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GENDER DYNAMICS IN AGRICULTURE: A CASE STUDY OF WOMEN'S EMPOWERMENT IN THE CAY-SEED PROJECT

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Abstract:
Gender dynamics exert a profound influence on agricultural development, playing a pivotal role in household welfare, national food security, and economic prosperity. While often conflated with biological distinctions, gender transcends mere physiological differences, encompassing a complex interplay of social constructs and interactions between individuals and their environment. This paper elucidates the multifaceted dimensions of gender within agricultural contexts, delineating its role in shaping resource allocation, opportunity distribution, and societal roles. Drawing upon seminal works by Blackstone (2003), Drafor et al. (2005), and others, it underscores the distinction between gender and sex, highlighting the socio-cultural determinants that underpin gender roles and responsibilities. Central to this discourse is the recognition of the fluidity inherent in gender roles, a dynamism compounded by evolving economic landscapes. As posited by Doss (2001) and Quisumbing and Doss (2021), changing economic circumstances engender shifts in the traditional delineation of gender roles, necessitating a nuanced understanding of their manifestation within agricultural systems. Defined as socially ascribed roles, activities, and attributes, gender roles delineate the contours of participation and engagement along agricultural value chains, with women, men, and youth assuming distinct socio-economic positions. The paper contends that an appreciation of gender dynamics is indispensable for devising inclusive and equitable agricultural policies and interventions. By acknowledging the differential experiences and contributions of diverse gender groups, stakeholders can harness the full potential of agricultural development initiatives, fostering resilience, sustainability, and socio-economic empowerment. Moreover, it advocates for a holistic approach to gender mainstreaming, one that transcends tokenistic representation to address the underlying power dynamics and structural inequalities that perpetuate gender disparities within agricultural systems. In conclusion, this paper underscores the imperative of integrating gender perspectives into agricultural development agendas, emphasizing the transformative potential of gender-sensitive approaches. Through a synthesis of theoretical insights and empirical evidence, it elucidates the intricate interplay between gender, agriculture, and development, paving the way for informed policy formulation and targeted interventions that uphold principles of equality, justice, and human dignity.

Keywords: Gender dynamics, Agricultural development, Gender roles, Socio-economic empowerment, Gender mainstreaming

INTRODUCTION

Gender plays a fundamental role in agricultural Gender relies greatly on the biological differences development, particularly, in ensuring household and between males and females being a social construct of national food security, and economic development. Interactions between them and their environment (Blackstone, 2003; Drafor et al., 2005). It is different from sex, which is just the biological and physical difference between males and females. Gender determines the roles males and females perform in societies and shapes differences in resources and opportunity allocation in agricultural systems (Quisumbing and Doss, 2021). However, other literature has indicated the dynamism of these gender roles because of changing economic circumstances (Doss, 2001; Quisumbing

and Doss, 2021). Gender roles can be defined as roles, activities, responsibilities, and attributes ascribed to different genders within a society and based on cultural beliefs, societal values, and norms (Carr, 2008; Quisumbing and Doss, 2021). Women, men, and youth play different roles along agricultural value chains within agricultural production systems (Quisumbing and Doss, 2021) and occupy different socioeconomic positions (Carr, 2008).

Gender roles shape agricultural production practices such as crop types and cultivation methods in Africa (Obidiegwu and Akpabio, 2017). Generally, women play principal roles in food production, food processing, marketing and customer-related activities (Mishra et al., 2017). Obidiegwu and Akpabio (2017) underscored that these assigned roles helped to understand issues bordering on who has the right to own or access resources, produce, and market, which specific crops. Gender roles also differ among different commodity chains. Agricultural production processes involve physical strength, the application of knowledge and technology, and economic and financial investments (Obidiegwu and Akpabio, 2017). Hence, Carr's (2008) assertion that certain commodity is termed as men's whilst others are for women holds. Yam, a traditional staple crop in West Africa is not left out with its label as a men's crop (Obidiegwu and Akpabio, 2017). Others also question this labelling of crops by gender (Doss, 2001; Lambrecht et al., 2017). Doss (2001), for instance, indicated that the cultural definition of a man's crop and a woman's crop does not necessarily match the actual practices. However, when specific crops are allocated to specific genders, it allows for the realization of differences in productivity, vulnerability to shock and income generation prospects among the genders (Obidiegwu and Akpabio, 2017).

Yam production provides an opportunity for poverty reduction and nourishment for farmers (Aidoo et al., 2011). It is known as a social, economic, and cultural crop, and serves as a traditional emblem of authority in some yam-growing communities (Obidiegwu and

Akpabio, 2017). Despite its socioeconomic benefits, yam production is faced with several challenges among which is reliable healthy yam seeds source, which is always scarce and expensive (Anaadumba, 2013; Zakaria et al., 2014). Furthermore, due to the social and gendered norms embedded in seed yam production, there is gender-unequal access to healthy and reliable yam seeds. This unequal access to seed is because traditionally, women are not allowed to plant yam thus; yam seed would preferably be sold to men rather than women. Further, men plant large acreages of yam and might not have enough seeds reserved for women. To provide healthy and reliable sources of seed yam to smallholder farmers in yam-producing communities for increased productivity and consequently improve food security and livelihoods of male, female and youth yam producers, the Community Action for Improving Farmer Saved Seeds (CAY-Seed) project was implemented in Ghana. CAY Seed, a gender-responsive project, through community participation approaches, the gender and social dynamics component, ensured that interventions reached men, women, youth and vulnerable yam farmers. This paper aimed to present the community gender sensitization and awareness creation processes on gender issues, identified gender roles in seed yam production and changes that are occurring or have occurred in gender roles among others in seed yam production.

Most farming households have several strategies to ensure their food security needs, which the responsibility often falls on women as their gender role (Koryo-Dabrah et al., 2021). In the yam growing communities, women and youth go into water yam production to ensure that their households are food secured. FAO (2003) indicated that "Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life." This rests on food being available, accessible, utilizable and stable, the pillars of food security (Fraanje and LeeGammage, 2018; Koryo-Dabrah et al., 2021). All these pillars must be considered and addressed to ensure that people are food-secured. How will the development and improvement of seed yam production relate to food security? This study infers the implications of food security from the gender dynamics of seed yam production.

Different ranges of gender role perspectives exist. The ecological perspective suggests that gender roles are created through interactions among individuals, society, and the environment. Thus, individuals, societies and the environment are all involved in constructing roles for males and females. From the biological perspective, men's and women's roles are determined by the natural affirmations of feminine for women and masculine for men and that

there is no inherent greater value for any gender. The sociological perspective, however, suggests that these feminine and masculine roles are learned and not essentially connected to being male or female biologically. Gender roles may be shaped by ideological, religious, ethnic, economic, and cultural factors (Quisumbing and Doss, 2021), which are fluid and subject to change. It is from this stance, that feminists' perspective proposes that gender roles can be unlearned (Blackstone, 2003). Thus, can change with changing cultures and societies, which this paper advocates. Gender roles are socially defined expectations of men and women in family relations, societies and their working relationships (Quisumbing and Doss, 2021). Thus, in agricultural production, men and women are expected to perform different roles. Traditionally, in Ghana, yam production is perceived as men's crop because of the masculine strength required for mounds making and some traditions associated with it. Placing seeds in mounds is traditionally the sole responsibility of men, a social norm that persist in yam growing communities. Seed yams are not grown separately from ware yams. Farmers often milked (that is harvesting of unmatured ware yam) a portion of their yam fields, which would grow again into seed yams for the following year's production. Women did not own yam farms traditionally. They mostly assisted with some of the farming activities such as carting micro yams and placing them on mounds in their spouses' yam fields (Haleegoah et al., 2016; Aidoo et al., 2011) or as hired laborers. All other activities such as tillage operation, weeding, preparation of yam setts and tubers, staking, harvesting, preparation of yam barns, and marketing were men's responsibility (Obidiegwu and Akpabio, 2017). Women were also not involved in production and marketing decisions, except among female-headed households (Tibesgwa and Visser, 2016; Mishra et al., 2017). Again, women were disadvantaged in accessing resources such as land and capital among others for ware and seed yam production (Mishra et al., 2017; Tibesigwa and Visser, 2016; Johnson et al., 2016). This made women in yam-producing areas less financially empowered and household food insecure. Apart from these, women's contribution to food production, food security and rural economic growth is always underrated (Mishra et al., 2017; Aidoo et al. 2011).

Generalized claims and statements made regarding women in agriculture in developing countries are labelled as being broad, inaccurate and even referred to as gender myths (Doss, 2001; Lambrecht et al., 2017). Do these claims hold despite several gender interventions? Haven't there been changes in gender roles in agriculture? Doss (2001) noted that gender roles are dynamic and often respond to changing economic situations. Lambrecht et al. (2017), for instance, provided an overview of changes in gender patterns and gender dynamics in agriculture looking at several dimensions of gender issues in Northern Ghana. Mensah and OfosuMensah (2020), noted that gender roles in agricultural production and marketing activities are dynamic and can change due to commercialisation and innovations in such activities. Indeed, there were changes in men's and women's roles and their access to yam production resources due to several interventions and transformations going on in the countryside. Considering women's roles along agricultural value chains, changes in these roles and their potential to contribute to achieving increased agricultural productivity, the project's activities are used to illustrate this relevance. Generally, there is not enough information on gender dynamics and their effect on agricultural development. Therefore, the information gathered from this study will contribute to this dearth of knowledge.

This research aimed to use community participatory approaches to study gender dynamics and changing gender roles in seed yam production, the determinants of these changes and their implications for agricultural policy and food security. Specifically, it studied awareness of changing gender roles, changes in decision-making and marketing, changes in access to and control over seed yam production and marketing resources for seed yam production. Determinants of changes and their inferred implications on agricultural policies and food security were identified and discussed.

MATERIALS AND METHODS

Study area description

The study was conducted in two major yam growing Municipalities: Ejura Sekyedumase, Ashanti region and Atebubu-Amantin, Bono East region of Ghana, where yam production is highly dominant and a major source of

livelihood. Most yam growers are from different Northern ethnic groups of Ghana, and are dominated by males thus, the relevance of gender issues. Ejura-Sekyedumase Municipal is located within Latitudes 7°9″N and 7°36″N and Longitudes 1°5″W and 1°39″W, covering a total land area of about 1340.1 sq km. Atebubu Amantin Municipal is located within latitude 7˚23″N and 8˚22″N and Longitude 0˚30″W and 1˚26″W, covering a total land area of about 2,624 sq km with mostly rural settlements.

The intervention by the CAY-Seed project was of much relevance to the Municipals. Figure 1 show the Map of the Municipals where the study was conducted. The communities studied included Ahotor, Densi (Treatment 1), Abour, Asanteboa (Treatment 2), Mem and Watro (Control) in Atebubu Amantin Municipal and Masuo, Nyinasie (Treatment 1), Bisiw No. 1, Nokwareasa (Treatment 2), Kramokrom and Kasei (Control) in Ejura Sekyedumasi Municipal.

Community participatory approach

This approach employed both qualitative and quantitative tools to obtain data. The qualitative approach was participatory gender sensitisation workshops using flip chart presentations, picture card descriptions and group presentations to sensitise communities on gender issues. In addition, focus group discussions were conducted to obtain in-depth information on perceived gender roles, changing gender roles and change determinants in seed yam production. For the quantitative tool, a questionnaire survey was used. Data included information on farmers' awareness of the different gender roles in seed yam production and marketing, changing gender roles in various yam production activities, decision making and access to and control over yam production resources.

Sampling

For the quantitative data collection, a multi-stage stratified sampling technique was employed to target yam farmers within study communities. The first stage was the targeted communities within the study locations. These communities were stratified into treatment 1 (T1), treatment 2 (T2) and control. The next stage was that from each of the communities, a minimum of thirty yam farmers were randomly selected as core project farmers, who received treatment 1 and 2. The core farmers were trained on the positive selection of yam seeds (T1) and good seed yam agronomic practices (T2). Farmers in control communities received no training (T3). Table 1 shows the distribution of the treatments. In addition to the core farmers, other non-core farmers from the treatment communities and the control communities were also randomly selected to be part of the study. Together, there were twelve communities, and a structured interview schedule was administered to four hundred and seventy farmers comprising 278 males and 192 females.

Qualitative data were collected from a total of 670 randomly selected participants from all the study communities comprising 348 youth (a male or female from age 18 to 35 is considered as youth) and 322 adults with a sex distribution of 371 males and 299 females.

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Figure 1. Map showing study locations.
Source: https://www.google.com/imgres?imgurl=https%3A%2F%2Fars.els-cdn.com%2Fcontent%2Fimage%2F1-s2.0S1871141317300896gr1.jpg&imgrefurl=https%3A%2F%2Fwww.sciencedirect.com%2Fscience%2Farticle%2Fpii%2FS1871141317300896&tbnid=9MJ4TCeI3rN0tM&vet=12ahUKEwj9pPeb_pvmAhWa0uAKHb_aDnUQMygbegQIARA-..i&docid=FuM7Pmu_55igM&w=678&h=480&q=map%20of%20atebubu-amantin%20and%20Ejura%20Sekyedumase&ved=2ahUKEwj9pPeb_pvmAhWa0uAKHb_aDnUQMygbegQIARA- Accessed 24th January, 2023.

Data analysis

Descriptive statistics such as frequencies, means and charts were used to describe farmers, farm-level characteristics and production variables of interest. Content analysis of qualitative information brought out themes and trends of research interests. Confirming with participants in the FGDs, researchers inferred from results the changing roles implications on food security.

RESULTS AND DISCUSSION

Demographic characteristics

Survey results showed most male respondents (59.1%) as against 40.9% females (Table 2). The distribution of farmers by gender for all locations is shown in Table 3.

The mean age of males was 42.46, while that of the females was 44.16 and was not statistically significantly different (Table 4). With these mean ages of male and female yam farmers, it is anticipated that they would be in yam production for a long while to benefit effectively from training received on quality seed yam production and being gender aware. This would ensure sustained seed yam production and yam productivity. In discussing gender issues, the youth and the vulnerable are mentioned because their roles in agriculture production are equally socially defined. The youth are needed much in agriculture to take over the ageing farming population. Persons between the ages of 18 and 35 were classified as youth.

Results showed that males had longer periods of education with mean years of about 5 years compared to 2 years for females. This is typical of agriculture in Ghana from the GLSS-4 Report (2000), Afari (2001) and Dapaah (2014). The GLSS-4 report (2000) indicated that about 43% of persons in the agricultural industry had never been to school,

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about 25% had less than primary education, about 28 had primary education and only 4% had secondary or higher education.

Table 1. Distribution of respondents by treatments and municipalities.

Municipal	T1	T2	T3	Total
Ejura-Sekyedumase	124 (53.9) *	37 (16.1)	69 (30.0)	230 (100)
Atebubu-Amantin	57 (23.8)	103 (42.9)	80 (33.3)	240 (100)
Total	181 (58.5)	140 (29.8)	149 (31.7)	470 (100)

T1=Communities where farmers were trained on positive selection of yam seeds; T2= Communities where farmers were trained on good seed yam agronomic practices; T3= communities received no training; *Figures in parenthesis are percentages; Source: Survey Data, 2016.

Table 2. Distribution of farmers by gender and treatments.

Gender	T1	T2	T3	Total
Male	100 (36.0) *	88 (31.7)	90 (32.4)	278 (59.1)
Female	81 (42.2)	52 (27.1)	59 (30.7)	192 (40.9)
Total	181 (38.5)	140 (29.8)	149 (31.7)	470 (100)

T1=Communities where farmers were trained on positive selection of yam seeds; T2= Communities where farmers were trained on good seed yam agronomic practices; T3= communities received no training; *Figures in parenthesis are percentages; Source: Survey Data, 2016.

Table 3. Distribution of farmers by gender for all locations.

Gender	Frequency	Percent
Adult male	172	36.6
Adult female	128	27.2
Male youth	106	22.6
Female youth	64	13.6

Source: Survey Data (2016).

Table 4. Distribution of age, years of schooling and household size.

Gender	Age		Years in school		Household size	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Male	42.46	14.957	4.87	5.012	8.68	4.651
Female	44.16	14.312	2.00	3.772	8.27	4.337
F		0.344	58.309		1.479	
Sig.		0.558	0.000		0.225	

Source: Survey Data (2016).

Dapaah (2014) observed this trend among yam farmers in the Krachi East District in the Oti Region. This result confirms these observations and important to it is the gender differences in the number of years in school for men and women. Most respondents were married with a mean household size of 8.68 for males and 8.27 for females (Table 4).

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Table 5. Distribution of ethnic background by treatment communities.

Tribe	T1	T2	T3	Total
Different tribes from Northern Ghana	155 (44.4)	82 (23.5)	112 (32.1)	349 (100)
Akan	25 (21.2)	58 (49.2)	35 (29.7)	118 (100)
Other	1 (33.3)	0 (0.0)	2 (66.7)	3 (100)
Total	181 (38.5)	140 (29.8)	149 (31.7)	470 (100)

T1=Communities where farmers were trained on positive selection of yam seeds; T2= Communities where farmers were trained on good seed yam agronomic practices; T3= communities received no training; *Figures in parenthesis are percentages. Source: Survey Data (2016).

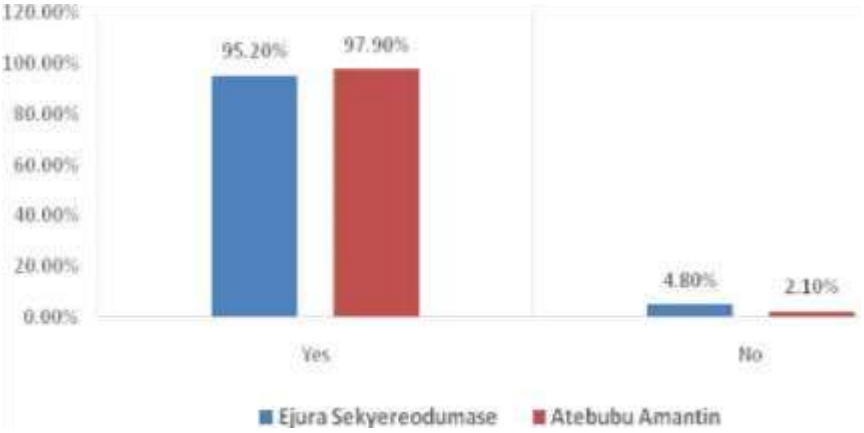

Figure 2. Awareness of different gender roles in seed yam production.

Respondents' ethnicity (Table 5) is of great importance because it explains male dominance and the cultural embeddedness (Obidiegwu and Akpabio, 2017) of gender issues in yam production. About 74% of respondents were from different tribes from Northern parts of Ghana such as Dagomba, Nanumba, Maprusi, Moore, Frafra, Nankani, Bulsa, Kusaal, Grusi, Wali and Birifo etc., 25% were Akans (Bonos and Ashantis) and less than one per cent from other ethnic backgrounds, specifically from the Volta Region.

Stereotyped gender roles in seed yam production

During the sensitization workshops, perceptions of community members on who does what in seed yam production and what has changed were obtained. All participants were aware of men, women and youth playing different roles in yam production and marketing. Information from the qualitative tools utilized, helped in the development of the survey questionnaire. Survey results illustrated in Figure 2 that 95% and 97% of people in Ejura Sekyedomase and Atebubu Amantin respectively were aware of the different roles played by different genders in seed yam production. The responses again showed that 94% in Ejura Sekyedomase and 96% in Atebubu Amantin were aware that different genders played different roles in seed yam marketing (Table 6). This confirms the assertion by Carr (2008) that gender roles differ among different genders and are dynamic. These dynamic roles were reflected in what farmers perceived as changes in seed yam production. These roles were defined by the cultural beliefs, social values and norms within each of the studied communities. They were indicated as stereotyped roles because that is what society expects them to be.

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Again, it is an indication that community members were aware that it was not only men who were involved in seed yam production and marketing but other persons (women and youth) were also involved. Therefore, yam production cannot be generalized as for men "only". Participants mentioned this awareness and changes in gender roles during the sensitization workshops. Thus, the higher percentages recorded during the survey might have been the outcome of increased awareness of the sensitization workshops created.

The existing different gender roles as perceived by respondents are presented in Table 7. The productive roles were conducted mostly by male and female adults, and the male youth. Women and young females were involved in reproductive tasks such as cooking for the family and farm labour and fetching of water for instance. Although, we can argue that male adults and male youth carried out the most labour-intensive activities, the tasks of female adults and female youth were also arduous.

Table 6. Awareness of the different gender roles in seed yam marketing.

Responses	Ejura-Sekyedumase	Atebubu-Amantin	Total

Figures in parenthesis are percentages. Source: Survey Data (2016).

Table 7. Different genders and activities performed on seed yam farms.

Farming activities	Adult male	Adult female	Male youth	Female youth
Looking for land for yam production	371 (78.9)*	43 (9.1)	52 (11.1)	4 (0.9)
Looking for yam seeds	309 (65.7)	72 (15.3)	82 (17.4)	7 (1.5)
Land clearing and stumps removal	210 (44.7)	36 (7.7)	213 (45.3)	11 (2.3)
Burning of weeds	198 (42.1)	84 (17.9)	140 (29.8)	48 (10.2)
Ploughing / harrowing	220 (46.0)	98 (20.9)	131 (27.9)	21 (4.5)
Mounds making	146 (31.1)	15 (3.2)	303 (64.5)	6 (1.3)
Ridging	153 (32.6)	45 (9.6)	241 (51.3)	31(6.6)
Carrying of yam seed	52 (11.1)	225 (47.9)	45 (9.6)	148 (31.5)
Cutting of yam seeds and treating	244 (51.9)	86 (18.3)	115 (24.5)	25 (5.3)
Placing of yam seeds on mounds	51 (10.9)	223 (47.4)	68 (14.5)	128 (27.2)
Planting the yam seed	233 (49.6)	37 (7.9)	188 (40.0)	12 (2.6)
Weeds and soil mulching	120 (25.5)	151 (32.1)	112 (23.8)	87 (18.5)
Burning of trees for stakes	180 (38.3)	106 (22.6)	140 (29.8)	44 (9.4)
Cutting and carrying of stakes	200 (42.6)	67 (14.3)	164 (34.9)	39 (8.3)
Putting the vines in the stakes	219 (46.6)	77 (16.4)	160 (34.0)	14 (3.0)
Weeding (3 times) / spraying	162 (34.5)	16 (3.4)	271 (57.7)	21 (4.5)
Carrying water for spraying	33 (7.0)	203 (43.2)	63 (13.4)	171 (36.4)
Harvesting and sorting	207 (44.0)	58 (12.3)	190 (40.4)	15 (3.2)
Sale at farm gate	212 (45.1)	100 (21.3)	104 (22.1)	54 (11.5)
Sale on the market	211 (44.9)	115 (24.5)	108 (23.0)	36 (7.7)
Cooking for labourers and family	18 (3.8)	295 (62.8)	19 (4.0)	138 (29.4)
Carrying harvested tubers	69 (14.7)	188 (40.0)	78 (16.6)	135 (28.7)
Loading yams into tractor / shed	133 (28.3)	92 (19.6)	199 (42.3)	46 (9.8)
Constructing storage facility	210 (44.7)	21 (4.5)	234 (49.8)	5 (1.1)

Figures in parenthesis are percentages.
Source: Survey Data (2016).

Results show that male adults were responsible for the acquisition of farm inputs and other resources such as land and seed yam, land clearing and removal of stumps, ploughing, harrowing, planting, collection of sticks for staking,

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vine staking, harvesting, sorting, and sale of seed yam at farm gate and market. Male youth were responsible for land clearing and removal of stumps, mound making, ridging, weeding and spraying, construction of yam barns and loading and carting of seed yams and storage.

Adult females carried out farm operations such as head pottage of seed yam, placement of seed yam on mounds and covering with soil after the males had planted them (for there was the belief that only males could plant yams), mulching, fetching water for spraying, cooking for laborers and family members and carrying and packing harvested micro tubers.

According to Aidoo et al. (2011), certain jobs were described as men's jobs because of their laboriousness, the reason why such crops were often labelled as Men's crop. That was also the perception among community members in the study locations. Hence, women assisted their male counterparts by participating in roles assigned to them. The sensitization workshop, however, drew members' attention to changes occurring in these stereotyped perceptions of women as assistants in yam production.

They appreciated how these gender roles were changing and several social dynamics going on in seed yam production. For instance, interactions with participants during FGDs indicated that women also owned yam farms, took decisions on all activities on such farms and had control over incomes from such farms. However, this meant that women hired labor for activities that required male input or support.

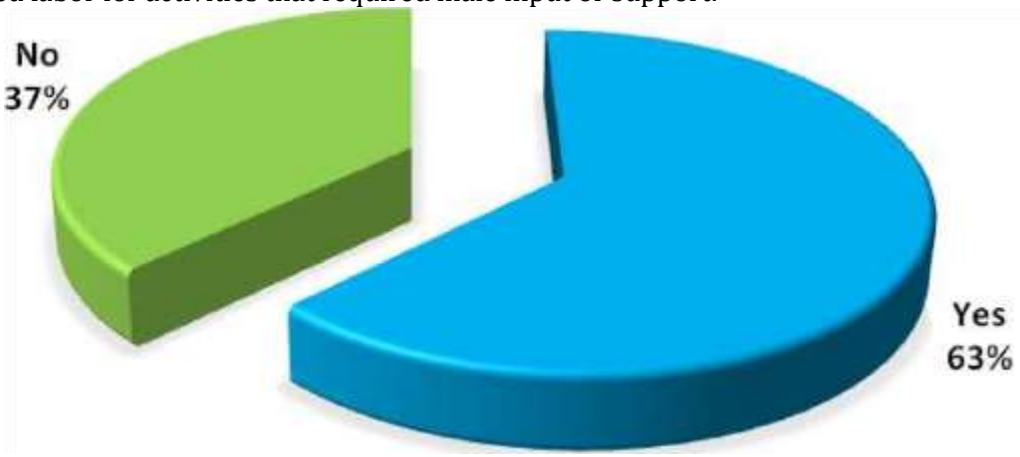

Figure 3. Awareness of changes in gender roles.
Source: Survey Data (2016).

Changing gender roles in seed yam production and their determinants

FGDs information showed that the significant change that had occurred in seed yam production and marketing specifically was with women's vigorous involvement. Almost all the study communities indicated this. These are quotes from a male farmer from Masuo and a female farmer from Ahotor.

"Most of the women now have their yam farms and make their seeds. If she has her yam farm then she will have to bear the cost and take decisions on the farm. … Madam obviously she will sell her yams and use the money as she decides, the husband has his own" (Source: FGDs transcript, 2016). "I have my yam farm. I cannot farm like my husband, but I have one, it's about 2 acres and I hire men to do the tasks that men do. The rest I do it myself. He helps with the land acquisition and getting the chemicals for weeding (Source: FGDs transcript, 2016).

Women were actively involved and made decisions in their capacities as yam farmers, whether married or not. Men, however, continued to make decisions on the purchase of farm inputs, land renting, seed yam pricing and sales.

Results from qualitative and quantitative data showed that apart from land preparation, mounding and harvesting, all other activities on yam farms could now be performed by women in all locations. It was found that women's capacities had been built (through the CAY SEED project and other previous projects) to cut yam seed, plant yam and

practice trellis staking, which was previously done solely by men. Some women said in a chorus during an FGD at Bisiw No.1 in the Ejura Sekyeredomase Municipal. "When the CAY Seed people came in, Dr. Osei and his people, we now have learnt how to cut the yam into smaller parts and use them as seeds. We treat it with neem power so that it will not be eaten by rodents. We didn't plant the yams in this community, we would just place them on the mounds for the men to plant, but now they showed us how to make ridges and we can plant the yams ourselves" (Source: FGDs transcript, 2016).

From the quantitative data, approximately 63% of all respondents were aware that changes had occurred following the project's intervention compared with 37% who were not aware of any changes (Figure 3).

Women because of their economic independence could also hire labour to do such activities (land preparation, mounding and harvesting) manually or with the use of agrochemicals where required. Changes in marketing and transportation roles are because trucks could get to farms, which have saved women from head pottage and transporting of harvested yams to barns or the roadside.

This agrees with the changing gender roles due to the changing socio-economic positions of people (Doss, 2001; Carr, 2008).

More men are involved in seed yam marketing compared to women in Table 7. In Table 8 however, we have some women in seed yam marketing as the survey indicated, this may be because they could get an excess of the men's seed yam to sell with the intervention. The FGDs had explained that women were into seed yam production now and would plant with their seeds and sell the excess to other farmers. They have smaller seed yam farms but when supported and encouraged they could produce more for their use and to sell. This would help bridge the gender gap of women's limited access to quality seed yams for increased yam production and productivity to enhance their livelihoods.

About 47% of all respondents who were aware of changing gender roles in seed yam production indicated that male adults look for land for yam production. However, 23% said all genders performed this task. In searching for seed, 35% of respondents said it was performed by adult males but 18% said it was done by all genders. Other percentage responses for other yam production activities are indicated in Table 8.

Respondents showing that all genders performed some roles indicate changes in such roles instead of the traditional stereotyped assigned roles to different genders.

Some roles that were solely attributed and delegated to men, women or youth were presently being performed by all because of the education and involvement of all the different genders in the project's activities. People had changed their way of thinking in these communities that those roles could be performed either jointly or by all people of different genders. Men during the FGDs accepted the need to empower women and youth in seed yam production to complement their efforts in providing for the household. This result aligns with the findings of Afari (2001) that informal education has a significant impact on farm productivity. The roles assigned by society are not fixed and could change at any time when different genders are exposed and their capacities built (Carr, 2008). These changes, the study observed, were made possible because of the general economic trends that allowed for economic independence for all persons including women and youth, the CAY Seed training interventions targeting all genders, and available and accessible agricultural technologies to all genders.

Changes in decision-making, access and control over seed yam production resources

Decision making

Results from qualitative data showed that women, young women and male youth are mostly involved in water yam cultivation (Table 9). In such situations, they would own their yam farms and make their own decisions which are in agreement with Tibesgwa and Visser (2016) and Mishra et al. (2017) who reported that owners of the entity often made decisions but women were not involved directly in production and marketing decision making apart from female-headed households.

Men and women agreed that decisions in seed yam production and marketing were taken by both men and women (Table 10). The mean figures of male respondents were 97.5 and 95 for men's involvement in decision-making in

yam production and marketing and 86 and 82 for women's involvement in decision-making in yam production and marketing.

The mean figures of female respondents were 83.3 and 81.3 respectively for men's involvement in decision making in yam production and marketing and 97.9 and 95.8 for women's involvement in decision-making in yam production and marketing. For the youth involvement in decision-making for seed yam production and marketing, there were no significant differences in male and female responses.

Responses indicated men, women and youth participation in decision making but the study probed further to discover the extent of this participation (Table 11). For men's involvement in production and marketing decisions, we had a majority (79.6 and 78.6%) mentioned that their involvement was high but for women's involvement in production, we had about 48% of respondents gave it medium involvement and 42% giving it high involvement. Regarding the extent of women's involvement in marketing decision-making, we had 47% of respondents indicating high and 43% medium women involvement. Concerning youth involvement in production decision-making, the figures were 48% for medium and 32% for high and the figures for marketing decision making were 41% medium and 34% high. These results indicate changes in decision-making in yam production and marketing but there were differences, however, in the extent of women and youth involvement in decision making.

Access to resources

About 49% of respondents indicated that it is the adult male who had access to capital for seed yam production, the others (51%) think otherwise. They think adult females, both adult males and females; male and female youth had access to capital (Table 12). While one cannot be conclusive about this because of no detailed baseline information, this result is much appreciated because women have always been labelled as not having access to production resources, especially capital. Although the percentage of responses was higher, about 53% of adult males had access to land, and the rest of the respondents (47%) thought that all the genders had access to land for seed yam production. This is in confirmation with the study by Lambrecht et al. (2017), which showed changes in men's and women's landholdings among adults between ages 16 and 65 in Ghana from 1991 to 2013 and noted that women's access to land is not as low as some advocates proposed. Access to seed yam had always been an issue in yam production and about 48% of respondents indicated it was male adults who had access to seed yam. The majority (52%) however, think otherwise, that is, all the other genders had access. Responses for other production resources such as labour, other inputs, harvested tubers, income from yam sales and agricultural extension services are presented in Table 12. They all indicated that all genders had access to these resources and not only adult males as had been the case.

Table 8. Changing gender roles in seed yam production.

Farming activities	Adult male	Adult female	Male youth	Female youth	Adult male x adult female	Adult male x male youth	Adult female x female youth	All genders
Searching for land	62 (47.0)	10 (7.6)	8 (6.1)	-	5 (3.8)	15 (11.4)	1 (0.8)	31 (23.5)
Searching for seeds	43 (35.2)	15 (12.3)	11 (9.0)	-	7 (5.7)	18 (14.8)	6 (4.9)	22 (18.0)
Land clearing / stumping	31 (25.4)	5 (4.1)	34 (27.8)	-	3 (2.5)	33 (27.0)	5 (4.1)	11 (9.0)
Burning weeds	29 (24.2)	13 (10.8)	28 (23.3)	-	6 (5.0)	13 (10.8)	18 (15.0)	13 (10.8)
Ploughing / harrowing	11 (29.7)	-	22 (59.5)	-	1 (2.7)	1 (2.7)	-	2 (5.4)
Mounding	14 (11.6)	2 (1.7)	47 (38.8)	1 (0.8)	1(0.8)	39 (32.3)	4 (3.3)	13 (10.7)
Ridging	9 (10.5)	7 (8.1)	35 (40.7)	-	3 (3.5)	19 (22.2)	4 (4.7)	9 (10.5)
Carrying yam seed	3 (2.5)	31 (25.6)	7 (5.8)	16 (13.3)	3 (2.5)	6 (5.0)	43 (35.5)	12 (9.9)
Cutting and treating yam seeds	32 (25.8)	11 (8.9)	19 (15.3)	-	6 (4.8)	21 (16.9)	11 (8.9)	24 (19.4)
Placing on mounds	4 (3.3)	35 (28.7)	9 (7.4)	10 (9.0)	4 (3.3)	6 (4.9)	39 (32.0)	14 (11.5)
Planting	30 (23.3)	5 (3.9)	22 (17.1)	2 (1.6)	13 (10.1)	39 (30.3)	3 (2.4)	15 (11.6)
Covering yam with weeds / soil	9 (7.4)	31 (25.4)	10 (8.2)	14 (11.5)	6 (4.9)	11 (9.0)	26 (21.4)	14 (11.5)
Burning trees for stakes	15 (12.3)	26 (21.3)	21 (17.2)	3 (2.4)	7 (5.7)	14 (11.5)	22 (18.0)	14 (11.5)
Cutting and carrying stakes	24 (19.2)	7 (5.6)	24(19.2)	2 (3.2)	13 (10.4)	12 (9.6)	29 (23.2)	14 (11.2)
Putting the vines in the stakes	23 (19.3)	9 (7.5)	19 (16.0)	4 (3.3)	8 (6.7)	33 (27.7)	8 (6.7)	15 (12.6)
Weeding (3 times) and Spraying	23 (18.5)	2 (1.6)	34 (27.4)	3 (2.4)	7 (5.6)	40 (32.3)	5 (4.0)	10 (8.1)
Carrying water for spraying	2 (1.7)	41 (33.9)	8 (6.6)	11 (9.1)	4 (3.3)	4 (3.3)	44 (36.5)	7 (5.8)
Harvesting and sorting	27 (21.8)	6 (4.8)	18 (14.5)	4 (3.3)	11 (8.9)	23 (18.5)	14 (11.3)	21 (16.9)
Farm gate sales	22 (22.0)	16 (16.0)	10 (10.0)	3 (3.0)	3 (3.0)	13 (13.0)	19 (19.0)	14 (14.0)
Market sales	21 (17.2)	26 (21.3)	13 (10.7)	3 (2.5)	12 (9.8)	10 (8.2)	23 (18.8)	14 (11.5)
Cooking for labourers/ family	1 (0.8)	52 (43.0)	1 (0.8)	17 (14.0)	1 (0.8)	2 (1.7)	40 (33.1)	7 (5.8)
Carrying harvested tubers	-	34 (27.9)	10 (8.2)	15 (12.3)	6 (4.9)	7 (5.7)	40 (32.8)	10 (8.2)
Loading yams into tractor / Shed	11 (8.5)	6 (4.6)	26 (20.0)	6 (4.6)	15 (11.5)	38 (29.2)	13 (10.0)	15 (11.5)
Constructing storage facility	35 (28.7)	2 (1.6)	31 (25.1)	1 (0.8)	3 (2.5)	44 (36.1)	1 (0.8)	5 (4.1)

Source: Survey Data (2016).

Control over resources

It is one thing having access and another having control, which is the claim of ownership of production resources. This is where power relations in gender play an important role regarding production resources. From Table 13, about 54% of all respondents indicated it was the adult male who had control over capital for seed yam production. The trend is similar for all other seed yam production resources such as land, labour and seed yams where the majority of respondents think adult males had control. For the other resources, the majority showed that all the different genders had control over them.

Table 9. Yam types and gender involved in their production in all locations.

Source: FGDs Transcript (2016).

Table 10. Decision making in seed yam production and marketing by gender.

Decision making	Male		Female		All	
	Mean	SD	Mean	SD	Mean	SD
Men involved production	97.5	0.2	83.3	0.4	91.7	0.3
Men involved marketing	95.0	0.2	81.3	0.4	89.4	0.3
Women involved production	86.0	0.3	97.9	0.1	90.9	0.3
Women involved marketing	82.0	0.4	95.8	0.2	87.6	0.3
Youth involved production	55.4	0.5	56.3	0.5	55.7	0.5
Youth involved marketing	51.4	0.5	48.7	0.5	50.3	0.5

Source: Survey Data (2016).

Table 11. Extent of gender participation in yam production and marketing decisions.

Genders and decision types	Extent of involvement		
	Small	Medium	High
Men involved production	32 (7.4)	56 (13.0)	343 (79.6)
Men involved marketing	27 (6.4)	63 (15.0)	330 (78.6)
Women involved production	43 (10.1)	203 (47.7)	180 (42.3)
Women involved marketing	40 (9.7)	177 (43.1)	194 (47.2)
Youth involved production	51 (19.5)	126 (48.1)	85 (32.4)
Youth involved marketing	59 (24.9)	97 (40.9)	81 (34.2)

*Figures in parenthesis are percentages. Source: Survey Data (2016).

Table 12. Access to resources for seed yam production among genders.

Resources	Adult male	Adult female	Both adults	Male youth	Female youth
Capital	229 (48.7)*	92 (19.6)	84 (17.9)	53 (11.3)	12 (2.6)
Land	250 (53.2)	74 (15.7)	85 (18.1)	50 (10.6)	11 (2.3)
Labour	206 (43.8)	72 (15.3)	96 (20.4)	87 (18.5)	9 (1.9)
Seed Yam	224 (47.7)	86 (18.3)	97 (20.6)	57 (12.1)	6 (1.3)
Other Inputs#	189 (40.2)	76 (16.2)	98 (20.9)	85 (18.1)	22 (4.7)
Harvested Tubers	165 (35.1)	86 (18.3)	137 (29.1)	71 (15.1)	11 (2.3)
Extension Services	211 (44.9)	72 (15.3)	122 (26.0)	52 (11.1)	13 (2.8)
Sales Income	167 (35.5)	103 (21.9)	130 (27.7)	56 (11.9)	14 (3.0)

*Figures in parenthesis are percentages; #this refers to inputs such as herbicides, nematicides etc. Source: Survey Data (2016).

Table 13. Control over resources for seed yam production among genders.

Resources	Adult male	Adult female	Both adult	Male youth	Female youth
Capital	255 (54.3)*	81 (17.2)	75 (16.0)	54 (11.55)	5 (1.1)
Land	264 (56.2)	65 (13.8)	85 (18.1)	51 (10.9)	5 (1.1)
Labour	243 (51.7)	70 (14.9)	82 (17.4)	71 (15.1)	4 (0.9)
Seed Yam	246 (52.3)	78 (16.6)	85 (11.3)	53 (11.3)	8 (1.7)
Other Inputs#	213 (45.3)	78 (16.6)	80 (17.0)	76 (16.2)	23 (4.9)
Harvesting	231 (49.1)	67 (14.3)	103 (21.9)	61 (14.3)	8 (1.7)
Harvested Tubers	216 (46.0)	71 (15.1)	116 (24.7)	62 (13.2)	5 (1.1)
Marketing	213 (45.3)	96 (20.4)	98 (20.9)	59 (12.6)	4 (0.9)
Extension Services	172 (36.6)	57 (12.1)	98 (20.9)	97 (20.6)	46 (9.8)
Income Use	210 (44.7)	82 (17.4)	123 (26.2)	51 (10.9)	4 (0.9)

*Figures in parenthesis are percentages; #this refers to inputs such as herbicides, nematicides etc. Source: Survey Data (2016).

Decision making over seed yam production resources

Once people have control over production resources, their ability to make decisions on such resources does not pose any problem. The survey asked respondents which gender group could make decisions on seed yam production resources. From the results, decision-making regarding seed yam production resources spread among the different genders. While a majority of respondents think it was done by all the different genders, the rest think decisions were made by the adult male. This trend goes for all the seed yam production resources (Table

14).

Inferred from this result is that, while individuals had their own seed yam farms, they had access to and control over their production resources and made decisions on such production resources. This demystifies the motion that, apart from women household heads, decision making in yam production and marketing was in the domain of men (Tibesigwa and Visser, 2016; Lambrecht et al., 2017; Mishra et al., 2017). These results show that women and youth also had their ware yam or seed yam farms and made decisions regarding such farms.

Food security implications

Food security exists when all people, always, have physical, social and economic access to enough, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life (FAO, 2003). This relies on food being available, accessible, utilizable and stable (Fraanje and Lee-Gammage, 2018), which are the four pillars of food security. All the pillars must be considered and addressed to ensure that people are food-secured. Inferred from the gender dynamics in seed yam production are the related increased involvement of women and youth to enhance food security. A major constraint in yam production is the continual unavailability of disease and pest-free yam seeds for farmers. Low yam productivity, coupled with limited seed yam for annual cultivation, has been observed (Aidoo et al., 2011). Therefore, to enhance yam productivity and ensure food security, it is crucial to prioritize the availability and accessibility of high-quality seeds. Once these quality seeds are readily available and accessible, farmers can significantly improve their productivity. When these factors are stable with continual availability, accessibility and utilisation of improved seed yams for continual cultivation, security of yam seeds can be expected for continual and increased productivity. This could be assured if more people especially women and youth go into improved seed yam production, which was the main objective of the CAY Seed project. Qualitative results showed that women and youth are into water yam production in the studied communities.

Table 14. Decision making over seed yam production resources among genders.

Resources	Adult male	Adult female	Both adult	Male youth	Female youth
Capital	158 (33.6)*	71 (15.1)	194 (41.3)	44 (9.4)	3 (0.6)
Land	170 (36.2)	65 (13.8)	188 (40.0)	42 (8.9)	5 (1.1)
Labour	167 (35.5)	65 (13.8)	181 (38.5)	54 (11.5)	3 (0.6)
Seed yam	175 (37.2)	71 (15.1)	174 (37.0)	45 (9.6)	5 (1.1)
Other inputs#	161 (34.3)	96 (20.4)	149 (31.7)	61 (13.0)	3 (0.6)
Harvesting	142 (30.2)	66 (14.0)	206 (43.8)	51 (10.9)	5 (1.1)
Harvested tubers	127 (27.0)	69 (14.7)	221 (47.0)	48 (10.2)	5 (1.1)
Marketing	136 (28.9)	88 (18.7)	193 (41.1)	47 (10.0)	6 (1.3)
Extension service	167 (35.5)	63 (13.4)	190 (40.4)	44 (9.4)	6 (1.3)
Use of income	116 (24.7)	74 (15.7)	229 (48.7)	45 (9.6)	6 (1.3)

*Figures in parenthesis are percentages; #this refers to inputs such as herbicides, nematicides etc.

Source: Survey Data (2016).

"Afasie (local name of water yam) serves as a food security crop for us because we can store it all year round when the entire white yam is finished. We eat some, sell some and cook some for the laborers when we are preparing land and mounds for the next season's yams"

The above quote from one woman from Watro, one of the control communities at Atebubu Amantin Municipal said it all. Water yam served as a food security crop in these communities because they relied on it during the lean season, while preparing for the planting season for food for their families and laborers, and for cash. It was always accessible, available and is part of their preferred and culturally accepted foods in the study communities. Apart from water yam, an observed change in these communities was that women and youth were into white yam seed production. However, they cultivated smaller plots; therefore, they need to be encouraged to increase their seed yam farm sizes. Traditionally, yam has been considered a household asset, with decisions regarding its production resources typically made solely by male household heads. However, there has been a shift, with women and youth now actively participating in decision-making for both their water yam and seed yam farms. Men have recognized the importance of empowering women and youth in seed yam production to complement their efforts in providing for their

households, challenging the traditional male dominance in yam production. An example of this shift can be seen in the story of a male farmer in Abour, one of the study locations in Atebubu Amantin Municipal. He said:

"… Yes, the CAY Seed Project has really helped in getting women and youth to go into seed yam production. Had it not been for my wife's seed yam farm, we would have been food insecured when I lost my yam farm to drought. From her yam fields, we got some yam seeds to plant and some ware yams for the family" (source: FGDs transcript, 2016).

Yam has always been a source of income, which could be used to purchase other food staffs to be food secured, and as a source of food that always sustained families until the next harvest every year. It is also used to feed employed labor during the growing seasons. Both men and women yam farmers are thus empowered to ensure food security for their households and that of the farm laborers through yam production.

The findings from the study show the importance of gender responsiveness in the implementation of agricultural development projects for enhanced food security. Again, the gender and social dynamics confirm that gender roles are not fixed but change with time as Tibesigwa and Visser (2016), Lambrecht et al. (2017) and Mishra et al. (2017) reported.

Conclusion

The study examined changing gender roles in seed yam production using a mixed-method approach. Results showed that though there were no age differences among male and female respondents, their years in school differed with males having more years in school compared to females. Women and youth also performed roles socially assigned to males indicating some social and gender dynamics taking place in seed yam production (Doss, 2001; Carr, 2008; Lambrecht et al., 2017). These are related to all genders involved in all activities of seed yam production and having access and control over resources for seed yam production. These have enhanced food security; ensuring that all the four pillars of food security (availability, accessibility, utilization and stability) are addressed in seed yam production for increased yam productivity. These changes were made possible partly due to the CAY Seed gender awareness creation, training and the availability of gender-friendly technologies that all genders could access for their economic independence.

It was concluded that gender roles change with the changing socio-economic environments in seed yam production. Specific to this work is the awareness of such changing roles created through gender sensitization. Although all genders have access to and control over seed yam production resources, some people think that decision-making on these resources is still in the domain of males. This might be the result of stereotyping of gender roles. Thus, gender awareness creation should continually be the aim of all gender-responsive projects to ensure gender equality to enhance food security in yam growing communities in the country.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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