Original Research Article

A GENDER ANALYSIS ON THE INVOLVEMENT OF FARMERS IN RICE-BEAN (*Vigna umbellata)* PRODUCTION ACTIVITIES IN THE SELECTED REGIONS OF NYANZA, KENYA

ABSTRACT

Aim- Analyze gender relationship and farmers' involvement in rice-bean (*Vigna ambellata*) production activities in selected regions of Nyanza, Kenya.
Study design- ex post facto survey design was used.
Place and duration of study- The study was conducted in selected regions of Siaya, Kisii and Migori between August 2020 and July 2021.
Methodology- Questionnaires and interviews were administered to collect information from 103 households; Kisii (18) Siaya (24) and Migori (61). Analysis was through statistical package for social Scientist's version 26(SPSS; 26). ANOVA was used to determine level of involvement by gender in rice-bean production, ordinal regression was used to determine influence of gender on rice-bean production and chi-square to determine the association between gender and rice-bean production.
Results- The response rate was 100% (N=103**).** Women were more involved in rice-bean production with production index of 2.96 compared to men who had production index of 2.39 translating to a significant association between gender and production activities (F=50.189, *P*-val=0.00<0.05). Gender influences rice-bean production by 61.3%. The chi-square test showed significant association between gender and rice-bean production (*P*=0.001<0.05).
Conclusion-Gender influences the level of involvement in rice-bean production activities; efforts to revive rice-bean may not be realized if the needs of male and female farmers are not treated separately in rice-bean production and priority given to those that exhibit high level of involvement. The article collaborates with existing theory by Eagly on gender and division of labor based on stereotyping and societal nurturance to produce gender specific roles. Efforts should be set up by the government through Ministry of Agriculture in conjunction with other stakeholders to formulate policies to mainstream gender involvement in rice-bean production to unlock rice-bean potential. Provide certified seeds and extension education blended with rice-bean agronomic information.

1. INTRODUCTION

Rice-bean *(Vigna umbellata*) is a pulse which is a legume that does well in tropical to temperate climates. It is grown majorly for food. The origin of rice-bean is traced to Indochina and some neighboring regions like Thailand where it was domesticated [1]. It does well in a wide range of soils including and not limited to: shallow, infertile or degraded soils, however a highly fertile soil may deter pod formation and reduce the yield of seeds [2]. In addition it is tolerant to draught, temperatures [3]. Rice-bean is majorly used for human nutrition, though it can also be used as fodder and green manure. It's grown either as a pure stand or an intercrop with maize crop. The areas under rice-bean farming have been declining gradually despite of its nutritional value as a result of introduction of high yielding crops such as maize, small and fragmented land holding has also contributed to the decline of its' production [4].

The status of household nutrition, food security and gender are essentially connected. Numerous social-cultural differences exist in the role of women in farming of crops; however, women are the major producers of the World's staple crops [5]. Both women and men farmers do not face the same production

conditions. As a result, they don't make the same production choices with implications for output and incomes [6]. According to FAO [7] women make great contribution in third world countries. However, their tasks vary from one country to another. In SSA women contribute to agricultural labor force averagely by 43% by supplying up-to 80 percent of food crops in some societies [5]. Therefore, gender aspect is important as far as food production, food security and rice bean production is concerned. For instance, women contribute to agro-conservation by serving as custodians of seeds which consequently contribute to food security [8]. However, the differences in terms of role played in the farm by each gender can affect the level of food productivity depending on who decides what to be produced, when to be produced, how to produce, when to sell, the quantity to be sold and how much to preserve [9]. Gender disparities in asset possession, labor specialization and endowment to inputs and output and taking part in making decision regarding specific activities in crop production can also affect level of food productivity [10]. This underscores the need to analyze gender relationships and farmers' involvement in rice-bean production activities.

Role of gender therefore requires critical attention, because greater number of the rural labor force in developing countries consists of women whose effort is not rewarded [11]. The larger percentage of women in the rural agricultural labor indicates men do little yet they are critical component of the household. In adequate information to farmers especially the female farmers act as a barrier to yield enough food and generate adequate income to sustain the members of household members [12]. Disseminating agricultural research and extension services to both male and female as a way of improving productivity and utilization of an underutilized crop such as Rice-bean must therefore start with needs analysis and role played by both genders. This study therefore focused on analysis of gender involvement in rice-bean production activities such as land preparation, planting, weeding, pest control, harvesting, drying, threshing and winnowing so as to inform on the better ways extension agents can use in advocating for reviving and enhancing continued cultivation of Rice-bean so as to increase its productivity, enhance food security and income among small scale farmers. Generally, farm level activities dominantly appear to be gendered .For example in India, activities that includes; pesticide application, land preparation, planting, fertilizer application and transplanting of seedlings in rice fields were exclusively performed by men whereas women were actively engaged in weeding, winnowing and threshing [13]. However, for the case of rice-bean the relationship between gender and farmers' involvement is not clear hence the need to analyze gender relations in farmers' involvement of in rice-bean farming.

2. MATERIALS AND METHODS

An analysis on gender in the involvement of farmers in rice-bean production activities (*Vigna ambellata*) was carried out in selected regions of Nyanza, Kenya. The objective was to identify gender and farmer relations in rice-bean production activities with respect to level of involvement. The study was conducted in three counties namely; Kisii, Migori and Siaya. Aspects of farming activities included; land preparation, planting, weeding, pest application, harvesting, threshing and winnowing.

2.1 STUDY POPULATION

This study targeted population of 300 households who practice rice-bean farming in the three sampled Counties according to the Ministry of Agriculture (MoA) reports of 2019 in the respective counties. The sample size was determined by Krejcie and Morgan method and the study population under study was 103 households consisting of rice-bean farmers who had technical knowledge on the crop.

2.2 SAMPLE AND SAMPLING PROCEDURES

This study used multi-stage, purposive and snowball sampling. In this study, the three Counties were purposively sampled because they met criteria of rice-bean farming namely; Siaya, Migori and Kisii. With assistance of County agricultural field officers, Multi-stage sampling was done to establish 2 Sub-Counties in each county that practice rice-bean farming. At the Sub-County level, Agricultural officers were purposively sampled to assist in identifying farmers. With aid of Sub-county Agricultural officers snowball sampling was used to sample 103 rice-bean farmers in each Ward. Frankel and Wallen [14] explains that in snowball sampling, you begin by identifying someone who meets the criteria for inclusion in the study then by asking them to recommend others whom they may know who also meet the criteria.

This sampling method is especially useful when the researcher is trying to reach populations that are inaccessible or hard to find. Similar to rice-bean farmers who could not be easily accessed snowball sampling was used.

2.3 LIMITATIONS OF THE STUDY

The limitation of the study is that it covered only selected regions in Nyanza namely in Siaya, Kisii and Migori in the year 2021. The study was also limited to rice-bean farmers in the selected counties.

2.4 DATA ANALYSIS AND PRESENTATION

The data gender roles in rice-bean production was collected, screened, coded and keyed into statistical package for social sciences Version 26 (SPSS,26) and analyzed descriptively as frequencies and percentages and using analysis of variance (ANOVA) and chi-square test at significance value of P=0.05. ANOVA was used to determine level of involvement by gender in rice-bean production and chi-square to determine the association between gender and rice-bean production activities. The testing of hypothesis was carried out at significance level P= 0.05.

In order to determine the level of men and women involvement in production activities indexing (PAI) was carried out on 8 production activities namely; land preparation (LP), planting(P), weeding (W) pesticide application (PA), harvesting (H), threshing (T), drying (D) and winnowing (W) on a likert scale of 3 ranging from not involved (1) occasionally involved (2) and fully involved (3) and their means worked out to determine the level of involvement. Analysis of variance was then carried out on mean test whether there was any significance.

$$PAI=\frac{LP+P+W+PA+H+T+D+W}{8}$$

3. RESULTS AND DISCUSSION

3.1 Social -economic characteristics of rice-bean farmers in selected regions of nyanza

This included gender, age, level of education, farm size access to market and access to extension services. The analysis was done by determining frequencies and percentages

3.1.1 Gender

In order to understand gender involvement in rice-bean farming; analysis of the respondents' gender was necessary. From the findings 70% were females and 30% were males (Table1). women were more involved in rice-bean farming in the three Counties for instance in Kisii women accounted for 14% while men 4%, Migori women were 43%while men 17% while in Siaya women accounted for 14% and men 10%. This shows gender variation in the involvement in rice-bean production whereby women were more involved compared to men.

This is similar to studies of Adebayo *et al.,* [15] who reported that female were more involved in cultivation of crops considered to boost household food security. Rice-bean is considered a household food crop. Thus, this could be the reason why rice-bean farming was mainly dominated by women. A study by Milicent [16] also revealed that the production of Bambara which is similarly an orphaned (neglected) crop and a contributor to household food security was more associated with female farmers. Therefore, this could imply that women were more involved in the production of crops that contribute directly to household food security as men were associated with cash crops which are income oriented.

Table 1 distribution of rice-bean farmers by gender

County	Total (N)	%	Male (N)	%	Female	%

Kisii	18	18	4	4	14	14
Migori	61	59	17	17	44	43
Siaya	24	23	10	10	14	14

N =103

3.1.2 Age of the farmers

Farmers were also asked to indicate their age. From the findings there was age variation in the participation of rice-bean farming. Majority of the farmers were of age class 35-50 years (37.9%), age group 60 years and above (14.6%) was least presented followed by age class of 19-34 years (23.3%). Based on gender 35.5% men and 38.9% women of age class 35-50 years were actively involved in rice-bean production. In age group 60 years and above men accounted for 22.6% while women accounted for 11.1%. (Table2). This shows that most rice-bean farmers are the middle-aged class ranging between 35-50 years where female accounted for 37.9% and male 35.5%.

Middle age class normally 35-50 is the most productive age group in human growth and development cycle. According to Babangida [17] middle age farmers play a significant role in small scale agricultural production in Sub-Saharan countries. The participation could be as a result of experience amassed in rice-bean farming and the urge to keep their families food secure. Age class 19-34 years indicated youths in their formative active stage who probably engaged in non-farming activities for fast income alternatively could be going to school for education and thus only school dropouts could be involved in the production of rice-bean. 60 years and above represented advanced age group which was least involved due to reduced labor output as a result of reduced energy and availability of other younger family members.

Table 2 distribution of rice-bean farmers by age

Age range	General (%)	Male (%)	Female (%)
19-34 yrs	23.3	22.6	23.6
35-50 yrs	37.9	35.5	38.9
51-60 yrs	24.3	19.4	26.4
60 yrs and above	14.6	22.6	11.1

N=103

3.1.3 Education level Status of rice-bean farmers

Rice-bean farmers were also asked to indicate their highest level of education and the results were presented as shown in the (Table 3). The findings indicated that the majority of the farmers had primary education (53.4%) followed by secondary (22.3%), ones with completely no formal education (11.7%), diploma (7.8%) and bachelors (4.9%). Gender wise female were the majority with primary education (54.2%) while male were 51.6%. Those who completely lacked formal were distributed as 16.7% female and 0% male which translates to high illiteracy among the women.

Education influences positively the farmers' decision making on what practice, how to practice and when to practice. However for this study education had no influence in rice-bean farming. This could imply that women participation in rice-bean farming could be as a result of existence of rice-bean farming and most knowledge could be passed down to generation. These results collaborates with earlier findings by Monica *et al.,* [18] which found out that most small-scale legume farmers in Tanzania relied on their own experience and knowledge as majority lacked formal education.

Table 3education level of rice-bean farmers

Education level	General (%)	Male (%)	Female (%)
Bachelor's Degree	4.9	3.2	5.6
Diploma	7.8	9.7	6.9
None	11.7	0	16.7
Primary	53.4	51.6	54.2
Secondary	22.3	35.5	16.7

N= 103

3.2 Gender roles in rice-bean production activities

Rice-bean production activities analyzed in relation to gender included; preparation of land, sowing/planting, weeding, pesticide application to control pests, harvesting, drying, threshing and winnowing activities.

3.2.1 Gender roles in preparation of land

Farmers were asked to indicate their level of involvement in land preparation, the data was then analyzed and presented (Table 4) as frequencies and percentages. The findings show that 83.5% of the respondents were fully involved in land preparation, 5.8% were not involved at all in land preparation. 81.9% of female respondents were fully involved in land preparation and 87.1% of male were fully involved in land preparation. 8.3% of female and 0% male were not involved at all in land preparation. The gender involvement in land preparation was further analyzed using chi-square test at a significance level of *P*=0.05 to find out whether there was a relationship between gender and level of involvement. The results showed that gender had significant association with involvement on land preparation (*$\chi 2$=81.420, P-Val=0.000<0.05)* where the results showed that gender had influence in land preparation.

Land preparation is a labor-intensive activity mostly done by men as it requires physical potential. Milicent *et al.,* [16] affiliated tedious activities of land preparation in bambara production with male gender. Veenita *et al.,* [19] also linked land preparation in paddy cultivation with male. This study also is in line with the two findings as it indicates that male were more involved in land preparation in rice-bean production. This could imply that men were more involved in activities that were tedious and required physical strength as the case of land preparation.

Table 4 Gender involvement in land preparation

Gender of Respondent	Not involved	Occasionally involved	Involved	Total
Male (N)	0	4	27	31

Male (%)	0%	12.9%	87.1%	100.0%
Female (N)	6	7	59	72
Female (%)	8.3%	9.7%	81.9%	100.0%
Total (N)	6	11	86	103
Total (%)	5.8%	10.7%	83.5%	100.0%
χ2=81.420	*df=1*	*P-Val=0.000*		

3.2.2 Gender roles in planting

Planting is part of production activity in rice-bean production, data was then analyzed and presented (Table 5) as frequencies and percentages. The findings indicate that 94.2% of the farmers were fully involved in planting while 2.9% were not involved at all. 95.8% of female respondents were fully involved in planting while 90.3% of male were involved in planting rice-bean. 1.4% of female and 6.5% were not involved at all in planting of rice-bean. The gender involvement in planting was further analyzed using chi-square test at a significance level of *P*=0.05 to find out whether there was a significant relationship between gender and level of involvement. The results indicated that, there was significant association between gender as the females participated more in planting (*χ2=92.191, P*-Val=0.001<0.05).

Planting of the household food crops is often regarded as female work. Bella et al [20] found that the planting of haricot bean which is a household food crop was majorly dominated by female farmers. Women are more affiliated with crops that serve a primary role for domestic food requirements [21]. These findings notes that female farmers in the rural set up could be more bothered with activities that enhance the survival of their family. Adebayo *et al.[15]* also affiliated activities of planting with female genders. This study also concurs with the three findings. Therefore rice-bean also being a household food crop has a female face hence women were more involved in its planting as they had planting materials at their disposal.

Table 5 gender involvement in planting

Gender of Respondent	Not involved	Occasionally involved	Involved	Total
Male (N)	2	1	28	31
Male (%)	6.5%	3.2%	90.3%	100%

Female(N)	1	2	69	72
Female (%)	1.4%	2.8%	95.8%	100%
Total (N)	3	3	97	103
Total (%)	2.9%	2.9%	94.2%	100%
χ2=92.191	*df=1*	*P-Val=0.001*		

3.2.3 Gender roles in weeding

Gender involvement in weed activities was also covered under this study. The frequencies and percentages were as shown below (Table 6). The findings indicate that 86.4% of the farmers were fully involved in weeding while 4.9% were not involved at all. 93.1% of female respondents were fully involved in weeding while 71% of male were fully involved. 1.4% of female and 12.9% were not involved at all in weeding rice-bean. A chi-square test at a significance level of *P*=0.05 also revealed a highly significant relationship between gender and farmers' level of involvement in the weeding activities (*χ2=83.707, P-*Val=0.000<0.05).

Women active participation in weeding activities implies their significant concern for better and vigorous growth and development of rice-beans at early growth stage [22]. This is in tandem with the study by Chayal et al. [23] who found weeding as one of the major activities that women greatly participate in. This study also affirms that weeding in rice-bean production was a major concern to female rather than males.

Table 6 gender involvement in weed control

Gender of Respondent	Not involved	Occasionally involved	Involved	Total
Male (N)	4	5	22	31
Male (%)	12.9%	16.1%	71%	100%
Female(N)	1	4	67	72
Female (%)	1.4%	5.6%	93.1%	100%
Total (N)	5	9	89	103
Total (%)	4.9%	8.7%	86.4%	100%
χ2=83.707	*df=1*	*P- Val= 0.000*		

3.2.4 Gender roles in pesticide application and pest control

Gender involvement in pest control activities were analyzed using the frequencies, percentages and Chi-square test. The analysis were done and presented (Table 7). The findings indicate that 90.3% of the farmers were fully involved in pest control while 4.9% were not involved at all. 90.3% of female farmers were fully involved in pest control while 87.1% of male were fully involved. 2.8% of female and 9.7% of male were not involved at all in pest control of rice-bean. Chi-square analysis at a significance level of *P*=0.05 also revealed that gender had a significant influence on farmers' level of involvement in pest control activities (χ2=88.21, *P*- Val= 0.000<0.05)

Women are often involved in farming activities which do not require more physical strength. According to Veenita *et al.,* [19] women are less involved in land preparation due to more physical strength required by the task. Contrary to pesticide application which does not require a lot of physical strength. This could explain why more female were involved in pest control as far as rice-bean production is concerned. Alternatively women own activities in the farm they may notice pest problems more than male who are less concerned.

Table 7 gender involvement in pest control

Gender of Respondent	Not involved	Occasionally involved	Involved	Total
Male (N)	3	1	27	31
Male (%)	9.7%	3.2%	87.1%	100%
Female(N)	2	4	66	72
Female (%)	2.8%	5.6%	91.7%	100%
Total (N)	5	5	93	103
Total (%)	4.9%	4.9%	90.3%	100%
χ2=88.21	*df=1*	*P- Val= 0.000*		

3.2.5 Gender roles in harvesting of rice-bean

Results of the analysis of gender involvement in harvesting activities based on frequencies indicated that 91.3% of the farmers were fully involved in harvesting activities while 5.8% were not involved at all. 98.6% of female respondents were fully involved in harvesting while 90.3% of male were involved in harvesting of rice-bean. 1.4% of female and 6.5% of male were not involved at all in harvesting of rice-bean (Table8). The results of chi-square test at a significance level of *P*=0.05 further revealed a highly significant difference in the level of involvement of female and male farmers in the harvesting activities. The difference in the levels of involvement were highly significant at *χ2=88.667, P*- Val=0.000<0.05 significance level.

A similar finding was reported in India by Mata and Sasvari [24] who rated involvement of female farmers in harvesting activities at 60%. This study also affirms that harvesting of rice-bean is mainly done by female. This could as a result of it being tasked to supplement household food security which is a responsibility tasked to women

Table 8 gender involvement in harvesting

Gender of Respondent	Not involved	Occasionally involved	Involved	Total
Male(N)	6	2	23	31
Male (%)	19.4%	6.5%	74.2%	100%
Female(N)	0	1	71	72
Female (%)	0%	1.4%	98.6%	100%
Total (N)	6	3	94	103

Total (%)	5.8%	2.9%	91.3%	100%
χ2=88.667	*df=1*	*P- Val=0.000*		

3.2.6 Gender roles in threshing

Gender in relation to threshing was also studied. The findings indicate that 78.6% of the farmers were fully involved in threshing while 14.6% were not involved at all. 95.8% of female respondents were fully involved while 38.7% of male were involved in threshing rice-bean. 1.4% of female and 45.2% of male were not involved at all in threshing of rice-bean (Table 9). The chi-square test at a significance level of *P*=0.05 revealed that there was a highly significant relationship (*χ2=67.956, P-Val= 0.000<0.05)* between gender and involvement level of farmers in the threshing activities in the as presented in Table 11

These results points out that threshing activities were predominantly carried out by women which is in support of findings by Amri and Kimaro [25] and Meinze-Dick *et al.*[26]. Even though , the results varied with those by Mata and Sasvari [24] in which male were more in the winnowing activities of rice compared to female, however the variation could be as a result of crop shift from food to cash crop thus the gender role is also expected to change with male farmers dominating as opposed to the previous.

Table 9 gender involvement in threshing

Gender of Respondent	Not involved	Occasionally involved	Involved	Total
Male(N)	14	5	12	31
Male (%)	45.2%	16.1%	38.7%	100%
Female (N)	1	2	69	72
Female (%)	1.4%	2.8%	95.8%	100%
Total(N)	15	7	81	103
Total (%)	14.6%	6.8%	78.6%	100%
χ2=67.956	*df=1*	*P-Val= 0.000*		

3.2.7 Gender roles in drying the rice-bean

The results for the descriptive statistics and chi-square test for gender involvement in drying activities of Rice-bean are presented in Table 10. The findings indicate that 83.5% of the farmers were fully involved in drying rice-bean while 11.7% were not involved at all. 98.6% of female respondents were fully involved in drying while 48.4% of male were fully involved in drying rice-bean. 0% of female and 38.7% of male were not involved at all in drying of rice-bean.. A chi-square test at a significance level of *P*=0.05 further revealed a highly significant difference in the farmers' level of involvement by gender in the drying of rice-bean (*χ2=86.00, P- Val= 0.000<0.05)*

The higher percentage of female farmers indicates that women were highly involved in drying activities compared males. Most women stay at home taking care of young kids and household chores as compared to their male counterparts [19]. This could indicate that most of the women were able to dry the crop at the comfort of their homes as they were at home in most of the time. This therefore implies that most female were involved in drying of rice-bean as they were at home most of the time.

Table 10 gender involvement in drying of rice-bean

Gender of Respondent	Not involved	Occasionally involved	Involved	Total
Male(N)	12	4	15	31
Male (%)	38.7%	12.9%	48.4%	100%
Female (N)	0	1	71	72
Female (%)	0%	1.4%	98.6%	100%
Total ((N)	12	5	86	103
Total (%)	11.7%	4.9%	83.5%	100%
χ2=86.00	*df=1*	*P- Val= 0.000*		

3.2.8 Gender roles in winnowing of the rice-bean

The analysis of gender involvement in the winnowing activities of Rice-bean was achieved by descriptive statistics and chi-square test at a significance level of *P*=0.05. The results are presented in Table 11. The findings indicate that 76.7% of the farmers were fully involved in winnowing while 20.4% were not involved at all. 95.8% of female respondents were fully involved in winnowing while 32.3% of male were fully involved in winnowing rice-bean. 2.8% of female and 61.3% of male were not involved at all in planting of rice-bean..

A chi-square test at a significance level of *P*=0.05 revealed a significant gender difference in the involvement level of farmers in the winnowing activities (*χ2=60.014, P*-Val=0.000<0.05).

Female farmers were highly involved in winnowing activities than their male. The finding suggests winnowing activities were more of a female's activity and concurred with Meinze-Dick *et al.* [26]

Table 11 gender involvement in rice-bean winnowing activities

Gender of Respondent	Not involved	Occasionally involved	Involved	Total
Male(N)	19	2	10	31
Male (%)	61.3%	6.5%	32.3%	100%
Female (N)	2	1	69	72
Female (%)	2.8%	1.4%	95.8%	100%
Total (N)	21	3	79	103
Total (%)	20.4%	2.9%	76.7%	100%
χ2=60.014	*df=1*	*P-Val=0.000*		

3.2.9 Assessment of Gender Involvement in Rice-bean Production Activities and influence of social economic characteristics on rice-bean production

The overall assessment of gender involvement was done by use of analysis of variance, multi- regression and chi-square analysis. The results through a chi-square showed a significant association of gender (*P*-Val=0.000<0.05) and rice-bean production activities. Through ordinal- regression gender contributes 63.7% influence on rice-bean. Through the ANOVA women were more involved in production activities in the selected regions of Nyanza (Table18). Women had higher Production Activities Index of 2.96 compared with male who had 2.39 translating to a significant association between gender and production activities (F=50.189, *P*-val=0.00<0.05) as shown in Table 17.The finding concurred with Sangir *et al.*[27]

who established more involvement of female farmers in the production activities of food crops. The social economic characteristics had no significant influence on rice-bean production activities (Table 16).

Table 12 involvement index by gender in rice-bean production activities

	N	Mean	Std. Deviation	Std. Error
Female	72	2.96	.201	.024
Male	31	2.39	.615	.110
Total	103	2.79	.457	.045

Table 13 ANOVA on level of involvement in rice-bean production activities by gender.

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	7.071	1	7.071	50.189	.000
Within Groups	14.230	101	.141		
Total	21.301	102			

Table 14 Overall contribution of gender on rice-bean production activities

Pseudo R-Square	
Cox and Snell	.411
Nagelkerke	.613
McFadden	.477

The study indicated that a majority of rice-bean farmers were females (70%) as opposed to males (30%) who were fewer. Majority of the farmers aged between 35-50 years which coincides with representation of most farmers in the rural set up according to a number of studies. Majority of the rice-bean farmers in the study area had a land size of 1 acre and below and practiced rice-bean production averagely on ¼ an acre. The largest acreage was found approximately to be 4 acres. On education level, most of the farmers had primary education level (53.4%), 22.3% secondary level and 11.7% completely lacked formal education, 7.8% diploma and 4.9% bachelor degrees similar to other studies that have found most farmers to be illiterate..

The analyzed data revealed that women were more involved in production activities in the selected regions of Nyanza. Women had higher Production Activities Index of 2.96 compared to male who had 2.36.

The study focused in evaluating the association between gender and farmer participation in the production tasks of rice-bean. Using chi-square, ANOVA and multiple regressions the objective of the study was analyzed. The results further showed that there is a statistical significant association between gender and farmers' participation in production roles in rice-bean. This implies that there is a close association between gender and participation of farmers in production of rice-bean legume. These results are corresponding with other similar studies carried out on indigenous traditional crops that supplement nutritional and food security of subsistence farmers.

In accordance to data analysis and presented results, it can be concluded as follows:

The level of participation by gender in farming activities was highly significant with female farmers reflecting higher participation than males in all the rice-bean production activities; this could be as a result of males being involved in higher paying employments or focusing cash crops such as sugarcane which is the main cash crop in the area and some males could be engaged in fishing while women continuous effort in its cultivation could be as a result of a role it plays in the household food security and nutrition.

The variation in participation in production activities was highly significant as women were predominantly involved all the activities. This can be explained by men dominating in other cash crops like sugarcane thus females participate fully because it plays a major role in the household food security.

These results have implications for the Government through the ministry of Agriculture in conjunction with key stakeholders and other development partners.

The ministry of Agriculture through extension agents should:

Embrace mechanisms that can enhance the participation of small-scale farmers in the revival and revitalizing of rice-bean by disseminating agricultural information and technologies which tallies with both male and female farmers

Create partnership and linkages for value addition of rice-bean as a way of creating market for the rice-bean.

The needs of male and female farmers should be treated separately in rice-bean cultivation activities. Female farmers should prioritized as they exhibit high level of involvement in effort of reviving the crop; thus appropriate information and technologies should be geared to each gender in order to boost rice-bean production as a way of sustainable food production in the household.

References

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