

Gendered Food Mapping of Fried Sweetpotato in Ghana

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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

The study was conducted in Bawku Municipality in the north-eastern part of the Upper East Region of Ghana. Three types of information (key informant interviews, focus group discussion (FGD) and individual interviews) were collected from three communities that is; Abisiga, Baribari and Tempezua. Descriptive statistics of the individual interview shows that women constitute 33% of the sample that is 6 out of 18 respondents. The ages of the respondent ranges between 19 and 72 with the average age being 39 years. The ethnic distributions of the sample are Kusasi (56%), Bissa (33%) with the rest being Fulani and Moosi. Agriculture was the backbone of the economies of the enumerated communities. Men and women were both involved in the production of food crops and livestock. The community survey revealed that both men and women have similar perceptions of what constitutes a poor or rich household. Both male and female farmers engaged in monocropping, mixed cropping, intercropping and ridging. Sweetpotato was produced as a monocrop because the leaves of the crop often spread out, making it difficult for a second crop to thrive. The community interactions showed that the majority of men and women farmed together on family plots (up to 80%). However, the community FGD showed that men tended to have better access to productivity enhancing inputs such as good quality lands, fertilizer and family labour. The data from the individual interview show that Obari was the most preferred sweetpotato variety irrespective of sex. Most men preferred Obari because its vines were widely available, whereas for the women, it was because of its good taste. Kuffour was another variety preferred by men predominately, and Puripuri by women. Amuskwera was reported as one of the less preferred sweetpotato varieties cultivated in the surveyed communities. It was reported to be tasteless, not mealy, less compact and had low domestic demand. The main constraints to sweetpotato production across the surveyed communities had to do with inadequate access to fertilizer and labour as well as pests and diseases. The female respondents defined a good sweetpotato crop as one that is easy to process, has a good taste and can grow on marginal lands while for the males, high yield, market demand, good taste and tolerance to pests were important.

Keywords: fried sweetpotato, preferences, Ghana, mealiness, taste, market demand.

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 (cassava, yam, potato, sweet potato, banana) 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, 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
- **Activity 3: Gendered product mapping**
- Activity 4: Community-based RTB Food processing/preparation diagnosis
- Activity 5: Consumer taste tests in rural and urban market segments

This report presents the findings for Activity 3, Gendered product mapping.

The objectives of activity 3, 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 and product, 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.

2 METHODOLOGY

2.1 Study area

The Bawku Municipality is located in the north-eastern part of the Upper East Region of Ghana. The Municipality falls within latitude 11°N and longitude 0.61E and located about 78km from Bolgatanga, the capital of the Upper East Region. The Municipality is about 28km from Pusiga District which now shares boundaries with Burkina Faso, Ghana's immediate neighbouring country to the north. In 2010, the population of the Municipality stood at 98,538 (52% female) with a population density of 398.56 persons per square kilometre. The population of the Municipality constitutes about 9.4% of the population of the Upper East Region (Government of Ghana, GoG, 2016).

The Municipality is endowed with vast arable land which is conducive for large scale farming. This notwithstanding, crop yields especially the productivity of staple food crops is generally low as compared to other districts within the Upper East region. Several factors such as erratic rainfall, soil infertility, bush fires and lack of farm inputs have contributed to low agriculture production in the municipality. Consequently, food insecurity is a recurrent problem especially during the dry season. In terms of agro processing, the Bawku Municipal Assembly has no large-scale manufacturing industries. However, the Ministry of Food and Agriculture in the Municipality has over the years trained women on new technologies in food processing. The municipality is therefore characterized by small-scale food processing. Bawku municipality although largely considered as an agrarian economy, is also regarded as the commercial nerve of the Upper East Region. The Municipality has a three-day market cycle which plays a very important role in the local economy. Commodities traded locally range from foodstuffs, livestock to manufactured goods. Due to its strategic location and its proximity to the eastern Burkina Faso and Northern Togo as well as easy crossing into Mali and Niger, trade is very important. However, due to the carving of the two districts (Binduri and Pusiga), the market centers in the Municipality has been reduced (GoG, 2016).

Given the strategic location of the Bawku Municipality, importance of sweetpotato and previous interventions by the CIP, the municipality was purposively selected for this assignment. Three types of information (key informant interviews, FGD and individual interviews) were collected from three communities (i.e. Abisiga, Baribari and Tempezua). Key informant interviews were conducted with community elders, one in each of the community visited. Two separate FGD (disaggregated by sex) were held in each community (6 FGDs; 3F, 3M). A total of 18 individuals from the three communities were consulted (6F, 12M). In addition, market interviews were conducted in urban and peri-urban areas: Bawku market and Pusiga market, respectively. Three and four market interviews were conducted in the Pusiga and Bawku market, respectively (7M; 6F, 1M). Expert fryer and consumer assessments were also undertaken at two levels namely at the urban (Bawku) and peri-urban (Manga) levels. Four expert fryer and 30 consumer assessments were conducted at each level.

All the three key informants interviewed were men from 45 to 73, years old. The key informants were all indigenes, two Kusasis and one Bissa in terms of ethnicity. The key informants were all opinion leaders and given their level of experience and nativity, they were all able to provide useful information about their community.

The male and female FGD were composed of participants ranging from 20 and 75. The major ethnicities of the participants were Kusasi and Bissa with Moosi and Fulani being minorities. The participants of the FGD were all involved in the production of sweetpotato with majority of them as consumers and processors.

Descriptive statistics of the individual interview shows that women constitute 33% of the sample that is 6 out of 18 respondents. The ages of the respondent ranges between 19 and 72 with the average age being 39 years. The ethnic distributions of the sample are Kusasi (56%), Bissa (33%) with the rest being Fulani and Moosi. About 39% of respondents are household heads with spouses being 28%. The rest of the respondents are other family members. All the respondents are Muslims and have been involved in frying of sweetpotatoes. The primary occupation of 94% of the sample is agriculture.

3 FINDINGS: SOCIO-ECONOMIC CONTEXT AND PRODUCT PREFERENCES

3.1 Social segmentation and livelihoods

The three communities that were surveyed are all rural communities with an overwhelming majority of households deriving their livelihood from agriculture. In terms of sex, the female population is slightly higher than the male population. As is characteristic of northern Ghana, poverty is widespread with female-headed households being especially vulnerable. The dominant ethnic groups are Kusasi, Bissa and Mossi. Fulanis are a minor ethnic group. **Table 1** presents a summary of the social segments observed in the 3 communities visited.

Table 1: Social segments (KII, n=3)

Community name	Social segments (%)
Tempezua	Ethnicity: Bissa (60%), Kusasi, Moosi and Fulani constitute the rest Sex: Female (60%) Occupation: Agriculture (99%) Wealth: Poor (70%)
Abisiga	Ethnicity: Kusasi (99%) Sex: Female (55%) Wealth: Rich (5), average wealth (10%)
Baribari	Ethnicity: Kusasi (99%), Moosi and Fulani Sex: Female (70%) Wealth: Rich (20), average wealth (60%)

One feature that distinguishes Tempezua from the other communities is that a river that serves as a source of water for dry season irrigation but on the other hand, restricts access to the community during the rainy season.

Livelihood activities in the communities

As earlier indicated, agriculture is the backbone of the economies of the enumerated communities. Men and women are both involved in the production of food crops and livestock. However, it emerged that men and women tend to grow different types of crop and rear different livestock. Whereas men are often involved in the production of staple crops and large livestock such as maize, millet, rice, cattle and sheep, women tend to produce vegetables, legumes and poultry such as groundnut, sesame, domestic fowls and guinea fowls. Women are also involved in the gathering firewood and wild produce such as shea nuts. Crops such as sweetpotato and soybean are cultivated by both sexes. Apart from agriculture, women undertake other livelihood activities such as stone picking, retailing/petty trading and pottery. Other income generating activities undertaken by men include wholesaling/bulk sale of farm produce, artisanal work (e.g. carpenters, tailors, masons) and government work (e.g. teachers). The sex disaggregated livelihood activities of the surveyed communities are presented in **Table 2**.

Table 2: Livelihood activities (FGD)

Male/female FGD + Community name	Livelihood activities and people they are important for
Tempezua women FGD	Agriculture, gathering of wild produce and stones
Tempezua men FGD	Agriculture, trading
Abisiga women FGD	Agriculture, stone gathering (small scale quarrying)
Abisiga men FGD	Agriculture, trading, others (mechanics, transporters)
Baribari women FGD	Agriculture, stone gathering, trading, pottery
Baribari men FGD	Agriculture, artisans (e.g. carpenters, tailors, masons) and public servants

It is interesting to note that the women FGD in Abisiga reported agriculture as their only source of livelihood. Trading and small scale quarry is the frequently mentioned source of livelihood after agriculture. Occupations such as gathering of wild produce, pottery and transportation are related to the presence of wild trees, clay deposits and motor tricycles, respectively. Most men and women have more than one source of income given that agriculture is predominantly rainfed and therefore limited to only 5 months in a year.

Wealth Categories in the communities

The community survey revealed that both men and women have similar perceptions of what constitutes a poor or rich household. A household is often considered wealthy if they live in a big house built with blocks and roofed with zinc, have more members, bigger farms, apply external inputs such as fertilizer, obtain high agricultural outputs, own motorbikes and ruminants. The characteristics of poor households are directly opposite those of rich households. **Table 3** presents community specific wealth attributes disaggregated by sex.

Table 3: Wealth categories

Male/female FGD + Community name	Wealth categories mentioned in FGDs
Tempezua women FGD	Rich people have big house and are able to buy fertilizer for farms and own motorbike (s). They are able to cultivate more than 5 acres of land Average households farm 2-3 acres and may own bicycles Poor people walk and farm on smaller pieces of land, e.g an acre or less
Tempezua men FGD	Rich live in houses built with blocks, own livestock and motorbikes Poor live in houses built with mud and roofed with thatch. Sometimes doors are absent. The poor are unable to apply fertilizer hence the farms usually look brownish.

Abisiga women FGD	Rich have access to land, are able to apply fertilizer and obtain high agricultural output.
Abisiga men FGD	Rich have cattle and larger household size Poor have no livestock, have poor housing and serve as farm labour
Baribari women FGD	Rich can afford new cloth, fertilizer, hired labour, school fees Poor struggles to get adequate food in a day, unable to afford school fees and not mobile.
Baribari men FGD	Rich live in houses built with blocks, own livestock and motorbikes Poor live in houses built with mud and roofed with thatch. Sometimes doors are absent. The poor are unable to apply fertilizer hence the farms usually look brownish.

3.2 Farming practices and social segmentation

3.2.1 Farming practices and social segmentation

There does not appear to be a marked difference between male and female farming systems. Both sexes engage in monocropping, mixed cropping, intercropping and ridging for a variety of reasons. Sweetpotato is produced as a monocrop because the leaves of the crop often spread out and covers the immediate area around it thereby making it difficult for a second crop to thrive. It is not uncommon for a cereal and legume (e.g. maize and soybean) to mixed cropped in order to diversify risk, maximize land and consequently food and income security. Ridging is usually done to allow for easy aeration and drainage. **Table 4** presents the farming practices undertaken in the three communities enumerated.

Table 4: Farming practices

Male/female FGD + Community name	Farming practice	People who practice (Q4.2)
Tempezua women FGD	Monocropping and ridging to improve output	Women and men
Tempezua men FGD	Mixed cropping, monocropping and ridging to maximize land, agro inputs and yields	Men and women
Abisiga women FGD	Mixed cropping and ridging to maximize land, diversify produce and increase output	Women and men
Abisiga men FGD	Intercropping and monocropping for crops that thrive and do not allow for competition, respectively	Men and women
Baribari women FGD	Intercropping and ridging so as to get the most from the land since women do not have access to bigger plots	Women and men
Baribari men FGD	Mixed and monocropping to ensure better use of labour and high yields	Men and women

Do men and women farm on separate plots or shared farms in this community? If separate, what are the differences and similarities between men and women's plots? If shared, what proportion are each? If men and women farm together, are there differences in the type of work that men and women do? FGD 4.3

The community interactions showed that the majority of men and women farm together on family plots (approximately 80%). Therefore, it is uncommon to find separate farms for men and women. Men and women as well tend to join forces to produce staple crops for household use (e.g. cereals) whilst maintaining separate farms for complementary (e.g. vegetables) and commercial crops (legumes). For shared farms, men and women undertake both separate and joint activities. Women tend to undertake or lead in activities such as planting, heaping or assembling harvest, load and offloading whilst men tend to undertake or lead in activities such as weeding, ridging and harvesting. Both sexes are involved in fertilizer application as well as conditioning and storage of harvest. The

community FGD showed that men tend to have better access to productivity enhancing inputs (e.g. good quality lands, fertilizer and family labour) and therefore have better looking farms and consequently obtain higher outputs (**Table 5**).

Table 5: Differences in men and women’s plots

Male/female FGD + Community name *	Women’s plots	Men’s plots
Tempezua women FGD	Minimal external inputs and relatively inexperienced	Men have better access to productivity enhancing resources and therefore have greener farms and higher outputs
Tempezua men FGD		Men often have access to fertilizer and labour and therefore obtain higher output
Abisiga women FGD	Minimal external inputs	Use fertilizer and therefore get bigger roots of sweetpotato
Abisiga men FGD		Men have better farms because of easy access to family labour to undertake ridges and more farming experience
Baribari women FGD	Minimal external inputs	Use fertilizer and therefore get good harvest
Baribari men FGD	Women tend to use hired labour and acquire vines from the market so often plant late and experience low yields	

3.2.2 Important crops in the community

Table 6 shows the crops that are important to women and men in the enumerated communities. Given that rice is not a traditional staple and will not therefore be appropriated by the household, it has become an important source of income and food for women. Ability to store for a long time is one of the attractive features of rice.

Table 6: Important crops in rural communities

Crop importance	Women	Men
1st	Rice	Maize
2nd	Maize and soybean	Sweetpotato
3rd		Rice and soybean
4th	Sweetpotato	

Maize is the second most important crop for women but the most important crop for men given that it is a staple crop, stores for a long time, does not require elaborate processing and is well adapted. Soybean is also preferred for its storability, income generation ability and nutrition. Sweetpotato is the second most important crop for men because of its income generation ability, varied domestic uses and health benefits. Sweetpotatoes are often transported by men (who tend to have means of transport) to the Burkina Faso market in order to generate income. Given the prohibitive constraints associated with cross country trade, women tend to prefer to cultivate other crops for income. It is therefore not surprising that sweetpotato appears as the fourth most important rather than one of the three most important crops for women. **Table 7** summarizes the reasons why women and men opt for specific crops.

Table 7: Reasons why the crop is important and for who

Crop	Reasons why the crop is important (FGD 5.2)	People for who the crop is important (FGD 5.3)
Rice	Income, food and storability	Women
Maize	Food, storability, well adapted	Men
Soybean	Income, food, storability	Women
Sweetpotato	Income, health benefits	Men

3.2.3 Crop of focus - sweetpotato

The FDGs showed that the three communities surveyed did not differ significantly in the way sweetpotato was produced (**Table 8**). Sweetpotato is usually grown as a monocrop and planted and harvested around late June and early September, respectively. Fertilizer application and weeding is usually done one and three weeks after planting, respectively. Farmers tend to rotate sweetpotato with either maize or soybean.

The focus group discussions showed that whereas all men in Abisiga and Baribari produce sweetpotato, about 50 percent of women in those communities do not produce sweetpotato due to constraints such as lack of access to arable lands. About 70% of farmers in Tampezua cultivate sweetpotatoes with the remaining not producing because of constraints such as inadequate funds to procure fertilizer.

An average household sells about 70% of their sweetpotato harvest, fries 10% and consumes the remaining 20% as a variety of products including boiled, roasted, raw, stew, porridge among others.

Table 8: Differences in men and women’s plots

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
Tempezua	Sweetpotato is usually grown as a monocrop and planted and harvested around late June and early September, respectively.	Men (70%) Women (70%)	12%
Abisiga	Fertilizer application and weeding is usually done one and three weeks after planting, respectively. Farmers tend to rotate sweetpotato with either maize or soybean.	Men (100%) Women (60%)	10%
Baribari		Men (100%) Women (40%)	9%

3.2.4 Varieties of the crop and planting material

The data from the individual interview show that Obari was the most preferred variety irrespective of sex (Table 9). Kuffour and Purupuru were also regarded highly by men and women, respectively. Kuffour/Apomoden and Amuskwera were ranked low by women and men, respectively, during the individual interviews.

Table 9: Varieties grown in order of importance (II)

Importance	Women	% citation	Men	% citation
1	Obari	42	Obari	45
2	Purupuru	21	Kuffour	27
3	Apomoden	9	Apomoden	9
4	Kuffour	9	Amuskwera	8

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

** Use scientific names where possible

Table 10 presents the popular varieties of sweetpotatoes identified during the FGD. Regardless of sex, Obari and Kuffour were both cited as the first and second most important sweetpotato varieties, respectively. Obari was preferred for its high yield, storability, taste which is described as being like yam and general high market demand. Kuffour was preferred because of its yield, early maturity and health benefits. The individual and FGD both showed that Obari was the most preferred variety. Contrary to the popular opinion, Kuffour was ranked lowly by women during the individual interviews. This result requires further research, but one possible explanation is the tendency to experience a substantial drop in utility when substantial quantities of Kuffour is consumed.

Table 10: Varieties grown in the community and ranking in order of preference

Importance	Men's FGD	Women's FGD
1	Obari	Obari
2	Kuffour	Kuffour
3	Apomodun	Puripuri
4	Amuskwera	Apomodun
5	Puripuri	Amuskwera

Why do you grow this variety?

The individual data showed that farmers have specific reasons for cultivating each variety of sweetpotato. Whereas most men preferred Obari because its vines were widely available, most women opted for that variety because of its good taste. Men prefer Apomodun because of its short duration to maturity whilst women prefer it for its good taste. **Table 11** presents the underlying reasons for the choice of various varieties disaggregated by sex.

Table 11: Reasons why the variety is grown

Variety* ** and products	Reasons why preferred	% of women citing	% of men citing
Obari	High yield	33	67
	Stores well	25	75
	Good taste	50	50
	Vines available		100
Apomodun	Early maturity		100
	Good taste	100	
Purupuru	High yield	100	
Kuffour	Early maturity		100
	High yield		100
Amuskwera	High yield		100

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

** Use scientific names where possible

The female FGD revealed that long storage, good taste, yield, hard texture, health benefits (women) and low fertilizer requirement are the key attributes that women consider in deciding the variety of sweetpotato to cultivate. The qualities that determine the variety selected by men include health benefits, good taste, yield, early maturity, market demand and storage. Except for availability of vines which was mentioned during the II, all the other features were mentioned in both the FGD and II.

What varieties does your spouse grow? What varieties does your spouse prefer?

The survey revealed that couples tended to cultivate the same varieties and therefore utilized vines from the same source. It was uncommon to find couples or members of the same household who produced different varieties. It appears the decision to opt for a particular variety is often strategically taken in order to allow for broad acceptance by members of the household.

Less preferred varieties

Amuskwera was reported as one of the less preferred sweetpotato varieties cultivated in the surveyed communities. The variety was reported to be tasteless, not mealy, less compact and has low domestic demand. The variety is purposively grown to target the Burkina Faso market where the variety is said to be in high demand. Amuskwera is sometimes used as a hunger crop during times of domestic shortages.

Planting material

The FGD revealed that farmers get their planting materials from their local communities near the riverside and either from family members or friends. There was no mention of receipt of planting materials from more formal sources such as agricultural extension services or research and development organizations. This finding suggests that the planting material delivery system for sweetpotato is mainly informal and depends on personal contact. **Table 12** shows the sources of planting material as gathered from the II. The table collaborates the findings of the FGD as it shows that the majority of planting material obtained from informal sources.

Table 12: Source of planting material

Source of planting material	% of women citing	% of men citing
Other farmers	70	100
Inherited	10	
Market	10	
NGO	10	

Which factors/challenges could be limiting use of improved crop varieties in this community? And, how have these been addressed?

The main constraints to sweetpotato production across the surveyed communities had to do with inadequate access to fertilizer and labour as well as pests and diseases. These constraints affected both men and women. Soil fertility in the enumerated communities is generally poor and therefore require some level of amendment in order to support economic production of sweetpotato. Given that all agricultural households have a broadly similar production calendar, all household tend to demand labour for similar operations about the same time thereby resulting in shortage in labour supply during critical phases of the crop cycle. Some farmers, mostly women, anticipate the cyclical shortages in labour supply by limiting or avoiding the production of some crops.

3.2.5 Important characteristics of the crop (in general not specific to the product)

Table 13 presents the features that make individual farmers (women and men) consider a particular sweetpotato crop as good. The female interviews showed that a good sweetpotato crop is one that is easy to process, has a good taste and can grow on marginal lands. For the male II, high yield, market demand, good taste and tolerance to pest emerged as the characteristics that show that a sweetpotato is good.

Table 13: Characteristics of a good crop (II)

Importance	Women	Men
1	Easy to process	High yield
2	Good taste	Market demand
3	Can grow on marginal lands	Good taste
4		Tolerance to pest

During the FGD, tolerance to pests and disease as well as the absence of rootlets on matured roots were the two features ranked by men and women as the most important characteristics of a good sweetpotato crop. Pests and diseases cause injuries to the roots thereby considerably reducing their shelf life. Similarly, the presence of rootlets signifies that the harvested roots are unwholesome and

will therefore not result in a high-quality product. **Table 14** describes the characteristics of a good quality product disaggregated by sex. The table suggests that men and women have similar preferences.

Table 14: Most important crop characteristics in order of preference (FGD)

Importance	Men's focus groups	Women's focus groups
1	Tolerance to pests and diseases	No rootlets
2	No rootlets	Tolerance to pests and diseases
3	Low moisture content	Low moisture content
4	Big size	Big size

Results of the II (**Table 13**) and FGD (**Table 14**) revealed interesting differences. Whereas the findings from the male II suggest that postproduction features were the key attributes considered by men, production attributes were rather the main characteristics revealed during the male FGD. A similar observation applies to the women II and FGD.

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

As earlier indicated, spouses or members of a household tend to agree on qualities or characteristics of a crop that should be selected for production since joint cultivation of household or family farms is a common feature.

3.2.6 Uses of the Crop

A number of products can be derived from the roots of sweetpotatoes including fried, boiled, flour, chips, roasted and raw. The women FGD showed that big root that are free from pests and rootlets could be processed into a variety of products. The men FGD showed that specific qualities were important for specific products as presented in **Table 15**. Varieties that used up less oil during frying were preferred for making fries and varieties that taste like yam and were hard textured were generally good for boiling. Sweet roots can be eaten raw as a snack.

Table 15: Summary table of products and important characteristics

Product	Men's FGD	Women's FGD
Fried	Does not soak oil	Big size, no pests and diseases, smooth without rootlets
Boiled	Taste like yam and hard texture	
Flour		
Chips		
Baked/roasted	No pests	
Raw	Sweet	

The characteristics of fried sweetpotato desired by individual men and women are presented in **Table 16**. The table shows that a substantial proportion of both men and women prefer a moderately sweet final product. Flavour was not mentioned by women whilst only a small proportion of men considered colour.

Table 16: Frequency of citations of important characteristics of fried sweetpotato

Characteristic	% of women citing N= 6	% of men citing N= 13
Moderate sweetness	50	40
Moderate texture	25	30
Good flavour		20
Light brown colour	25	10

Tables 15 (FGD) and 16 (II) show clear differences in the attributes preferred by men and women. Table 16 focuses only on attributes of the fried whilst Table 15 also includes qualities of the raw product such as size and wholesomeness (pest free).

3.2.7 Labour

The II shows that processing of sweetpotato into fried and other products is a task done by women with support of girls unless the household is composed of only boys which sometimes rarely happen for a brief period (**Table 17**). The findings of the II is consistent with that of the FGD (Table 18).

Table 17: Frequency of citations of people who conduct the production and processing of fried sweetpotato (II)

People who produce and process the product	% of women citing N=	% of men citing N=
Men	0	0
Women	100	100

Table 18 provides a summary of the roles played by women and men in the processing and sale of sweetpotato roots. The community FGD showed that processing of sweetpotato in fried and other products is done by women. When a woman is unavoidably unavailable, then a man may assume responsibility and process sweetpotato for home consumption but never for sale to the public. Processing of sweetpotato is usually done by adult women with support from younger girls. Boys are seldom involved in processing. Interestingly, sweetpotatoes are transported and marketed in Burkina Faso by men. Women are not heavily involved in the Burkina Faso market due to their household care responsibilities and low productivity. However, sale of the crop in domestic markets is done by women whilst men tend to dominate the sale of the crop at the community level. Apart from the sweetpotato roots, the vines are also sold and this activity is often done by men because of the perception that men have better bargaining skills with regards to vine marketing.

Table 18: Persons responsible for processing and selling fried sweetpotato (FGD)

Male/female FGD + Community name *	Persons responsible for processing labour	Persons responsible for selling
Women FGD	Adult women with support from girls. Men are only involved when women are unavoidably unavailable.	Men are involved in the sale of sweetpotato roots at their community and in Burkina Faso (export) whilst women are involved in the domestic market
Men FGD		

3.3 Decision making and trade-offs between the different uses of the crop

Table 19 provides an indication of the level of independence that men and women exercise in making sweetpotato production and utilisation decisions. The table suggests that men exercised a higher level of independence in relation to use of the crop with women also exercising some independence with regards to the variety of crop to plant, marketing and use of profits from fried and related products. Note that both men and women need to consult in taking any of the decisions mentioned above.

Table 19: Mean score of independence in decisions by sex and region (II)

Decision	Mean score of independence 1-4*	
	Women	Men
Variety of crop to plant	3.3	3.4
Use of crop	3	2.8
Marketing	3.3	3.4
Use of profits from sale of [specify product]	2.8	3.2
Use of profiles from sale of alternative product	2.8	3.1

*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.

***How were decisions made on how the crop would be used among the different products? About what is consumed at home or sold? Who was involved and what was considered? II Q17.2**

The II interviews suggest men tended to have the final say when it came to decisions about how much sweetpotato needed to be sold and what product it should be processed into for home consumption. Nonetheless, decisions were often made based on consensus or a justifiable basis. For example, the amount allocated for sale was often based on financial need, previous sale quantities, price and storability. The type of product to process was also taken factoring the preferences of children and men.

***In your community, 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**

As earlier indicated, the survey revealed that sweetpotato roots can be used to prepare a variety of dishes including fried, boiled and roasted. There is virtually no disagreement on what product the crop is utilized for as men, who doubling as household heads, have the final say on how the crop is utilized. It emerged that the final decision often takes into account the preference of children as they are important consumers of sweetpotato at the household level. Children and men tend to prefer fried and roasted products, respectively.

***Have there ever been challenges or disagreements in the household about these decisions? Please explain. II Q17.3 E.g. For example, in some areas, men may prefer to sell the crop fresh while women prefer to sell the crop processed. This is linked to who has control over the product's sale and profit.**

The II and FGD did not reveal challenges or disagreements among household members on what products or foods were prepared or processed with their sweetpotato roots.

3.3.1 Household food budgeting

Thinking about when you harvest the sweetpotato. How much of the harvest was used for consumption at home? As what product? (kg/t) (II Q33.1)

Table 20 presents the quantity of sweetpotato utilized for home consumption disaggregated by sex. The table shows men on the average obtained higher yields (an extra bag) but allocated a lower proportion of their harvest for home consumption. They tended to sell a higher proportion of their produce thereby suggesting that women were more concerned about meeting household consumption needs.

Table 20: Quantity of harvest used for home consumption by sex and region (II)

	Women	Men
Range (bags)	1-10	2-10
Mean (bags)	3.4	4.5
% of harvest	49	28

This result suggests that sweetpotato is a more important commercial crop for men but a more important subsistence crop for women. Women often sold their sweetpotatoes to traders in their communities or in the urban market whereas men often sold their produce in the Burkina Faso market. The men mostly control the means of transport and are able to travel much farther distances.

How much of the harvest was sold? (kg/t) Fresh or processed into what product(s)? To what market(s)? Probe between rural or urban market, trader, restaurant, food vendor, large company. II Q33.2

As earlier indicated, **Table 21** shows that quantities of sweetpotatoes sold by men was more than twice that of women.

Table 21: Quantity of harvest sold by sex and region (II)

Product (fresh or processed)		Women	Men
Fresh	Range (kg/t)	2-9	4-30
	Mean (kg/t)	5.6	12.4
	% of harvest	80	78

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

A summary of the II showed that changes in the production, processing and sale of sweetpotato had affected the spouse/children of 81% of respondents. The effect had mainly been positive as many more farmers were now using fertilizer and other external inputs thus obtaining higher outputs and income as compared to the past.

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

The survey revealed significant positive changes in marketing and mechanisation with the resultant effect being improvement in the welfare of households. Compared to the past, many more farmers were now using animal drawn and machine powered implements and were also increasingly selling their produce in the Burkina Faso market as earlier indicated.

3.4 Preparation and processing the product

***What are the processing and preparation steps for the [product]? FGD Q12**

AND

***Are there variations of the product and variations of the processing of the [product] in your community? Are the variations related to different varieties, food processes or food preferences? Please describe. FGD Q13.**

The women FGD in Abisiga and Tempezua revealed that sweetpotato fries were made by first peeling off the skin of the roots before slicing the flesh into smaller pieces. The pieces were then washed with water that contains salt. The washed slices were then fried in hot oil (hotness is determined by sprinkling a little water and observing the loudness of the sound that follows) until it changed colour to brownish. Sample one of the brownish fries to see if it was well cooked before removing all the fries from the oil. The fries were then drained in a sieve before serving. Similar steps were described by the women FGD in Baribari with the only notable exception being washing of the roots prior to peeling.

A broadly similar procedure for making sweetpotato fries emerged from the men FGD. As described; the process of making fries begins by heating oil while peeling and washing the roots. The peeled roots are cut into slices with one put into the oil to test its hotness. The slices are fried in the hot oil until it changes colour to brownish after which they are removed and served. Interestingly, each of the men FGD missed one step (e.g. did not mention addition of salt, washing of the roots or flesh or testing to see if the fries are well cooked) in describing the process.

Who typically is involved in conducting this step? Probe: social segments and hired or household labour etc. e.g. female hired labourers; women and girls in the household FGD Q12.2

The men FGD indicated that women were often in charge of processing sweetpotato into fries. Domestic and commercial processing of sweetpotato was done with family labour, mostly women with support from girls. Note that the services rendered were not usually considered as paid labour. Therefore, no one was paid directly for helping with processing even though profits from commercial frying were normally used to jointly improve the welfare of household members.

***What are the most important processing steps or parameters you need to control very well to obtain of high quality [product under study]? II Q22.**

The data from the II (Table 22) revealed important stages in the processing process that can impact significantly on the outcome of the final product. A large proportion of both women and men cited the temperature at which sweetpotatoes are fried as an important step that can improve or mar the quality of the final fried product. Putting in the fries too early or too late will result in a final product that has soaked a lot of oil or is burnt.

Table 22: The most important processing steps to obtain a higher quality fried sweetpotato cited by sex (II)

Most important processing steps	% of women citing N=	% of men citing N=
Addition of salt	20	20
Temperature of oil	40	40
Peeling of roots	20	30
Washing of roots	20	10

Processing resources and access

Women and men required the same resources to process sweetpotato into fried products. Some of the resources required include firewood/charcoal, coal pot, frying pan, sieve, ladle with holes and kitchen knife.

Frying pan and knife are key cooking utensils required for making fried sweetpotato. Data from the II (Table 23) show that women often bought their own knives but then used the frying pan of their husbands who were unlikely to demand it during a divorce. Men and women generally did not face constraints in accessing utensils for frying.

Table 23: Mean score of access (1-4*) to equipment or utensils required for processing fried sweetpotato

Equipment or utensils required for processing the crop into the product	Mean score of access 1-4*					
	Women	Men	Region X	Region Y	Yoruba	Ethnic minority
Frying pan	4	2.3				
Knife	1					

*Legend

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

3.5 Consumption of the product

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

Regardless of the sex of the consumer, fried sweetpotatoes were eaten with similar kinds of servings across the surveyed communities. Common servings included ground spices known locally as 'yazi', tomato sauce and chilli sauce.

Poor quality characteristics

The II data showed that a poor-quality fried sweetpotato was; soft, tasteless, had a bad aroma, not compact, soaked oil and was either over or undercooked. There were no differences between male and female spouses.

Thinking of people in your community, how often is the product consumed. Is this the same for everyone in the community? Probe on social segmentation. How has this changed in the last five years? KII Q9.

The key informant in Tempezua revealed that an average household in the community consumed sweetpotato four times in a week. Whereas the consumption of the poor was limited to only the sweetpotato season, rich households consumed the crop throughout the year. In Abisiga, children consumed more sweetpotatoes followed by women and men. The Baribari community had similar

consumption features like Tempezua except that the frequency of consumption was about twice a week.

Do you think people are buying more or less compared to five years ago? Why? Probe on social segmentation. How has this changed in the last five years? KII Q10.

The key informant interviews showed that there were now many more buyers of sweetpotato when compared to the last five years. The increase in demand could be attributed to the Burkina Faso market and other domestic market beyond the Bawku Municipality such as the Bolgatanga Market.

Are there any taboos or restrictions of people in growing, processing or consuming the crop or its products? Probe differences in social segments. KII Q11.

The key informant indicated that there weren't any existing taboos or restrictions on the production, processing or utilization of sweetpotatoes in the surveyed communities.

However, both the FGD (Abisiga and Baribari) and the II data showed that about 32% of respondents reported that there were beliefs associated with sweetpotato production. A popular belief was that a menstruating woman who visits her farm would obtain lower than expected outputs as the roots would crack and the crop may die. The only remedy was for the menstruating women to plant an acacia plant in the middle of the farm. With the Acacia plant in the middle of the farm, the women could work on the sweetpotato farm even when she was menstruating.

3.6 Product characteristics

Raw Material (Crop for the product)

II questions:

***In your opinion, what variety(ies) give the highest quality fried sweetpotato? 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 II data shows that the varieties that give a high quality sweetpotato product included Obari, Kuffour and Apomodén. Obari was said to make good fries because it was mealy, did not soak oil and was generally nice looking. Kuffour and Apomodén were preferred for their health benefits.

***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.**

The II data revealed qualities of raw sweetpotatoes that could result in good fries. Regardless of sex, absence of pest/weevil and uniform colour were reported as good attributes that can be identified by looking at the roots. Males further identified the absence of rootlets whilst the women also mentioned moderate size as additional physical features of good sweetpotato roots. In terms of touch, the men also mentioned heaviness and hard texture as important features. Men and women have different criteria for assessing the goodness of a raw sweetpotato root that will turn into a good quality fry. The men mentioned moderate sweetness whereas the women reported low moisture content as the important characteristics.

What are characteristics of a variety of the crop that give a poor quality fried sweetpotato so that you would not use or buy it? II Q21.

The data shows that characteristics that defined poor quality fries were exactly the reverse of features of good fries as presented above. That is, qualities such as presence of pests, small size, tasteless and high moisture were poor characteristics.

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 fried**

sweetpotato? What are the characteristics? Rank in order of importance 1=most important. Note for use for pairwise ranking exercise. FGD Q10.

The women FGD revealed that the characteristics that showed that a sweetpotato root will make a high-quality fry in order of importance were storability, hardness and sweetness. Roots that were known to store for a longer period of time or had a higher shelf-life, were hard textured and are not tasteless generally made good quality fries. The men FGD showed that the following features were important for making fries; maturity, pest free and low moisture content. Roots that are not fully matured as evidenced by the presence of rootlets, have been attacked by weevils or contain a lot of water (when the tip is broken) will generally result in a poor fry. Other important favourable characteristics mentioned include bigger roots and moderate to high root price.

Processing characteristics

The male II showed that before a fried sweetpotato product was considered to be of a good quality then it must have a light brown or uniform flesh colour, dry on the outside but moderately soft, smell good with moderate sweetness. In terms of texture in the mouth, it ought to be crispy but mealy on the side. The female II revealed similar characteristics as presented in the overall or summarized activity 3 profile.

The men FGD revealed the following as the qualities showing that a sweetpotato root had a good processing/frying ability; low moisture, colour and maturity. Roots that had a high moisture content, do not change colour when well fried and not fully matured generally result in poor quality fries. It emerged during the women FGD that the type of oil and temperature of the oil has a significant effect on the processing-ability of fried sweetpotatoes.

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

The characteristics (in order of importance) that make a quality fried sweetpotato (i.e. the final product) as captured during the women FGD were; mealiness (i.e. ability to spread in the mouth), moderate outer dryness (i.e. not too dry) and moderate inner moistness. The good qualities mentioned during the men FGD include; nice taste or moderate sweetness, fullness or satisfaction and brownish colour. The FGD suggested that whereas men and women were ultimately concerned by food security, men were more concerned about the taste (sugariness) of the final fried sweetpotato rather than its mealiness.

4 FINDINGS: MARKET STUDY

4.1 Sample information

A summary of the information pertaining to the market study respondents is shown in Table 24. Except for one Assembler-Wholesaler, all the traders and food vendors that were interviewed in Ghana were females. Food vending (more generally small-scale food processing) and trading of agricultural produce in local markets are activities often undertaken by women in Ghana. The one Assembler-Wholesaler that we interviewed was only involved in the export of sweetpotatoes to the Burkina Faso market, an activity he reckoned was unfavourable for women as it involves overnight sleep and being away from domestic responsibility.

The mean age of the sampled traders was about 44 years which implies that an average trader can actively engage in sweetpotato marketing for at least another decade. The mean household size was 8 which implies that an average trader may have access to family labour that can be relied on in times of need. The data shows that an average marketer had 12 years of trading experience. On average, traders travelled about 11 kilometres to access the nearest market. The road network, which is symptomatic of the general poor state of infrastructure in the study area, hinders marketing.

The ethnicity of the sampled traders was; Kusasi, Bissa, Guruma and Moshi. The majority of traders had never been to a school. The highest level of school was 6 years of basic education. Educated traders were more likely to have an edge with respect to record keeping and use of technology to access markets. All the traders sampled had a mobile phone with majority of them having a motor

bicycle. Mobile phones facilitate the exchange of market information while a motor bicycle facilitates access to market. Commodities frequently marketed by traders were sweetpotato, maize, tomato, pepper, goat and sheep. Commodities frequently processed by food vendors/fryers were sweetpotato, yam and plantain. Fryers processed and sold these 3 commodities together when they were in season.

Table 24: Background information on sample

Interview	001	002	003	004	005	006	007	008
Gender	F	F	F	F	F	F	F	M
Age (profile)	50	29	50	50	50	60	30	29
Ethnicity	Guruma	Bissa	Moshi	Kusasi	Guruma	Kusasi	Bissa	Kusasi
Household size	6	8	6	10	6	8	12	7
Level of education	None	Basic 6	None	Basic 2	None	None	None	Basic 4
Ownership of means transportation (If yes, type)			Yes	Yes	Yes	No	Yes	Yes
Ownership of means of communication (If yes, type)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Road to nearest town is good (Y/N)	No	Yes	No	No	No	No	No	No
Distance to market from the home (in km)	2	5	2	10	2	20	30	15
Marketing experience (years)	4	5	25	30	4	10	11	7
Main occupation (Specify)	Food vendor	Food Vendor	Trader	Trader	Food vendor	Trader	Trader	Trader
Crops person is dealing with (indicate main crops or products)	Sweetpotato Yam, plantain	Sweetpotato Yam, plantain	Sweetpotato maize	Sweetpotato maize	Sweetpotato Yam, plantain	Sweetpotato	Sweetpotato Tomato Pepper	Sweetpotato Goat Sheep

4.2 The value chain

Typical of most agricultural value chains, the sweetpotato value chain began with agro input suppliers which consisted of both agro-enterprises and sweetpotato producers who provided vines, inorganic fertilizers and other inputs required for sweetpotato production (**Figure 1**). Apart from producers, other agro-input dealers were located mainly in peri-urban and urban areas such as Pusiga and Bawku. Production of sweetpotato was mainly done in rural communities such as Zongnaba, Salwama, Pusiga, Zoboliga, Ninkogo, Saratinga, Bugri Sugudi, Gambudigu, Waara, Baribari Tampizua, Bulugu and Bado. Producers sold their harvested roots to wholesalers, exporters, processors or retailers. A direct relationship between producers and consumers was not evident as sweetpotato consumers either produced their own roots or bought it from elsewhere. In addition to consumers, wholesalers sold their roots to processors and retailers. Pusiga and Bawku served as the market and processing centres in Ghana while Sujurunorma, Sankaduri, Fotinga and Bittou served as the export market for sweetpotatoes from Ghana. Financial, research and extension services cut across the entire value chain as these services were needed by all actors within the value chain.

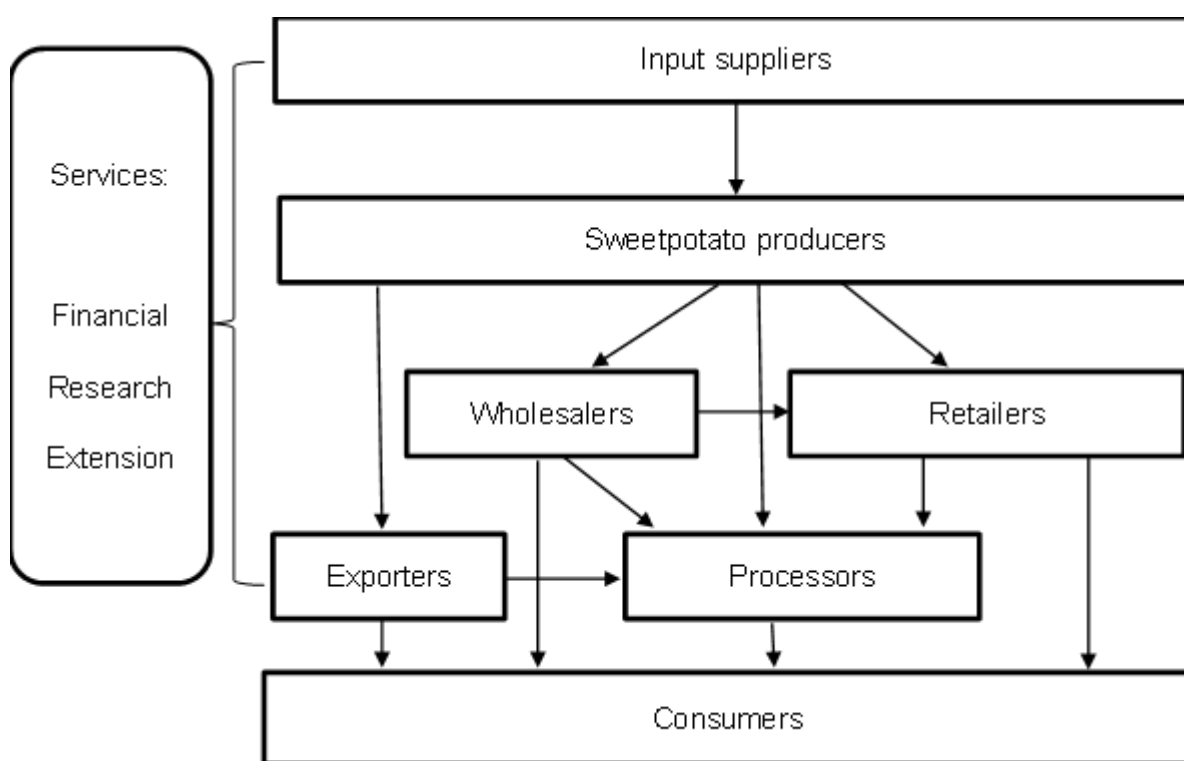


Figure 1: Sweetpotato value chains in Ghana

The survey showed that about 10-70% of roots were consumed as fried products (Table 25). Farmers did not process before selling their roots. All harvested produce were sold as fresh roots in their communities. At the peri-urban level, traders resold nearly all the roots as fresh with the proportion of roots processed prior to sale not exceeding 10%. Processing was mainly done at the urban centres where up to 70% of roots were processed into fries and other products before sale.

Table 25: Proportion (%) of crop used in fresh and processed forms (MI Q9 or Q16)

	Crop use (home consumption vs sales)	Percentage (%)
Rural level	Home consumption	
	Sold in fresh form	100
	Sold in processed form [product]	0
	Sold in processed form [other products]	
Town level	Home consumption	
	Sold in fresh form	90-100

Crop use (home consumption vs sales)		Percentage (%)
Urban level	Sold in processed form [product]	0-10
	Sold in processed form [other products]	
	Home consumption	
	Sold in fresh form	30-100
	Sold in processed form [product]	0-70
	Sold in processed form [other products]	

Sweetpotato roots were mostly processed into fried and other products in Pusiga and Bawku, two major towns in the sweetpotato enclave. These sites also served as the major market locations of the crop. The crop was hardly processed at the community level except for home consumption where the roots were fried, baked and boiled into a variety of products.

Demand segments

Demand for sweetpotato can be segmented into 4 main markets namely the wholesale, retail, processing and export market segments. Roots were usually sold as fresh in export, wholesale and retail markets but processed into fried or related products by food vendors and restaurants.

Buyers of fresh roots were nearly all women who were often fryers, restaurant operators or managers of households. Fried sweetpotatoes were often demanded by children, youth and women. There did not appear to be a direct relationship between consumption of sweetpotatoes and wealth.

The main sweetpotato characteristics demanded by customers were root size, wholesomeness, texture and taste. Customers tended to prefer roots that were bigger, had no injuries or traces of pests such as weevils, were hard textured and had moderate level of sweetness. The specific characteristics preferred by different segments of the sweetpotato market, along with a description of the various buyers, are presented in Table 26.

Table 26: Customer groups buying the fried sweetpotato

Level and/or demand segment	Demographics of the customer groups / buyers of [product]	Description of what are these customers demanding
Community level:		
Processing site:	Small scale fryers	Moderate sweetness, hardness, health benefits,
Wholesale market:	Medium scale female processors (restaurants) and retailers	Moderate sweetness, hardness, big roots, pest free
Retail market :	Small scale female processors (fryers, boilers) and members of a household	Big roots, pest free, low moisture content

4.3 Characteristics for a high-quality crop

A ranking of the preferred sweetpotato traits shows that big roots, pest free and hard texture were the most important features preferred by users of the crop (Table 27). Big roots were preferred because they are easier to peel and provide a lot more flesh. Pest infested roots result in very low-quality final products and are therefore less preferred. Hard textured roots are generally good for making both fried and boiled products as consumers tend to like dry and crispy fries. Taste, health benefits and popularity were the other considerations that influenced sweetpotato demand.

Table 27: Characteristics of a high-quality crop

Rank	Characteristic	Indicators used for ranking crop characteristics and demand segment they are important for
1	Root size	Big roots
2	Wholesomeness	No rootlets, pests or injuries
3	Hardiness	
4	Moderate sweetness	Tastes like yam

Rank	Characteristic	Indicators used for ranking crop characteristics and demand segment they are important for
5	Health benefits	Orange-fleshed
6	High demand	Popular

4.4 Proportion of the crop consumed and sold

Food vendors and urban households are important users of sweetpotatoes. Table 28 shows that rural farmers retained about 40-60% of their sweetpotato roots for home consumption and sold 30-100% of their produce to households in urban areas with food vendors obtaining 10-70 of the produce.

Table 28: Proportion (%) of the crop consumed and sold by farmers

Customer groups	Percentage (%)	
	Consumed	Sold
Rural consumers – farmers keeping the crop for home consumption		40-60
Rural consumers – purchasing the crop for home consumption		
Household consumers in urban areas / cities		30-100
Institutions such as hospitals or schools		
Restaurants		
Food vendors		10-70
Others (specify)		

4.5 Consumption patterns of different consumer groups

Fresh sweetpotato roots are mostly purchased by women and processed into fried and other products. The sweetpotato fries are typically sold in urban areas to the youth (frequently in schools) and other members of the public.

4.6 Preferred varieties

The market interviews show that four varieties of sweetpotatoes were frequently sold for varied reasons (Table 29). Puripuri was the variety with the highest demand because of its desirable qualities such as hard texture, good taste and storability. Obari, the second most demanded variety, was sought after due to its hard texture and good state. Kuffour was popular because of its associated health benefits whilst Amuskwera was mainly cultivated for the export market and as a last resort during periods of scarcity.

Table 29: Varieties/types of crop demanded

Variety / types of the crop demanded	Order of importance	Reasons why this variety is demanded
Puripuri	1	Hard, tastes like yam and stores well
Obari	2	Hard and tastes like yam
Kuffour	3	Health benefits
Amuskwera	4	High demand in Burkina Faso

4.7 Quantities of the crop and product traded

Markets in the study area were organized on a 3-day interval basis. The market interviews reveal that traders usually bought between 4 to 30 bags of sweetpotato every market day (third day) during the sweetpotato marketing season which spans from September to March (Table 30). Within the same period, fryers typically bought a bag of sweetpotato every market day. There was hardly sweetpotato marketing and processing during the production season (from April to August).

Table 30: Quantities traded (tonnes) as fresh and processed by region

	Quantities traded (bags)
Fresh crop	4-30
Processed [product]	1
Processed [other products]	

Table 31 shows that traders were able to sell 2-20 bags of sweetpotato every market day within the dry season (September to March) with fryers also processing 1 bag every market day within the same period.

Table 31 Daily throughput/amount traded daily (bags)

Part of the year	Quantities of crop (bags)	Quantities of product (bags)
Wet season		
Dry season	2-20	1
Planting time		
Festive periods		
Time of school fees		
Other (specify)		

4.8 Transport, storage, and means of selling the crop

Motor tricycle was the principal means by which sweetpotato roots were transported from farming communities to marketing centres or in-between marketing centres (**Table 32**). The roots were exported to Burkina Faso using both motor tricycles and trucks. The roots were often transported in bags. Wholesale was often done in bags while retail can be in bags, basins or heaps on the floor. Exposure to sunlight or heat during transportation, storage and sale was identified as the predisposing and cross-cutting factor that affects the quality of the final sweetpotato product. Pests such as weevils were an additional predisposing factor that can cause damages to the roots during storage and consequently reduce the quality of the final sweetpotato product.

Table 32 Means of transportation (MI, n=7)

	Means	Important characteristics of the crop associated with product transportation, storage and sale OR Important characteristics that may affect the product
Transportation	Motor tricycle	Sunlight
Storage	Bags	Sunlight, pests
Means and forms of sales	Bags and heaps	Sunlight

Drivers of change in terms of demand for crop and final product

Health benefits, own-price, productivity of substitute crops such as yam, root size and versatility were the factors that drive changes in demand for sweetpotato roots (**Table 33**). Demand for a particular variety increases once consumers become aware of its health benefits and vice versa. Consistent with classical demand theory, own-price has an inverse relationship with demand. The quantities of a variety demanded tend to increase as its price declines. The market interviews reveal that general demand for sweetpotato increased when there was a decline in yam productivity or when yam become scarce. As earlier indicated, varieties with bigger roots were preferred to those with smaller roots. Varieties that can be used to prepare a variety of dishes also have a higher demand than varieties that only have a narrow use.

Table 33: Drivers of change in terms of demand for crop (MI, n=7)

	Crop	End-product
Demand in general	Health benefits Price Productivity of substitute crops such as yam Root size	Satisfaction and fullness Taste
Changes as far as major characteristics of the crop or end-product are concerned	Ability to be used for varied products	

4.9 Trend lines for consumption

Figure 2 suggests that the importance of sweetpotato in Pusiga and Bawku had increased in the past few years and was expected to even become more important in the next couple of years (MI, n=7). Wholesalers expected to increase the average number of bags sold from 10 to about 40 by the year 2024. Retailers also expected to increase the number of bags sold by 1 each year. For retailers, they expected that the number of days it took to fry 1 bag of sweetpotatoes would reduce from 5 in 2017 to about 1 in 2021.

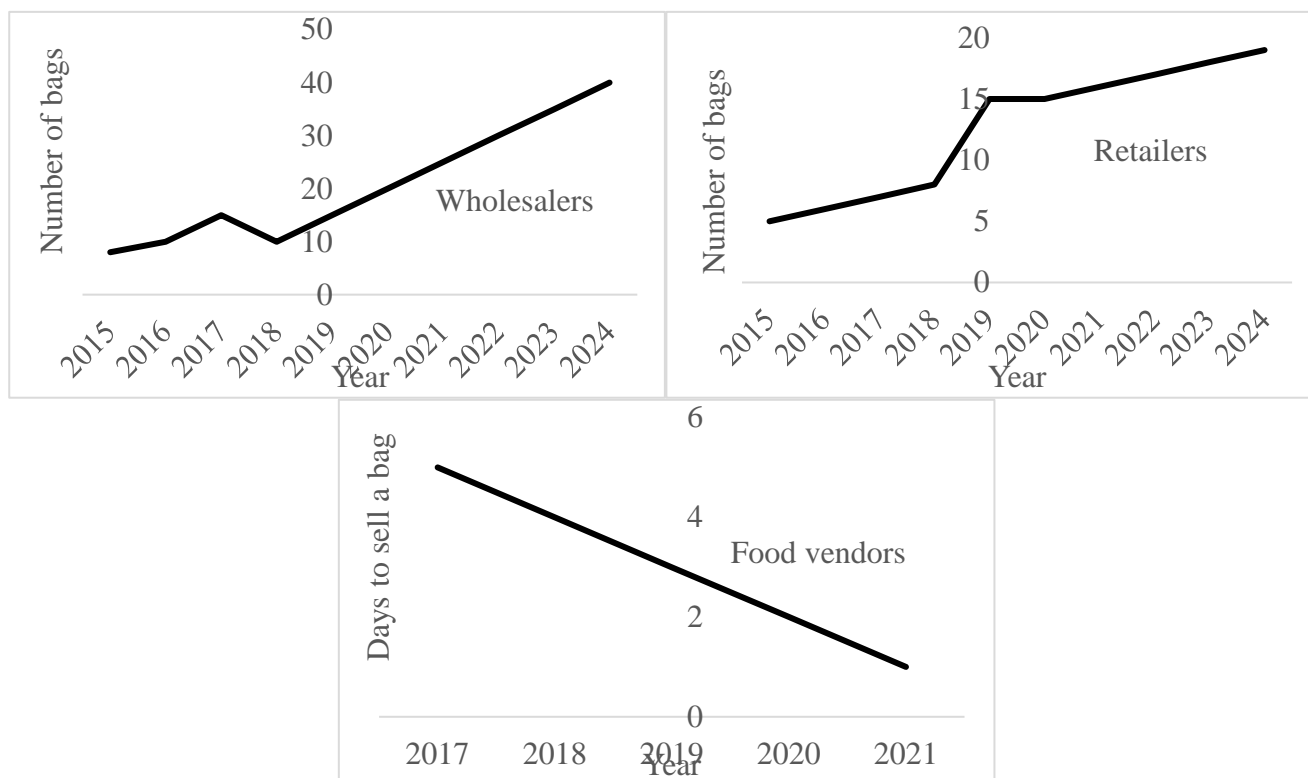


Figure 2: Sweetpotato sales over time

4.10 Economics of the product

A net revenue analysis of the different demand segments of the sweetpotato value chain shows that wholesalers made the highest margins, closely followed by retailers (Table 34). The data suggests that food vendors, on the average, break even. Although food vendors made the highest gross revenue, this did not translate into margins as they also happened to incur the most costs. Food vendors make their margins by selling other complementary products made from yam and plantain.

Table 34: Net revenue analysis

Elements (GHs per bag)	Food vendors	Retailer	Wholesaler
Gross revenue	160	140	130
Cost			
Roots	120	120	100
Transportation and loading	8	10	10
Ingredients (oil, spices, firewood)	32		
Total cost	160	130	110
Net revenue	0	10	20

5 CONCLUSION

The FGD revealed the socio-economic diversity of communities, in terms of gender, indigenes versus settlers (i.e., Kusasis and Bissas versus Moosis and Fulanis), poor versus rich as well as agricultural versus non-agricultural households. The communities were dominated by indigenes, poor agricultural households and females. Men and women tended to have respective crops and livestock that they often produced with sweetpotato being a cross cutting crop. Men and women had both individual and joint farms. Given that sweetpotato was produced by both men (second most important crop) and women (fourth most important crop), improvements in the productivity and utilisation of the crop can serve as a good entry point for minimizing unfavourable gender disparities and improving upon general household welfare.

Regardless of social segmentation, members of the surveyed communities undertook monocropping, mixed cropping and ridging in order to maximize agricultural output. Sweetpotato was grown as a monocrop as it suppresses the growth of other competitive crops. There is no urgent need to improve the tolerance of the crop to allow for mixed cropping but such a feat could potentially allow for many more farmers to cultivate the crop. The survey also revealed that the planting materials distribution system was not well developed. Most farmers obtain their planting materials from other farmers. An improvement in the distribution system could make it easier for farmers to access newly improved varieties of sweetpotato. Other constraints to sweetpotato production (especially for women) include inadequate access to fertilizer and labour as well as pests and diseases. Varieties currently preferred by both men and women are obari and kuffour with amuskwera being less preferred. The criteria used to determine preference, which could also serve as useful basis for future breeding efforts, include yield, storability, taste, days to mature, market demand, and tolerance to pests and diseases.

Sweetpotato was consumed in the surveyed areas in a variety of forms including raw, fried, boiled, roasted, processed into flour and chips. Processing of sweetpotato into fried and other products is a task mainly undertaken by women with support from girls even though it is usually the head of the household (mostly men) who ultimately determine what product should be derived from the sweetpotatoes produced. Sensitization on the need to balance gender roles and responsibilities is one area that can be highlighted in a future intervention in the study area.

The prospects of the sweetpotato subsector in the enumerated area looks bright. The data shows that an average household currently consumes sweetpotato at least twice a week. Sweetpotato is currently being consumed with ground spices known locally as 'yazi', tomato sauce and chilli sauce.

The frequency of sweetpotato consumption will likely increase with productivity and production which will ensure greater availability and access. There are currently no taboos or restrictions on the production and utilization of the crop in the study area. The market for sweetpotato has expanded in the last 5 years because of the Burkina Faso export market. This will likely continue to serve as a catalyst for the thriving of the sweetpotato subsector in Ghana.

For raw sweetpotato root, the women FGD revealed that the characteristics that show that a sweetpotato root will make a high-quality fry in order of importance are storability, hardness (low moisture content) and sweetness. The men FGD showed that the following features are important for making fries; matureness, pest free and low moisture content. The characteristics (in order of importance) that make a quality fried sweetpotato (i.e., the final product) as captured during the women FGD are mealiness (i.e., ability to spread in the mouth), moderate outer dryness (i.e., not too dry) and moderate inner moistness. The good qualities mentioned during the men FGD include nice taste or moderate sweetness, fullness or satisfaction and brownish colour. The FGD suggest that whereas men and women are ultimately concerned by food security, men are more concerned about the taste (with reference to sugariness) of the final fried sweetpotato rather than its mealiness.

The market survey shows that women dominate trading and processing of sweetpotatoes in Ghana. Therefore, any intervention in the sweetpotato sector must include inputs from women (especially those involved in the sale and processing of the crop) since they determine to a large extent what variety is available to end users. The sweetpotato marketing and processing sector in Ghana appears to have a bright future since an average participant of the sector already own a mobile phone, have a means of transport, is about 44 years old with 12 years of marketing experience and has access to family support given a mean household size of 8. Low levels of education, poor state of infrastructure especially road network and distance to markets are some constraints that can be addressed to facilitate effective marketing and processing of the crop.

Like most agricultural value chains, the sweetpotato value chain consists of various actors who play varied roles such as input suppliers, producers, wholesalers, retailers, processors, exporters and consumers. These actors receive technical and financial support from financial, research and extension organizations. The functions of each value chain actor can either enhance or reduce the quality of the final product delivered to consumers hence there is the need to build capacity across the entire value chain so that each actor can deliver high-quality value-added service at each stage of the chain.

The market interviews also show that sweetpotatoes that are considered to be of a high-quality are the ones with big roots, no pests or injuries, hard textured, tastes just like yam, have health benefits and are in high demand. These are the features that breeders should consider in their programs. At the moment, varieties that meet some of these qualities and are in high demand in a descending order are puripuri, obari and kuffour. Traders buy between 4-30 bags of sweetpotato every market day during the sweetpotato marketing and processing season (i.e. dry season) while processors buy about 1 bag within the same scope. Sweetpotato marketing appears to be a profitable trade. The data suggests that the crop has become important in the last couple of years and is expected to continue to be important in the next couple of years if current bottlenecks such as undesirable variety traits, transportation and storage constraints are addressed.



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