

**GENDER -SPECIFIC CONSTRAINTS AFFECTING TECHNOLOGY USE
AND HOUSEHOLD FOOD SECURITY IN WESTERN PROVINCE OF
KENYA**

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ABSTRACT

The factors that hinder farm intensification process among smallholders in Kenya are many and varied. These factors are not gender neutral; they affect the ability of both men and women to achieve greater productivity in agriculture. Lack of farm intensification contributes to stagnation of agriculture, increases poverty and limits rural development. The problems that face women farmers are more distinct due to socio-cultural constraints that affect their access to and control over essential assets necessary for improving their livelihoods and those of their households. Lack of access to and ownership of productive assets is an effect as well as a cause of poverty. The objective of the study was to assess gender specific constraints that affect the impact of farm technologies on household food security among smallholders in Western Province of Kenya. A multi-stage stratified random sampling technique was used to select 499 households. Using a semi-structured questionnaire administered to household heads together with six focus group discussions, the study examined how gender affects the intensity of use of farm technologies such as hybrid seeds, fertilizers, pesticides, animal draught power and storage technologies and impact on household food security. In addition, the study analyzed the effect of the level of education of household head and contact with extension service on maize yield. The results show that lack of access to land, extension services, credit, income and low education level are the most important constraints facing women farmers. While women accessed credit from informal sources such as rotating credit and savings, men accessed credit from banks and cooperatives. Women who accessed credit spent more on farm inputs and consequently they realized higher maize output. The results further showed that access to extension services was a problem to both genders; 21 % of women and 20 % of men had access to extension services - demonstrating the inability of the current extension system to disseminate existing and new technologies to smallholders. Access to formal school-based education and extension service had a large and significant effect on maize yield. Women were further constrained by limited time to perform their roles as well as limited access to technologies. Wives (59%) were more affected by labour changes associated with technology use than husbands (21%). The findings provide useful information to policy makers on how to address the complex issues related to gender, agricultural development and rural poverty.

Key words: Gender, technology, food security, Kenya

INTRODUCTION

There are five assets or capitals that rural households depend on for survival and which affect agricultural production. They include; financial, physical, social and human capitals/assets. The extent to which household members are entitled to or lay claim to these assets depends on various factors including their age, position in the household and their gender. Gender is a socio-cultural construct of the society that determines the identity, roles or functions, entitlements and deprivation of women and men in the society [1]. Gender disaggregated data are becoming increasingly important in assessing prevailing conditions of food security and agricultural development. Using gender analysis, information can be collected on division of labour, level of access to and control over resources, benefits and deprivation for both men and women as imposed by society and the effect this differentiation has on food security and nutrition [2, 3]. Some of the questions addressed in gender analysis include: who produces what goods and services, what resources are available, who has access to or control over resources and who benefits. Gender analysis helps in understanding intra-household relations and decision-making and how this affects the farmers' use of various technologies for food production.

The strong inter household relations between relatives in Western Province mean that food and resources such as land are shared between many households. While inter household relations may help to increase the pool of labour for agricultural production, it may increase competition over important productive resources contributing to food insecurity. In addition, the high dominance of polygamous families especially in Busia district leads to a complex structure of competition over resources. Women in such households are most likely to be poorer since access to resources may depend on various conditions determined by the husband. These conditions may include the number of children the woman has given birth to, the sex of the children and the position of the wife in the hierarchy. Understanding intra and inter household dynamics helps in appreciating the extent to which both men and women are impeded from participating equitably in food production. Such dynamics also reveal power relations within the household and how this affects nutrition levels of the most vulnerable members, particularly women, children and the aged. This study shows that unequal access to important resources and capitals between men and women limits farm intensification thereby contributing to household food insecurity. In addition, the results indicate that improvement of extension service and education level of household heads increases productivity. Using focus group discussion, this study was able to construct women's and men's daily calendar and resource profile, in addition to identifying the factors that influenced division of labour according to gender [4]. The objective of the study was to assess gender specific constraints that affect the impact of farm technologies on household food security among smallholders in Western Province of Kenya.

MATERIALS AND METHODS

Study Design

This was a comparative study involving resource poor households that do not grow cash crops in Busia and Vihiga districts. A semi structured questionnaire was administered to 282 and 217 households in Vihiga and Busia, respectively. A total of 499 households were included in the study. In addition, 3 focus group discussions (FGD) were carried out in each district. The FGDs were grouped according to gender; male only, female only and mixed group FGDs. The field work for this study was carried out between March 2006 and March 2007.

Sampling procedure

The study used a multi-stage stratified random sampling technique due to the expansive nature of the study area. First, Western Province was purposively selected out of the eight provinces in Kenya. This was due to the high prevalence of food insecurity in the province despite its suitable socio-economic and ecological conditions. In the second stage, two districts were selected; Busia and Vihiga due to their contrasting socio-economic, cultural, demographic and ecological characteristics but which suffer from chronic food poverty despite falling within medium to high agricultural potential regions. In the third stage, five divisions were randomly selected from each district and finally households were selected at sub-location level. In addition, the households were stratified according to household headship namely male headed, *de jure* female headed and *de facto* female headed households.

Data collection and analysis

The study collected both qualitative and quantitative data. The quantitative results presented in this paper are derived from descriptive statistics as well as Analysis of Variance (ANOVA). The ANOVA tool was used to test whether access to education and extension service had a significant effect on maize yield. The qualitative data were obtained from focus group discussions and were summarised in the form of tables showing activity profile, resource profile and daily calendar for both men and women.

The study area

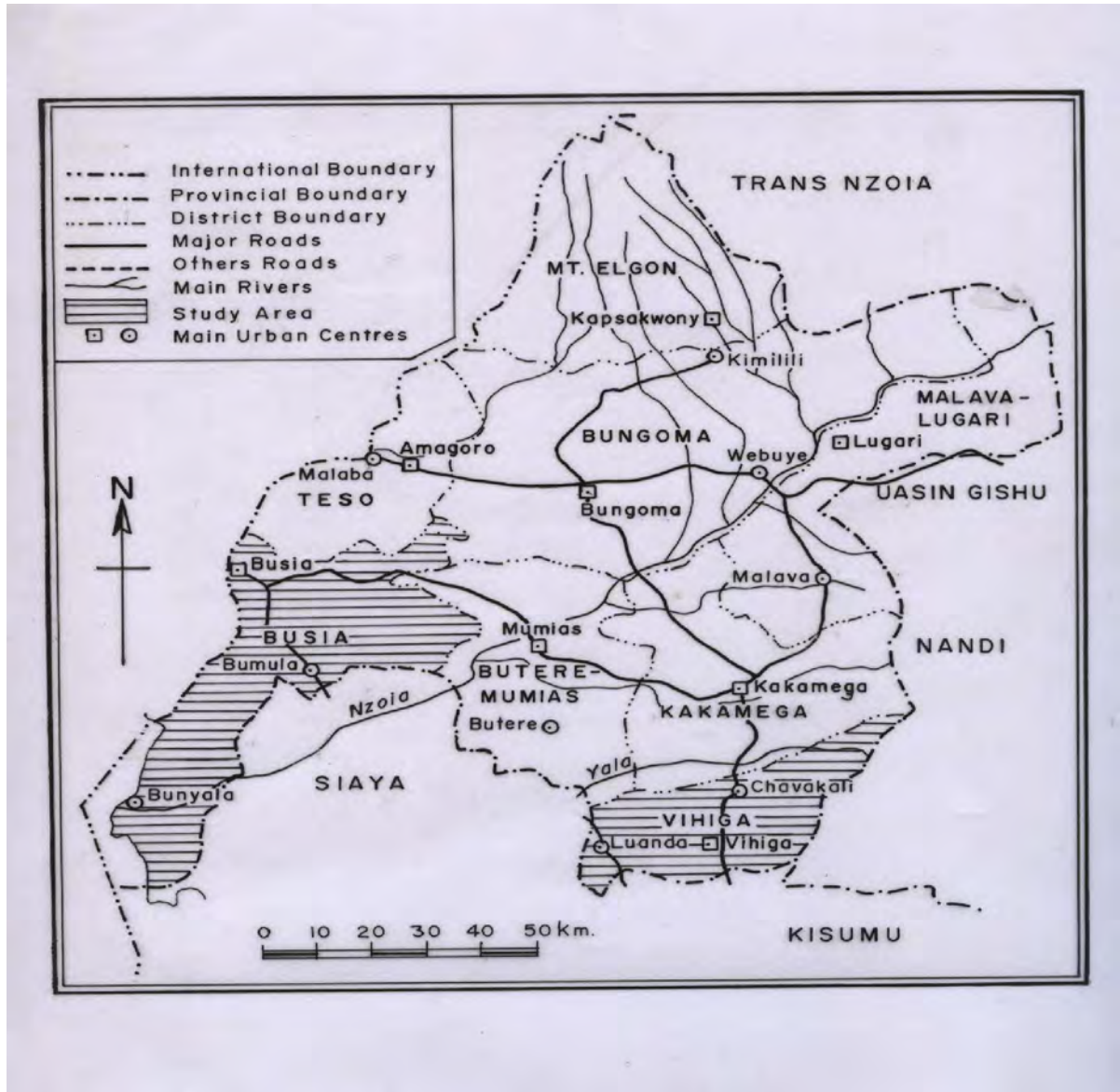


Figure 1: Map of Western Province showing study area

The study area is Western Province of Kenya (Figure 1), which lies within the Kenyan Lake Victoria Basin and borders Uganda to the west. Western Province covers a land area of 8,264 square kilometres with an average population density of 406 persons per square kilometre and has 701 323 households [5]. Vihiga district lies in the upper highland region and receives an average of 1800mm to 2000 mm of rainfall while the lakeshore district of Busia receives between 760 mm and 1500 mm of rainfall per annum [6].

The bimodal rainfall pattern in the two districts allows for two seasons of harvest of cereals and pulses per year. The main food crops are maize, sorghum, millet, beans, groundnuts, bananas, cassava and a wide range of horticultural crops. Vihiga district had a population of 498,883 in 1999 with a population density of 886 persons per square kilometre- it is one of the most densely populated rural districts, not only in the province but in the country [7, 8, 9]. On the contrary, Busia district occupies an area of 1,124 square kilometres with a total population of 370,608 and density of 330 persons per square kilometres [10]. Infrastructure in the two districts is quite poor with most areas having earth roads that are impassable during the rainy season. This makes the procurement of farm inputs expensive and limits the smallholders' participation in a cash economy. Low and declining soil fertility resulting from continuous cropping without sufficient replenishment also contributes to low agricultural productivity.

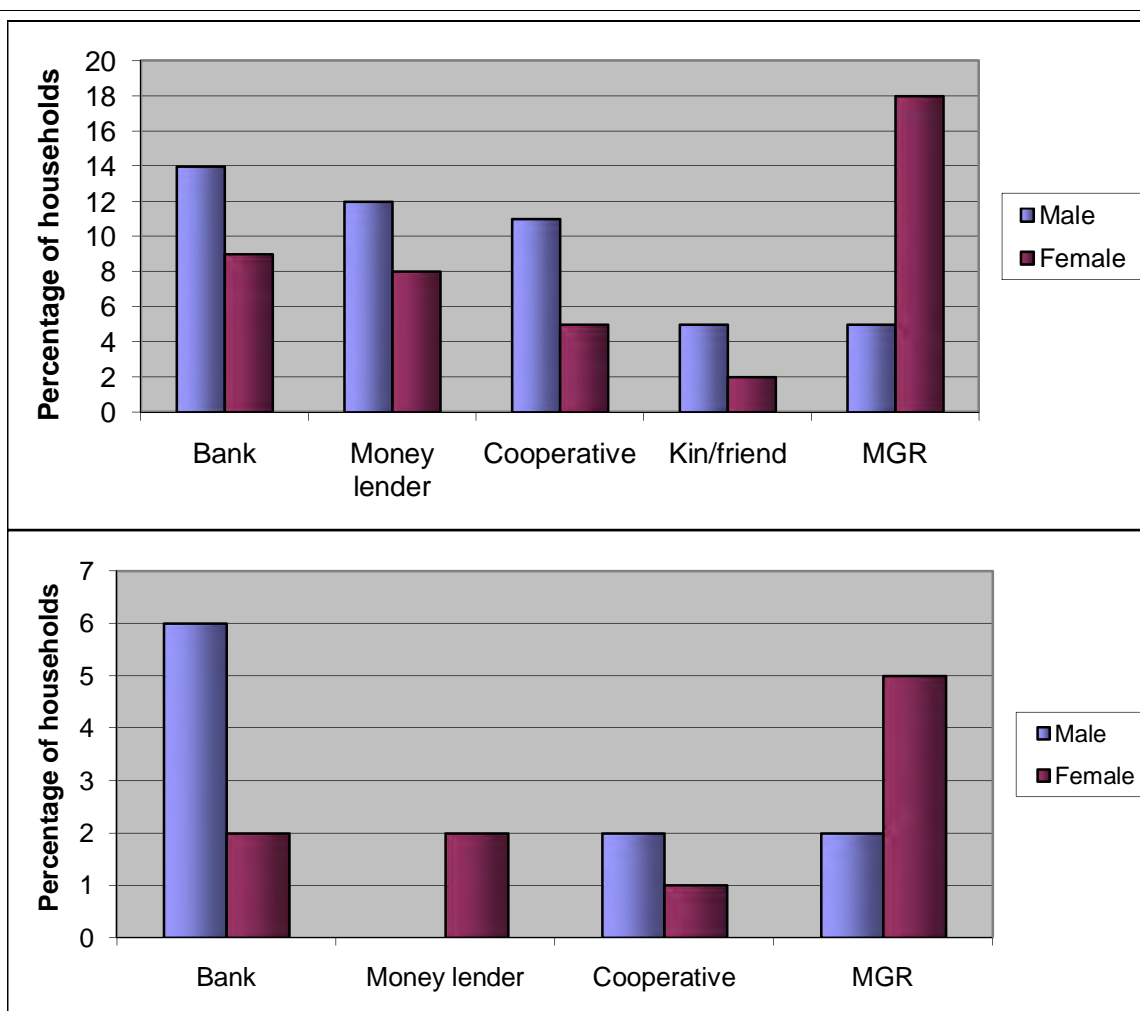
RESULTS

Access to and control over land resources

The results indicate that a large percentage of land is owned by men (78 %), while women own only 9 %. Similarly 69 % of husbands control the land and capital resources necessary for food production while their wives control only 27 %.

Access to credit facilities

The study established that men had access to credit from banks, moneylenders, and cooperatives while women's sources of credit were kin/friend and rotating credit and savings, locally referred to as '*lisanga*' (Figure 2). Interestingly, the women who had access to credit realized higher maize yields -an indication of the potential that exists in achieving higher productivity through availability of friendly and affordable credit for women. Access to credit was a major constraint to agricultural production not only for women but also for men. This is evidenced by the small proportion of both male and females that had accessed loans from formal institutions (Figure 2). Lack of the necessary collateral and high interest rates are some of the constraints that were reported as limitations to accessing credit from banks. In Vihiga, men accessed credit in banks (14%) and cooperatives (11%). Only 9% and 5% of women had access to credit from banks and cooperatives, respectively. Most of the credit in Vihiga went to dairy farming whose production was fairly intensive and a major source of income for smallholders. In Busia, access to credit was even more limited for both men and women; 6% of men and 2% of women had access to bank credit, while 2% of men and 1% of women had access to credit from cooperatives. A relatively larger number of women (18%) had access to credit from women rotating credit and savings in Vihiga and 5% in Busia.



MGR: Merry-Go-Round (women rotating credit and savings group/association)

Money lenders are individuals who give out short-term credit by use of informal contract

Figure 2: Sources of credit according to gender for Vihiga and Busia, respectively

Access to education, training and extension services

Majority (40%) of household heads had attained primary school education, 23 % had secondary school and 21 % college education. There was geographical and gender discrepancy in education with Busia having more household heads with either no formal education or limited non-formal education (19 %), while Vihiga had only 8% and 4% percent, respectively, in the same category. While the majority of women had primary level education (46%), more men had secondary, college level and university

education. The 3 % of the household heads who had attained university education were men.

The results show that only 20% and 18 % of the household heads in Busia and Vihiga, respectively, had been visited by an extension officer, thus demonstrating the inadequacy of extension service to smallholders. There was no discrepancy in the number of males and females visited by extension officers. There were 20 % of men and 21 % of women who were visited by extension officers. Only 4 % of the visits were solicited for, while 15 % were unsolicited. Visits to Farmer Training Centres (FTC) also showed geographical and gender variation; 20% and 18% of men in Busia and Vihiga, respectively, visited FTCs as compared to 10% and 7% of women in Busia and Vihiga, respectively. Despite the small proportion of households that had contact with extension services, Analysis of Variance (ANOVA) results showed a statistically significant effect of education [(F (5, 83) =3.75, p=0.004] and extension service [(F (2, 83) = 9.055, p=0.000] on maize output. The combined effect of the two variables was also significant [(F (8, 83), 3.802, p=0.001] (Table 1).

Access to research and technology

Limited capital (financial and tools of production) was indicated as the most limiting factor of production by 60 % of the women, while limited land was mentioned by 51 % of men. Husbands in both districts made over 70 % of decisions on allocation of financial resources on farm equipments. Husbands invested in labour saving technologies that performed farm activities that fell within their sphere. For instance, the use of land preparation technologies such as ox drawn ploughs increased land under cultivation; however, the limited weeding technologies increased women’s workload. In addition, use of High Yielding seed Varieties (HYV), fertilizers and mechanization increased the intensiveness of farm operations, thereby increasing demand for women’s labour. More than half of the women were affected by labour changes attributable to farm intensification, as compared to 21 % of men (Figure 3).

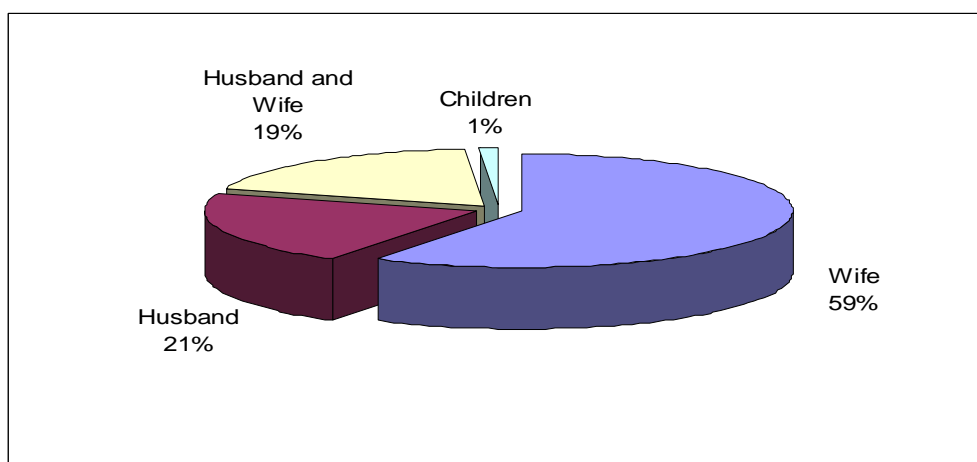


Figure 3: Household members affected by labour changes caused by technology

Access to and control over income

The study revealed that 66% of men controlled off-farm income while 55 % of men also controlled farm income (Figure 4). A relatively larger percentage of women controlled farm income (36 %) than off-farm income (Figure 4). This was attributed to their dominance as full time farmers and the fact that they were engaged more in selling of farm produce that fell under their control. Women mostly controlled income from vegetables and some traditional crops such as millet. Incomes from traditional crops such as sorghum that are important in the diet of households in Busia were under men's control. In the majority of the households (53 %) income expenditure was done through consultation between husband and wife (jointly) while in 47 % of the households expenditure flow was separate. The study also observed a discrepancy in the amount of wages in relation to gender. The women earned ksh.50 for farm work while men earned ksh 70 per day in Busia. The wage labour was more costly in Vihiga with women earning between ksh 50-70 per day, while men earned Ksh.70-100. This, however, depended on the nature of farm work and whether or not meals were provided during the course of the work.

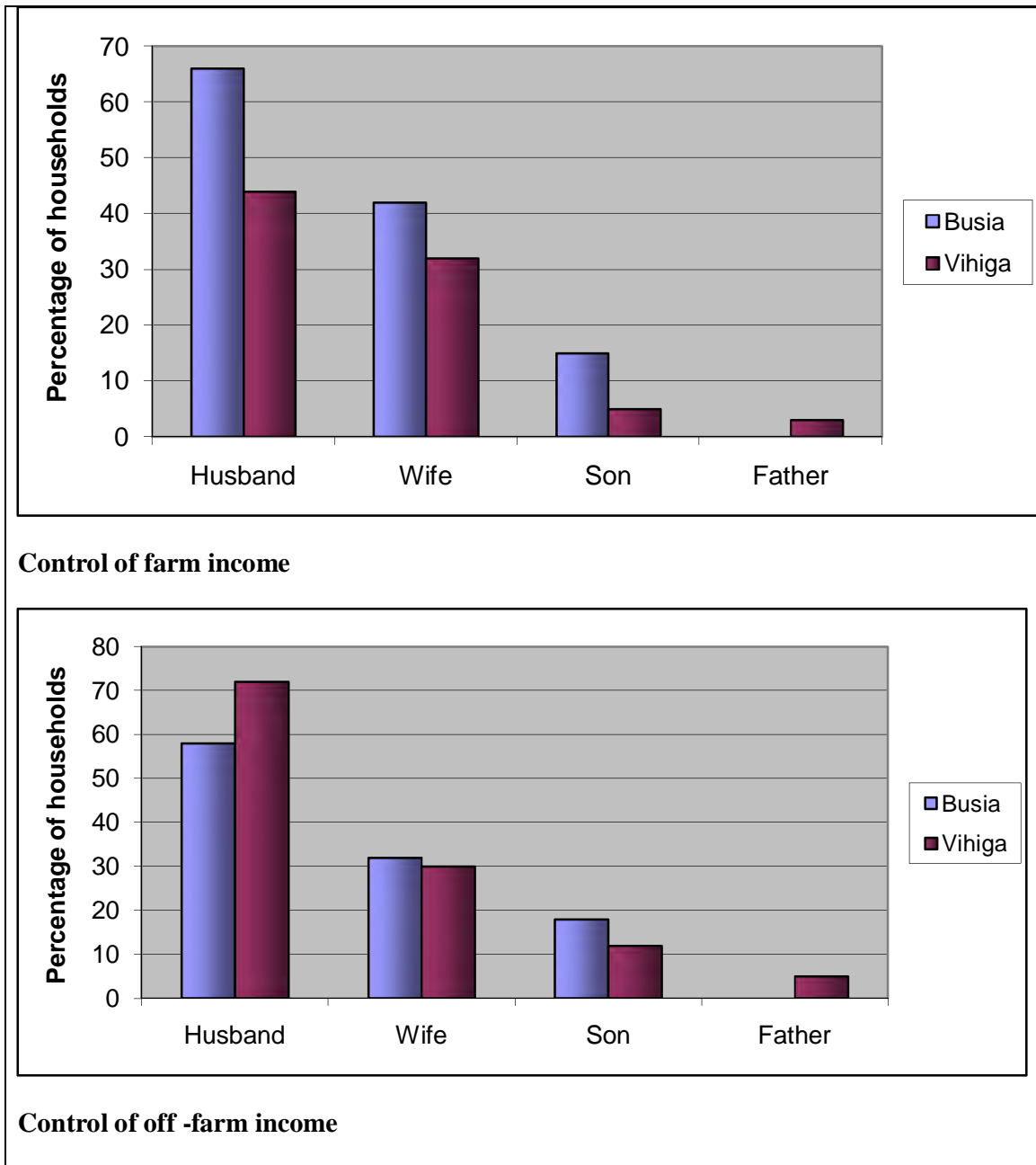


Figure 4: Control of farm and off- farm income according to gender

Factors influencing gender roles

There were various factors that influenced division of labour within the household. These were either constraints or opportunities for the households in terms of household provisioning mechanisms. During the mixed group FGD (both men and women were included), community norms, social hierarchy and social factors were mentioned as constraints due to the way they discriminated women in various aspects such as ownership of productive resources and their designation of gender roles (Table 2). Institutional structures, legal parameters and training were given as opportunities for both men and women since they empowered both genders in recognizing their rights, as well as providing a legal framework through which disadvantaged groups found avenues for redress. Demographic, economic and political factors were seen as both constraints and opportunities in the access and control of resources for both men and women (Table 2). On one hand, demographic trends increase competition for resources that result in either positive or negative outcomes for both genders. Political changes, on the other hand, can either increase or reduce the number of women in decision making at both local and national levels, may change the policy, legal and institutional framework thereby affecting women's welfare.

Access to and control over resources according to gender

During FGD, participants provided summaries of the most important resources and who had access and control over them. Men had control over resources such as land, farm equipments, labour (including their wife's), credit, extension and cash. The women controlled basic needs such as food and together with their husbands they had control over education and training of themselves and their children (Table 3).

Activity Analysis according to gender

During the men and women only FGDs, the daily calendars for both gender were constructed. The daily calendar for women showed that they woke up at 4.00 am and were always the last to go to bed at 10.00 pm. (Table 4). On average, they spent 8 hours per day on household chores and another 8 hours on farm operations. Since women were fully occupied with household chores and farm work, they hardly had time to attend to their own health and nutrition needs let alone time for social activities.

Unlike women, the men woke up two hours later than women (6.00 am) and retired to bed two and half hours earlier than women (7.30 pm) (Table 5). They spent no time on household chores and about 6 hours on the farm per day. Unlike women, they had more time to rest and socialise with their friends.

DISCUSSION

Access to productive assets and income is important in achieving household food security. Such assets determine the household's ability to adopt biological and technical innovations that are necessary for increasing productivity and income of smallholders. Control over or access to productive assets determines a person's productive capacity and output levels and the level of vulnerability to food insecurity

and the assets they can acquire to cope with various shocks occasioned by climatic vagaries, diseases and price fluctuations. Among smallholders, land is one of the most important assets for sustenance yet, not every individual within the household may have access to this important resource. In particular, women especially those from *de jure* female headed households, are disadvantaged, since they may not have access, let alone control over land and other resources such as labour and capital for production. This makes them vulnerable to food insecurity and children from such households may often be undernourished. The results showed that the majority of women in the study area have limited control over important resources such as land, capital and labour. The findings compare well with those of Ogun State of Nigeria where 91.3 % of women gave access to land and control over land resources as important factors necessary for improving sustainable crop farming activities [11].

Since a large percentage of food crops produced by smallholders was consumed, the inputs for these had to be provided from income earned in other agricultural enterprises or non-farm income generating activities. However, women were always constrained by access to extra income due to the limited time to engage in income generating activities in addition to having limited skills. This was made even more difficult due to their limited access to credit. The microcredit movement has gained momentum since Muhammed Yunis and the Grameen Bank of Bangladesh received the Nobel Peace Prize in 2006 and the declaration by the UN of 2005 as the International Year of microcredit [12, 13]. However, women farmers in Kenya, especially those from smallholder households, have little or no access to credit. To increase the use of farm inputs, greater priority has to be given to increasing women's participation in markets, as well as other income-generating activities other than agriculture, the expansion of microcredit to rural areas notwithstanding. Without such efforts, technology will bypass the majority of Kenyan farmers who are women. Use of labour saving devices such as animal draught power, not only helps in increasing food production, but also makes it possible for men and boys to perform duties such as water collection that traditionally fall under women's domain. In Oyo State of Nigeria, women gave time constraints as one of the factors that limited their participation in food security and nutrition programmes implemented by the government [14].

The study observed very limited access to extension services by both male and female farmers in the study area. This contradicted the earlier belief that extension officers preferred to talk to the men who were heads of households [15, 16]. Nevertheless, the proportion of both men and women who had contact with extension personnel in the year preceding the study was too low. In a study in Kenya, it was observed that if women farmers were given the same levels of education, experience and farm inputs as their male counterparts, the yield of maize, beans and cowpeas could increase by 22 % and by 25 % if all women attended primary school [17]. In Egypt, increasing the education level of mothers from none or less than primary to completion of primary school reduced the proportion of the population living below the poverty line to 33.7 % [18]. While in Mozambique, increasing the number of adult females that have completed primary school in each household by one, led to a 23.2% decrease in the population living below the poverty line [19]. It has been observed that, where

extension service system is efficient, the cost of maize production not only reduces, but productivity is much higher [20]. This is due to the effect of extension on improving crop husbandry, land management practices and the use of farm inputs [21].

Even though greater efforts may be made to introduce new technologies through agricultural Research and Development (R&D), this may not achieve greater benefits unless it is accompanied by efficient extension services and expansion of education level of those who are engaged in agriculture.

Decision making at household level on the allocation of resources to food production is skewed towards husbands who are not major food producers. This was similar to the situation in Northern Ghana, where men were in charge of storage and control of food, despite the women providing most of the labour in the production of the same [22]. In Ethiopia, men controlled use of draught power, sale of livestock hides and skins, while women had control over milk and milk products, dung, building materials and household fuel [23].

CONCLUSION

It has become clear from this study that some problems afflicting smallholders in Kenya in general are not gender neutral. Problems such as limited access to credit, extension services, education, land and income, reduce the intensification of small farm holdings and are an impediment to the attainment of household food security. Women were found to be more constrained by limited access to productive resources such as land, capital and income compared to men. The interesting contribution of this study is the emerging trend of equal access to extension service between men and women. Although the proportion of households that had contact with extension personnel was small, there was no discrepancy between men and women- an indication of change in policy. However, efforts to make extension service systems more efficient and responsive to smallholder farmers should be stepped up. The predominance of informal credit sources for women requires policy intervention in not only strengthening these informal associations, but also removing obstacles that hinder women from accessing credit from formal organizations. Investment in sustainable rural micro financing as well as expansion of off-farm income generating opportunities are some of the preconditions for increasing the use of farm inputs and general improvement in the well being of rural communities. There is need for extensive research on the role of informal sources of credit on household food security. This is in view of the fact that such informal sources mostly serve women farmers.

Table 1:ANOVA results showing the effect of education and extension on maize output

Tests of Between-Subjects Effects

Dependent Variable: Maize produced (Kg/Hectare)

Source	Type III Sum of Squares	df	Mean Square	F	sig	Partial Eta Squared	Noncent Parameter	Observed Power ^a
Corrected Model	30.256 ^b	15	2.017	2.768	.002	.333	41.527	.989
Intercept	116.023	1	116.023	159.247	.000	.657	159.247	1.000
EDUCA	13.660	5	2.732	3.750	.004*	.184	18.749	.920
NOVIST	13.195	2	6.597	9.055	.000*	.179	18.111	.971
EDUCA*NOVIST	22.159	8	2.770	3.802	.001*	.268	30.414	.982
Error	60.472	83	.729					
Total	309.00	99						
Corrected Total	90.727	98						

a. Computed using alpha = .05

b. R Squared = .333 (Adjusted R Squared = .213)

*Significant at 0.05

EDUCA= Education level of household head

NOVIST= No of contacts between household head and extension worker

Table 2: Factors that influence gender division of labour, access and control of resources

<i>Influencing factors</i>	<i>Constraints Opportunities</i>	
Community norms and social hierarchy	X	
Demographic factors	X	X
Institutional structures		X
Economic factors	X	X
Political factors	X	X
Social factors	X	
Legal parameters		X
Training		X

Table 3: Access and control of resources and benefits

<i>Resources</i>	<i>Access</i>		<i>Control</i>	
	<i>Women</i>	<i>Men</i>	<i>Women</i>	<i>Men</i>
Off-farm income	X	X		X
Asset ownership	X	X		X
Basic needs	X	X	X	
Education/training	X	X	X	X
Land	X	X		X
Equipment	X	X		X
Labour	X	X		X
Cash	X	X		X
Benefits				
Credit	X	X		X
Extension	X	X		X
Incentives				
In Cash	X	X		X
In kind	X	X	X	

Table 4: Daily calendar by gender (women)

Time	Activity carried out
4.00-5.00 am	Wake up and pray
5.00-5.30 am	Prepare fire and warm water for washing face
5.30-6.30 am	Cleaning of house and homestead
6.30-6.45 am	Give breakfast to husband, and children
6.45-12.00 noon	Farm work
12.00-1.00 pm	Prepare and eat lunch with the family
1.00-1.30 pm	Clean utensils
1.30-4.30 pm	Farm work
4.30-6.00 pm	Clean the children, warm water for the husband
6.00-7.00 pm	Prepare and eat dinner with family
7.00-8.00 pm	Wash utensils
8. 00-8.30 pm	Pray and prepare to go to bed
8.30-10.00 pm	Bedroom issues
10.00-3.00 pm	Sleeping time
3.00-.4.00 am	Bedroom issues
4.00-5.00 am	Wake up and pray

Table 5: Daily calendar by gender (men)

Time	Activity carried out
6.00-6.30 am	Wake up and pray
6.30-7.00 am	Wash the face and have breakfast
7.00-12.00 noon	Farm work
12.00-1.00 pm	Have lunch
1.00-2.00 pm	Resting time
2.00-4.00 pm	Farm work
4.00 pm	Retire from the farm
4.00-6.00 pm	Rest/socialize with friends
6.00-7.30 pm	Take a bath and eat dinner
7.30 pm	Retire to bed
7.30-10.00 pm	Bedroom issues
10.00-3.00 am	Sleeping time
3.00-4.00 am	Bedroom issues
4.00-6.00 am	Sleeping
6.00-6.30 am	Wake up and pray

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