Field Scientific Report

Gendered Food Mapping on Boiled Yam in Nigeria

Understanding the Drivers of Trait Preferences and the Development of Multi-user RTB Product Profiles, WP1

Umudike, Nigeria, November 2020

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Ethics: The activities, which led to the production of this document, were assessed and approved by the CIRAD Ethics Committee (H2020 ethics self-assessment procedure). When relevant, samples were prepared according to good hygiene and manufacturing practices. When external participants were involved in an activity, they were priorly informed about the objective of the activity and explained that their participation was entirely voluntary, that they could stop the interview at any point and that their responses would be anonymous and securely stored by the research team for research purposes. Written consent (signature) was systematically sought from sensory panelists and from consumers participating in activities.

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ABSTRACT

Farming is the major livelihood activity for all the communities studied (male and female), and in the context, both male and female farmers indicated that yam was the most important crop they produced – as it was important for food, resilience in items of hunger, income and cultural activities. Otherwise, farmers were engaged in the production of other food crops like cassava, cocoyam, potato, rice, tomato, pepper, vegetables and cucumber. In addition to food crops, in Obinagu Ishiagu women mentioned a number of other activities undertaken alongside agriculture, including pottery, blacksmithing, mining of stones and lead.

The eight communities studied grew yam and prepared boiled yam both for market and home consumption to meet up with other household requirements. Yam products were often consumed daily in the study region. It was estimated by key informants in the region that of the yam kept for household consumption, almost would be consumed as boiled, with a smaller portion as pounded yam, and the rest are stored;

The results show that the respondents were predominantly Indigenes, but communities also had a number of migrant settlers – and no different preferences among these groups were identified. Farmers in each of these communities group themselves into three categories - poor, moderately wealthy and very wealthy farmers – with farmers in each category producing and consuming boiled yam; however, the scale of which increased with wealth status. Interestingly one community, Onueke-Ezza, had the lowest proportion of farmers who were considered poor, estimated at (3%), which corresponded with a rate of boiled yam consumption for the community at 45%. This example shows how an abundance of yam – produced or consumed – is a signifier of wealth in many communities in the region.

Despite perceptions of yam being a 'man's crop' in the region, this study found evidence to the contrary. There were some areas where women produced yam, particularly water yam, and also undertook important roles in different aspects of production. For example, men in Onueke community, in Ezzah South, were responsible for land clearing, while women were responsible for weeding and gathering yam, and children for gathering yam seeds. Burning trash, land preparation, preparation of sets, planting, staking of yam, earthening up are other roles that men were responsible for. In contrast, women in Amagu Community commonly weed, gather yams and pack yams into barns, while men prepare land, plant, stake, earthen up, and harvest. Women will also plant different crops, usually early maturing, around the base of a yam mound that is commonly planted by men. Both men and women sell yam, depending on the product (fresh, boiled, roasted, pounded) and the community. Each community was unique in terms of which gender sold what products. However, decision making regarding the production of the crop and selling, tended to be more male dominated, where women, on average, were consulted but not the decision makers of yam.

Regarding varietal preferences, the respondents mainly used local varieties. FGDs found that farmers lacked awareness of new varieties or felt that new varieties didn't before as well as local varieties. Among both men and women in Onueke, Ezzah community, they ranked Igum as first, same is applicable in Umuebe Community Ezzamgbo and Umuebe Izzamgbo, Ohaukwu where both gender groups ranked Utsekpe as the best, this result agreed with the individual interview that indicated Utsekpe variety as very prominent in Umuebe community. In Obinagu Ishiagu community, both women and men ranked Ji Igwe as the best variety.

High quality yam crop characteristics for men and women were green leaves, full canopy, large tuber and large plumule. When respondents were asked about a high quality yam crop to make boiled yam, women mentioned 'sweet taste' in addition to the list, while men mentioned 'bulking cracks'. Sweet, moderately soft, and bright colour (white or yellow), heavy in the mouth but not too strong and not sticky in the hand, were the most frequently cited characteristics for boiled yam. Most respondents indicated that the household will complain if the boiled yam has dull colour or colour beyond white, if the yam is

too hard and difficult to chew, if the yam is extra soft and if the yam is bitter and has odour. Some variations in processing steps were found, such as that some boiled yam before removing the peel.

1 FINDINGS: SOCIO-ECONOMIC CONTEXT AND PRODUCT PREFERENCES

1.1 Introduction

This report is part of the RTBfoods project, Work Package (WP) 1. The main objective of RTBfoods is to deploy RTB varieties that meet user-preferred quality traits to increase the adoption and impact of improved RTB varieties in sub-Saharan Africa (SSA). To do so, the project is working to (1) Define what are the key user-preferred quality traits for a range of RTB food products (boiled yam) through surveys with end-users (product profiles); (2) Link these product profiles with biophysical and functional properties of RTB food products, and develop laboratory-based methods to assess these properties in a quantitative manner; (3) Develop high-throughput phenotyping protocols (HTPP) for rapid screening of user-preferred quality traits in new RTB varieties; (4) Integrate key user traits into breeding and variety deployment programs.

WP1 provides the evidence base for user's preferred characteristics for the selected products that are the focus of the RTBfoods project. Varietal preferences start with the demand from a range of users, such as producers, processors, retailers and consumers along the food chain. User's varietal choices are informed by the preferences they have for certain characteristics of the crop (characteristics preferred) that can be linked to traits. Preferences for characteristics, are in turn, influenced by the products, and their variations, that users make (e.g. matoke in Uganda, gari, fufu or pounded yam in Nigeria), and for what purpose (e.g. urban or rural markets, household consumption). Users often have several specific characteristics that they prefer and/or have 'non-negotiable' sets of characteristics, such as, for producers, that the crop is high yielding or disease resistant. These different interests culminate into trait packages that can help explain the drivers of varietal acceptance.

Sometimes there are clear differences in the characteristics preferred by user groups that follow product/consumption profiles, but other times it is more complex. Different users of a crop may live in the same household, have different interests with how the crop is used and what products are made. This can result in multiple and, perhaps, contrasting preferences that vary according to the user's role in the food chain, meaning that the input and decision-making roles of different users is of primary importance in RTB crop breeding.

Preferences for certain product characteristics stem from broader socio-economic and gender dynamics, which are in turn an integral part of understanding crop choice and use. Men, women, boys and girls play different roles in RTB food chains, and differ in their access to, perceptions of risk for, and ability to decide on use of improved varieties. For example, gender roles regarding household food security and marketing can mean that one gender may prioritise crop or product storability characteristics (in ground or after harvest) over yield characteristics. In addition, in locations with shared farming systems between men and women, such as in Uganda, one household member may have more decision-making authority on cropping decisions than others. Different varietal characteristics can also influence the level of labour and exertion involved in processing. In addition, consumers have their own sets of sensory preferences linked to different varieties, and consumers may have different preferences based on their background, gender, location or food culture. Therefore, characteristics that respond to multiple-use and multiple-user groups (such as yield and disease resistance), or differentiating segments of use, including men and women in all their diversity, are an important factor in breeding initiatives.

However, there is a gap in knowledge of preferences for RTB crops among different user groups, particularly food processors, retailers and consumers, and diversity within user groups (e.g. producers can have different size of landholding, access to extension etc.), as breeding programmes have historically focused on production related characteristics at the expense of post-harvest and consumer

preferences. In addition, information on characteristics is often overly-simplified by not including information on the optimal range or description that would help breeders be able to meet user needs. Furthermore, there is little known about how gender relations and norms influence and result in preferred characteristics, along with varietal uses. WP1 aims address these gaps in knowledge under the RTBfoods project, which will contribute to shaping crop breeding to be more responsive to user needs along the food chain.

The WP1 approach uses interdisciplinary methods and lines of inquiry (food science, gender and economics) to collect evidence on the preferences of RTB product characteristics for different user groups in the product chain and identify the factors that influence these preferences for men, women and other social segments, and how they may be prioritised differently (e.g. labour requirements and storability may be prioritised more for women, over yield characteristics). The delivery of the information is expected to support the capacity of RTB breeding programmes to be more demand-led. The approach has the following activities:

- Activity 1: State of Knowledge review
- Activity 2: Capacity strengthening and sharing
- **Step 2: Gendered product mapping**
- Step 3: Community-based RTB Food processing/preparation diagnosis
- Step 4: Consumer taste tests in rural and urban market segments

This report presents the findings for Step 2, Gendered product mapping for boiled yam.

The objectives of Step 2, are to:

- Understand who is producing, processing, selling and consuming the crop and product, from a gendered perspective.
- Understand the multiple uses and products of the crop and possible trade-offs between uses
- Identify the quality characteristics and descriptors by stakeholder group (e.g. producers, processors) and demand segment (e.g. rural consumers).
- Understand how gender influences preferences and prioritisation for characteristics.

This activity focuses on both the crop (yam) and product (boiled yam), to identify the quality characteristics along the food chain (production, post-harvest and market) by different stakeholders, the multiple uses and trade-offs between uses, that may reflect different interests of men and women.

1.2 Background

Nigeria is the largest producer of yam in the world with about 47.53mmt and yield of 7.94t/ha (FAOSTAT, 2018). Fig. 1 shows a positive trend in farm size (‘100,000units) and production (million tonnes) from 1999 (2,613,000ha; 25,873,000kg) to 2018 (5,990,184 ha; 47,532,615 kg). However, there was a negative trend in yield from 1999 (9.90t/ha) to 2018 (7.94t/ha). This implies that area cropped with yam was accelerating while output was decelerating within the period.

One major problem of increasing agricultural productivity of yam is the availability of land and access to good quality planting materials in West Africa (Gildemacher *et al.* 2009). The limited use and gross insufficiency of available certified seed are other constraints documented that are common throughout sub-Saharan Africa (Maroya *et al.,* 2014a). Mignouna *et al.,* (2014b) noted that yam planting materials can take up to 50% of the total production costs. The associated costs could constitute a great discouragement to smallholder yam farmers in West Africa. A prominent technical constraint to seed yam production is its low multiplication ratio in the fields.

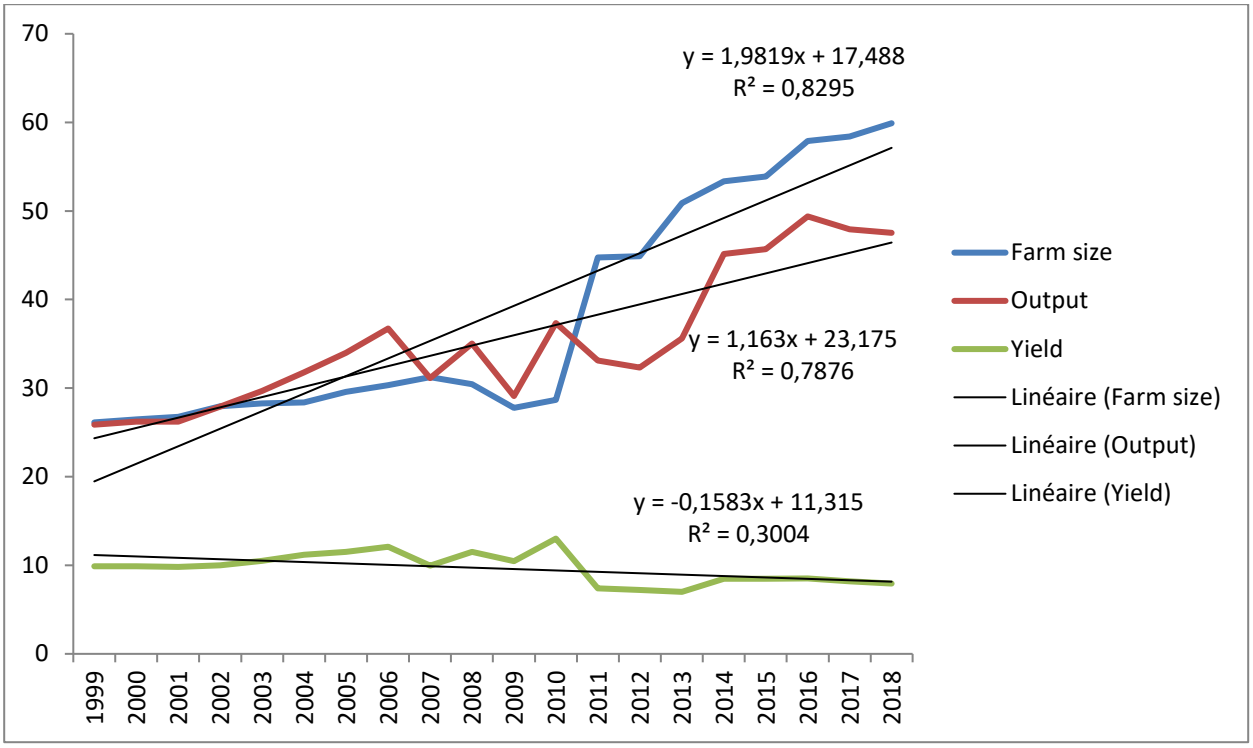

Figure 1 Trend analysis for Yam Farm Size, Area and Productivity in Nigeria (1999- 2018) FAOSTAT (2018)

Despite the nutritious value of yam (Bradbury and Holloway, 1988) and its major contribution to the daily calorie intake of the population (Asiedu and Sartie, 2010), little is known about consumer preferences regarding the quality characteristics of yam. However, awareness is increasing of the importance of consumer preferences in varietal adoption and the market success of products, which largely depends on the acceptability of crop traits among consumers in terms of sensory and utilization characteristics (Egesi *et al*., 2003; Jumah *et al*., 2008a; Jumah *et al*., 2008b).

Consumer preferences for yam products can have important implications for building sustainable food sectors through targeted breeding. First, at the production level, it may help designing new crop varieties and crop management systems that simultaneously satisfy the needs of the farmers and the consumers' preferences (Hounhouigan *et al*., 2003; Amegbeto *et al*., 2003). Second, it may also have implications at the market level for identifying the relevant information about the product and the quality attributes that have to be given to consumers (Barlagne, 2017). Finally, with these preferences addressed, it is likely to improve adoption rates of varieties with improved yield and disease resistance traits, which will, in turn, contribute to strengthening food systems (Selfa *et al*., 2008; Rastoin and Ghersi, 2010; Tsolakis *et al*., 2014).

1.3 Methodology

There are four activities under Step 2 that take place in eight rural communities where people grow, process and consume the crop. These are:

- Key informant group interviews (KII) with community leadership.
- Sex-disaggregated Focus Group Discussions (FGD) with people who produce, process and consume the product. The FGDs specifically provide information on products, gender roles and social segments, processing steps and equipment, characteristics and descriptors that can be probed in further in IIs.

- Individual interviews (II) with community members who process the product (and produce the crop, if possible) in the community, conducted by a food scientist and gender specialist. The IIs provides individual/household level description of preferred characteristics and priorities at different stages of product processing, household decision making, and trade-offs.
- Market Interviews (MI) with key individuals or groups involved in marketing and trading activities.

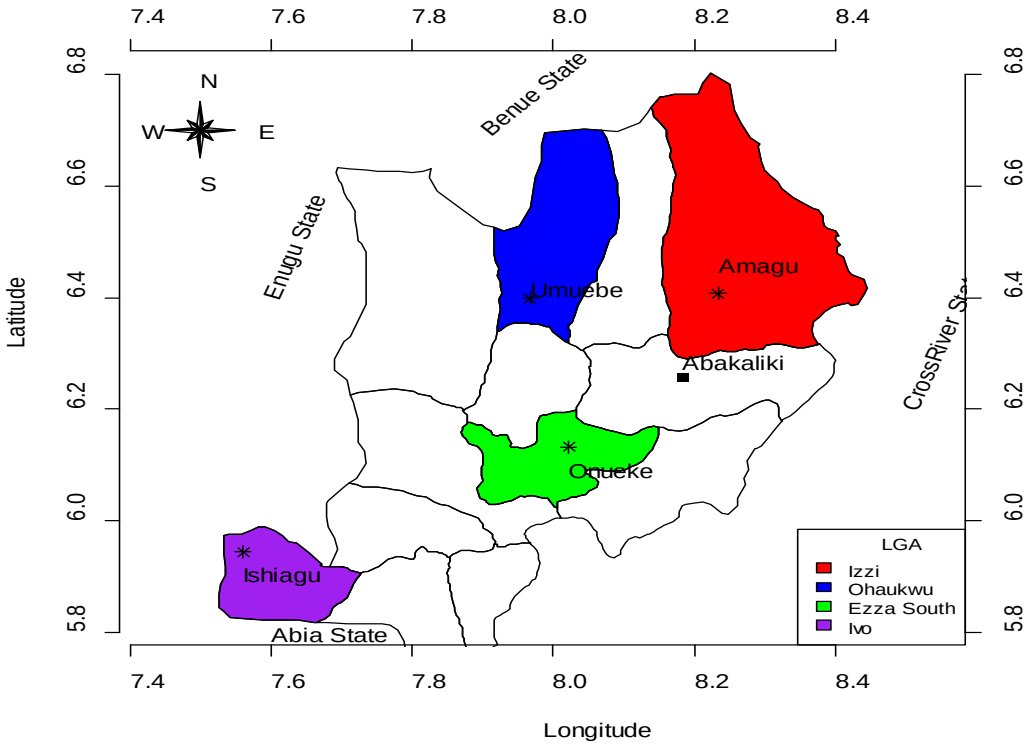

Figure 2 Study area in Ebonyi State, Southeastern Nigeria

1.4 Social segmentation and livelihoods

Table 1 shows that, according to key informant interviews (KIIs), communities were predominantly Igbo, or Indigenes (people indigenous to the area), with smaller non-indigene populations, in the communities visited (4). KIIs in all communities also identified three wealth categories in their communities, namely: poor, moderately wealthy and very wealthy farmers. However, an exception was in Onueke-Ezza, with the lowest population of poor farmers (3%) and the rate of boiled yam consumption as 45%. KII in Ohaukwu community found that they had the largest population of people that they considered poor, compared to other communities included in the study.

Table 1: Social segments (KII Q2)

Community name	Social segments (%)
Onueke Ezza	Ethnicity: Igbo, Indigene {Male, Female, Youth and Children (80%)}, Non- Indigene (20%) Christians (95%), Traditionalists (5%) Home Consumption: (45%) of the yam is consumed as boiled
Amagu, Izzi Abakiliki	Ethnicity: Igbo - Indigene (90%) {Male and Female Farmers (70%), Youth and Children (20%)}, Non- Indigene (10%) Wealth: Poor (30%), Moderate wealth (70%), very wealthy (<.1%),
Umuebe Ohaukwu	Ethnicity: Igbo - Indigene (90%) {Male, Female (50%), Youth and Children (30%)}, Non-Indigene (10%) Wealth: Poor (70%), Moderate wealth (20%), very wealthy (10%)
Obinagu, Isiagu	Ethnicity: Igbo - Indigene (90%) {Male and Female Farmers (70%), Youth and Children (20%)}, Non- Indigene (10%) Wealth: Poor (50%), Moderate wealth (20%), very wealthy (30%)

Table 2: Livelihood activities (FGD Q2)

Male/female FGD + Community name	Livelihood activities and people they are important for
Female FGD, Onueke, Ezza	We cultivate cocoyam, potato, rice, tomato, pepper, vegetable, cassava, cucumber, yam we also process and other produce to sale in the market.
Male FGD Onueke, Ezza South LGA	The cultivation of yam, cassava, rice farming and groundnut, cocoyam, maize, egusi, and sweetpotato are our major source of livelihood in Onueke Ezza.
Female FGD Amagu Izzi	Majority of the farmers in our community, Amagu Izzi grow rice, yam, cassava and vegetables.
Male FGD Amagu Community	We are majorly yam farmers that grow cassava, rice and cocoyam
Male FGD, Umuebe Community Ezzamgbo	The people in this community are predominantly farmers that grow not only yam but cassava, cocoyam, maize, sweetpotato and rice. These are the main important livelihood activities of Ezzamgbo people. In addition to that, we produce cucumber, tomato, vegetables, etc.
Female FGD, Obinagu Ishiagu	Ishiagu Community cultivates okro, rice, yam, maize, vegetable and cassava. Apart from farming, Ishiagu indigenes are well known for pottery, blacksmithing, mining of stones and excavation of soil to get lead as their source of livelihood.
Male FGD, Obinagu Ishiagu	Ishiagu farmers also produce oil palm, cocoyam and potato.
Male FGD, Umuebe Izzamgbo, Ohaukwu	Apart from planting yam, cassava, cocoyam and rice as food crops, Ezzamgbo farmers also produces maize, okro, potato and pepper.

The livelihood activities (FGD Q2) shown in Table 2 indicate that farming is the major livelihood activity for all the communities studied, for both men and women, according to FDGs. The main crops that are farmed include food crops like cassava, cocoyam, potato, rice, tomato, pepper, vegetables, cucumber, yam, egusi, maize, sweetpotato, okra, which provides food for the family and serves as source of income. In addition to food crops, in Obinagu Ishiagu the women's FDG indicated that they undertook other activities to support their livelihoods including: pottery, blacksmithing, and mining of stones and excavation of soil to get lead as their source of livelihood. However, the eight communities studied also boil yam both for market and home consumption to meet up with other household requirements.

The results in Table 3 show the wealth categories of farmers, which are summarised from FGDs. Farmers are categorised based on community's perceptions of wealth. Some communities categorize farmers in the community by "levels of farmer", based on the volume of commercial farm activities being carried out by them, while others see it as "types of farmer" such as rich, middle and low income farmers.

Table 3: Wealth categories (FGD Q3)

Male/female FGD + Community name	Wealth categories mentioned in FGDs
Female FGD, Onueke, Ezzah	Farmers who have access to market, with 4-5 hectares are rich farmers. Four level of farmers. Level one: farmers who are based on commercial purpose (supply up to ten 911 trucks each truck takes up to 21,000 yam tubers). Level 2 are farmers who produce to sale within the state and local market. 3-those that produce for home consumption. Level 4- poor farmers who cannot produce enough for themselves; they work for the rich or beg for food. Poor farmers also lack money to cultivate; those that do not have land are majorly widows. Farming can be linked to wealth in this community. Women are among the wealthy farmers about 60% belong to the 1st level.
Male FGD Onueke, Ezza South LGA	The number of labourers that can be hired, farm size, farm output, and the size of yam barn shows the farmers level of wealth. The family labour-communal labour as well as the farm size indicates how big or small the farmer is. The rich are mainly about the middle aged 45-70 years or 60 years, majority are men. Those that are not too rich were about same age range and mostly women
Female FGD Amagu Izzi	Wealthy Farmers: With more hectares of land, the greater wealth you are assumed to have , wealthy farmers normally have large hectares of farmland, They own up to 10ha of yam farm. Men (50%), women (30%), Moderate wealthy (middle income earners): They own up to 9ha – 3ha yam farm, men (60%), and women (40%) Low (poor farmers): These have less than 3ha, men 60%, women 40%, Mostly middle aged men and women
Male FGD Amagu Community	Size of yam barn is a good indicator of a good farmer. A rich farmer has a big barn with so many lines of yam staked in the barn. About 10 truckloads can be included in this category. A rich farmer has several wives with a large household size. They also train their children in higher education with large plots of land – about 20ha can be cultivated in a year. The men and women also cultivate yam in their community. They sell more than they consume. They have the resources for farm work. The middle level includes farmers with an average yam barn with about 3-4 truckloads of yams with 4-8ha. They sell more than they consume. The least among them have 1-2 ha, they are the small-scale farmers. They have yam barns with 1.5 truckloads of yam. They don't have the resources for farming. Much of the yams produced are for consumption.
Male FGD, Umuebe Community Ezzamgbo	Wealthy Farmers - In our community, a big farmer is known to have 911 trucks (911 truck can take up to 21,000 yam tubers). A big farmer has his own land. He is also known to marry many wives. Their farm size is about 25-30 ha. They are also commercial famers. They also have the resources for farm work. Moderate wealthy (middle income earners) - The middle-income earners are also commercial farmers with about 8-9, 911trucks. They also marry more than one wife. They produce for the market and for consumption. They sell more than they consume anyway. They also have the resources to produce inputs for farm work. Low (poor farmers) - The last group has small portions of land. They are usually engaged in working for other people in their various farms for income. They are majorly subsistent farmers. They have enough strength for farm labour activities. They marry one or two wives.

Male/female FGD + Community name	Wealth categories mentioned in FGDs
Female FGD, Obinagu Ishiagu	We have different levels of farmers. The 1st level cultivates 4-5 hectares of land, they hire labourers to do their farm operation. The 2nd level of farmers is the ones that do the farming activities themselves. This group of farmers starts their farming operations early like February and doing it gradually to meet up with the rich ones.
Male FGD, Obinagu Ishiagu	Wealthy Farmers - When one possesses a large expanse of land or has lots of plots, we conclude that such farmer as wealthy or rich, unlike others who do not have. 5ha of yam field -70% males, 30% females (youth are more in rice and okra). Moderate wealthy (middle income earners): 3-4 ha. 70% males, 30% females. Low (poor farmers) - 1/2ha -30% males, 70% females.
Male FGD, Umuebe Izzamgbo, Ohaukwu	There are three groups of wealth linked to farming in this community, they are Wealthy Farmers: These farmers have 2-3 hectares of yam farm (both males and females); males make up to 60% while the females are 40%. Moderate wealthy (middle income earners): These people have up to 0.5 - 1.5 hectares of yam farm (both males and females); males make up to 70% while females make up to 30%. Low (poor farmers): These have 0.3 hectares of yam in which males make up to 40% males and 60%.
Onueke Ezzah	Wealthy Farmers: The have rich farmers, and we know them by the type of house they build (house with quality roofing such as corrugated iron sheets and spacious room, 3 story home with up to 20 rooms), The number of cars (expensive flashy cars), the number of wives they have. Some have 18 wives and they do take care of them. Middle farmers: They are being measured by no of farm animals (15-20 cattle and goat and sheep to large area of farm.) Low farmers: Those managing to keep themselves alive. They feed from hand to mouth and some cannot train their children beyond secondary school level.
Amagu, Izzi Abakiliki	The level of their crop production is what differentiates a farmer from another.
Umuebe Ohaukwu	Yes, there are farmers who have more lands and yam barns. This can be attributed to the level of money each has to be able to acquire plots of land and hire labourers to help out in the farm.
Obinagu, Ishiagu	There are no different types of farmers. There are both man and woman in these farms and also the youth. They are the ones that do the job

In the women's FGD in Onueke, Ezzah, the women reported that they have four levels of farmers. Level one farmers are those who are engaged in commercial businesses (supply up to ten 911 trucks (each truck can take up to 21,000 yam tubers). Level two farmers produce to sale within the state and local market. Level 3 farmers are seen as subsistence farmers who only produce for household consumption. Level four farmers are poor farmers who cannot even produce enough for themselves, they work for the rich or beg for food, according to them the reason may be due to lack of fund, they do not have land for cultivation and majority of them may be widows. Therefore, farming can be linked to wealth in their community. Women are among the wealthy farmers about 60% belong to the 1st level.

In the men's FGD in Amagu Community, the men reported that the size of a yam barn is a good indicator of a good farmer. A rich farmer has a big barn with so many lines of yam staked at the barn. About 10 truck-loads can be in the ban. A rich farmer has several wives with a large house hold size. They also train their children in higher education with large plots of land – about 20ha can be cultivated in a year. The men and women also cultivate yam in this community. They sell more than they consume. They have the resources for farm work. The middle level include the farmers with average yam barn of about 3-4 truckloads of yams from 4-8ha of land. The sell more than they consume. The least among them have 1-2 ha, they are the small-scale farmers. They have yam barns with 1.5 truckloads of yam. They do not have the resources for farming; more of the yams produced are for consumption. Contrary to the

wealth categories described in the KII in Obinagu, Ishiagu, who did not feel that there were any differences farmers. There have men, woman, and youth in their community who do the farm work.

Table 4 Farming practices (FGD Q4)

Male/female FGD + Community name	Farming practice (Q4.1)	People who practice (Q4.2)
Female FGD, Onueke, Ezzah	There are different methods of cultivation which include: dry season yam cultivation (involve digging of small holes), making of mounds and ridges at the swampy area, which is usually done between November to December for the minisetts and seed yams. The reason for planting in dug holes is for the yam to expand well. This is done during harmattan period (*Adaka*) while other varieties are planted between February to March.	Husband and wife farm together, some others farm on different plots especially those with many wives.
Male FGD Onueke, Ezza South LGA	We plant on heaps/mounds for tuber and root crops but for rice we plant on flats. For sweetpotato and other crops we plant at the base of the mounds. The land may be owned together (spouses) but when planting, it is on individual basis. The land tenure system is very important indicating why we cultivate individually. We do not own farm crops together because the capacity of each person differs. What you may like to do is not what the other person may want to do. The roles also differ.	Land clearing: Mainly done by women who are between 25-40 years of age. Burning the trashes: usually done by the owner of the land, raked or gathered together and burnt. Land preparation: Majorly men of about 20-40 years old. The size of the mounds differ anyway, the children can do small mounds. Preparation of sets: Majorly done by men of about 30-60 years of age. Planting: done by men of about 30-60 years. Staking: Mainly men of about 30-60 years. Weeding: women of middle age. Earthening up: Men of about 20-40 years. Yam within our own area is regarded as a chief cup. There are certain ceremonies that need to be performed before you harvest or bring yam to the market. It is called the new yam festival. Gathering: The women and children do this. They also take these yams to the yam barn. Preparation of yam for staking in the barn is mostly done by the women while the men are in charge of tying the yams at the yam barn.
Female FGD Amagu Izzi	All farmers practice the same method of farming (mounds), but on separate farms. Even in households, men and women (few who plant yams) farm separately.	The youth do the physical activity more than the men and middle-aged men.

Male/female FGD + Community name	Farming practice (Q4.1)	People who practice (Q4.2)
Male FGD Amagu Community	We plant on mounds/heaps. Some are personal plots, and others are community plots allocated to you every year.	Clearing – men and women clear although mostly done by men between 25-35 years, Gathering/burning – Owner of the farm usually does this, usually men. Land preparation is mostly done by men who are between 25-35 years and are hired labourers. Planting: usually men between 25-35 yrs. Staking: usually men. The stakes are usually Indian bamboo and branches of trees. Weeding: Women dominate in this activity of mostly 20-40 years. And they do this 3 times during the farming season. Earthening up: usually done by men. Harvesting: usually done by men 25-35 years. Gathering the yams: usually done by women and children. They also engage in packing the yams to the barn. Tying of yams in the barn: usually done by men of about 35-50 years of age.
Male FGD, Umuebe Community Ezzamgbo	We plant on heaps/mounds but rice is planted on flat land. We also own and plant on individual plots. We do this because we own land differently on individual basis. We also intercrop yam with other crops like cassava, okro, maize, potato, pepper, etc.	Men and women are both engaged in land clearing but this is majorly women's activity. Their age group range from 25-30 years. Some of the hired labour for this activity is either indigenes or migrants. Burning the trashes: This is done by the owner of the land. The owner may also hire someone else to help. Land preparation: usually done by men who are 15-65 years of age. Majority are indigenes. Others may be migrant farmers. Planting: Done majorly by men of about 30-50 years of age. This has to do with experience in planting. Weeding: Is done by the women and children of about 15-40 years of age. Staking of yam: Done by men and children. Men of about 15-65 years of age. The children go to help to bring bamboo and also learn from their fathers on how these things are done. Trailing the vines on bamboos: usually done by men of about 20-50 years of age. Earthening up: Majorly a man's activity of about 15-50 years. Harvesting: Done by men from 30-50 years. Gathering: Women and children. Barn: Tying is done by men.
Female FGD, Obinagu Ishiagu	No response	For heap making, it is male farmers, both youth and aged men. For tillage of rice and okro farm, young and aged elderly men do it. The youth are Ishiagu youth; also Ezza youth comes to do the cultivation of the farm.

Male/female FGD + Community name	Farming practice (Q4.1)	People who practice (Q4.2)
Male FGD, Obinagu Ishiagu	We farm the same way (mound or heap making) in individual farms. Households farm together but in some families, separate plots exist. Separate plot exist mainly with widows and polygamous homes. Very few cultivate separately	Different activities exist for men and women: males are involved in land selection, clearing, heap making (no traditional inhibition or law against women making heaps), planting, staking. Females are involved in weeding, planting maize, egusi, apart from yam, females plant other crops (men can also plant).
Male FGD, Umuebe Izzamgbo, Ohaukwu	Every one farm the same way (making of mounds). People farm separately, but in some families, males and females farm together because of oneness in the family.	Men do all the activities in yam cultivation. Women can only be included in some crops like water yam or cassava or any other food security crop, but the yam entirely belong to the man. Generally farming of yam is on separate plots.

It was clearly observed in the study that farm practices were significantly gendered (Table 4). A men's FGD in Onueke community, Ezzah South LGA identified land clearing, weeding and gathering as women's roles, except for gathering of yam seeds of which children are involved. While the burning of trashes, land preparation, preparation of sets, planting, staking of yam, and earthening up are roles done by men. In a women's FGD in Amagu community, the farmers practice same method of farming, but on separate farms. Even in households, men and women farm separately. This was unusual as other communities farmed mainly on shared plots. The youth do the physical activities more than the men and middle-aged men. A men's FGD in Amagu community indicated that weeding, gathering the yams, and packing the yams in the barn was mainly roles of the women. The men focus more on land preparation, planting, staking, earthening up and harvesting. Land clearing was done by both men and women.

It is clearly shown in Table 5 below, that within the communities studied, both male and female farmers from the same household plant on the same plot of land (except in Amagu). Typically, male farmers concentrate on their yams, and the female farmers do the remaining activities in the farm, such as planting maize, okro, cocoyam, etc at the base of the mounds, weeding, application of pesticides, and harvesting. Sometimes male farmers join their wives in some of activities. Table 5 also shows that men also carry out land preparation activities.

Table 5 Differences in men and women's plots (FGD 4.3)

Male/female FGD + Community name *	Women's Role	Men's role
Female FGD, Onueke, Ezzah	Women do mix cropping	Men plots are always sole crop
Male FGD Onueke, Ezza South LGA	Our women can also go to plant other crops at the base of our mounds.	Mostly the yam farms are owned by the men
Female FGD Amagu Izzi	The women do the rest of the work.	Men, together with the male youths do the land clearing and land tilling. Though some men do help their wives in all other activities in the farm.

Male/female FGD + Community name *	Women's Role	Men's role
Male FGD Amagu Community	About 20% of the women engage in yam production. The women can go to the yam farms of their husband to plant water yam, cocoyam, pepper, okro, vegetables at the base of the crest. It also includes groundnut.	The men who are engaged in yam production (80%.).
Male FGD, Umuebe Community Ezzamgbo	The women plant other crops like water yam, cassava, maize, etc. at the base.	Men and women can farm on the same plot. But since this is mixed cropping, the men concentrate on their yams
Female FGD, Obinagu Ishiagu	The women will plant cassava, maize and vegetable by the side of the moulds. But in a situation the woman is the head of the family, the difference in their farm is in the staking of the yam because men stake their yams well while the women without the husband can hardly stake yams unless she employ labourers to do that. Women are also involved in planting of other crops, weeding the farm and applying insecticide in the farm.	Men and women cultivate on the same plot with men planting yam on the crest of the mounds. Men plant and stake yams.
Male FGD, Obinagu Ishiagu	The women do the rest of the activities. Some men do join their wives in every activity.	Men do the clearing and mound making
Male FGD, Umuebe Izzamgbo, Ohaukwu	In female plots, men assist in planting of yam and the staking.	In male plots, women weed plant and cassava

The results in Tables 6a and 6b show aggregated ranking of the importance of crops in communities from FGDs. The tables show that men and women believe that yam is the most important crop. This is followed by cassava (for men and women), and rice (for men, however, for women it was tied with cassava). However, the women's FGDs ranked okra and cocoyam to follow, which are both considered female crops in a similar way as men value their yam.

Table 6 Important crops in the study area of South-East region of Nigeria

Count	Female	Male	Female	Male	Female	Male	Summary score		Most important crops (1= most important) (aggregated)	
	1st (x3)	1st (x3)	2nd (x2)	2nd (x2)	3rd (x1)	3rd (x1)	Female	Male	Female FGDs	Male FGDs
Yam	12	12					12	12	1	1
Cassava			4	6		1	4	7	2	2
Rice			4	2		3	4	5	2	3
Okra					2		2		3	
Cocoyam					1		1		4	

Table 7: Important crops in rural communities – aggregated (FGD 5.1)

Crop importance	Women's FGD	Men FGDs
1st	Yam	Yam
2nd	Cassava +Rice	Cassava + Rice
3rd	Okra	Rice
4th	Cocoyam	

The reasons behind the crop rankings are provided in Table 8 below. Overall, yam was found to be important for food, income and for cultural practices. A men's FGD in Obinagu Ishiagu described yam as being the most important because it as *isi nri* (head of food ie king of crop), as it is a food that is used to welcome visitors. The communities consulted asserted that yam is also seen as the king of all crops and is celebrated in new yam festivals performed annually between August and September. In these communities, some men were given yam titles like *Jioke* (yam sharer). The title *Jioke* is the highest title that any farmer can aspire to get, and it is related to the size of yam barns, which in turn, is related to the extent that the farmer is food secure. The importance of yam is also exemplified with its use in marriage ceremonies, where it is usually one of the items demanded for during the payment of dowry. A female FGD in Umuebe Izzamgbo, Ohaukwu, affirmed that yam is indeed a male crop because it occupies most of their lands; which is true because all the male FGDs in different communities indicated that it's very important to them.

In addition to yam, cassava and rice are the second most important in these communities. Cassava is understood as every day, staple food that everyone cultivates and consumes. It can be processed into other products like gari, fufu, abacha, *akara* (cassava cake) etc. It is used as a substitute when yams are yet to be harvested (i.e. after 6 months). It is also a food security crop. Rice is also a major food mostly cherished by children. It can also generate income because when taken to the market, it is sold easily. It is valued in some ceremonies like marriage, child dedication and burials. Okra is very important because it gives quick income; it will take just 6 weeks for you to begin to get income from it after planting. Okra is harvested and sold at four day intervals, immediately it matures. Okra can still be sold in dry state to make money. *"We use proceeds from okra to train our children in the university, build houses, cultivate our yam farm and also use in cooking for a woman that gave birth newly"* indicated by

Female FGD Umuebe Izzamgbo, Ohaukwu). Cocoyam matures early and used for food, soup making as thickener) and for income generation. It is also regarded as women crop.

Table 8 Reasons why the crop is important and for who (FGD 5.2 and 5.3)

Crop	Reasons why the crop is important (FGD 5.2)	People for who the crop is important (FGD 5.3)
Yam	1: It is very easy to cultivate 2: It is a major staple foods 3: It also generates income 4: It is important because of its cultural Significance (e.g. used to welcome visitors and for festivals/ceremonies, like new yam festival and marriage ceremonies) 5: It is a food security crop	Men FGDs Onueke, Ezzah, Amagu Izzi, Umuebe Community Ezzamgbo, Obinagu Ishiagu)
Cassava	1: Cassava, if processed stores well on the shelf (long shelf life) and can be used for other products. 2: It is also a food security crop 3: It is a major staple food crop	Men and Women FGDs Onueke, Ezzah, Amagu Izzi, Umuebe Community Ezzamgbo, Obinagu Ishiagu)
Rice	1: Rice is also a major food mostly Cherished by children. 2: It generates income.	Men and Women FGDs Onueke, Ezzah, Amagu Izzi, Umuebe Community Ezzamgbo, Obinagu Ishiagu)
Okra	1: Okra is very important vegetable crop Gives quick income.	Men and Women FGDs Onueke, Ezzah, Amagu Izzi, Umuebe Community Ezzamgbo, Obinagu Ishiagu)
Cocoyam	It has early maturity, for food, for soup making (soup thickner) and for generating income.	Women FGDs Onueke, Ezzah, Amagu Izzi, Umuebe Community Ezzamgbo, Obinagu Ishiagu)

It is clear from the results (Table 8) that yam is usually intercropped with other arable crops like maize, okra, vegetable, melon in the four communities studied. This may be because of scarcity of land due to the land being divided into small portions among families (communal system of farming). Also most of these crops are early maturing crops which can be planted at the base of the heap, while yam planted at the crest, except cassava that is not intercropped with yam immediately. Other farming practices include land rotation in Amagu Izzi, intercropping and shifting cultivation in Umuebe Ohaukwu and Obinagu, Ishiagu communities. The KIIs in Obinagu Ishiagu community stated that initially they use manual tools to prepare their lands, but recently chemicals are used. Across the four communities studied, every male member of the community grows yam except in Obinagu Ishiagu where 70% men and 30% of women grow yam, however, the yam that the women grow is mainly water yam that requires both short and long stakes. In general, however, it is difficult to tell whether women grow lower-value subsistence crops because they have different preferences and concerns or because they cannot access the land, inputs, credit, information, and markets that would permit them to do otherwise. In Ghana, for instance, women farmers view maize production as a productive, income-generating activity yet refrain from growing maize because they lack the capital to purchase the required inputs or hire someone to plough the fields. Instead they continue cultivating cassava and yams, which require fewer external inputs (Guendel, 2009). Yam is regarded as male inheritance and up to 95% their lands are used for yam because of its traditional value, and as major staple food crop in south east region of Nigeria. Almost half (45%) of the yam estimated by KIIs to be produced from these communities are boiled, and a smaller portion (15%) for pounded, while the rest are stored. Most of the products are for home consumption and for sale across the four communities studied.

Table 9 Differences in men and women's plots (KII Q4, 5 and 8)

Community	Description of how the crop is grown	Proportion (%) of people in the community who grow the crop	Proportion (%) of the crop that the average household uses for making the product
Onueke Ezzah	In communal lands divided into smaller potions for families. Land preparation is done around November and left till December to increase the fertility of the land and it makes it easy to do the mound making. The cultivation and planting of yam start in February. For seed yam, we usually start fourth week in April to second week of June, we stake individually as the vines are coming out to avoid the hot soil causing damage to the yam. It can be weeded two times before harvest. Application of fertilizer as the need be at 6 weeks or thereabout. The harvesting starts in August for the new yam, after the new yam festival we cut some of the tubers off from the vine area lowering little tuber that will produce seed yam for planting next season. The final harvest will be from November to January.	About 95% of men grow yam. It is a key crop in this area. Men use it for title taking most especially. If you do not grow yam you are not regarded as a real man. About 40% of the women plant yam especially *D. alata* because they find it difficult to get staking materials (bamboo) for ware yam which they get from a very far place and thick bush. So they prefer *alata* that needs minimal staking. They believe that staking enhances yam yield.	About 60% is consumed in our different homes and 45% is boiled and eaten. Only 15% is pounded
Amagu, Izzi Abakiliki	Communal, and land rotation: Mixed cropped with maize, okra and pumpkin, pepper but cassava must wait for the yam to grow and tuber before planting it.	100% of the farmers, because even if you are doing government work you will still farm yam. Both male and female cultivate yam even youths.	10% is being consumed at home, and 20% is put back into the soil for the next season.
Umuebe Ohaukwu	We practice intercropping with (cassava, maize, cocoyam, ugu, pepper). However, cassava is very important to add.	All cultivate yam	70% is used for home consumption.
Obinagu, Isiagu	February - May –clearing starts. Formerly we use manual clearing, but now we use chemical. We intercrop in mounds (March April) waiting for rain and then plant other crops (cassava, melon, akidi, odudu). Shifting cultivation is practiced with a spacing of 4 years.	Everybody cultivates the yam. 30% women and 70% men. The women cultivate mainly water yam. There are people of middle class who also cultivates yam.	50% of the yam goes for consumption

Table 9 shows the yam varieties important in each community, ranked in order of importance. It was discovered that among the communities sampled, men and women grow yam. *Nvula/Mbana/Wafin* (Water yam) mostly grown in all the communities. Only male respondents were sampled in Obinagu Ishiagu community, however, *Igum* is most prominent in Onueke Ezza and Amagu Izzi communities, it ranked first in both gender groups, this is followed by Obela and Utsekpe in Umuebe Izza which ranked second. Obiaoturugo ranked third in Umuebe Izza Ohaukwu and Obinagu Ishiagu for male gender only.

The fourth position was given to Nvula/*Mbana/Wafin* (Water yam) for male and female in the four communities. *Iphara* variety, for Amagu Izzi, ranked fifth for both gender while *Obele Ocha* and Okpebe ranked fifth for male and female in Umuebe Izzah Ohaukwu, this is followed by Oku and Igume for male only in Obinagu Ishiagu. Finally, while Amagi and Okwalankata (alata) ranked sixth in Amagu Izzi, Igwe variety in Obinagu Ishiagu ranked sixth also for male only.

Table 10: Varieties grown in order of importance (II Q15.1)

Community	Importance	Women(N=8)	Men (N=32)
Onueke, Ezzah	1	Igum	Igum+ Ighumu
	2	Nbana	Oko+ Nyeji
	3	Amaga	Abi+
	4	Oku	Nvula+ Ogomodo
Amagu,Izzi	1	Igum	Igum
	2	Okpebi	Oku
	3	Awagi	Okpombe
	4	Nvula	Mbula/nyeji
	5	Iphara	Iphara
	6		Amagi +okwalankata
Umuebe, Izzah Ohaukwu	1	Nwaopoko + Obela	Obela
	2	Utsuekpe+ Utuakpe	Utsuekpe
	3	Abi+ Ogomodi	Ogomudu + Obiaoturuogo
	4	Oku+ Nvula	Abbi
	5	Obele ocha	Okpebe
Obinagu Ishiagu	1		Nwopoke
	2		Obiaoturugo + Nka + Oruntem
	3		Mbana + Sam paper
	4		Oku + Igume + Wafin
	5		Igwe

The results in Table 10 shows the varieties of yam planted in order of preference according to FGDs. Among both men and women gender groups in Onueke, Ezzah community, they ranked Igum as first, same is applicable in *Umuebe* Community Ezzamgbo and Umuebe Izzamgbo, Ohaukwu where both gender groups ranked *Utsekpe* as the best, this result agreed with the individual interview table that indicated *Utsekpe* variety as very prominent in Umuebe community. In Obinagu Ishiagu community, women's group ranked *Ji Igwe* as the best variety while *Igwe* was ranked best for the male group, *mbala* and *Iguma* was ranked last.

Table 11: Varieties grown in the community and ranking in order of preference (FGD 6.1)

Community	Importance	Men's FGD	Women's FGD
Onueke, Ezzah	1	Igum	Igum/ okeji
	2	Jimman	nwanyeji
	3	(Ordinary yam)	Water yam
	4	Any other white yam that is not Igum	Oko
	5	Oko (Yellow yam)	
	6	Mvula	
Amagu Izzi	1	Igum (Nwopoko)	Igumu
	2	Iphara (local)	Iphara
	3	Okpembe	Okpwembe

Community	Importance	Men's FGD	Women's FGD
	4	Amange	Oko
Umuebe Community Ezzamgbo	1	Utsekpe	
	2	Obela	
	3	Ogom-odi	
	4	Okpebe	
Obinagu Ishiagu	1	Igwe	Ji Igwe
	2	Agbaocha	Obiaoturugo
	3	Obiaoturugo	Orunte
	4	Mbala	Iguma
Umuebe Izzamgbo, Ohaukwu	1		Utsukpe
	2		Obella
	3		Ogomodo
	4		Mbala
	5		Abi (Amagi)
	6		Okpambe

In two communities, both the male and female FGDs ranked igum yam variety as the most important variety cultivated because it was considered to have a good taste, like sugar. Akoro and water yam are planted because they mature and bulk early, and store better compared with other yams. Oku is yellow in colour, strong and can hold hunger. Iphara is high yielding while Okpwembe yields well with multiple tubers. Utsekpe is planted because it is high yielding and early maturing. Obella is very sweet (especially when boiled), it has good marketability, used for traditional rights during marriage ceremonies. Ogomodo has a high price and generates more money when sold as it it can be eaten without oil. Igwe is early maturing and high yielding. It produces seed yam and is sweet. Obiaoturugo comes out when other yams are going off season and is high yielding, has a sweet taste and is easy or faster to boil compared to other varieties.

Table 12 Reasons why the variety is grown (IIQ15.2)

Variety* ** and products	Reasons why preferred	% of women citing (N=8)	% of men citing (N=32)
Igum	Sweet, white colour	37.5	43.75
	Soft		
	High yielding ,big size, early maturity		
Oku	Sweet, yellow strong	1.25	9.375
Abi	Early maturity		3.125
Nvula	Sweet, early bulking	1.25	9.375
Ifara	Sweet, high yielding, big in size		6.25
Obela	Sweet, soft		12.5
Usaekpe	Early maturing		3.125
Obiaoturugo	High yielding		9.375
Igwe	Early maturing		9.375
Nwaopoko	Big in size		37.5
Oruntem	Soft, big in size sweet		6.25
Orume	High yielding		12.5
Jamaika	Early maturing	1.25	6.25
Sapaper	Smooth skin		9.375

*** Local (L), New variety, recently released (N), Improved variety (I)**

**** Use scientific names where possible**

About 62% of the men and women in the study area plant the same variety with their spouse while about 9 percent of the males had partners who neither cultivates different variety nor interested in cultivating yam. “No, my wife doesn’t grow yam, she is only interested in cassava.”

Table 13 Varieties that are less preferred in the community? Why? FGD 6.b

Less preferred variety	Frequency in FGDs (N=8)
Abii	3
Akuru	1
Ngwirinti	1
Okpambe	1

The female FGD in Umuebe, Obinagu and Amagu communities in Ebonyi state identified Abii (*Alata*) as the less preferred variety. The male farmers at Obinagu noted that Akuru and Ngwirinti are the less preferred variety in their locality. The rest of the communities did not identify any variety that is less preferred and according to them “we do not cultivate any variety that is not good in our farms…”, “there is no less preferred variety in our community here.” From these responses we see homogeneity because *Abii* is less preferred in three communities under study, *Abii* is less preferred by men, but much more cultivated by women because it has less economic value compared to *rotundata*, early maturing and serves as food security for the women. Also Yam (*rotundata*) is generally regarded as a man’s crop.

Source of planting material II Q 15.3

It was observed from the responses that majority of the farmers bought their planting materials from the market (Table 13). About 40% of the male farmers received their planting material from their father.

Table 14 Source of planting material (II Q15.3)

Source of planting material	Frequency of women citing N=8	Frequency of men citing N=32
Agric	1	0
Husband	1	0
Purchase market	6	21
Fellow farmer	0	2
Father	0	13
Stepmother	0	1
Previous plating material	1	2

Communities cited two types of reasons that limited their use of released crop varieties. Firstly, a lack of awareness of released varieties, and secondly, the poor performance of the new varieties in yield, taste and processing.

Characteristics of a Good Crop II Q14.1 and 14.2

According to the individual interviews, men and women ranking the top four characteristics of a good yam crop in very similar ways, as show in table 14. The four included Greenwich leaf, big tuber, full canopy and a big plumule.

Table 15 Characteristics of a good crop (II Q14)

Importance	Women	Men	South-East	Total
1	Greenish leaf	Greenish leaf	Big smooth body	Greenish leaf (73)
2	Big tuber	Full canopy	Full canopy	Big tuber (56)
3	Full canopy	Big plumule	Greenish leaf	Full canopy (55)
4	Big plumule	Big tuber	Healthy plumule	Big plumule (34)

Table 16 Desirable characteristics

Characteristics	Freq M(3)	Freq F(3)	M+F	Freq M (2)	Freq F (2)	M+F	Freq M (1)	Freq F (1)	M+F
White yam	6		6	4		4			
Sweet yam		3	3	4		4			
High yield	9	3	12	8	8	16			
Smooth body	3		3	16		16	6	3	9
Greenish colour of leaf	24	9	33	16	12	28	12		12
Full canopy	18	9	27	16		16	9		9
Big tuber	15	3	18	20		20	15	3	18
Multiple tuber	8	4	12	2	4	6	3		3
Big plumule	15	9	27	4		4	3		3
Thick healthy vine	6		6	4	4	9	3		3
Disease resistance				4		4			
Early maturity				4	4	8			

According to FGDs, there were gender differences in the most important characteristics of the yam crop (Table 16), which were not found in the IIs as described above. Men stated greenish leaf, full canopy, smooth skin and bulking cracks. In contrast, women's most important characteristic was sweet taste (an important sensory characteristic), followed by greenish leaf, smooth skin and a big tuber (sweet and 'big tuber') not mentioned in the top four by men.

Table 17 Most important crop characteristics in order of preference (FGDQ7.1)

Importance	Men's focus groups	Women's focus groups
1	Greenish leaf	Sweet taste
2	Full canopy	Greenish leaf
3	Smooth skin	Smooth skin
4	Bulking cracks	Big tuber

Do you think these would be different characteristics/criteria for your spouse? Why or why not? II Q14.3

The response from IIs shows that about 72% and 38% of men and women, respectively, indicated that their spouse have the same preference as them, while about 22% and 25% of them said their spouse have different criteria.

List all the products from the crop FGD Q8.1

***only in revised version: What are the main important characteristics of the crop for this product? FGD 8.3**

As described earlier in the report, yam is processed into a range of products that have different quality characteristics associated with them. These are shown in Table 18 below. There were differences between men and women's FGD in the number of characteristics associated with the product: men mentioned many more characteristics. This could be related to their role in growing the crop, but at the same time, it is women who process and prepare yam to be consumed. However, there are similarities among the different communities as their characteristics of focus include big size and smooth skin.

Table 18 Summary table of products and important characteristics (FGD Q8.1 and 8.3)

Product	Men's FGD	Women's FGD
Boiled yam	Smooth skin, it has to be sweet	Smooth skin, big size and matured yam (have the same body colour and the one not good the bottom will be whitish and when cooked it will be like *yawuri yawuri* (brittle)
Pounded yam	Size of the yam The type of yam smooth skinned with no dark threads No skin problem How soft it is Appearance, neat, no lumps, white-as white as paint Should be attractive with no threads, Swelling ability The peels on the skin be removed with not much moisture and with pleasant aroma. It has to draw, soft and smooth. It has to be white in colour	The yam has to be big, fresh, has mature smooth skin, the head will be yellow, pure white in colour
Fried yam	big sized, smooth body, peeling will be easy for you Colour- white, Pleasant odour because it is sweet. Smooth and white Pure white. Friable, crispy Fried yam-Cooks well.	It should be mature and have smooth body also.
Roasted yam	Fresh yam-Smoot body with no wounds. Big sized yams. It also has weight. Dried yam-Well dried, type of yam (Utsekpe or Obela is better), good aroma	Matured yam (very brown colour), have smooth body

Main important characteristics of the crop for this product? II Q16.4

Table 19 below also shows the quality characteristics associated with the different yam products by gender, but from the individual interviews. We see that men and women generally agree on the characteristics, but that men have cited more characteristics compared to women, supporting the findings from the FGDs.

Table 19 Frequency of citations of groups that boiled yam was mentioned as important

Boiled Yam	**Male (%)**	**Female (%)**
Smooth skin	6.25	25
Sweet	28.13	62.5
Big tuber	12.5	25
Matured tuber	3.13	
Pleasant aroma	9.38	
Have line on the body	9.38	
Moderately soft	46.88	62.5
Bright colour (white or yellow)	37.5	75
Pounded Yam	**Male**	**Female**
Smooth skin	15.63	12.5
Soft	43.75	37.5
Big tuber	12.5	25
White colour	43.75	87.5
Swelling ability		
Peels easily removed		
Low moisture on the skin		
Pleasant aroma	6.25	
Drawability	50	
Sweet	9.38	
Not stick to palm	12.5	12.5
Lumpless	21.88	
Easy to pound	9.38	
Fried Yam	**Male**	**Female**
Smooth skin	9.38	
Big tuber	9.38	
White colour		
Pleasant aroma		
Sweet crispy		
Matured tuber		
Roasted Yam	**Male**	**Female**
Smooth skin	9.38	
Heavy weight		
Big size	9.38	
Good aroma		

Who sells [product] in your household? (II Q16.3 original or 16.2 revised)

Men and women were asked who conducts the processing and selling of boiled yam in their household. Almost half of men interviewed stated it was their wife (47%), followed by both husband and wife (28%), myself (6%) and mother (6%). For women, half (50%) stated it is the mother who undertakes these tasks, followed by the father (13%), and myself and children (13%).

Table 20 Frequency of citations of people who conduct the processing OR selling for boiled yam (II Q16.2)

	Male (n=32)	Female (n=8)
Wife	46.88	
Husband		
Both(hus and wife)	28.13	
Myself	6.25	
I and my children		12.5
Father		12.5
Mother	6.25	50

Labour Responsibility by activity (FGD Q 8.2)

The responses from majority of the FGDs show that both men and women participate in the selling of fresh yam, while a greater percentage sells yam in processed forms. This is supported by the quote 'Men and women do sale, although mostly men of middle age from 40-60 years. Customers can even come to the yam barn and buy them in lines. When sold in restaurant/hotels, they are mostly sold by women and also can be sold at bus stops, open market, restaurant, food vendors. It is also a money spinner because it is our delicacy. It is sold in restaurants, food vendors by women. This can also be garnished with vegetables'

Table 21: Persons responsible for processing and selling boiled yam (FGD 8.2, 8.3)

Male/female FGD + Community name *	Persons responsible for selling
Women FGD, Onueke	Both men and women but mostly women
Men FGD, Onueke	Men and women sell although mostly men of middle age 40-60 years. Customers can even come to the yam ban and buy them in lines Sold in restaurant/hotels Mostly sold by women Can be sold at bus stops, open market, restaurant, food vendors Sold at bus stops, parks, markets, mostly women. It is also a money spinner because it is our delicacy Sold in restaurants, food vendors by women. This can also be garnished with vegetables
Women FGD Amagu	Fresh form is sold by women; pounded yam is both men (30%) and women (70%), while the boiled yam is being sold by the women.
Male FGD Amagu	Both men and women but more women do this than the men, especially when the man trusts the women Mostly women in restaurant or hotels Mostly women in restaurant or hotels Mostly sold by women in the market. Out of season food Used to prepare okpa Women sell in the market
Male FGD Umuebe	Fresh yam-Men and women do sell but the men sell most. The men can also tell their women to go and sell. Pounded yam-Men and women do sell but dominated by men. Boiled yam-Mostly women Roasted Yam-Mostly women Fried Yam-Mostly women Dried yam-Women to sell

Male/female FGD + Community name *	Persons responsible for selling
Female FGD Obinagu	Women sell the entire product from yam.
Male FGD Obinagu	Fresh yam is being sold by Both males & females with (80% males and 20% females). The pounded yam is not popularly sold in the market here because people eat it in their various homes. But the boiled yam is being sold by the women.
Female FGD Umuebe	Both males and females sell the products. - For pounded yam (males 80%, females 20%). - For boiled yam (100% women) - For roasted yam (100% women) - For fried yam (100% women)

Level of independence in making decisions II Q31.1-31.4

The results in Table 22 show the mean scores of independence in decisions about yam and product by gender. Result shows that men perceived themselves to have greater independence in decision making, ranging from what variety to plant, to use as profiles. In contrast, and surprisingly, women thought they had the most independence about what variety of yam to plant – despite their minor role in yam production. For the other decisions, on average, women felt that the decision was made by another person.

Table 22: Mean score of independence in decisions (II 16.4)

Decision	Mean score of independence 1-4*	
	Women (n=8)	Men (32)
Variety of crop to plant	3.5	3.09
Use of crop	2.5	3.13
Marketing	2.1	3.3
Use of profits from sale of boiled yam	2.86	3.13
Use of profiles from sale of alternative product	2.57	3.03

***Legend**

1=no independence the decision is made by someone else,

2=a little independence to suggest ideas but decision is taken by someone

3=most independent but need to consult someone

4 = complete independence.

Household decisions regarding the product

Results show that most decisions are taken by the man and woman regarding production, and utilization of boiled yam in the south-east region.

Table 23: Frequency of citations of people who make decisions on boiled yam (II Q16.4 original or II Q16.3 revised)

People who make decisions on the product	% of women citing N=	% of men citing N=
Wife		6.25
Husband	12.5	
Mother		3.125
Father	12.5	
Children		3.125
Myself	37.5	28.13
I and my wife(husband)	11.25	46.88
All family members	12.5	6.25

***Thinking about when the [crop under study] is harvested, how do you make the decision to harvest? Who was involved and what was considered? II Q17.1**

In making decision on how to harvest, the responses from the IIs show that the majority of the men make decisions while others do it together with their wives. *"My wife and I make all the decision in my house. We sit down together and discuss about it".* It was reported that solving financial problems are among the factors that they consider before harvesting. *"If we do not have cash at hand, we may decide to sell yam in order to raise money to reinvest in the farm"*

***How were decisions made on how the crop would be used among the different products Q17.2**

The responses from individuals interviewed showed that mostly men are the ones who decide on how yam are used in the family while others do involve their wives since they are the ones in the kitchen preparing the food. Women reported that their husbands assist them in making decision while they consider the need of the family.

If the crop is used for different purposes and products, does it happen where there is disagreement on how the crop is used? FGD Q9

The greater number of the people indicated that there are some disagreements when it comes to how to use or consume yam. *"Yes, there may be disagreements, but they are usually resolved easily. When the yam is in the pot cooking, anybody who wants boiled yam can go to the pot and take some while the other ones remain for those who want pounded yam."*

Challenges or disagreements in the household about these decisions II Q17.3

Majority of the respondents (about 90% of men and 75% of women) noted that there is no disagreement on how to use what was harvested.

Processing steps

Processing yam into boiled yam includes a number of steps. This includes peeling, washing, cutting and boiling, as described below:

The steps involved in the processing of boiled yam include:

Peeling: this is the removal of the out brown back of the yam to expose the white or any colour of the flesh. Some boil the yam with the peel and peel and eat the yam.

Cutting: this involves size reduction of the peeled/unpeeled yam tuber into smaller sizes, the size of the cut varies with individual and region of the yam (head, middle and tail)

Washing: this involves the removal of dirt using water

Cooking: this involves the boiling of the cut yam in water; the time of boiling is determined when the yam is soft and brings out yam aroma. This is followed by eating however if the yam is boiled with the peels the cooking is followed by peeling before eating.

The figure below presents two different types of processing for boiled yam, of which the sequencing of the processing steps is different. The first process includes slicing, washing, boiling and peeling. The second process is peeling, washing, cutting and boiling. In the first process, peeling is a little bit easier and efficient with little or not much loss in the flesh that goes with the peels.

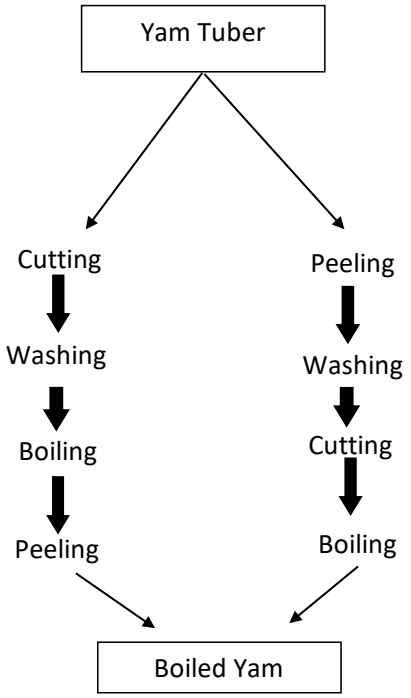

Figure 3 The Processing of Boiled Yam in the study area

The respondents said that the processing, and each processing step, is done by both men and women, but the men are usually youth. There is no hired labour for processing boiled yam.

Materials needed for processing boiled yam are:

1. Tripod Stand.
2. Firewood.
3. Pot.
4. Knife.
5. Tray pan.
6. Plate and spoon

Regarding women's and men's access to the equipment required to process boiled yam, the average was that all owned the equipment outright, according to the table below.

Table 24: Mean score of access (1-4*) to equipment or utensils required for processing the crop into the product

Equipment or utensils required for processing the crop into the product	Mean score of access 1-4*	
	Women	Men
Tripod stand	1	1
Pot	1	1
Knife	1	1
Tray	1	1
Spoon	1	1

***Legend**

1-own outright, 2-use but wouldn't take in a divorce, 3-rent, 4-borrow from husband, 5-other

The entire household has the processing equipment.

The FGDs stated there was only one way to process, except for the men's FGDs in Amagu and Umuebe Ezzamgbo communities that noted that processing variations existed – that yam could be boiled before removing the peel.

The most important processing step to make a high quality boiled am was different for men and women according to individual itnerviews. Just under 90% of women cited that the most important step was cooking (or boiling), compared to 45% of men who said it was peeling. *However, note that the sample size for women is only 8.*

Table 25: The most important processing steps to obtain a higher quality boiled yam cited (II Q22)

Most important processing steps	% of women citing N=8	% of men citing N=38
Cooking	87.5	18.18
Peeling		45
Washing	12.5	18.18
Cutting		13

Thinking about when you harvest yam, how much of the harvest was used for consumption at home? II Q33.1)

The women consume more of the harvest than most men, men sell more. The rest are sold or kept for next season planting. The products that they are being used for is boiled and pounded yam. Boiled yam is usually consumed more than pounded yam.

Table 26: Quantity of harvest used for home consumption (II Q33.1)

			Land size category (indicate ha or ac)		
	Women	Men	-2	2-5	5+
Range (kg/t)	-	-			
Mean (kg/t)	-	-			
% of harvest	70	40			

Most of the respondents that sell yam sell in the raw form, and they sell at their local market where whole sellers and people from the city come to buy from them. The product, boiled yam is being sold by food vendors (Table 27).

Table 27: Quantity of harvest sold (II Q33.2)

Product (fresh or processed)				Land size category (ha or ac)		
		Women	Men	-2	2-5	5+
Fresh	Range (kg/t)					
	Mean (kg/t)					
	% of harvest	30	60			

When has it been different? Under what circumstances? II Q 33.3

Approximately 80% of the respondents indicated that they usually do not change the proportion of the harvest they consume at home and how much they sell. However, some people said they may sell during the new yam festival as people buy a lot of yam as it is required to celebrate. The men also said that they sell more yam during the dry season because during this period, yam is scarce and consumer demand is high because yam is sweeter. Some sell when they have financial need at home.

Have changes in the production, processing or sale of the product affected you/your spouse/children? II Q34.1

Approximately 25% indicated that there has not being change in the production, processing or sale of boiled yam. Approximately 20% noted that there has being an increase in production of the crop because of improved planting practices and planting materials. Others said that there has been a decrease in production due to weather fluctuations. "*In production, we have experienced changes in weather, when you plant yam and the rain did not come early that year, it will rot. I experienced it in 2016".* People also have less land due to an increase in population. The location of the farm was pointed out by a female farmer, who land is allocated to, who said that *"The site of the farm may determine the changes. Some years, I will have good yield and sell more while in some years yield will be low and I will sell less."* Most men said yam is cheaper now because more farmers are producing at present so the price is low. The changes pointed out by the female are mainly low price and low yield.

Have there been any changes in the market or mechanization in your community? How has this affected your work? What about other groups of people? II Q34.2

About 50% of the total respondents said there are no changes in the market or mechanization of yam production or making of boiled yam. Others said there are changes in the reconstruction of the local market by the government. The women talked about changes in increases in labour, this might be because of the inadequate labour in the study area.

Processing challenges (II Q26)

There were no challenges reported for processing boiled yam from any of the respondents.

Consumption of the product (FGD Q16.1)

The product has no additional processing prior to consumption. After boiling it is consumed**.**

What is the [product] consumed with? FGD Q16.2

Boiled yam is often consumed with palm oil mixed with ground pepper, salt and onions. Sometimes tomato stew is made and eaten with it. It is also consumed as porridge, garnished with vegetables, beans and yam. There are no differences in gender.

***When a person (you or a member of your family) says that the quality of the [product under study] is not good when they eat it, what are the general reasons for this? II Q29.**

Most respondents indicated that the household will complain if the boiled yam has dull colour or colour beyond white, if the yam is too hard and difficult to chew, if the yam is extra soft and if the yam is bitter and has odour.

Thinking of people in your community, how often is the product consumed. KII Q9.

The majority of the respondents indicated they eat yam on a daily basis on the average, but after planting yam the yam will be scarce so they eat occasionally because it is scarce. Youth like eating yam more than the adults and followed by the women. The men prefer swallow also they don't like chewing yam because it does not last in the body. All the people irrespective of status like to eat yam.

Do you think people are buying more or less compared to five years ago? KII Q10.

Out of the four KII, one person indicated there has being change in the selling of yam because their farmers sell more yams now because people are aware of the type of yam they produce – that they are good yams. The KI from Onueke Izza and Umuebe Ohaukwu said they have taboos. The KI from Onueke Said

"The taboo here is that you cannot harvest yam before the new yam festival, it is part of the respect we give to yam. It started in the olden days with our forefathers. So, we cannot break it now. If you harvest before the festival, you will go and appease the land because you have done something bad. After that you can now harvest. Another one is that after harvesting which takes place between November and January –February. After November to February any yam in your farm can be harvested by anybody even if you have not harvested your yam till then. It is believed that you have taken what you need and left the ones you don't need for the less privileged that could not cultivate yam."

While one KII from Umuebe said:

"The New yam festival must be done before harvest. Some people do not join us to do because they are Christians. The women should not use a hoe to make mounds for yam but can do for their other crops. If a woman does it (uses a hoe for yam), she will be sanctioned to provide a goat. It is a kind of respect and also if a woman does it, she will be fined and cannot take care of the husband and family that is why the law was put."

Other KII indicated there are no taboos in their communities. This confirms the findings from Q18II.

2 PRODUCT CHARACTERISTICS

The quality characteristics of a final product depend on the quality characteristics of the crop (raw material) and the processing ability of the crop. You may distinguish the raw final product just after processing (for example raw gari e.g. dry gari) and the final product ready to eat (for example gari cooked into eba or gari added with water and peanuts).

2.1 Raw Material (Crop for the product)

II questions:

***In your opinion, what variety(ies) give the highest quality [product under study]? Why? Facilitator to note if these varieties are different then the varieties they grow" (Q14), or what was stated by the FGD the previous day.II Q19.**

The most mentioned is Igum, which has the quality of being white sweet and smooth skin. Others are okeji, obiaotulugo, orente opoko obela igwe and oko. The varieties they mentioned are not different from what they cultivate.

***If you were to purchase the crop on the market to make the product, how do you recognise and perceive a good crop variety for making a high-quality [product]? By looking at it, by touching, smelling or by tasting it? Rank in order of importance 1=most important. Note for use for pairwise ranking exercise. II Q20.**

1. smooth skin
2. White flesh
3. heavy to carry
4. sweet in taste.

What are characteristics of a variety of the crop that give a poor quality [product under study] so that you would not use or buy it?II Q21.

1. Rotten
2. Dark in colour
3. Light in weight which indicates that beetles has eaten them
4. better

FGD questions:

***Thinking about when you harvest the crop or purchase the crop on the market to make the product, how do you recognise when the crop will make a good, high quality [product understudy]? What are the characteristics? Rank in order of importance 1=most important. Note for use for pairwise ranking exercise. FGD Q10.**

1. The yam that is very white.
2. Big tuber
3. Yam that the body is smooth.
4. Yam that is heavy in weight.
5. Yam that do not have any scratch on it for boiled yam.

***How do you recognise a bad crop variety for the [product under study]? What are the characteristics? Has your community experienced this before? Please describe. FGD Q 11.**

Rough skin with lot of hair

Rots all over the tuber which can extend inside

Light weight

Tough skin “it will be hard at cooking (eg Ngwerenta), it will also have poor yield.

It is still sparingly available but we are dropping it”

2.2 Processing (revise as applicable to your product)

II questions:

***Thinking about when you process the [crop], what would be the characteristics that show it has good processing-ability into [product]? Rank in order of importance 1=most important. Note for use for pairwise ranking exercise. II Q23.**

Easy to peel

Minimal peel loss.

Do not change colour while peeling or after peeling

It will bring out less form during cooking

It softens as you cook

It settles inside the water during washing ie it does not float.

Good fresh yam aroma during cooking

***When buying or selling the product (after processing the product), what are the essential and most important characteristics required for a high quality product? By looking at it, by touching, smelling or by tasting it? Rank in order of importance 1=most important. Note for use for pairwise ranking exercise. II Q24.**

1. White in colour
2. Sweet taste
3. Good yam aroma
4. Heavy in the mouth but not too strong
5. Not sticky in the hand

What are the quality characteristics that would influence, your decision or a customer's decision, not to buy or use the [product under study]? Why? II Q24.1

Dark in colour

Sticky and too soft

Bitter I taste

Too hard

It milts in the mouth while eating.

Pairwise for characteristics (see appendix A). Facilitator to collect the most important top six characteristics from Q20, 23, 24. II Q25.

The summary of the pair wise shows that

1. white colour
2. big tuber
3. sweet taste
4. smooth skin

FGD questions:

***Thinking about when you process the [crop], what would be the characteristics that show it has good processing-ability into [product] at each stage of processing? Rank in order of importance1=most important. Note for use for pairwise ranking exercise. FGD Q14.**

White flesh

Smooth skin

Sweet taste

Easy to peel

Soft

Good aroma.

All the FDGs mentioned these above attributes.

Pairwise for raw material and processing characteristics (see appendix A). Facilitator to collect the community's most important top six characteristics from Q10 and Q14. FGD Q15.

The pairwise ranking was topped by

White colour

Sweet taste

Soft

Good aroma

Final product (raw or ready to eat final product) characteristics

II questions:

***At home, when preparing the [product under study] (cooking into a paste, boiling, adding water, ingredients etc), what are the characteristics of the product required? Probe: sensory characteristics – texture, appearance, taste, smell etc. II Q27.**

it has to be white,

have good aroma during cooking

the yam wont scatter in the pot or look soggy

it has to be soft and smooth, have a good white colour

***Describe the characteristics of a high-quality end [product] prior to consumption, just by looking or touching it. Rank in order of importance – or use pairwise ranking exercise for final product characteristics.**

It will look bright (white or Yellow)

It will not look soggy

It will be mealy

When touched it will be easy to break apart.

II Q28.1 When you eat the [product under study]? What are the characteristics of a high quality product in the mouth and how do you evaluate it? Taste, texture in the mouth, aroma etc., depending on the consumption form? II Q28.

Sweet

Soft

Not milt in the mouth

Breaks apart easily in the mouth

Final product (see appendix A). Facilitator to collect the community's most important top six characteristics from Q27, 28. II Q30.

1. Sweet
2. White
3. mealy
4. Breaks apart easily in the mouth

Characteristics of a high quality product (FGD)

1. White
2. Soft (not too soft)
3. Sweet
4. good aroma

Final product characteristics (FGD)

1. Big size
2. White flesh
3. Soft
4. Sweet
5. Good aroma

2.3 Conclusion

- The product (boiled yam) is majorly traded by adult female youths
- It is bulky and contains lots of water making it difficult and costly to transport
- Boiled yam as a product is profitable (takes much less time and effort for preparation)
- The shelf life for the crop i slow and cannot be kept for a long time as a fresh product
- The consumption of the product is more in the urban areas and majorly consumed in the dry season

During breading preference should be giving to

- Size of the tuber, the bigger the more preferred.
- Colour of the flesh, the white colour is most preferred though some other like yellow yam as long as browning is not present.
- The sweet yams are being preferred for boiling.

3 MARKET REPORT FOR BOILED YAM

Table 28 provides an overview of the yam sellers interviewed for the market study. These were four women in total. The average age was 39 years and the household size 8 people. These indicate they are still strong and active with large household sizes. They also had some basic education up to secondary level. Three sellers owned a means of transportation while one person did not. All the respondents had means of communication which was mainly handset. The average distance to the nearest market for the traders was about 2.25km with the maximum as 4km. Among three of the

individuals, their average marketing experience was 20 years indicating that majority of the traders had long years of experience except for one person, who had only 2 years of experience. All the respondents sold boiled yams to restaurants, except for one person who was a street vendor.

Table 28 Background information on sample (MI Q1-7/1-14)

Interview	001	002	003	004	Mean
Gender	female	Female	Female	female	
Age (profile)	35	42	33	47	39.25
Ethnicity	Ibo	Ibo	Ibo	Ibo	
Household size	5	6	17	4	8
Level of education	Secondary	Junior Secondary	Secondary	Primary	
Ownership of means transportation (If yes, type)	y	N	N	n	
Ownership of means of communication (If yes, type)	Y	Y	Y	y	
Road to nearest town is good (Y/N)	n	Y	y	y	
Distance to market from the home (in km)	1	3	4	1	2.25
Marketing experience (years)	11	2	12	15	10
Main occupation (Specify)	Trading-	Trading	Trading	Trading	

3.1 The value chain

Zakibiam in Benue State (located in the middle belt area of Nigeria and Taraba State

Okwor Market (ezzamgbo, Ebonyi

Izzi, Onueke, andEzzamgbo in Ebonyi State

Figure 4 Value Chain Map for Yam in Ebonyi State

Yam cultivation is dominated in the northern part of the country especially in Zakibiam, Benue state, where majority of the yams traded come from. These are usually transported in heavy duty vehicles and trucks to the South East Nigeria where it is mainly consumed. In terms of minor trade flows, yams are also traded within the same state but from locations where it is in abundance like in markets located within the state.

Table 29 Nigeria Yam Value Chain Highlights

Production	Transportation & Storage	Market
Nigeria produces 60% of the world's yams, annually producing an average of 31 million metric tons •Cultivation is concentrated in the forest, derived savannah and southern Guinea savannah agro ecological zones in the central and southern region •Though area harvested has increased by more than 50% since 1990, yields in 2010 (10.5 MT/Ha) were similar to 1990 estimates •Estimated yield gap in 2011 was 10.5 MT/Ha •Most yam farmers are male smallholders with low levels of education •Women are playing a larger role in yam production in some parts of Nigeria •Major constraints include access to credit, disease and pest attacks, and high production costs (including inputs, time and labour)	Transport is difficult because of poor road conditions, the bulkiness of the product, poor vehicles, theft en route, and bribes paid by drivers to Nigerian police at checkpoints •Inadequate storage facilities can induce dry rot and losses of up to 50% of fresh matter	•Most farmers must travel to their nearest semi-urban or urban market to sell their yams •Yam prices have increased overall in recent years, with price variability depending on the season •Wholesaler gross margin is approximately one-third of the sale price •Lack of credit constitutes a major barrier for yam marketers and traders •Transportation constituted the highest percentage (71.96%) of the marketing cost for wholesalers •Men and women are more equally involved in yam marketing and tradin

Source: Kathryn Bergh, Patricia Orozco, Mary Kay Gugerty, and C. Leigh Anderson (2012)

Figure 5 : 911 Truck waiting to be loaded with yam, ZakiBiam Nigeria, January 2013.

Source: Nweke, Felix., Aidoo, Robert and Okoye, Benjamin (2013)

Proportion (percentage) of the crop kept by the farmer for home consumption and sold by farmers, and to which markets in (MI Q9 (first), Q16 (Nigeria))

● **Fresh form:** About 15% is kept by the farmer for home consumption.

● **Processed form:** About 70% of the fresh tubers are sold as boiled yam usually in combination with beans for people to consume. Some indicated selling in the form of yam porridge garnished with vegetables while others sale as roasted and consumed with oil.

● **Processed form:** About 5% is processed by the farmers into other forms like achicha (dry yam chips usually from the spoilt/rotten ones) processed further into alibo. In the country average frequencies of consumption were 65 percent from fresh tuber, 25 percent from product processed in the traditional sector and only 10 percent from product processed industrially (Nweke, 2017).

Figure 6: Wholesome and unwholesome yam being dried for making amala, Zakilbiam, January 2013

Source: Nweke, Felix., Aidoo, Robert and Okoye, Benjamin (2013)

Proportion (percentage) of the crop consumed in urban areas around the market in: Fresh form, Processed form: MI Q10 (first), Q17 (Nigeria)

The results in Table 30 indicate that the major producing locations (rural) usually sell to urban consumers more (70%) while the urban dwellers consume fresh forms more (70%). Sold in other processed forms, usually *alibo*, was minimal while others were sold processed as the product (10-15%) in both the rural and urban centres. In West Africa, yam is produced more for sale than for home consumption. In both Nigeria and Ghana, 60 percent of the yam harvested, after discounting for seed, is sold and nly 40 percent is consumed in the farmers' households (Mignouna *et al.* 2014).

Table 30 Proportion (%) of crop used in fresh and processed forms (MI Q9 or Q16)

	Crop use (home consumption vs sales)	South-East Region Percentage (%)	
Rural level	Home consumption	15	These are the major producers while the urban and rural centres are the major consumers
	Sold in fresh form	70	
	Sold as boiled yam	10	
	Sold in processed form [other products like pounded yam]	5	
Urban level	Home consumption	60	In the urban areas, more people consume yams (75%) because of the density of population in this area, more number of food vendors and restaurants
	Sold in fresh form	20	
	Sold as boiled yam	15	
	Sold in processed form [as pounded yam]	5	

***Major locations where boiled yam is processed and marketed? MI Q11 (first questionnaire), Q18 (revised Nigeria)**

Zakibiam Benue State, Izzi and Ikwo in Ebonyi State and Uturu in Abia State. Benue State, In Nigeria has been labelled the food basket of the nation. ZakiBiam market is the largest in the country, and maybe in Africa. Farmers from far and wide bring their produce for better bargains while traders come from across the country and neighbouring Cameroun, Niger and Ghana to make purchases. The market opens to only yam sellers and buyers. This is the best place to buy yams at a very low cost as most sellers are local cultivators of the crop. Benue is Nigeria's largest yam producing state and records an average sale of 1.5 million yams a year.

Izzi in Ebonyi, Obinogu in Ivo LGA, Agwu LGA in Enugu, Akaeze in Ivo LGA. Trailers convey yams out of these towns to other places.

Demand segments associated with boiled yam. MI Q12 (first questionnaire), Q19 (revised Nigeria)

Men are the major buyers of boiled yam, who are usually between 25-35 years old. Most people that purchase yam are civil servants, traders, etc. Most take away the product in food packs. Children, men and women buy boiled yam but majorly consumed by adult men and women. They buy from the restaurants or food vendors. “Sometimes food vendors bring pounded yam and fufu to my restaurant which I also sell to customers who might request for these in my restaurant” as indicated by a trader who sale boiled yams.

Demographics of the customer groups / buyers of boiled yam. MI Q22 (first questionnaire), Q30 (revised Nigeria)

It was difficult for the sellers to estimate the size and describe the characteristics of their buyers. Description included that buyers came from towns and villages, and that it was consumed by men, women and children, but mostly among men and children.

One seller said *“drivers, commuters and individuals come to buy boiled yam in my restaurant. I sell very close to the market. The market is a 4-days market but I sell daily. More customers come to buy on Nkwo day which is the major market day. The consumers come from towns and villages but more by the villagers whom are mainly commuters and civil servants”.*

The rural dwellers (10%) consume more of boiled yams because they produce the yams more in the rural area Middle aged men consume more of porridge boiled yam, while pounded yam is consumed by aged from 40 and above. Consumers in towns are estimated at 5%.

Customer demands. MI Q23 (first), Q31 (Nigeria)

The table below shows the responses from each of the yam sellers on their preferences of yam variety for boiled yam. Only one individual mentioned the name of variety – Igum – which was also ranked very highly among the communities, both men and women. This was related to its colour and drawability. Other factors included how neat it was, white colour, heaviness in the mouth, sweetness, etc.

Table 31 Preferences of yam variety for boiled yam

Seller	Description of preferred variety for boiled yam
1	Our choice of yam variety is *Igum* variety because it draws and also has white colour. *1gum* has good colour stability. I always buy the type of yam that appeals the eyes of people, anybody that sees the yam will like to come and eat it. Also when I am peeling it, the body is smooth and there is no spot on the body.
2	The way it was cooked How neat it is The consumers prefer the colour white The dry matter should be very high-it should be heavy in the mouth
3	Consumers prefer sweet yams that are white compared to others. The seasonality is also important, during the wet season after harvest; yams are not palatable but become palatable during the dry season. This is as a result of the high moisture content.
4	1. How neat the yam is 2. Colour- should be white 3. When touched, is like brittle and not mealy

Percentage of the crop and product traded (MI Q15 original questionnaire, Q23 revised Nigeria)

Table 32 Quantities traded (tonnes) as fresh and processed

Product	Quantities traded (tonnes)
Fresh crop	70%
Processed [product]	20%
Processed [other products]	10%

The majority of yam sold is estimated to be sold fresh, as opposed to processed. It is also mainly in the dry season (from October) because the moisture content is low making it sweet. People demand for more yams during that period also because of celebrations like traditional weddings, dowry payments and other festivities which come up more in the dry season. Then the supply of yams during the dry season tends to cease making it less available than during the rainy seasons. This makes the price of yams increase. During the planting time, it is also high in demand because the yams are scarce. Boiled yams are sold more during the rainy season because people tend to take hot food more within the rainy season. During the dry season, it is also more costly and the demand is slow.

Percentage traded daily in market of the product, (MI Q16 original questionnaire, Q24 revised Nigeria)

Table 33 Daily throughput/amount traded daily (%)

Part of the year	Quantities of crop (tonnes) (tonnes)	Quantities of product (tonnes)
Wet season		60%
Dry season	70%	70%
Planting time	50%	
Festive periods	70%	
Time of school fees		
Other (specify)		

Transport, storage, means of selling the crop and associated quality characteristics (MI Q17 original questionnaire, Q25 revised Nigeria, MI Q18 original questionnaire; Q26 revised Nigeria)

Table 34 below provides an overview of the means of transportation, storage and means of selling yam and boiled yam, and the important characteristics associated with it. Respondents indicated that the main means of transportation for yams was in trucks. One person indicated that they moved their produce in a wheelbarrow. Ware yams, a specific variety of yam, was transported in 911 trucks from Benue State. Boiled yam is commonly transported by bicycle. The major issue regarding product quality during transportation is damage or perishability.

In terms of storage, ware yams for boiled cassava are stored in barns, under shade in rooms or kept on wood/planks in the room. It can also be stored outside on planks/wood under shade.

Yams are sold as medium and/or large tubers in markets/stalls.

Table 34 Means of transportation, storage and issues affecting product quality

	Means	Issues that affect product quality
Transportation	Truck Bicycle	The roads are in a dilapidated state and vehicle mishaps. Sometimes the vehicle conveying the yams will be involved in accidents. Sometimes, we might trip with the wheelbarrow conveying the product and fall. This makes it contaminated with dirt.
Storage	in hut under tarpaulin, in sealed container	Perishability
Means and forms of sales		During sale, in slack periods, the demand is low. During sale, sometimes the customers bolt away without paying for the food. During sale, rains might disturb me and make me not to sell more as targeted.

Drivers of change in terms of demand for crop and final product (MI Q20 original questionnaire, Q28 revised Nigeria; MI Q19 original questionnaire, Q27 revised Nigeria.

Overall, demand for yam was thought to be increasing over the past ten years, and it was expected to increase further due to the increase in population. The price of boiled yam has also been increasing for the past ten years. For the past two years, the price has been increasing. In 2016, it was N150 for a plate and last year N250.

The sellers identified a number of drivers that influence demand for yam. The most significant among the four interviews was economic, namely people's income – which relates to the ability of the wealthy classes to purchase the product, and secondly the price of yam. Both of these factors are indicative

indicators of the health of the economy. Road conditions was another factor, as yam has to be transported by distance. Seasonality was another factor, which related to price (high during wet season) and taste (taste is better in the dry season).

Table 35 Drivers of Change of demand and quality of yam and boiled yam

Seller	Drivers of demand	Drivers of change of quality characteristics of yam
1	Income is paramount – and therefore the health of the economy in general is an importance source of demand. People who consume pounded yam are described as wealthy, this is followed by location in terms of distance from the source of production to the source of consumption.	Seasonality of yam, more market during dry season, Taste during the dry season is better. The yams are unpalatable during the rainy season.
2	Infrastructure is very important-in terms of road conditions from the point of production to the market. This is also related to price of yam which tends to be costly affecting demand. It is also seasonal, with the price of yam so high during the wet season when all yams must have been planted	Nutrition: It is highly nutritious when garnished with vegetable. The demand becomes high.
3	Low number of value-added products for yam unlike cassava is a major factor affecting demand. Yam can only be processed as flour. Poor storage conditions and transport is also a drive of change.	Lack of money The scale of production is a factor- if the production is high; people will tend to demand more because the price will be lower.
4	Increasing population. Low shelf life, disease attack while in storage and income of the consumers.	Yams like *Obioturugo* can change colour from white to brown which is not pleasant to people. Sometimes, the yams rot.

Profitability of the crop

The results show a total revenue of about N180,000 for 300 yams at N600 per tuber of yam. About N135,000 was expended on purchase of the yams with loading/offloading and transportation costs at N144,300. The results show an estimated total profit of N35,700 for 300 tubers of yam. Respondents indicated that the yams are bought in bags and each bag contains between 15-20 yams each.

Table 36 Profitability Analyses for Yam

Item	Unit	No	Price	Value
Revenue	Tubers	300	600	180000
Costs				
Purchase price	Tubers	300	450	135000
Loading/offloading	Tubers	300	5	1500
Transportation	Tubers	300	26	7800
Total cost				144,300
Profit (revenue-costs)				35,700

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5 APPENDICES

5.1 Appendix 1: Boiled Yam Profile Table

	Group: ***Male***	***High quality characteristics*** *Characteristics that give a good, high quality product*	***Indicator of high quality characteristic*** *Where data available, describe characteristics (e.g. how sour)*	***Priority of high quality*** **characteristics** Indicate *the rank, and note if simple or pairwise ranking*	***Poor quality Characteristics*** *that give a bad or poor quality*	***Indicator of poor quality characteristics*** *Where data available, describe the characteristics (e.g. how sour*)	**Varieties-GOOD** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*	***Varieties- BAD*** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*
1	Raw material characteristics for product quality (agronomic, post-harvest)	II Q20	II Q20	II Q20	II Q21		IIQ15, IIQ19	II Q21
		Ash coloured Skin	The skin of a good yam is ash in colour and matured when you touch it, it is heavy as stone	6	Beetle attack	the yam that has '*eje'* (i.e beetle), which ate it or has deeper rot.	All the varieties are good for boiling, just boil and eat with sauce; such varieties as: Igum, Oko, Abi	There is no bad variety for boiled yam
		Big sized tuber	The size of the tuber will be six inches solid block.	2	Dark coloured yam	The colour turn from white to yellow, have pumps on the skin. When touched it will be like bread and be smelling rotten smell.	(i) ighumu (ii) oko (yellow) (iii) nyeji (iv) ji mbala (v) amagi/abi (ome ngwa ngwa	There is no bad variety for boiled yam
		Brown skin tuber	The body of the yam will be brown	4	Decayed yam tuber	the yam that is bruised during harvesting will not be good because it will start to rot inside.	opoke(1) –. Okeji – Nyeji– Abi Oturuugo, OteEkpe Oko, Edegbere Mbula ,Okepa Isiakpukpa .	There is no bad variety for boiled yam
		Fresh skin tuber	The skin will be fresh not like a burnt skin,	5	Not white tuber	the yam that is not white	Igwe, Obiaotulugo, Sam paper, Wafin (water yam)	There is no bad variety for boiled yam

	Group: ***Male***	***High quality characteristics*** *Characteristics that give a good, high quality product*	***Indicator of high quality characteristic*** *Where data available, describe characteristics (e.g. how sour)*	***Priority of high quality*** **characteristics** Indicate *the rank, and note if simple or pairwise ranking*	***Poor quality Characteristics*** *that give a bad or poor quality*	***Indicator of poor quality characteristics*** *Where data available, describe the characteristics (e.g. how sour*)	**Varieties-GOOD** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*	***Varieties- BAD*** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*
1	Raw material characteristics for product quality (agronomic, post-harvest)	Good and viable Seed		7	Lines on the tuber	he yam that has lines at the back of the tuber and when peeling		
		No rot	if it is light in weight, you know that it is rotten.	7	Rotten body	the yam that gets rotten easily like nvula	Orunte	
		Smooth skin tuber	smooth and spotless When cut into two.	1				
		White coloured skin	it will be white in colour, Good taste like sweet and honey)	3	Spots on the body	If yam has spots on the body. Then it wont be good for boiling		
		Smooth skin tuber	smooth and spotless When cut into two.	1	Tiny head	The head is tiny with different colours with lumps in the skin		
					Rough body	The yam that the body is rough and rotten inside.		
					Dry rough skin tuber	The yam that the body is rough and rotten inside.		
					Not soft	The yam that does not get soft no matter how long you cook it		

	Group: ***Male***	***High quality characteristics*** *Characteristics that give a good, high quality product*	***Indicator of high quality characteristic*** *Where data available, describe characteristics (e.g. how sour)*	***Priority of high quality*** **characteristics** Indicate *the rank, and note if simple or pairwise ranking*	***Poor quality Characteristics*** *that give a bad or poor quality*	***<u>Indicator</u> of poor quality characteristics*** *Where data available, describe the characteristics (e.g. how sour*)	**Varieties-GOOD** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*	***Varieties- BAD*** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*
2	***Processing characteristics*** *of raw material for the product quality during processing (Step 3 will add more details here)*	II Q23 Easy to peel	II Q23, Q25	II Q23, Q25 7	II Q21	II Q21	II Q15, Q19	
		White coloured skin	it will have a good white colour,	1	Dark colour on the head		Utiekpe,	*Nvula* can be used but very difficult to process
		Minimal peel loss	The yam that the peel loss will be minimal	6	Difficult to process	*Nvula* can be used but very difficult to process		
		Smooth flesh	It will have a smooth body, the skin will be smooth and soft with no abrasion or bruises,	8	Black lines on the tuber	The yam that has lines at the back of the tuber and when peeling, it will be watery. E.g. Nvula (water yam).		
		No spot	it will be fresh and with spotless skin,	2	Spots on the body	If yam has spots on the body.		
		Not rotten tuber	It will be fresh and not decayed or rotten. It will be nor be sick (ikakpo)	7	Not white			
		No thorns	When peeling the yam, the peels will be going out easily, there will be no thorns on it	7				
		Good slicing	By slicing, you need to slice the yams better but not so small/tiny to avoid it soaking water, you slice in such a way that it will cook well to enable pounding or eating in boiled form	7				
		Easy to cook	Easy to cook, and have some crack on it	6				
		Strong	After cooking and it is strong, it is better to eat it boil well	7				

	Group: ***Male***	***High quality charac-teristics*** *Charac-teristics that give a good, high quality product*	***Indicator of high quality characteristic*** *Where data available, describe characteristics (e.g. how sour)*	***Priority of high quality* charac-teristics** Indicate *the rank, and note if simple or pairwise ranking*	***Poor quality Charac-teristics*** *that give a bad or poor quality*	***Indicator of poor quality characteristics*** *Where data available, describe the characteristics (e.g. how sour*)	**Varieties-GOOD** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*	***Varieties- BAD*** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*
	Charac-teristics of raw final product	**II Q24, II Q27**	**II Q24, Q27**		II Q29	II Q29	IIQ21	
		Ash colour		6	Dull colour	The Yam that has dull colour is not good		
		White colour	t will have a good white colour	1	Hard to cut	when it hard to cut with hand or while chewing it		
		Fresh aroma	it will have a pleasant fresh yam aroma,	6	Not soft	*For boiled yam, if it is not soft and hard when chewed*		
		Heavy	Heavy in the mouth but not too strong	4	Not sweet	*The person will complain that the yam is not sweet*		
		Milk colour	The colour will be milk colour	5	Not well cooked	when cooked and the yam is well done.		
		Neat	It will be neat in the eye	7	Odour	*People will complain if the yam has odour*		
		No dirt	It should have no dirt in it,	7	Strong	it is very strong to eat, then people will complain		
		Smooth	the yam must be smooth without lumps	3	Too soft	if the boiled yam is extra soft due to overcooking,		
		Soft	It will be soft in the hand.	3				
		Starchy	The yam will have starch in it	6				
		No discolouration	there should be no discolouration on the fleesh while peeling,	6				
		No black spot		6				
		Not absorbed water	It should not drink water	5				
		Not overcooked	If it cooks beyond the required time or if it doesn't get soft at the expected time, then it is not good.	6				
		Well cooked	it should get done well(o gahi anumiri).	5				
		Sweet taste	The Yam will be sweet in taste					

	Group: **Male**	***High quality charac-teristics*** *Charac-teristics that give a good, high quality product*	***Indicator of high quality characteristic*** *Where data available, describe characteristics (e.g. how sour)*	***Priority of high quality* characteristics** Indicate *the rank, and note if simple or pair wise ranking*	***Poor quality Characteristics*** *that give a bad or poor quality*	***Indicator of poor quality characteristics*** *Where data available, describe the characteristics (e.g. how sour*)	**Varieties-GOOD** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*	***Varieties- BAD*** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*
3	***Charac-teristics of cooked/ready to eat final product*** (*Step 4 will add more detail here).* *To look at*	White colour	it will have good white colour	1	Dull Colour	if the colour of the yam is very dull	All the varieties are good for boiling, just boil and eat with sauce; such varieties as: Igum, Oko, Abi,	There is no bad variety for boiled yam
	To look	Ash colour	The boiled yam will have ash colour.	4	Bad odour	The Boiled Yam that has bad odour		
		Clean	boiled yam- the colour should be clean	3	Not sweet yam			
		Attractive	The colour should be attractive , white or yellow in colour after cooking	3	Not well cooked yam	When the Yam is not well cooked, it will show when you taste it		
	To touch	Soft	it will be soft to show that it is well cooked	1	Strong Tuber	When the Yam is very strong to eat	(i) ighumu (ii) oko (yellow) (iii) nyeji (iv) ji mbala	There is no bad variety for boiled yam
		Easy to break	When touched it will be easy to break apart.	4				
		Mealy	The yam should be mealy	3				
	To look	Not scattered	It is not scattered or soggy	3				
	Texture in the mouth	Easy to swallow	It should be easy to swallow and not stick to the throat	4				
	To touch	Not strong		6				
	To taste	Sweet taste	If It is sweet, you will know you are eating yam.	2				
	Texture in mouth	Smooth	it should be mealy and smooth in the mouth. *Oga **aphi aphi n' onu***	3			Utiekpe	
							Igwe, Obiaotulugo, Sam paper, Wafin (water yam)	
							Orunte	There is no bad variety for boiled yam

	Group: ***Female***	***High quality charac-teristics*** *Characteristics that give a good, high quality product*	***Indicator of high quality charac-teristic*** *Where data available, describe characteristics (e.g. how sour)*	***Priority of high quality*** **characteristics** Indicate *the rank, and note if simple or pairwise ranking*	***Poor quality Charac-teristics*** *that give a bad or poor quality*	***Indicator of poor quality charac-teristics*** *Where data available, describe the characteristics (e.g. how sour*)	**Varieties- GOOD** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*	***Varieties- BAD*** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*
1	Raw material charac-teristics for product quality (agronomic, post-harvest)	II Q20 Big sized tuber	II Q20 very big sized tuber like tree stem	II Q20 2	IIQ21 Not bulking	IIQ21 The yam that does not bulk and big as one yam	IIQ15, IIQ19 All the varieties are good but *Igum* is the best for boiled yam.	No bad yam variety was mentioned
		Fresh skin	The Yam that the skin is fresh	1	Not fresh tuber	The yam tuber that is not fresh	Nwaopoko is Sweet, and can be eaten without adding anything.	No bad yam variety was mentioned
		Round and sturdy	The yam that is long or oval in shape.	2	Rotten Tuber	The yam tuber will be rotten when you see it. It will also be very stiff and hard when pierced with nail (ita-aki).	Otiekpe and Obela are good for boiled yam. But there is a variety of abala that is also very good (*nwaawafu*).	No bad yam variety was mentioned
		Smooth skin	smooth skin (fine as if oil was applied on it)	1	Rough body	If the body of the yam is rough with gallops. Also, the yam that the body is rough and rotten inside.		
		White coloured Skin	White coloured skin is good for boiled yam	2				No bad yam variety was mentioned
								No bad yam variety was mentioned

	Group: **Female**	***High quality charac-teristics*** *Characteristics that give a good, high quality product*	***Indicator of high quality charac-teristic*** *Where data available, describe characteristics (e.g. how sour)*	***Priority of high quality* characteristics** Indicate *the rank, and note if simple or pairwise ranking*	***Poor quality Charac-teristics*** *that give a bad or poor quality*	***Indicator of poor quality charac-teristics*** *Where data available, describe the characteristics (e.g. how sour*)	**Varieties- GOOD** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*	***Varieties- BAD*** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*
2	***Processing charac-teristics*** *of raw material for the product quality during processing (Step 3 will add more details here)*	II Q23	II Q23, Q25	II Q23, Q25	II Q21	II Q21	II Q15, Q19	No bad yam variety was mentioned
		No spot	(no attack of pest or disease)	2	Rotten body	The yam will be rotten when you see it. It will also be very stiff and hard when pierced with nail (ita-aki).	All the varieties are good but *Igum* is the best for boiled yam.	
		White colour	(Turing from white to red when peeled). the yam will be white in colour	1	Rough body	If the body of the yam is rough with gallops. Also, the yam that the body is rough and rotten inside	Nwaopoko.	
		Not rotten tuber	The yam that is not rotten	2	Not bulking	The yam that does not bulk and big as one yam	Otiekpe and Obela , abala, (*nwaawafu*).	No bad yam variety was mentioned
		No black threads on the skin	It should have no black threads or blemishes inside it	1	Not fresh tuber			No bad yam variety was mentioned
		No hair	f there is no hair seen on the boiled yam	2				No bad yam variety was mentioned
		No yellow tint		2				
	Characteristics of raw final product	**II Q24, II Q27**	**II Q24, Q25**		II Q29	II Q29	IIQ21	
		Heavy	the weight will be heavy	4				
		No dirt	It should have no dirt in it,	3				
		Soft	it should be soft to the eye not hard to the eye	2				
		Sweet taste	sweetness of the yam	3				
		White colour	The bright white colour of the yam	1				
		Foamy		2				
		No discolouration	here should be no discolouration on the flesh while peeling	2				

	Group: **Female**	***High quality charac-teristics*** *Characteristics that give a good, high quality product*	***Indicator of high quality charac-teristic*** *Where data available, describe characteristics (e.g. how sour)*	***Priority of high quality* characteristics** Indicate *the rank, and note if simple or pairwise ranking*	***Poor quality Charac-teristics*** *that give a bad or poor quality*	***<u>Indicator</u> of poor quality charac-teristics*** *Where data available, describe the characteristics (e.g. how sour*)	**Varieties- GOOD** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*	***Varieties- BAD*** *Include scientific names and indicate (L)-local, (I) improved older released variety or (N) new variety recently released*
3	***Characteristics of cooked/ready to eat final product*** (*Step 4 will add more detail here).* *To look at*	II Q28 No spot	II Q28, Q30	2	II Q29	II Q29		
		White colour	The yam with good white colour	1	Overcooked	If the yam is over done "drink water" it will not be appetizing.	All the varieties are good but *Igum* is the best for boiled yam.	No bad yam variety was mentioned
	To touch	Soft	The yam should be soft when you see it	1	Strong	They will complaining that: It is very strong while eating the boiled yam. This means it was not cooked very well.	Nwaopoko is Sweet, and can be eaten without adding anything.	
	To taste	Sweet Yam	The yam will be sweet during eating	2	Not well cooked	If the yam is not well cooked	Otiekpe and Obela are good for boiled yam. But there is a variety of abala that is also very good (*nwaawafu*).	No bad yam variety was mentioned
		Milk colour		3	Not sweet	The person will complain that the yam is not sweet or that it is very strong and was not well cooked.	All the varieties are good but *Igum* is the best for boiled yam.	No bad yam variety was mentioned
					Too soft	The Yam that is too soft after boiling	Nwaopoko is Sweet, and can be eaten without adding anything.	
					White to yellow	that the colour turns from white to yellow		

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