



# POST-HARVEST ACTIVITIES AND MARKETING OF CASSAVA IN OBUDU LOCAL GOVERNMENT AREA, CROSS RIVER STATE, NIGERIA

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## ABSTRACT

The performance of post-harvest activities on agricultural produce by farmers could reduce their forceful disposal of produce to consumers at cheap prices at the farm gate level as a result of absence of organized markets for the sale of agricultural produce at the moment. This study determined the relationship between post-harvest activities and marketing of cassava in Obudu local Government Area, Cross River State, Nigeria. In specific terms, the study determined the socioeconomic characteristics of respondents and relationship between transportation, processing, storage and marketing of cassava in the study area. Four research questions were answered and the correlational research design was used. The sample size for the study was 126 comprising 112 registered cassava farmers and 14 processors. Quantitative and qualitative approaches were used to collect the data. A 25-item structured questionnaire was used in collecting the quantitative data, while focused group discussions (FGD) was used for generating qualitative data. Face validity of the instrument was done by three experts and Cronbach Alpha reliability index of 0.76 was obtained. Data collected was analyzed using percentages to answer research question one and Pearson Product Moment Correlation analysis to answer research questions 2-4. The study found out that a moderate relationship exists between transportation, processing and marketing of cassava while a weak relationship existed between storage and marketing of cassava. It was concluded that a positive relationship exists between post-harvest activities and marketing of agricultural produce and recommended among others things that the extension outreach programme of the Ministry of Agriculture should encouraged farmers and other stakeholders in the agricultural production value chain to adopt appropriate post-harvest activities in the handling of agricultural produce generally and cassava in particular

**KEYWORD:** Post-harvest activities, cassava, marketing, produce, Obudu, L. G. A.

## INTRODUCTION

Cassava (*Manihot esculenta*) is a major food and industrial crop in tropical and sub-tropical Africa, Asia and Latin America. It is a common staple in the diets of man and can be eaten boiled, roasted and processed into different forms such as starch, African salad (*abacha*), flour and pounded cassava (*fufu*) (Akwagiobe et al, 2022). The crop tolerates virtually all tropical soils and as a chief source of carbohydrates in the diet, it supplies the energy needs of man.

Cassava is however a poor source of protein containing only 1 to 3 percent on dry matter basis, and is low in amino percentage, with acids such as methionine, lysine tryptophan, phenylalanine and tyrosine (Montagnac et al, 2009; Akwagiobe et al, 2022, Falade & Akingbala, 2010). There are two major cultivars of cassava, namely, short season (6-11months) and long season (12 months or more) varieties. Cassava is a drought tolerant, famine reserve crop, an invaluable food source that contributes to household food security

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(Food and Agricultural Organization FAO, 2013; Okeme et al, 2020), while the leaves are consumed as vegetable or dried and fed to livestock (Alawa, et al, 2023). The crop is grown extensively by farmers in Obudu at both subsistence and commercial scales. As a result of the multiplicity of uses of cassava and its prominence as a staple there is need to ensure proper handling of the produce after harvest for improved marketing otherwise referred to post-harvest activities.

Post-harvest handling of agricultural produce entails all activities that are carried out on farm produce or yields after harvest to ensure that they are preserved for relatively longer periods (Alawa et al, 2014). In specific terms, post-harvest activities are all forms of operations carried out on cassava after the tubers are harvested to ensure that the produce or products command better prices in the market. Golob, Boxal and Gallat (2009) observed that post-harvest techniques such as threshing, drying, winnowing, storage methods, processing methods, transportation, marketing plans determine the quality and shelf-life of agricultural produce. Similarly, Mehra and Rojas (2008) posited that improved food production, productivity and post-harvest handling of agricultural produce among poor and food insecure populations throughout developing countries could increase food security and reduce poverty. Post-harvest activities in cassava are majorly performed by cassava farmers and processors who obtain cassava tubers from four main sources namely; farm gates, wholesalers, retailers and processors' farms. Within the frame of this study, post-harvest activities in transportation, processing, and storage are critical for effective marketing of the cassava produce.

Transportation in this context refers to the movement of cassava produce (tubers and leaves) from the farm to the preferred location for post-harvest handling operations. It also entails the movement of cassava products such as garri and flour from the area of processing to the market for sale at favourable prices. Transportation of cassava depending on the scale of cultivation could be achieved through, wheelbarrows, head pans, baskets, jute bags, bicycles or in Lorries and vans where there are access roads (Alawa, 2019; Ani et al, 2013). Marketing can pose a problem for poor farmers who may not have resources to transport their produce to the market, especially those living in villages with poor feeder roads (Ani et al, 2013). With poor access to markets, marketing of cassava can be particularly problematic because of its bulky nature, especially if it is not processed [Cassava Report Final (CFR), 2013]. Similarly, Alawa (2019) observed that transportation is critical in the post-harvest handling of agricultural produce in general and cassava in particular with the explanation that the farm sites for cultivation of cassava may not be the same location for post-harvest activities like processing and storage. Transportation is life; it nurtures life and keeps life and businesses going (Olagunju, 2022). It plays a

significant role in the efficient running of modern societies and serves as the engine of growth and development of societies (Badejo, 2011). Transportation enhances farmers' income where agricultural produce/products are moved from the farm gate level (Alawa, 2019). It is therefore invaluable in the post-harvest handling of agricultural produce.

Processing of cassava has to do with activities targeted at ensuring that the products in form of flour (*garri*), starch, *fufu*, pellets, and chips are ready to be sold. These activities include peeling, grating, slicing among others (Akubo et al, 2023). Cassava is processed into garri by peeling the cassava root, washing, and grating, followed by solid state fermentation, pulverizing and frying. Garri is the most common form in which cassava is consumed by several millions of people in Africa, especially in the West Africa sub region (Akubo et al, 2023; Akwagiobe et al, 2022). Cassava processing originated from the need to reduce the bulkiness of the roots (as it contains 60-70 percent water), remove the toxicity (cyanogenic glycosides) that makes it perishable (Olutunla & Obamuyi, 2018). Processing increases shelf life, improves digestibility and makes cassava products appealing to the consumers and extends the products beyond the area and season of production, thus stabilizing supplies, ensuring favourable markets and increasing food security at national and household levels (FAO, 2020; Akwagiobe et al, 2022). Cassava processing is as important as its storage in the post-harvest handling cycle.

Storage as used in this study refers to the practice of safekeeping of any cassava product for deferred marketing. Cassava farmers indulge in such practice in order to take advantage of better market conditions. The common cassava product stored are *garri* and cassava flour. Nzeh and Ugwu (2014) reported that most (70%) farmers store cassava in processed form and the major processed form is *garri* (84%) while most (68%) of the harvested tubers are sold on farm than in the market (18%). From the foregoing, post-harvest handling activities of cassava are inextricably linked to efficient marketing of the produce/products.

Marketing involves all the activities in the flow of goods and services from the producers to the final consumers. Contextually, marketing entails the selling of cassava produce and products by the cassava farmer or processor to the final consumer at most favourable prices. This implies that farmers and/or middlemen could sell cassava tubers after harvest either at farm gate level, transporting the tubers to the local market or as a product after carrying out post-harvest activities on the produce thereby changing the form to products like garri, flour, tapioca among others. The later forms the crux of this study. Cassava generates cash income for the largest number of households, in comparison with other staples, and contributes positively to poverty alleviation

(Ani et al., 2013). Furthermore, the efficiency in cassava marketing according to Obisesan (2012), is an important determinant of both consumers' living cost and producers' income which justify the potentials of cassava marketing to agricultural and overall economic development. Onyinbo et al. (2011) observed that growth in cassava production has been primarily due to fast increase in population, large internal market demand, complemented by the availability of high yielding improved varieties of cassava. The authors explained that the growth may not also be unconnected with a relatively well-developed market access infrastructure, the existence of improved processing technology and a well-organized internal market structure. Afolabi, (2009) stated that production is not complete until the product gets to the hands of the final consumer by marketing and efficiency of marketing system (Nzeh, 2007) stimulates agricultural production. The efficiency is realized when the products are sold at prices higher than the production and distribution costs (Nwokoro in Nzeh & Ugwu, 2014). The additional income generated after marketing of cassava contributes to economic development of households in cassava producing zones generally and Obudu Local Government Area in particular.

Obudu L. G. A is prominently located in the northern agro-ecological zone which lies in the rainforest zone of Cross River State with great endowment of climatic and edaphic factors that support the massive production of arable crops such as yam, groundnut, pepper, cassava among others. Alawa et al (2023) reported that farmers in the zone have adequately taken advantage of this natural provisions and are adequately involved in the cultivation of these crops mostly at subsistence level. No doubt, cassava has multiple utilitarian value but farmers and cassava processors at the moment have complaints of poor returns to investment from the sale of cassava. A verbal interaction between the researchers and experienced cassava farmers/processors in the study area revealed that cassava tubers, *garri* and other products are sold to middlemen who transport them to other places for sale at better prices. Some of the farmers explained that they are always under compulsion to sell their cassava tubers and other products at "give away" prices because of its perishable nature. Government on her part has not done enough in providing organized markets for the sale of agricultural produce with the protection of the farmers as a core objective. But these losses and low prices received by the farmers would have been reduced if they apply post-harvest handling operations on cassava produce.

The specific objectives of the study are to:

1. ascertain the socioeconomic characteristics of the respondents;
2. find out the relationship between transportation and marketing of cassava in the area,
3. determine the relationship between processing and marketing of cassava in the area
4. find out the relationship between storage and marketing of cassava in the area

#### METHODOLOGY

The study was carried out in Obudu Local Government Area, Cross River State, Nigeria. Obudu is one of the eighteen Local government areas of the State. It has a landmass of 741km<sup>2</sup>, a population of 19,668 (National Population Commission NPC, 2006), and is bordered to the north by Vandeikya of Benue State, to the east by the commune of Akwaya in the republic of Cameroon, and to the south and west by the Local Government Areas of Boki and Bekwarra respectively. Obudu is located on the globe on Latitude 6° 40' 5.48" N of the equator and Longitude 9° 09' 52.31" E of the Meridian. The local government is structured politically into ten wards and farming is the major activities of the inhabitants with specialty for arable crops like yam, maize, okra, pepper, Bambara nuts, potato, cocoyam, cowpea, melon and cassava. They are also involved in the cultivation of field crops like cocoa, banana, plantain, oranges, mango, Avocado pears and bush mango. Correlational research design was adopted in the study. The population for the study was 126, comprising, 112 registered cassava farmers and 14 processors obtained from the Cross River Agricultural Development Project (CRADP) and Commercial Agriculture department of the Ministry of Agriculture, Cross River State. The justification for the choice of the research subjects was based on the fact that they are experienced and have been actively involved in post-harvest activities of cassava in the locality. There was no sampling in this study because of the small and manageable size of respondents. The study adopted mixed methods of data collection involving both quantitative and qualitative procedures. A 25-item structured questionnaire was used to collect the quantitative data while focused group discussions (FGD) were held with respondents for generation of qualitative data. The questionnaire had two parts; Part I was designed to obtain demographic information of the respondents like age, sex, educational status, years farming/processing experience and household size while Part II concentrated on the research variables, that is, transportation, processing, storage (independent) and marketing of cassava (dependent) as perceived by the subjects. A four point scale of strongly agree, agree, disagree and strongly disagree was used for data collection. The highest level in the scale received 4 points and the least was allocated 1 point. Two types of validity, that is, face and content validity were done on the instrument by three experts; two from the Department of Agricultural Economics, in the Faculty of Agriculture and Wild Life Resource Management and one from Test and measurement unit of the Department of Educational Foundations, University of Calabar, Nigeria.

A content validity index of 0.80 obtained was appropriate (Davis, 1992). Cronbach alpha reliability method was used to determine the internal consistency of the questionnaire and a coefficient of 0.76 was obtained. The researchers administered one hundred and twenty-six (126) copies of the questionnaire to the respondents with the help of three trained research assistants. One hundred and nineteen (119) copies of the questionnaire (representing 94% retrieval rate) were retrieved and analyzed using percentages to answer objective one which was concerned with socioeconomic characteristics of respondents. Pearson Product Moment Correlation was used to establish the relationship between transportation, processing, storage and marketing of cassava produce, that is, objectives 2-4. The data was done with SPSS version 21.

Focus group discussions (FGDs) with registered cassava farmers and processors were carried out in

line with the objectives of the study. The FGDs were held once with cassava farmers and processors respectively. The trustworthiness of qualitative data was established through triangulation, prolong engagements with participants, peer debriefing and data collection was logical, traceable and documented (Alawa, *et al.*, 2020; Lincoln & Guba, 1985). The FGD data generated was analyzed through the development of codes (themes), patterns and establishment of relationships based on the patterns.

### Results

The study results are presented in Tables 1 to 4 and are discussed accordingly.

#### Research question 1

What are the socioeconomic characteristics of the respondents? To ascertain the socioeconomic characteristics of respondents in line with the first objective of the study, descriptive statistics were used. The result is presented in Table 1

**TABLE 1: Socioeconomic characteristics of cassava farmers and processors**

Variable	Frequency	Percentages (%)
<b>Age</b>		
<30	18	15
30-39	31	26
40-49	39	33
>49	31	26
<b>Sex</b>		
Male	38	32
Female	81	68
<b>Educational status</b>		
No formal Education	23	19
Primary Education	32	27
Secondary Education	51	43
Tertiary Education	13	11
<b>Household size</b>		
1-5	29	24
6-10	81	68
>10	9	8
<b>Farming/processing experience</b>		
1-7	32	27
8-15	61	51
15 and over	26	22

Source: Field Survey, 2023.

Data in Table 1 reveals that 15% of cassava farmers/processors were below 30 years; 26% were between the ages of 30 and 39; 33% were between the ages of 40 and 49; while 26% above 59 years. The result showed that a major proportion of the cassava farmers and processors were between 40 and 49 years. This indicates that cassava farmers and processors were middle-aged and are at their viable stage to withstand the rigors of cassava farming, processing and marketing. The result also shows that 32% of cassava farmers and processors were males and 68% were females indicating that cassava farmers and processors were appreciably females. Furthermore, the result reveals that 19% of cassava farmers and processors did not attend any formal school, 27% completed primary education; 43%

completed secondary education while 11% received tertiary education. The result in Table 1 further reveals that a reasonable proportion of cassava farmers and processors lived with 6 to 10 members represented by 68%. Result from Table 1 also showed that a greater proportion of cassava farmers and processors had farming experience of 8 to 15 years represented by 51%, indicating that their involvement in cassava farming and processing is born out of experience hence, could satisfactorily provide information on the trend of post-harvest activities and marketing of cassava

**Research question 2**

What is the relationship between transportation and marketing of cassava in the area? To determine the relationship between the variables in realization of the second objective of the study, Pearson Product Moment Correlation was used and the result is presented in Table 2

**TABLE 2: Summary of Pearson Correlation analysis of the relationship between transportation and marketing of cassava (N = 119)**

Variable	$\bar{X}$	SD	R
Transportation	12.32	2.16	.438
Marketing of cassava	25.63	2.33	

Source: Researchers' field survey

Data in Table 2 presents the relationship between transportation as a post-harvest activity and marketing of cassava as perceived by the respondent. The Table presents an r-value of .438 which indicates a moderate and positive relationship between transportation and marketing of cassava produce and products. This implies that the more and efficient ways cassava produce (tubers) and products (garri, in particular) are transported from the farm gate or processing houses the better will be the marketing value (sale) and profit thereof.

Data obtained through FGDs by the researchers with cassava farmers and processors revealed their actual involvement in transportation of cassava produce and products from the farm gate level to the market for sale. When asked to comment on the benefits of transporting cassava tubers and product, one of the participants said thus:

*"...As we transport cassava tuber and products like garri to the market, buyers offer us better prices than those people that follow us to the farm to buy from. The only problem we face in the transportation of cassava is because it is bulky and our roads to the farm are in bad shapes. When we consider all these stress,*

*we are often forced to sell at cheap prices to them and the buyers pay their transportation cost..."*

This result reasonably justifies the activities of middlemen who may not be involved in cassava farming and processing but invade the communities and markets in the study area to buy off cassava produce and products from the farmers and processors with the intent of transporting them to other areas to take opportunity of the sales. This finding strengthens research efforts of Olagunju (2022), Alawa (2019) and Badejo (2011) who reported that transportation plays a significant role in the efficient running of modern societies and enhances farmers' income where agricultural produce/products are moved from the farm gate level.

**Research question 3**

What is the relationship between processing and marketing of cassava in the area? To ascertain the relationship between the independent and dependent variables in achievement of the third objective of the study, Pearson Product Moment Correlation was used and the result is presented in Table 3.

**TABLE 3: Summary of Pearson Correlation analysis of the relationship between processing and marketing of cassava (N = 119)**

Variable	$\bar{X}$	SD	r
Processing	13.16	2.42	.51
Marketing of cassava	25.63	2.33	

Source: Researchers' field survey

Data in Table 3 presents the relationship between processing as a post-harvest activity and marketing of cassava as perceived by the respondents. The Table presents an r-value of .51 which indicates a moderate and positive relationship between processing and marketing of cassava produce and products. This implies that the more and efficient ways cassava produce (tubers) are processed either by cassava farmers themselves or cassava processors the better will be the marketing (sale) and profit from these products.

The FGDs data obtained by the researchers with cassava farmers and processors revealed their active participation in the processing and marketing of cassava products like *garri* in the study area. When asked to comment on the gains obtained from processing of cassava, a participant had this to say:

*"...cassava is a crop that deteriorates quickly especially when it is harvested.*

*When we reduce the moisture contents through processing and fry into garri,*

*It becomes lighter for us to carry (transport) and garri is better preserved for*

*some days. With garri, if we got to the market and we are not able to sell all of*

*it in one market day, we can keep it till the next market which is every five days and it will not go bad..."*

Processing of cassava reduces the weight of the tubers, facilitates transportation and ensures efficient marketing of the products at better prices. This finding conforms to Olutunla and Obamuyi (2018) who stated that cassava processing reduces the bulkiness of the roots removes the cynogenic glycosides that makes it perishable. It increases shelf life, improves the digestibility and makes cassava products appealing to the consumers and extends the products beyond the area and season of production, thus stabilizing supplies, ensuring favourable markets and increasing food security at national and household levels (FAO, 2020; Akwagiobe et al, 2022). Processing of cassava produce therefore is germane to its marketing.

#### **Research question 4**

What is the relationship between storage and marketing of cassava in the area? In order to determine the relationship between the variables in achieving the fourth objective of the study, Pearson Product Moment Correlation was used. The result is presented in Table 4

**TABLE 4: Summary of Pearson Correlation analysis of the relationship between storage and marketing of cassava (N = 119)**

Variable	$\bar{X}$	SD	r
Storage	11.21	2.01	.119
Marketing of cassava	25.63	2.33	

Source: Researchers' field survey

Data in Table 4 presents the relationship between storage as a post-harvest activity and marketing of cassava as perceived by the respondents. The Table presents an r-value of .119 which indicates a very weak positive relationship between storage and marketing of agricultural produce and products. This implies that even though storage of cassava products, for example, *garri* may enhance positively the marketing (sale) of the product, continuous storage for a long period reduces the quality of the produce/product especially if processing was not properly done.

Data obtained through FGDs by the researchers with cassava farmers and processors revealed their involvement in the storage and marketing of cassava

products majorly *garri* in the study area. A participant had this to say:

*"...like we said earlier, when we store garri that we cannot sell in the market,*

*it is for a very short time and will take it back to the market. We are afraid that*

*the garri will go bad if we keep it for a longer time. For me in particular, if I keep*

*my garri for a week, I am always forced to give it out at any price to the buyers*

*because I do not want to lose anything in my farm business..."*

This finding negates the report of Nzeh and Ugwu (2014) that most (70%) of the farmers store cassava in processed form and the major processed form is garri (84%) while most (68%) of the harvested tubers are sold on farm than in the market (18%). Cassava farmers and processors in Obudu L. G. A. are thus, involved in cultivation and post-harvest activities such as, transportation processing and storage of cassava at the micro-level of production. Their involvement as subjects in this study based on their active involvement and experience have added value to this study.

### CONCLUSION AND RECOMMENDATIONS

The issue of organized markets that take into consideration the protection of farmers against unfair prices for their produce has been a problem in Cross River State and Obudu Local Government Area in particular. Farmers are left with no option than to give out their produce at very low prices to middlemen to the extent that cost of labour and farm inputs may not be justifiably satisfied. The crux of this study hinged on the determination of relationships between post-harvest activities and marketing of cassava. With these relationships, it is hoped that if farmers in general and cassava farmers/processors in particular adopt these post-harvest activities in the handling of their produce, they could break into the activities of these middlemen and generate proceeds that will reflect their involvement in agriculture.

It is recommended that the extension outreach programme of the Ministry of Agriculture should encouraged farmers and other stakeholder in the agricultural production value chain to adopt appropriate post-harvest activities in the handling of agricultural produce generally and cassava in particular. Through this means, information on emerging post-harvest technologies that are more efficient and less laborious could be disseminated to them.

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