents were literate, which is advantageous for the adoption of innovations in the studied area. According to the authors, this will facilitate the transmission of relevant agricultural technologies to the farming community. It is possible that it will make them more receptive to numerous agricultural extension programs and policies. According to Asadu et al. (2014), the majority (58%) of respondents had between 5-8 household members. The average household size was seven people. This finding implies that additional family labor would be readily available, as big household size is an evident advantage in terms of farm labor supply. The authors also observed that the majority of responders (38%) were civil officials. Some chose farming as their major career, while 30% chose trading and other businesses such as tailoring and hairdressing.

This means that the vast majority of respondents earned a living. This income will assist the women in raising funds for improved cassava processing activities. According to Asadu et al. (2014), all (100%) of the respondents belonged to at least one organization. They belonged to an average of 1.6 organizations. These organizations could act as extended contact points for a large number of farmers or other processors. They provide chances for interactive participation with extension groups. According to the article, a third (36%) of respondents had 0-2 contacts with Women in Agriculture (WIA) representatives in 2012. According to the survey, 29% had three to five encounters, 19% had six to eight contacts, and only 16% had nine to eleven contacts with WIA agents in 2013. According to the preceding, respondents weren't getting as much assistance with extension as needed since the average number of visits in 2013 was 5 times. This is hardly encouraging for technology uptake.

Falola, Fakayode, Kayode, and Amusa (2020) found a mean age of 41.2 years, ranging from 41 to 50 years old, according to the researchers, this demonstrates that the women in the study region were still in their active years. According to the findings, 61.3% of the respondents who identified as women were married. Less than five to fifteen persons made up the average household, which had a typical class of six to ten people. And 56.3% of respondents had no formal education, compared to 3.1% who had higher education. 23% of the women did not belong to any social organizations, compared to about 57% of the women.

According to Falola et al. (2020), additional key sources of income for rural women are trading and farming, which account for 35.6% and 21.9%, respectively. Only 9.4% worked in waged labor (mostly in the civil service and private sectors).

According to the findings, some of the ladies were earning money from many sources. According to the authors, this could be an attempt to maximize their profits and/or protect themselves from the risks associated with being monoactive.

In his study on “Analysis of Women Participation in Cassava Production and Processing in Imo

State, Southeast Nigeria", In 2019, Onyemauwa stated that the majority of cassava processors (57%) were between the ages of 35 and 44, indicating that the majority of respondents were in their middle and active years of life. The study also found that a high proportion of respondents (57%) were married, and that the majority of respondents (72%) do not belong to or participate in cooperative activities. In addition, the majority of agricultural technology is offered to farmers who subscribe to and participate in cooperative activities. Their failure to participate in cooperative activities will most likely limit their production and processing activities. According to the study, the majority of respondents (62%) had 11-20 years of cassava processing experience. According to the survey, the majority of respondents had low level of education.

2.11.2 Studies on technologies used in cassava processing.

In examining the processing technology available to cassava processors and range of products derivable from cassava processing in Enugu State, Nigeria, Mgbakor, (2015) revealed that respondents employ certain modern cassava processing equipment in their operations. Cassava processors used cast iron frying pots for frying operations, according to the majority (98.2%) of survey respondents. According to the author, other processing equipment frequently used by (77.9%) of respondents include drying on a platform/tarpaulin/mat, (73.8%), aluminium/plastic built basket sieve, (72.9%), and (71.5%) of them frequently utilized grating machine and hydraulic press, while milling machines were frequently utilized by 34.1% of processors. However, the vast majority (92.3%) of cassava producers/processors stated that they had never used a mechanical peeler, washing machine (98.2%), steeping tank (99.1%), sieving machine (99.4%), motorized fryer (100%), electric sealer (100%), hammer mill (99.7%), or pulverizing machine (97.1%). The author went on to say that the exorbitant cost of these cassava processing devices, which are out of reach for local processors, could be to blame for the high frequency with which they were never used in the study area. He further stated that most cassava processors in Enugu state still operate on a modest scale and so cannot afford to employ outstanding processing equipment. Cassava processing in the study area continues to present significant problems due to low productivity and a lack of technological application.

Mgbakor (2015) went on to say that the bulk of processors (77.4%) employ upgraded technology, while 22.6% use conventional technology. The implication is that the majority of farmers in our poll use upgraded technologies, albeit not in all operations. In the research domain, there is a combination of better and conventional technique use, which could be referred to as "mixed technology." However, it is a step ahead and a departure from traditional cassava processing processes.

Achem (2017) examined the mechanization of cassava processing operations in Kwara State in another study. Almost all peeling, washing, drying, frying, and chipping is done by hand. However, significant progress has been made in the mechanization of grating and milling activities, which are mechanically powered by diesel (90.1% and 87.4%, respectively). The majority of cassava processing procedures are still done by hand. This has significant ramifications because manual procedures are often labor-intensive, difficult, time-consuming, and unsuited for large-scale production. This result provides further obstacles to downstream researchers and investors, including equipment fabricators and various levels of government.

Okorji, Eze, and Eze, (2003) studied the efficency of cassava processing techniques among rural women in Owerri, Imo State, Nigeria. The analysis revealed that 80% of garri processors used dewatering machines for pressing activities, with two of these equipment found in the study region. Only 20% of respondents who processed garri utilized a mechanized fryer; the majority of respondents cook by hand. Furthermore, 70% of the processors employed automated graters, with an average of six cassava graters found in the study region; these equipment are more prevalent in the study area.

Furthermore, as reported by Awoyemi, Adesokan, Kayode, Omotesho, and Osasona (2020) in "assessment of cassava processing technologies usage among rural women in kwara state, Nigeria," data analysis shows that the majority of respondents have access to pressing (100%), grating (100%), dewatering (92.5%), and milling (99.2%) machines. It indicates that every cassava processor in this area has access to both the pressing and grating devices. It also demonstrates that practically all cassava processors have access to both dewatering and milling devices. This finally indicates that the availability of these diverse devices will improve cassava processing while reducing stress and labor.

Furthermore, the study's findings show that cassava peeling equipment/machine, mechanical sieves, dryer, and fryer utilization is low, sifting machine usage is moderate, grating, , pressing and milling machine usage is high. This means that the responders eventually embraced and frequently utilize grating, dewatering, and milling machines.

2.11.3 Studies on occupational hazard associated with cassava processing technologies

In a study, Okareh, Ogunfayo and Atulumah, (2015) examined the hazards associated with small scale *garri* processing in Ibadan metropolis, Nigeria. The most typical method for initial cassava processing is manual peeling with blades of various sizes. While peeling cassava, 69.1% of respondents received accidental cuts. There were reports of frequent eye irritation owing to visible dust and smoke emissions in the workplace, which can be ascribed to the fact that firewood is the only source of energy used as fuel in the garri frying process. The majority of respondents (89.1%) reported exhaustion at work as a result of heat exposure, while 98.2% reported aches and pains as a result of the stress associated in garri processing. An on-the-spot inspection revealed that all of the workers were not properly clothed, with the majority wearing only underpants and a wrapper. This could be due to the fact that they are continually exposed to high temperatures, which causes excessive sweating. Musculoskeletal problems, such as pain and stiffness in the hands, fingers, and wrists (87.3%), pain in the legs and feet (90.7%), numbness in the legs and feet (81.8%), constricted waist (90.9%), knee discomfort (58.2%), and back and neck pain (85.5%), were the most common health issues reported by workers. In addition, 98.2% of respondents reported encountering biohazards in the form of bug infestation in processing centers, with 89.1% reporting insect bites/stings from pooled waste water around the processing center.

In another study, Oyegbami, Oboh and Omueti, (2010) explored cassava processors' awareness of occupational and environmental hazards associated with cassava processing in South-western Nigeria. According to the findings, the majority of those polled had knowledge of occupational dangers such as aches and pains (91.1%), cuts/bruises (100%), fatigues (77.1%), and dermatitis (100%), It might happen at any point from the peeling to the final cooking/frying stage.

These are risks that are manifested physically as a result of the procedure. Man may be fully unaware of the risks connected with cassava processing since his first priority is to fight hunger through food production and consumption, especially in the face of poverty. The majority of people surveyed were aware of work hazards include dermatitis (100%), aches and pains (91.1%), fatigues (77.1%), and cuts and bruises (100%), which can happen anywhere from the peeling process to the final stage of frying or cooking, according to the data. These are risks to one's physical safety that arise from the procedure. Man may be fully unaware of the risks connected with cassava processing activities since his first priority, especially in the face of poverty, is to fight hunger through food production and consumption. The results of this study also showed that processors were aware of the risks to the environment presented by cassava wastewater, including the harm to buildings and plants that was observed during interviews.

In their study on “Occupational and environmental health hazards associated with food processing and the use of personal protective equipment: A case study of Garri processing in southern Ghana”. According to Fosu-Mensah et al., (2021), a large proportion (97.8%) of processors believed garri production was detrimental to health, with 2.2% believing differently. They also stated that just 16.7% of women wore the clothing that covered their hands and legs. Some of the health risks mentioned by the garri manufacturers included smoke inhalation, severe heat from the fire, and a boulder mishap. According to the findings, only 5.6% of those polled had received training on how to prevent occupational potential health risks and install better stoves., with the remaining 94.4% having received no training. They also documented that respondents sought medical attention for health concerns which include induced fever, severe aches, dizziness, pains, induced diarrhea, cuts which could be deep and requires stitching, boulder accident, eye irritation, and skin rashes. Furthermore, the vast majority of respondents (80%) released their wastewater into the environment. None of the responders treated their wastewater before releasing it into the environment. Approximately 20% of responders saved their effluent for future use. The respondents cited the following environmental effects of effluent: poor odor (87.8%), 96.7% destruction of vegetative cover when wastewater is dumped, 10% tree mortality, and 43.3% loss of soil productivity

Adepoju, Oladeebo and Toromade, (2019**)** Analyzed Occupational Hazards and Poverty Profile among Cassava Processors in Oyo State, Nigeria. The study discovered occupational dangers in the cassava processing industries in then area. The majority of respondents (98.15%, 94.88%, and 94.42%) stated that they were frequently faced with problems such as inhaling smoke during frying operation, cuts sustained while peeling, malaria and typhoid fever owing to insect infestation while planting and processing cassava. Approximately 92%, 76.27%, and 66.51% of the processors reported bug bites, headaches from stress while processing cassava, and Catarrh during sieving yam flour. Over 80% of the processors reported frequent joint pain while pounding fufu, While 72.09 percent expressed regular weariness as a result of the rigorous nature of the processing and 47.44 percent experienced eye discomfort, Furthermore, 33 percent of the processors said they never got bitten by a snake while collecting and peeling cassava, while 49.3 percent said it happened frequently. 53.95% of the respondents reported hearing loss as a result of excessive noise generated by the grinding equipment during cassava processing. Fourty-six percent of them reported frequent skin irritation from extreme heat. The least dangerous threats faced by cassava processors are exposure to harmful cyanide content during cassava dewatering and food poisoning owing to cyanide concentration in cassava if not adequately dewatered.

2.11.4 Impact of cassava processing technologies on the livelihood of women processors

In a study, Adeleye et al., (2020) assessed Cassava Processing techniques on the Livelihood of Agro-Forestry Farmers in Edo State, Nigeria. According to the study, (0.8%) improved their output with less than 50kg, (33.6%) increased between 50kg and 100kg, and (46.4%) increased between 100kg and 200kg. Furthermore, 16.0% of farmers raised their agricultural output between 200 and 500kg, while 3.2% rose above 500kg. This means that if the procedures were applied, they could boost production. All farmers, without exception, stated that the processing technology improved their livelihood. This means that using cassava processing techniques boosted their production, which in turn increased their farm income and, as a result, the livelihood of processors.

Ekwe, Ukpai, and Ahumihe (2017) conducted research on "small scale processors' involvement in cassava postharvest and families' food provision in Imo state, Nigeria." The distribution of respondents based on the status of household food provision gained from cassava post-harvest technologies, rated on a 5-point Likert-type scale, shows that respondents recorded a moderate level (3.31) of Household food provision from their involvement in cassava post-harvest activities.

Again, the results suggest that respondents have yet to leverage the benefits of the various cassava post-harvest activities available, which may be the cause of the area's persistent hunger. Further findings in the study show a relationship between respondents' cassava postharvest livelihood activities and household food provision status, with probit analysis revealing a significant positive relationship between household food provision status and cassava postharvest activities such as processing/marketing fufu (2.967) and processing/marketing flour (2.967/2.413). This means that as respondents' households were more active in the processing and sale of cassava fufu and flour, their food provision status improved.

Yidana, Osei-Kwarteng, and Amadu (2013) concluded in their study on "the impact of cassava processing on the livelihoods of women processors in Central Gonja district of the Northern region of Ghana" that cassava processing is profitable and contributes significantly to the standard of living of women cassava processors in terms of income generation and family food security.

2.11.5 Contributions of women processors to household welfare

In their study on “Rural Women in Kwara State (Nigeria) and their Contributions to the Welfare of their Households”, Falola, Fakayode, Kayode and Amusa, (2020). The analysis of data reveals the contribution of women to family expenses. According to the study, 92.33% of women's earnings are spent on feeding, with the remaining 6.67% preserved for personal use. Food was likewise the most important area of contribution, accounting for 47.73% of their entire contribution to family expenditure, according to the statistic. Clothing, children's education, investments, transportation, health and medical care, and housing rent were the categories of non-food expenditure contribution by women, in decreasing order of importance. Other non-food expenditures incurred by the females were electricity bills, petrol, and taxes. This accounts for 3.54% of their total contribution to household consumption.

According to these findings, women contribute considerably to the economic well-being of rural households. Adepoju, Ogunniyi, and Agbedeyi (2015) investigated the role of women in food security in households in Osun State, Nigeria. The study's data analyses revealed the rank order of women's roles in household food security. Food processing and meal preparation were scored first, with a weighted mean score of (2.0083). This is followed by family security (1.9833), acquiring a variety of food items for consumption (1.8917), food purchasing and distribution (1.6667), enhanced processing techniques (1.6500), and kid nutrition (1.6167), in that order.

2.11.6 Constraints associated with the use of cassava processing technologies

Ewebiyi, Ikotun, and Olayemi, (2020) analyzed the constraints to utilization of improved processing technologies among cassava processors in oyo state, Nigeria. The study's findings revealed that the majority of respondents (91.5%, 88.6%, 84.1%, 83.0%, and 80.1%) saw insufficient cash, a lack of technical know-how, insufficient information, excessive purchasing costs, and insufficient engineers as major barriers to implementing enhanced processing technology Furthermore, political insecurity, natural catastrophes, and a lack of computer literacy were indicated as minor hurdles to the employment of improved processing technology among cassava processors in the research region by 64.2% and 60.8% of respondents, respectively. This demonstrated that respondents' limitations constituted a significant obstacle to their adoption and use of advanced processing technology.

In another study, “assessment of cassava processing technologies usage among rural women in kwara state, Nigeria”, According to Awoyemi et al., (2020), the principal restrictions to the use of cassava processing technology in the study region are high machine costs (2.98) and high maintenance costs (2.97). This means that majority of those surveyed couldn't really acquire the machinery needed for cassava processing, and those who could not afford the maintenance costs. It also shown that intermittent power supply (1.79) is a constraint of the technologies' employment, although it has no substantial influence.

In another study, “Analysis of Women Participation in Cassava Production and Processing in Imo State, Southeast Nigeria”, According to Onyemauwa (2012), the primary barriers limiting women's participation in cassava cultivation and processing in the state are rated in order of priority. They include women's non-ownership of farm land, women's involvement with domestic tasks, insufficient farm size, and excessive processing costs.

2.12.0 Key Concepts Linked to Sustainable Livelihood

2.12.1 The Concept of Livelihood

There are numerous resources that are very paramount to household livelihood of an individual or group or family that participates in agricultural enterprises e.g cassava processing. Some cassava processors in order to meet their needs, homes have access to tangible and immaterial resources..

The breadth of social, physical, economic, and political factors that affect how easily disenfranchised families may access quality services including government, markets, information, and healthcare are included in the livelihood resources of the cassava processors. In other words, the families of cassava processors who lack access to the systems and services that have an impact on their livelihoods and that determine their capacity to perform their civic duties and rights as equal citizens are the most vulnerable.

A study by Dercon, (2001) reported that the livelihoods approach is an important aspect of improving the living standard of individual cassava processor or group and is concerned first with people that participate in agricultural and non-agricultural activities. Additionally, it aims to provide a precise and realistic picture of people's assets and capital endowments as well as their attempts to translate strength into successful living results.

2.12.2 Natural Assets

According to Young and Goldman, (2015) natural resource stocks from which resource flow and services (such as the nitrogen cycle and erosion prevention) that are essential for subsistence are derived are referred to as natural capital by farmers or agricultural practitioners. Natural capital is made up of a wide range of resources, including both movable assets utilized directly in the production of goods and intangible public goods like the environment and biodiversity (such as trees, land). However, this part of the assets that support livelihoods helps farmers and cassava processors be more productive.

2.12.3 Physical Assets

The contribution of physical capital to the growth of agricultural enterprises particularly cassava processing cannot be over emphasized. The necessary producing commodities and basic infrastructure are considered physical capital. According to the findings of a study carried out by Jonathan (2000), physical capital infrastructure refers to modifications made to the physical surroundings that enable individuals to achieve their fundamental needs and increase the productivity of their businesses. The tools and equipment that individuals use to work more productively, particularly in the domain of cassava processing operations, are known as producer products.

2.12.4 Financial Assets/Income

This is a determinant factor in term of increasing and decreasing the productivity of an enterprise. Good income is very important in agricultural production activities and its availability often boosts agricultural production activities particularly cassava production. Cassava processing is said to be women business and they require access to good income/financial asset that can lead to good agricultural productivities and hence, improve livelihood.

Krantz, (2001) defined that the term "financial capital" refers to the money that people have access to and utilize to pursue their goals for a living. This term encompasses both flow and stockpiles, and both consumption and production of goods and services of economic sectors. The findings implied that respondents largely depend on cassava processing for their livelihood. The report of DFID, (2000), that guaranteeing women's incomes is a crucial prerequisite for ending poverty and safeguarding human rights, especially at the individual level, as it helps lay the groundwork for societal change. The adoption of new technology by farmers is positively correlated with revenue (Ekwe, 2004).

2.12.5 Human Assets

According to Yang (2003), human capital is defined as the abilities, knowledge, and capacity for work, together with excellent health, that when combined allow people to pursue a variety of livelihood strategies and attain livelihood goals. This also enormously contributed to the growth of other assets (physical, natural, and capital, financial and human). On the other hand, at the household level, human capital is an important factor with characteristics of amount and quality of labour available, and this varies according to household size, skill, level, leadership potential, and health status (Kollmar and Gamper, 2002).

2.12.6 Social Assets

The phrase "social capital" refers to social resources that help individuals or households achieve their goals for a sustainable way of life. The great diversity of livelihood strategies at every level within and between industries, within households, and throughout time has also been highlighted by studies (Stirrat, 2004).

2.12.7 Yield

This is the produce or products received from involvement in agricultural activities such as the output from cassava processing which result into large quantity of cassava products. Yield can only be increased or boosted if all other factors of agricultural production like improved stem cuttings, land, financial assets, agrochemicals, processing equipment, extension services, labour, are at the farmer’s processors’ disposal. Though, to increase yield is the utmost target of all farmers/processors in the agricultural farming activities.

2.13 Adoption of New Techniques

Adoption of improved technology is central to agricultural development of all categories of farmers and it is one of the ways to increase yield in agricultural farming activities. Acceptance of new technological innovations of cassava processing by women processors will boost their yield and thereby improve the income they generated from processing activities and thus lead to improvement in both livelihood strategies and objectives of women processors and their family or household as a whole. And when this happens, it can lead to improvement in their standard of living as well.

2.14 Livelihood Approach Framework

Livelihoods can be defined as ways of life of people which includes people's actions they engage in to meet their necessities for survival and how they go about doing so. which includes people's activities for their survival and how they execute them in fulfilling these needs. For instance, cassava processing is a way of life of cassava processors because majority of them depend largely on the activities for their livelihood.

According to Long (2004), livelihood entails trying to make a living, trying to meet diverse economic needs and consumption, managing risks and uncertainties, pursuing new chances, and choosing between different value perspectives. Life is all about managing relationships, claiming one's worth, and the connections between each of those responsibilities and group identity, in addition to providing for one's basic needs. Omiti and Omosa (2002) asserted that livelihoods are entirely dependent on the kind of image the society wants to present of itself and the importance of the system complying to this image.

Additionally, Barret and Reardon (2000) defined assets as stocks that generate returns in the form of cash or in-kind benefits, because they represent the foundational stage upon which one may construct the household livelihood, these assets for sustaining life are reliant on the household's capacity to engage in activities that generate money (Barrett & Reardon, 2002).

2.15 Sustainable Livelihoods Approach (SLA)

Long-term maintenance or improvement of resource productivity is referred to as a sustainable way of life. In the discussion of rural development, poverty alleviation, and environmental management, the idea of sustainable rural livelihoods is becoming more and more important. Collectively, these definitions show that a person's means of support can take many different forms, relating to both their actions and the results of those actions.

The method is built on the notion that individuals require a range of assets in order to achieve successful livelihood outcomes; no one asset category can satisfy people's needs for the wide range of livelihood outcomes they want. Poor people typically have restricted access to any kind of assets. Access to resources is crucial for the ability to escape poverty (Warner, 2000). Resources that are accessible to people, households, or groups enable them to utilize them and enable them to build a living (Bebbington, 1999).

The SLA is prominent in current development initiatives that seek to combat poverty, enhance the livelihoods of communities, and lessen their vulnerability through income-generating activities (Edwards, 2002; Neiland & Bene, 2004). Many NGOs and development organizations are using it more frequently to comprehend capital management systems for living (Allison & Horemans, 2006). The approach acknowledges the the complexity of livelihood strategies is seasonal and cyclical. in an effort to enhance rural development policy and practice (Carney, 2002; Allison & Ellis, 2001).

It incorporates a wider viewpoint on how individuals make a living by looking beyond the activities that people engage in that generate revenue (Chambers & Conway, 1992; Farrington et al., 1999; Shankland, 2000). The sustainable livelihood strategy, which strives to improve people's livelihoods by leveraging their assets, is comprehensive and people-centered (Farrington et al., 1999). The sustainable livelihoods approach (SLA) will be used in this project. The SLA is a technique for comprehending how households use resources and capacities to create livelihood strategies that include a variety of activities.

It has been suggested that using the sustainable livelihoods framework to understand rural women's circumstances and the sustainable livelihoods principles to change how their circumstances are addressed is one strategy to promote livelihoods that is sustainable (Carney, 2003). The livelihood framework makes it easier to think holistically about the factors that the poor may be particularly vulnerable to, the tools at their disposal to increase their assets, expand their capacities, and lessen their susceptibility, along with the wider community's laws and institutions that have an influence on their capacity to support themselves (DFID, 1999).

The paradigm demonstrates a method of considering livelihoods while accounting for essential elements such as possibilities and restrictions in each context (Ashley & Carney, 1999). There are many livelihood models that researchers have developed, but they all share certain key components, which are as follows:

a.Context: The external environment that affects households and is mostly to blame for their difficulties (social, economic, political and environmental dimensions, conditions and trends).

b. Assets and Capabilities: The resources that poor people own or have access to and employ to make a living are known as assets and capacities (financial, natural, physical, human, political, and social capital).

c. Policies, institutions and processes : The institutions, organizations, policies, and legislation that control access to resources and the option of livelihood options are referred to as institutions, policies and processes.

d. **Livelihood strategies**: The strategies that help people acquire the resources and skills they need to improve their quality of life (i.e., consumption, production, processing, exchange and income generating activities).

e. Outcomes: Effective livelihood solutions should increase people's income security and economic sustainability. These include enhanced wellbeing, better sustainable use of the natural resource base and less susceptibility. They also include better nutrition, health, shelter, water and education.

The primary elements that limit or improve people's prospects for a good life are shown in the framework for livelihood, along with the usual connections between them. The framework for sustainable livelihoods, which includes these components, is shown in Figure 1.

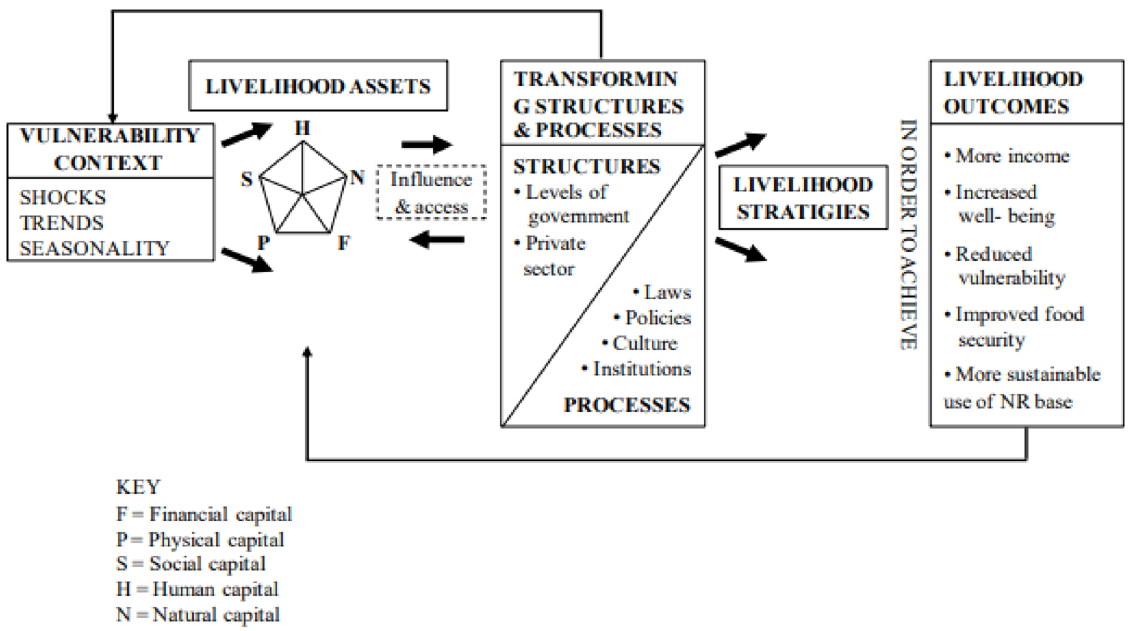

Figure 1: Sustainable livelihoods framework (DFID) (From Carney et al., 1999: 9)

2.16. Gaps in Literature

Mechanizing the unit operations in cassava processing and utilization of improved processing technology is important in the cassava processing sub-sector of the agricultural sector. Researches on the use of improved cassava processing technology although common their impact on the livelihood of cassava processors has not been fully reported. To address his gap, this study assessed the impact of cassava processing technology usage on the livelihood of processors by comparing the livelihood users of improved and conventional technologies in cassava processing.

The study reported a significant difference between the livelihood of improved technology users and conventional technology users with improved technology users exhibiting a better livelihood status when compared with conventional technology users.

2.17. Theoretical Framework

2.17.1 The Unified Theory of Acceptance and Use of Technology (UTAUT)

The value of this unified theory of technology acceptance and usage (UTAUT) in the technology acceptance model developed by Venkatesh and others in "User acceptance of information technology towards a unified vision" "cannot be over emphasized for its contributions to farmers/processors adoption process. This theory expresses users' both the initial intentions to use an information system and the actual utilization. According to the theory, there are four main constructs: (1) performance expectations; (2) effort expectations; (3) social influence; and (4) facilitating circumstances.

The first three are categorized as direct determinants of user behaviour, and the fourth is categorized in the same way. The four main dimensions' effects on usage intention and behaviour are said to be moderated by gender, age, experience among adopters' socioeconomic factors, and voluntariness of use. One of the most important concerns is: What are the user's attitudes about accepting technology? Many educational institutions, including universities, research institutes, and other tertiary institutions, have adopted and implemented this theory to address this issue. Regardless of the level of infrastructure and support services offered, it is important to consider whether the teachers and trainers, in the case of cassava processing technologies, were prepared to integrate available technologies to modify the livelihood assets of cassava processors through the adoption of improved cassava processing technologies.

The four key ideas in this theory; Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Condition (FC) were developed by Venkatesh et al., 2003. The four key ideas addressed are independent variables that influence dependent variables, behavioural and usage, according to Venkatesh, Morris, Davis and Davis (2003). The four key principles have, however, served as a conduit via which socio-economic characteristics such as gender, age, experience, and volunteers of system use have indirectly influenced the dependent variables. An important indicator of how people will utilize technology is seen to be their behavioural intention.

b. Performance Expectancy: The performance expectancy, according to Venkatesh et al. (2003), is the extent to which an individual or processor believes that using the system would assist him or her achieve improvements in job performance. Therefore, it is expected that performance expectancy will decrease the impact of a person's gender and age on behavioural intention.

c. Effort Expectancy: This is what Venkatesh et al. (2003) acknowledged to be the system's level of usability ease. It is expected that effort expectancy will attenuate the effects of gender, age, and processor experience on behavioural intention.

d. Social Influence: This might be characterized as the extent to which a person or processing acknowledges the significance others find in their use of the new system (Venkatesh et al., 2003). Social influence is hypothesized to moderate the impact of gender, age, experience, and volunteers of a person's system or processor on behavioural intention to embrace better technology.

e. Facilitating Conditions: The degree to which a person feels that an organization and technological infrastructure exist to enable use of the system is one of the key factors influencing how well-received new technology is (Venkatesh et al., 2003). This could be a hypothesis to determine how experience and age affect behavioural intention.

The UTAT survey according to Alqeisi and Hegazy (2015) was found to have the model to be explained by seventy percent of the variation in consumer intentions to use technology. From the forgoing of the theory, it is important for the social scientists to consider using the concepts highlighted by the theory in order to justify their research results in according with the principles of adoption of new technologies.

However, understanding of the basic features of this theory gives insight into the dire needs for intervention technologies stakeholders, in this case cassava processing technologies disseminated by RTEP and other collabourating agencies, to note that the need arises to ensure effective moderation of the influence on behavioural intention of the processors. Also, there is need to work towards the realization of the institutional goal through efficient and adequate provision of necessary facilitating conditions. These include organizational and technical infrastructures supporting the adoption of technologies.

2.17.2 The Concerns-Based Adoption Model (CBAM)

This theory includes three frameworks for evaluating instructors, researchers, or other mediators in relation to the acceptance and implementation of programs to see where they fall in the change process. Levels of Use, Stages of Concern, and Innovation Configurations are the three evaluation frameworks. The stages of concern framework was the primary focus of the CBAM and has remained the central component, leading to numerous investigations of its use to support the implementation of new educational practices, therefore all three CBAM frameworks are worthwhile (For instance, the application of extension technologies, potential issues with extension training, and family-centered early intervention techniques).

From not knowing about the planned change through refining and refocusing newly formed practices, the CBAM Stages of Concern framework offers a structured way to access practitioners' feelings about change throughout the change process (Lo, 2018; Matar, 2015; Roach, Kratochwill & Frank, 2009).

The stages of action are arranged in a hierarchy and on a scale from 0 to 6 (Awareness, Information, Personal, Management, Consequence, Collabouration, and refocusing), where 0 denotes "little knowledge about or interest in change" and 6 denotes considerations for modifying the intervention or replacing it entirely with something even more effective (Anderson, 1997, p. 334). In summary, it makes sense that social influence theory's many ideas may be applied to the implementation of EBIs by both academics and school personnel.

Three potential methods are included in CBAM for researchers and practitioners to evaluate practitioners' stages of concern: (1) One-legged conferences; (2) open-ended concerns statements; and (3) the phases of Concern Questionnaire (SoCQ)(Hall & Hord, 1987). One-legged conferences feature quick meetings that typically take place in school hallways or other informal consultation settings. These meetings allow for the gathering of data regarding participant perceptions of the intervention and the comparison of remarks to the Stages of Concern.

Although they can take longer and be more difficult to evaluate than one-legged conferences, open-ended concerns statements are another way to assess practitioners' Stages of Concern (Hall & Hord, 1987). Another tool for assessing practitioners' Stages of Concern is the SoCQ (Hall & Hord, 1987), which may also be the most time-effective. The highest concern in the respondent's profile is taken into consideration when analyzing the survey findings.

The Stages of Concern represent an equilibrium continuum that practitioners may move through as they transition from one level of comfort and certainty with change to a new level of comfort with innovative practice. It may be possible to lessen the likelihood of passive or active resistance to new practices in an effort to maintain equilibrium by carefully taking into account the concerns of practitioners during the adoption process of EBIs, as indicated by their status on the Stages of Concern framework. In order to evaluate and support the implementation of interventions and programs, practitioners and researchers should regularly employ the Stage of Concern evaluation methodologies. To better comprehend the reasons behind the adoption or rejection of an EBI, CBAM can be used to the EBI movement. With a better understanding of how to enhance intervention implementation, researchers (in this case ADPs, IFAD) and practitioners (in this case, cassava processors) can better promote and disseminate programs. The stages of concern framework developed by CBAM is an appealing method for comprehending and encouraging the adoption of new practices. Studies have shown how teachers affect students' behaviour and performance, as well as how faithfully they implement their lessons (George, Hall, and Uchiyama, 2000; Van den Berg and Ros, 1999). In response, researchers have used exploratory factor analysis to create models with fewer elements and fewer stages of concern and have seen it having the most promising outcomes (Bailey and Palsha, 1992; Shotsberger and Crawford, 1999).

However, going by the features of this theory, which share the diffusion of innovation and training as instructors to cassava processors in Kogi and Kwara States, the use of different Social Influence theory tenets is quite imperative. This can be further view in terms of having informal environments for dialogue that permit information collecting regarding participants' perceptions; in this example, the cassava processors, about the intervention and comparing their comments. Other implications or important significance which could be drawn from the relationship of this study and the CBAM theory is the need for organization of conferences on the specific objectives of intervention to gather adequate information about the interventions, encouraging, exchanging ideas through group discussion (open ended concerns statements), e.g. Cassava group processors and evaluation of the genuity of the information given and assessment of empirical evidences.

2.17.3 Theory of Change

Impact assessment is a methodical evaluation of the major or long-lasting (Positive or Negative) changes in people's lives caused by a specific activity or series of activities in comparison to a counterfactual (adapted from Roche, 1999). The idea demonstrated how actions related to agricultural development affect livelihood and food security in a condensed and generalized impact route (or a result chain). A development intervention's predicted or actual effects on the social, economic, and environmental elements that it is intended to or unintentionally affects are identified through impact assessment.

The explanation of an expected series of events that will result in a specific desired outcome is known as the theory of change. A theory of change, according to James (2011), describes how actions are thought to result in a series of outcomes that help achieve the ultimate intended impacts.

A learning-based philosophy of change is presented in the comic relief review as an ongoing process of reflection to examine change and how it occurs. It integrates a program or project into a larger examination of the processes involved in transformation and draws on outside knowledge of development. The theory of change expresses our understanding of change while also recognizing its complexity.

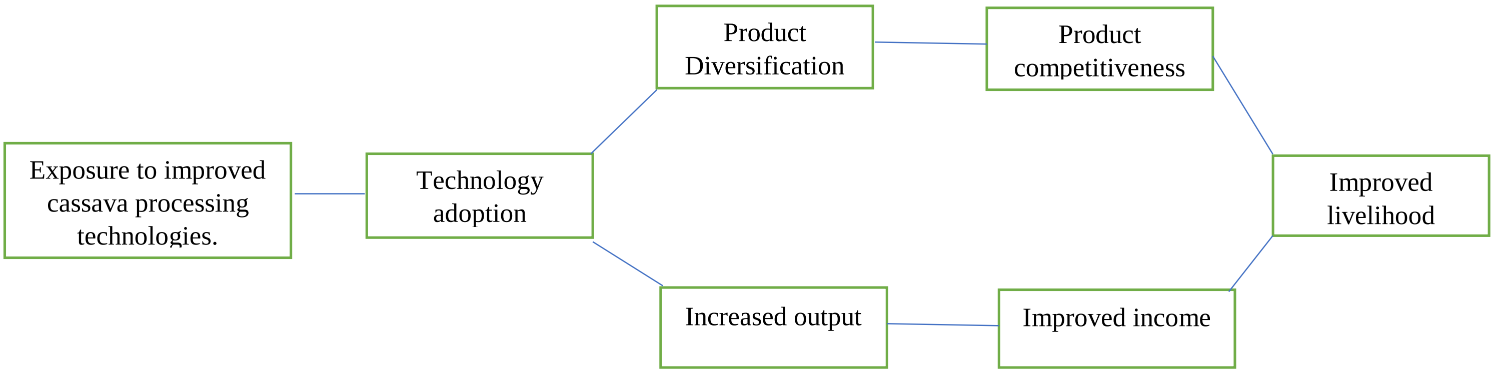

Figure 2: Schematic Depiction of a Theory of change.

Fig. 2 illustrates the theory of change of the cassava processing intervention considered in this study. The first is the causal chain in the cassava processors' participation in the programme. Participation in the programme implies the adoption of improved cassava processing technologies provided by RTEP and other interventions in the States. As shown in the figure, the effect of the adoption of the new technology is twofold. First, the new technology is expected to lead to diversification of processing options and products. Second, it is expected to lead to increased product output arising from the mechanization of the unit operations of cassava processing. Both effects lead to product competitiveness and improved income. The overall outcome is that there would be an improvement in the livelihood of cassava processors.

2.18 Conceptual Framework

Conceptual frameworks are made up of a number of big ideas and theories that aid in the correct problem identification, question framing, and literature search for researchers (Paul, 2005). Fig. 3 displays the conceptual framework the author employed for this investigation. The framework shows how the independent variables may bring about change in the dependent variable occasioned by the use of technology in cassava processing. The antecedent variables that occur before the independent and dependent variables, these variables explain the pre-existing conditions before the any intervention. The antecedent variables in this study includes food insufficiency, poor housing condition, poor water facilities among other. The independent variables are social and economic traits of cassava processors, which include age of the respondents, marital status, experience in processing, household size, membership of associations and the source of cassava for processing. The dependent variable is the cassava processing impact on livelihood expressed by the livelihood outcomes of cassava processors. These impacts may translate to direct outcomes that can be seen in change in product output, change in income, poverty reduction, improved product quality and employment generation. Other outcomes include acquisition of physical assets (houses, processing equipment, farm tools, home appliance), change in status and esteem, training and capacity building, reduced vulnerability and improved food security. The intervening variables are factors which have influence the core variables and the direct outcomes but will not be investigated in the study. They are the catalytic elements required to stimulate the adoption of cassava processing technologies. The intervening variables include appropriate government policies, availability of infrastructure, availability of extension services, cohesive and formidable group dynamics e.t.c. These factors to some extent may indirectly influence the dependent and independent variables.

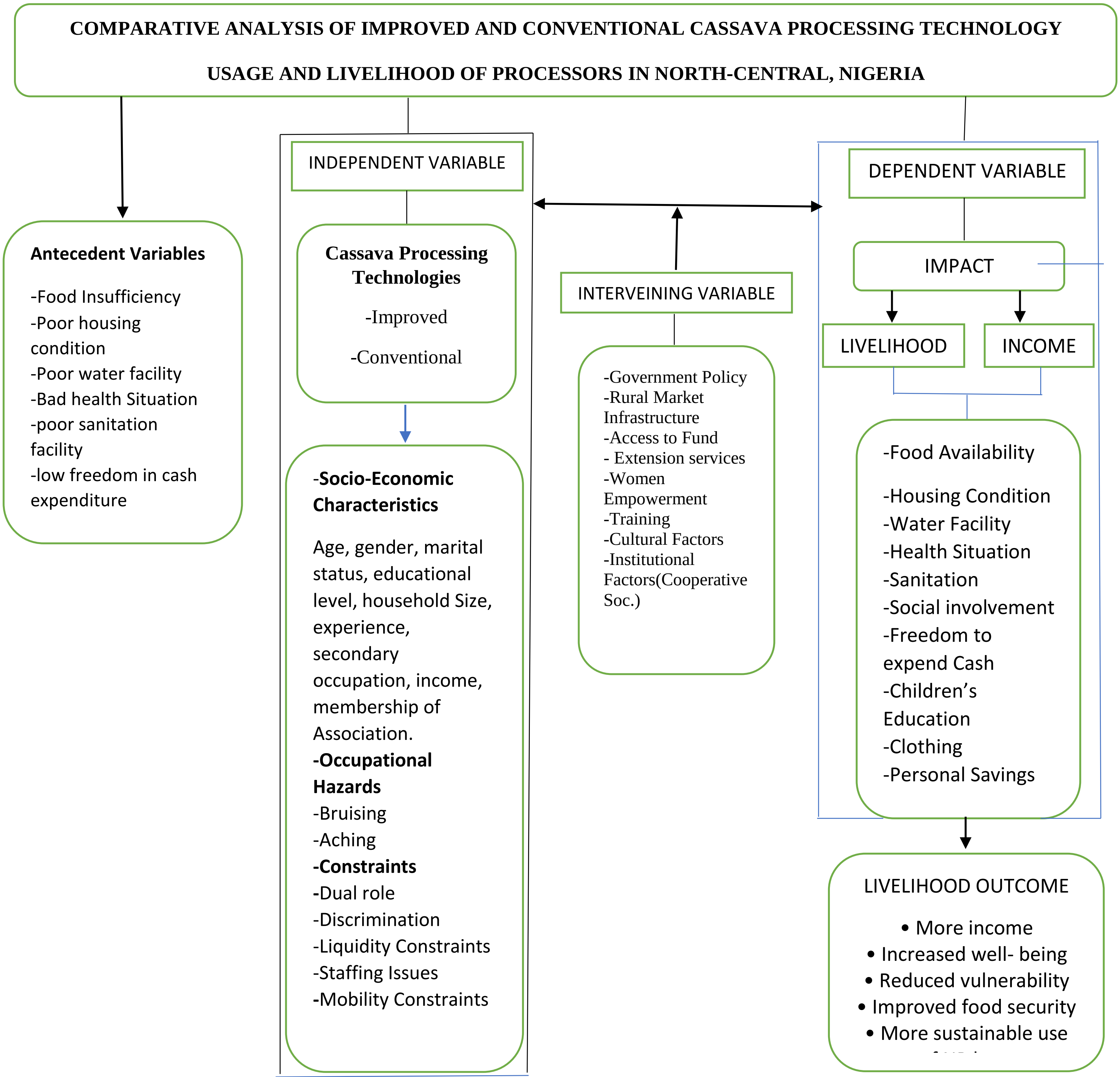

Figure 3: Conceptual Framework of the Study.

Source: Author's own concept, 2021.

CHAPTER THREE

3.0 METHODOLOGY

3. 1 Study Area

The study was carried out in Kogi and Kwara States which are in the north-central geopolitical zones of Nigeria.

3.1.1 Kogi State

Kogi State, popularly known as the Confluence State, was created along eight others on 27th August 1991. It was formed from the former Nigerian states of Kwara and Benue. The state is located between longitude 5.22E and latitudes 6.330N and 8.440N of the equator. Thus, it extends from the southern edge of the tropical rain forest to the northernmost tip of the wooded derived savannah and guinea savannah.

Igala, Ebira, and Okun are the three primary ethnic groupings and languages in Kogi State. The population of the state was 3.596 million as presented by the National Population Census (NPC) of 2006. Roughly 228,964 farm households, or about 80% of her population, are small-scale farmers who live in rural areas, according to the 1999 village listing Survey (VLS). Kogi State has 21 local Government Areas (LGAs). In terms of land mass, Kogi State occupies 75,000 square kilometres (km^2), ranking 13th out of the 36 states of the federation. Arable land constitutes approximately 67 percent (50,000 sq km) of the land area. River Niger and Benue, the two major rivers in the country, transverse the length of the state with their confluence at Lokoja and several tributaries provide expansive flood plains which are very well adapted to production of many crops.

Kogi State climate is divisible into wet and dry season. Meteorological records indicate that rainfall starts in most years during the month of April, the dry season starts in November and lasts until February or March depending on the year. The annual rainfall pattern varies between 1000mm and 1800mm, which is often sufficient for the cultivation of the majority of agricultural crops. All-season average daily temperatures vary from 24 to 27 degrees Celsius. The hottest months of the year are March and April with temperature rising up to 30^0C in the northern part of the State. Average relative humidity during the raining season is about 80%, and this fall considerably below 21% during the dry season.

The main agricultural activity is the cultivation of food crops such rice, yams, cassava, sorghum, maize, millet, and groundnuts. Commercial cassava farming has been more popular in the state recently. The most common farming method is multiple cropping, which involves combining various crop mixtures, with compositions based on cassava being the most popular. Typically, each family has an average farm area of 2-3 ha, with a family size of 6-7 people.

Kogi state ADP has four agricultural zones to facilitate delivery of extension services. Zone A has its headquarters at Aiyetoro-Gbede, while zone B is located at Anyigba. The headquarters of zone C and D are respectively Koton-karfe and Aloma.

(https://www.nigeriagalleria.com/Nigeria/States_Nigeria/Kogi/Brief-History-of-Kogi-State.html retrieved July, 2020).

3.1.2 Kwara State

Kwara state was created in May 1967. Further state creation exercises bifurcated the state in 1976 and 1991 to its present size. With Ilorin serving as the State capital and administrative center, it has sixteen Local Government Areas (LGAs)(KWSG Diary, 2006).

The state has a land area of around 32,500 square kilometers and is situated in the North Central geopolitical zone. It is located between the Equator's latitude of 6.500 and 11.500 North and the longitudes of 2.800 and 7.500 East. The typical temperature ranges from 27 to 35 degrees Celsius. The annual mean rainfall ranges from 1000 to 1500 millimeters, and the pattern of precipitation is tropical in nature. The dry (harmattan) season begins in November and lasts until March, whereas the rainy/wet season typically begins in early April and concludes around the end of October.

As one moves towards the northern region of the State, the vegetation gradually starts to shrink to Guinea savannah from the southern rain forest. Undulating hills, plains, valleys, and green open spaces make up the scenery. State is traversed by the River Niger. Other significant rivers are Asa, Osin, and Owu, which features a waterfall and is a popular tourist destination. Numerous crops with significant economic value can be grown in the state thanks to its climate, topography, vegetation, and soil types. Cassava, yam, rice, sorghum, cowpeas, vegetables, etc. are among the crops grown there. The state is also good for rearing animals. According to the 1991 National Population Commission (NPC) census, there were 1,556 469 people living there. Four significant ethnic groups, including the Yoruba, Nupe, Fulani, and Baruba, coexist in the state.

The state's Agricultural Development Programme (ADP) contains four agricultural zones with headquarters in Kiama for Zone A, Pategi for Zone B, Igbaja for Zone C, and Malete for Zone D. The ADP was created to make it easier to conduct extension services (KWSG Diary, 2006).

3.2 Study Population

The Sample Frame of the study includes all members of women cassava processors groups in Kogi and Kwara State of Nigeria. This is made up of 1660 women processors in the study area.

3.3 Sampling Procedure and Sample Size

The survey participants were chosen using a three-stage selection method. Due to the concentration of cassava processors in these two ADP zones, only two of the four ADP zones in the two states were purposively chosen for the initial stage (Stage one). List of cassava processors who have adopted and are using improved technologies based on cassava processing interventions over the years was obtain from the ADP headquarters in each States. The second stage involved selection of 35% of the members of all the registered improved technology users' groups in the 2 states, making a total of 205 and this was done using proportionate sampling method. The third stage involved random selection of an equal number (205) of Conventional technology users in the same zones to have a genuine comparison effect. This is to allow for comparison between improved and Conventional technology users and to ascertain the possible impact of the use of these technologies. This gives a total sample size of 410 that was used for the study.

Table 1 The procedure used for the proportionate allocation of the respondents for the study.

State	Zone	Groups	Processing Membership	Proportionate Sample size (Improved)	Control group (Conventional)
Kogi	A(Aiyetoro-Gbede)	8	115	40	40
	B (Anyigba)	10	155	54	54
	Total	**18**	**270**	**94**	**94**

Kwara	C (Igbaja)	12	195	68	68
	D (Malete)	10	123	43	43
	Total	**22**	**318**	**111**	**111**
	Total			**205**	**205**

Source: Author, 2021.

3.4 Method of Data Collection

Primary and secondary sources were used to gather the study's data. A structured interview schedule was used to collect the primary data. Trained enumerators and extension agents were engaged and trained from the Kwara State Agricultural Development Programme and Kogi State Agricultural Development Programme to collect information from the respondents while the internet, past studies, and both published and unpublished agricultural journal publications served as the sources for secondary data.

3.5 Validation of the instrument

In this study, face and content validity was employed. The interview schedule was given to specialists from the Department of Agricultural Extension and additional specialists. This was organized in accordance with the study's objectives and hypotheses. Before collecting data, the interview schedule was extensively modified in response to the experts' comments and recommendations. The purpose of this was to ensure that each of the items captured what it was designed to measure.

3.6 Reliability of the Instruments

In this case, the research instrument was subjected to test-retest method of reliability. Fifty respondents at Omu-aran and Ayedun, Kwara State were chosen for the pre-test. The first set of data were collected from the respondents at a set date and after two weeks, the second data set were collected from the same respondents. Then, the second test scores were correlated with the first test scores for all the variables in the research instrument to determine the coefficient of consistency. The correlation co-efficient (r) of 0.76 obtained ascertained the reliability of the instrument.

3.7 Measurement of Variables

The independent variables for the study were measured as follows:

3.7.1 Socio-Economic Characteristics:

1. Age: Women processors were requested to state their actual ages in years.
2. Marital Status: Women processors were requested to indicate whether they are single (1), married (2), single parent (3) divorced (4) or widowed (5).
3. Educational Level: Women processors were asked to state their years of schooling
4. Household Size: Women processors were requested to state the number of individuals with which they live under the same roof and eat from the same pot.
5. Years of Experience in cassava processing: The length of time respondents have been involved in cassava processing was requested, in years.
6. Other sources of Income: Women processors were asked to select from the available options to identify their other occupation.: Trading (1), Hair Plaiting (2), civil servant (3), Artisan (4), Tailoring (5), Farming (6).
7. Membership of Association: Respondents were asked to indicate whether they belong to any association or not and it was measured on the scale of Yes(1) and No (0)
8. Association belonged to: Respondents were asked to indicate the association they belong to and it will be measured as; Cassava processors group (1), Social Group(2), marketers (3), Farmers cooperative (4), women group (5).

9. Average annual income from cassava processing: Respondents were asked to indicate their annual income from cassava processing.
10. Average annual income from other sources: Respondents were asked to indicate their annual income from other sources aside agripreneurship.

A. Cassava processing technologies and tools available to cassava processors in the study area: This was measured by listing out available technologies and tools as observed in the study area at the time of the survey.
B. General cassava processing activities and occupational hazard associated with cassava processing in the study area: Twenty-seven potential hazards were listed. Cassava processors were requested to indicate their response for each item on a three-point rating scale; where 2 is assigned for 'always', 1 for 'sometimes', 0 for never.
C. Contribution of rural women to household welfare in the study area: This was measured on the bases of the major areas rural women spend money in the study area. About 11 major expenditure area will be itemized. This was measured on the bases of percentage contribution to each expenditure area.
D. Constraints faced by cassava processing in the study area: Potential difficulties in the areas of economics, society, and culture/religion were listed. Women processors were asked to rate each restraint on a three-point scale; where 2 is assigned for 'Major', 1 for 'Minor', 0 for 'Not a constraints'.

3.7.2 THE DEPENDENT VARIABLE: This is the implication of cassava processing technology on the livelihood of women processors. The operational definitions and methodologies used to measure the Seven Livelihood Indicators of Women cassava processors are illustrated in the discussion that follows. As developed by Sheheli (2011) in Bangladesh and modified by

Omotesho, Akinriade and Ogunlade (2017) as cited by Koloche, (2019) to ascertain the sources of income that rural women in such areas rely on for their livelihood. This livelihood indicator adopted for this study was to determine the implication of technology on the livelihood of women cassava processors in the study area. These seven indicators include:

3.7.2.1 Food availability and consumption Situation:

Three sub-dimensions were used to quantify the family's physical access to basic food during the entire year, the number of eating occasions, the daily pattern of food items ingested, and the number of dining occasions. The scores of the aforementioned three sub-dimensions were added together to determine each respondent's score for food availability and consumption situation.

i. Number of eating occasions: Number of eating occasion was measured with the number of times a cassava processor or any member of her household ate during the last 24- hour period prior to data collection. It was measured on a dichotomized scale where Yes is ‘1’ and No is ‘0’. Thus, the score could vary from 0 to 7.

ii. Daily pattern of food items consumed: This section is intended to discuss the foods that rural women ate throughout the course of a 24-hour period. Food items that women cassava processors eat as used by Hies (2005) and the results of the pilot survey 14 food items or food groups were chosen, and the percentage of each food item consumed by cassava processors during the 24 hours preceding the data collection period was recorded. A dichotomous choice question was presented to them, with "Yes" denoting 1 and "No" denoting 0. The score might thus range from 0 to 14.

iii. Availability of food: Food availability was graded as "3" for adequate, "2" for inadequate, and "1" for scarce. The family's access to food was assessed by the 12-month total scores for rural women. As a result, the range of possible scores for food availability was from 12 to 36, with 12 denoting the "lowest" and 36 denoting the "greatest" degree of food supply. Finally, the combined scores for the three sub-dimensions of the food availability and consumption situation were calculated. These scores range from 12 to 57, with 12 denoting a poor situation and 57 denoting a very good one.

3.7.2.2 Housing condition:

This indicator describes the current state of the rural women's home.

Five aspects of a house were taken into account to determine the housing conditions: the roof, walls, floor, location of the kitchen, and furniture. The score derived from these five house attributes were added to determine each respondent's overall housing situation. The possible score ranges from 5 to 17, with 5 denoting "extremely bad" housing conditions and 17 denoting "very good" conditions.

3.7.3.3. Water facilities:

Water sources, drinking water quality, various uses for water, and availability of drinking water were the four sub-dimensions used to measure the water facilities indicator. Each respondent's water facility score was determined by adding the scores from the four sub-dimensions mentioned above.

i. **Sources of water:** The kind of water supply that rural women mostly use for bathing, drinking, and cooking, as well as for doing laundry at home was used as the foundation for measuring the source of water. There were a total of five water sources, with the most accessible receiving a score of five and the least accessible receiving a score of one. As a result, water sources could receive a score between 1 and 5.

`ii. Quality of drinking: Four different criteria were used to evaluate the drinking water quality, with a possible score ranging from 1 to 4. As a result, water sources could receive a score between 1 and 4.

iii. Different purposes of water: The various uses of water were calculated based on five items: bathing for two, washing a cloth for one, cooking for four, drinking for five, and utensils for three. The range of possible scores was 1 to 5. As a result, water sources could receive a score between 1 and 5.

iv. Availability of drinking water: Drinking water accessibility was evaluated based on its year-round abundance. For each month, the supply of drinking water was scored as "3" was assigned for adequate, "2" represents inadequate, and "1" for scarcity. Each respondent's values for the previous year were summed together to get a score for the accessibility of drinking water that ranged from 12 to 36.

Finally, the combined scores for the four water facilities' auxiliary features which range from 15 to 50, with 50 denoting a very good water facility was be determined.

3.7.3.4 Health situation:

When the body and the soul are functioning in unison with the outer world, that is the definition of health (Nilsson and Petterson, 1998). Two sub-dimensions of the health situation; “perceived health status” and “access to medical care” were used to define and assess it. The health situation score was obtained by adding the scores from the two sub-dimensions.

i. Perceived health status: Five elements served as the basis for measuring this indicator. The range of the health status score was from 1 to 5. Good (5), Disabled (4), Short term illness (3), Long term Illness (2) and Weak (1).

ii. Ability to get health treatment: In the study area, it was established which healthcare providers offered services to rural women. There were five different healthcare professionals overall. A "2" for frequent visits, a "1" for infrequent visits, and a "0" for never visiting were given for the accessibility of medical treatment providers. Five items were used to test health care capacity, with a possible score ranging from 0 to 10.

The health situation score ranged from 1 to 15, with 1 denoting a "very bad" health situation and 15 denoting a "very good" health situation, taking into account the health state and ability to receive medical treatment.

3.7.3.5 Sanitation:

Sanitation was defined and assessed in terms of three sub-dimensions: the presence of a toilet, the type of toilet, and the state of the toilet. The sanitation score was obtained by adding the scores for the three sub-dimensions.

i. Possession of a toilet: This metric relates to the presence of a toilet in the home. Three items with scores of 2, 1, and 0 for having one's own toilet, using another person's toilet, and not having access to a toilet were the subjects of the data collection. Possession of a toilet could result in a score between 0 and 2.

ii. Type of toilet: This metric relates to the presence of a toilet in the home. Data were gathered on the three items with scores of 3, 2, and 1, respectively, for having sanitary restrooms, pit restrooms, and open-air restrooms. The range of available scores for toilet type was from 1 to 3.

iii. Toilet condition: This metric relates to the physical state of the toilet used by the cassava processor. To assess the condition of the restroom, the roof, walls, floor, and toilet placement were taken into account. The toilet condition score was created by adding the scores that were so acquired. The possible toilet condition scores ranged from 4 to 13, with 4 denoting a "very bad" condition and 13 denoting a "very good" state.

The sanitation score was then scaled from 5 to 18, where a score of 5 indicated that the facilities for women who prepare cassava were subpar and a score of 18 showed that they had excellent facilities.

3.7.3.6 Participation in social activities:

The frequency with which rural women attend various social gatherings is referred to as participation in social activities. By calculating a "social engagement score" based on participation in five chosen social activities, it was determined. Participation was graded as "2" for always, "1" for occasionally, and "0" for never. To get the overall score of engagement in social activities, the scores from five social events were then summed. As a result, the score for social activity involvement might range from 0 to 10, with 0 denoting "no engagement" and 10 denoting "regular participation."

3.7.3.7 Freedom in cash expenditure:

The ability of a cassava processor to spend on many elements of the family's activities is shown by this indication. The freedom of monetary expenditure was measured on a 4-point Likert-type scale, with scores of 4, 3, 2, and 1 signifying dependence on "herself," "husband," "together," and "other family members," respectively, for expenditure decisions. To gauge the flexibility of monetary expenditure, eight characteristics of spending were considered. The next step was to add the scores from each of the eight aspects to get the final score. The range of possible scores is 8 to 32, with a score of 8 denoting A score of 32 indicates "great freedom in financial expenditure," which means the respondent makes all of her own decisions, while a score of 0 indicates "poor freedom in cash expenditure," which means the respondent substantially depends on other family members to make decisions.

3.8.0 Developing the Cumulative Livelihood Status Score (CLSS)

The CLSS was established utilizing both qualitative and quantitative data in order to gather accurate and trustworthy information about the livelihood status of women cassava processors. To fully understand any multidimensional phenomenon, the indicators must be combined into more complicated indices (Sharp, 2003). Thus, the goal of the CLSS is to have a thorough understanding of the financial situation of cassava processors.

Two stages were taken to determine the CLSS. First, a total percentage score was calculated for each of the seven parameters of livelihood. The scores of these seven factors were then used to construct the cumulative livelihood status. Below is a summary of how a cassava processor's cumulative percentage score and cumulative livelihood status score are calculated:

3.8.1. Calculating the Cumulative Percentage Score

Each indicator's "cumulative percentage score" was calculated in two steps: (i) calculating the percentage score for each cassava processor, and (ii) calculating the cumulative percentage score.

I. The field score of each individual cassava processor was divided by the matching maximum score, and the result was represented as a percentage. The percentage score for each individual cassava processor was calculated using the formula below:

$$\text{ICPPS} = \frac{\text{ICPFS}}{\text{ICPPMS}} \text{X } 100$$

Where, ICPPS = Individual cassava processor’s percentage score

ICPFS = Individual cassava processor's field score

ICPPMS = Individual cassava processor's possible maximum score

II. The cumulative percentage score was calculated by multiplying the total percentage score for each cassava processor by the sample size. The cumulative percentage score was calculated using the formula shown below:

$$\mathrm{CPS} = \frac{\Sigma\mathrm{ICPPS}}{\mathrm{N}}$$

Where, CPS = Cumulative percentage score

ΣICPPS = Sum of individual cassava processor's percentage score

N = Sample size

3.8.2. Calculating the Cumulative Livelihood Status Score

By dividing the total cumulative percentage score of the livelihood indicators by 7, the cumulative livelihood status score of a rural woman was calculated. The cumulative livelihood status score was calculated using the methodology below:

$$\mathrm{CLSS} = \frac{\Sigma\mathrm{CPS}}{\mathrm{LI}}$$

Where, CLSS = Cumulative livelihood status score

ΣCPS = Sum of cumulative percentage score of seven livelihood indicators

LI = Livelihood indicators (7)

Different academics have recommended and used a similar study methodology to define multidimensional notions like livelihood, poverty, destitution, and empowerment (Rao & Woolcock, 2004; Barrett, 2004; Sharp, 2003; Chant, 2003; Kanbur, 2003).

3.9 `Data Analysis

The study's objectives were analyzed using descriptive statistics, which made use of frequency counts, percentages, mean scores, standard deviation, and charts. The study's hypotheses were tested using inferential statistics including multivariate regression and the t-test.

Table 2: Statistical tools Used

Objectives and hypotheses		Statistical tools Used
Objectives: 1, 2, 3 and 5		Descriptive statistics such as frequency count, percentages, Means, charts and Standard deviation
4		Livelihood indicators
Hypotheses:	H_{01}	Multivariate regression
	H_{02}	t-test
	H_{03}	Pearson Product Moment correlation (PPMC)
	H_{04}	Pearson Product Moment correlation (PPMC)

Source: Author, 2021.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

The study's findings were collated, presented and discussed in this chapter. The research findings and implications of the observations were extensively discussed. The results of the study were interpreted and discussed based on the specific objectives and hypotheses formulated for the study.

4.1 Socio-Economic Characteristics of Respondents

The socio-economic characteristics of the cassava processors in the study area are described in this section. Age, marital status, and household size, educational status, farm size, processing experience, source of cassava for processing, other occupation, membership of association among others were the chosen socioeconomic factors for the cassava processors were collated, tabulated and discussed.

4.1.1: Age

Age is a significant factor that influences many attributes in the lives of farmers and processors alike. Among the attributes that age influences are years of experience, maturity, responsibility, decision making ability, community participation and inclusion, attitude and perception. Age is an important socioeconomic factor in any sociological survey and research findings in any social system because it is a key to determining the productivity, income, savings, consumption pattern and livelihood as a whole.

Table 3 reveals that majority of the respondents were between 31- 50 years of age. In the case of improved technology users, the age of selected women cassava processor ranges from 28 to 70 years, having an average age of 44 and a standard deviation of 7 years, respectively. Majority of the respondents (80.5%) were in the age range of 31- 50 years, 17.1% of the respondents are above 50 years of age and only 2.4% of the respondents are below 30years of age.

In the case of conventional technology users, the age of selected women cassava processor ranges from 22 to 60 years with a mean age of 41 and a standard deviation of 10, respectively. Majority of the respondents (61.4%) were in the age range of 31-50 years, 19.6% of the respondents are above 50years of age and 19% of the respondents are below 30years of age.

This suggests that the bulk of respondents were in their prime earning years. The results reveal that most of the women cassava processors in the study area, both in Kogi and Kwara State are young, active and agile. Most of the activities in cassava processing are labour-intensive, which may help to explain why the bulk of the group was of middle age. During this time, women typically have greater needs for welfare, and their expanding children's needs may also necessitate more need for funding.

The outcome is congruent with Onyemauwa's findings (2019), Asadu, Agwu, Chah, and Enwelu (2014), as well as Olajide and Oyebode, (2015) where they stated that majority of the cassava processors are in their middle and economically active age of life and therefore has the ability to carry out their processing activity effectively and improve their livelihood as well as that of their household.

4.1.2: Marital Status

The results in Table 3 also revealed that most of the women who responded to the poll were married and had husbands as household members. In the case of improved technology users, majority of the respondents (79.5%) were married while 16.1% are widowed and 4.4% are Single parents. In the case of Conventional technology users, majority of the respondents (79%) were married, 2.9% were single, 6.8% were single parents, 8.3% were widowed and 2.9% were divorced.

According to this study, the majority of respondents were female and had families, which suggests financial responsibility. These women tried to improve their current socioeconomic situation by starting a cassava processing business. The amount of involvement in one or more income-generating activities ultimately rises in households where women are the primary breadwinner due to the constant pressure on their meager resources to maintain the household (Ansoglenang, 2006). The results of this study are in conformity with Matanmi, Afolabi, and Komolafe's (2017) as well as Achem, Akangbe, and Animashaun (2013) assertion that married processors with families and financial obligations handle the majority of cassava processing activity.

4.1.3: Educational Background

Results in Table 3 also presents the educational level of women cassava processors. Rural women's education levels ranged from no education to 20 years of formal education. Five categories were utilized to characterize education based on education scores: no formal education (0), primary (1–6), secondary (7–12), and tertiary (>12). The mean years of education for users of improved technology is 8 years while that of users of Conventional technology is 10 years.

In the case of users of improved technology, 10.7% of the interviewees had no formal education, followed by primary education (43.9%), secondary education (30.2%), and tertiary education (15.1%). Majority of the respondents (89.2%) had one level of education or the other. Similarly, in the case of users of Conventional technology, the result shows that 2.9% of the respondents had no formal education, 29.8% had primary education, 44.4% had secondary education and 22.9% had post-secondary/ tertiary education. This implies that majority of the respondents (97.1%) were educated while only 2.9% had no formal education. The respondents therefore have a chance of understanding the accruing benefits relating to their occupation as a means of livelihood and this would assist their information seeking behaviour and adoption of improved practices in cassava processing.

This result disagrees with the findings of Matanmi et al., (2017) where they stated that the majority of cassava processors lack formal education.

Table 3: Distribution of respondents by Age, Marital status and educational status

Socio-economic Characteristics	Improved		Conventional	
	F	**%**	**F**	**%**
Age				
<30	5	2.4	39	19.0
31-40	63	30.7	70	34.1
41-50	102	49.8	56	27.3
51-60	33	16.1	40	19.5
>60	2	1.0	0	0
Total	205	100	205	100
Mean	**44.45**		**41.26**	
Marital Status				
Single	0	0	6	2.9
Married	163	79.5	162	79.0
Single Parent	9	4.4	14	6.8
Widowed	33	16.1	17	8.3
Divorced	0	0	6	2.9
Educational Level				
No Formal Education	22	10.7	6	2.9
Primary	90	43.9	61	29.8
Secondary	62	30.2	91	44.4
Tertiary	31	15.1	47	22.9
Mean	**8**		**10.33**	

Source: Field Survey, 2021

4.1.4: Household Size

The oldest social group in charge of running a home is the family (BBS, 2008b). Large family sizes are typically correlated with increased labour endowments, which would allow a household to efficiently complete various agricultural activities. Table 4 displays the distribution of rural women processors by the size of their families. The rural women cassava processors had somewhere between 2 and 12 members. The women cassava processors were split into three main categories based on the size of their families: small (up to three), medium (four to six), and large (six or more).

In the case of users of improved technology, the household size of selected women cassava processor ranges from 3 to 12persons, averaging six people, with a two-person standard deviation. 53.7 percent of rural women had medium-sized families, 5.8 percent had small families, and the remaining 40.7 percent had large families.

In the case of non-improved technology users, the household size of the chosen women cassava processors spans from 2 to 12 people, with an average and standard deviation of 6 and 2 people, respectively. The majority of rural women (50.2%) had a medium-sized family, followed by 6.3% who had a tiny family, and 43.4% who had a large family.

The result of this study therefore implies that, since a large proportion of the respondents had between medium and large household sizes, they may have opportunity of using members of their households as a source of labour thereby reducing labour cost and increasing working capacity.

The respondents' relatively large family sizes may also act as a form of insurance against a labour supply shortage. In the agricultural sector, family labour provision is greatly influenced by household size.

This is in line with Sule, Ogunwale and Atala (2002) who stated that a large proportion of farmers have large household sizes. Also, the study is in line with Olusegun, Obi-egbedi and Adeniran., (2015) and Asadu et al. (2014) who claimed that the average number of people in a farming household for cassava producers was around 7.

4.1.5: Years of Processing Experience

Years of processing experience entails the total number of years a person had spent on the occupation. Years of cassava processing experience is therefore a total number of the years the cassava processors had spent in processing cassava into garri and other products. The higher the farming experience, the more the knowledge and technological ideas of adopting new technologies and all things being equal, the higher would be his output and income.

Results presented on Table 4 shows that majority of the respondents were experienced cassava processors having processing experience ranging more than 5 years. The minimum years of processing experience was 3 years and the maximum years was 40 years. Users of improved technologies had average years of processing experience of 17years with standard deviation of 6 years. 11.1% of the respondents have 6 to 10 years processing experience,41.5% have 11 to 15 years processing experience, 33.7% had 16 to 20 years of processing experience and 13.7% of the respondents have more than 20years processing experience. This implies that majority of the respondents who used improved technologies (88.9%) had more than 10 years of processing experience while just 11.1% have processing experience of between 6 and 10 years.

In the case of users of Conventional technology, the mean years of experience is 14 years with a standard deviation of 7 years. 31.7% of the respondents had 6 to 10 years of processing experience, 29.3% of the respondents had 11 to 15 years of processing experience, 23.9% had 16 to 20 years processing experience, 10.7% had greater than 20 years processing experience while 4.4% have less than or equal to 5 years of processing experience.

This result of this survey implies that both users of improved and Conventional technologies were experienced processors with average years of processing experience of 14 years or more. This is in agreement with the findings of Onyemauwa (2019) who reported that majority of cassava processors had 11-20 years of cassava processing experience.

4.1.6: Sources of Cassava for processing

Sources of cassava for processing implies where cassava processors get their cassava for processing. For the purpose of this study, three sources were identified, these include; own production, other farmers and market. The result on Table 4 also reveals that majority of the respondents sourced their cassava from the market. In the case of improved technology users, a large proportion (61.0%) sourced their cassava from the market, 36.6% sourced their cassava from other farmers and only 25.4% produce the cassava they process. This implies that a large proportion of cassava processors were not involved in cassava farming and are only involved in processing alone as a means of livelihood. In the case of Conventional technology users, a large proportion of the respondents (52.7%) also source their cassava from the market, 48.3% source their cassava from other farmers, while only 34.6% produce the cassava they process. This implies that majority of cassava processor get their cassava from outside source and not necessarily their own production. These also means that cassava processors rely primarily on cassava processing as a source of livelihood, while cassava production is left for other crop farmers in the study area.

4.1.7: Farm Size

Due to the fact that farming families are primarily dependent on agriculture, land is the most precious and significant asset for farm households. The size of the household may be a key factor in determining basic needs and livelihoods, but measuring its output is challenging. Rural women who participated in the survey had farms ranging in size from 1 hectare to 5 hectares.

On Table 4, the distribution of responders by farm size is shown. In the case of upgraded technology users, the average farm size of the respondents was 0.8 hectares; the biggest percentage (49.8%) did not have any farmland, followed by 45.9% who had between one and two hectares of farmland and only 4.4 percent who had more than two hectares.

In the case of Conventional technology users, average farm size of the respondents were 1.01ha, the highest proportion (46.3%) was landless, 42.9% had 1 to 2 hectares of farmland while 10.7% had between 3 to 4 hectares of farmland. This implies that rural women cassava processors were predominantly involved in cassava processing and do little to no farming. In addition to engaging in cassava processing, a larger percentage of respondents are small-scale farmers. This is consistent with Ajadi, Oladele, Ikegami and Tsuruta (2015) findings that small-scale farmers in Nigeria hold land ranging from 1 to 5 hectares.

Table 4: Distribution of Respondents by Household Size, Source of Cassava and Farm size

Socio-economic Characteristics	Improved		Conventional	
	F	%	F	%
Household Size				
≤3	12	5.8	13	6.3
4-6	110	53.7	103	50.2
≥6	83	40.5	89	43.4
Total	205	100	205	100
Mean	**6**		**6**	
Processing Experience				
≤5	0	0	9	4.4
6-10	23	11.1	65	31.7
11-15	85	41.5	60	29.3
16-20	69	33.7	49	23.9
>20	28	13.7	22	10.7
Total	205	100	205	100
Mean	**17**		**14**	
Sources of Cassava				
Own Production	52	25.4	71	34.6
Other farmers	75	36.6	99	48.3
Market	125	61.0	108	52.7
Total	252	122.9	278	135.6
Farm Size				
0	102	49.8	95	46.3
1-2	94	45.9	88	42.9
3-4	4	2.0	22	10.7
≥4	5	2.4	0	0
Total	205	100.0	205	100.0
Means	**0.8**		**1.0**	

Source: Field Survey, 2021

4.1.8: Other Occupation

Participation in secondary occupation has a positive and significant influence on level of adoption of innovation. Participation in secondary occupation will increase adoption level at substantial rate as it helps to cushion the financial challenges at lean periods (Yirga, 2016).

From Table 5, it is shown that respondents had some other occupations ranging from trading, farming, civil service to artisanal services. Improved technology users had other occupations comprising trading, artisan, civil service, and farming at 57.6%, 13.6%, 10.2% and 18.5% respectively. Also, in the case of Conventional technology users, the processors had varying occupations in addition to cassava processing, these include; trading, artisans, civil servant and farming with proportions 44.4%, 32.2%, 11.2% and 12.2% respectively. The findings implies that majority of the respondents participated in other income generated activities apart from cassava processing to cushion the effect of financial demand at lean periods as well as to keep busy between production cycles. This result is consistent with that of Asadu et al. (2014) and Falola et al. (2020) that cassava processors are also involved in trading, civil service e.t.c as secondary occupation.

4.1.9: Membership of association

Results on Table 5 also reveals that a large proportion of the respondents belonged to one association or the other. In the case of improved technology users, all the respondents (100%) claim to be a member of one association or the other. In the case of Conventional technology users, majority of the respondents (98%) claim to belong to one association or the other while a few (2%) do not belong to any association. This implies that, majority of cassava processors belong to association and therefore can enjoy group advantages such as financial assistance, savings, government support and other benefits as it may accrue in the associations. This is in congruent with Asadu et al. (2014), that cassava processors belong to at least one association.

4.1.10: Association Belonged to:

Membership of association is seen as a guarantee to benefit from special interventions across the tiers of government and non-governmental organizations (NGOs). It is on this premise that Yahaya and Orokhafer, (2001) stated that social involvement of farmers through their participation in farmers' cooperative will enhance diffusion of information among the farmers.

Table 5 shows that a little above half of Improved technology users (56.6%) were members of cassava processors cooperative, while 33.2% claim to be a member of farmers' cooperative and 15.1% were members of women group. In the case of Conventional technology users, 56.2% of the respondents were members of cassava processors group, 32.5% were members of women group, 13.3% belonged to farmers' group, while a few respondents (2%) were not members of any association. The finding implies that both improved and Conventional technology users were members of an association particularly cassava processors groups. The result is in line with that of Yahaya et al (2001) who found that majority of respondents participated in associations considering the advantages of being in a group.

4.1.11: Extension Contact

Extension contact and mass media exposure have a greater role to play in the dissemination and adoption of improved technologies. Regular and frequent visits of extension workers are essential for convincing and motivating farmers to adopt improved technologies.

The data in Table 5 shows that 19.5% of improved technology users had extension contact fortnightly, 10.2% had monthly extension contact, 31.7% had bimonthly extension contact and 38.5% had extension contact only once in a while. In the case of Conventional technology users, 6.4% of the respondents had monthly extension contact, 24.4% had bimonthly extension contact, 46.8% of the respondents had extension contact once in a while 22.4% had no extension contact.

This implies that improved technology users had frequent extension contact than users of Conventional technology. This could be connected to the fact that extension agents were more committed to extension services of their technologies to the processor with a view boosting their capacity rather than a general extension services from the ADPs to all farmers. This result is in line with Asadu et al. (2014) that cassava processors are not receiving as much extension help as needed.

Table 5: Distribution of respondents by other occupation, membership of association, association belonged to and extension contact.

Socio-economic Characteristics	Improved		Conventional	
	F	%	F	%
Other Occupation				
Trading	118	57.6	91	44.4
Artisan	28	13.6	66	32.2
Civil Servant	21	10.2	23	11.2
Farming	38	18.5	25	12.2
	205	100	205	100
Membership of Association				
YES	205	100	201	98
NO	0	0	4	2
	205	100	205	100
Association Belonged to				
Cassava processors group	116	56.6	114	56.2
Farmers' cooperative	68	33.2	27	13.3
Women group	31	15.1	66	32.5
Non	0	0	4	2
	215	104.9	211	104.0
Extension Contact				
No Contact	0	0	46	22.4
fortnightly	40	19.5	0	0
Monthly	21	10.2	13	6.4
Bimonthly	65	31.7	50	24.4
Once in a while	79	38.5	96	46.8
	205	100	205	100

Source: Field Survey, 2021.

4.1.12: Average Annual Income from Cassava Processing

Ahmed, (2009); Ahmed, Wahab and Thilsted, (2007) and Al-amin, (2008) were of the opinion that only until the rural poor earn better money from their economic activity will their living standards improve. Table 6 reveals that improved technology users' annual income from cassava processing ranges from N200,000 to N940,000 with a mean and standard deviation of N528,654 and N139,484 respectively. A little above average of improved technology users (52.2%) had average annual income of between N500,000 to N1,100,000 from cassava processing, 38.5% had average annual income of between 300,001 to 500,000, and 9.3% had average annual income of between N100,000 to N300,000 from cassava processing. However, in the case of Conventional technology users, annual income from cassava processing ranges between N80,000 to N700,000 with a mean and standard deviation of N294,610 and N121,618. Majority (61%) claim to make between N100,000 to N300,000 annually, 28.8% earned between N300,001 to N500,000 annually, 4.4% claimed generating average annual income of between N500,001 to N700,000 while 5.9% earned less than N100,000 annually.

The finding implies that users of improved technology earned more with a mean of N528,654 when compared to that of Conventional technology N294,610. The result is consistent with that of Koloche, Hamza, Mohammed, Yahaya and Garba (2016) who reported that beneficiaries of improved technologies had net returns in their processing business, all things being equal than others who did not benefit from improved packages.

4.1.13: Average annual income from other source

The results on Table 6, reveals that improved technology users' annual income from other source ranges from 0 to N576,000 with a mean and standard deviation of N189,522 and N107,422 respectively. Majority (70.7%) of improved technology users claimed to earn between N100,000 to N300,000 average annual income from other sources apart from cassava processing, 22% earned less than N100,000 while only 7.3% had average monthly income of between N300,001 to N700,000 form other source of income apart from cassava processing.

In the case of Conventional technology users, annual income from other sources ranges between 0 and N880,000 with a mean and standard deviation of N222,136 and N150,000 respectively. Majority of the respondents (60%) earned between N100,000 to N300,000 annually from other income source, 15.6% claimed to make between N300,001 to N1,100,000 annually, while 24.4% claimed generating average annual income of less than N100,000 from other source. The result implies that Conventional technology users earned more from non-cassava processing sources than beneficiaries of improved technology. This could be to support themselves and family with other income generating activities in order to make ends meet. This report is in agreement with Asadu et al. (2014) where he implied that these earnings will assist processors in raising money for enhanced cassava processing operations.

Table 6: Distribution of respondents by average annual income from cassava and average annual income from other source.

Socio-economic Characteristics	Improved		Conventional	
	F	%	F	%
Average Annual income from Cassava Processing				
<100,000	0	0	12	5.9
100,000 - 300,000	19	9.3	125	61.0
300,001 - 500,000	79	38.5	59	28.8
500,001 – 700,000	89	43.4	9	4.4
700,001 – 900,000	17	8.3	0	0
900,001 – 1,100,000	1	0.5	0	0
	205	100.0	205	100
Mean	**N528,654**		**N294,610**	
S.D	**N139,485**		**N260,000**	
Average Annual income from other Source				
<100,000	45	22.0	50	24.4
100,000 – 300,000	145	70.7	123	60.0
300,001 – 500,000	13	6.3	13	6.3
500,001 – 700,000	2	1.0	4	2.0
700,001 – 900,000	0	0	15	7.3
900,001 – 1,100,000	0	0	0	0
	205	100	205	100
Mean	**N189,522**		**N222,137**	
S.D	**N107,422**		**N150,000**	

Source: Field Survey, 2021

4.1.14: Cassava Products

Table 7 presents the result of products respondents process from cassava. In the case of users of improved technology, all the respondents (100%) process garri from cassava, also majority of the respondents (87.3%) process cassava flour (Elubo) in addition to garri from cassava. In the case of Conventional technology users, all the respondents (100%) also process garri from cassava, 10.7% of the respondents also process cassava flour (Elubo) in addition to garri from cassava. This implies that majority of cassava processors produce primarily garri from cassava.

4.1.15: Source of Labour

Table 7 reveal the results of the sources of labour utilized by cassava processors. In the case of beneficiaries of improved technology, majority of the respondents (76.1%) engaged both family and hired labour in cassava processing, 17.6% used hired labour and 6.3% used family labour only. In the case of Conventional technology users, more than half of the respondents (57.1%) used family and hired labour, 20.5% used only hired labour and 22.4% used family labour. This implies that, since majority of the respondents have large family sizes, they utilize family as source of labour and hire labour to perform tasks that require skill and expertise.

Table 7: Distribution of respondents by cassava product and source of labour.

Socio-economic Characteristics	Improved		Conventional	
	F	**%**	**F**	**%**
Cassava Products				
Garri	205	100.0	205	100.0
Elubo	179	87.3	22	10.7
	384	187.3	227	110.7
Source of Labour				
Family Labour	13	6.3	46	22.4
Hired Labour	36	17.6	42	20.5
Family & Hired	156	76.1	117	57.1
	205	100.0	205	100.0

Source: Field Survey, 2021

4.1.16: Quantity of Cassava Product Processed

The results on Table 8 shows the quantity of cassava products processed by respondents. All of the respondents are garri processor. However, majority of the respondents process other products out of cassava in addition to garri, these products include but not limited to elubo (cassava flour), HQCF (High Quality Cassava Flour), tapioca, fufu powder, lebu, starch e.t.c. This study however focuses on products processed regularly rather than products processed once in a while. In the case of improved technology users, the quantity of garri processed by cassava processors ranges from 200 to 550kg with a mean and standard deviation of 306.61 and 84.59 respectively. Majority of the beneficiaries of improved technology (60.5%) process between 201 to 300kg per cycle, 13.2% process between 301 to 400kgs per cycle, 10.2% process between 401 to 500kgs per cycle, 3.4% process more than 500kgs per cycle while 12.7% process less than or equal to 200kgs of garri per cycle. In the case of Conventional technology users, the quantity of garri processed by cassava processors ranges from 100 to 480 kgs with a mean of 218 and a standard deviation of 82. A little above average (52.2%) process between 100 to 200kgs of garri per cycle, 28.3% process between 201 to 300kgs of garri per cycle, 6.3% process between 301 to 400kgs per cycle, 3.4% process 401 to 500kgs of garri per cycle. This implies that beneficiaries of improved technology process more garri than non- beneficiaries with a difference in mean of almost 100kgs, this could be due to the improved technology. This agrees with the findings of Ayinde, Adenuga, Omotesho and Oke, (2012) which concluded that improved cassava processing technology provided by RTEP had impacted on its beneficiaries and that the capital investment in the programme by both the Federal and State Governments is justifiable.

Table 8: Distribution of respondents based on the quantity of Garri processed

Quantity of Garri Processed	Improved		Conventional	
	F	**%**	**F**	**%**
Garri (kg)				
<100	0	0	20	9.8
100 – 200	26	12.7	107	52.2
201 – 300	124	60.5	58	28.3
301 – 400	27	13.2	13	6.3
401 – 500	21	10.2	7	3.4
>500	7	3.4	0	0
Total	205	100	205	100
Mean	**306.61**		**218.24**	
S.D	**84.60**		**81.99**	

Source: Field Survey, 2021

4.1.17: Quantity of Garri Processed (cycle)

Table 9 presents the results of the number of cycles a processor can handle per month. In the case of beneficiaries of improved technology, the number of cycles a processor can handle ranges between 3 to 8 cycles with a mean and standard deviation of 4.78 and 0.82 respectively. About half of the respondents (49.8%) process 5 to 6 cycles in a month, 14.1% process more than 6 cycles and 36.1% process 3 to 4 in a month.

In the case Conventional technology users, the number of cycles a processor can handle ranges from 1 to 5 with a mean and standard deviation of 3.32 and 0.97 respectively. Majority of the respondents 71.7% process 3 to 4 cycles per month, 15.6% process 1 to 2 cycles per month, 8.8% process 5 to 6 cycles per month, and 3.9% process less than 1 cycle per month. This implies that improved technology users completed more processing cycles per month when compared to Conventional technology users, this transcends into more quantity of garri processed by beneficiaries of improved technology. There is therefore need to introduce improved technologies and practices to conventional technology users in order to improved their productivity which will in turn better their livelihood.

Also, from the observations on the field, improved technology users produce garri with higher quality that conventional technology users. Garri processed using improved technologies were stone free, neater and smoother compared to that make through conventional means.

Table 9: Distribution of respondents by quantity of garri processed (Cycle)

Quantity of Garri Processed (Cycle)	Improved		Conventional	
	F	**%**	**F**	**%**
Garri				
<1	0	0	8	3.9
1 – 2	0	0	32	15.6
3 – 4	74	36.1	147	71.7
5 – 6	102	49.8	18	8.8
>6	29	14.1	0	0
Total	205	100	205	100
Mean	**4.76**		**3.32**	
S.D	**0.822**		**0.44**	

Source: Field Survey, 2021

4.1.18: Assets acquired from cassava processing

Table 10 presents the distribution of the assets acquired from cassava processing. This implies assets acquired by cassava processors that can be attributed to cassava processing, this was divided into physical assets and productive assets. Physical assets as captured in this study includes; houses, land, farm tools and implements and livestock. In the case of improved technology users a little more than half of the respondents (58.5%) claimed to have built houses from the proceeds of cassava processing. Also, majority of the respondents (88.8%, 95.6%, 76.1%) claimed to have acquired Land, farm tools and implements and livestock from cassava processing respectively. In the case of Conventional technology users, majority of the respondents (82.9%) claimed to not have acquired houses from cassava processing while only 17.1% have acquired houses from casava processing.

Majority of Conventional technology users (62.9%, 72.7%, 75.1%) claimed to have acquired Land, farm tools and implements and livestock from cassava processing respectively.

In addition, in the case of improved technology users, majority of the respondents 76.1% and 64.9% claimed to have acquired processing shed and processing machine respectively. In the case of Conventional technology users, 84.9% claimed to have acquired processing shed while only 27.3% claimed to have acquired cassava processing machines. This implies that improved technology has really impacted the beneficiaries thereby enabling them acquire assets through income generated from cassava processing.

Table 10: Distribution of Respondents by the Assets acquired from cassava processing

ASSETS ACQUIRED FROM CASSAVA PROCESSING	Improved		Conventional	
	F	**%**	**F**	**%**
PHYSICAL ASSETS				
Houses				
Yes	120	58.5%	35	17.1%
No	85	41.5%	170	82.9%
Land				
Yes	182	88.8%	129	62.9%
No	23	11.2%	76	37.1%
Farm tools and implements				
Yes	196	95.6%	149	72.7%
No	9	4.4%	56	27.3%
Livestock				
Yes	156	76.1%	154	75.1%
No	49	23.9%	51	24.9%
PRODUCTIVE ASSETS				
Processing Shed				
Yes	156	76.1%	174	84.9%
No	49	23.9%	31	15.1%
Processing machine/equipment				
Yes	133	64.9%	56	27.3%
No	72	35.1%	149	72.75%

Source: Field Survey, 2021

4.2.1 Cassava Processing Technologies Available in the Study Area

The technologies used to process cassava in the study locations are listed in Table 11.1. Through the work of change agents, women have been exposed to enhanced peeling, grating, grinding, sieving, hydraulic pressing, tray frying, and drying technologies for cassava processing. The usage of conventional peelers, graters, presses or screw jacks, local fryers, and basket sieve are some examples of classic processing technologies. The cassava multiplication programme (CMP), the Root and Tuber Expansion Programme (RTEP) and the presidential initiative on cassava were the main suppliers of modernized technology in the study area, according to key informants.

The participants of these intervention programmes enjoyed a number of benefits. Compared to their non-participating colleagues, they are more knowledgeable and have better access to new technologies. Therefore, they made advantage of the majority of the upgraded processing techniques to create hygienic and premium cassava items. Vibrating sieves, mechanical peelers, motorized graters, motorized dryers, screw jacks, and hydraulic presses are among the often used improvements in cassava processing equipment, and their primary use is to maximize profits.

Table 11.1 detailed technologies employed in all processing stages. For peeling cassava root, local/metal knives are traditionally used, improved technologies employed include; mechanical peelers, motorized peelers, hand peelers/raspers (mechanized). Conventional technologies employed for washing of peel cassava roots include metal bowls, plastic bowls and plastic drums. Improved technologies used for washing includes aluminum tanks, concrete tanks molded with drains at the bottom, some concrete tanks were tiled for hygienic reasons. Grating is done traditionally using tin iron pierced with nails on one side taking the form of manual graters used in homes. Improved technologies used for grating includes mechanized grater, motorized grater, hammer mill, disc grater and hand grater. Fermentation and pressing activities are done traditionally using heavy stone on heavy weighed cloth or nylon bag (for several days) and screw press for pressing which takes about 3 days or more. Improved technologies used for fermentation and pressing includes batch fermentation in aluminum tank, locally made hydraulic or mechanical presses. Hydraulic press used could press grated cassava root withing fifteen minutes to one hour, way faster when compared to the traditional screw press. Sieving is carried out traditionally using woven basket and suspended cloth pieces holding mash. Improved technology used for sieving include drum sieve and rotatory sieve. Large pots and cast iron are used over wood fire traditionally for frying. Improved technologies used for frying includes tray fryers with isolated heat source; this used the traditional tray fryer, but the fryer is attached to the walls of the processing centre and fuel wood is supplied from outside the building to keep the smoke out. Other improved fryers include automatic/rotatory fryers, solar dryers and kiln type dryers. Sifting is done traditionally with a woven basket and with an improved pulverizer and sifter. Finished garri is package locally using jute bags and sewn or tied to seal. Under improved technology, scale polythene bags are used sealed with a sealing machine to preserve freshness. This result is in line with Achem (2017) who reported that almost all peeling, washing, drying, frying, and chipping are still been done by hand. Also, Awoyemi et al., (2020) that every cassava processor has access to both the pressing and grating devices and that cassava peeler, mechanical sieve, dryer, and fryer utilization is low.

Table 11.1: Distribution of cassava processing technologies and tools available in the study area.

	Processing Stages	Conventional Technology	Improved Technology
1	Peeling	Local/metal Knife	Mechanical Peelers Motorized Peelers Hand Peeler/rasper Mechanized)
2	Washing	Metal bowls Plastic bowls Plastic drums	Aluminum tanks Concrete tank with drain
3	Grating	Tin iron pierced with nail on one side	Mechanized Grater Motorised grater Hammer mill disk grater hand grater
4	Fermentation and pressing	Big stone on hefty nylon or linen bag (for several days) Screw press	fermentation in a batch in an aluminum tank, hydraulic or mechanical presses produced locally
5	Sieving/Pulverizing	Woven baskets suspended cloth pieces holding mash	Drum sieve rotating sieve
6	Frying	Large pot over wood fire Cast Iron pan over wood fire	Tray fryers with isolated heat source Automatic/rotatory fryers Solar dryer kiln type dryer
7	Sifting	Woven basket	Improved pulverizer and sifter
8	Packaging	Local jute bag	Scaled polythene bag (sealed)

Source: Field Survey, 2021.

4.2.2 Cassava processing technologies being used in the study area.

Results on Table 11.2 presents the cassava processing technologies being used respondents in the study area. In the case of improved technology users, majority of the respondents (61.5%) indicated to always use knives for peeling cassava roots, 33.7% indicated that they sometimes use knives for peeling while only 4.9% indicated to have never used knives for peeling cassava roots. Majority of the respondents (67.3%) indicated to have never used manual peelers while 32.7% indicated to always use manual peelers. Further results on Table 11b also indicated that 96.1% of the respondents never used mechanized peelers while only 3.4% always used mechanized peelers. This implies that majority of improved technology users still peel cassava tubers by hand and have not adopted mechanized methos of peeling cassava roots. All of the improved technology users (100%) indicated to always use concrete tanks linked into a soak away to wash peeled cassava tubers. All of the respondents (100%) also indicated that they always use mechanized graters to grate cassava tubers. All of the respondents (100%) also indicated to always use hydraulic press for dewatering grated cassava tubers.

Majority of the respondents (96.1%) indicated to have never used hand sieves for sieving while 3.9% of the respondents indicated to sometimes sieve by hand. All of the respondents (100%) indicated to always use mechanized shakers for sifting. Majority of the respondents (95.1%) indicated to always use tray fryers over mold and fire wood for fryers the processed cassava into garri and 4.9% of the respondents indicated that they sometimes use tray fryers over mold and fire wood for fryers the processed cassava into garri. Majority of the respondents 95.1% indicated to have never used mechanized fryer for frying while 4.9% of the respondents indicated to always use mechanized fryer for frying processed cassava into garri. The heat source in the case of improved technology users is isolated usually fed from outside the building to prevent processors from getting in contact with the smoke from the firewood.

In the case of Conventional technology users, majority of the respondents (88.8%) indicated to always use knives for peeling cassava tubers while 11.2% indicated to sometimes use knives for peeling. Majority of the respondents (88.8%) indicated to have never used manual peelers for peeling cassava tubers, while 11.2% indicated to always use manual cassava peelers for peeling. All of the respondents (100%) indicated to have never used mechanized peelers for peeling cassava tubers. All of the respondents (100%) indicated to always use plastic bowls for washing peeled cassava roots. Majority of the respondents (97%) indicated to have never used hand grating for grating cassava tubers, 2% of the respondents indicated to sometimes use hand grating while only 1% of the respondents indicated to always use hand grating for grating cassava tubers. Majority of the respondents (99%) indicated to always use mechanized graters to grate cassava tubers and 1% of the respondents indicated to sometimes use mechanized grater for grating cassava tubers. All of the respondents (100%) indicated to always use screw press for dewatering grated cassava roots. All of the respondents (100%) indicated to always sift cassava granules by hand. All of the respondents (100%) indicated to always use tray fryers over on mold with firewood to fry processed cassava into garri.

This result implies that improved technology users use mechanized processing implements in almost all the processing activities compared to Conventional technology users who use mainly manual means of processing in all the processing activities. The only processing activities widely adopted by Conventional technology users is the mechanized grater and this is because this is available at public mills and done for a token. This is in agreement with the findings of Mgbakor, (2015) still operate on a conventional scale and cannot afford to employ improved processing equipment. The study is also in line with Okorji, Eze, and Eze, (2003) that cassava processors use graters and pressers and carry out other operations manually.

Table 11.2: Distribution of respondents by cassava processing technologies used in the study area.

s/n	Processing Activities	Improve			Conventional		
		Always (%)	Sometimes (%)	Never (%)	Always (%)	Sometimes (%)	Never (%)
1	**Peeling**						
	Knife	61.5	33.7	4.9	88.8	11.2	0
	Manual Peeler	32.7	0	67.3	11.2	0	88.8
	Peeling Machine (Mechanized)	3.4	0.5	96.1	0	0	100
2	**Washing**						
	Plastic Bowl	0	0	100	100	0	0
	Concrete Bowl linked to Soak away	100	0	0	0	0	100
3	**Grating**						
	Hand grating using metal bowl pierced on one side	0	0	100	1.0	2.0	97.0
	Mechanized grater	100	0	0	99	1	0
4	**Pressing**						
	Stone on linen bag	0	0	100	0	2	98
	Screw press	0	0	100	100	0	0
	Hydraulic press	100	0	0	0	0	100
5	**Sifting**						
	Hand Sifting	0	3.9	96.1	100	0	0
	Mechanized Shaker	100	0	0	0	0	100
6	**Frying**						
	Frying Pot	0	0	100	0	3.4	96.6
	Tray fryer over mold and firewood	95.1	4.9	0	100	0	0
	Mechanized Fryer	4.9	0	95.1	0	0	100

Source: Field Survey, 2021

4.3 General processing activities and occupational hazard associated with cassava processing technology.

Result in Table 12 present the distribution of cassava processors general processing activities and occupational hazard associated with each technology. In the case of improved technology users, majority of the respondents (60%, 61.5%) indicated to have never experience blisters of fingers and hands from cassava processing and cuts while peeling cassava. However, all of the respondents (100%) indicated to always experience hand itching and discoloration from contact with raw cassava tubers since hand is used to move the cassava from one unit operation to another. In carrying out washing operation, all of the respondents (100%) indicated that they always experience Skin irritation and itching as a result of contact with cyanide. All of the respondents (100%) also indicated that they always experience ergonomic hazard from grating. All of the respondents (100%) claimed to never have experience death of plants around the processing centre due to indiscriminate and continuous disposal of effluent, building damage by sewage, the smell of effluent, and potential insect and disease infestation from continues accumulation of effluent, health risk brought on by the ongoing build up of wastewater and eutrophication of still water, which causes the loss of oxygen and the death of aquatic life. This could be because during the implementation of RTEP which most of improved technology users benefitted from, soak away was introduced for management of effluent, all waste water from the processing centre were directed into the soak away which takes care of hazards that could result from indiscriminate disposal of effluent. Further results in Table 12 also indicated that, all of the respondents (100%) indicated that they never experienced inhalation of cyanide and smoke and eye irritations from exposure to smoke during frying operation. This could be because beneficiaries of improved technologies under the RTEP programme umbrella were introduced to tray fryers with isolated heat source where the heat source is supplied from outside and the person frying doesn't have direct contact with the smoke. However, a little above average of the respondents (55.1%) indicated to always suffer from skin irritation from exposure to intense heat while frying. Also, all of the respondents (100%) indicated to have never experienced irritation of the nose and throat from smoke inhalation, difficulty in breathing from smoke inhalation, increased irritability, loss of concentration and inability to do mental tasks as a result of the frying operation. However, majority of the respondents (65.4%, 88.8%, 85.9%, 78%, 65.9%, 60% and 61.5%) indicated to always experience persistent joint aches and pains from stirring, fatigues, numbness in legs and feet, pain/Stiffness in hands, fingers and wrist, cramped waist from sitting for a long time, musculoskeletal disorders and increased body temperature and discomfort due to exposure to intense heat during the frying operations. Majority of the respondents (74.1%) indicated to always experience inhalation of Visible dust and smoke from fine cassava grits during packaging of garri. This could result in respiratory disease and smoke inhalation injuries.

In the case of Conventional technology users, Table 12 shows that majority of the respondents (85.4%, 75.1% and 100%) indicated to always experience blisters of finger and hands from peeling, cuts while peeling and hand itching and discoloration from peeling cassava roots. All the respondents (100%) indicated to have experienced skin irritation and itching as a result of contact with cyanide from washing cassava roots. Also, all the respondents (100%) indicated to have experienced ergonomic hazard from grating washed cassava roots. A little above average of the respondents (55.1%) indicated that they always experienced death of plants around the processing centre due to indiscriminate and continuous disposal of effluent during fermentation and pressing operations. However, all of the respondents (100%) indicated to have never experienced damage to buildings by effluent from fermentation and pressing operations. All of the respondents (100%) indicated that they always experience stench from effluent. Majority of the respondents (68.8%)

indicated to have never experienced insect and disease infestation from continues accumulation of effluent. A considerable number of respondents (47.3%) indicated that they always experience health hazard that resulted from continues accumulation of effluent. Majority of the respondents (88.8%) indicated that eutrophication of still water causes oxygen levels to drop and aquatic life to perish sometimes occur as a result of indiscriminate and continuous disposal of effluent. Further results on Table 14b shows that, majority of the respondents (79.5%, 74.1%, 100%, 100%, 93.2% and 85.9%) indicated to always experience inhalation of cyanide and smoke, eye irritations from exposure to smoke, skin irritation from exposure to intense heat, irritation of the nose and throat from smoke inhalation, difficulty in breathing from smoke inhalation and increased irritability. A little above average of the respondents (54.1% and 50.2%) indicated that they sometimes experienced loss of concentration and inability to do mental tasks during frying operation. All of the respondents (100%) indicated that they always experienced persistent joint aches and pains from stirring, fatigues, numbness in legs and feet, pain/Stiffness in hands, fingers and wrist, cramped waist from sitting for a long time, musculoskeletal disorders and increased body temperature and discomfort due to exposure to intense heat from frying operation. Also, a little above average of the respondents (54.1%) indicated to always experience inhalation of Visible dust and smoke from fine cassava grits.

This result implies that improved technology users face lesser risks of exposure to occupational hazards when compared to their Conventional technology user counterparts. This could be because adoption of improved cassava processing technologies and practices reduced improved technology users' exposure to health hazards associated with cassava processing. This result is in line with that of Okareh, Ogunfayo and Atulumah, (2015) as well as Oyegbami, Oboh and Omueti, (2010) that cassava processors are exposed to hazards as a result of cassava processing.

Table 12.1.1: Distribution of respondents by general processing activities and occupational hazard associated with each technology (Improved Technology).

	Occupational Hazards	Always	Sometimes	Never
1	**PEELING**			
	Blisters of finger and hands from peeling	32(15.6%)	50(24.4%)	123 (60%)
	Cuts while peeling	36(17.6%)	43(21.0%)	126(61.5%)
	Hand itching and discoloration	205(100%)	0	0
2	**WASHING**			
	Skin irritation and itching as a result of contact with cyanide	205(100%)	0	0
3	**GRATING**			
	Ergonomic hazard	205(100%)	0	0
4	**FERMENTATION AND PRESSING**			
	Death of plants around the processing centre due to indiscriminate and continuous disposal of effluent	0	0	205(100%)
	Damage to buildings by effluent	0	0	205(100%)
	Stench from effluent	0	0	205(100%)
	Possible insect and disease infestation from continues accumulation of effluent	0	0	205(100%)
	Health hazard that results from continues accumulation of effluent	0	0	205(100%)
	Eutrophication of still water causes a lack of oxygen and killing of aquatic life.	0	0	205(100%)

Source: Field survey, 2021.

Table 12.1.2 : Distribution of respondents by general processing activities and occupational hazard associated with each technology (Improved Technology).

5	**FRYING**			
	Inhalation of cyanide and smoke	0	0	205(100%)
	Eye irritations from exposure to smoke	0	0	205(100%)
	Skin irritation from exposure to intense heat	113(55.1%)	60(29.3%)	32(15.6%)
	Irritation of the nose and throat from smoke inhalation	0	0	205(100%)
	Difficulty in breathing from smoke inhalation	0	0	205(100%)
	Increased irritability	0	0	205(100%)
	Loss of concentration	0	0	205(100%)
	Inability to do mental tasks	0	0	205(100%)
	Persistent joint aches and pains from stirring	134(65.4%)	60(29.3%)	11(5.4%)
	Fatigues	182(88.8%)	20(9.8%)	3(1.5%)
	Numbness in legs and feet	176(85.9%)	25(12.2%)	4(2.0%)
	Pain/Stiffness in hands, fingers and wrist	160(78.0%)	39(19.0%)	6(2.9%)
	Cramped waist from sitting for a long time	135(65.9%)	59(28.8%)	11(5.4%)
	musculoskeletal disorders	123(60%)	50(24.4%)	32(15.6%)
	Increased body temperature and discomfort due to exposure to intense heat	126(61.5%)	36(17.6%)	43(21.0%)
	SIFTING			
	Inhalation of Visible dust and smoke from fine cassava grits	152(74.1%)	50(24.4%)	3(1.5%)

Source: Field survey, 2021.

Table 12.2.1 : Distribution of respondents by general processing activities and occupational hazard associated with each technology (Conventional Technology)

	Occupational Hazards	Always	Sometimes	Never
1	**PEELING**			
	Blisters of finger and hands from peeling	175(85.4%)	22(10.7%)	8(3.9%)
	Cuts while peeling	154(75.1%)	51(24.9%)	0
	Hand itching and discoloration	205(100%)	0	0
2	**WASHING**			
	Skin irritation and itching as a result of contact with cyanide	205(100%)	0	0
3	**GRATING**			
	Ergonomic hazard	205(100%)	0	0
4	**FERMENTATION AND PRESSING**			
	Death of plants around the processing centre due to indiscriminate and continuous disposal of effluent	113(55.1%)	32(15.6%)	60(29.3%)
	Damage to buildings by effluent	0	0	205(100%)
	Stench from effluent	205(100%)	0	0
	Possible insect and disease infestation from continuous accumulation of effluent	21(10.2%)	43(21%)	141(68.8%)
	Health hazard that results from continuous accumulation of effluent	97(47.3%)	84(41%)	24(11.7%)
	Eutrophication of still water causes a lack of oxygen and killing of aquatic life.	20(9.8%)	182(88.8%)	3(1.5%)

Source: Field survey, 2021.

Table 12.2.2 : Distribution of respondents by general processing activities and occupational hazard associated with each technology (Conventional Technology)

5	**FRYING**			
	Inhalation of cyanide and smoke	163(79.5%)	42(20.5%)	0
	Eye irritations from exposure to smoke	152(74.1%)	50(24.4%)	3(1.5%)
	Skin irritation from exposure to intense heat	205(100%)	0	0
	Irritation of the nose and throat from smoke inhalation	205(100%)	0	0
	Difficulty in breathing from smoke inhalation	191(93.2%)	14(6.8%)	0
	Increased irritability	176(85.9%)	29(14.1%)	0
	Loss of concentration	79(38.5%)	111(54.1%)	15(7.3%)
	Inability to do mental tasks	75(36.6%)	103(50.2%)	27(13.2%)
	Persistent joint aches and pains from stirring	205(100%)	0	0
	Fatigues	205(100%)	0	0
	Numbness in legs and feet	205(100%)	0	0
	Pain/Stiffness in hands, fingers and wrist	205(100%)	0	0
	Cramped waist from sitting for a long time	205(100%)	0	0
	musculoskeletal disorders	205(100%)	0	0
	Increased body temperature and discomfort due to exposure to intense heat	205(100%)	0	0
	SIFTING			
	Inhalation of Visible dust and smoke from fine cassava grits	111(54.1%)	84(41.0%)	10(4.9%)

Source: Field survey, 2021.

4.4.1 Contribution of cassava processors to household welfare (Improved technology)

Table 13 presents the distribution of beneficiaries of improved technology's percentage contribution to household welfare. A considerable number of respondents (42%) contributed to 100% of children's school needs. Majority of the respondents (85.8% and 85.9%) contributed to half and more of the family expenditure on food and hospital bills. About half of the respondents (51.2%) solely take care of their personal expenses from their own income. A little above half of the respondents (80.5%) contributed 50 percent and more to the purchase of children clothing. Majority of the respondents 68.8%, 73.6%, 79%, 82.9%, 79.5%, 78.5% contributed half and below to house rent, family savings, family investments, building project, social obligations and extended family responsibilities respectively. Further results on Table 13 shows that 18.5%, 7.8%, 5.9%, 2.9%, 0.55 and 2.4% of the respondents do not contribute at all to house rent, family savings, family investments, building project, social obligations and extended family responsibilities respectively. These results implies that, improved technology users contributed significantly to children school needs, family food consumption, hospital bills and children clothing. This result implies that beneficiaries of improved technology contributed significantly towards the welfare of their family. This is in agreement with the findings of Anderson and Lent, (2017) that Women start businesses primarily to provide for the necessities of their families. Also, Falola, Fakayode, Kayode and Amusa, (2020) who reported that more that 90% of women income is spent on consumption and other household needs.

Table 13: Distribution of Respondents by contribution to household welfare (Improved technology).

S/N	EXPENDITURE AREAS	100%	More than 50%	50%	Less than 50%	Not at All
1	Children's school needs	42	38.5	5.4	14.1	0
2	Family food consumption	40	42.4	3.4	14.1	0
3	Hospital Bills	41.0	40.5	4.4	14.1	0
4	Personal needs; Clothing, Jewelry, hygiene, costmetics	51.2	15.1	16.6	17.1	0
5	Children clothing	27.3	25.9	27.3	19.5	0
6	House rent	2.7	0	36.6	32.2	18.5
7	Family Savings	15.5	3.4	38.5	35.1	7.8
8	Family investments	14.1	1.0	32.7	46.3	5.9
9	Building Project	14.1	0	35.6	47.3	2.9
10	Social Obligations	15.1	4.9	36.1	43.4	0.5
11	Extended Family Responsibilities	13.2	5.9	30.2	48.3	2.4

Source: Field Survey, 2021

4.4.2 Contribution of cassava processors to household welfare (Conventional technology)

Table 14 presents the distribution of Conventional technology users' percentage contribution to household welfare. Majority of the respondents (67.8%, 67.8% and 76.1%) contributed more than 50 percent toward children's school needs, family food consumption and hospital bills. Majority of the respondents (60.0%) take care of 50 percent or more of their personal needs, a considerable number of this proportion (32.2%) take care of all of their personal needs alone. Majority of the respondents (85.4%) also contributed 50 percent or more to children clothing. A considerable number of respondents (43.4%) contributed 50 percent and less to house rent expenses while 47.3% of the respondents do not contribute at all to house rent payment. Majority of the respondents (58%, 54.6%, 54.7%, 71.2% and 75.7%) contributed 50 percent and less to family savings, family investments, building projects, social obligations and extended family responsibilities. A considerable proportion of the respondents (28.8%, 31.7%, 35.1%, 14.1% and 13.2%) do not contribute at all to family expenses such as family savings, family investments, building projects, social obligations and extended family responsibilities. This result implies that Conventional technology users also contributes significantly to household welfare and if afforded more opportunities will contribute more. This finding is consistent with Xiong, Ukanwa and Anderson's (2018) assertion that rural Nigerian women are expected to provide for their families' livelihoods in addition to bearing and caring for children. He said that many rural households depend on the food, clothing, and education that women give. Rural women are inventive and create things out of nothing to meet their families' fundamental requirements (Nwoye, 2007; Ajani, 2012 ; Mbah, and Igbokwe, 2015)

Table 14: Distribution of respondents by contribution to household welfare (Conventional technology).

S/N	EXPENDITURE AREAS	100%	More than 50%	50% (half)	Less than 50%	Not at all
1	Children's school needs	67.8	7.3	4.4	8.3	12.2
2	Family food consumption	67.8	6.8	5.9	8.3	11.2
3	Hospital Bills	76.1	3.4	1.0	8.3	11.2
4	Personal needs; Clothing, Jewelry, hygiene, cosmetics	32.2	5.4	22.4	38.5	1.5
5	Children clothing	41.0	20.5	23.9	10.2	4.4
6	House rent	8.3	1.0	4.4	39.0	47.3
7	Family Savings	11.7	1.5	7.8	50.2	28.8
8	Family investments	11.7	2.0	10.7	43.9	31.7
9	Building Project	9.3	1.0	5.4	49.3	35.1
10	Social Obligations	10.7	3.9	7.3	63.9	14.1
11	Extended Family Responsibilities	11.2	0	9.8	65.9	13.2

Source: Field Survey, 2021

4.5.0 Implication of the Use of Cassava Processing Technologies on the Livelihood of Processors.

4.5.1 Livelihood indicators

There are seven livelihood indicators as used by Sheheli (2011) which were considered for this study as being essential to the respondents' daily lives.

4.5.1.1 Food availability and consumption situation

People consume food as a necessity for survival in order to preserve their health and regain their vitality. This section is intended to talk about eating habits of respondents. It discussed food frequency, the food items consumed by cassava processors and their household over a 24-hour period as well as availability of food through the year. As used by Hies (2005) and as a pre-test result, 13 food items were chosen as consumed by rural women who processed cassava. The percentage of rural women who consumed each food item during the 24 hours before the data collecting period was collected and is shown in table 15.

4.5.1.2 Number of eating occasion of Cassava processors.

Table 15 presented the result of number of eating occasion of respondents. In the case of beneficiaries of improved technology, majority of the respondents (66.8%) do not eat any meal before a morning meal while only 33.2% eat a food before a morning meal. All respondents (100%) ate a morning meal, 35.6% of the respondents ate a meal between the morning and the afternoon meal. This is especially common amongst families with younger children and children of school age who take school lunches and snacks to school. 64.4% of the respondents do not eat any meal between a morning and an afternoon meal. All respondents (100%) ate an afternoon meal. 37.1% of the respondents ate a meal between an afternoon and an evening meal while majority of the respondents (62.9%) didn't eat any meal between an afternoon and an evening meal. All the respondents (100%) ate an evening meal. Majority of the respondents (81%) didn't eat any meal after an evening meal, while only 19% of the respondents ate a meal after an evening meal. This result implies that, majority of the respondents ate three meals per day and some in fact ate between meals which indicates a good number of eating occasions that possibly was made possible by the use of improved technology.

In the case of Conventional technology users, 95.1% of the respondents do not eat any meal before a morning meal, only 4.9% of Conventional technology users ate a meal before a morning meal. 98.5% of the respondents ate a morning meal, 1.5% didn't eat a morning. 27.8% of the respondents ate a meal between a morning and an afternoon meal while 72.2% didn't eat a meal between a morning and an afternoon meal. 97.6% of the respondents ate an afternoon meal while only 2.4% didn't eat an afternoon meal. 5.8% of the respondents ate a meal between an afternoon and an evening meal while majority of the respondents (94.1%) didn't eat any meal between and afternoon and an evening meal. Majority of the respondents (98.5%) ate an evening meal while only 1.5% didn't eat an evening meal. Majority of the respondents 97.1% didn't eat any meal after an evening meal while only 2.9% of the respondents ate a meal after an evening meal. This result implies that majority of Conventional technology users also ate 3 meals a day and a number of respondents even ate between meals. This implies that improved technology users ate three meals more frequently when compared to users of Conventional technology and this could possibly be linked to the use of improved technology.

Table 15: Distribution of respondents by number of eating occasions within a 24-hour period

S/n	Eating Occasion	Improved		Conventional	
		Yes	**No**	**Yes**	**No**
1.	Any food before a morning meal	68(33.2%)	137(66.8%)	10(4.9%)	195(95.1%)
2.	A morning meal	205(100%)	0	202(98.5%)	3(1.5%)
3.	Any food between morning and Afternoon meals	73(35.6%)	132(64.4%)	57(27.8%)	148(72.2%)
4.	An afternoon meal	205(100%)	0	200(97.6%)	5(2.4%)
5.	Any food between afternoon and evening meals	76(37.1%)	129(62.9%)	12(5.8%)	193(94.1%)
6.	An evening meal	205(100%)	0	202(98.5%)	3(1.5%)
7.	Any food after the evening meal	39(19%)	166(81%)	6(2.9%)	199(97.1%)

Source: Field Survey, 2021

4.5.1.3 Distribution of Respondents by daily pattern of food Items consumed

Following Hies's (2005) report and the pre-test results, 13 food items were chosen. The percentage of cassava processors who consumed each of the itemized food item during the 24 hours before the data collecting period was recorded and is shown in table 16.

In the case of beneficiaries of improved technology, 99.5% of the respondents consume cereals as staple food. 93.7% also consume root and tubers within the last 24-hours to this study. Majority of the respondents (86.8%) also consumed legumes. It is remarkable that only 45.4% and 32.2% of the respondents consumed milk and egg respectively. However, majority of the respondents 77.1%, and 50.7% consumed fish and meat respectively, this covers as source of protein in the diet. 90.7% of the respondents reported that they consumed oil and fat. Women who worked as cassava processors in the study region ate a lot of vegetables (88.8% and 77.1%). A large proportion of the respondents (78.5%) ate fruits. Majority of the respondents (70.2%, 51.2%) also consumed sugar and beverages. Also, only a small proportion (32.7%) of the respondents consumed spices, soda and other food additives. This result implies that women cassava processors who use improved technology eat healthy, the pattern of food consumption demonstrates without a doubt that improved technology users had a balanced diet which could be attributed to the empowerment programme, that is, RTEP which provided them with improved processing machines in the study area.

In the case of Conventional technology users, 95.6% of the respondents ate cereal as staple while only 11.7% ate root and tubers. Majority of the respondents (77.6%) also ate legumes. Only 16.1%, 11.7% and 29.8% of the respondents consumed milk and milk products, eggs and fish respectively. However, majority of the respondents 59.5% consumed meat, this serves as a source of protein in the diet. 85.4% of the respondents reported they consumed fat and oils. A considerable number of

Conventional technology users (55.1%) reported they consumed green leafy vegetables while only 29.8% consumed other forms of vegetables. A considerable number of respondents (55.1% and 44.4%) consumed sugar and beverages. Also, only a small proportion (29.8%) of the respondents consumed spices, soda and other food additives.

This result implies that improved technology users' dietary diversification was good and they consumed a well-balanced meal when compared to users of Conventional technology. In the case of Conventional technology users, there was a general lack of nutritional diversity, and the diet is heavily reliant on carbohydrates with insufficient amounts of protein and minerals. Users of conventional technologies have dangerously unbalanced diets due to insufficient intake of fat, oil, fish, fruits, and vegetables. This implies that improved technology has really impacted dietary intake and consumption situation of beneficiaries of improved technology and had afforded them a better livelihood.

Table 16: Distribution of respondents by daily pattern of food Items consumed

S/n	Food Items Consumed	Improved		Conventional	
		Yes	No	Yes	No
1.	Cereals (Rice, Maize, wheat)	204(99.5%)	1(0.5%)	196(95.6%)	9(4.4%)
2.	Root & tubers (Yam, Sweet Potatoes)	192(93.7%)	13(6.3%)	24(11.7%)	181(88.3%)
3.	Legumes (Beans, peas)	178(86.8%)	27(13.2%)	159(77.6%)	46(22.4%)
4.	Milk/ Milk Products	93(45.4%)	112(54.6%)	33(16.1%)	172(83.9%)
5.	Eggs	66(32.2%)	139(67.8%)	24(11.7%)	181(88.3%)
6.	Fish (Fresh fish, Dry fish)	158(77.1%)	47(22.9%)	61(29.8%)	144(70.2%)
7.	Meat (Poultry, Beef)	104(50.7%)	101(49.3%)	122(59.5%)	83(40.5%)
8.	Oil & Fat	186(90.7%)	19(9.3%)	175(85.4%)	30(14.8%)
9.	Green Leafy Vegetable	182(88.8%)	23(11.2%)	113(55.1%)	92(44.9%)
10.	Other Vegetable (Carrot, Tomatoes)	158(77.1%)	47(22.9%)	61(29.8%)	144(70.2%)
11.	Fruits(Mango, Banana)	161(78.5%)	44(21.5%)	58(29.3%)	147(71.7%)
12.	Sugar/Honey	144(70.2%)	61(29.8%)	113(55.1%)	92(44.9%)
13.	Beverages(Tea, Coffea, Chocolate drink)	105(51.2%)	100(48.8%)	91(44.4%)	114(55.6%)
14.	Others (Spices, Soda)	67(32.7%)	138(67.3%)	61(29.8%)	144(70.2%)

Source: Field Survey, 2021.

4.5.1.4 Distribution of Respondents by Food Availability

Table 17 presents the result of food availability of cassava processors. In the case of Improved technology users, Table 17.1 reveals that there was adequate food from January to February as indicated by majority of the respondents with proportions 60% and 61.5% respectively. Also, there was adequate food from August to December as shown by the respondents in the proportion of 65.4%, 88.8%, 85.9%, 78% and 65.9% respectively. However, using mean score and ranking order, the food availability was highest from September to December ($\bar{x}$=2.87, 2.84, 2.75 and 2.61) and considered adequate for a majority of respondents. Findings from Table 17.1 showed that there was low food availability between the months of April ($\bar{x}$=1.90) and May ($\bar{x}$=1.89) and were considered period of food inadequacy. The results indicated that there was low food availability only for April and May as indicated by the majority (68.8%, 66.3%) of the respondents. This therefore implies that in a whole year, for ten months, there was availability of food for the respondents indicating that improved technology has positively affected the food security of it users. The two months of food shortage might be a lean period for the respondents in the study area. The findings further implies that the manifestation of improved technology impacts has enhanced their livelihood capabilities in the study area. This results is in congruent with that of Koloche et al., (2016) who reported that intervention programmes enhanced livelihood of beneficiaries of these programmes.

In the case of Conventional technology users, Table 17.2 shows that there was inadequate food from January to February as indicated by the majority (62.0 and 54.6%), the result also revealed that there was shortage of food in march as indicated by a large proportion of the respondents (51.2%). The result also revealed that there was adequate food from April to November and indicated by the majority (56.1, 85.8, 59.0, 79.5, 88.3, 85.9, 75.6 and 73.2%). December was also recorded as a period of food inadequacy by about half of the respondents (52.2%). However, using mean score and ranking order, the food availability was highest from July to October ($\bar{x}$= 2.80, 2.86, 2.82 and 2.73) and considered adequate for majority of the respondents. Findings from Table 17.2 showed that there was low food availability between the months of January ($\bar{x}$ =1.95) and March ($\bar{x}$ =1.04) and were considered period of food inadequacy. This therefore implies that in a whole year, for eight months, there was availability of food for the respondents and there was shortage of food for four months.

This implies that beneficiaries of improved technology are more food secured when compared to their non-beneficiary counterparts. This result agrees with that of Ekwe, Ukpai, and Ahumihe (2017) that involvement in cassava processing improved processors' food provision status.

Table 17.1.: Distribution of respondents by food availability (Improved technology Users)

Month	Food Availability							
	Adequate		Inadequate		Shortage			
	F	%	F	%	F	%	Mean	Rank
January	123	60	50	24.4	32	15.6	2.44	6
February	126	61.5	43	21	36	17.6	2.43	7
March	80	39	71	34.6	54	26.3	2.14	9
April	21	10.2	141	68.8	43	21	1.90	11
May	24	11.7	136	66.3	45	22	1.89	12
June	60	29.3	113	55.1	32	15.6	2.13	10
July	84	41	97	47.3	24	11.7	2.29	8
August	134	65.4	60	29.3	11	5.4	2.60	5
September	182	88.8	20	9.8	3	1.5	2.87	1
October	176	85.9	25	12.2	4	2	2.84	2
November	160	78	39	19	6	2.9	2.75	3
December	135	65.9	59	28.8	11	5.4	2.61	4

Source: Field Survey, 2021

Table 17.2.: Distribution of respondents by food availability (Conventional technology Users)

Month	Food Availability							
	Adequate		Inadequate		Shortage			
	F	%	F	%	F	%	Mean	Rank
January	34	16.6	127	62.0	44	21.5	1.95	11
February	51	24.9	112	54.6	42	20.5	2.04	8
March	54	26.3	46	22.4	105	51.2	1.04	12
April	115	56.1	53	25.9	37	18	2.18	7
May	89	43.4	93	45.4	23	11.2	2.32	6
June	121	59.0	81	39.5	3	1.5	2.58	5
July	163	79.5	42	20.5	0	0	2.80	3
August	181	88.3	19	9.3	5	2.4	2.86	1
September	176	85.9	21	10.2	8	3.9	2.82	2
October	155	75.6	45	22	5	2.4	2.73	4
November	56	27.3	94	45.9	55	26.8	2.00	9
December	29	14.1	107	52.2	69	33.7	2.00	9

Source: Field Survey, 2021

4.5.2 Housing Condition

Housing is an essential component of physical capital and a key sign of one's ability to support oneself. Rural women's homes are created with different types of materials, such as tin, straw, brick and dirt, based on their financial capacities, regardless of whether they rent, build, inherit, or are owned by their spouses. Along with the socioeconomic condition of the rural family, the interior design of homes differed widely.

4.5.2.1 Distribution of Respondents by Housing condition

Data in Table 18 revealed the housing condition of cassava processors. In the case of improved technology users, Table 18.1 revealed that all the respondents lived in houses with iron sheet roofs (100%), external walls built with ordinary brick (75.1%) and cemented floors (64.9%). Findings in Table 18.1 also showed that about half of the respondents have their kitchen positioned inside the house (51.7%) while 48.3% of the respondents have their kitchen positioned outside, away from the house. About half of the respondents have simple half upholstery furniture (50.2%), 39.5% owned full upholstery furniture, 7.3% had plastics chairs and 2.9% had benches in their respective houses. The respondents thought highly of their homes, which also featured nice furnishings. The majority of the respondents lived in well-framed homes, according to the housing situation of those who benefited from improved technology. The degree of change in respondents' socioeconomic position in the research area, which may be related to the usage of more advanced technology, may be the cause of the variation in housing conditions and home construction materials. This has the connotation that the majority of respondents exploited the available capital assets; human, natural, physical, and financial for their dwelling.

In the case of Conventional technology users, Table 18.2 revealed that all the respondents live in houses with corrugated iron sheet roofs (100%), external walls made of ordinary brick (84.9%)

and cemented floors (86.3%). Table 18.2 also revealed that the vast majority of respondents (66.8%) had their kitchen positioned outside, separated from the house while only 33.2% of the respondents had their kitchen positioned inside the house. A considerable number of the respondents (48.3%) had simple half upholstery furniture, 23.4% owned full upholstery furniture and 28.3% had plastic chairs in their respective houses.

This result implies that improved technology Users had better housing condition when compared to Conventional technology users.

Table 18.1.: Distribution of respondents by housing condition (Improved technology Users)

Items	Types of Construction Materials	Percentage (%)	Mean ±SD
Roof	Iron Sheet	100	**3.00 ± 0.00**
	Leaves	0	
	Straw	0	
Wall	Brick and painted	17.6	**3.10 ± 0.49**
	Brick without paint	75.1	
	Mud	7.3	
	Straw	0	
Floor	Tiled	2	**2.37 ± 0.62**
	Rugged/Carpeted	27.8	
	Cemented	64.9	
	Ordinary	2	
Kitchen Position	Inside	51.7	**1.52 ± 0.50**
	Outside	48.3	
Furniture	Full Upholstery	39.5	**3.26 ± 0.72**
	Half Upholstery	50.2	
	Plastic chairs	7.3	
	Benches	2.9	

Source: Field Survey, 2021

Table 18.2.: Distribution of respondents by housing condition (Conventional technology Users)

Items	Types of Construction Materials	Percentage (%)	Mean ±SD
Roof	Iron Sheet	100	**3.00 ± 0.00**
	Leaves	0	
	Straw	0	
Wall	Brick and painted	12.2	**3.09 ± 0.38**
	Brick without paint	84.9	
	Mud	2.9	
	Straw	0	
Floor	Tiled	3.9	**2.18 ± 0.47**
	Rugged/Carpeted	9.8	
	Cemented	86.3	
	Ordinary	0	
Kitchen Position	Inside	33.2	**1.37 ± 0.35**
	Outside	66.8	
Furniture	Full Upholstery	23.4	**2.95± 0.30**
	Half Upholstery	48.3	
	Plastic chairs	28.3	
	Benches	0	

Source: Field Survey, 2021

4.5.3 Distribution of respondents by Water Source

Figure 4 depicts an overview of cassava processors' access to many sources of water. In the case of beneficiaries of improved technology, Figure 4.1 revealed that a vast majority of the respondents (61%) had access to borehole as their main water source while 39% of the respondents get required water from tube wells. This result implies that improved technology users had access to safe water sources to lead a healthy life.

In the case of Conventional technology users, Figure 4.2 revealed that majority of the respondents (64%) have tube well as their main source of water while 36% of the respondents had access to borehole water. This result implies that beneficiaries of improved technology had access to safer water source when compared to non-beneficiaries. According to key informant, the use of borehole by improved technology users was made possible through intervention programme, particularly RTEP.

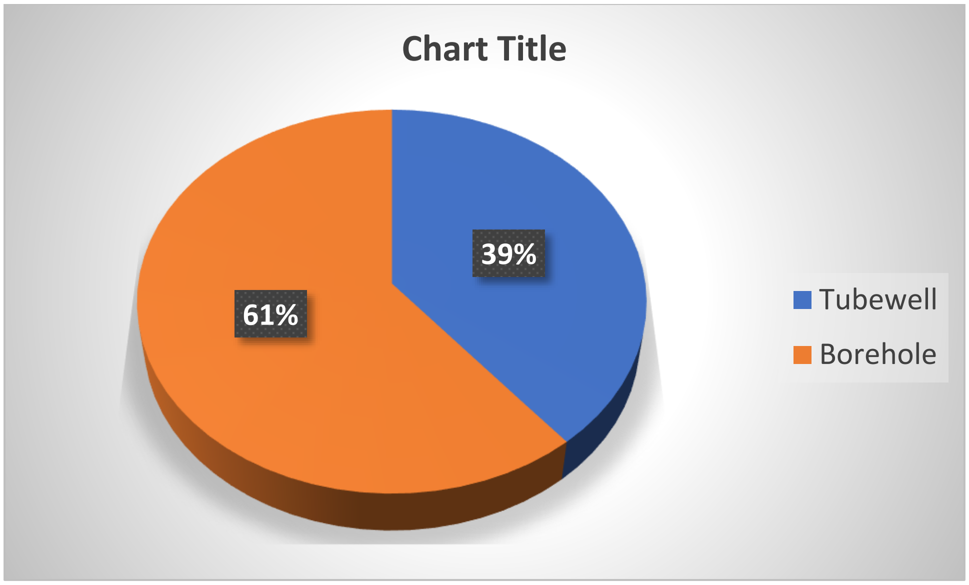

Figure 4.1: Available water sources of respondents in the study area (Improved technology users)

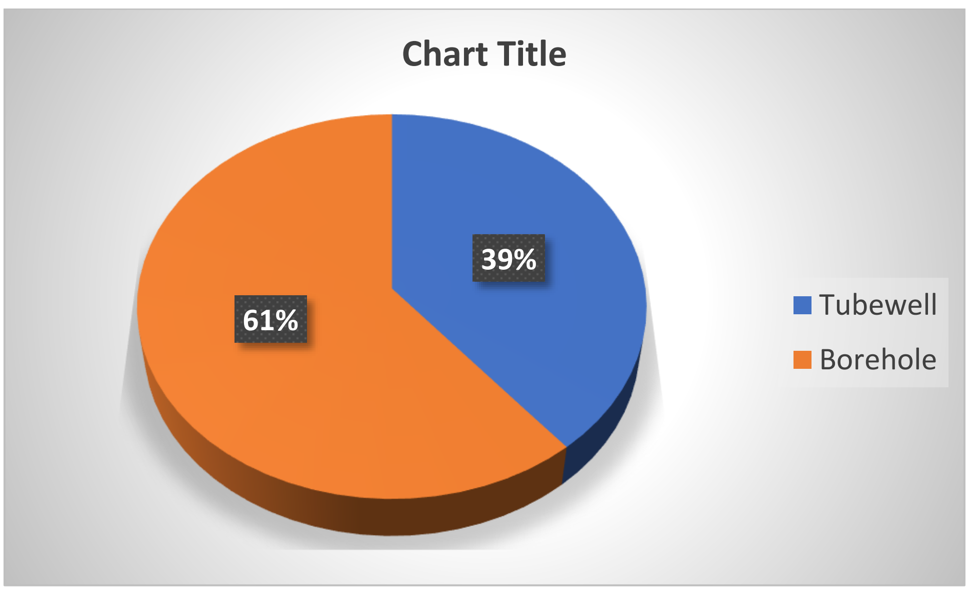

Figure 4.2: Available water sources of respondents in the study area (Conventional technology Users)

4.5.4 Distribution of respondents by Water Quality

From Table 19, it is shown that majority of improved technology users (85%) had very clean water while 15% of the respondents had fair water quality while about half of Conventional technology users (52%) had access to water with fair quality. 48% of the Conventional technology users had access to a very clean water source. This implies that beneficiaries of improved technology had access to good quality water which indicated a good livelihood and could be said to be better than that of non-beneficiaries in the study area. This result indicated that improved technology users' water facilities were seen to have improved as a result of the use of improved technology.

Table 19: Distribution of respondents by water quality

Water quality	Improved		Conventional	
	F	%	F	%
Very bad	0	0	0	0
Bad smell	0	0	0	0
Fair	31	15	107	52%
Very clean	176	85	98	48%

Source: Field Survey, 2021

4.5.5 Use of water sources for different domestic purposes

Table 20 provides information about daily water use for home purposes. In the case of Improved technology users, a vast majority of the respondents used the water source available to them for all purpose. A vast majority of the respondents used pipe borne water for drinking (63.4%), cooking (62.9%), washing of utensils (59.5%), bathing (59.5%), washing clothes (58.5%). Also, the remaining proportion of the respondents (36.6%, 37.1%, 40.5%, 40.5% and 41.5%) used tube well for cooking, drinking, washing of utensils, bathing and washing cloth/cleaning respectively.

In the case of Conventional technology users, majority of the respondents used tube well for drinking (55.1%), cooking (55.1%), washing of utensils (58.5%), bathing (59.5%) and washing of cloth/cleaning (59.5%). Also, the remaining proportion of Conventional technology users (44.9%, 44.9%, 41.5%, 40.5% and 40.5%) used pipe borne water for cooking, drinking, washing of utensils, bathing, and washing of clothes/cleaning. This result implies that, beneficiaries of improved technology have access to safe water sources that serves all domestic and even economic purposes while a large proportion of non-beneficiaries use water sources available to them for all domestic purposes.

Table 20.1: Distribution of Respondents by different purposes of water (Improved technology Users)

Water Sources	Different Purposes (%)				
	Drinking	**Cooking**	**Utensils**	**Bathing**	**Washing Cloth/Cleaning**
Stream	0	0	0	0	0
River	0	0	0	0	0
Rain	0	0	0	0	0
Tube well	36.6	37.1	40.5	40.5	41.5
Borehole	63.4	62.9	59.5	59.5	58.5

Source: Field Survey, 2021

Table 20.2: Distribution of Respondents by different purposes of water (Conventional technology Users)

Water Sources	Different Purposes (%)				
	Drinking	**Cooking**	**Utensils**	**Bathing**	**Washing Cloth/Cleaning**
Stream	0	0	0	0	0
River	0	0	0	0	0
Rain	0	0	0	0	0
Tube well	55.1	55.1	58.5	59.5	59.5
Borehole	44.9	44.9	41.5	40.5	40.5

Source: Field Survey, 2021

4.5.6 Availability of drinking water

The results of the respondents' drinking water availability are shown in Figure 5. In the case of RTEP beneficiaries, Figure 5 showed that; pipe borne water in the research region served as the primary supply of drinking water. Figure 5's regional monthly water supply distribution availability throughout the course of the year demonstrates that water availability was more than enough all through the year ($\bar{x}$=2.58, 2.72, 2.92, 2.97, 2.96, 2.91, 2.89, 2.66, 2.59, 2.41, 2.40, and 2.42). The results also suggested that majority of the respondents do not suffer from dryness since a large proportion of the respondents had access to borehole as indicated in earlier results indicating the sources of water available to the respondents.

In the case of Conventional technology users, Figure 5 showed that water availability was inadequate during the months of December ($\bar{x}$=1.69), January ($\bar{x}$= 1.61), February ($\bar{x}$= 1.59) and March ($\bar{x}$= 1.71). The results also suggest that the peak periods of dry season in the study area are from January to march. The result also suggested that non-beneficiaries of improved technology suffer from dryness since majority of non-beneficiaries collected water from tube wells.

This implies that beneficiaries of improved technology had access to safe and sustainable water source when compared to non-beneficiaries.

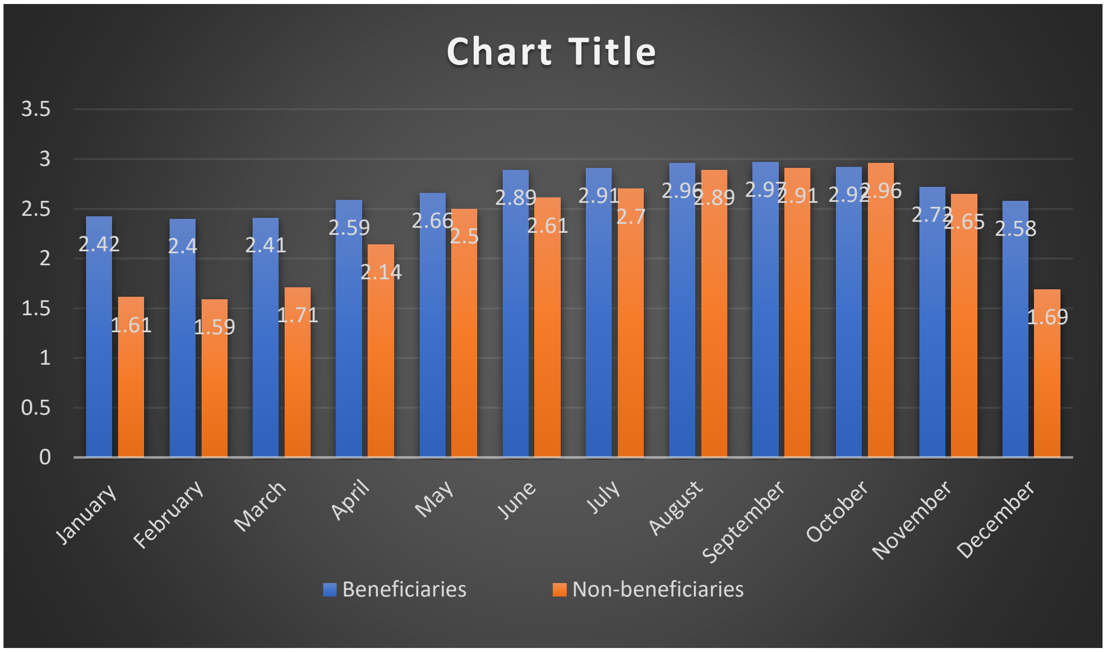

Figure 5: Distribution of respondents by drinking water availability.

4.5.7.1 Distribution of respondents by perceived health status of respondents

Table 21 presents the result of perceived health status of cassava processors. In the case of Improved technology Users, data on Table 21 shows that a vast majority of the respondents (93.7%) claimed good health status while very few (3.9%) claimed to have short term illness, 1.5% claimed to be disabled, and 1% claimed to have long-term illness. In the case of Conventional technology users, majority of the respondents 94.1% claimed good health status, while 5.9% had short term illness. This result implies that both improved and Conventional technology users had good health status.

4.5.7.0 Health Situation

Table 21: Distribution of respondents by perceived health status of respondents

Categories	Improved		Conventional	
	F	**%**	**F**	**%**
Good	192	93.7	193	94.1
Disabled	3	1.5	0	0
Short-term Illness	8	3.9	12	5.9
Long-term illness	2	1	0	0
weak	0	0	0	0
Total	205	100	205	100

Source: Field Survey, 2021

4.5.7.2 Distribution of respondents by the use of health treatment providers

Results in Table 22 showed the health treatment providers the respondents patronized in the study area. In the case of improved technology users, using mean score, the findings in Table 22.1 revealed that self-treatment with mean score 1.37 was most popularly used by the respondents and ranked 1st among others closely followed by village pharmacy ($\bar{x}$ = 1.36) and general hospital ($\bar{x}$ = 1.29). Also, in Table 22.1 private hospital with a mean score of 1.05 and village doctor ($\bar{x}$ = 0.69) were the least patronized by the respondents in the study area.

In the case of Conventional technology users, self-treatment with a mean score of 1.52 was most popularly used by the respondents and ranked 1st among others closely followed by village pharmacy ($\bar{x}$= 1.33) and general hospital ($\bar{x}$= 1.21). Also, in Table 22.2, village doctor with a mean score of 0.95 and private hospital ($\bar{x}$ = 0.84) were the least patronized by Conventional technology users in the study area.

For rural women, the most well-liked source of healthcare was the neighborhood pharmacy. Because the village drugstore was frequently close to the home and required less money for both the services and the medicine, cassava processors sought its assistance. Another significant factor was the fact that the women obtained assistance from the local drugstore without physically travelling there. The family head or another adult family member gave the responsible chemist's person a description of the disease's symptoms, and they sold drugs based on their experience without a doctor's prescription. Only a small percentage of rural women visited the government hospital in cases of serious illness or when difficulties occurred during childbirth.

The findings of the current study suggest that the majority of cassava processors (including those who used enhanced and less-improved technology) received insufficient medical care, which may have been caused by ignorance, social limitations, and a lack of facilities.

Table 22.1.: Distribution of respondents by the use of health treatment providers (Improved

Health Treatment Providers	Frequency of Health Treatment				
	Visit Regularly(%)	Occasionally (%)	Never Visited (%)	Means	Ranks
Self-treatment	48.3	40.5	11.2	1.37	1
Village Pharmacy	42	52.2	5.9	1.36	2
Village Doctors	6.8	55.6	37.6	0.69	5
General Hospital	37.6	53.7	8.8	1.29	3
Private Hospitals	21.5	62	16.6	1.05	4

Source: Field Survey, 2021

Table 22.2.: Distribution of respondents by the use of health treatment providers

(Conventional)

Health Treatment Providers	Frequency of Health Treatment				
	Visit Regularly(%)	Occasionally (%)	Never Visited (%)	Means	Ranks
Self-treatment	59.0	33.7	7.3	1.52	1
Village Pharmacy	38	56.6	5.4	1.33	2
Village Doctors	15.1	64.4	20.5	0.95	4
General Hospital	26.3	68.8	4.9	1.21	3
Private Hospitals	14.1	56.1	29.8	0.84	5

Source: Field Survey, 2021

4.5.8.1 Distribution of Respondents by Toilet possession

To preserve cleanliness and prevent the spread of infectious diseases, access to a hygienic restroom is essential. Table 6 presents the result of toilet possession of the respondents. In the case of Improved technology users, the results in Figure 6.1 revealed that a vast majority of the respondents (85%) had their own latrine, a few (8%) use other people's latrine and a few of the respondents (7%) had no latrine at all. In the case of non-beneficiaries, Figure 6.2 revealed that a vast majority of the respondents (62%) had their own latrine, a considerable number of the respondents (34%) use other peoples' latrine while 4% of the respondents had no toilet at all. This result implies that a larger percentage of Improved technology users had their own latrine when compared to Conventional technology users. This suggests that the welfare and livelihood condition of beneficiaries of improved technology was good. This could be attributed to the increase in the level of production and income that may give opportunity for getting their own latrine.

4.5.8 Sanitation

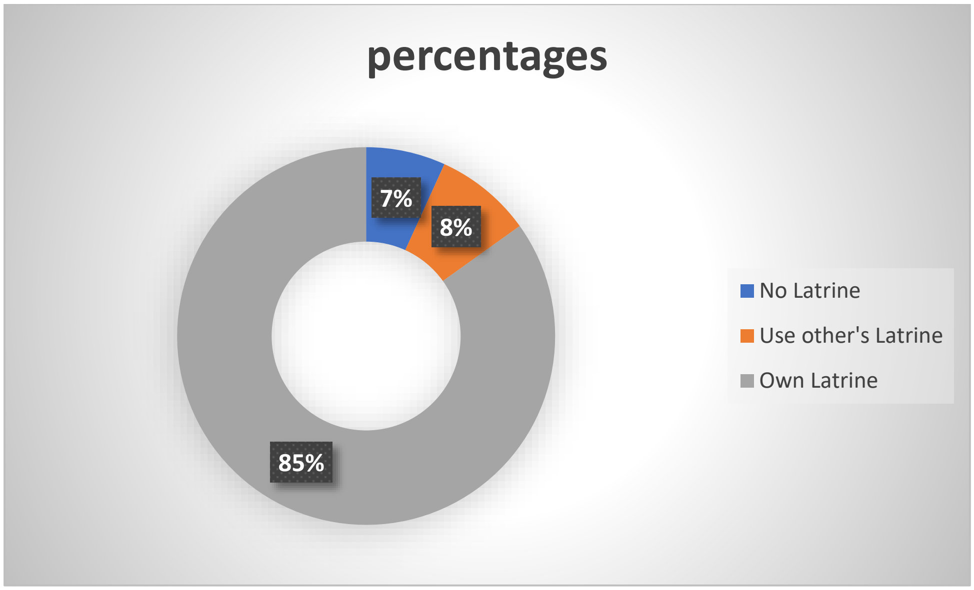

Figure 6.1.: Distribution of respondents by toilet possession (Improved)

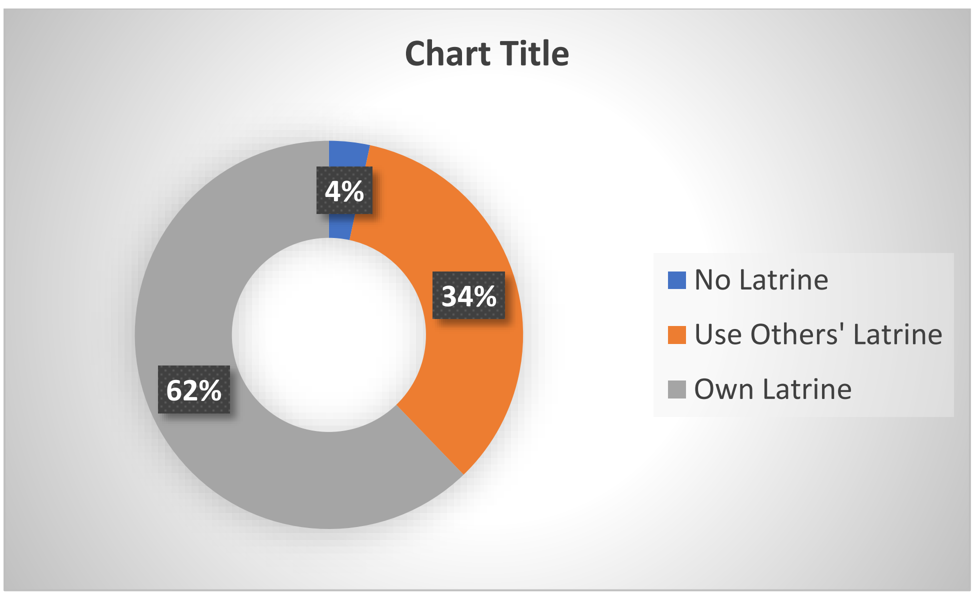

Figure 6.2.: Distribution of respondents by toilet possession (Conventional)

4.5.8.2 Distribution of respondents by the type of toilet used

From Table 23, it is shown that majority of improved technology users (60%) used sanitary toilet, 31.7% used pit latrine while 8.3% used open space. It is worthy of note that, as the majority had their own latrine, the welfare/livelihood condition of improved technology users was good. In the case of Conventional technology users, majority of the respondents (76.6%) used pit latrine, 2% used open spaces while only 21.5% used sanitary toilet.

The findings imply that beneficiaries of improved technology have gained more livelihood assets and capabilities and could afford a hygienic sanitary system. This is in contrast to the position of World bank, (2010) that among rural households, few used sanitary latrines while majority used home-made pit latrines.

Table 23: Distribution of respondents by the type of toilet used

Type of toilet Used	Improved		Conventional	
	F	**%**	**F**	**%**
Sanitary toilet	123	60	44	21.5
Pit latrine	65	31.7	157	76.6
Open space	17	8.3	4	2.0
Total	205	100	205	100

Source: Field Survey, 2021

4.5.8.3 Distribution of respondents by toilet construction

Table 24 presents the results of toilet construction of the respondents. Table 24.1 showed that majority of beneficiaries of improved technology possessed toilet with iron sheet roof (82.9%), exterior walls made of bricks without tiles (66.8%) and cemented floors (69.3%). Also, some of the respondents (18%) had toilets with iron sheet walls and 16.6% had no roof or with open roof. This implies that toilet condition of the respondents were semi structured, highly-structured toilet such as with tiles and walls made of brick is not common in the study area. Further results in Table 24 showed that majority of improved technology users' toilets were situated inside the house (62.9%) attached to the living house while 37.1% of the toilet were outside.

In the case of Conventional technology users, Table 24.2 showed that about half of the respondents possessed toilet with open roof (50.2%), a significant number of the respondents had external toilet wall made of Iron sheets (37.1%), 33.7% had external toilet wall made of bricks. Majority of the respondents' toilet had cemented floor (85.4%). Further results on Table 24.2 showed that majority of the Conventional technology users' toilets were situated outside of the house (70.7%).

This result implies that improved technology users had better sanitary condition when compared to Conventional technology users. This result indicated an improvement in the livelihood condition of beneficiaries of improved technology, having majority of the respondents with toilet positioned inside the house considering the rural set up and other decision-making factors in the rural settings.

Table 24.1.: Distribution of respondents by toilet construction (Improved)

Items	Types of construction materials	Percentage (%)	Mean ± SD
Roof	Iron sheet	82.9	2.65 ± 0.79
	Straw	0.5	
	open	16.6	
Wall	Brick and tiled	7.3	2.67 ± 0.89
	Brick without tiles	66.8	
	Iron sheet	18	
	Jute stick	1.0	
	Open	6.8	
Floor	Tiled	22.9	1.15 ± 0.53
	Cemented	69.3	
	Bare	7.8	
Position	Inside	62.9	1.60 ± 0.55
	Outside	37.1	

Source: Field Survey, 2021

Table 24.2.: Distribution of respondents by toilet construction (Conventional)

Items	Types of construction materials	Percentage (%)	Mean ± SD
Roof	Iron sheet	44.9	2.45 ± 0.59
	Straw	4.9	
	open	50.2	
Wall	Brick and tiled	0	2.36 ± 0.45
	Brick without tiles	33.7	
	Iron sheet	37.1	
	Jute stick	24.4	
	Open	4.8	
Floor	Tiled	4.7	1.12 ± 0.40
	Cemented	85.4	
	Bare	9.0	
Position	Inside	29.3	1.05 ± 0.41
	Outside	70.7	

Source: Field Survey, 2021

4.5.9.1 Distribution of respondents by participation in social activities

Results on Table 25 presented the social involvement of the respondents. In the case of improved technology users, Table 25.1 shows that majority of the respondents (82%) always participated in Family events and 18% of the respondents participated in family events occasionally. In cultural programmes, more than half of the respondents (57.6%) always participated in cultural programmes and 42.4% of the respondents participated occasionally. Further results on table 25 shows that a considerable number of improved technology users (49.8%) always participated in village meetings, 42.4% of the respondents occasionally participated in village meetings, while 7.8% of the respondents never participated in village meetings. Also, 49.8% of the respondents always participated in voluntary help, 35.6% of the respondents occasionally participated in voluntary help while 14.6% of the respondents never participated in voluntary help. Further results on table 25 also shows that a considerable number of respondents 42.9% always participated in mediation, 33.2% of the respondents occasionally participated in mediation while 23.9% never participated in mediation.

In the case of Conventional technology users, Table 25.2 shows that majority of the respondents (74.1%) always participated in family events, about half of the respondents (54.1, 50.2, and 50.2) participated occasionally in cultural programme, village meetings and voluntary help respectively. A considerable number of respondents 31.2% always participated in mediation and 36.6% participated occasionally in mediation.

These results implies that respondents, both improved and Conventional technology users participated fully in social activities. Though the level of participation of beneficiaries of improved technology seem to be higher than that of non-beneficiaries. Participation in group activities and voluntary services could enable both improved and Conventional technology users to get better livelihood opportunities.

4.5.9.0 Participation in social activities

Table 25.1: Distribution of respondents by participation in social activities (Improved technology Users)

Social Activities	Extent of participation					
	Always		Occasionally		Never Participated	
	F	%	F	%	F	%
Family Events	168	82	37	18	0	0
Cultural Program	118	57.6	87	42.4	0	0
Village meeting	102	49.8	87	42.4	16	7.8
Voluntary help	102	49.8	73	35.6	30	14.6
Mediation	88	42.9	68	33.2	49	23.9

Source: Field Survey, 2021

Table 25.2: Distribution of respondents by participation in social activities (Conventional technology users)

Social Activities	Extent of participation					
	Always		Occasionally		Never Participated	
	F	%	F	%	F	%
Family Events	152	74.1	50	24.4	3	1.5
Cultural Program	79	38.5	111	54.1	15	7.3
Village meeting	75	36.6	103	50.2	27	13.2
Voluntary help	84	41	103	50.2	18	8.8
Mediation	64	31.2	75	36.6	66	32.2

Source: Field Survey, 2021

4.5.10 Freedom in cash expenditure

In order to achieve equality, family harmony, and national growth, active engagement by women making decisions at all levels is crucial (Hoque and Itohara, 2008).

4.5.10.1 Distribution of respondents by Freedom in cash expenditure

Table 26 presents the results of freedom in cash expenditure of cassava processors. In the case of improved technology users, Table 26.1 revealed that majority of the respondents (82%) take decision together with their spouses on daily expenditures, 15% of the respondents take decision alone on daily expenditure, 2% of the respondents of the respondents had decision on daily expenditures taken by their spouses and other family members (1%) take decision on daily expenditure of the family. Further results on Table 26.1 shows majority of the respondents take decision together with their spouses on decisions on Investment on child education, land, health, household assets, household repair (77.6%, 72.2%, 83.4%, 72.2% and 76.6%) respectively. Cassava processors had considerable freedom in taking and use of loan and loan repayment (61.5% and 59.5%).

In the case of Conventional technology users, Table 26.2 showed that majority of the respondents (61.0, 51.7, 81.5, 81.0, 52.2% and 80.5,) take decision with their spouses on household repair, child education, investment on land, health, household assets and daily expenditure. Further results showed that 73.2% and 79.5% had freedom in taking and use of loan by themselves.

It is clear from the study's findings that cassava processors, both improved and Conventional technology users take decision together with their spouses regarding money related matters. From the analysis, it could be observed that the cash expenditure is evenly distributed and the processors who are mainly women had to a very reasonable extent freedom in cash expenditure. It follows therefore again that with the benefits derived from the use of improved technology, processors income has increased and were actively involved in cash expenditure, thereby contributing to the family welfare and children education expenses. These findings are in contrast with the report of Hogue and Itohara, (2008) that male family members are the ones who make decisions, and most of the time a man makes a decision without consulting his wife.

Table 26.1.: Distribution of respondents by freedom in cash expenditure (Improved)

Expenditure	Other member (%)	Together (%)	Husband (%)	Herself only (%)
Daily Expenditure	1	82	2	15
Investment on Land	1.5	72.2	15.6	10.7
Household repair	1.5	72.2	15.6	10.7
Child education	1	77.6	9.3	12.2
Health	1	83.4	3.4	12.2
Household assets	2.4	76.6	10.2	10.7
Take loan and use	0.5	33.7	4.4	61.5
Loan servicing	0.5	37.6	2.4	59.5

Source: Field Survey, 2021

Table 26.2.: Distribution of respondents by freedom in cash expenditure (Conventional)

Expenditure	Other member (%)	Together (%)	Husband (%)	Herself only (%)
Daily Expenditure	0	80.5	4.9	14.6
Investment on Land	1.0	61.0	24.9	13.2
Household repair	1.0	51.7	35.1	12.2
Child education	2.9	81.5	5.9	9.8
Health	2.0	81.0	5.4	11.7
Household assets	0	52.2	34.1	13.7
Take loan and use	3.4	22.0	1.5	73.2
Loan servicing	3.4	16.1	1.0	79.5

Source: Field Survey, 2021

4.6.0 LIVELIHOOD INDICATORS

Table 27 provides a summary of the livelihood status of rural women as determined by the percentage scores of seven livelihood indicators.

4.6.1 Distribution of respondents by the seven livelihood indicators

The state of seven indicators of livelihood in the study area for improved technology users has been shown in Table 27.1. The score with the highest overall percentage was earned by housing condition (77.93), which indicated that the respondents' housing situation was very good and better than other livelihood indicators. This is followed by food availability and consumption situation (75.25), which indicated that improved technology users and their household feeds better and are more food secured which could be attributed to the use of improved technology. Participation in social activities (73.61) ranked third while health situation (70.93), sanitation (68.54), water facilities (64.17) and freedom in cash expenditure (64.09) ranked fourth, fifth, sixth and seventh respectively. The results indicated that, although housing condition, food availability and consumption situation and participation in social activities didn't reach the top of their game (100 percent) they were in a better situation than other measures of livelihood.

Cassava processors are divided into five groups based on their overall livelihood status score: very low (43–48), low (49–54), medium (55–60), high (61–66), and very high (67 - 73). The cumulative livelihood status of Improved technology users was computed to be **70.65** which indicated a very high livelihood status.

In the case of Conventional technology users, Table 27.2 revealed that the highest cumulative percentage score was obtained from health Situation (69.45), which indicated that the health situation of Conventional technology users was good and better than other livelihood indicators. This is followed by Freedom in cash expenditure (62.69) and participation in social activities (61.35). Also, water facilities (60.26), sanitation (54.20), housing condition (53.75), and food availability and consumption situation (52.50) ranked fourth, fifth, sixth and seventh respectively. The cumulative livelihood status of Conventional technology users was computed to be **59.17** which indicated a medium livelihood status.

This implies that improved technology users had a very high livelihood status and are better when compared to Conventional technology users. It can therefore be said that the livelihood status of beneficiaries of improved technology has improved as a result of the use of improved technology. This is in agreement with the findings of Adeleye et al., (2020) that the processing technology improved livelihood of cassava processors. This means that using cassava processing techniques boosted their production, which in turn increased their farm income and, as a result, the livelihood of processors. Also, this result is in congruent with that of Yidana, Osei-Kwarteng, and Amadu (2013) that cassava processing is profitable and contributes significantly to the standard of living of women cassava processors in terms of income generation and family food security.

Table 27.1.: Distribution of respondents by the seven livelihood indicators (Improved technology Users)

Livelihood Indicators	Cumulative Percentage Score (CPS)	Rank
Food Availability and Consumption Situation	75.25	2nd
Housing Condition	77.93	1st
Water Facilities	64.17	6th
Health Situation	70.93	4th
Sanitation	68.54	5th
Participation in Social Activities	73.61	3rd
Freedom in Cash Expenditure	64.09	7th
	∑CPS = 494.52	

Cumulative Livelihood Status Score (CLSS) = ∑CPS/LI = 494.52/7 = **70.65**

Source: Field Survey, 2021

CPS = Cumulative percentage score

CLSS = Cumulative livelihood status score

LI = Livelihood indicators

Table 27.2.: Distribution of respondents by the seven livelihood indicators (Conventional technology Users)

Livelihood Indicators	Cumulative Percentage Score (CPS)	Rank
Food Availability and Consumption Situation	52.50	7th
Housing Condition	53.75	6th
Water Facilities	60.26	4th
Health Situation	69.45	1st
Sanitation	54.20	5th
Participation in Social Activities	61.35	3rd
Freedom in Cash Expenditure	62.69	2nd
	$\sum$CPS = 414.20	
Cumulative Livelihood Status Score (CLSS) = $\sum$CPS/LI = 414.20/7 = **59.17**		

Source: Field Survey, 2021

CPS = Cumulative percentage score

CLSS = Cumulative livelihood status score

LI = Livelihood indicators

4.7.0 Constraints faced by cassava processors in the study area

Table 28 shows the result of the distribution of the study area's cassava processors' challenges. In the case of improved technology users, lack/scarcity of spare parts ($\bar{x}$ = 1.91) ranked highest amongst various constraints, high cost of processing equipment ($\bar{x}$ = 1.87) ranked second, high maintenance and operational cost of equipment ($\bar{x}$ = 1.83), lack of credit and fund ($\bar{x}$ = 1.77) were ranked third, and forth respectively.

In the case of Conventional technology users, lack of credit ($\bar{x}$ = 1.84) ranked highest amongst various constraints, high cost of processing equipment ($\bar{x}$ = 1.67) ranked second, high maintenance and operational cost of equipment ($\bar{x}$ = 1.65), high cost of production ($\bar{x}$ = 1.64) were ranked third, and forth respectively.

The issue of lack/ scarcity of spare parts on the part of beneficiaries of improved technology could be as a result of the need to maintain the equipment given to the various groups by RTEP and other agencies, there arise a need to maintain the equipment which could be a major challenge as oppose to Conventional technology users who use public mills and are not responsible for maintenance. On the part of Conventional technology users the issue of lack of credit constituted a major challenge which is faced by women involved in business ventures.

This outcome is consistent with that of Jaya Kumar and Kannan (2014), who emphasized the potential and problems facing women in agribusiness. He emphasized that the primary obstacles facing women include financial difficulties, the dual role of women juggling work and home obligations, illiteracy among rural women, a reduced capacity for risk-taking, a lack of knowledge and support, the need for training and development, etc. Women will have the opportunity to venture into and succeed in business enterprises as a result of the government's growing interest in women entrepreneurs. This result is also in line with that of Ewebiyi, Ikotun, and Olayemi,

(2020) as well as Awoyemi et al., (2020) where they reported insufficient cash, a lack of technical know-how, insufficient information, excessive purchasing costs, and insufficient engineers as major barriers to implementing improved processing technologies.

Table 28: Distribution of respondents by constraints faced by cassava processors

s/n	CONSTRAINTS	Improved		Conventional	
		Means	**Ranks**	**Means**	**Ranks**
1	Lack of appropriate/efficient processing equipment	1.47	7th	1.52	6th
2	Lack/scarcity of spare parts	1.91	1st	1.60	5th
3	High Cost of processing equipment	1.87	2nd	1.67	2nd
4	High maintenance and operational costs of equipment	1.83	3rd	1.65	3rd
5	Lack of credit/funds	1.77	4th	1.84	1st
6	Poor power supply	1.49	6th	1.11	8th
7	The dual role of women responsibility of business and family	0.82	17th	0.86	16th
8	Less risk bearing capacity	1.01	12th	0.92	14th
9	Unsupportive spouse	0.69	19th	0.58	19th
10	High cost of Production	1.62	5th	1.64	4th
11	Exploitation by middle men	1.06	9th	1.01	10th
12	Sale and Marketing Problem	1.05	10th	0.97	12th
13	Difficulty with Unions	0.86	15th	0.77	17th
14	Low level of Demand for cassava products in the local economy	0.88	14th	0.73	18th
15	Lack of access to and control over income	0.78	18th	0.99	11th
16	Limited Advancement Opportunities	1.19	8th	1.12	7th
17	Lack of skilled labour	0.85	16th	0.89	15th
18	Health problems	0.94	13th	0.96	13th
19	Poor returns on investments	1.02	11th	1.03	9th

Source: Field Survey, 2021.

4.8 Test of Hypotheses

4.8.0 Result of multivariate regression between some selected socio-economic characteristics and livelihood of women cassava processors

The finding in Table 29 illustrates the relationship between a few particular socioeconomic traits and the livelihood of women cassava processors using multivariant regression analysis. The findings revealed that age has a positive and significant relationship with water facilities (p=0.133) at 5% level of significance, while age has a negative and significant relationship with social involvement (p=-0.120) and freedom to spend money (p=-0.120) both at 5% level of significance. This suggests that age has a significant relationship with the water facilities available to a cassava processor, there social involvement and their freedom to spend money. This implies that as respondents gets older, they could afford a better source of water and have access to a more hygienic water facility. The result also implies that, as respondents get older, there social involvement and freedom to expend money reduces. The null hypothesis is therefore rejected for age and water facility, social involvement and freedom to expend money. However, Table 29 also shows that there is no significant relationship between age and food availability (p=0.017), housing condition (p=0.001), health situation (p=0.025) and sanitation (p=0.058). The null hypothesis is therefore accepted for age and food availability and consumption situation, housing condition, health situation and sanitary condition.

The result on Table 29 also revealed that marital status has a positive and significant relationship with food availability (p=0.806), water facilities (p=2.270), sanitation (p=1.303), social involvement (p=4.109) and freedom to expend money (p=4.109) at 10%, 1%, 1%, 1% and 1% level of significance respectively. This suggests that marital status has a significant relationship with food availability and consumption situation, water facilities, sanitation, social involvement and freedom to expend cash. The null hypothesis is therefore rejected in this case. However, there is no significant relationship between marital status and housing condition and health situation. The null hypothesis is therefore accepted in this case.

The results in Table 29 also revealed that a significant and positive relationship exist between education and housing condition (p=0.088), health situation (p=0.093), sanitation (p=0.117), social involvement (p=0.144) and freedom to expend cash (p=0.144) at 1%, 1%, 10%, 5% and 5% level of significance respectively. This suggests that there is a significant relationship between education and housing condition, health situation, sanitation, participation in social participation and freedom to expend cash. This implies that respondents with high educational level could have better housing condition buy planning and saving up proceeds from cassava processing to meet housing needs. Respondents who are well educated could also be more inclined to underlining symptoms of health challenges and appropriate management of health situations by visiting health service providers as at when needed compared to respondents with lower years of schooling. Also, respondents who are more educated could have access to a better sanitation facility that respondents who are less educated. Respondents with higher educational level could also be more socially inclined than respondents with lower level of education in terms of social involvement. Respondents with higher level of education could also be able to manage cash better and therefore has more freedom in expending cash than respondents with lower educational level. Table 29 also revealed that there is no significant relationship between education and food availability and consumption situation and water facility. The null hypothesis is therefore rejected for education and housing condition, health situation, sanitation, involvement in social activities and freedom to expend cash while the null hypothesis is accepted for food availability and water facilities.

Table 29 also shows that household size has a positive and a significant relationship with food availability (p=0.455) and health situation (p=0.260) at 5% level of significance. Household size also has a negative and significant relationship with housing condition (p=-0.186). This suggests that there is a significant relationship between household size and food availability, health situation and housing condition. This implies that respondents with large household sizes will have more food available to them probably due to more family members involving in income generating activities. Also, respondents with smaller household sizes could have better housing condition due to having a manageable population to accommodate. Further results on Table 29 shows that there is no significant relationship between household size and water facilities (p=0.336), sanitation (-p=0.422), involvement in social activities (p=-0.051) and freedom to expend cash (p=0.154). this suggests that there is no significant relationship between household size and water facilities, sanitation, social involvement and freedom to expend cash. The null hypothesis is therefore rejected for household size and food availability and consumption situation, health situation, and housing condition while the null hypothesis is accepted for household size and water facilities, sanitation, social involvement and freedom to expend cash.

Table 29 also revealed that a positive and significant relationship exist between Years of experience in cassava processing and social involvement (p=0.153) and freedom to expend cash (p=0.153) both at 1% level of significance. Also, a negative and significant relationship exist between experience and health situation (p=-0.036) at 10% level of significance. This implies that respondents with a longer year of experience in cassava processing could be more socially inclined and have financial capacity to attend to social responsibility than respondents with a lesser year of cassava processing experience. Also, respondents with more years of experience could have more freedom to expend cash than respondents with lesser year of experience. The result in Table 29 also shows that there is no significant relationship between experience and food availability (p=0.043), housing condition (p=-0.001), water facilities (p=-0.041) and sanitation (p=-0.068).

The null hypothesis is therefore rejected for experience and involvement in social activities, freedom to expend cash and health situation while the null hypothesis is accepted for experience and food availability, housing condition, water facility and sanitation.

Table 29 also revealed that a negative and significant relationship exist between farm size and food availability (p=-0.462), housing condition (p=-0.225) and health situation (p=-0.168) at 10%, 5% and 5% level of significance respectively. This suggests that there is a significant relationship between farm size and food availability and consumption situation, housing condition and health situation.

Table 29 also revealed that a positive and significant relationship exist between income and food availability (p=0.029), housing condition (p=0.044), sanitation (p=0.069), social involvement (p=0.076) and freedom in expending cash (p=0.076) at 10%, 1%, 5%, 1% and 1% respectively. This implies that an increase in income from cassava processing will result in an increase in food availability, better housing condition, better sanitation, able to participate more in social activities and has freedom to expend cash. The null hypothesis is therefore rejected for cassava income and food availability, housing condition, sanitation, social involvement and freedom to expend cash. Further result on table 29 shows that there is no significant relationship between income from cassava processing and water facilities (p=-0.049) and health situation (p=0.002). This suggests that there is no significant relationship between income from cassava processing and water facilities and health situation. The null hypothesis is therefore accepted in this case.

Table 29 also revealed that other income has a significant and positive relationship with food availability (p=0.0920) and a negative and significant relationship with social involvement (p=-0.089) and freedom to expend cash (p=-0.047). this suggest that an increase in other income could lead to an increase in food availability and reduce social involvement and freedom to expend cash.

The null hypothesis is therefore rejected for other income and food availability, social involvement and freedom to expend cash. Also, Table 29 shows that there is no significant relationship between other income and housing condition (p=0.018), water facilities (p=-0.074), health situation (p=-0.009) and sanitation (p=0.021). The null hypothesis is therefore accepted in this case. This implies that there is no significant relationship between other income and housing condition, water facilities, health situation and sanitation. That is an increase in other income might not have an effect on the housing condition of the respondent as well as water facilities, health situation and sanitation.

Table 29: Result of multivariate regression between some selected socio-economic characteristics and livelihood of women cassava processors (n=410).

	Food availability	Housing Condition	Water facilities	Health situation	Sanitation	Participation in Social activities	Freedom in cash expenditure
Age	0.017	0.001	0.133**	0.025	0.058	-0.120**	-0.120**
Marital status	0.806*	0.202	2.270***	0.114	1.303***	4.109***	4.109***
Education	-0.051	0.088***	0.003	0.093***	0.117*	0.144**	0.144**
Household Size	0.455*	-0.186**	0.336	0.260***	-0.422	-0.051	0.154
Experience	0.043	-0.001	-0.041	0.036*	-0.068	0.153***	0.153***
Farm size	0.462*	-0.225**	0.167	-0.168**	-0.352	-0.115	0.115
Income	0.029*	0.044***	-0.049	0.002	0.069**	0.076***	0.076***
Other Income	0.092**	0.018	-0.074	-0.009	0.021	-0.089***	-0.047

*=Significant at 10% level; **=Significant at 5% level; ***=Significant at 1% level.

Source: Field Survey, 2021.

4.9.0 Result of independent Two-sample T-Test between improved and Conventional technology users.

The result of independent sample t-test in Table 30 shows that the livelihood of improved technology users and Conventional technology users was significantly different (t= -18.614, p= 0.000). Since P<0.005, then there is a statistically significant difference between the livelihood status of improved and Conventional technology users. Hence, the null hypothesis is rejected and the alternative hypothesis is accepted.

This result indicates that improved technology users exhibit a better livelihood outcome than Conventional technology users. Therefore, it could be said that the use of improved technologies as provided by RTEP has really impacted the livelihood of its beneficiaries in the study area. This result is in line with Oladipo, (2012) who found a significant difference in the productivity of NACB small-holder credit facilities beneficiaries and and non-beneficiaies in Osun State, Nigeria.

Table 30: Result of independent Two-sample T-Test between improved and Conventional technology users.

Independent Sample Test							
		Levene's Test for equality of variances			t-test for Equality of Means		
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference
Livelihood	Equal variances assumed	.898	.344	-18.614	408	.000	-10.16101
	Equal variances not assumed			-18.614	399.334	.000	-10.16101

Source: Field Survey, 2021.

4.10.0: Results of correlation analysis showing the relationship between the use of improved technologies and livelihood outcomes of processors in the study area.

Table 31 showed the results of the correlation analysis between the use of improved technologies and livelihood outcomes of processors in the study area. The table showed that there were positive and significant relationship between the respondents' livelihood outcomes (constructed by considering the seven livelihood indicators such as food availability and consumption situation, housing condition, health situation, water facilities, sanitation, involvement in social activities and freedom to expend cash) and their use of improved cassava processing technologies. This suggests that the use of improved technologies in cassava processing activities is a strong predictor which influences the livelihood outcomes of the respondents. Therefore, the use of improved technology leads to an increase in the productivity of processors and ultimately enhances the livelihood of cassava processors. The null hypothesis is therefore rejected in this case and the alternative hypothesis accepted.

Table 31: Results of correlation analysis showing the relationship between the use of improved technologies and livelihood outcomes of processors in the study area.

Variables	r-value	p-value	Decision
Food availability and consumption situation	0.571**	0.000	Significant
Housing condition	0.434**	0.000	Significant
Water facilities	0.663**	0.000	Significant
Health situation	0.791*	0.002	Significant
Sanitation	0.367**	0.000	Significant
Participation in social activities	0.912*	0.004	Significant
Freedom in cash expenditure	0.295*	0.001	Significant

**Correlation significant at 0.01 level (2-tailed)

*Correlation significant at 0.05 level (2-tailed)

Source: Field Survey, 2021

4.11.0: Results of correlation analysis showing the relationship between the use of Conventional technologies and livelihood outcomes of processors in the study area.

Table 32 showed the results of the correlation analysis between the use of Conventional technologies and livelihood outcomes of processors in the study area. Table 32 showed that there were positive and significant relationship between the respondents' livelihood outcomes (constructed by considering the seven livelihood indicators such as food availability and consumption situation, housing condition, health situation, water facilities, sanitation, involvement in social activities and freedom to expend cash) and their use of Conventional cassava processing technologies. This suggests that the use of Conventional technologies in cassava processing activities influences the livelihood outcomes of the respondents. Therefore, the use of Conventional technology ultimately affects the livelihood of cassava processors. The null hypothesis is therefore rejected in this case and the alternative hypothesis accepted.

Table 32: Results of correlation analysis showing the relationship between the use of Conventional technologies and livelihood outcomes of processors in the study area.

Variables	r-value	p-value	Decision
Food availability and consumption situation	0.475**	0.000	Significant
Housing condition	0.534**	0.000	Significant
Water facilities	0.536*	0.001	Significant
Health situation	0.391**	0.000	Significant
Sanitation	0.377**	0.000	Significant
Participation in social activities	0.612*	0.004	Significant
Freedom in cash expenditure	0.205*	0.002	Significant

**Correlation significant at 0.01 level (2-tailed)

*Correlation significant at 0.05 level (2-tailed)

Source: Field Survey, 2021

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The study's summary, conclusion, and recommendations are presented in this chapter. The research was done to evaluate cassava processing technologies and the livelihood of in Kogi and Kwara State, Nigeria. Primary data were collected through interview schedule that was properly structured and the secondary data used for the study were sourced from agricultural journals, annual report of the ADPs, internet and past studies. Data were collected from 410 respondents which were selected through a multistage sampling technique. Descriptive statistics such as frequency counts, percentages, charts, mean scores, standard deviation and ranks were used. Inferential statistics such as t-test and multivariant regression were used in analyzing the data. The following were the major findings of the study:

The majority of respondents were between the ages of 31 and 50. Most of the women who participated in the poll were married. The mean years of education for improved technology users was 8 years while that of Conventional technology users was 10 years. The majority of respondents lived in households with between four and six people. Majority of improved technology users (88.9%) had more than 10 years of processing experience, majority of Conventional technology users (63.9%) also had more than 10years of processing experience. A large proportion of women cassava processors are landless. The majority of respondents belonged to one or more associations. Majority of the respondents had extension contacts only once in a while. The study also revealed that a little above average of improved technology users (52.2%) had average annual income of between N500,000 to N1,100,000 from cassava processing while Majority (61%) of Conventional technology users claim to make between N100,000 to N300,000 annually from cassava processing.

A vast majority of the respondents engaged both family and hired source of labour in cassava processing activities. A vast majority of the improved technology users (60.5%) process between 201 to 300kg per cycle. A little above average (52.2%) of Conventional technology users process between 100 to 200kgs of garri per cycle. A large proportion of improved technology users (49.8%) process 5 to 6 cycles per month. About half of the respondents (58.5%) claimed to have built houses from the proceeds of cassava processing, majority of the respondents (88.8%, 95.6%, 76.1%) claimed to have acquired Land, farm tools and implements and livestock from cassava processing respectively while in the case of Conventional technology users, majority of the respondents (82.9%) claimed to not have bought houses from cassava processing.

Through the work of change agents, women have been exposed to enhanced peeling, grating, grinding, sieving, hydraulic pressing, tray frying, and drying technologies for cassava processing.

The usage of conventional peelers, graters, presses or screwjacks, local fryers, and basket sieve are some examples of classic processing technologies.

In the case of improved technology users, majority of the respondents (60%, 61.5%) indicated to have never experience blisters of fingers and hands from cassava processing and cuts while peeling cassava. However, all of the respondents (100%) indicated to always experience hand itching and discoloration, Skin irritation and itching from contact with raw cassava tubers, ergonomic hazard from grating. All of the respondents (100%) claimed to never have experience death of plants around the processing centre, damage to buildings, stench, possible insect and disease infestation, health hazard, effluent and eutrophication of still water causes oxygen levels to drop and aquatic life to perish. due to indiscriminate disposal of effluent. In the case of Conventional technology users, majority of the respondents (85.4%, 75.1% and 100%) indicated to always experience blisters of finger and hands from peeling, cuts while peeling and hand itching and discoloration from peeling cassava roots. All the respondents (100%) indicated to have experienced skin irritation and itching, ergonomic hazard. A little above average of the respondents (55.1%) indicated that they always experienced death of plants around the processing centre due to disposal of effluent. However, majority of the respondents (100%, 68.8%) indicated to have never experienced damage to buildings, insect and disease infestation by effluent from fermentation and pressing operations. All of the respondents (100%, 47.3% and 88.8%) indicated that they always experience stench, health hazard and eutrophication of slow-moving water as a result of indiscriminate and continuous disposal of effluent.

In the case of improved technology users, majority of the respondents (85.9%, 85.8%, 85.9%, 82.9% and 80.5%) contributed 50 percent and more to cater for education of offspring, family food needs, health care, personal needs and children clothing. In the case of Conventional technology users, Majority of the respondents (67.8%, 67.8%, 76.1%, 92.2% and 85.4%) contributed more than 50 percent toward catering for education of offspring, family food needs, health care, personal needs and children clothing.

In the case of both improved and Conventional technology users, majority of the respondents ate three meals per day. However, improved technology users ate three meals more frequently when compared to users of Conventional technology. Majority of improved technology users live in houses with iron sheet roofs (100%), external walls built wth ordinary brick (75.1%) and cemented floors (64.9%), about half of the respondents have their kitchen positioned inside the house (51.7%), about half of the respondents have simple half upholstery furniture (50.2). In the case of Conventional technology users, all the respondents possessed live in houses with iron sheet roofs (100%), external walls built with ordinary brick (84.9%) and cemented floors (86.3%). Majority of the respondents (66.8%) had their kitchen positioned outside, separated from the house. A considerable number of the respondents (48.3%) had simple half upholstery furniture.

Majority of improved technology users (61%) had access to pipe borne water as their primary source of water, had very clean water (85%) and used pipe borne water for drinking (63.4%), cooking (62.9%), washing of utensils (59.5%), bathing (59.5%), washing clothes (58.5%) while in the case of Conventional technology users, majority of the respondents (64%) utilized well water for domestic use, had access to a very clean water source (48%), used tube well for drinking (55.1%), cooking (55.1%), washing of utensils (58.5%), bathing (59.5%) and washing of cloth/cleaning (59.5%).

Majority of improved and Conventional technology users (93.7% and 94.1%) claimed good health status, self-treatment (1.37 and 1.52) was the most popularly used health treatment provider by both improved and Conventional technology users respectively.

Majority of women cassava processors (85% and 62%) had their own latrine, majority of improved technology users (60%) used sanitary toilet, possessed toilet with iron sheet roof (82.9%), exterior walls made of bricks without tiles (66.8%) and cemented floors (69.3%). Majority of Conventional technology users (76.6%) used pit latrine, about half of the respondents possessed toilet with open roof (50.2%), a significant number of the respondents had external toilet wall made of Iron sheets (37.1%), 33.7% had external toilet wall made of bricks. Majority of the respondents' toilet had cemented floor (85.4%).

Cassava processors, both improved and Conventional technology users take decision together with their spouses regarding money related matters. It was be observed that the cash expenditure is evenly distributed and the processors who are mainly women had to a very reasonable extent freedom to expend money.

The cumulative livelihood status of Improved technology users was computed to be **70.65** which indicated a very high livelihood status while the cumulative livelihood status of Conventional technology users was computed to be **59.17** which indicated a medium livelihood status.

In the case of improved technology users, lack/scarcity of spare parts ($\bar{x}$ = 1.91),high cost of processing equipment ($\bar{x}$ = 1.87), high maintenance and operational cost of equipment ($\bar{x}$ = 1.83), lack of credit and fund ($\bar{x}$ = 1.77) were the major constraints. In the case of Conventional technology users, lack of credit ($\bar{x}$ = 1.84), high cost of processing equipment ($\bar{x}$ = 1.67), high maintenance and operational cost of equipment ($\bar{x}$ = 1.65), high cost of production ($\bar{x}$ = 1.64) were the major constraints to the use of cassava processing technology.

The results of multivariate regression analyses between the selected socio-economic variables of women cassava processors and their livelihood shows that a significant relationship exist between the selected socio-economic variables and the livelihood of women cassava processors in the study area. The result of the independent two-sample t-test shows that there is a significant difference between the livelihood of improved and Conventional technology users in the study area. The results of the correlation between livelihood outcomes and the use of cassava processing technologies also showed that there is a relationship between the cassava processing technologies used by cassava processors and their livelihood outcomes.

5.2 Conclusion

Based on the research findings, improved technologies contribute immensely to cassava processing. The use of improved technology had a considerable influence on their livelihood status, most especially in the areas of housing condition, food availability and consumption. Users of Conventional technologies experienced more occupational hazards in their processing activities compared to improved technology users. There was also a significant difference between the livelihood outcomes of improved technology users compared to their Conventional technology user counterpart. Lack and or scarcity of spare parts, high cost of processing equipment, high maintenance, operational cost of equipment and lack of credit and funds, amongst others constitute a major constraint to the use of improved processing technologies. The use of improved technology enhanced productivity in terms of quantity of garri processed (output), income, and livelihood conditions.

5.3 Recommendations

1. Interventions like RTEP, Presidential initiative on cassava and other empowerment programme as such should continue and adequate follow up activities with continuous training should be conducted in order to revive non-functioning processing centres and to update processors' knowledge.
2. Re-introduction and inclusion of additional cassava processors in all villages across the two states to enable large numbers of processors to benefit and hence increase cassava products industry.
3. Government should invest heavily in subsidized cassava processing machinery to promote processing options diversity in the downstream industry.
4. In addition to raising the standard of living for rural processors, the provision of essential infrastructures like electricity, water, accessible roads, and filling stations will also encourage them to purchase diesel and electricity-powered equipment.

5. The ADP should organize sensitization programme on occupational hazards associated with cassava processing and cassava processors should be trained on necessary precautions to take to reduce the effect of these hazards on their health and the environment.
6. The government, IFAD and other NGOs should create more access to credit facilities to cassava processors at the lowest interest rate to ameliorate the problem of inadequate finances by the processors in the study area.
7. Stakeholders in the cassava industry should organize standard marketing channels at the grassroots to curb marketing challenges being faced by the cassava processors thereby making a way for good marketing to realize worthwhile income.
8. There is need to improve the extension contact to cassava processors so as to assist the processors on some complexities in processing and to afford non-beneficiaries opportunities to enjoy other benefits and programme as may arise.
9. The ADPs through the extension agents should encourage cassava processor to form and operate more formidable processors groups through which they can harness better opportunities.

5.4 Contribution to Knowledge

1. The study documented the socio-economic characteristics like age, educational status, years of cassava processing experience, quantity of garri processed and average annual income of cassava processors in the study area that had significant influence on cassava processing and livelihood of rural women.
2. The study provided comprehensive data on the cassava processing technologies and tools (both Conventional and improved) available and used by cassava processors in the study area.

3. The study provided quantitative data on the health and professional hazards linked with cassava processing technologies based on each unit processing activities and how it affects cassava processors.
4. The study evaluated the livelihood outcomes of cassava processors in the study area.
5. The study provided quantitative data on the percentage contribution of women processors to household welfare based on the available cassava processing technologies.
6. The study identified the constraints associated with the use of cassava processing technologies in the study area.
7. The study provided quantitative data on the food availability and consumption situation of women processors' household in the study area.
8. The study provided quantitative data on the housing condition of women cassava processors in the study area, ascertained the sources of water, water quality, utilization of water for different domestic purpose the monthly drinking water distribution in space over a year by cassava processors in the study area, documented the perceived health status and health treatment providers available to cassava processors in the study area and provided quantitative data on the sanitary condition of women cassava processors in the study area. The study also established the level of participation of cassava processors in social activities in the study area, ascertained the level of freedom in cash expenditure exhibited by cassava processors in the study area.
9. The study provided quantitative data on the livelihood status of cassava processors based on the technology utilized.

5.5 Limitations of the study

1. Only two of the four zones in Kogi and Kwara States were included in the data collection, which may not accurately reflect the situation in the entire nation since people adapt their livelihood tactics to the particular circumstances they confront.

2. For this study, only the female participants in cassava processing were taken into account.

The sample size and demographics of the respondents were constrained due to time and resource constraints, making it impossible to use a larger sample. Only 410 cassava processors, or 35% of the study population, were taken into account.

3. There are numerous indicators for assessing the livelihood of women that have been cited by various writers or researchers; however, in this study, only seven indicators were employed to measure the livelihood of rural women.

5.6 Suggestion for further study

1. The current study only examines women who process cassava, but future studies must unquestionably incorporate men's perspectives on improving living standards.

2. The study was carried out in two Nigerian States in two ADP zones. To confirm the current research findings, a similar research design can be used in other regions of the nation with comparable socioeconomic and physical conditions.

3. Other factors (such as religion, inventiveness, husband's attitude, and view of rural women on gender awareness) may also have an impact on the standard of living cassava processors. These characteristics may be used in future research initiatives.

4. This study did not look at coping mechanisms used during disasters, a crucial part of livelihood. Understanding and coming to terms with specific and efficient risk management and coping mechanisms are necessary. Additional research can look for complete and exhaustive solutions to this problem.

5. Rural women participate in a variety of intervention programs and income-generating activities, and diverse technologies were applied to their implementation. These technologies seldom ever take into account the unique requirements of rural women. To determine the gaps in current technology, potential fixes, and to introduce new technologies that rural women especially in the cassava enterprise truly need under the constraints of available facilities, more research is required.

6. Both governmental and non-governmental organizations have their own programme to help rural women advance. However, there is a huge demand for impact analyses of how different programme compare in terms of performance. On this foundation, policies for greater involvement of women in development activities can be more successfully put into practice.

REFERENCES

Abali, I., Ifenkwe, G. E. & Emerhiri, E. (2014). Analysis of Women Participation in Cassava Production in Rural Communities of River State, Nigeria. Proceedings of the 19th Annual National Conference of Agricultural Extension Society of Nigeria held at the Federal University of Agriculture, Owerri Imo State, Nigeria. 27th-30th April, 2014, 8-16.

Abdoulaye, T. & Sanders, J.H. (2002). Stages and determinants of fertilizer use in semiarid African agriculture: the Niger experience. Agric. Econ. 32:167-179.

Abdoulaye, T., Abass, A., Maziya-Dixon, B., Tarawali, G., Okechukwu, R., Rusike, J., Ayedun, B. (2014). Awareness and adoption of improved cassava varieties and processing technologies in Nigeria. Journal of Development and Agricultural Economics, 6, 67–75.10.5897

Abubakar, M., Abdulkadir Baba, H., Katsina C, B., Abdulkarim, N., & Olawale J, O. (2015). Fabrication and Performance Evaluation of a Pedal Driven Pulverizing and Sieving Machine for Dewatered Grated Cassava.

Achem, B. (2017). Assessment of the Mechanization of Cassava Processing in Kwara State, Nigeria. CONTINENTAL J. AGRICULTURAL SCIENCE, 11(2), 13–25. https://doi.org/10.5281/zenodo.574324

Achem, B.A. (2011): Assessment of Constraints to Cassava Value-Added Enterprises in Kwara State, Nigeria. Journal of Agricultural Extension (AESON). Vol. 15 (1) 124-134.

Achem, B. A., Akangbe, J.A., & Animashaun, J.O (2013). An Assessment of the Effects of Root and Tuber Expansion Project (RTEP) on the Livelihood of Cassava Processors in Kwara State, Nigeria. International Journal of Agricultural Management and Development, 3(3): 167-174.

Adebayo, K. (2006). Dynamics of the Technology Adoption Process in Rural-based Cassava Processing Systems in South West Nigeria. International Foundation for Science, Sweden.

Adekanye, T. A., Ogunjimi, S. I., & Ajala, A. O. (2013). An assessment of cassava processing plants in Irepodun local government areas, Kwara state, Nigeria. World journal of agricultural research, 1(1), 14-17.

Adeleye, A. S., Omoghie, E. S., Yusuf, A. S., Ojedokun, C. A., & Ibikunle, K. Y. (2020). Assessment of Cassava Processing Techniques on the Livelihood of Agro-Forestry Farmers in Edo State, Nigeria. *Journal of Applied Sciences and Environmental Management*, *25*(2), 189-193.

Adeniji, A. (2000). National seed series. Cassava Multiplication Project, Paper presented on root and tuber development in Nigeria, 1-8.

Adenugba, A. A. & John, P. (2014). Hazardous Conditions Of Women In Garri Processing Industry In Ibadan, South West, Nigeria. Journal of Educational and Social Research, 4(3), 511–521. doi:10.5901/jesr.2014.v4n3p511

Adepoju, A. A., Ogunniyi, L. T., & Agbedeyi, D. (2015). The role of women in household food security in Osun State, Nigeria. *International Journal of Agricultural Policy and Research*, *3*(3), 104-113.

Adepoju, A. A., Oladeebo, J. O., & Toromade, A. S. (2019). Analysis of occupational hazards and poverty profile among cassava processors in Oyo State, Nigeria. *Asian Journal of Advances in Agricultural Research*, *9*(1), 1-13.

Adetan, D. A, Adekoya L. O & Aluko, O. L. (2003), Characterization of some properties of cassava root tubers. Journal of Food Engineering. 59: 349-353.

Adetunji, M. O. (2022). Policy Sustainability Issues: Case Study of Cassava Farmers in Ikorodu: Lagos, Nigeria (Doctoral dissertation, Walden University).

Adeyonu, A. G. (2012). Gender Dimensions of Time Allocation of Rural Farming Households in Southwest Nigeria. Current Research Journal of Social Sciences 4(4): 269-276.

Adeyonu A. G. and Oni. O. A. (2014). Gender time allocation and farming households' poverty in rural Nigeria. World Journal of Agricultural Sciences Vol. 2 (5), pp.123-136.

Ahiakwo AA, (2015). Appraisal and projection of cassava mash sieving technology. Net J Agric Sci, 3(2): 49-55.

Ahmed, N. (2009). The Sustainable Livelihoods Approach to the Development of Fish Farming in Rural Bangladesh. Journal of International Farm Management, 4(4): 1-18.

Ahmed, N., Wahab, M.A., & Thilsted, S.H. (2007). Integrated Aquaculture-Agriculture Systems in Bangladesh: Potential for Sustainable Livelihoods and Nutritional Security of the Rural Poor. Aquaculture Asia 12(1): 14-22.

Ajadi, A. A., Oladele, O. I., Ikegami, K., & Tsuruta, T. (2015). Rural women's farmers access to productive resources: the moderating effect of culture among Nupe and Yoruba in Nigeria. Agriculture & Food Security, 4(1), 1-9.

Ajani E.N., (2012), Occupational diversification among rural women in Anambra State, Nigeria. Unpublished PhD Thesis, Department of Agricultural Extension, University of Nigeria, Nsukka, pp. 84.

Ajav, E. A., & Akogun, O. A. (2015). The performance of a combined dewatered cassava mash lump pulverizer and sifter under some operational factors. AgricEngInt: CIGR Journal, 17(2), 82-92.

Akinola, A.A., Alene, A.D., Adeyemo, R., Sanogo, D., Olanrewaju, A.S., Nwoke, C., Nziguheba, G. & Diels, J. (2010). "Determinants of Adoption and Intensity of use of Balanced Nutrient Management Systems Technology in the Northern Guinea Savanna of Nigeria". Q. J. Int. Agric. 49(1):25-45.

Akintunde, B.O., Oyawale, F.A. & Akintunde, T.Y. (2005)," Design and Fabrication of a Cassava Peeling Machine". Nigerian Food Journal 23: 231-238

Akinwumi, J.A. & Adegboye, R.O. (2003): Cassava Processing in Nigeria. Appropriate Technology 16(3), 21

Akosua, A. & Bani, R. J. (2007). Loss assessment in the production of garri from cassava (Manihot esculenta). Journal of Food, Agriculture and Environment, 5:55-57

Akpokodje, O. I., Uguru, H. & Esegbuyota, D. (2018). Remediation of Cassava Effluent Contaminated Soil Using Organic Soap Solution: Case Study of Soil Physical Properties and Plant Growth

Performance. Journal of Scientific Research and Reports. 21(3): 1-11, JSRR.45048 ISSN: 2320-0227

Al-Amin, S. (2008). Role of Women in Maintaining Sustainable Livelihoods of Char Landers in Selected Areas of Jamalpur District. PhD Thesis. Department of Agricultural Extension Education Bangladesh Agricultural University, Mymensingh.

Alene, A.D., Poonyth, D., & Hassan, R.M. (2000). Determinants of adoption and intensity of use of improved maize varieties in the central highlands of Ethiopia: A Tobit analysis". Agrekon (South Afr. J. Agric. Econ. 39(4):633-643.

Allison, E.H. & Ellis, F (2001). The livelihoods approach and management of small-scale fisheries.

Allison, E.H. & Horemans, B. (2006). Putting the principles of the Sustainable Livelihoods Approach into fisheries development policy and practice. Marine

Al-Qeisi, K., & Hegazy, A. (2015). Consumer online behaviour: A perspective on Internet banking usage in three non-western countries. Procedia economics and finance, 23, 386-390

Alyanak, L. (2007). A modest Grater means safer and Quicker Cassava in Uganda. News Highlight. Mews/2007/970508-e.htm

Amine, L.S. & Staub, K.M., (2009), "Women entrepreneurs in sub-Saharan Africa: An institutional theory analysis from a social marketing point of view", Entrepreneurship and Regional Development Vol. 12., No. 2, pp.183-211.

Anderson A. R. & Obeng B. A. (2017), "Enterprise as socially situated in a rural poor fishing community", Journal of Rural Studies, Vol. 49, pp. 23-31

Anderson, A.R. & Lent, M.D., (2017), Enterprising the rural; Creating a social value chain Journal of Rural Studies. doi.org/10.1016/j.jrurstud.2017.08.020

Anderson, P. W. (1997). The theory of superconductivity in the high-Tc cuprate superconductors (Vol. 446). Princeton: Princeton University Press.

Aniedi, O.E., Linus, O.A., Ime, A.O & Benjamin, R.E (2012). Mechanization of Cassava peeling. Research Journal in Engineering and Applied Sciences. 1(5) 334-337

Ansoglenang, G. (2006). Rural Women and Micro-credit Schemes: Cases from the Lawra District of Ghana. A Thesis Submitted to the Faculty of Social Science, University of Tromso, in

ARC. (2011). Institute of Industrial Crops Research: Cassava Research 3 (12)

Asadu, A.N., Agwu, A.E., Chah, J.M. and Enwelu I.A (2014). Factors Influencing Adoption of Improved Cassava Processing Technologies by Rural Women in Enugu State, Nigeria. *International Journal of Agricultural Science, Research and Technology in Extension and Education Systems, 4(4):205-210.*

Ashley, C. & Carney, D. (1999). Sustainable Livelihoods: Lessons from Early Experience. London: DFID.

Awoyemi, A. O., Adesokan, O. J., Kayode, A. O., Omotesho, K. F., & Osasona, K. K. (2020). Assessment Of Cassava Processing Technologies Usage Among Rural Women In Kwara State , Nigeria. Https://Doi.Org/10.46909/Cerce-2020-027

Ayinde, O. E., Adenuga, A.H., Omotesho K.F. & Oke, A. O. (2012). Comparative Analysis Of Root And Tuber Expansion Programme. Journal Of Agriculture And Social Research (Jasr) Vol. 12, No. 2, 2012, 12(2), 19–28.

Bailey Jr, D. B., & Palsha, S. A. (1992). Qualities of the stages of concern questionnaire and implications for educational innovations. The Journal of Educational Research, 85(4), 226-232.

Bamire, A.S., Fabiyi, Y.L. & Manyong, V.M. (2002). Adoption pattern of fertilizer technology among farmers in the ecological zones of South-Western Nigeria: A Tobit analysis. Austr. J. Agric. Res. 53:901-910.

Barrett, C. B., & Reardon, T. (2000). Asset, activity, and income diversification among African agriculturalists: some practical issues. Available at SSRN 257344.

Barrett, C., & Reardon, T. (2002). T. Webb (2001). Nonfarm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics, and policy implications. Food policy, 26(4), 315-331.

Barrett, C.B. (2004): Mixing Qualitative and Quantitative Methods of Analysing Poverty Dynamics. Department of Applied Economics and Management, Cornell University, USA.

Bebbington, A. (1999). _Capitals and Capabilities: A Framework for Analysing Peasant Viability, Rural Livelihoods and Poverty, World Development 27(12): 2021–44.

Brünjes, J. & Diez, J.R., (2013). "'Recession push'and 'prosperity pull' entrepreneurship in a rural developing context", Entrepreneurship & Regional Development, Vol. 25 No.3-4, pp.251-271.

BBS 2008b. Statistical Yearbook of Bangladesh 2007, 27th edn, Bangladesh Bureau of Statistics, Panning Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.

Carney, D. (2002). Sustainable Livelihoods Approaches: Progress and Possibilities for Change. London: Department for International Development.

Carney, D. (2003), Implementing the sustainable rural livelihood approach. In: D. Carney (eds.), Sustainable Rural Livelihoods: What Contribution Can We Make? Pp. 3-23. London: Department for International Development.

Carney, D., Drinkwater, M., Rusinow, T., Neefjes, K., Wanmali, S., & Singh, N. (1999). Livelihoods Approaches Compared. Department for International Development (DFID), London, GB.

CCOHS (Canadian Centre for Occupational Health and Safety), (2014). OSH Answers Fact Sheets. Hot Environments - Health Effects and First Aid. Retrieved July 9, 2015, from http://www.ccohs.ca/oshanswers/phys_agents/heat_health.html

Chant, S., (2014), "Exploring the "feminisation of poverty" in relation to women's work and home-based enterprise in slums of the Global South", International Journal of Gender and Entrepreneurship, Vol. 6 No.3, pp.296-316.

Cock, J.H. (1982). Cassava: a basic energy source in the tropics. Science, 218 (4574), pp. 755-762.

COSCA (2000): Collabourative study of cassava in Africa.

Dada A.D., Ali G.A., Afolabi O.O., & Siyanbola W.O. (2010): Innovative Approaches to Industrial Utilization of Cassava in a Developing Economy: African Journal of Science, Technology, Innovation and Development (AJSTID), 2(2), 154-174.

Damisa, M.A. & M. Yohanna, (2007). Role of rural women in farm management decision making process: Ordered probit analysis. Trends in Applied Science Research, 2(3): 241-145.

Daniels, A., Udah, A., Elechi, N., Oriuwa, C., Tijani, G., & Sanni, A. (2011) Report on Cassava Value Chain Analysis in the Niger Delta. Foundation for Partnership Initiatives in the Niger Delta (PIND), 1st Floor St. James Building, 167 Abuja (Nigeria)

Dasgupt, I. (2009). Women's employment, intra-household bargaining and distribution: A two-sector analysis. http://www.nottingham.ac.uk/economics/credit/research/papers/cp.99.5.pdf.

Denning, G., Kabambe, P., Sanchez, A., Malik, R., Flor, R., Harawa, P., Nkhoma, C., Zamba, C., Banda, C., Magombo, M., Keating, J., Wangila, J., & Sachs. S. (2009). Input subsidies to improve smallholder maize productivity in Malawi: toward an African green revolution PLoS Biol., 7, pp. 2-10

DFID. (2000): Poverty Elimination and the Empowerment of Women: Strategies for Achieving the International Development Targets, London: DFID.

Dercon, S. (2001). Assessing vulnerability. Publication of the Jesus College and CSAE, Department of Economics, Oxford University.

DFID (1999). Sustainable Livelihoods Guidance Sheets - Section 1+2. Department for International

Diop, A. (1998). Storage and Processing of Roots and Tubers in the Tropics, Agro-Industries and Post – harvest management: Agricultural Support Systems Division, (Food and Agricultural Organization)F.A.O, Rome, Italy

Dixon, A.; Nweke, F.I & Lynam, K.J. (2009): Issues and lessons for cassava in West and Central Africa; IITA.

ECP. (2010): Esan Cassava Processors Helping Woman to Become More Efficient. Team 27: Donald Straub United States, Laura Gomez Cardona Colombia, Oil Jude Okechkwu Nigeria, Paul Maurice Ralph New Zealand, Rients de Boer Sweden and Wendy Zapata

Edeh, J., Onwuka, O., Chukwu, J., & Nwankwojike, B. (2022). Modeling and simulation of efficiency of cassava attrition peeling machine. Agricultural Engineering International: CIGR Journal, 24(2).

Edwards, P. (2002). Rural Aquaculture: Aquaculture for poverty alleviation and food security. Aquaculture Asia, 7: 53-56.

Ehinmowo, O.O. & Fatuase, A.I. (2016). Adoption of Improved Cassava Processing Technologies by Women Entrepreneur in South West, Nigeria. World Journal of Agricultural Research, 4(4): 109-113.

Ekwe, K.C. (2004) Factor Associated with Utilization of Improved Garri Processing Technology in Southeastern Nigeria. Unpublished Ph.D Thesis in Dept. of Rural Sociology and Extension, Michael Okpara University of Agriculture, Umudike. P. 151.

Ekwe, K. C., Ukpai, K., & Ahumihe, E. (2017). Small scale processors' engagement in cassava postharvest and households' food provision in Imo State, Nigeria. *Nigeria Agricultural Journal*, *48*(1), 151-158.

Elmasoud, R. A. (2001). Rural Women Participation in Socio-economic Development in Shiekhan Province (NKS). Unpublished M.Sc. Thesis, Faculty of Agriculture, University of Khartoum, Khartoum

El-Sharkawy, M.A. (2003). Casssava biology and physiology Plant Mol. Biol., 53, pp. 621-641

Enete, A., F. Nweke, & E. Tollens. (2002). Contributions of men and women to food crop production labour in Africa: information from COSCA. Outlook on Agriculture 3(4): 259-265.

Ewebiyi, I. O., Ikotun, T. O., & Olayemi, O. O. (2020). Constraints to utilization of improved processing technologies among cassava processors in Oyo state, Nigeria. *Journal of Science and Sustainable Development*, *7*(1), 41-49.

Ezedinma, C. I., Okafor, C., Asumugha, G. N & Nweke, F. (2006). Trends in farm labour productivity and implications for cassava industrialization in Nigeria. Proceeding of the 40th Annual Conference of the Agricultural Society of Nigeria held at Umudike, Abia State, Nigeria. 16-20th October, 2006, 109-115.

Ezekwe, G.O. (1979). Mechanizing Cassava Peeling: The Project Development Agency (PRODA) ofCassava Nibbling Machine. PRODA Technical Reports No. 1, 1-20

Fakayode, S.B., Babatunde, R.O. & Ajao, R. (2008) Productivity analysis of cassava based production systems in Guinea savannah Am. Eurasian J. Sci. Res., 3 (1), pp. 33-39

Falola, A., Fakayode, S. B., Kayode, A.O., and Amusa, M. A. (2020). Rural Women in Kwara State (Nigeria) and their Contributions to the Welfare of their Households. Journal of International Women's Studies, 21(6), 167-180

FAO, (2004). Cassava industrial revolution in Nigeria. www.fao.org/docrep007/y5548e/y5548e07htm

FAO. (2003). FAOSTAT, online Statistical Database. Rome, Italy. http: www.fao.org

FAO. (2006). FAO STAT. Statistics division of FAO. Retrieved July, 2021 from www.fao.org

FAO. (2008). Championing the cause of cassava: News and Highlights.

FAO. (2010). The State of Food Insecurity in the World: Addressing Food Insecurity in Protracted Crises; FAO: Rome, Italy.

FAO. (2011). Women in Agriculture, Closing the gender gap for development. Rome.

FAO. (2015). Report on Regional Conference on Cassava in the Caribbean and Latin American, 10–12 February 2014, Food and Agriculture Organization of the United Nations, Rome.

FAO. (2016). The state of food and agriculture: Women in agriculture, closing the gender gap. FAO, Rome. Database_FAOstat. http://faostat3.fao.org/wds/rest/exporter/ streamexcel [accessed on 30 September. 2021

FAO. 2016. FAOSTAT database. [Online]. Available at: http://bit.ly/NmQzZf. [Accessed:10 April 2020].

FAO (2017) The State of Food Security and Nutrition in the World 2017: Building Resilience for Peace and Food Security. Rome: Food and Agriculture Organization of the United Nations.

FAO. (2018). Food Outlook - Biannual Report on Global Food Markets – November 2018. Rome, p. 104 License: CC BY-NC-SA 3.0 IGO http://www.fao.org/3/ca2320en/CA2320EN.pdf

Fapohunda T.M. (2012). Women and informal sector in Nigeria: Implications for development. British Journal of Arts and Social Sciences, 4(1)3, 5-45.

Farrington, J., Carney, D., Ashley, C., & Turton, C. (1999). Sustainable Livelihoods in Practice: Early Application of Concepts in Rural Areas. Natural Resources Perspectives

Fatuase, L. O., Mogbojuri, A. O., & Anyaeche, C. O. (2019). Adoption Of Cassava Processing Technologies Among Entrepreneurs In Ekiti State, Nigeria. Journal of Natural Sciences Engineering and Technology, 18(1), 143-154.

Federal Ministry of Agriculture and Water Resources (FMA&WR). (2007). Federal Department of Agriculture (FDA) Federal department of agriculture; federal ministry of agriculture reports. Abuja, Nigeria.

Fletschner, D., Anderson, C. L., & Cullen, A. (2010). "Are women as likely to take risks and compete? Behavioural findings from Central Vietnam", The journal of development studies, Vol.46 No.8, pp.1459-1479.

Folaranmi, G.A (2011). The Role of Agricultural Mechanization in the Enhancement of Sustainable Food Production in Nigeria, ARBICO. A Paper Presented at the Workshop for Cassava Farmers & Processors, Rockview Hotel, Abuja, April.

Food and Agricultural Organization (FAO), (2012). A Review of Cassava in Africa with Country Case Studies on Nigeria and Ghana. Agriculture and Consumer Protection.

Food and Agricultural Organization (FAO). (2011). Food Production in Nigeria (1999 - 2009)

Forsythe, L., Posthumus, V. & Adrienne, M. (2016). A crop of one's own? Women's experiences of cassava commercialization in Nigeria and Malawi. Journal of Gender, Agriculture and Food Security 1(2): 110-128.

Fosu-Mensah, B. Y., Adabie, D. F., Johnson, P. N. T., & Mensah, M. (2021). Occupational and environmental health hazards associated with food processing and the use of personal protective equipment: A case study of Garri processing in southern Ghana. *Journal of Applied and Natural Science*, *13*(1), 230-237.

Frca, P. G. & Frca Fficm, R. V. M. (2015). Smoke inhalation injury. BJA Education, 15 (3): 143–148

George, A. A., Hall, G. E., & Uchiyama, K. (2000). Extent of implementation of a standards-based approach to teaching mathematics and student outcomes. The Journal of Classroom Interaction, 35(1), 8-25.

Graham, J. & Traylor, J. (2020). Cyanide toxicity. StatPearls Publishing, Treasure Island (FL), 2 July 2020, PMID: 29939573. ,https://europepmc.org/article/NBK/NBK507796

Haggblade, S., Hazell, P. B., & Reardon, T. (Eds.). (2007). Transforming the rural nonfarm economy: Opportunities and threats in the developing world. Intl Food Policy Res Inst

Hall, G. E., & Hord, S. M. (1987). Change in schools: Facilitating the process. Suny Press.

Hauser, S., Wairegi, L. W. I., Asadu, C. L., Asawalam, D. O., Jokthan, G., & Ugbe, U. (2014). Cassava system cropping guide. https://www.iita.org/wp Cassava_system_cropping_guide.pdf, Accessed 12th May 2020

Hershey, C., Henry, G., Best, R., Kawano, K. Howeler, R.H. &Iglesias, C. (2001). Cassava in Asia: Expanding the Competitive Edge in Diversified Markets. A Review of Cassava in Asia with Country Case Studies on Thailand and Vietnam. Validation Forum on the Global Cassava Development Strategy, Rome, Italy) Proceedings, vol. 3, Food and Agriculture Organization of the United Nations (FAO); International Fund for Agricultural Development (IFAD), Rome, IT (2001), pp. 1-62

Hies (2005). Final Report of Household Income & Expenditure Survey-2005. Bangladesh Bureau of Statistics, Planning Division, Ministry of Planning Government of the People Republic

Hoque, M. & Itohara, Y. (2008). Participation and Decision Making Role of Rural Women in Economic Activities: A Comparative Study for Members and Non-Members of the Micro-Credit Organizations in Bangladesh, Journal of Social Sciences 4(3): 229-236.

Howe, J.A. Maziya-Dixon, B. & Tanumihardjo, S.A. (2009). Cassava with enhanced β-carotene maintains adequate vitamin A status in Mongolian gerbils (Meriones unguiculatus) despite substantial cis-isomer content. Br. J. Nutr., 13, pp. 1-8

Ibnouf, F. O. (2009). The role of women in providing and improving household food security in Sudan: Implications for reducing hunger and malnutrition. *Journal of International Women's Studies*, *10*(4), 144-167.

Ibrahim, G., & Wa, A. (2020). Design and Fabrication of Cassava Processing Machine: The Necessary Aid for Technological Renaissance.

IFAD, F., (2000). The world cassava economy. Facts, trends and outlook. IFAD, FAO, Rome.

IFPRI (International Food Policy Research Institute), (2010): Strengthening Innovation Capacity of Nigerian Agricultural Research Organization. IFPRI Discussion Paper 01050.

Igbeka, J.C. (1996). Agro-Processing Machinery and Equipment Manufacturing in Nigeria. Proc. of NationalWorkshop on Appropriate Agricultural Mechanization, NCAM, Ilorin 339-348

IITA. (2010). International Institute for Tropical Agriculture: Cassava in Tropical Africa, a Reference Manual, pp: 83-100.

IITA. (2010). Post Harvest Technology". Annual report. pp. 62-80.

Ijigbade, J. O., Fatuase, A. I., & Omisope, E. T. (2014). Conduct and profitability of garri production for increased food security in Ondo State, Nigeria. *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*, *19*(7), 89-95.

Ikejiofor, M.C. & Oti, E. (2012). Performance Evaluation of a Combined Cassava Mash Pulverizer/Sifter. International Journal of Advanced Scientific and Technical Research, Issue 2, volume 3, pp. 304 – 308.

Ikpi, A.E., & N.D Hahns, eds (2009). Cassava: lifeline for the rural households. Lagos, Nigeria UNICEF.

International Fund for Agricultural Development (IFAD), (1999): Project Appraisal Document. Rome.

Itodo, I. N. (1999). Peeling rate of a manually operated cassava (Manihot Esculenta Cranz) peeling machine.African Journal of Root and Tuber Crops, 3(2); 3-7.

James, C. (2011) "Theory of Change Review. A report commissioned by comicRelief",: http:// mande.co.uk/2012/uncategorized/comic-relief-theory-of-change-review/

Jayakumar, P & Kannan, J. (2014). Challenges and Opportunities for Rural Women Entrepreneurs, Journal of Economic and Business Review, 2 (1) .35-39.Retrieved from http://epratrust.com/articles/upload/6%20JEYAKUMAR%20V2,%20I-1.pdf

Jonathan, G. (2000). Sustainable livelihoods. International Social Science Journal, 17(4): 77-86

Juma, C. (2015). The New Harvest: Agricultural Innovation in Africa. Oxford University Press

Juntarawijit, Y. & Juntarawijit, C. (2019) Cooking smoke exposure and respiratory symptons among those responsible for household cooking: A study case in Phitsanulok, Thailand. Heliyon 5; 1-7.

Kabir, M. S., Hou, X., Akther, R., Wang, J., & Wang, L. (2012). Impact of small entrepreneurship on sustainable livelihood assets of rural poor women in Bangladesh. *International Journal of Economics and Finance*, *4*(3), 265-280.

Kamal, A. R & O. A. Oyelade (2010). Present status of cassava peeling in Nigeria. Journal of AgriculturalEngineering and Technology, 18 (2): 7-13.

Kanbur, R. (Ed.) (2003). Q-Squared: Combining Qualitative and Quantitative Methods in Poverty Appraisal. Permanent Black, D-28 Oxford Apartments, 11, I.P. Extension, Delhi 110092.

Kaur, M. and M. L. Sharma. (1991). Role of women in rural development. Journal of Rural Studies, vol. 7, No. ½.pp.11-16.

Kiriti. T., & Tisdell .C. A., (2003). "Family Size, Economics and Child Gender Preference: A Case Study in the Nyeri District of Kenya," Social Economics, Policy and Development Working Papers 105583, University of Queensland, School of Economics.

Kolawole, O.P., Agbetoye, L.A.S. & Ogunlowo, A.S. (2007). Strength and elastic properties of cassava tuber. International Journal of Food Engineering, 3 (5), 1 – 10

Koloche, I. M., Hamza, A. M., Mohammed, A., Yahaya, S. A., & Garba, H. M. (2016). The Quantity of Shea Nut Assessed , Collected and Processed Using Improved Shea Nut Processing Technologies in Niger State , Nigeria. 12(2), 1–10. https://doi.org/10.9734/AJEA/2016/24444

Koloche, I.M. (2019). Effects of German International Corporation Processing Technology on the Livelihood of Shea Nut Processors in Niger State, Nigeria. Unpublished Ph.D. Thesis Submitted to the Department of Agricultural Extension and Rural Development, University

Kormawa, P. & Akoroda, M.O. (2003). Cassava Supply Chain Arrangements for Industrial Utilization in Nigeria IITA, Ibadan.

Krantz, L. (2001). The sustainable livelihood approach to poverty reduction. SIDA. Division for Policy and Socio-Economic Analysis, 44, 1-38.

Kristof, N., & Wudunn, S. (2009). Half the sky turning oppression into opportunity for women worldwide Retrieved Feb, 2020 from https://ssir.org › books › entry › half sky Sheryl Wudunn Nicholas Kristof.

KWSG. (2006): Official Diary 2006

Le An, N. (2012). Pedal powered cassava peeling machine. Diploma work.

Linley., C. J., Katundu, J. & Felistus, C. (2002). Bitter Cassava and Women: An intriguing response to food Security. LEISA Magazine 18, Issue 14.

Lo, Y. Y. (2018). English Teachers'concern On Common European Framework Of Reference For Languages (Cefr): An Application Of Cbam. Juku: Jurnal Kurikulum & Pengajaran Asia Pasifik, 6(1), 46-58.

Long, S.A.(ed.). (2004). Livelihoods and CBNRM in Namibia: The Findings of the WILD Project. Final Technical Report of the Wild Integration for Livelihood Diversification Project (WILD), prepared for the Directorates of Environmental Affairs and Parks and Wildlife Management, the Ministry of Environment and Tourism, the Government of the Republic of Namibia, Windhoek, March 2004.`

Lukuyu, B., Okike, I., Duncan, A., Beveridge, M. & Blümmel, M. (2014). Use of cassava in livestock and aquaculture feeding programs. ILRI Discussion Paper 25. Nairobi, Kenya: International Livestock Research Institute.

Maduabum, A.I. (2012). Improved Mechanized Garri Frying Technology for Sustainable Economic Development in Nigeria. Proceedings of the international multiconference of Engineers and Computer Scientists, IMEC, Hong Kong, March 14th-16th.

Masika, R. & Joekes S. (2009). Employment and sustainable livelihoods: A gender perspective.

Matanmi, B. M., Afolabi, O., & Komolafe, S. E. (2017). Impact of Root and Tuber Expansion Programme : the Case of Garri Processors in Kwara State , Nigeria. 109–114. https://doi.org/10.1515/ats

Matar, N. (2015). Evaluating E-Learning System Use by CBAM-Stages of Concern Methodology in Jordanian Universities. World of Computer Science & Information Technology Journal, 5(5).

Mbah, E. N., & E. M. Igbokwe. (2015). "Rural Non-Farm Enterprises for Empowerment of Women in Anambra State, Nigeria", Scientia, Vol. 11 No.1, pp. 42-52.

Mbisso, D. (2010). Petty trading in marketplaces, space generation, use and management at Temeke Stereo Marketplace in Dares Salaam, Tanzania.

Mgbakor M.N. (2015). Processing technologies available to cassava processors and range of products derivable from cassava processing in Enugu State, Nigeria. IDOSR journal of current issues in social sciences 1(1): 80-100

Mgbenka, R. N., Mbah, E. N., & Ezeano, C. I. (2016). A review of smallholder farming in Nigeria: Need for transformation. *International Journal of Agricultural Extension and Rural Development Studies*, *3*(2), 43-54.

Modupe, F.M. (2008). Economic implication of poverty alleviation programmes on rural women in Ondo state: case study of Country Women Association of Nigeria. Journal of Social Sciences. 4; 4. 352 -357

Momodu, M.O. (2002). Information needs and information seeking behaviour of rural dwellers in Nigeria: a case study of Ekpoma in Esan West Local government area of Edo State, Nigeria. Library Review. 51.8; 406 – 410.

Montagnac, J.A., Davis, C.R. & Tanumihardjo, S.A. (2009). Nutritional value of cassava for use as a staple food and recent advances for improvement Compr. Rev. Food Sci. Food Saf., 8 (3) pp. 181-194

Moyo, S. (2016). Family Farming in Sub-saharan Africa: its Contribution to Agriculture, Food Security and Rural Development (No. 150) Working Paper

Nagler,P. & Naudé,W. (2014). Patterns and Determinants of Non-Farm Entrepreneurship in Rural Africa: New Empirical Evidence. In 9th IZA/World Bank Conference

Neghab, M., Delikhoon, M., Baghani, A. N., & Hassanzadeh, J. (2017). Exposure to Cooking Fumes and Acute Reversible Decrement in Lung Functional Capacity. International Journal of Occupational and environmental Medicine 8(4), 1-5

Neiland, A.E. & Bene, C. (2004). Incorporating Fish Market and Trade Information into Policy-Making for Sustainable Livelihoods and Poverty Reduction: Methods and Lessons from the Lake Chad Basin. Rome, FAO. (A Report for the DFID/FAO Sustainable Fisheries Livelihoods Programme - SFLP-)

Nilsson, I. & Petterson, H.I. (1998). The History Of Medicine. Boras Sns Publishing House. 60p.

Njoku, D.N. & Muoneke, C.O. (2008). Effect of cowpea planting density on growth, yield and productivity of component crops in cowpea/cassava intercropping system Agro-Science, 7 (2), pp. 106-113

Norman, M., Brighton, M. M., Elijah, N., & Raymond, M. N. (2012). The status of the agro-processing industry in Zimbabwe with particular reference to small-and medium-scale enterprises. African Journal of Agricultural Research, 7(11), 1607-1622.

Nseabasi S. A. (2015). Women and Rural Development in Nigeria: Some Critical Issues for Policy Consideration. Social Sciences. Vol. 4, No. 5, , pp. 110-118. doi:10.11648/j.ss.20150405.11

Nweke, F. I. (2004). New challenges in the cassava transformation in Nigeria and Ghana (Vol. 118). Intl Food Policy Res Inst.

Nweke, F.T, Spencer D.S.C & Lynam K.J (2002): The cassava Transformation: Africa's Best-kept secret. State University Press. East Lansing.

Nwibo, S. U., Ezike, K. N. & Odoh, N. E. (2011). Cassava production, commercialization and value addition. Proceeding of the 25th Conference of Farm Management Association of Nigeria, Owerri, Nigeria, 173-179.

Nwokoro, S. O. & Aletor, U. A. (2007). The Nigerian Cassava Initiatives for man and Livestock. In: Erhabor, P. O., Azaki, S. S and Ingawa, S. A. (eds.). Cassava the white Gold. Benin City, Nigeria: Initiative Publication, 140-182.

Nwoye, M., (2007), “Gender responsive entrepreneurial economy of Nigeria: Enabling women in a disabling environment”, Journal of International Women's Studies, Vol. 9 No.1, pp.167-175.

O Toole K and A. Macgarvey (2009). Rural women and local economic development I south-west Victoria. Journal of Rural Studies 19: 173-186.

O’Hair, K.S. (2009). Casava: New Crop Fact SHEET, Tropical Research and Education

OAU, (1998). Post harvest technology research group, (1998). Capacity and Agroprocessing technology needs of women in Osun and Ondo State, survey report conducted for the UNDP under the WID/NIA program by the PHTRG, Obafemi Awolowo University Ile-Ife.

Oboh, G. (2004). Management of Occupational Hazards Associated with Traditional Methods of Cassava Processing in Ogun, Ondo and Oyo States, Nigeria. In: Proceedings of A Workshop on Promotion of Improved Mangt. Technol. Aimed at Reducing Occupational and Environ. hazards Associated with Traditional Cassava Processing in Ogun, Ondo States. Inst. Agric. Res. Training, Obafemi Awolowo University Ibadan, Nigeria. pp. 11-20.

Obueh, H. O. & Odesiri-Eruteyan, E. (2016). A Study on the Effects of Cassava Processing Wastes on the Soil Environment of a Local Cassava Mill. J Pollut Eff Cont 4(4). DOI: 10.4176/2375-4397.1000177.

Odebode, S. O. (2003). Contribution of selected non-timber forest products to household food security in Osun State, Nigeria. In Proceedings of 12th World Forestry Congress, Quebec, Canada, September (Vol. 21, p. 55).

Odigboh, E. U., & Ahmed, S. F. (1982). A Machine for Pulverizing and Sifting Garri Mash. Nigerian Journal of Technology, 8(1), 19-24.

Odigboh, E.U. (1985). Mechanization of Cassava Production and Processing; A Decade of Design and Development. Inaugural Lecture series 8, University of Nigeria, Nsukka.

Ogunlela, Y. I., & Mukhtar, A. A. (2009). Gender issues in agriculture and rural development in Nigeria: The role of women. *Humanity & social sciences Journal*, *4*(1), 19-30.

Ohimain, E. I. (2015). A decade (2002–2012) of presidential intervention on cassava in Nigeria; the successes and challenges. Asian Journal of Agricultural Extension, Economics and Sociology, 6(4), 185-193.

Okareh, O. T., Ogunfayo, A. I., & Atulumah, N. O. (2015). Hazards associated with small scale garri processing in Ibadan metropolis, Nigeria. *actaSATECH*, *6*(1), 64-69.

Okebiorun E.O. & Jatto N.A. (2017). Value Addition in Cassava Processing: Evidence from Women in Ilesa West Local Government Area of Osun State. Agriculture and Food Sciences Research, 4(1): 30-36.

Okigbo, B. N. (1980). Nutritional implications of projects giving high priority to the production of staples of low nutritive quality. In the case for cassava (Manihot esculenta, Crantz) in the humid tropics of West Africa. Food and Nutrition Bulletin, 2(4), 1-10.

Okorji, E. C., Eze, C. C., & Eze, V. C. (2003). Efficency of cassava processing techniques among rural women in Owerri, Imo State, Nigeria. Journal of Agriculture and Social Research (JASR), 3(2), 84-96.

Okwulehie, F.C., Opara, H.C. & Onimawo, I.A. (2014). Nutrient content of soy fortified garri Niger. J. Nutr. Sci., 35 (1) pp. 60-64

Oladeji, J. O., Olujide, M. G., & Oyesola, O. B. (2006). Income generating activities of Fulani women in Iseyin Local Government area of Oyo State. *Studies of Tribes and Tribals*, *4*(2), 117-121.

Oladipo, G.E. (2012). Effects of micro-finance banks on the development of rural small-holder farmers in Odo-Otin LGA, Osun State, Nigeria. Unpublished thesis in the department of Geography and Environmental Management, University of Ilorin, Ilorin, Nigeria.

Olajide, B. R., & Oyebode, L. A. (2015). Factors influencing group viability among cassava processor groups of the Root and Tuber Expansion Programme (RTEP) in Oyo state, Nigeria. Tropical Agricultural Research and Extension, 17(1).

Olomo, O.V. (2006). Appropriate Processing Machines Selection: Considerations in Machinery Design and Development. A paper presented to SAMEGs at Imo State ADP Owerri, 18th December 2006.

Olukunle, O. J. & Jimoh, M. O. (2012). Comparative analysis and performance evaluation of three cassava peeling machines. International Research Journal of Engineering Science,Technology and Innovation,1(4):94 -102.

Olukunle, O. J., Ogunlowo, A.S. & Sanni, L. (2010).The search for effective cassava peeler. The WestIndian Journal, 32 (1 &2),42-47

Oluoch-Kosura, W.A., Marenya, P.P. & Nzuma, M.J. (2001). Soil fertility management in maize-based production systems in Kenya: Current options and future strategies. Paper submitted at the Seventh Eastern and Southern Africa regional maize conference, Nairobi. pp. 350-355.

Olusegun, O. V., Obi-egbedi, O., & Adeniran, L. O. (2015). Root and tuber expansion programme and poverty reduction among farmers in Southwest Nigeria. October. https://doi.org/10.5897/JDAE2015.0656

Omiti, J., & Omosa, M. (2002). A Synthesis of Existing Information on the Impact of HIV/AIDS on Rural Livelihoods in Kenya.

Omotesho,K.F., Akinrinde,A.F., & Ogunlade,L. (2017). Determinant of livelihood status of rural farming households in kwara state, Nigeria. Paper presented at the 27the Annual

Omotosho, O. & Amori, A. (2015). Caustic Hydrogen Peroxide Treatment of Effluent from Cassava Processing Industry: Prospects and Limitations. International Journal of Engineering and Technology Innovation, 5 (2), 121-131

Oni, T.O (2013). Evaluation of Income and Employment Generation from Cassava Value Chain in the Nigerian Agricultural Sector. Ife Lecture series No. 9, The Postgraduate College , University of Ife, Nigeria.

Onyemauwa, (2019). Analysis of Women Participation in Cassava Production and Processing in Imo State, Southeast Nigeria. AGRICULTURA TROPICA ET SUBTROPICA, *45*(2), 72-77

Onyemauwa, C.S. 2012. Analysis of Women Participation in Cassava Production and Processing in Imo State, Southeast Nigeria. Journal of Economics and Sustainable, 3 (5), 81-90.

Onyenwoke, C. A., & Simonyan, K. J. (2014). Cassava post-harvest processing and storage in Nigeria : A review. African Journal of Agricultural Research, 9(53), 3853–3863. https://doi.org/10.5897/AJAR2013.8261

Oyegbami, A. (2004). Social hazards associated with cassava processing and control management practices. In Proceedings of a workshop on promotion of improved management technologies aimed at reducing occupational and environmental hazards associated with cassava processing in Ogun, Ondo and Oyo States (pp. 33-37).

Oyegbami, A., Oboh, G., & Omueti, O. (2010). Cassava processors' awareness of occupational and environmental hazards associated with cassava processing in south-western Nigeria. *African Journal of Food, Agriculture, Nutrition and Development*, *10*(2).

Oyewole, O.B. 2002. The powers at the roots: Food and its Microbials Allies. 15th Inaugural lecture University of Agriculture, Abeokuta-Nigeria.

Oyinkan, A. O., Poku, A., K. & John-Baptiste, A. (2016) The Fire Under the Shed: The Cornerstone Fuelling Our Plight. In: Terry, A.L. and John-Baptiste, A. [eds] Western Public Health Casebook. London, ON: Public Health Casebook Publishing.

Paul, C. (2005). Dynamo models of the Solar Cycle. RDF Meta data, Max Planck

Philips, T.P. (1983). An overview of cassava, consumption in cassava toxicity. Proceedings of a workshop in Ottawa, Canada. International Development Research Centre. Monograph, 3 (4): 50-56.

PIM (2001). RTEP- Project Implementation Manual. Kwara State Agricultural Development Programme. Ilorin.

Poverty Oxford & Human Development Initiative, (2017). "Nigeria Country Briefing", Multidimensional Poverty Index Data Bank OPHI, University of Oxford Available at: www.ophi.org.uk/multidimensional-poverty-index/mpi-country-briefings/

Quaye, W., Gayin, J., Yawson, I. & Plahar, W. A. (2009), Characteristics of various cassava processing methods and the adoption requirements in Ghana. Journal of Root Crops, vol. 35 No.1, pp. 59-68.

Rahman, M. (1987). Women and rural development in Pakistan. Journal of Rural Studies 3 (3): 247-255.

Rao, V. & Woolcock, M. (2004). Integrating Qualitative and Quantitative Approaches in Program Evaluation. World Bank and Oxford University Press, USA.

Retrieved from http://www.nottingham.ac.uk/economics/credit/research/papers/cp.99.5.pdf.

Roach, A. T., Kratochwill, T. R., & Frank, J. L. (2009). School-based consultants as change facilitators: Adaptation of the concerns-based adoption model (CBAM) to support the implementation of research-based practices. Journal of Educational and Psychological Consultation, 19(4), 300-320.

Roche, C. (1999). Impact assessment for development agencies: Learning to value change. Oxford, U.K.: Oxfam.

RTEP. (1999): Working Paper IV. 35-37

RTEP, 2004: Project Monitoring and Evaluation Report on Root and Tuber Expansion Programme (RTEP). www.worldbank.org and external topics accessed 3/8/2021.

Sanogo, D., & Adetunji, O. (2008). Presidential initiatives on cassava in Africa: Case studies of Ghana and Nigeria. NEPAD Pan African Cassava Initiative (NPACI). Partnerships in Support of CAADP, IITA, NEPAD, Ibadan, Nigeria.

Shankland, A. (2000). Analyzing Policy for Sustainable Livelihoods‘, Research Report 49, Brighton, UK: Institute of Development Studies.

Sharp, K. (2003). Measuring Destitution: Integrating Qualitative and Quantitative Approaches in the Analysis of Survey Data. IDS Working Paper 217, Institute of Development Studies,

Sheheli (2011) Improving Livelihood of Rural Women through Income Generating Activities in Bangladesh. Dissertation zur Erlangung des akademischen Grades doctor rerum

Shiferaw, B. & Holden, S.T. (1998). Resource degradation and adoption of land conservation technologies in the Ethiopian Highlands: A case study in Andit. Tid, North Shewa. Agric. Econ. 21:241-256.

Shotsberger, P. G., & Crawford, A. R. (1999). On the elusive nature of measuring teacher change: An examination of the Stages of Concern Questionnaire. Evaluation & research in education, 13(1), 3-17.

Singh, G., & Belwal, R. (2007). “Entrepreneurship and SMEs in Ethiopia: Evaluating the role, prospects and problems faced by women in this emergent sector”. Gender in management: An international journal, Vol. 23, No.2, pp. 120-136

Stirrat, R. L. (2004). Yet another ‘magic bullet’: the case of social capital. Aquatic Resources, Culture and Development, 1(1), 25-33.

Sule, A. M, Ogunwale, S. A. & Atala, T. K. (2002) Factors affecting adoption on fishing innovation among fishing entrepreneurs in Jebba Lake Community. Journal of Agricultural Extension 6, 48 – 60.

Tadele, Z. & Assefa, K. (2012). Increasing food production in Africa by boosting the productivity of understudied crops Agronomy, 2 (4), pp. 240-283

Taiwo, K. A., & Fasoyiro, S. B. (2015). Women and cassava processing in Nigeria. *International Journal of Development Research*, *5*(2), 3513-3517.

Tijaja, J. (2010). The evolution and organisation of cassava value chains in global trade landscape: lessons for Africa from Thailand; Development Policy and Practice, the Open University, UK Milton Keynes MK7 6AA, United Kingdom.

Uthman F, (2011). Design and fabrication of cassava lump breaking and sieving machine. J Res Dev, 1:42-50.

Van den Berg, R., & Ros, A. (1999). The permanent importance of the subjective reality of teachers during educational innovation: A concerns-based approach. American educational research journal, 36(4), 879-906.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.

Von Braun J, Mirzabaev A (2015). Small Farms: Changing Structures and Roles in Economic Development, ZEF- Discussion Papers on Development Policy No.204, Centre for Development Research, Bonn.

Warner, K. (2000). Forestry and Sustainable Livelihoods: What Part Can Forests and Forestry Play in Reducing Poverty? Unasylva, 202, Vol. 51, 2000, pp. 3-12.

World Bank. (2010). The World Bank For Official Use Only Report No . 54615-Bd International Development Association International Finance Corporation Country Assistance Strategy Public Disclosure Authorized The People ' S Republic Of Bangladesh For The Period Fy11-14 Banglad. 54615.

Xiong, L., Ukanwa, I. & Anderson, A.R. (2020). "Institutional influence and the role of family in poor women's micropreneurship", International Journal of Entrepreneurial Behaviour & Research, Vol. 26 No. 1, pp. 122-140. https://doi.org/10.1108/IJEBR-05-2017-0162

Yahaya, M.K. & Orokhafer, S.B. (2001). Cocoa farmers perceived influence in communication utilization of improved cocoa seed technologies in Uwan-East Local government area of

Yang, D. (2003). Remittances and Human Capital Investment: Child Schooling and Child Labour in the Origin Households of Overseas Filipino Workers. Unpublished manuscript Gerald R. Ford School of Public Policy and Department of Economics. Ann Arbor: University of Michigan.

Yidana, J. A., Osei-Kwarteng, M., & Amadu, Y. (2013). The impact of cassava processing on the livelihoods of women processors in Central Gonja district of the northern region of Ghana. *African Journal of Agricultural Research*, *8*(49), 6524-6528.

Yirga, C. (2016). Adoption of Crop Technologies among Smallholder Farmers in Ethiopia : Implications for Research and Development Adoption of Crop Technologies among Smallholder Farmers in Ethiopia : Implications for Research and Development. December.

Young, H., & Goldman, L. (Eds.). (2015). Livelihoods, natural resources, and post-conflict peacebuilding. Routledge.

Yusuf, S.A., Balogun, O.L., & Falegbe, O.E. (2015). Effect of Urban Household Farming on Food Security Status in Ibadan Metropolis Oyo State. Nigeria. Agricultural Sciences. 60 (1): 61- 75.

Zaid, Y. A., & Popoola, S. O. (2010). Quality of life among rural Nigerian women: The role of information.

Zeller, M., Diagne, A., & Mataya, C. (1998). Market access by smallholder farmers in Malawi: Implications for technology adoption, agricultural productivity and crop income. Agric. Econ. 19:219-229.

APPENDICES

DEPARTMENT OF AGRICULTURAL EXTENSION AND RURAL DEVELOPMENT FACULTY OF AGRICULTURE, LANDMARK UNIVERSITY, OMU ARAN, KWARA STATE.

***PROJECT TITLE*:** CASSAVA PROCESSING TECHNOLOGY USAGE AND THE LIVELIHOOD OF WOMEN PROCESSORS IN NORTH CENTRAL NIGERIA

NOTE: This questionnaire is designed to obtain information on the above topic, which is purely for academic/research purpose. All information supplied will be treated with absolute confidentiality.
Thanks for your anticipated cooperation.

QUESTIONNAIRE NUMBER:………………………………………………………...

DATE OF INTERVIEW:…………………………………………………………….

STATE:…………………………………………………………………………………

A.D.P ZONE:………………………………………………………………………..

L.G.A:…………………………………………………………………………………….

NAME OF COMMUNITY:…………………………………………………………..

PROCESSING GROUP NAME:…………………………………………………….

NAME OF ENUMERATOR:…………………………………………………………

INSTRUCTION: Please kindly tick ( ) as appropriate or fill in the gap where necessary
SECTION A: SOCIO - ECONOMIC CHARACTERISTICS

(1) Age of respondent …………………………….. years.
(2) Marital Status : (a) Single ( ) (b) Married ( ) (c)Single parent ( ) (d) Widowed ( ) (e) Divorced( )
(3) Years of Schooling:………………..years.
(4) Household Size:…………………
(5) How long have you been in cassava processing?…………………………………years.
(6) Main source of cassava for processing: (a) Own production ( ) (b) other farmers ( ) (c) Market ( )
(7) Farm Size:……………………….
(8) Aside cassava processing, what other source of income do you have? (a)Trading ( ) (b)Hair Plaiting ( ) (c)Civil servant ( ) (d)Artisan ( ) (e)Tailoring( ) (f)Farming ( ) (g)Others……………….
(9) Do you belong to any association? (a) Yes ( ) (b) No ( )

(10) Association belonged to: (a)Social Group( ) (b) Cassava processors group ( ) (b)Marketers group ( ) (c)Farmers cooperative ( ) (d)Women group ( ) (e) Others……………………

(11) Contact with Extension agents: (a) Daily ( ) (b) 2-3 times a week ( ) (c) Weekly ( ) (d) fortnightly ( ) (e) Once in a week ( )

(12) Average annual income from Cassava processing:…………………..

(13) Average annual income from other source:……………………….

ACTIVITIES OF CASSAVA PROCESSORS

12. Which product(s) do you process from cassava? (a) Garri ( ) (b) Elubo Lafun ( ) (c) Fufu ( ) (d) High quality Cassava flour (HQCF) ( ) (e) Other:……………………………..

13. What type of labour do you use mostly for processing cassava? (a) Family Labour ( ) (b) Hired Labour ( ) (c) Family and Hired ( )

14. What is the average quantity of cassava product(s) you process per cycle?

S/N	**Product**	**Quantity (kg)**
1	Garri	
2	Elubo Lafun	
3	Fufu	
4	HQCF	
5	Other (Specify)	

A cycle consists of all operations that lead to the production of a product.

15. How many cycles (average) can you handle in a month?

S/N	**Product**	**No. of Cycle**
1	Garri	
2	Elubo Lafun	
3	Fufu	
4	HQCF	
5	Other (Specify)	

16. Indicate the physical assets that you acquired that can be attributed to cassava processing

S/N	Assets	YES	NO
1	Houses		
2	Land		
3	Farm tools and implements		
4	Livestock		
5	Others (Specify)………………….		

21. Indicate the production assets you acquired that can be attributed to cassava processing

S/N	Assets	YES	NO
1	Processing shed		
2	Processing machines/equipment		
3	Others (Specify)……………………		

B. Cassava processing technologies and tools available in the study area.

	Processing Stages	Conventional Technology	Improved Technology
1	Peeling		
2	Washing		
3	Grating		
4	Fermentation and pressing		
5	Sieving/Pulverizing		
6	Frying		
7	Sifting		
8	Packaging		

C. Cassava processing Technologies Used in the Study area

s/n	Processing Activities	Always	Sometimes	Never
1	**Peeling**			
	Knife			
	Manual Peeler			
	Peeling Machine (Mechanized)			
2	**Washing**			
	Plastic Bowl			
	Concrete Bowl linked to Soak away			
3	**Grating**			
	Hand grating using metal bowl pierced on one side			
	Mechanized grater			
4	**Pressing**			
	Stone on linen bag			

	Screw press			
	Hydraulic press			
5	**Sifting**			
	Hand Sifting			
	Mechanized Shaker			
6	**Frying**			
	Frying Pot			
	Tray fryer over mold and firewood			
	Mechanized Fryer			

D. General processing activities and occupational hazard associated with each technology.

	Occupational Hazards	**Always**	**Sometimes**	**Never**
1	Peeling			
2	Washing			
3	Grating			
4	Fermentation and pressing			
5	Sieving/Pulverizing			
6	Frying			
7	Sifting			
8	Packaging			

E. CONTIBUTION OF WOMEN CASSAVA PROCESSORS TO HOUSEHOLD WELFARE

S/N	EXPENDITURE AREAS	Less than 50%	50%(half)	More than 50%	100%	Not at All
1	Children's school fees					
2	Family food consumption					
3	Hospital Bills					
4	Personal needs; Clothing, Jewelry, hygiene, costmetics					
5	Children clothing					
6	House rent					

7	Family Savings					
8	Family investments					
9	Building Project					
10	Social Obligations					
11	Extended Family Responsibilities					

F. Implication of cassava processing technology on Livelihood of processors

1. **Food Availability and Consumption Situation**

During the previous 24-hour period, did you or anyone in your household consume…

S/n	Eating Occasion	YES	NO
1.	Any food before a morning meal		
2.	A morning meal		
3.	Any food between morning and Afternoon meals		
4.	An afternoon meal		
5.	Any food between afternoon and evening meals		
6.	An evening meal		
7.	Any food after the evening meal		

Daily Pattern of food Items Consumed

S/n	Food Items Consumed	YES	NO
1.	Cereals (Rice, Maize, wheat)		
2.	Root & tubers (Yam, Sweet Potatoes)		
3.	Legumes (Beans, peas)		
4.	Milk/ Milk Products		
5.	Eggs		
6.	Fish (Fresh fish, Dry fish)		
7.	Meat (Poultry, Beef)		
8.	Oil & Fat		
9.	Green Leafy Vegetable		
10.	Other Vegetable (Carrot, Tomatoes)		
11.	Fruits(Mango, Banana)		
12.	Sugar/Honey		
13.	Beverages(Tea, Coffea, Chocolate drink)		
14.	Others (Spices, Soda)		

Monthly Distribution of Food Availability

Month	**Food Availability**		
	Adequate	Inadequate	Shortage
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			

2. Housing Condition

Items	**Type of Construction Materials**			
Roof	Iron Sheets		Leaves	Straw
Wall	Brick & Painted	Brick without Paint	Mud	Straw
Floor	Tiled	Rugged/Carpeted	Cemented	Ordinary
Kitchen Position	Inside		Outside	
Furniture	Full Upholstery	Half Upholstery	Plastic Chair	Benches

3. Water Facilities

Sources of water	**Tick below**	**Quality of drinking water**			
		Very clean	**Fair**	**Bad smell**	**Very bad**
Stream					
River					

Rain					
Tube Well					
Pipe Borne					

Water Sources	Different Purposes				
	Drinking	**Cooking**	**Utensils**	**Bathing**	**Washing Cloth/Cleaning**
Stream					
River					
Rain					
Tube Well					
Pipe Borne					

Monthly Distribution of Drinking water Availability

Month	Water Availability		
	Adequate	**Inadequate**	**Scarcity**
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			
Total			

4. HEALTH SITUATION

Perceived Health Status: Good ( ) Disabled ( ) Short-Term Illness ( ) Long-term Illness ( ) Weak ( )

Ability to get health treatment

Use of Health Treatment providers by Women Processor

Health Treatment Providers	Frequency of Health Treatment		
	Visit Regularly	Occasionally	Never Visited
Self-treatment			
Visit Pharmacy			
Village Doctors			
General Hospital			
Private Hospitals			

5. Sanitation

i. Toilet Possession: No Latrine ( ) Use other's Latrine ( ) Own Latrine ( )

ii. Type of Toilet Used: Sanitary toilet ( ) Pit toilet ( ) Open Space toilet ( )

iii. Toilet Construction:

Items	Type of construction materials		
Roof	Iron sheet ( )	Straw ( )	Open ( )
Wall	Brick &Tiled ( )	Iron sheet ( )	Jute stick ( )
Floor	Tiled ( )	Cemented ( )	
Position	Inside ( )	Outside ( )	

6. Participation in Social Activities

Describe your participation in Different social activities

Social Activities	Extent of participation		
	Always	Occasionally	Never Participated
Family Events			
Cultural Program			
Village meeting			
Voluntary help			
Mediation			

7. Freedom in cash expenditure

Expenditure	Other member	together	husband	Herself only
Daily Expenditure				
Investment on Land				
Household repair				
Child education				
Health				
Household assets				

Take loan and use				
Loan servicing				

G. CONSTRAINTS FACED BY CASSAVA PROCESSORS IN THE STUDY AREA;

s/n	CONSTRAINTS	Major	Minor	Not a constraint
1	Lack of appropriate/efficient processing equipment			
2	Lack/scarcity of spare parts			
3	High Cost of processing equipment			
4	High maintenance and operational costs of equipment			
5	Lack of credit/funds			
6	Poor power supply			
7	The dual role of women responsibility of business and family			
8	Less risk bearing capacity			
9	Unsupportive spouse			
10	High cost of Production			
11	Exploitation by middle men			
12	Sale and Marketing Problem			
13	Difficulty with Unions			
14	Low level of Demand for cassava products in the local economy			
15	Lack of access to and control over income			
16	Limited Advancement Opportunities			
17	Lack of skilled labour			
18	Health problems			
19	Poor returns on investments			

Ogele, Kwara State

Grater

SORTING & PEELING

SEALER & Scale

PACKAGED PRODUCTS

Manual Sieving

PEELING & SEIVING

Field;Kogi State

Tray Fryer

Diesel Powered Engine


Mechanized mill


Mechanized Sieve

Tub Washer

Screw press and Batch Fermentation of the floor (Eyenkorin, Kwara State)


Mechanize Fryer

Ogele, Kwara State