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WOMEN AND CASSAVA PROCESSING IN NIGERIA

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ABSTRACT

Women are the key players in cassava production and processing in Nigeria. They are involved in the planting, harvesting, processing, distribution and sales. Cassava processing operations include peeling, grating, fermentation, pressing, roasting, cooking and milling. Some of the constraints women still face in cassava processing include manual peeling which is time consuming and tedious, natural fermentation process which takes a long time, inadequate processing equipment, lack of storage facilities, high transportation cost, high processing cost, lack of funds, unstable agricultural policies, ineffective linkages in the value chain, and lack or delayed technical support of extension services. Their productivity is due to low input technologies, lack of resources as a result of poverty and inadequate government support. Research technologies for small scale cassava processing have not adequately addressed the problems of women cassava processors in the gender perspective such as in the design of female-friendly tools for hydraulic pressing for ease of operation. Many of the cassava processing equipment produced by researchers are yet to be adopted by the rural processors Empowering women cassava processors effectively therefore requires gender responsive research approach, educating the women through sensitization and training and government intervention by gender mainstreaming of agricultural policies to tackle issues relating to cassava processing in the cassava value chain. Key areas in educating the women processors include training on standards for cassava products and improved food safety practices, sensitization on industrial uses of cassava in order to encourage them to diversity their products to increase income generation and use of cassava waste in generating biogas to save processing cost.

INTRODUCATION

Cassava is an important crop in Africa. It survives in poor soils, has a high yield of carbohydrates and good resistance to pest infestations, diseases and drought (Oyewole, 2002). Cassava roots are processed and eaten by 500 million people a day in Africa where it is a staple for 40% of the population (NetGenCassava, 2013). Cassava grows well in west, east, central and South African countries. The western countries include Nigeria, Benin and Ghana; eastern countries include Uganda, Kenya, Zambia and Tanzania, southern Mozambique and Zimbabwe and in the central Africa; the Democratic Republic of the Congo. Cassava is a versatile crop; all parts of the plant including its root have been processed into a number of products.

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These include food for human consumption, animal feeds and industrial based products. Cassava based diets are main sources of dietary energy. Cassava food products include *gari, lafun, fufu,* flour, tapioca and chips. Dextrins, starch, syrups, alcohols and dextrose are products from cassava. Some of these serve as raw materials in different industries (Ashaye *et al*., 2007). Nigeria is the largest producer of cassava in the world. Cassava plays a particularly important role in the agriculture of developing countries, especially in sub-Saharan Africa. It is a food security crop which serves both as subsistence and cash crop to poor resource farmers. Cassava tubers and the various products hold an important position in Nigerian economy and also in its gross domestic product, which also is found common to Ghanaian economy The Food and Agriculture Organization (FAO) estimated as at year 2000 that cassava production was approximately 34 million (FAO, 2004). Some of the constraints limiting increased production of cassava include pests and diseases, agronomic problems, land degradation, shortage of planting materials, unfavorable

policies, market access and timely extension services. A number of innovative initiatives were utilized in increasing cassava production in which cassava farmers were organized into clusters by Local Government Areas to access mechanical equipment, high yielding varieties and improved farming practices. Other factors include deprival of women's equal access to land, technology, education and resources. Another factor is a shift of farm responsibilities to the women due to shortage of male labourer as a result of migration to urban centers (Onyemauwa, 2012). Normally, a woman is loaded with other domestic activities apart from labouring on the farm. This paper considers the role of women in cassava processing, the technologies available and utilized and challenges in value addition.

The role of women in cassava processing

Women make a significant contribution to food production. They provide 60-80% of agricultural labour and are responsible for 80% of food production (Mgbada, 2002). Women play a central role in cassava production, harvesting, processing and marketing, contributing about 58 percent of the total agricultural labour in the Southwest, 67 percent in the Southeast and 58 percent in the central zones (FAO, 2004, Onyemauwa, 2012). Cassava is usually consumed in processed forms. The processing of cassava in Nigeria can be categorized into different capacity levels as cottage or household, micro, medium and large scale levels. The cottage level requires no labour but members of the household. The micro processing level requires one or two units of labour and the large scale requires three to 10 workers (FAO, 2004).

Perishability of cassava

Fresh cassava root is a highly perishable produce with a moisture content of about 70%. It has a shelf-life of about 2 to 3 days after harvesting (Emeokoma, 1994). Physiological changes occur rapidly after harvesting due to the high moisture content which leads to rot and decay (Emeokoma, 1994). The tubers therefore need to be processed promptly after harvesting once the tubers are removed from the soils. Post harvest losses reported is as high as 50% (Ndunguru, 1999). Poor post harvest handling practices have been known to contribute to this losses (Silayo *et al.,* 2007). One of the ways of reducing cassava loss is through processing. Therefore, cassava must be processed into various forms in order to increase the shelf life of the products, facilitate transportation and marketing, reduce cyanide content and improve palatability. Processing reduces food losses and stabilizes seasonal fluctuations in the supply of the crop. Storage techniques that ensure longer shelf-life for cassava roots should also be looked into. In assessing the losses in processing of cassava to *gari*, an average loss of 6.1% occurred during the peeling stage in local centres and 4.7% at improved technology centres (Akosua and Bani, 2007). The grating process recorded average losses of 5.9% at both local and improved technology centers. The losses at the dewatering stage ranged from 3.0% for local and 5.6% for improved technology centres. The sifting process recorded losses of 4.3 and 5.4% for local and improved technology centres respectively. The total average loss in cassava processing into *gari* for local centres was 19.3% while that for improved technology centres 21.5%. A garification rate of 0.32 and 0.33 was established for local and improved technology centres respectively (Akosua and Bani, 2007). Mechanization, thus increased losses. New technologies should be designed to reduce wastages for maximum gain of processors.

Gender roles and cassava processing operations

Peeling and grating

Peeling is a unit operation mostly done by women and children manually using knives. The peeled roots are grated by women, using a simple traditional grater. Mechanical and automated peelers and power driven graters are new technologies which have been designed and fabricated to reduce drudgery in the peeling and grating process of cassava. Taiwo *et al.* (2001) reported in a study assessing the capacity and technology needs of *gari* processors that mechanical grating of peeled cassava tubers has been fully adopted. Olukunle and Jimoh (2012) evaluated the operational parameters of an automated peeler for cassava, the speed of the machine varied from 100 - 600 rpm. Results of tests of the peeler revealed that the throughput capacity ranged from 76 - 442 kg/h. For women to increase their productivity through the use of this equipment, awareness and training on these machines need to be carried out.

Fermentation

Gari and *fufu* are examples of fermented products from cassava. The fermentation process is carried out by women. Grated cassava mash is placed in sacks and pressed with stones or a jack between wooden platforms. Cassava processed into *gari* undergoes solid state fermentation for about 3 days while *fufu* is a product of submerged fermentation in which whole roots or pieces of peeled roots are placed in water for 3-5 days. Fermentation process either by solid or sub-merged fermentation reduces the cyanide content of cassava (Imeh and Odibo, 2013). Fermentation involves a series of microorganisms and the prevailing conditions determine which organisms will dominate hence the need to control or monitor the process closely.

Pressing or dewatering

In the traditional cassava processing operations, pressing is usually carried out by women. Moisture in the fermented mash or grated pulp is usually expressed by packing in sacks such as jute or polypropylene and pressure applied. Stones are placed or jacked-wood platforms are set to drain or press off the excess liquid from the pulp. Pressing by use of hydraulic press is usually done by men. Taiwo *et al*. (2001) recorded that 84.7% of cassava processing centers surveyed, men operated the diesel engine machines which dominated cassava processing centers. Dewatering of grated cassava by mechanical method was embraced by 88% of processors surveyed. Involvement of women in operational and management of mechanical devices was recorded not o be encouraging. Training in operational tasks for women was however recommended (Taiwo *et al*., 2001).

Roasting and frying of cassava mash

The roasting of sieved fermented dewatered pulp into *gari* is done by women in a pan using firewood. The roasting process contributes to reduction in the total cyanide level in the cassava. The smoke from the wood constitutes a great health hazard to the women especially with long time processing, especially their eyesight (Fasoyiro, 2012). Low cost technologies to address these problems need to be considered. The women breathe in cyanide fumes while frying the dewatered mash. The stirring paddles are short therefore contact parts of the metal fryer during stirring thereby sustaining blisters (Taiwo *et al*., 2001).

Drying

This process is mostly done by women. Peeled and cut cassava pieces are usually sun-dried on flat surfaces or on road sides to reduce moisture to about 10% level as in the case of cassava chips. Drying process also contribute to reduction of cyanide level in the cassava. Sun-drying is the cheapest way of drying cassava. However, the product is easily exposed to environmental vagaries and contamination from dust, moisture, animal and bird faeces. Effective and efficient dryers such as rotary dryers to meet such needs are already designed and fabricated (Okunade and Sanni, 2010). However, the dryers are not in use among local processors due to their cost.

Cooking and Milling

Cooking and milling process is mostly done by women. Low cyanide containing varieties of cassava are usually cooked to produce boiled cassava and tapioca (Mahungu *et al*. 1987). Traditionally, dried root pieces and fermented/dried pulp are milled into flour by pounding in mortar or using hammer mills. Automated machine with sieving devices have been developed for processing of high quality cassava flour (IITA, 2005). Such technologies could also be adapted for low cost milling machine for traditional foods such as *lafun, fufu, gari* for obtaining product of uniform consistency.

Constraints in Cassava Processing

Women face several constraints during cassava processing and some of these include: lack of steady supply of cassava throughout the year and drudgery in traditional processing of peeling, grating and dewatering due to inadequate processing equipment. Inadequate infrastructural and storage facilities for both the raw and finished products.

Uncontrolled fermentation - this often leads to products of different batches that are not consistent in taste and flavor.

Irregular cassava shape - Cassava shape varies among the cultivars. Roots with irregular shapes are difficult to harvest and peel either by hand or mechanically, resulting in great losses of usable root materials. Root size also varies with cultivars although it depends more on environmental factors such as soil and planting conditions (Kendi, 2001). Smaller roots require more labor for peeling. The drudgery associated with traditional processing is enormous and the products from traditional processing methods are often contaminated with undesirable extraneous matters. Some of the products are therefore not hygienic and have poor market value (Davies *et al*., 2008, Oyewole, 2002, Odebode, 2008). High transportation cost of cassava from the farms is another constraint. Fresh cassava roots are bulky due to the high moisture content, of about 70% and therefore transportation of the tubers to urban markets is difficult and expensive. Transporting of roots from the farm to the homestead and subsequent processing are mainly done by women. Processing are carried out manually using simple and inexpensive tools and equipment that are available to small farmers. Transport of products to markets is made difficult by the poor condition of rural roads.

Long Processing time - Unit operations in cassava processing involve several steps including: peeling, size reduction (grating) fermenting, dewatering, sieving, drying and milling.Some of these operations such as peeling are tedious and time consuming. Some operations take place over several days e.g fermentation. The traditional processing of cassava into many local foods (*gari, fufu, lafun*, etc.) requires at least 3-5 days of processing. In the traditional processing centres in many countries like Nigeria and Ghana, the frying process such as in *gari* processing is still done using firewood. The women suffer from the effect of the smoke (Oyewole, 2002, Davies *et al.,* 2008).

Low returns from product sales - During the early rainy season, the dry matter content of roots is usually lower than in the dry season, which can result in a lower yield of products. In the dry season when the soil is hard, harvesting and peeling tubers for processing are difficult and result in more losses (FAO, 2004).

Ineffective linkages between processors, farmers, transporters and marketers is another challenge to processors in the cassava value chain (Ayoade and Adeola, 2009). This could lead to untimely delivery of cassava roots for processing thus delaying cassava processing. If fresh roots are held over 5 days before processing is initiated, the possibility of end-product contamination with aflatoxin is much increased (FAO, 2004). Lack of funds, unstable agricultural policies high processing cost, poor power supply are other constraints women processors are facing (Ayoade and Adeola, 2009). Lack or delayed technical support in form of information on improved practices due to insufficient access to extension services is another constraint faced by the processors (Okocha *et al*., 2006).

In addressing some of these challenges such as storage, leaving cassava roots in the soil and storage in boxes lined with saw dust are traditional ways of reducing the perishability of cassava. Use of refrigeration, deep freezing, waxing and chemical treatments are quite expensive method and may render the products unsuitable for processing FAO, 2004). In securing funds to sustain their businesses, women cassava processors form cooperatives groups or clusters to assess loans (FAO, 2004). Mainstreaming gender in the agricultural policies and rural development sector is of utmost importance in meeting the need of cassava women processors alongside men involved in cassava production which might be omitted.

It is important to take into account the differing needs and conditions of women and men in cassava processing

Cassava Consumption: Traditional products

Cassava and cassava-based products are the most important food products for the people in Nigeria. A study on the consumption pattern of cassava in Southeastern Nigeria shows that 53.3 percent and 34 percent of people ate cassava in various forms daily or every other day respectively (Onyemauwa, 2012). The traditional product processed by women include:

Gari: is a creamy-white, granular flour with a slightly fermented flavor and a slightly sour taste made from fermented, gelatinized fresh cassava tubers.

Fufu: is fermented wet-paste made from cassava and ranks next to *gari* in consumption in Nigeria.

Lafun: is a fibrous product of cassava smilar to *fufu.*

Tapioca: is a pre-gelatinized cassava starch (IITA, 2005).

Issues of product quality standards have also been addressed for *gari* to safeguard hygiene, nutritional and organoleptic qualities. Standards have been set for *gari*grades, product quality, hygiene, contaminants, storage packaging, transportation and labelling (Sanni *et al.,* 2005). However, *gari* processors still need to be continuously sensitized and trained because *gari*with sands were still reported to be found in market places (Fasoyiro *et al.,* 2012). Enforcing control measures by food agencies will also ensure compliance to rules.

Value added products: new area for exploitation

In Nigeria as well as in many developing countries of the world, food security is an issue of topmost concern. Some of the initiatives that have been introduced by IITA were non-traditional ways of consuming cassava, which has been developed into different recipes (Abass *et al.,* 1998). *Fufu* has been processed into dry *fufu*, a shelf-stable product to increase commercialization of the traditionally processed cassava (Oyewole and Aibor, 1992). Cassava flour has the benefit that diversified value added products can be processed from it at the rural and urban household level for income generation (Adebayo, 2010). Research studies have shown that cassava can be used in partial replacement of wheat in bread making. High quality cassava flour (HQCF) has been processed into convenient products such as cookies, flakes and biscuits (Abass *et al.,* 1998, Oyewole *et al.,* 1996). The nutritional status of cassava can also be improved through fortification with other protein-rich crops. This can all serve as alternative income streams for resource poor women. One of the policies in Nigeria is the inclusion of 10% flour in wheat bread making to reduce wheat importation. Cassava flour has also been developed into composite flour. This is to improve the nutritional quality of its product. Cassava based snacks have been improved with locally available legumes such as soybean and pigeon pea (Okocha *et al.,* 2006, Fasoyiro *et al.,* 2011). Women can also convert cassava peels and wastes into animal feeds. Biogas can also be generated from the waste and utilized in cassava processing to reduce fuel cost (Eze, 2010).

Empowering Women Processors – The Way Forward

Research studies should first carry out need assessments of the cassava processors using participatory approaches involving the women. Cassava processors should also be involved in designing interventions. An example is the Better life for Rural Women Program in Nigeria. In order to empower female processors, they need interventions in various areas that will improve the quality of their products as well as reduce the drudgery associated with value addition processes. Some of these interventions include:

- Conduct studies on how to ensure controlled fermentation and consistency in traditional cassava products
- Provision of funds such as soft loans and technical support for women processors by the government to enhance their productivity and the cassava value chain should be encouraged.
- Design and fabrication of affordable and women friendly tools through gender responsive research should be done.
- Training on standards for cassava products and improved food safety practices for cassava processors is recommended.
- Sensitization and training of women cassava processors on industrial uses of cassava in order to encourage them to diversity their products to increase income generation is recommended.
- Private sector and non-governmental organizations should be involved in the use of research and technology in assisting cassava processors in processing and marketing of their produce.
- Training of cassava processors in using cassava waste in generating biogas to save processing cost should be encouraged.
- In order to have effective implementation of the objectives of the agricultural transformation agenda for cassava value chain in Nigeria, incorporating a gender perspective into all policies, plans, programmes and projects to ensure their impact on women and men are obtained in an equitable way is important.There is the need to recognize that women cassava processors need to be involved to participate in the policy making process.

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