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Gender Constraints and Rice Varietal Characteristics Preferences in Lowland Rice Ecosystem in Ghana

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Abstract
This study examined the constraints and differences in varietal preferences for male and female rice farmers in lowland rice ecosystem in Ashanti Region of Ghana. Successful development interventions such as dissemination of improved rice varieties are, by their nature, transformative but paying attention to gender constraints and varietal preferences will always make them more effective. Yet, these issues are not adequately documented and analyzed in adoption studies. A total sample size of seventy (70) rice farmers was randomly selected for an in-depth individual interview, using structured questionnaires. Analytical tools used were mainly descriptive and statistical methods. The results indicate that gender constraints are influenced by gender roles. The male constraints are lack of credit to expand cultivation, land preparation, bird scaring, land availability and weeding, whilst their female counterparts are credited to expand cultivation, bird scaring, weeding, labour availability and land preparation. Furthermore, the varietal preferences of males are marketability, good taste, good cooking quality, medium plant height and good aroma, whilst good taste, early maturity, high yield, high tillering ability and marketability loom very large in females' choice of rice varieties characteristics. The paper concludes that Ghana needs to review her rice breeding policies to confront the challenge of low adoption of improved rice varieties, and in doing this gender constraints and preferences for varietal characteristics should be factored into breeding.
Keywords: Gender constraints and preferences, varietal characteristics, lowland rice ecosystem, improved rice varieties

1. Introduction

Rice cultivation in Ghana has a long history and nearly two centuries back it was already one of the major commercial food crops. Currently rice is rated the second staple crop in Ghana in terms of consumption after maize, and its production provides staple food, livelihood and income for rice-farming communities in Ghana. Rice consumption keeps increasing as a result of population growth, urbanization and change in consumer habits. The fast-growing demand for imported polished rice is driving interest in expanding production of Ghana's local rice. Increasing the supply of local rice to feed a growing demand in the country is a major challenge facing the country. Area expansion and irrigation have already become a minimal source of output growth at a world scale. Agricultural growth is believed to depend more on yield-enhancing technological change (Datt and Ravallion, 1996). The high demand for rice, therefore, is being met on decreasing agricultural lands by employing high yielding improved rice varieties due to rapid urbanization and industrialization. Due to this, much emphasis has been placed on the dissemination of higher yielding improved varieties in Ghana. This course is being championed in Ghana because it is believed the adoption of the improved agricultural technologies was what kick-started the Green Revolution in Asia could lead to significant increase in rice productivity in Ghana (World Bank, 2008). As a result, rice research has unduly emphasized on releasing higher yielding varieties regardless of whether the product characteristics are desirable or not to the target group. This is confirmed by Faltermeier (2007) who reported that rice farmers in Ghana have benefited from the dissemination of high-yielding varieties in addition to other complementary technologies such as fertilizer, weedicides and fungicides applications, agronomic practices and improved post-harvest practices.

Ragasa *et. al.* (2013) reported 20 improved rice varieties have been officially released in Ghana since the 1970s. All the varieties released are advanced varieties from AfricaRice, the International Rice Research Institute (IRRI), or other countries' research institutes, and Centre for Scientific Industrial Research (CSIR) performed only testing, with no varietal modification. Most of the varieties released are for lowland rice ecologies, and only in 2009 were varieties released exclusively for upland rice ecologies. Generally, the adoption of these improved rice varieties has been very low, although adoption is expected to enhance productivity and incomes, reduce poverty and consequently ensure gender equity (Asante, 2004). Ragasa *et. al.* (2013) conducted a study on improved rice technology adoption and found out that the rate of adoption and intensity of use of improved rice technologies are lower in Ghana than that of sub-Saharan Africa. Empirical studies have provided evidence that gender affects adoption of agricultural technology (Lilja and Dalton, 1997). Gender faces constraints in rice

production as a result of gender roles. Men and women have clearly defined socio-economic roles in rice production and females are more constrained in rice production than males due to their multiple roles as home and farm managers. Furthermore, in developing the improved rice varieties, less attention is given to gender preferences for varietal characteristics. This has resulted into the dissemination of improved rice varieties which are not gender sensitive. A study conducted by Gladwin and McMillan (1989) reported that there is widespread of traditional rice cultivation which is dominated by females. This may be attributed to the fact that women prefer the attributes in the traditional variety, which are low yielding but seem to be tolerant to some of the stresses that characterize the rice ecosystems in Ghana.

In spite of these underlying reasons for the low adoption of improved rice varieties, there is a dearth of information on gender constraints and varietal characteristics preferences in Ghana, and majority of studies reviewed did not disaggregate data into gender and focused generally on rice farmers. The local culture and social aspects involving gender issues determining acceptance and development of varieties remain invisible (Richards, 1996). As cited in Ragasa *et. al.* (2013), the growth in the agriculture and rural sectors in many developing countries is undermined by gender-related issues (World Bank, FAO and IFAD, 2008; FAO, 2011). Knowledge of gender constraints and rice varietal preferences are vital in enhancing adoption of improved rice varieties and promoting local rice production. It is relevant that sources of new improved rice varieties take cognisance of these gender issues and address them to boost local rice production. Based on the problem identified, the goal of this study is to identify gender constraints and preferences for varietal characteristics in rice production in Ghana.

2. Study Method

Data was collected from both primary and secondary sources. The secondary data was obtained from publications, articles, journals, websites and from programme and project documents. Whilst the secondary data was useful, the key aspects of the study used primary data. Respondents were selected through a combination of simple random and purposive sampling techniques. The purposive sampling technique procedure involved selecting six communities with long engagement in rice production and high rice farming. The six major rice-growing communities, namely Dwaaho, Manfo, Afotokwa, Tepa/ Katabo, Akwasiase and Ntewie were purposively selected from the Ahafo Ano North District in the Ashanti Region of Ghana. A total sample size of 70 rice farmers, were sampled out of a total population of 159. Data was collected for the 2013 farming season. Table 1 shows the population of rice farmers and the sample size selected from each study community.

Table 1: Selection of respondents

Names of the communities selected	Total rice farmers population	Total sample selected for the study
Dwaaho	33	**15**
Manfo	42	**19**
Afotokwa	22	**10**
Tepa/ Katabo	32	**14**
Akwasie	19	**9**
Ntewie	12	**3**
Total	**159**	**70**

Source: District Management Information System (MIS) database, 2014.

A standardized questionnaire was designed, pre-tested and administered to the respondents. In order to ensure gender responsiveness in data generation, experienced gender-sensitive enumerators were used. Furthermore, data was obtained through individual interviews using structured interview schedules. The individual interviews were conducted to enable individual farmers to express their own views without any group influence. Information on respondents' socio-economic characteristics, farming and marketing practices, preferred trait of rice varieties in the order of importance from a list of rice varietal characteristics and ranking of constraints in rice production were solicited.

Data from the survey were coded and analyzed using the SPSS software. Descriptive and statistics were the two main analytical tools employed for the study. Statistics such as frequencies, percentages, Likert-scale ranking, mean scores and ranking were used. Average scores and ranks were used for the gender preferences for the varietal characteristics. Gender constraints in rice production was measured using a Likert scale (Responses; 1 = very important; 2 = important; 3 = not so important; 4 = not important)

The gender mean preferences of rice varietal attributes were assessed using the relation:

$$\text{Mean } (\bar{x}) = \frac{(\sum n * x_i)}{N}$$

Where n= number of individuals who chose the ith response, Xi= the ith response, N= the total number of farmers.

3. Results and Discussions

3.1 Socio-demographic characteristics of respondents by gender

Table 2 presents the socio-demographic characteristics of farmers by gender. The result reveals that only about 17 percent of the respondents' were women which suggest that there were less female farmers involved in rain-fed lowland rice production compared to their male farmers. This may be attributed to the fact that rice production is labour intensive activity and considering the multiple roles of females, more males are engaged in rice production than females. This result is consistent with findings of Adekunle (2013) on low number of female rice farmers involved in upland rice production in Sub Saharan Africa. He attributed low female involvement to them being more constrained by socio-economic factors (including resource endowment, capital and land).

The mean age of respondents was 47, which shows that rice farming is mainly practiced by the middle-aged group. According to the Ghana population Census, more than 50 percent of the population of Ghana is composed of youths (15 to 35 years). The existing labour intensive farming is no longer attractive to this age group who are drawn to urban areas for non-existing white collar jobs. This is pointing to the need for appropriate interventions to modernize agriculture and improve social amenities in the rural areas.

The illiteracy rate among respondents was 47 percent representing males and 75 percent for females. The high illiteracy rate among women is confirmed by a study conducted by FAO which indicated that the illiteracy rate in Ghana is still high but is very prominent among females which stand at 46% (FAO, 2013). Table 2 shows that the illiteracy rate at the study area is higher than that of the national figure. According to Ghana Population Census, the literacy rate of the total population is 71.5%, composed of Male: 78.3% and Female: 65.3%. The low levels of formal education for many rural communities are mostly linked to the vicious cycle of poverty among the rural folks.

The average household size recorded by male respondents was eight (8) while that of females was seven (7). Both male and female rice farmers recorded large household size in the study area. Due to lack of access to formal credit, in the labour intensive food production system like rice production, farmers rely mainly on family labour for their production activities. This explains why both male and female rice farmers recorded large household size.

About 28 percent of females own their own rice plot against 19 percent of the males. This is attributed to the matrilineal system in Ashanti region which allows females to own a parcel of land. Although about 9 percent of males were into share cropping, none of the females were into share cropping. The percentage of the male farmers who rented a rice plot was 67 percent as compared to 53 percent representing females, and 5 percent of the males were cropping on the family land as against that of 19 percent of their female counterparts. The average farm size for males is 1.2 acres and that for females is 0.8 acres. On the average about 98 percent of the farmers cited agriculture as their main activity. This is not surprising because according to 2010 Ghana population census, almost two-third of the country's population of about 20 million people is employed in the agricultural sector. Only 2 percent of the male farmers cited formal employment, commerce and craftsmanship as their main occupation. All the female farmers cited farming as their main occupation. Moreover, rain-fed lowland rice farming was practiced by both male and female farmers.

The study found that, only 25 percent of male and 19 percent of female farmers had access to credit. About 62 percent of the male farmers have had access to extension services as against 58 percent for the females. Also, the average number of times the males participated in field demonstrations was more than their female counterpart. These disparities may be attributed to the fact that women are constrained by time due to their multiple roles, consistent with a study conducted by Kaaya *et. al.* (2007) which reported that time constraints due to their multiple roles restricts women from benefiting from interventions.

3.2 Gender constraints

Table 3 depicts gender constraints in rice production. Eleven constraints to rice cultivation were identified and ranked by gender in the study area (see Table 3a and 3b). The first five highest constraints ranked by male in the order of importance were lack of capital/credit to expand cultivation, land preparation, bird scaring, land availability and weeding. Nevertheless, those of the females were lack of capital/credit to expand cultivation, bird scaring, weeding, labour availability and land preparation. It can be observed that the ranking of the gender constraints in rice production falls in line with gender roles in rice production.

Table 2: Socio-demographic Characteristics of survey farmers by gender

Variable	**Males**	**Females**
Respondents (%)	83	17
Mean age	47.6	46
Illiteracy rate	47	75
Household size	7.5	7.3
Agriculture as main Occupation (%)	98	100
Type of rice farming	Lowland	Lowland
Mean farming experience	19.5	20.2
Mean farm size	1.2	0.8
Access to credit	25	19
Access to extension (%)	62	58
Number of participation in field demonstration	26	25
Land Tenure system (%)		
Own	19.0	27.6
Sharecrop	9.1	0.0
Rent	66.7	53.4
Family	5.2	19.0

Source: Rice Farmers Survey Data, 2014

In Ghana, rice production is labour intensive hence fewer females are involved. Women are mostly involved in transplanting, weeding, bird scaring and post-harvest activities such threshing, winnowing, drying and to a lesser extent in marketing. Also, rice is a cash crop and just in the case of all cash crops, men dominate rice production. Lack of credit is major constraints to both male and female rice farmers', hence lack of formal credit was cited as the most important constraint in their rice production. Again, in Ghana, land preparation has always been male activity, therefore was ranked as the second most important constraint by males. However, bird scaring and weeding which are mainly women activity in rice production were cited as the second and third most important constraint in rice production by females. Land availability was ranked fourth by males because searching for appropriate rice plot for cropping is mostly done by males. Farmers generally had limited access to lands suitable for lowland rice cultivation and for that reason rice fields are normally rented out on short term basis and this affected permanent development of paddy fields. Due to lack of credit to hire labour to engage in initial land preparation, few women are involved in initial land preparation, therefore, labour availability and land preparation were ranked fourth and fifth respectively.

Table 3a: Gender constraints in rice production (Male)

Constraints	Very important		Important		Not so Important		Not Important		Total score	Rank
	Freq	Score	Freq	Score	Freq	Score	Freq	Score		
Capital (Credit)	49	196	7	21	0	0	2	2	219	**1st**
Land Preparation	40	160	10	30	0	0	8	8	198	**2nd**
Bird Scaring	32	128	21	63	0	0	5	5	196	**3nd**
Land Availability	38	152	10	30	1	2	9	9	193	**4th**
Weeding	26	104	26	78	0	0	6	6	188	**5th**
Labour	30	120	18	54	0	0	10	10	184	**6th**
availability	30	120	16	48	0	0	12	12	180	**7th**
Low Prices										
Diseases	27	108	19	57	1	2	11	11	178	**8th**
Marketing	25	100	20	60	0	0	13	13	173	**9th**
Availability of planting material	20	80	14	42	0	0	24	24	146	**10th**
Storage Losses	6	24	21	63	1	2	30	30	119	**11th**

Source: Rice Farmers Survey Data, 2014

Table 3b: Gender constraints in rice production (Female)

Constraints	Very important		Important		Not so important		Not Important		Total score	Rank
	Freq	Score	Freq	Score	Freq	Score	Freq	Score		
Capital (Credit)	12	48	0	0	0	0	0	0	48	**1st**
Bird Scaring	6	24	2	6	0	0	4	4	34	**2nd**
Weeding	3	12	6	18	0	0	3	3	33	**3rd**
Labour availability	4	16	4	12	0	0	4	4	32	**4th**
Land Preparation	3	12	5	15	0	0	4	4	31	**5th**
Diseases	2	8	6	18	0	0	4	4	30	**6th**
Marketing	3	12	4	12	0	0	5	5	29	**7th**
Low Prices	1	4	6	18	0	0	5	5	27	**8th**
Land Availability	2	8	3	9	0	0	7	7	24	**9th**
Storage Losses	0	0	4	12	0	0	8	8	20	**10th**
Availability of planting material	0	0	3	9	0	0	9	9	18	**11th**

Source: Rice Farmers Survey Data, 2014

3.3 Gender preferences for rice varietal attributes

It is clear from Table 4, that among the varietal attributes, marketability got the highest mean score (9.1) for male and was ranked first, followed by good taste (8.8) and good cooking quality (8.7) which were ranked second and third respectively. Table 4 further shows that the attributes 'Medium plant height' and 'good aroma' got fourth and fifth rank respectively for males. Male participants chose marketability as their most preferred choice than their female counterparts, a result that is most likely explained by their leading role in Marketing.

This result is consistent with that of Wanyonyi *et al.* (2008), who reported that male rice farmers play a leading role in marketing. The male farmers therefore, viewed good taste, cooking quality and aroma as traits that directly influence consumers' preferences for rice variety and marketability. Results also revealed that male farmers were cautious of the plant height and preferred medium plant height because they viewed short plant height as susceptible to extreme flooding conditions which would submerge the plants resulting into either plant death or grain rot. The short plant height variety was also cited to be difficult to harvest because it is short which would require one to bend while harvesting.

In the case of their female counterparts, good taste got the highest mean score (9.8) and ranked first, followed by early maturity (9.6) and high yield (9.3) which were ranked second and third respectively. Tillering ability and marketability with a mean score of (9.2) and (9.1) were ranked fourth and fifth respectively. The 'good cooking quality' (6.7), 'grain swells when cooked' (6.7) and 'drought resistant' were ranked ninth and tenth respectively. The female varietal attribute that got the lowest rank was 'drought resistant' (5.8). The female varietal preferences suggest that women were more concerned with the overall production of rice. As cited in Nanfumba *et.al.* (2013), high tillering ability is precursor for high grain yield potential and consequently, overall production (Hill, 2004). On the other hand, early maturity of a material is a drought escaping attribute particularly important in rain-fed lowland ecologies that may be predisposed to seasonal low soil moisture stresses or occasional drought spikes, which are prevalent due to incursions of climate change effects (Fukai *et. al*., 1996).

Nevertheless, the result indicates that the women were more concerned about the overall production and this is as a result of the concern of women for food security in the household. Food availability, food accessibility, food acceptability and food adequacy are made possible through increased production of food staples (*Diao et. al*., 2008). Women are vital to food security and family well-being and their need for the high tillering, high yielding and early maturity variety. Female participants' preference for early maturing variety, most likely, may be also due to women's role in the crop's value chain. A late maturing variety would require more weeding times, demanding more labour from women while at the same time taking longer time for them to find food for their family (Wanyonyi *et al.*, 2008).

Table 4: Gender preferences for rice varietal attributes

Varietal Attributes	Male (Mean Score)	Rank	Female (Mean Score)	Rank
More Tillering	7.9	VII	9.2	IV
Moderate soil Cover	7.9	VII	8.3	VII
Drought Resistance	7.6	VIII	5.8	X
Disease Resistance	8.2	VI	7.5	VIII
Medium plant height	8.4	IV	9.0	VI
Early maturity	7.2	X	9.6	II
High yield	7.2	X	9.3	III
Good milling quality	7.4	IX	7.5	VIII
Easy threshing	7.2	X	9.0	VI
Good cooking quality	8.7	III	6.7	IX
Good aroma	8.1	VI	7.5	VIII
Grain swells when cooked	7.2	X	6.7	IX
Good taste	8.8	II	9.8	I
Marketability	9.1	I	9.1	V

Source: Rice Farmers Survey Data, 2014

4. Conclusion

Both female and male respondents were in their mid 40s but the females were relatively younger than the males. The men, on the other hand, were more literate than the women. The women recorded more years of experience in rice farming than men, and their main occupation was farming. The males' average mean farm size was larger than females and only small percentage of the farmers had accessed formal loans. More males received extension services, and the average number of participation in field demonstrations for males was relatively higher than their female counterparts. Most of the farmers rented rice plots because majority of them were permanent settlers. Furthermore, it was observed from the ranking of the gender constraints in rice production that, their rankings are consistent with gender roles in rice production. The male cited lack of credit to expand cultivation, land preparation, bird scaring, land availability and weeding as their main constraints, whilst their female counterparts indicated lack of credit to expand cultivation, bird scaring, weeding, labour availability and land preparation as their main constraints.

The study showed that gender preferences for varietal characteristics varied by gender. Majority of female farmers considered taste as the most important characteristic whilst majority of male farmers prioritized marketability as the characteristic that influences their choice of improved rice variety. The varietal preferences of males are marketability, good taste, good cooking quality, medium plant height and good aroma, whilst good taste, early maturity, high yield, high tillering ability and marketability loom very large in females' choice of rice varieties characteristics.

The results have implications for breeding and modern variety adoption. Research approaches that incorporate gender preferences for various attributes of rice in breeding programmes have to be adopted. Also, a range of varieties should be developed in order to meet the multiple concerns of male and female rice farmers at different ecosystems as a single variety may not be able to fulfill all of their concerns. The paper concludes that Ghana needs to review rice breeding policies to confront the challenge of low adoption of improved rice varieties, and in doing this; gender preferences for varietal characteristics should be factored into breeding. Anything short of this will make it difficult for Ghana to boost local rice production in lowland ecosystem.

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