

International Journal of Agriculture Extension and Social Development

Volume 4; Issue 1; Jan-Jun 2021; Page No. 99-105

Received: 06-10-2020
Accepted: 04-12-2020

Indexed Journal
Peer Reviewed Journal

Urban women farmers' involvement in cassava tuber processing in Imo state, Nigeria

Nwakwasi RN, Umunakwe PC*, Anyanwu AUT, Nwaozuzu S and Oguoma LU

Department of Agricultural Extension, Federal University of Technology, P.M.B. 1526, Owerri, Nigeria

Abstract

The study investigated the roles urban women played in cassava processing in Imo State, Nigeria. Multistage sampling procedure was used to select a sample of 100 rural women farmers. Data were collected from the respondents using interview schedule. Data were analysed using percentage and mean statistic. The major cassava products available in the area included *fufu* (91.7%), *garri* (90.5%), cassava balls (70%) and *abacha/tapioca* (65.2%). The roles they played included pounding (98.0%), peeling (97.8%), frying (97.0%), cooking (96.7%), sifting (95.0%) and boiling (95.0%). The constraints faced by the women included poor market demand (\bar{x} = 3.5), unstable power supply (\bar{x} = 3.4), inadequate information on processing (\bar{x} = 3.3), the long period of time spent on processing (\bar{x} = 3.4) and inadequate finance (\bar{x} = 3.3). It was recommended that loans should be made available to the women to enable them cope with the constraints.

Keywords: cassava processing, urban women, farmer involvement, cassava products, processing constraints, Nigeria

Introduction

Cassava (*Manihot esculenta* Crantz) is a tropical root crop, originally from Amazonia, that provides the staple food of an estimated 800 million people worldwide. Grown almost exclusively by low-income smallholders, it is one of the few staple crops that can be produced efficiently on a small-scale without the need for mechanization or purchased inputs and in marginal areas with poor soils and unpredictable rainfall (Food and Agriculture Organization, FAO, 2013) ^[11, 12, 13]. In sub-Saharan Africa (SSA) it is grown mainly by small-holder farmers often on marginal lands where it is productive even on poor soils and under drought conditions (Naziri *et al.*, 2014) ^[22]. This has made it a vital crop for both food security and income generation in developing countries. The International Fund for Agricultural Development (IFAD) and Food and Agriculture Organization (FAO) (2000) ^[18] reported that cassava has historically played an important famine-prevention role in Eastern and Southern Africa where maize is the preferred food staple and drought is a recurrent problem.

Africa is the largest cassava producing region in the world and Nigeria is the world's leading producer, accounting for about 55% of world's production (James & Faleye, 2015) ^[19]. The sub-Saharan African region is one of the most producing region in Africa. It produced about 80.9 million metric tons of cassava in 2012, accounting for 54.2% of African global production. Nigeria alone produced 2016 about 4,548 million tons in 2016 (FAO, 2017) ^[15]. Although cultivated mostly in rural areas especially in developing countries, the rising importance of urban farming has seen many urban dwellers cultivating cassava. According to FAO (2013) ^[11, 12, 13] this resulted from the rising urban poverty

and hike in the cost of cereals which has led to intensification in the production and consumption of cassava so as to boost urban food security in Africa.

Cassava utilization patterns vary considerably globally. In Africa, much of the cassava tubers produced (88%) is used for human food, with over 50% used in the form of processed products (Westby, 2002) ^[34]. They are consumed as fresh roots (which may be eaten raw, roasted in open fire or boiled in water or oil), dried roots (which are stored or marketed as chips, balls and flour), pasty products (uncooked and steamed pastes), granulated products (*garri*, *attieke* and *tapioca*) and cassava leaves (IFAD & FAO, 2000) ^[18]. Besides, cassava tubers have many industrial uses. Echebiri and Edaba (2008) ^[7] put the estimates of industrial cassava use in Nigeria as 16.0% as chips in animal feed, 5.0% processed into syrup concentrate for soft drinks and less than 1.0% processed into high quality cassava flour used in biscuit and confectionery, dextrin, adhesives, starch and hydrolysates for pharmaceuticals and seasonings.

In spite of its agronomic and economic importance, cassava production faces numerous challenges. The tubers are bulky with about 70.0% moisture content and therefore transportation of the tubers to urban markets is difficult and expensive. The roots contain cyanide which is toxic to humans and livestock; and is inedible when uncooked. The tubers have a very short shelf life (3 - 4 days) which renders them unpalatable and unmarketable after harvest (Reilly *et al.*, 2007). However, several approaches have been employed to increasing the palatability of cassava tubers and curtail the postharvest losses resulting from the perishability such as underground storage, storage in boxes with moist saw dust, storage in bags combined with use of fungicides, pruning plants before harvest, cold storage and

freezing or waxing the roots. But these methods are not appropriate for large volumes of cassava tubers because they are too expensive or complicated (Sanchez *et al.*, 2016) [32].

Processing reduces perishability and toxicity. The International Food Information Council Foundation (2010) [17] stated that processing converts food substances into more useful, shelf-stable and palatable foods or portable beverages for human consumption. Van Boekel *et al.* (2010) [33] opined that it improves quality, extends shelf life, improves bioavailability, removes harmful microbes and toxins and improves the safety of food. Nyirenda *et al.* (2011) [24] stated that cassava processing improves palatability, increases shelf-life, facilitates transport and most importantly, detoxifies cassava roots by removing cyanogens.

In Nigeria, women play key roles in the production, harvesting, processing and marketing of agricultural produce. They contribute about 58.0% of the total agricultural labour in Southwest, 67.0% in the Southeast and 58.0% in the Central zones (Onyemuwa, 2012) [30]. Research focus has dwelt so much on the activities of rural farmers unlike their urban counterparts, thus creating a gap in knowledge. This study was designed to fill the gap by identifying the roles urban women farmers played in cassava processing in Imo State, Nigeria.

Objectives of the study

The main objective of the study was to identify the roles of urban women farmers in cassava processing among rural women farmers in Imo State, Nigeria. Specifically, the study sought to:

1. Describe the socioeconomic characteristics of the women farmers;
2. Identify processed cassava products in the area;
3. Ascertain the level of involvement of the women in cassava processing;
4. Determine the roles the women performed in cassava processing; and
5. Identify the constraints they faced in cassava processing in the area.

Methodology

The study was conducted in Imo State, Nigeria. It is located within longitude 5°29'N 5°58'N and longitude 7°20'E 7°03'E (en.m.wikipedia.org/wiki/Imo_State). It has boundaries with Abia State on the east, River Niger and Delta State to the west, Anambra State on the north and Rivers State to the south. It has a population of 4.7 million people and occupies an area of 5,530 Km². It is divided into 27 local government areas. The area has two distinct seasons – rainy which begins in March and ends in October and dry which begins in November and ends in March. The temperature of the area is usually high throughout the year with no monthly average below 70°C and annual range of about 50°C. The hottest period is between January and April just before the rain sets in. Relative humidity is about 90%, except in December to February when the harmattan brings in dry conditions. Rainfall is the most vital climatic factor in the area because the majority of the people depend on it for agriculture. Annual rainfall is heavy, about 2,400mm in most places. Vegetation of the area is rainforest and this

supports cassava production (Chikwendu *et al.*, 2017).

The population for the study comprised all women cassava farmers living in urban areas in Imo state. Multistage sampling procedure was used to select the sample. Stage one was the purposive selection of five urban communities in the state. The second stage was the selection of 20 farmers who cultivate cassava.

Processed cassava products in the study area was measured by providing a list of common cassava products in Nigeria and asking them to indicate the ones available to them and their responses recorded as yes or no. The level of involvement was measured using the nominal scale of highly involved, moderately involved and not involved. The roles performed by women in cassava processing were measured by listing activities involved in cassava processing and the women were asked to indicate the ones they were involved in by ticking 'yes' or 'no'. The constraints faced by the women in cassava processing were determined by providing a list of likely constraints to cassava processing and asking the women to indicate the ones applicable to them and their responses recorded on a 3-point Likert-type scale of very serious = 3, serious = 2 and not serious = 1. The mean of the scale was determined by adding the values of the scale (i.e. 3+2+1) and dividing by the number of scale (6/3) to obtain the discriminating index, 2.0. So, any item with a score ≥ 2.0 would be taken as a constraint to cassava processing in the area. Data were collected using structured questionnaire and were analyzed using mean score and percentages.

Results and Discussion

Table 1 shows that the majority (58.0%) of the women was aged between 41 and 60 years and the mean age was 47.6 years. The majority (51.1%) were married, the majority (76.0%) received one form of formal education or the other; the majority (56.0%) had farming experience of 16 -25 years and had spent an average of 12.8 years in farming. The result implies that the farmers are aging and may not efficiently engage in cassava processing especially as it is mostly done manually in many developing countries like Nigeria.

Chekene (2015) [5] reported that farming work force in Nigeria is dominated by farmers above 40 years of age. Age could influence a farmer's ability to perform tasks requiring physical strength. It could also influence a farmers' willingness to adopt innovations as younger farmers are less conservative than aged farmers (Agbamu, 2004) [1]. Marriage encourages synergy among farm family members. This could promote the spread of innovations on cassava processing as every member of the farm family is a potential source of information. It could also encourage division of labour among the farm family members thus reducing the cost of labour and maximizing the use of time.

The acquisition of formal education could enhance decision making ability among farmers. Educated farmers can access agricultural information from an array of sources since they could read and write unlike their uneducated counterparts and this could enhance the cassava processing enterprise. The result however showed that the farmers have been into cassava production for a relatively long period of time. This period of time could provide them with a wealth of experience valuable in cassava processing. More so, the

number of years they have spent in processing would have enabled them save some money that would enhance their adoption of cassava processing innovations. Oluwatosin (2011)^[28] found that access to credit reduces inefficiency as it enables farmers adopt better technologies.

The result further revealed that the majority (60.0%) of the farmers had household sizes of 6 - 10 persons with an average of eight people; the majority (66.0%) were members of social organizations; the majority (60.0%) had a farm size of 1-2 hectares with a mean of 1.2 hectares; a greater proportion (47.0%) had a monthly income of less than ₦20,000.00 and a mean income of about ₦40,000.00. The result also showed that inheritance (67.0%) was the major means of access to land among the farmers.

The result implies that the study area is dominated by farmers with relatively large household sizes. Large households entail a greater number of people who are potential sources of labour and useful agricultural

information. Membership of social organizations promotes diffusion of innovations and interactions among farmers and extension agents. It could also enhance cooperative activities among farmers like the popular thrift societies. Also, the result reveals that the farmers are smallholders. This could be attributed to the land tenure system prevalent in Africa. According to FAO (2011)^[10] the patriarchal setting in many countries in Africa whereby male dominates on decisions concerning land makes it difficult if not impossible for women to access or own land in their own right. Small land holding could negatively influence a farmer's productivity which could impair his willingness to adopt innovations. Finally, the monthly income regime of the farmers suggests that they could afford some traditional implements required for cassava processing. However, this ability may be limited by demands on the income resulting from their relatively large household sizes.

Table 1: Distribution of women according to socioeconomic characteristics

Socioeconomic characteristics	%	\bar{X}
Age (Years)		
1 - 20	2.0	
21 - 40	27.0	
41 - 60	58.0	47.6
> 60	14.0	
Marital status		
Single	16.0	
Married	51.0	
Divorced	10.0	
Widowed	23.0	
Level of Education		
No formal education	24.0	
Primary school	22.0	
Secondary school	33.0	
Tertiary Education	21.0	
Experience in processing		
< 5		
5 - 10		
10 - 20	11.0	
> 20		
6 - 15	17.0	12.80
16 - 25	56.0	
> 25	16.0	
Household Size (Number of Persons)		
< 5	21.0	
6 - 10	60.0	8
> 10	19.0	
Membership of social Organizations		
Yes	66.0	
No	34.0	
Nature of farm Business		
Full Time	41.0	
Part Time	59.0	
Farm Size (Hectares)		
< 1	20.0	
1 - 2	60.0	1.2
> 2	20.0	
Monthly Income (₦'000)		
≤20,	47.0	
21 - 40	14.0	39,633.1
41 - 60	19.0	
> 60	20.0	

Land tenure system		
Inherited	76.0	
Purchased	40.0	
Rented	50.0	
Leased	28.0	

Source: Field Survey Data, 2015

Processed cassava products in the area

Table 2 reveals that *fufu* (91.7%), *garri* (90.5%), cassava balls (70.0%) and *abacha/tapioca* (65.2%) were the available cassava products in the study area. This implies that cassava is predominantly used as human food in the area. The dominance of these products might imply cultural preference of the products since cassava is processed into different products in different locations. Westby (2002) [34] stated that the majority (88.0%) of cassava tubers produced in Africa is used for human food, with over 50.0% used in

the form of processed products. This finding concurs with the reports of Onyemauwa (2010) [29] and the Presidential Initiative on Cassava (2006) [31] that *garri*, *fufu*, starch, *lafun*, chips and pellets constitute the primary cassava products in Nigeria. The processing of cassava into more storable forms basically offers farmers the opportunity of overcoming the perishability of the fresh roots. It could also enhance their financial returns, add value, reduce drudgery and environmental impacts.

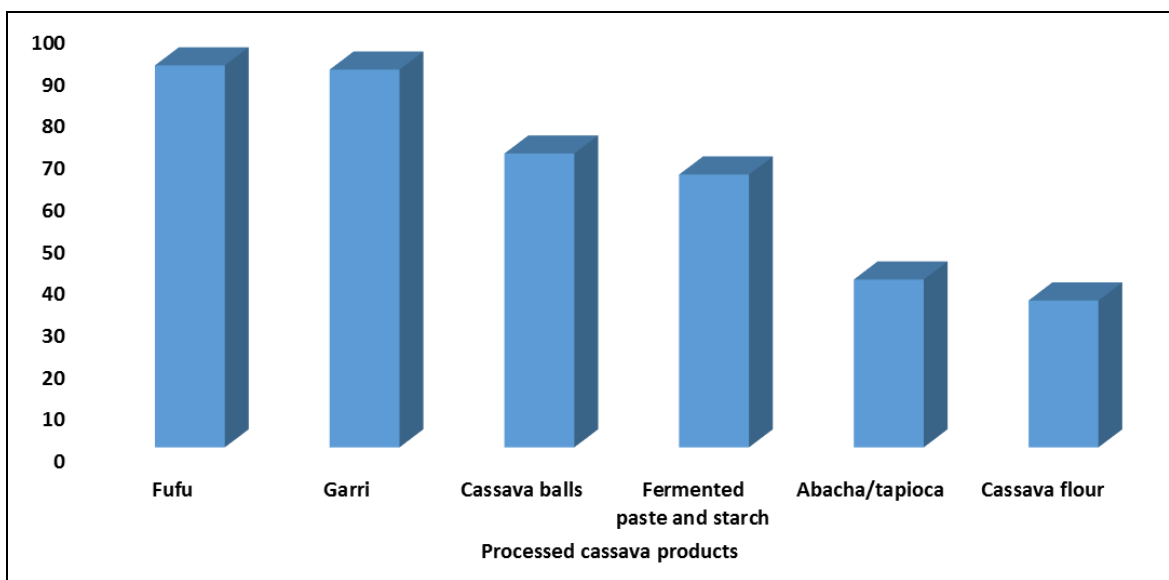


Fig 1: Bar chart showing available cassava products

Level of involvement in cassava processing

Figure 1 reveals that most (72.3%) of the women was highly involved in cassava processing while 26.7% was moderately involved. The result no doubt affirms the significant role women play in agriculture in Africa. Cassava is culturally designated women’s crop in Nigeria and thus its production and processing are carried out mostly by women. This may be due to cultural, social and economic factors surrounding

the crop. The perception that it is women’s crop might take men’s attention to other crops considered men’s crops. Similarly, the consideration of the crop as more of a food crop than a cash crop might reduce men’s involvement in its production. Men tend to show more interest in the production of cash crops than food crops. Okoroafor and Nwaobiala reported that women dominated cassava production and processing in Abia State, Nigeria.

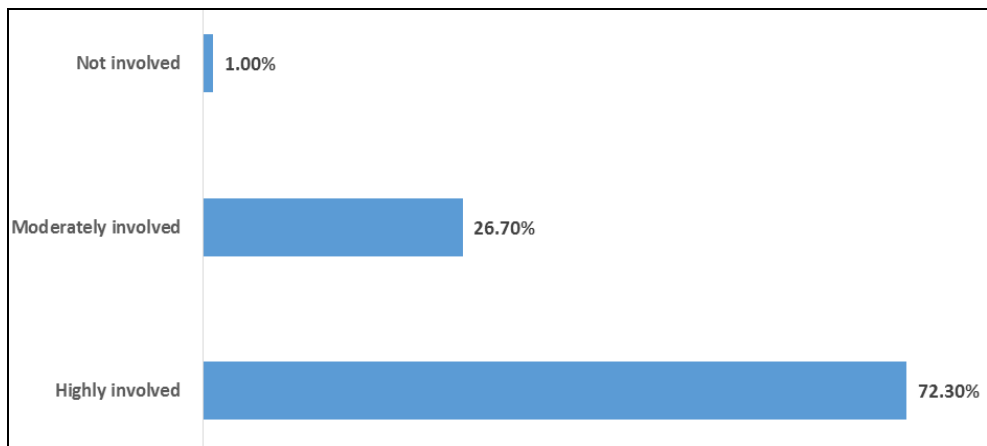


Fig 2: Level of involvement in cassava processing

Roles performed by women in cassava processing

Figure 2 shows that women performed many activities involved in cassava processing in the study area which include pounding (98.1%), peeling (97.9%), frying (96.9%), cooking (96.9%), sifting (95.9%), boiling (95.1%), soaking (90.1%) and milling (85.1%). However, grating (44.2%) and pressing (31.1%) were the least of roles performed by the women in the study area. This showcases the significant involvement of women in agro-processing. Bello *et al.* (2013) [3] found that the majority (89.9%) of the women surveyed were involved in cassava processing. The dominance of women in cassava processing could be attributed to the traditional perception of the crop as a ‘woman crop’ (Ani, 2004) [2]. In line with this perception, men may show no much interest in the activities involved in it from cultivation to processing. Nweke *et al.* (2002) [23] reported that women perform most of the tasks involved in cassava processing while men increase their labour input in cassava producing areas where cassava is mainly produced for cash and for urban consumers. COSCA study (1996) [6] showed that in 76.0% of the villages selected in six African countries, processing was carried out by women. Pounding is a way of preparing fine, smooth and soft mash from fermented cassava tubers using mortar and pestle. It is usually a strenuous activity as it is still done manually in most Africa families where cassava is consumed. Women and children often perform this task as it is most times seen as cooking but men get involved especially when it is for the market. The indication of pounding as the most performed activity by women in the area is in line with the preference

for *fufu* as the most available cassava product. Peeling involves the removal of the outer covering of cassava tubers. Tubers are often subjected to this stage after harvesting. However, when the tubers are used for *fufu* production, this activity may be skipped but must be thoroughly washed to avoid interference with the colour of the product. Peeling is still done manually in most African societies by children and women. Frying involves constant heating of the sundried/pressed cassava with constant stirring in wide, shallow, non-sticky metal pans till it becomes light or crisp *garri*. During the process of heating, red oil may or may not be added which prevents the burning of the *garri* during the process of heating and gives light yellow colour to the finished product, thus yielding yellow or white *garri*. This may be time consuming as it is done bit by bit. Soaking is synonymous with *fufu* preparation. It involves the peeling, washing and cutting of cassava tubers and putting them in containers filled with water to stay for some days to ferment after which it is sieved. Grating and pressing are very tedious and mostly done by men. Grating could be done manually or mechanically. However, in recent times, it is done mechanically whereby people take their tubers to the mills for grating. Pressing is also being done mechanically in recent times. However, some farmers still employ the local method of tying with sticks to promote dehydration. In some places, heavy stones are used for the pressing in which case they are placed on the pulp contained in a bag and allowed to last for some days. This is usually done by men due to its strenuous nature.

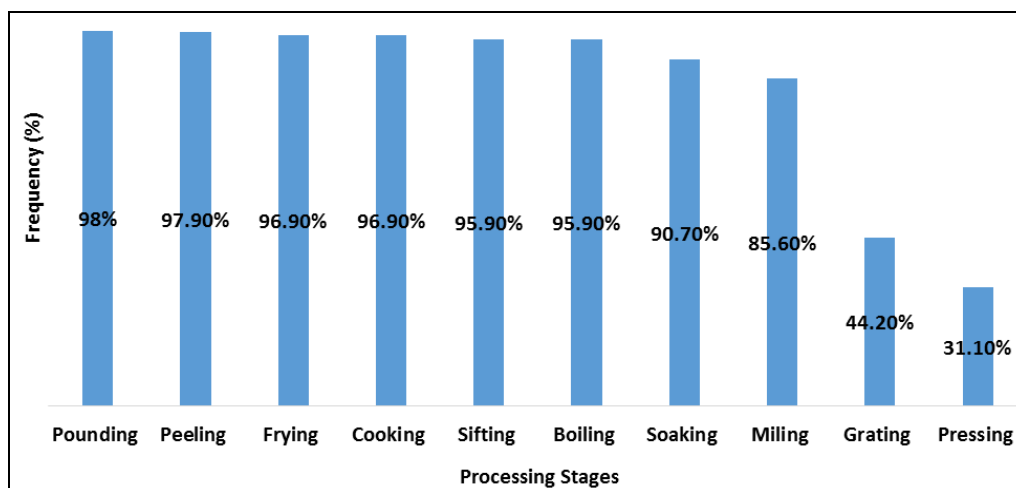


Fig 3: Bar chart showing the roles performed by women in cassava processing

Constraints to cassava processing

Table 2 indicates that unstable power supply ($\bar{x} = 3.4$), inadequate poor supply ($\bar{x} = 3.3$), length of time involved ($\bar{x} = 3.0$), lack of storage facilities ($\bar{x} = 3.4$), poor government policies ($\bar{x} = 3.3$), inadequate information on processing of cassava products ($\bar{x} = 3.3$), lack of sophisticated equipment ($\bar{x} = 3.1$), high physical energy requirement ($\bar{x} = 2.8$) and poor extension coverage ($\bar{x} = 2.8$) were the constraints faced by the women farmers in cassava processing. These could affect the quantity of cassava produced thus adversely affecting food security and poverty reduction. Unstable

power supply (electricity) could compel farmers into looking for alternative sources of energy for processing which may be costly and unsustainable. For, example resorting to the use of charcoal or fuelwood could have some environmental costs such as deforestation and climate change. Several studies have reported the need for credit among rural farmers in Africa (Bolarinwa & Oyeyinka, 2005; Ekwere & Edem, 2014; Olagunju & Adeyemo, 2008) [4, 8, 27] and this is more among women farmers whose access to credit is limited by socio-cultural norms. Inadequate capital

could prevent investments in cassava processing such as the ownership of mechanical graters, frying pans etc. even the access to other sources of energy apart from electricity. Lack of storage facilities may reduce the quantity of cassava processed since unprocessed products face the risk of spoilage. Lack of sophisticated equipment could lead to drudgery in cassava processing and may increase wastage of

cassava products. Poor extension coverage could lead to poor access to information on processing. Mogues *et al.* (2009) [20] reported a relatively lower access to extension service among women farmers in Ethiopia. These findings concur with a report by Ogunleye *et al.* (2008) [25] and Muhammad-Lawal *et al.* (2013) [21] which identified these factors as constraints to cassava processing in Nigeria.

Table 2: Distribution of respondents according to constraints in cassava processing

Constraints	X	S.D
Inadequate finance	3.29*	0.2947
High cost of labour	2.34	0.2249
Inadequate transport facilities	3.09*	0.1850
Unstable power supply	3.44*	0.2390
Lack of sophisticated equipment	3.06*	0.1794
Lack of storage facilities	3.40*	0.2343
Poor government policies	3.26*	0.2121
Poor market demand for processed products	2.20	0.2038
Poor access to market information	2.79*	0.1260
Lack of rural feeder roads	2.20	0.0121
Inadequate information on processing	3.33*	0.2234
Fluctuations in weather	2.54	0.0100
Manual processing takes time	3.41*	0.0247
High physical energy requirement	2.79*	0.0127
Dominance of men in decision	2.09	0.0140
Poor extension coverage	2.78*	0.0126
Long period of time spent on processing	3.00*	0.0172
Price instability	3.34*	0.2249

Source: Field Survey Data, 2015

Conclusion and Recommendations

Cassava is an important staple and is transforming into an important cash crop in Nigeria. It is available in such products as *garri*, *fufu* and cassava balls. Urban women play active roles in cassava processing. However, its processing is constrained by a lot of factors such as unstable power supply, inadequate finance, length of time involved and lack of storage facilities. Until, these constraints are adequately addressed, the potentials of cassava as a food security crop will remain largely untapped in urban areas in Nigeria. In order to avoid that, the following recommendations are therefore made:

1. Loans should be made available to farmers by the government and other relevant agencies. This could be achieved through the revival of the moribund agricultural banks and encouraging farmers to belong to cooperative societies for easy access to the loans.
2. Farmers should be provided with modern cassava processing equipment such as pressing machine and grating machine at subsidized rates by the government and other development agencies. This can also be achieved through the formation of cooperative societies to enable farmers pool their resources and potentials together.
3. The agricultural extension agencies should organize capacity building programmes on cassava processing for farmers to enhance their capability in cassava processing.

Reference

1. Agbamu JU. Essentials of agricultural communication in Nigeria. Lagos: Malthouse Press 2004, 203.

2. Ani AO. Women in agriculture and rural development. Maidugiri: Priscaquilla Publishers 2004.
3. Bello M, Ejembi EP, Allu E, Anzaku TAK. Rural women processing cassava in Doma local government area of Central Nigeria deserve technical attention. Research on Humanities and Social Sciences 2013;2(1):11-20.
4. Bolarinwa KK, Oyeyinka RA. Communal conflict impact on agricultural extension agents operation in Atisbo local government area of Oyo State, Nigeria. Journal of Agricultural Extension 2005, 8(1).
5. Chekene MB. Factors influencing the adoption of improved rice varieties in Borno State, Nigeria. Journal of Agricultural Extension 2015;19(2):21-34.
6. Collaborative Study of Cassava in Africa. Working Paper, 13, COSCA 1996.
7. Echebiri RN, Edaba MEH. Production and utilization of cassava in Nigeria: prospects for food security and infant nutrition. PAT 2008;4(1):38-52.
8. Ekwere GE, Edem ID. Evaluation of agricultural credit facility in agricultural production and rural development. Global Journal of Human Social Science, Geography, Geo-Sciences, Environmental Disaster Management 2014;14(3):19-26.
9. Food and Agricultural Organization (FAO). The global cassava development strategy and implementation plan. Proceedings of the validation forum on the global cassava development strategy. FAO, Rome 2004.
10. Food and Agricultural Organization (FAO). The role of women in agriculture. Prepared by the SOFA Team and Cheryl Doss. ESA Working Paper No. 11-02, 2011. Retrieved online on 24th February, 2016 from

- <http://www.fao.org/economic/esa>.
11. Food and Agricultural Organization Statistics. FAOSTAT database of crop statistics. FAO, Rome 2013.
 12. Food and Agricultural Organization. Gender differences in assets. ESA working paper No. 11-12. Agricultural Development Division, FAO 2011.
 13. Food and Agriculture Organization, FAO. Save and grow: Cassava. A guide to sustainable production intensification. FAO, Rome 2013.
 14. Food and Agriculture Organization. Save and grow: Cassava. A guide to sustainable production intensification. FAO, Rome, Italy 2013.
 15. Food and Agriculture Organization. Food outlook: biannual report on global food market. FAO. Rome, Italy 2017.
 16. Imo state. (N.D). Retrieved online from <http://en.m.wikipedia.org/wiki/imo> (state).
 17. International Food Information Council Foundation (IFICF). What is a processed food? You might be surprised understanding our food communication tool kit. Information handout for the IFICF 2010.
 18. International Fund for Agricultural Development (IFAD) & Food and Agricultural Organization (FAO). The world cassava economy: facts and outlook 2000.
 19. James D, Faleye T. Cassava mechanization prospects and future in Nigeria. International Research Journal of Agricultural Science and Soil Science 2015;5(3):98-102.
 20. Mogues T, Cohen MJ, Birner R, Lemma M, Randriamamonjy J, Tadesse F *et al*. Access and governance of rural services: Agricultural extension and drinking water supply in Ethiopia. Ethiopia Strategy Support Programme II (ESSP- II). International Food Policy Research Institute (IFPRI) 2009.
 21. Muhammad-Lawal A, Ometosho OA, Oyedemi FA. An assessment of the economics of cassava processing in Kwara state, Nigeria. Invited paper presented at the 4th International Conference of the Association of Agricultural Economists, September 22-25, Hammamet, Tunisia 2013.
 22. Naziri D, Quaye W, Siwoku B, Wanlapatit S, Tu VP, Bennet B. Not all those who wander are lost: A comparative analysis of postharvest losses in cassava value chains in Ghana, Nigeria, Thailand and Vietnam. Paper submitted for the 14th Congress of the European Association of Agricultural Economists. Agri-food and Rural Innovations for Healthier Societies, Ljubljana, Slovenia 2014.
 23. Nweke FI, Spencer DSC, Lynam JK. The cassava transformation: Africa's best-kept secret. East Lansing, USA. Michigan State, University Press 2002.
 24. Nyirenda DB, Chiwona-Karlton L, Chitundu M, Haggblade S, Brimer L. Chemical safety of cassava products in regions adopting cassava in regions adopting cassava production and processing - experience from Southern Africa. Food and Chemical Toxicology 2011;49:607-612.
 25. Ogunleye KY, Adeola RG, Ibigbami IO. Gender roles in cassava processing activities among processors in Ogo-Oluwa local government area of Oyo state, Nigeria. International Journal of Agricultural Economics and Rural Development 2008;1(1):30-37.
 26. Okoroafor KM, Nwaobiala CU. Effectiveness of cassava women processors in value addition technologies in Abia State, Nigeria. International Journal of Agricultural Science, Research and Technology in Extension and Education Systems 2014;4(3):137-142.
 27. Olagunju FI, Adeyemo R. Evaluation of operational performance of the Nigerian Agricultural Credit Cooperative and Rural Development Bank (NACRDB) in Southwestern Nigeria. IJAERD Press 2008.
 28. Oluwatosin FM. Measuring technical efficiency of yam farmers in Nigeria: A stochastic parametric approach. Agricultural Journals 2011;6(2):40-46.
 29. Onyemauwa CS. Analysis of household consumption of cassava products in Ohaozara, Ebonyi State, Southeast Nigeria. Researcher 2010;2(6):1-6.
 30. Onyemauwa CS. Analysis of women participation in cassava production and processing in Imo State, Nigeria. Journal of Economics and Sustainable 2012;3(5):81-90.
 31. Presidential Initiative on Cassava. Cassava master plan: A strategic action plan for the development of the Nigerian cassava industry 2006.
 32. Sanchez T, Dufor D, Moreno JL, Aragon IJ, Dominguez M, Ceballos H. Changes in extended self-life of cassava roots during storage in ambient conditions. International Center for Tropical Agriculture (CIAT), Apartado, Cali, Colombia 2016.
 33. Van Boekel M, Fogliano V, Pellergrini N, Stanton C, Scholz G, Laliljie S *et al*. A review on the beneficial aspects of food processing. Molecular Nutrition and Food Research 2010;54:1215-1247.
 34. Westby A. Cassava utilization, storage and small-scale processing. In: RJ. Hillocks JM, Thresh & AC Belloti (Eds.), Cassava: Biology, production and utilization 2002.