Gender and agriculture subject choice among secondary students in Kakamega and Bungoma counties, Kenya

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ABSTRACT

This study sought to establish the role played by gender in selection of agriculture subject by students in Kakamega and Bungoma counties. Descriptive research design was adopted as guided by both occupation theory and conceptual framework. The population of study consisted of 4549 students out of which a sample size of 364 students was purposively sampled. Questionnaires and document contents analysis were used to gather data. Descriptive statistics using frequency, percentages, means and standard deviation were employed to present the findings. The findings revealed that gender plays a significant role in the selection of agriculture subjects among secondary schools. Selection trends show that more students from mixed boys' and girls' schools selected agriculture subject, followed by girls' boarding and lastly boys' boarding, hence recording increasing selection in all the categories of gender of schools. Mean agriculture selection was higher in boys' schools, followed by girls' schools and lastly mixed schools. Factors influencing selection in agriculture subject include type of school such as mixed or one gender school, category of school such as day or boarding school. Day schools exhibit higher selection as compared to both boarding and day, and mixed day and boarding. It was also noted that, gender plays a role such that girls are more motivated in terms of selection in agriculture career than boys; hence, gender is important in the progression to agriculture career. The study recommends the need for adaption strategies to enhance progression in agriculture career. The Ministry of education policies should be well aligned to motivate students of both girls and boys to select agriculture subject. Factors such as type of school which includes public (national, extra county, county sub county) and private, gender of school such as boys', girls, mixed boys' and girls', mixed day and boarding, should be streamlined towards increased agriculture career selection through educational guidelines and policies concerning selection of agriculture subjects.

Keywords: Agriculture, Gender, Kakamega and Bungoma Counties, Secondary Schools, Selection

I. INTRODUCTION

Gender is defined as the socially and culturally ascribed roles, behaviors and traits that a society believes. It is the socially and culturally constructed roles, behaviors and expectations that societies place on their members based on their biological sex. It extends beyond the realms of biological difference to provide the psychological, social and cultural aspects of identity and interaction (McIntosh, 1983). Gender is a major factor in educational realms in the formulation of the academic interests, choice of subjects and the performance results of the students. It determines the perception of students to various academic subject such as agriculture. The social norms and expectations tend to tell what is correct to males and females, hence the influence on the attitudes of students to a given subject (McIntosh, 1983). As an example, agriculture could be considered male dominated given that it is related to manual labor and peasant life. These impressions may drive away female pupils who would choose the subject of their interested.

There are several mediators of the effect of gender on subject choice. The gender expression and identity development make a difference in the way students identify themselves with the socially accepted roles (Hines, 2015). Also, the parenting and upbringing styles play a significant role in developing the perceptions of the children concerning gender roles. According to Bradley (2014), children brought up in settings where gender expectations are strictly followed have higher chances of adopting stereotypes that affect their decisions in education. On the same note, the educational attainment of the parents and guardians can either support or undermine the traditional gender roles (Berger, 1966). Economic and power relations are also a significant factor. Agriculture has been linked to financial subsistence, as opposed to schooling in most societies, thus this could also have an effect on the way various sexes establish its worth (Tronto, 2013). Also, intersectionality brings to light the dynamic interplay of overlapping social identities, including gender, socio-economic status, and rural or urban background, to determine the outcomes

of education (McCall, 2005). All these overlapping issues can either restrict or widen the options of students in their context.

These gender influences play a critical role in influencing the course of study that students pursue especially in agriculture. According to studies carried out in the field of educational psychology, gender differences in the choice of subjects are frequently associated with beliefs and classroom activities. To illustrate, the so-called stereotype threat, the fear of becoming the negative stereotype, may lead to adverse effects on the self-confidence and intentions to study a certain subject among students (Steele, 1997). Girls, especially, might not take courses that they consider to be male-dominated like agriculture because they fear of not performing well or being seen as social outcasts. Classroom dynamics also play a role in this. Teacher instruction, such as body language and teacher implicit prejudices, can develop either positive or negative learning conditions (Brodkey, 1996). Unconscious bias towards one gender as compared to another will only demoralize the participation of teachers and fascinate the interest to the subject. Also, the self-esteem and lack of academic confidence is another factor that prevents students to make independent choices regarding the subject.

Another necessary condition is the access to role models. As Murphy (2015) stresses, the absence of female role models in particular areas also makes girls less motivated to follow such disciplines. Lack of visible female professionals in the field of agriculture education could enforce the notion that the subject is not a girl thing. Subject uptake is also affected by the design of the curriculum and methods of instruction. According to Fields (2013), the attitudes of people surrounding the student tend to shape their beliefs concerning their abilities. The study affirms that when parents and peers believe that agriculture is less prestigious or not fit to a specific gender, students will tend to adopt these perceptions and make subject decisions on this basis. This connection is mediated by diverse social, cultural, psychological and institutional reasons. The only way to handle these influences is to take conscious measures to break the stereotypes, encourage inclusive teaching methods, and offer equal opportunities and support to all students irrespective of gender (Fields, 2013).

1.1 Statement of the Problem

Despite the fact that agriculture is the blueprint to achieving food security and national development, unfavorable school environment that does not include and support students' academic achievement (Marzano &Toth, 2013), policies and lack of funding in the education sector deny girls and women education opportunity (Ekwere, 2014) and more so in agriculture subject. The current study sought to understand how school types categorized by gender such as boys' school, girls' school and mixed schools offering agriculture can affect gender in the selection of agriculture subject in Kakamega and Bungoma counties of Kenya. There is need to understand how gender has influenced the selection of the important subject such as agriculture so that policy makers are informed on how to enhance selection and hence agriculture career interest and development.

1.2 Research objective

The objective of the study was to establish trends in gender selection in agriculture subject in secondary schools in Kakamega and Bungoma County of Kenya.

1.3 Research Question

What are the trends in gender selection of agriculture subject in secondary schools in Kakamega and Bungoma Counties of Kenya?

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1. Occupation Choice Theory

The Theory of Occupation Choice is commonly linked with the name of Frank Parsons, who presented it in 1909 in his *Choosing a Vocation*. Parsons is considered the father of vocational guidance, and his concepts helped to form the basis of the interpretation of career choice made by individuals (Parsons, 1909). Scholars including John Holland later extended the theory and in the 1950s onwards, focused on the connection between work environments and personality types in influencing occupational choices.

According to the theory, choice of career or occupation is not random or by chance but usually a combination of factors. It hypothesizes that people choose professions according to their individual attributes, interpersonal factors, and environmental factors. Personal attributes refer to variables like interests, abilities, gender and age. Interpersonal factors are the impact of family members, peers, and significant others whereas environmental factors are trends in the job market, economic status, and educational opportunities. The theory notes that people will choose professions that will most suit their individual characteristics and what is offered to them in the world around them.

Occupation Choice Theory is used in this study to justify the way students make decisions in selecting professional programs. The theory indicates that students in other disciplines attach different weight to certain motivating factors as pointed out by Nancy Hodges and Elena Karpova (2010). Such driving forces can vary with personal attributes and situational forces.

The theory holds that there are objective and subjective personal factors. Objective factors are measurable factors like age and gender whereas subjective factors are the personal interests, attitudes and perceptions. Specifically, gender is regarded as one of the crucial factors affecting the subject and career decisions. Following this view, the present study was created to analyze the role of gender in the choice of the subject of agriculture in the secondary schools in Kakamega and Bungoma counties in Kenya. The theory thus offers a topical paradigm to comprehend the way that gender as an individual characteristic can influence academic and career choices of students.

2.2 Empirical Review

Majority of careers have transitioned from one gender to another as a result of societal, cultural, and economic shifts. Many historical events, including economic, cultural, environmental, academic, and many others, have altered the professional field of people, hence affecting employment rates and the labor force over time (The Economist, 2013).

Beintema and DiMarcantonio (2010) found that the gender gap in African Agricultural sciences was decreasing at a rate of 8% each year. In addition, they discovered that more women in Higher Education in Agriculture hold a Bachelor of Science degree and are concentrated in the life and social sciences as opposed to the "Hard sciences." When women select education, they begin to consider diversification. They desire to compete favorably with males so that they may share the available work prospects. The gender selection gap in agriculture narrows over time. Foreman, *et al*. (2018) discovered that students with agricultural experience and rural upbringing are more likely to pursue a profession in agriculture. The study compared demographic factors such as races, high school, and gender by matching survey data with Lowa State University records. Powell (2019) analyzed student demographics, to learn the characteristics that lead people to choose agriculture as a major, to find out whether these aspects change depending on a person's background or the means by which they entered college. Students in this study tended to be Caucasian females who grew up on farms or in rural areas. Findings show that parents, websites, campus visits, letters from the university, and personal conversations all play a role in choosing a college major.

A study by Kpiebaya (2012) found that students' attitudes about learning agricultural science were unaffected by gender in a substantial way. In addition, the attitudes of female students toward agricultural science as a career are identical to those of male students. The same study revealed that parents and teachers influence students to enroll in science-related courses, whereas students expressed a desire to be involved in course selection. In our day-to-day work experience, teacher professions play a significant impact in generating and sustaining students' interest in career selection. Rosser's (1995) research revealed that girls and boys have diverse attitudes and interests for the study of science and its related courses, including agriculture, according to studies. She further stated that as much as more women enroll in post-secondary schools and receive higher grades in science and engineering courses than men, significantly more men than women major in the natural sciences or engineering (Rosser, 1995). The purpose of the present study was to identify the factors responsible for gender and selection trends observed among students in agriculture from the year 2016 to 2021 in order to comprehend the implications of these trends on gender career progression in agriculture.

2.3 Conceptual framework

From the conceptual framework, factors influencing selection of agriculture subject may be gender of the school or gender of the student. Culture and policies of selection in a school and government policies may enable students and schools of a specific gender to select agriculture or fail to. Factors influencing increased selection of agriculture become factors for selection by gender.

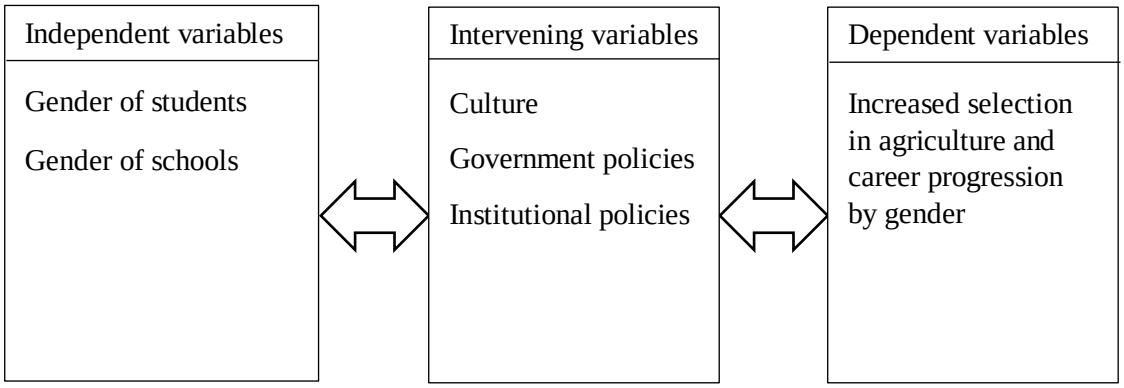

Figure 1
Conceptual framework for the study on Gender and Selection of Agriculture

III. METHODOLOGY

3.1 Research Design

The study employed a descriptive study design. Descriptive research design is qualitative and quantitative research which allows description of data the way they are. The descriptive design was suitable since the study involved large sample of data obtained through administering questionnaires, to a sample of literate respondents.

3.2. Study Location

The study was conducted in Kakamega and Bungoma counties of Western Kenya. Western Kenya region is sub-divided into four counties which are Busia, Kakamega, Bungoma and Vihiga. Bungoma and Kakamega Counties were preferred for this study due to their large population that has necessitated construction of several variety of learning institutions to offer agriculture education.

3.3. Target Population

The study population from the two counties of Kakamega and Bungoma comprised of 4549 selected Agriculture students from 162 secondary schools selected from 820 schools of Kakamega and Bungoma Counties. The key informants included director of studies, teachers of agriculture as well as county Quality Assurance Officers of education.

3.4 Sampling Strategy

3.4.1 Sample Size

The qualitative sample consisted of county Quality Assurance and Standards officers of education, director of studies in secondary school while the quantitative sample consisted of 364 students of agriculture subject selected from 162 secondary schools of Bungoma and Kakamega counties, from which the appropriate sample size was drawn, based on the population size. Proportionate method was used to calculate a sample size of students required to take part in the Survey. For large populations that are more than 10000, (Cochran, 1972), developed the Equation 1 which yields a representative sample for proportions.

Equation I

$$n_0 = \frac{Z^2 pq}{e^2}$$
$$= \frac{(1.96)^2(5)(5)}{0.5^2}$$
$$= 385 \text{ respondents}$$

Since the population was less than 10000 students, Yamane (1967) formula for determining sample size was used to obtain a sample size of respondents as shown by Equation 2.

Equation 2

$$n = \frac{n_0}{1+\frac{(n_0-1)}{N}}$$

Where

n is the sample size

N is the population size

$$= \frac{385}{1+\frac{(385-1)}{4549}} = \frac{385}{1+\frac{384}{4549}} = \frac{385}{1+0.8} = \frac{385}{1.8} = 214$$

$$\frac{385}{1+\frac{384}{45.49}} = \frac{385}{1+0.08} = \frac{385}{1.08} = 331$$

$$\frac{10}{100} \times 331 = 33.1$$

To account for missing and non-response 10% of the sample size was calculated

$$\frac{10}{100} \times 331 = 33.1$$

This gave a sample size of 33.1+331=364 respondents, and the 10% (33) of the calculated sample size figure was added to 331 of respondents to get a total of 364 respondents to this study.

3.4.2 Sampling of Respondents

Three hundred and sixty-four (364) students of agriculture subject in secondary schools of Kakamega and Bungoma Counties were selected by stratified random method. The stratification was based on age, gender and program of study. One (4) director of study and one (1) County Quality Assurance of Standards Officer of education per County were purposively selected as respondents to this study.

Secondary students took part in a survey to provide responses to the questionnaire provided by the researcher. Since they were the target respondents and the unit of analysis, they were sampled at 5% precision level, at 95 % confidence level and P=5 (Yamane, 1967)

3.4.3 Sampling of Institutions

Purposive sampling was used to select Bungoma and Kakamega Counties as study site for this research since they have many and a variety of secondary schools needed to provide the necessary information for the current study. Proportionate sampling was used to estimate 162 schools needed for research but, since secondary schools were not the main sampling unit, their sample size was determined basing on Yamane (1967) table 2 of determining sample size for 10% precision level, at 95 % confidence level and p=5 (Yamane, 1967).

From the 439 schools of Kakamega County and 381 schools of Bungoma County by the time of study, Eighty-two (82) secondary schools from Kakamega County and Eighty (80) secondary schools from Bungoma County were proportionately sampled to provide data of enrolment in agriculture subject for the years 2016 to 2021 from the documented contents. The stratifications of interest were: the category of school and gender of the school. The two main categories were private and public schools.

3.5 Data Collection Procedures and Instruments

Data collection began after obtaining the necessary approval for research from Masinde Muliro University of Science and Technology and ethics. The researcher obtained a research permit from National Commission for Science, Technology and Innovation (NACOSTI). Selected schools were then stratified into day schools, mixed boarding, mixed day and boarding, mixed day, boys' schools and lastly girls' schools.

Data collection was conducted using both quantitative and qualitative approaches. Questionnaires were used to collect data captured responses from students using structured and Likert-scale questions. Document content analysis offered historical data on student enrolment in agriculture programs from 2016 to 2021. Focus group discussions comprising of selected students from various categories of schools identified challenges and strategies for career progression. Director of studies of schools and county Quality Assurance and Standards Officers of education

provided documents of enrolment for analysis, and supported the study by giving their opinion on gender enrolment in agriculture subject. Together, the tools ensured a comprehensive understanding of factors influencing gender selection and advancement in agricultural studies.

3.6 Data Analysis

Quantitative data was edited, coded and entered into the data sheets ready for processing using Statistical Package for Social Sciences version 25. The output of the data resulted into trends of gender enrolment in agriculture subject in different learning institutions and at different levels of study in Bungoma and Kakamega counties. It was also processed to show enrolment and progression in agriculture career in Kenya. Qualitative data was used for triangulation.

3.7 Ethical considerations

The researcher sought permission letter from Masinde Muliro University of Science and Technology postgraduate. The research proposal was approved by the Masinde Muliro University of Science and Technology research board and Ethics Committee. The research permit was then obtained from the National Commission for Science, Technology and Innovations (NACOSTI). The researcher also obtained permission to carry out research in the two Counties, from the county Commissioner, County director of Education and the County Governor. Permission to carry out research was also sought from the managers of selected learning institutions. Participants were informed of their roles and the purpose of study. The participants were informed that the study would not benefit them directly, but it would help the ministry of education policy makers to come up with strategies for progression in agriculture careers.

IV. FINDINGS & DISCUSSION

4.1 Selection in Agriculture Subject by Gender of School

Schools that were sampled for the study were boys' schools, girls' school, boarding and girls or boarding boys, day, day and boarding or mixed schools. Gender being a social term, it refers to socially constructed roles associated with women, men, girls and boys (McIntosh, 1983); hence as a social construct, gender varies from society to another. School communities are societies with different set ups that may be referred to as societies of boys, girls or mixed schools in this case. Gender defines the role of women in agriculture as the main manual workers on the farm to ensure that their families are food secure while several studies describe men as farmers who only support farming (Ekwere, 2014). These roles can influence selection of agriculture subject by girls and boy students. To affirm this, it became necessary to compute gender selections to show trends in selection and for clear interpretations on their selection of agriculture subject. The total number of agriculture students across the years is presented in Table 1.

Table 1

Total Number of Agriculture Students Selection by Gender of School

School type	2016	2017	2018	2019	2020	2021
boys	666	694	717	765	864	969
Girls	1,018	1,208	1,357	1,348	1,621	1,541
mixed boys and girls	2,707	2,955	3,598	3,880	4,447	4,869
Total	**4,391**	**4,857**	**5,672**	**5,993**	**6,932**	**7,379**

Table 1 shows that in sampled schools, the total number of boys' agriculture students was 666 and the numbers increased steadily up to 969 in the year 2021. In the year 2016, the total sampled girls were 1018 and the number increased steadily up to 1541, in the year 2021. In mixed schools the total agriculture subject students' was2707 16 and increased up to 4869 in the year2021. The total agriculture students enrolled was 4391, 4857, 5672, 5993, 6932 and 7379 for the years 2016, 2017, 2018, 2019, 2020 and 2021 respectfully, implying a steady increase across gender and across the years. The findings are graphically presented in Figure 2.

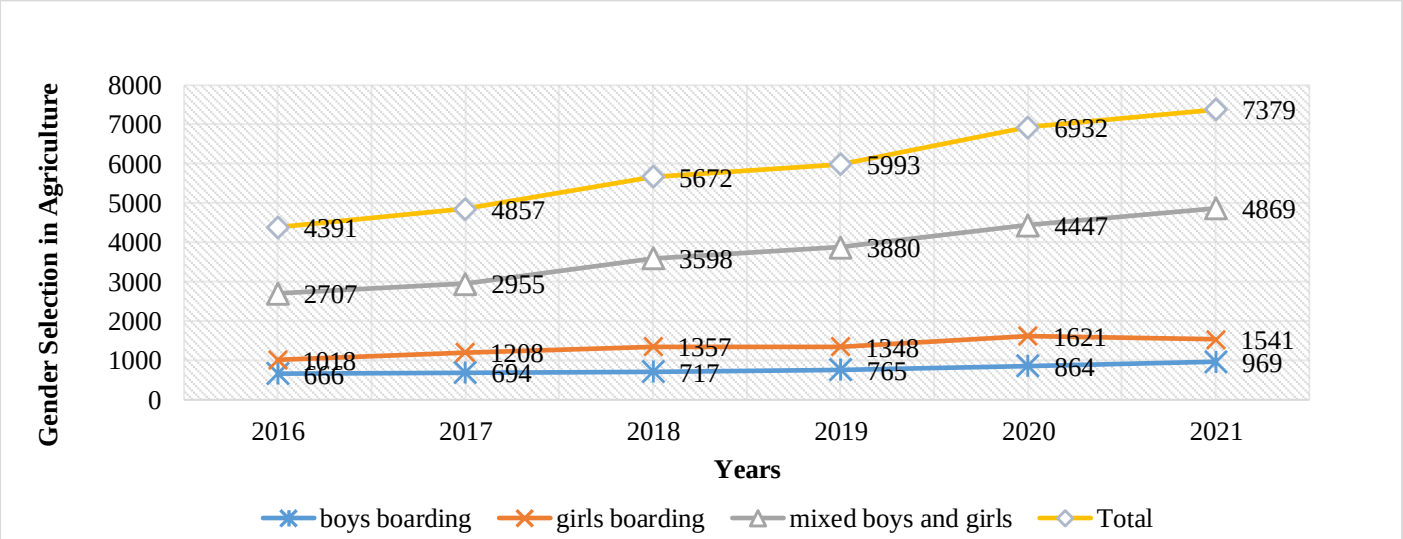

Figure 2

Selection comparison by gender of the school in Bungoma and Kakamega Counties

Figure 2 shows increasing selection in all the categories of gender of schools. Selection trends show that more students from mixed boys' and girls' schools select agriculture subject followed by girls' boarding and lastly boys' boarding.

4.2 Agriculture Mean Selection Comparison by Gender of school across the Years of Study.

The agriculture mean selection by gender across the years was established and recorded in Table 2 for comparison purposes.

Table 2

Mean Agriculture Selection by Gender of the School in Bungoma and Kakamega Counties

	Mean Agriculture Selection					
	2016	**2017**	**2018**	**2019**	**2020**	**2021**
Boys	39.18	40.82	42.18	45.00	50.82	57.00
Girls	29.44	35.06	39.22	38.28	45.86	43.89
Mixed	24.45	26.61	32.50	35.32	40.52	44.31

Table 2 shows that, the mean selection for boys' school was higher across the years for the three categories of gender observed. Mean agriculture selection was higher in boys' schools, followed by girls' schools and lastly mixed schools. The findings were further presented graphically in Figure 3.

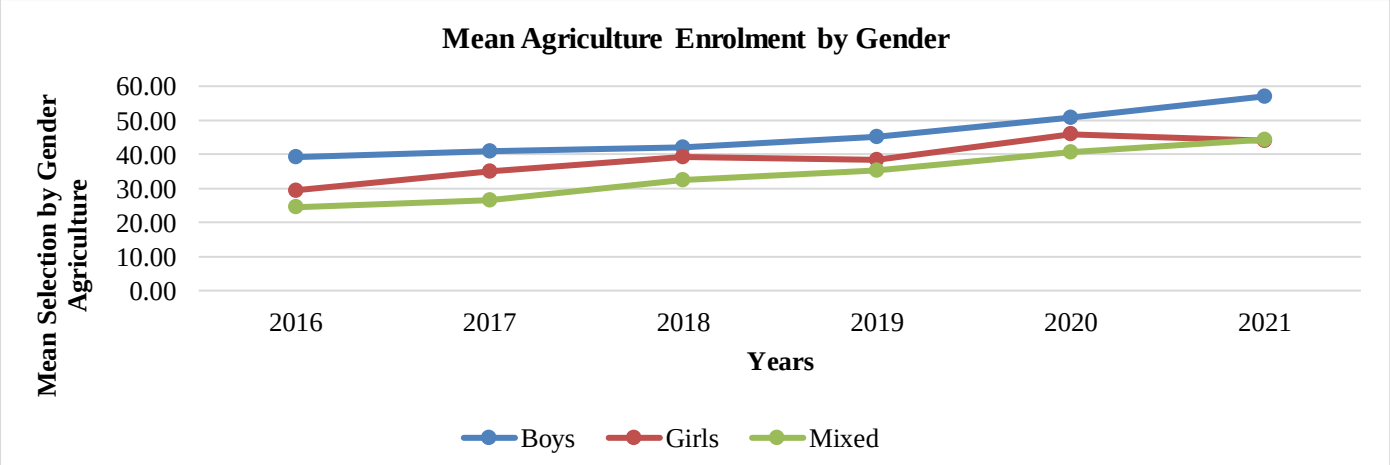

Figure 3

Agriculture Subject Selection by Gender of the School

From Figure 3, it was observed that the mean selection was highest in boys' schools followed by mean selection in girls' schools while mixed schools recorded the least mean of agriculture students. In the current study, trends show a higher mean selection of boys in agriculture subject than girls. According to the County Quality Assurance and Standards officer, data shows that there are few boys' schools than girls' schools. Girls are many and hence many girls' schools in the counties. He added that since sampling of schools was by proportionate method, few boys' schools were sampled for the study followed by girls' schools and finally many mixed schools. Mixed schools are usually sub-county schools with large populations and these high numbers might have reduced the mean observed in mixed schools as compared to the mean of boys' school and that of girls' schools. In every county, more mixed schools were sampled than boys' and girls' schools. These lowered the mean for the agriculture students presented in table: 2.

This trend was also supported by the director of studies in mixed secondary schools arguing that agriculture projects are easily performed by boys than girls. They affirmed that students exploring agriculture subject at form one (1) and two (2) classes find agriculture practical sessions to be a challenge, but with support from boys, many girls in mixed schools end up selecting agriculture. Hassan *et al*. (2011) reported that agricultural initiatives involve a significant degree of risk, and that agricultural ventures are gender-sensitive and demand a great deal of energy Generally, more students in mixed schools end up selecting agriculture subject. The director of studies added that, both gender of students from majority of mixed schools are day scholars and are capable of carrying out agriculture practical since they are expose to manual farming activities, hence are hardy and fit for, agriculture subject.

These findings are contrary to the research findings by Kpiebaya (2012) which indicated that gender had no significant influence on students' attitude towards the learning of agricultural science and that the attitude of female students towards agricultural as a profession is not different from that of the male students. In the current study the difference in attitude is clearly observed in terms of practice.

4.3 Gender and Individual Factors Gender as a Motivator in Agriculture Career

Since students had a response on gender, the study carried out further analysis on the cross-tabulation between actual gender and gender as a motivating factor in order to determine which gender category were more motivated to progress in agricultural career. The findings are presented as shown in Table 3.

Table 3

Cross-tabulation between Actual Gender and Individual Factor Gender

			Gender Motivator			Total
			Disagree	**Neutral**	**Agree**	
Gender of the student	Male	Count	80	48	15	**143**
		% of Total	22.0%	13.2%	4.1%	**39.3%**
	Female	Count	160	20	41	**221**
		% Total	44.0%	5.5%	11.3%	**60.7%**
Total		Count	240	68	56	**364**
		% Total	65.9%	18.7%	15.4%	**100.0%**

From the findings in Table 3, out of the total of 143 male respondent students, majority, 80(22.0%) disagreed that their gender did motivate them to progress in agricultural career whereas only, 15(4.1%) agreed. However, out of the 221 female students, majority, 160(44.0%) disagree that gender motivated them to progress in agricultural career whereas 41(11.5%) agreed. Therefore comparatively, more female students, 41(11.5%) agreed that they were motivated by their gender to progress in agricultural career as compared to the number of male students, 15(4.1%) counterparts. The significant association was indicated by Pearson Chi-square implying that female students are highly motivated by their gender to progress in agricultural career as compared to their male counterparts in Kakamega and Bungoma counties of Kenya.

Age is personal attribute that is believed to influence participation in agriculture among gender. Gender of students was cross tabulated with age categories of the students to find out its influence on gender as a motivating factor in agriculture subject selection. From this factor, majority of the students who were in the age category of (18-19) years agreed that age-gender factor motivated them to select agriculture subject.

A cross tabulation was carried out between age and gender. Pearson Chi square test of association was then presented to establish whether there was any association between actual age of the students and their rating on the gender factors that motivated them to select agricultural. The findings are presented as shown in Table 4.

Table 4

Pearson Chi Square Test of Association between Age and Gender Factor

Pearson Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Age & Motivator Age	10.201[a]	6	.116
Age and Gender	36.065[a]	12	.000

From the findings in Table 4, it is clear that there is no significant association at P-value of 0.05, between students' actual age and their rating on age as a factor that motivated them to select agriculture subject as a program of study. However, the tabulated age and gender Chi-Square test revealed a significant association, $\chi 2_{12,\ 0.05}=36.065$.

The current findings are in line with the research by Egbule (2020), which revealed that sexual orientation is a factor that influences students' choice of career. In some learning institutions it is possible that, agriculture subject has more female students than males while the reverse is also true.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

Agriculture selection among schools in Kakamega and Bungoma has been maintaining a positive trend since 2016. There has also been a consistent positive growth across the years. However, factors that contribute to different agriculture selection characteristics include type of school such as mixed or one gender school, category of school such as day or boarding school. Day schools exhibit higher selection as compared to both boarding and day, and mixed day and boarding. It was also noted that, gender plays a role such that boys lead in terms of selection and progression in agriculture career to tertiary institutions, while girls are more motivated by gender to select and practice agriculture. Therefore, progression in agriculture career is contributed to by several factors including the school type and categories as well as gender. Small changes affecting gender in terms of school type, category and gender motivation can therefore consistently make the progression trend in agriculture career to remain positive.

5.2 Recommendations

The study recommends the need for adaption strategies to enhance progression in agriculture career. The Ministry of education policies should be well aligned to motivate students of both Gender to select agriculture subject. Factors such as type of school which includes categories like public (national, extra county, county sub county) and private academy, and gender of school such as boys', girls, mixed boys' and girls', mixed day and boarding, should be streamlined with educational guidelines and policies to motivate selection of agriculture subjects. Policy makers should consider these factors during planning and implementation of education systems and programs to be studied in order to sustain high progression in some complex programs such as the agriculture careers which are both arts and sciences.

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