Assessment of Post-Harvest Needs of Small and Medium Scale Gari Processors in Rivers State

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Received: 2/04/2023 Revised: 3/06/2023 Accepted: 10/06/2023

Feeding over 7 million Rivers State dwellers requires a radical transformation in postharvest management of agricultural products. Garri, which is a product from cassava is one of the processed food widely consume in the state. However, primitive methods which result to a reasonable loss of the product are widely used in Rivers State. Therefore, in order to minimize or eliminate these losses within the system, the study was conducted to assess the needs of small and medium scale garri processors in Rivers State, Nigeria. Purposive and snow-ball sampling procedures were used to select 120 small and medium scale garri processors in the study area. A well-structured questionnaire was used to obtain information from the respondents and analysed using both frequencies, percentages, mean and PPMC statistical tools. The result revealed that r - distribution which represents the Pearson correlation coefficient significant level of the variables is statistically significant at 1% (0.01) between time constraint and perception of garri processors that, improved garri processing equipment is better than primitive tools with r = 0.258** most of the respondents (Above 90%) confirmed that all the listed improved garri processing and storage equipment are highly needed in the study area. The local tools used in the study area for gari processing includes knives (100%) stick presser (81.7%) and Aluminium frying pan (88.3%). All (100%) of the respondents showed favourable attitude towards the needs for improved processing equipment. The constraints to garri processors include lack of fund, health challenges, and lack of improved garri processing equipment, time consumption, small processing capacity and spoilage of cassava with each mean above grand mean (2.6). Therefore, improved post-harvest equipment are highly needed for processing garri in the study area to improve production efficiency and high-income generation for the processors. Government intervention is needed to erect mini garri processing centre in each community.

Keywords: Assessment, needs, post-harvest, garri processors

INTRODUCTION

Cassava (*ManihotesculentusCrantz*) is an important major staple food crop in Nigeria, such as Rivers State. The food crop can be consumed in various ways, boiled for eating or processed into garri, fufu, flour or snacks. Gari is processed from cassava roots and highly rich in carbohydrates and consumed by millions of people (Aminu *et al*., 2017). Ozigbo *et al.* (2020) reported that about 148 million people eat gari across the country, which made up of about 74% different tribes of people in Nigeria. Cassava is also a good source of raw materials to some industries such as textile industries, pharmaceutical, bakery, animal feed production, confectionery, sweetener, and food processing industry and a major source of income for rural households in Nigeria (Okele, 2018). However, the roots undergo metabolism and respiration immediately after harvest and accounts for the short shelf life of 24hrs -72hrs which makes the crop highly perishable in nature (Seidu et al. 2020; Onyenwoke & Simonyan, 2013). The perishable nature of cassava crop makes the post-harvest activities of the crop labour demanding and a necessity for technology application so as to achieve reasonable production (IITA, 2009).

Post-harvest losses of food occur across all the value chains which reduces both quantity and quality of food availability for consumption in the developing countries, the value chains include production, transportation, processing, marketing and storage. Aiyedun *et al.* (2022) stated that the level of food losses at post-harvest stages is higher in developing countries especially at processing and marketing stages. The high level of post-harvest losses at processing stages could be associated with the use of primitive technologies in the processing of the food. The traditional technologies have deficiencies such as health hazard, laborious, low efficiency, time consumption and lack of quality assurance, while the modern post-harvest strategies include the development of effective and simple machines and tools that reduce the processing time, labour and production losses (Oyeronke *et al.,* 2015).

Rivers State is among the top 5 cassava producing states which led to the establishment of 450 metric tons cassava processing plant at Afam in Oyigbo Local Government Area of Rivers State on May 28, 2021

 https://dx.doi.org/10.4314/etsj.v14i1.7

(Ezeaja, 2021) the aim of establishing the plant is to enhance value addition and increase the employment rate. Despite the establishment of this gari processing plants, the small and medium scale gari processors still remain dominants in gari production in the study area in which most of the processing activities are still carried out manually or with the use of local tools by the local processors which reduces production efficiency. Therefore, it is essential to examine the post-harvest technology needs of the small and medium scale cassava processors that could increase production efficiency and reduce post-harvest losses in the study area.

The specific objectives were to; (i) identify the available processing tools used by garri processors for processing garri in the study area; (ii) determine the perception of the garri processors on needs for improved garri processing equipment in the study area and (iii) determine the post-harvest constraints of garri processors in the study area.

Hypothesis of the Study

The hypothesis was set in a null form and was used to determine the relationship between variables in the study.

Ho_1: there is no significant relationship between the constraints to garri processors and their perception of needs for improved garri processing equipment in the study area.

POST-HARVEST NEEDS OF SMALL AND MEDIUM SCALE GARRI PROCESSORS

The literature review was made to have a general view of post-harvest needs of small and medium garri processors. Sanni *et al.* (2007) in their survey study on the cassava post-harvest needs assessment survey in Nigeria: Synthesis report found that processing cassava to garri was more costly in Rivers State and that cost reduction should be targeted by reducing labour input through the use of equipment and machines and concluded that if multiple-use equipment can be introduced in some of the locations, the potential for diversification would be very high. Meaning that the needs for post-harvest equipment for garri has been made known in the study area for more than a decade but the gap still remain not perfectly filled. Ogonu and Okejim (2018) confirmed the growth and development of any nation's economy depends on small and medium scale enterprises good performance. They attributed this to numerous numbers of small and medium scale enterprises, the size and their nature of operation. This is also applicable to the study area as small and medium garri processors dominate the garri processing sector.In a study carried out by Ozigbo *et al.* (2020) on review of garri processing technologies: The challenges and prospects, it was discovered that one of the major challenges in making garri in Nigeria is lack of techniques and machines required for processing activities. This implies that most of garri processors are still using local tools with low efficiency in processing garri in Nigeria. Oyeronke *et al*. (2015) in their study on assessment of the use of post-harvest loss prevention technologies for cassava in Nigeria discovered that to achieve better supply of cassava-based food, proper post-harvest handling and improved processing technologies must be given crucial attention. More than half (56.8%) of the population had positive perception towards utilization of selected improved cassava processing technologies (Ewebiyi *et al.,* 2020), the positive perception could be based on their needs for technologies improvement.

RESEARCH METHODOLOGY

The study was carried out in Rivers State, Nigeria (4.83960N, 6.91120E). A purposive sampling procedure was used for this study. Small and medium scale garri processors formed the population for the study. A multistage sampling procedure was used to select respondents for the study and this involved purposive selection of 3 local government Area (Abuoa/Odua, Ikwere and Oyigbo) where cassava production is high in the study area and two communities where gari is majorly produced were also selected to make 6 communities (Utari, Emago, Ozuaha, Igwuruta, Komkom and Obeama) and snow ball sampling was used to identify garri processors through referral by the identified respondent. Twenty small and medium scale gari processors from each community were selected to make 40 gari processors per L.G.A. and a total of 120 gari processors in all the 3 L.G.A. selected in the state. Small scale garri processors were selected based on small processing size and small capital and controlled by a person, while medium garri processors were selected based on average size processing capacities, and also involved partnership in business (Uzoejinwa *et al.,* 2016). Primary data was used for this study and sourced from the self-administration of structured questionnaire based on the objectives of the study.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Respondents

The result on socio-economic characteristics of the respondents is presented in Table 1. The results shows that the gari processors mean age was 45.5 years, this means that gari processors in the study area were still in their active and productive age and could be in need of equipment that will boost their production. This agrees with Osuafor *et al*. (2020) that gari processors are still strong and agile to boost their economy. Majority (78.3%) of the respondents were females, this could be as a result of the nature of the work, which is processing and gender bias in Nigeria. Most of the

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respondents (93.3%) were literates and only few (6.7%) of the respondents had no formal education. The mean for years of processing experience was 19.8 years. This implies that the processors were familiar with the limitations to the processing success. Many of the respondents (61.7) had no secondary occupation and depend solely on the gari processing for a living, which could influence their needs for production improvement. Majority (70.8%) were married and 13.3% of the respondents were single, while few (4.2%) of the respondents were divorced. The mean for the household of the respondents in the study area was 8 persons meaning that there will be no need to hire labour. Hence, family labour could be cheaply employed to reduce the cost of labour and this could solve problem of labour unavailability as reported by Amoah *et al.* (2022) that one of the challenges of women group in gari processing activities is unavailability of labour for peeling the cassava.

Table 1: Socio-Economic Characteristics

Socio-Economic Characteristics	Frequency	Percentage	Mean
Age (Years)			
21-30	15	12.5	
31-40	33	27.5	
41-50	31	25.8	45.5
51-60	34	28.3	
61-70	3	2.5	
71-80	4	3.3	
Sex			
Female	94	78.3	
Male	26	21.7	
Years of formal Education			
6years	40	33.3	9.9
12years	62	51.7	
16years	10	8.3	
Non formal	8	6.7	
House-Hold Size			
1-5	85	70.8	
6-10	55	45.8	
11-15	10	8.3	8
Marital Status			
Single	16	13.3	
Married	85	70.8	
Widowed	5	4.2	
Divorced	14	11.7	
Years of Business Experience			
1-15	53	44.2	
16-30	48	40	19.8
31-45	17	14.2	
46-60	1	0.8	
61-75	1	0.8	
Secondary Occupation			
Yes	46	38.3	
No	74	61.7	
Monthly income		₦88708.33	

Available Local Processing Tools

The result in Table 2 shows that all the processors (100%) used knives to peel the cassava, meaning that knives were the only available tools for peeling cassava in the study area. This supports the findings of Okareh *et al.* (2015) that manual method of using knives for peeling cassava remain most popular in local cassava processing chains. While most (60.8%) of the respondents have local cassava grater. Majority of the respondents (81.7%) have stick presser or jack screw presser and only 18.3% of the respondents were still using stone to press the cassava. About 70% of the respondents possessed local clay stove for frying garri while some of the respondents (30%) made use of wheel iron stove. Most of the respondents (88.3%) used local sieve and aluminium frying pans. Majority of the respondents (92.5%) have local calabash /turning stick for processing garri, while a few respondents used

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unbreakable plate instead of calabash or turning stick. The finding implies that local tools are the most available tools for garri processing, and the garri are still processed in traditional ways in the study area, which could reduce production and profit efficiency of the garri processors. It could also reduce the quality of garri produced in the study area. Elemasho *et al.* (2022) opined that using local methods or tools for production and processing consume time, and result in low efficiency.

Table 2: Available local processing tools

Available local gari processing tools	Available (%)	Not Available (%)
Knives	100	0
Local cassava grater	60.8	39.2
Stick presser/ Jack screw	81.7	18.3
Stone Presser	18.3	81.7
Wheel Iron Stove	30	70
Local Clay Stove	70	30
Local Sieve	88.3	11.7
Aluminium Frying Pan	88.3	11.7
Calabash/ Turning Stick	92.5	7.5
Unbreakable Plates	7.5	92.5

Constraints to Garri Processing in the Study Area

The constraints were measured on 3-likert type scale as 1- low constraint, 2- moderate constraint and 3- high constraint results of the constraints encountered by the garri processors in the act of processing garri in the study area are presented in Table 3.

The result of the constraints of garri processors revealed that lack of fund, health challenges, lack of improved garri processing equipment, time consumption, small processing capacity and spoilage of cassava are the major constraints to garri processors in the study area. The results in Table 3 were arranged in order of most pressing constraint with each mean greater than the grand mean (2.6). The respondents agreed that the aforementioned are the constraints to their garri processing activities. This implies that the garri processors in the study area do not have enough funds to meet their needs. This is in line with the findings of Ewebiyi *et al.* (2020), who reveal that inadequate fund is a major constraint to garri processors in his study area. As regards to the health challenges, it could be as a result of excessive heat and smoke constantly affecting the garri processors, which in most cases could lead to loss of sight, and high blood pressure. As noted by Okareh *et al.* (2015) in their study that due to excessive heat and smoke during garri processing, most of the processors dehydrated and developed poor health conditions. The respondents disagreed with other listed constraints such as poor packaging system, mould growth, middlemen exploitation and lack of market linkages, believing that they are not constraints to them in the study area.

Table 3: Post-harvest constraints of garri processors (N=120)

Constraints to garri processors	Mean	Standard Deviation	Decision Order	Rank
Lack of Fund	2.99	0.09	Agreed	1st
Health challenges	2.93	0.34	Agreed	2nd
Lack of improved gari processing equipment	2.91	0.28	Agreed	3rd
Time consumption	2.80	0.53	Agreed	4th
Small processing capacity	2.69	0.53	Agreed	5th
Spoilage of cassava	2.62	0.66	Agreed	6th
Poor packaging system	2.57	0.71	Disagreed	7th
Mold growth/ lack of storage facilities	2.52	0.72	Disagreed	8th
Middlemen exploitation	2.48	0.76	Disagreed	9th
Lack of market linkages	2.47	0.74	Disagreed	10th

Grand mean: 2.6

https://dx.doi.org/10.4314/etsj.v14i1.7

Perception of Improved Garri Processing Equipment

The result in Table 4 shows the attitude of respondents toward improved equipment for processing garri in the study area. All the respondents strongly agreed with the statements that support the needs for improved garri processing equipment and the mean for positive statement ranges between 4.54- 4.76 which is greater than the grand mean (3.0). The mean for the negative statements ranges from 4.19-4.65 and also greater than the grand mean (3.0) meaning that majority of the respondents disagreed with the negative statements against the post-harvest needs of garri equipment. This implies that the garri processors are in need of improved equipment and believe that the equipment will boost their production and this could improve the adoption rates of garri processing equipment in the study area. This agrees with the findings of Quaye *et al.* (2009) that more than 70% of the garri processors confirmed that improved processing technologies suitable to community-based settings.

Table 4: Perception of the Respondents on the Needs for Improved Garri Processing Equipment

Perception Statements	Mean Score	Decision
Positive Statements		
Improved garri processing equipment will reduce time consumption in garri processing business in the study area	4.76	SA
Garri processors needs improved processing equipment for quality assurance	4.75	SA
Reduce post -harvest losses due to traditional approach improved processing equipment is essential	4.68	SA
Improved garri processing equipment is better than primitive methods	4.67	SA
Improved garri processing equipment is a measure against health challenges such as blindness	4.54	SA
Negative Statements		
No need for garri improved equipment they are not environmentally friendly	4.54	SD
Local garri processing tools are more effective than improved equipment	4.43	D
Improved garri processing equipment needs expert and too complex to utilize	4.19	D
Improved garri equipment is needless because of the risk in the usage	4.43	D
Improved garri processing equipment are not costlier than local tools	4.65	SD

Areas of Needs

Result on areas of needs is presented on Table 5. Opinions of the respondents were rated on 3-likert – type scales (no need, low need and high need) most of the respondents (Above 90%) confirmed that all the listed improved garri processing and storage equipment are highly needed in the study area. This implies that, the respondents have made their interest on technology advancement known and ready to change from local tools to improved processing and storage equipment, provided all other factors remain constant in the study area. This support the bottom-up approach policy in agricultural extension where the beneficiaries are involved in decision making and their area of interest is targeted in research activities (Rossingol, 2023). If the areas of needs of garri processors are known and met it could increase garri production and also improve the quality of garri to be produced and the processors' health too will be protected in the study area.

Table 5: Areas of Needs on Improved Garri Processing Equipment

STATEMENT	No need (%)	Low need (%)	High need (%)
Medium garri processing equipment			
Cassava grater	0.8	0	99.2
Cassava presser	0	0.8	99.2
Stainless steel frying pan	0	1.7	98.3
Cassava stainless steel Sieve	0	1.7	98.3
Plastic Drum	0	3.3	96.7
Health Improvement equipment for garri processing			
Chimney	0.8	2.5	96.7
Bricks stove	0.8	0.8	98.3
Storage equipment needs for garri:			
Bags and Nylon	2.5	3.3	94.2
Stainless steel drums	1.7	3.3	95
Mini Garri Processing Centre	0	0.8	99.2

https://dx.doi.org/10.4314/etsj.v14i1.7

Test of Hypothesis

Results presented in Table 6 showed that the r - distribution which represents the Pearson correlation coefficient significant level of the variables is statistically significant at 1% (0.01) between time constraint and perception of gari processors that, improved gari processing equipment is better than primitive tools with r = 0.258**, although the correlation is weak but significant. This implies that the time wastage during the gari processing activities were due to the usage of primitive tools and the respondents were with the opinion that improved gari processing equipment will safe more time. This motivated the areas of needs listed by the respondents in the study area. Therefore, the null hypothesis which stated that there is no significant relationship between the constraints to garri processors and their perception of needs for improved garri processing equipment in the study area was rejected.

Ho_1: there is no significant relationship between the constraints to garri processors and their perception of needs for improved gari processing equipment in the study area.

Table 6: Correlation between Constraints and Perception of garri processors in Rivers State

	TMC	SPC	HTC	LIG	LOF	RTC	RPH	EBP	MAH	EQA
TMC	1									
SPC	0.181*	1								
HTC	0.329**	0.118	1							
LIG	0.459**	0.223*	-0.060	1						
LOF	-0.035	0.293**	-0.018	0.304**	1					
RTC	-0.053	-0.185*	-0.045	-0.021	-0.045	1				
RPH	O.104	-0.052	0.071	-0.068	-0.056	0.679**	1			
EBP	0.258**	-0.063	0.020	0.164	-0.059	0.690**	0.746**	1		
MAH	0.076	0.057	0.040	-0.021	0.169	0.525**	0.611**	0.605**	1	
EQA	0.072	-0.0129	-0.048	0.036	-0.046	0.838**	0.763**	0.672**	0.551**	1

**** Correlation is Significant at the 0.01 level (2-talled)**

***Correlation is Significant at the 0.05 level (2-talled)**

Key: TMC= Time Consumption, SPC= Small Processing Capacity, HTC= Health Challenges, LIG= Lack of Improved garri processing Equipment, LOF= Lack of Funds, RTC= Improved garri processing equipment will reduce time consumption, RPH= Improved garri processing equipment reduce post-harvest losses, EBP= Improved garri processing equipment is better than primitive methods, MAH= Improved garri processing equipment is a measure against health challenges, EQA= Need for improved garri processing equipment for quality assurance

CONCLUSION AND RECOMMENDATIONS

The study concluded that the garri processors in the study area were highly in need of improved equipment for processing and storage of garri because local processing tools still remain dominants for processing and storage of garri in the study area, while lack of finance and health challenges are major constraints to the garri processors. Government should assist to build mini processing centre through community development intervention project to assist the processors. Also, the processors in the study area should form cooperatives to be able to have access to loan to purchase some of the improved equipment for processing garri.

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