NIGERIAN AGRICULTURAL JOURNAL
ISSN: 0300-368X
Volume 49 Number 1, April 2018. Pp. 152-163
Available online at: http://www.ajol.info/index.php/naj

GENDER PREFERRED TRAITS ON CASSAVA PRODUCTION AND PROCESSING VALUE CHAIN IN IMO STATE, NIGERIA

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ABSTRACT
The study analysed Gender Preferred Traits and its effect on cassava production and processing value chain in Imo State, Nigeria. The study described the socio-economic characteristics of cassava farmers, ascertained the varietal preference of cassava and determined the factors affecting the production, processing and marketing of cassava in the study area. The study also identified gender based constraints on participation in production, processing and marketing of cassava, relative importance of cassava for men and women for food security and income and role men and women play in cassava production and processing activities. Two communities/locations were selected based on the intensity and importance of cassava production to the communities and ease of access. Focus Group discussion was carried out with a total of 27 women and 32 men (59) and 51 individual respondents. Results show that the study area was dominated by farmers whom are married, still strong and agile, educated with long years of farming experience, small household size and farm holdings. Results also show that women dominated in the production of, cassava which ranked the first most important source of income from crops in the two locations. Men and women carry out the same agricultural tasks with the exception of weeding-done exclusively by women and land clearing-done only by men. Seven local varieties were identified, four of which (chigazu, nwageri, nwocha and adanwankwo) were grown in the two locations. Women were clearly more knowledgeable than their male counterparts about cassava varieties. There were no strong or clear gender differences in varietal preferences, with both men and women mentioning both agronomic and cooking qualities. The female farmers harvested, processed, consumed and sold more cassava than their male counterparts. The results therefore call for policies aimed at encouraging younger farmers by granting them more access to land especially the females to enhance the cultivation and adoption of improved varieties. There is also need for increased access to processing facilities, extension contacts, formation of cooperatives and rehabilitation of rural road networks to enhance the adoption of improved cassava varieties.

Keywords: Adoption, Production, Processing, Gender Roles and Preferred Traits

Introduction

Cassava (*Manihot esculenta* Crantz) is considered the most important among the tropical root and tuber crops providing food and cash to over 30 million farmers and large number of processors and traders (Apata, et al, 2013). It is grown in almost all agro-ecological zones in Nigeria. The products from cassava include gari, akpu, tapioca, starch, lafun, chips and flour; gari is the commonest cassava product and widely consumed across households. However the production is very much characterized by small scale producers who use old and local varieties and traditional production technologies which largely accounts for low yield. Oyebanji et al (2003) noted that these small-holders account for over 80% of cassava production in Nigeria. Over 90% of cassava produced in the country is consumed locally with less than 10% utilised for industrial purpose. In the cassava value chain most especially in Nigeria earlier research has identified a number of concerted efforts at

production, processing, marketing value chain and gender in the value chain. Such studies on Gender and cassava marketing value chain include (FAO 2011), Gender and cassava production value chain (Osuji et al 2017 and Ahmadu et al 2014), the adoption of improved varieties (Awotide et al. 2015), Gender and cassava leaves value chain (Anderson, et al 2016), cassava production, processing and marketing (Nweke, et al 1999; Sewando et al, 2011; Lavenel et al, 2009 and IFAD, 1994), and postharvest handling and storage (Uchechukwu-Agua 2015). Hitherto, most emphasis in breeding selection has been on productivity traits (root weight, root number and dry matter content). Hence, adoption by smallholder farmers is very low leading to low outputs and low incomes. Adoption could be improved with greater understanding of farmers' cassava varietal attributes preferences. Incorporation of farmers and processor preferred traits into breeding programs will go a long way to check the low rate at which improved varieties are being adopted.

The cassava value chain in Nigeria has a lot of important value chain processes and much of these processes remain unexploited (Ahmadu et al., 2014).

Commercializing cassava and integrating producers and traders into commercial value chains is surmountable through challenging and slow proposition. This is because; each actor along the value chain devises means of showcasing its products to the customers. They ensure that quality products are delivered to their customers to earn more returns. The need for cassava value chain is to create additional markets for cassava products and more importantly, generate wealth to the farmers. (Obiefuna et al, 2009). About 60-80% of the total agricultural labour comes from women (Apata, et al, 2013; Sewando et al, 2011; Lavenel et al, 2009; Mgbada, 2002; Rahman, 2004 and IFAD, 1994). Moreover, women are almost entirely responsible for processing and marketing of cassava products in most part of the country. In most cases, women buy agricultural produce from their husbands and other farmers, processed and market. Odii, (1996) reported that numerous studies indicate that rural development policies directed at the household may not have their intended effects or produce unintended negative outcomes, unless the role and position of gender in rural households are explicitly taken into account. Women in Nigeria form an active labour force but they rarely own the means of productions as posited by Rahman, (2004). Socio-economic and political obstacles have for long been intensifying gender inequality and exacerbating poverty among women (Rahman and Haruna, 1999).

There is a dearth of knowledge on cassava preferred traits and effects on producers and processors in the value chain. In view of this gap, this research work will target the varieties men and women grow as it affects preferred varietal traits preferences of producers and processors in cassava value chain. The outcome of this research will bring to light the traits that are preferred by both men and women, and invariably facilitate demand driven breeding projects. This will increase the rate of adoption in the cultivation of improved varieties which will lead to increased productivity and improved standard of living of the actors with a positive effect on socio-economic activities and create a platform for equity and equality in the cassava value chain.

Methodology

Information for the study was obtained through group interviews with male and female cassava farmers using qualitative and quantitative structured questionnaire and interviews with farmer informants. The study was carried out in two communities of Imo State Nigeria: Logara **(**Latitude- 005.45042; Longitude - 007.200; Altitude - 129.6m) and Nnorie **(**Latitude - 5.36588; Longitude - 7.223034; Altitude - 113.23m) purposively selected to represent varying degrees of male and female involvement in cassava cultivation. Based on the literature and expert opinion, Imo state was selected to represent an area where men and women are involved in producing the cassava. Study communities were selected by Agricultural Development Program (ADP) staff on the basis of the importance of cassava production to the communities and accessibility. Focus Group Discussions (FGD) were carried out with a total of 27 women and 32 men and with 51 individual respondents. The team designed a check list for the structured interviews in the village (FGD and individuals). The guide include; varieties, traits

(agronomic and processing) and seed. The team also interviewed processors and marketers in the villages with questions on work explanation, tools, steps involved and preferences for cassava varieties and traits. Data was analysed by the use of descriptive statistics (including frequencies, means and percentages). Tests of sample difference were performed to establish any significant difference between means and frequencies (Moore, 2006), for important variables that explain adoption among male and female farmers. To establish difference in means of variables analysed, the test statistic for means is given by:

$$Z = \frac{m_x}{\sigma x} \qquad (1)$$

Where m_x is the difference between the means of variables for male and female farmers and σ_x is the joint standard deviation of both sub-samples.

For the percentage frequencies, the test statistics for comparisons were calculated as:

$$Z = \frac{(p_r - p_u)}{\sqrt{fr + fu}} \qquad (2)$$

Where;

$$fr = \frac{pq}{n_r} \quad \text{and} \quad fu = \frac{pq}{n_u}$$

Where p_r and p_u were percentages for variables for male and female farmers respectively, p is the percentage frequency in the pooled sample, and q=1-p.

Results and Discussion

Socio-Economic Profile of the Respondents

The results in Table 1 show the average statistics of the farmers in the study area.

Age

The average age of the male and female farmers was 41.04 and 35.12 years respectively indicating that majority of the farmers were still strong and active. The Z value was significant at 10% level, implying significant difference in age between the male and female farmers. However, there is contention on the direction of the effect of age on adoption (Bonabana-Wabbi, 2002). The ability of a farmer to bear risk and be innovative has been reported to decrease with age (Nwaru, 2004).

Household Size

The results show that the male and female respondents had household size of about 4 persons respectively indicating small household sizes. A large household size has the likelihood of enhancing adoption of improved production and processing technologies. A relatively large household size has been shown to enhance the availability of labor (Effiong, 2005 and Idiong, 2005).

Farmer's experience

The female farmers had longer years of experience (23.65yrs) compared to their male (12.24yrs) counterparts. A farmer's experience can generate or erode confidence. With more experience, a farmer can become more or less averse to the risk implied by adopting a new technology; thus this variable can have a positive or negative effect on a farmer's decision to adopt improved cassava varieties.

Farm size

The average farm sizes were 3.85 and 2.45 ha for the male and female farmers respectively. Farm size is an indicator of wealth and perhaps a proxy for social status and influence within a community. A larger farm size is expected to be positively associated with the decision to adopt improved cassava varieties. Farm size can also encourage farmers to intensify agricultural production. Farm size affects adoption costs, risk perceptions, human capital, credit constraints, labor requirements, tenure arrangements and many more. With small farms, it has been argued that large fixed costs become a constraint to technology adoption, especially if the technology is costly (Abara and Singh, 1993).

Table 1: Average Statistics of the Respondents sampled in the study area

Variable	Male Mean (std.dev)	female Mean (std.dev)	Z-value
Age	41.04 (14.59)	35.12 (10.95)	2.03*
Household Size	3.94 (2.58)	4.30 (0.98)	2.65*
Farming Experience	12.24 (12.95)	23.65 (11.94)	10.10***
Farm Size	3.85 (5.70)	2.45 (2.11)	5.91***
Quantity Harvested(kg)	4,273.91 (4,975.89)	6,065.38 (5703.14)	3.63***
Quantity Consumed(kg)	3,365.22 (8,318.70)	4,065.38 (5,703.14)	3.39**
Quantity Processed(kg)	2,806.52 (3460.70)	6,644.17 (9606.17)	6.55**
Distance to farm(km)	2.78 (1.76)	3.02 (1.89)	2.14*
Distance to Market(km)	2.83 (1.51)	3.05 (1.66)	2.35*
Distance to processing centre	0.62 (0.78)	0.91 (1.14)	2.08*
Road Condition is good (%)	17.39	11.54	3.81**
Ownership of means of communication (%)	78.26	88.46	3.84**
Membership of cooperatives (%)	50.00	40.00	3.00**
Extension Contact	52.17	50.00	1.20

***, ** and *** implies significant at 10%, 5% and 1% level respectively**

Quantity harvested

The quantity harvested was about 4.27t and 6.06t for the male and female farmers respectively indicating low productivity.

Quantity consumed

The males and females consumed about 3.36t and 4.05t of the cassava roots harvested respectively indicating that only 0.9t and 2.01t were left for the market. This implies that the females sold more cassava than their male counterparts

Quantity processed

The results show that almost all the cassava harvested by the women were processed (6.6t) compared to their male counterparts (2.8t)

Contact with extension: contact with extension workers will increase farmers' likelihood of adopting improved cassava varieties in the study area.

Household size: Because larger households are more likely to provide the labor that might be required by improved cassava varieties, a larger household size would be expected to increase the probability of adopting improved cassava varieties.

Distance to Farm, Market and Processing Centre

The results show the male respondents had less distance to farm (2.78km), market (2.83km) and processing centre (0.62km) compared to their female counterparts who had 3.02km, 3.05km and 0.91km respectively. Increased distance is expected to decrease varietal preference and adoption.

Road Condition

The male (17.39%) and female (11.54%) respondents indicated that the road conditions were good. This implies the deplorable nature of roads in the study area which is expected to decrease varietal preference and adoption of cassava varieties in the study area.

Ownership of means of communication

Majority of the male (78.26%) and female (88.46%) farmers had means of communication in the study area. Acquisition of information about a new technology demystifies it and makes it more available to farmers. Information reduces

the uncertainty about a technology's performance hence may change individual's assessment from purely subjective to objective over time (Caswell et al., 2001). Exposure to information about new technologies as such significantly affects farmers' choices about it. Feder and Slade (1984) indicate how, provided a technology is profitable, increased information induces its adoption.

Membership of cooperatives

About 50% and 40% of the male and female farmers belong to cooperatives respectively. A prevalence of social networks and organizations may substantially increase varietal preference and adoption as often such networks ensure that cooperation takes place among farmers over the use of scarce and communal resources. Moreover, small-scale farmers may be better placed to understand their local environments in a way that ensures the best use of existing resources, and in an environmentally sustainable way.

Extension contact

About 52.17% and 50.00% of the male and female farmers respectively had access to extension services. Good extension programs and contacts with producers are a key aspect in technology dissemination and adoption. A new technology is only as good as the mechanism of its dissemination" to farmers (IFPRI, 1995). Most studies analyzing this variable in the context of agricultural technology show its strong positive influence on adoption. Yaron, Dinar and Voet, (1992) show that its influence can counter balance the negative effect of lack of years of formal education in the overall decision to adopt some technologies.

Overview Gender Roles in cassava production and processing value chain in Imo State

In the two study locations farmers cultivate more than10 major crops (Table 2). Important secondary crops include; palm wine tapping, African pear (*Dacryodes edulis*), mango, citrus and plantain and bananas. Men and women cultivate all crops on plots managed and controlled by individuals. Although men and women grow most crops, women's predominance in farming was apparent in the relative proportion of women cultivating most crops. Women dominated in the production of cassava, cocoyam, maize, pepper, tomato, green leafy vegetables, plantain and melon (*egusi*), while yam and palm wine tapping were the only crops predominantly grown by men. Crops grown exclusively by women include; cocoyam, yams (*Dioscorea Alata* and *Dioscorea Dumentorum*) and vegetable beans, while oil palm was the only crop that men cultivated.

Table 2: Major crops grown by gender, Imo State

Crops	Location		
	Nnorie	**Logara**	**Ranking**
Yam	M ,W	M ,W	2
Maize	M,W	M,W	1
Cassava	M,W	M,W	
Groundnuts	W	M,W	
Pepper	W	M,W	
Tomatoes	W	M, W	
Green leafy vegetables	W	M, W	3
Cocoyam	W	M, W	
"Three leaf" and "Chinese" yam	W	W	
Plantain	M,W	W	4
Cowpea	W	W	
E*gusi* (melon)	M,W	M,W	
Oil palm	M	M	M

The results in Table 3 show gender roles in cassava production and processing in the study area. The results show that men and women carry out the same agricultural tasks with the exception of two: weeding, done exclusively by women, land clearing done only by men. Since women typically weed their husbands' farms, they plant some crops of their own (e.g. vegetables, melon, pepper, maize) on small areas of men's farms as a labour saving strategy. Other tasks women

perform for their husbands include; helping with planting, harvesting and transporting crops. Due to the gender division of labour and large farm sizes, both men and women rely on hired labour for several tasks including land preparation/clearing (male), planting (male and female), weeding (female) and harvesting (female

Generally, Imo State farmers face little or no constraint accessing farm land. Women can access land in three ways: through their husbands, by renting or buying.

Table 3: Cassava activity and labour calendar for men and women in Imo State

Task	Month	Who is involved
Land preparation	J F M Ap May Jn Jy Ag S Oct N D	Men , Women ,Male children, female children, Hired male labour, hired female labour
Land clearing	J,F,M,A	M,MC,HM
Making mounds/ridges	A,M,J	W,MC,FC,HW
Obtaining cassava stems	A,M.J	W,MC,FC,
Transportation	A,M.J	W,MC.FC
Planting	A,M,J	W ,MC,FC,
Weeding	June/Aug/oct/dec/jan	W,MC,FC.HW
Harvesting	All year round	W,MC.FC,HW
Selling	All year round	W,MC,FC
Processing	All year round	W,MC,FC

W=women=men; MC=male children; FC=female children; HM=hired male; HW-hired women

Gender differences in production constraints were not obvious from group discussions. Both men and women indicated pests and diseases, lack of funds to hire labour and purchase inputs, unavailability of fertilizer and unavailability of improved cassava stems. It is however clear that some constraints affected women more than men due to their gender, namely; lack of time to devote to their own farming activities because of women's involvement in working on their husbands' farms, their reliance on hired male labour for clearing and other tasks and women's more limited access to funds.

Sourcing of cassava stems

Farmers in Imo State obtain cassava stems from three main sources: farmers' farm, shared stems, but they also buy them from each other and from the market buying mixed bundles of unknown varieties. For both men and women farmers, the most important source of cassava stem was their own farms followed by purchasing cassava stems from the market. Sourcing and transporting cassava stems is considered a female task and husbands depend on their wives to look for cassava stems for them to plant on their own farms. Cassava has been in the custody of women, so they know more about it, and may have more varieties.

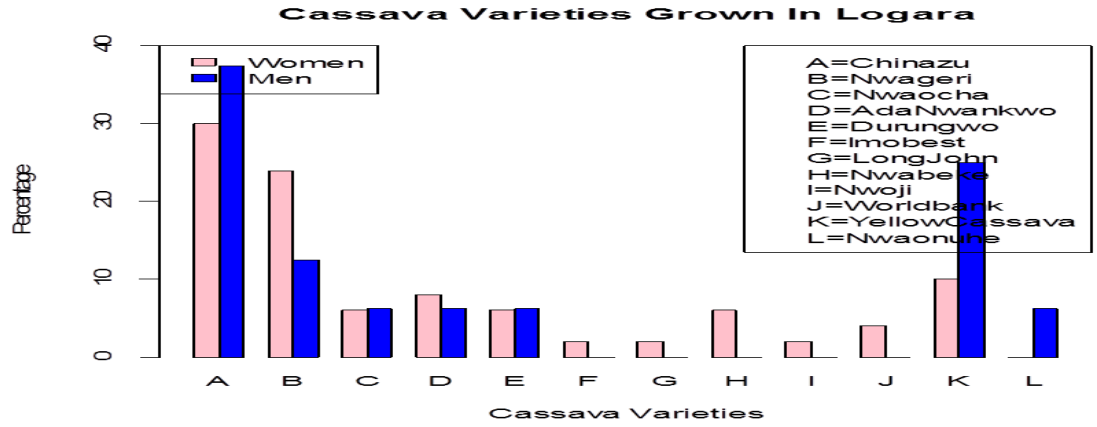

Fig. 1: Cassava Varieties Grown in Logara

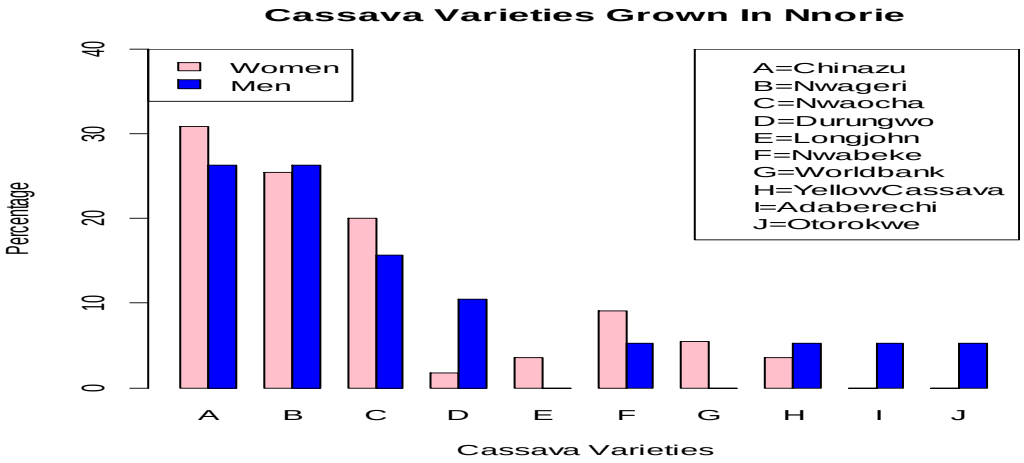

Fig. 2: Cassava Varieties Grown in Nnorie

Cassava Varieties

A total of 7 local varieties were identified, four of which (chigazu, Nwageri, nwocha and adanwankwo) were grown in all location (Table 3). Women were clearly more knowledgeable than men about cassava varieties and indicated this strongly during group discussions. Men indicated that they knew about the varieties from their wives and mothers.

Preferred varietal characteristics include:

- High yielding
- Produces many roots
- Early maturing
- Stores well in any soil
- Marketable (high price)
- High dry matter ("solid like yam")
- Draws when prepared into garri and fufu
- Increases in quantity when prepared into gari and fufu
- Good colour appearance

Table 3: Cassava Preferred Traits in the study area

Best 3 cassava varieties grown by Logara women	Preferred Traits	cassava varieties grown by Nnorie women	Preferred Traits
chinazu	High yielding with many roots per stand -Stem does nit die easily -High germination percentage - Gives poor quality product during on set of rainy season -Nwanyibekee draws but low yielding -Home soil affects root pulp color Gives high stem production/ planting materials	nwabekee	Big root sizes -Long underground storage Erect and good in mixed cropping
nwageri	Good adaptation - Disease resistance Pure white in colour - Low water content in the root(High dry matter	Nwageri	Gives room for piece meal harvesting
Yellow roots.	Garri naturally yellow -Flour used in baking bread and chin chin -Leaves used in feeding pigs, sheep and goats Ensure double harvesting	Chinazu	-High yielding and early maturing -Weed control

Gender preferred traits in cassava among the farmers in the study area

The results in Table 4 show the Cassava preferred traits by gender among the farmers in the study area. Responses show absence of no strong or clear gender differences in varietal preferences, with both men and women indicating same agronomic and cooking qualities.

Table 4: Response by Farmers on Preferred traits

Preferred traits Men	Response by men on preferred traits	Preferred traits Women	Response by women on preferred traits
High yielding	Double what it is presently . Many roots, good dry matter content. Heavy roots, but not a lot of water	High yielding	Plenty root/tuber numbers up to ten in each stand, small quantity harvested produces plenty garri
Stores for a longer period in the soil	It should keep for at least two years underground	Stores for a longer period in the soil	It doesn't rot when allowed to stay in the soil for over 2 years.
Early maturing	It should be at least as fast as maize. Six months to maturity would be good. Cassava that brings rapid returns on investment	Early maturing	Matures within 7 months "sharp sharp" and gives quick income without fertilizer application
High dry matter and low moisture content.	You see it when you process it. Some varieties fry quickly and easily. Some have too much water. Some you put in the press and it does not dewater easily (that may depend on the equipment and the season, because the roots absorb water when it rains)	high dry matter- low water content	Gives more quantity of gari, it doesn't disappear when toasting. The tubers does not melt or dissolve in the soil. When the tubers are soaked in water to ferment, it will not disappear or give less expected quantity
Controls weeds (they added this during this discussion)	Weeding is very expensive. Weeding takes all the profits. Good branching smothers weed	Poundability	When the roots can break easily, and smells like yam. It can be pounded after boiling or sun-dried or after fermentation and then pounded into lafun flour or fufu
Store longer underground	It should last for six months after full maturity. We need to have time to harvest, so you can harvest at any time of year. You want to preserve the cassava until there is a market, until the prices come up again	Stores well underground	Ability to store in the soil for over 2-3 years without rottening. It doesn't rot when allowed to stay in the soil for over 3 years
Big tubers	The market wants big tubers, with diameters as large as that of a soft drink can.	Big root size and number	Cassava stand/plant after harvesting that has between 6-8 roots and big size roots as big as full arm length
Good quality gari-	It should swell, when we fry it (toast it) and when we add water to it to make eba.	Does not select soil Swellability	If you plant the variety in a soil that it does not like, it will not yield well. For example, Ere Egolu Igwe variety. Need variety that is suitable and yields well in all soil types. Quantity increases or rises when poured in either cold or hot water. Swelling has to with the variety not the processing method/procedure. When preparing in boiled water, it gets thickened, requires addition of more water which makes it rise. This gives much quantity of processed products and more money

Table 4: Response by Farmers on Preferred traits continued

The potential to earn income	Some varieties make money if you have six heaps, and others cannot make money even if you have 20 heaps (because they do not swell enough <combination of starch and dry matter>. Cassava is our main food, so if you don't have gari, it's as if you don't have food	Ease of peeling	The outer skin doesn't stick too well with the inner root flesh and we also peel within 5 seconds. Peeling is easier immediately after you harvest. It also depends on season. Cassava is easy to peel during rainy season than
To be lively	Healthy and resistance to pests and diseases	Draw	Much Starch makes it draw
Good for lafun	Some varieties become watery very quickly. It should be firm to be able to stand for hours and to retain food qualities	Smoothness (No granules)	The end product like garri, akpu should not have the thread like sticks at all
Resistance to drought	The stem should not easily dry up in the dry season	Ability to process into Akpu/gari	Root is good for processing when you allow it to mature very well by leaving in the soil for long to develop. If the stem get damaged in any way and begins to sprout again, the root will not be good for processing and will have less starch. If it is a sweet variety, it will be easy to process into food because you do not need to worry about its poisonous bitter taste.
		Mouldability	molds very well without sticking to the palm of the hand. easily forms a round shape in seconds, without breaking apart
		Pot yield	They need a variety that will give more than expectation product quantity after processing
		Drawness / elasticity(with reference to preparing abacha	There was an argument concerning drawness. Some women said the bitterness in cassava affects the drawness others said proper processing by soaking abacha overnight and thorough washing several time removes the drawness. At the end it was agreed that bitterness in cassava has nothing to do with drawness in abacha.
		Heavy for gari	Gari that will not float when put in hot water. Specific gravity-heavier than water
		Product color	Depends on preparation and peeling. If the skin of the tubers are not peeled properly, it will give off white color akpu and vice versa
		Ratooning ability	Need a variety that is can ratoon up to five times

Typology of cassava producers

The chain actors in the cassava production processing value chain include the local collectors, retailers/processors and home consumers.

Three typologies of cassava producers were identified based on production, processing and marketing.

a) Producers are farmers who specialised in cassava production. This category produces large quantity of roots process and markets the roots and products.

b) Producers are farmers who produce cassava, process and market as one of the main cash crops.

c) Producers are farmers who produce cassava mainly for home consumptions, though some of the roots are still sold to get income.

Conclusion

The study analysed the effect of gender preferred traits on cassava production and processing in Imo State, Nigeria. The results showed dominance of four local cassava varieties grown by the farmers thus; chigazu, Nwageri, nwocha and adanwankwo with farmer responses showing no strong or clear gender differences in varietal preferences. The results call for policies aimed at encouraging younger farmers whom are more agile and stronger to drive increased adoption on improved cassava varieties. There is also need for land re-form policies by granting more access to land especially to the female farmers to enhance the adoption and preference for improved varieties. Provision of institutional and infrastructural facilities especially increased extension contacts, formation of cooperatives and good rural road networks to enhance increased yield and reduce the transaction costs on moving cassava from the farmgate to the market. Provision and access to processing inputs to drive the adoption of improved cassava varieties by farmers in the study area.

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