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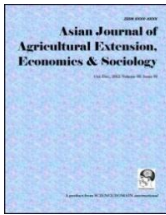
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Influence of Gender, Age, Marital Status and Farm Size on Coffee Production: A Case of Kisii County, Kenya

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Authors' contributions

This work was carried out in collaboration between all authors. Authors JN, EB and AA designed the study and wrote the protocol. Author JN carried out survey work, performed the statistical analysis, managed the analyses of the study, and managed the literature searches. All authors edited the manuscript, read and approved the final manuscript.

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ABSTRACT

Coffee is the fifth GDP earner employing over 600,000 households in Kenya. Coffee farmers are elderly averaging 51 years and a few young; this has had an influence in adoption of new technologies and reduced coffee production from 130,000 MT in 1989 to 50,000 MT in 2012 despite its profitability. The objective of this study was to assess the impact of gender, age, marital status and farm size on coffee production. Multistage and purposive random sampling technique was used to get qualitative and quantitative data using structured questionnaires and interviews on a sample size of 227 farmers from a total population of 69,000 and target population of 18,400 coffee farmers in Kisii County. Data was analyzed using descriptive statistics and inferential statistics at 0.05 level of significance, using Pearson Correlation. The research finding established mean production per

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tree which was 1.77 kilograms and Standard Deviation of 3.23, the average age of coffee farmers was found to be 57 years and 74.3% of them were married. The findings further revealed that, the average coffee farm size was 1.15 acres and Standard deviation of 1.05. On the influence of gender, age, marital status and area under coffee on coffee production, the findings revealed gender, age and marital status has no effect on coffee production ($P>0.05$), while area under coffee has an influence on coffee production ($P=0.023$). Agricultural extension practitioners need to advice and encourage the youth and female to take part in coffee farming and encourage the elderly farmers to mentor the youth and women to take charge of coffee farming.

Keywords: Coffee farmers; gender; coffee production; farmer age and coffee management.

1. INTRODUCTION

Coffee is cultivated in more than 80 countries in the world primarily in equatorial Latin America, Southeast Asia, India and Africa [1] with its energizing effect having first been discovered in the northeast region of Ethiopia [2] and its cultivation first took place in southern Arabia, while drinking occurred in the middle of the 15th century in the Sufi shrines of Yemen [3]. Brazil is leading in production of green coffee, followed by Vietnam, Indonesia and Colombia. Arabica coffee seeds are cultivated in Latin America, eastern Africa, Arabia, or Asia. Robusta coffee seeds are grown in western and central Africa, throughout Southeast Asia, and to some extent in Brazil [2,4-7].

Coffee was introduced to Kenya during the colonial times and the Africans were not allowed to cultivate [8,7]. Since then coffee is now grown in different parts of the country mostly by the elderly farmers of average age 51 years [9]. Delayed involvement of the youth and women in the management of coffee has reduced motivation, confidence and competence to make decisions, thus increasing the risk of expensive mistakes being made [10-12].

Performance of farms is important in determining the industry structure and the total number of farmers [13,11]. Households headed by widows experience more farm conflicts with the deceased husbands' relatives than widower; this cause the production decline between 5-11% [14-16]. Customary laws rarely allow widows to legally inherit land/farms [17,18]. According to [19], the death of a working-age male household head reduces the land allocated to high value crops and results in a large reduction in per capita household crop value production while presence of a designated person to take charge changes farmers' attitudes and behavior in regard to farm size and scale and with the degree of farm specialization [20], making them

intensify farm activities, invest in the farm business, and reduce risk adversity. This include, being more willing to adopt new activities [21].

Coffee is the fifth foreign exchange earner in Kenya after tourism, tea, horticulture and external remittances [22,7,23]. The crop provides about 10% of the GDP and employees over 600,000 households in kenya [24]. About 69,000 farmers are employed in the coffee industry in Kisii County [25]. Since 1989, production in Kenya fell from about 130,000 metric tons to 50,000 tons in 2012 [25]. This decline is attributed to decrease in yields arising from reduced use of inorganic fertilizer and pesticides caused by the fall in the profitability of coffee [26]. Kisii County production dropped from 4,500 MT in 1989 to the current 1,600 MT in the year 2012 [27,25].

Kenya's economy is directly proportional to the performance of agriculture and the largest growth in poverty reduction is by improving agricultural extension strategies to improve profitability [26]. The average minimum age for coffee farmers in Kenya is 51 years [9] with average coffee production of 2 Kg per tree down from the optimal average production of 10 Kg per tree of coffee [27]. In Kisii County the average coffee production per tree is less than 1kg per tree [25] with most coffee farmers being of retirement age. Some coffee farms are neglected or abandoned especially farms whose original owner died or are old to an extent that, they are unable to carry out coffee farming activities due to ownership wrangles or uncertainty [14]. The coffee bushes in Kisii County are poorly pruned with no meaningful change of cycle for the old trees, low usage of fertilizer, untimely weeding and pest control thus causing low production and profitability. The younger generation is not actively involved in the coffee farming [25].

This research sought to assess the impact of Gender, Age, Marital status and Farm Size on

Coffee Production and suggest guidelines for extension policy formulation.

1.1 Conceptual Framework

Timely weeding, pruning, fertilizer application, reduced intercropping intensity, disease and pest control influence production translating to high income, further encouraging diverse participation in farming. The higher income acquired attract competent people to manage value chain practice, and provide advice to its members for the need and advantage of timely farm agricultural practices. The conceptual framework is illustrated in Fig. 1.

2. METHODOLOGY

2.1 Research Design

Research design is the plan for carrying out the research study [28]. This study employed a case study research design with a deliberate attempt to collect data from members of population in order to determine the current status of that population with respect to one or more variables [29]. A case study research design was used because the target population was too large to observe directly.

2.2 Area of Study

Kisii is located in western region of Kenya, on Latitude: 0° 41' 0 N and Longitude: 34° 46' 0 E. Kisii town, the Headquarter of Kisii County is 309 km (192 mi) from Kenya's capital city of Nairobi.

The area is averagely 1,800 feet above sea level with bimodal rainfall whose seasonal distinction is not clearly defined. The terrain is undulating valleys and hills that are gentle. Kisii County is one of the leading coffee growing areas in the country [25]. Kisii County has a population of 1.1 Million people according to 2009 census report, and has an area of 1,317 km² with a population density of 874.7 people per Km². The county has 9 constituencies namely; Bonchari, South Mugirango, Bomachoge Borabu, Bomachoge Chache, Bobasi, Nyaribari Masaba, Nyaribari Chache, Kitutu Chache South and Kitutu Chache North. The county has a total of 24 coffee farmers' cooperative societies with 69,000 coffee farmers.

2.3 Target Population

The study population was 69,000 with a target population of 18,400 farmers and a sample size of 227 respondents with the distribution of the target population shown in Table 1.

Table 1. Target population

Population category	Number	Sample chosen
Cooperative management	243	27
Farmers of 24 cooperative societies with target population of 18,400	68,737	180
Millers	2	2
Agriculture officers	9	9
Cooperative officers	9	9
Total	69,000	227

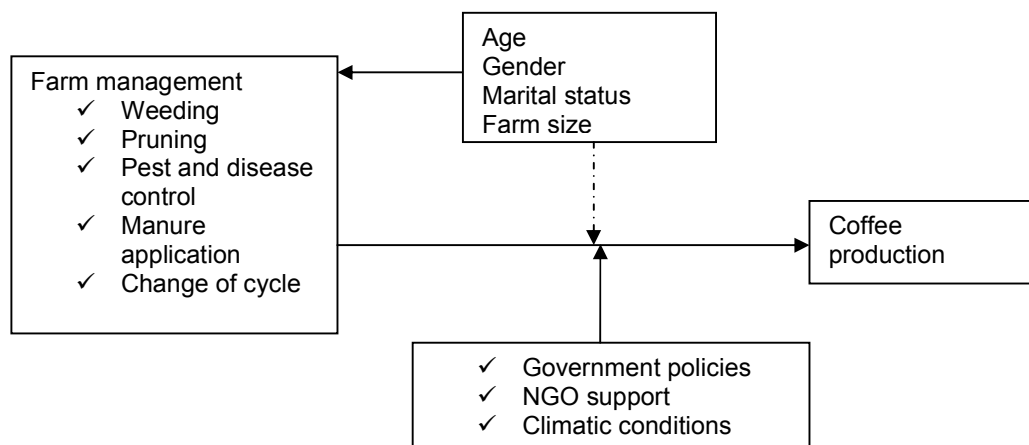


Fig. 1. Conceptual framework of the study

2.4 Sampling Design and Procedure

Multistage, simple random and purposive sampling procedure was followed to collect data from Kisii county farmers. Kisii County is a major coffee growing areas in the west of rift valley. The total number of farm family's who are coffee farmers was estimated to be 69,000. The study targeted a population of 18,400 farmers and a sample frame was obtained through consultation with stakeholders in the nine constituencies' priority being given to constituencies that has more coffee famers' cooperative societies. One cooperative society was chosen at random from each constituency and 20 respondents chosen at random from each society with 3 management officials from the 9 chosen societies. Further to the farmers there were 9 officials from the cooperative and agriculture departments each and 2-miller representatives placed in Kisii County.

A random sample was obtained from a list of chosen farm families and interviews were conducted to 227 respondents who included the family heads or their spouses. Sample data was drawn from Kisii county farmers at random in order to get clear and unbiased representation. The sample drawn was calculated using Fisher

Formula $n = \frac{Z^2 pq}{\ell^2} D$ at 95% (Z=1.96, 2-tailed

test), level of confidence, within $\pm 5\%$ ($\ell = 0.05$) margin of error and taking into account the proportion of coffee farmers in the nine constituencies, the sample size n was calculated

$$\text{as, } n = \frac{Z^2(1-p)p}{\ell^2} = \frac{1.96^2(1-0.18)0.18}{0.05^2} = 227$$

- n - The desired sample size
- Z - The standard normal deviate at 95% confidence level
- p - The proportion in the target population estimated to have characteristics being measured
- ℓ - The level of statistical significance test.

The formula was adopted since the target population was greater than 10,000 [29].

2.5 Research Instruments

Both primary and secondary data was used in the research. The primary data was obtained from farmers, coffee co-operative management,

members, millers and government officials. The secondary data was obtained from available literature. The data collection instruments used was questionnaires and interview schedule. The questionnaire comprised both open and closed ended questions. Further the interview schedule was prepared for Farmers Cooperative Society management and government representatives the questions structured in the sheet tallied with the objectives of the study.

2.6 Data Analysis and Presentation

This refers to the examination of the coded data and making inferences [28]. In this study, data was analyzed using both descriptive and inferential statistical techniques. The objectives were analyzed descriptively using frequency tables and percentages. Correlation Inferential statistics was conducted to test the significance of the study at 95% confidence interval. Data coding, entry and analysis was done with aid of SPSS version 22 programme.

3. RESULTS AND DISCUSSIONS

3.1 Return Rate

The questionnaires were administered to 227 respondents that included 180 farmers, 27 farmers' cooperative society officials, 9 agricultural officers, 9 cooperative officers and 2 officers from the milling section. A total of 214 questionnaires were returned, this translates to 94.3% return rate meaning the respondents were positive towards the study.

3.2 Gender of Respondents

From the findings, 151 respondents were male which translates to 70.6% while 63 respondents were female translating to 29.4% as shown in Fig. 2. This is clear evidence that, there was a gender imbalance in accessing the existing coffee farming resources and information. The finding of this study concurs with [30], who reported that, the registration of land has created new forms of disputes in families. The results indicated a gender bias in coffee farming where male farmers dominated and this is likely to demoralize female farmers from actively engaging in coffee farming activity, thus impacting negatively on coffee production since women are key in the actual farm operations. Further study indicates no significance on gender towards coffee production ($P > 0.05$) as illustrated in Table 5.

3.3 Age Bracket

Age is a key factor in adoption rate of technologies and performance of the farmer as he or she engages in farming or retiring from farming. Younger people tend to adjust faster and well to new technologies than the elderly who are conservative. The findings showing age of coffee farmers are presented in Fig. 3. Majority of the respondents are aged between 50-60 years old representing 29.0% while below 50 Years was 28.5%, 61-70 years were 25.6% and over 70 Years were 16.4%. This means 71% of the respondents were over 50 years of age with an average of 57 years hence proves that the youth participation in coffee farming is low. This concurs with [9] in his research in Mukurueni district, Kenya, who found out that the minimum average age for coffee farmers was 51 years. Coffee farming requires more energy to achieve optimal production hence the decline production trend may be attributed to the less energy dedicated to it by the low number of youth who are engaged in it. However, further analysis indicates no effect of age of coffee farmer on coffee production ($P>0.05$) as shown in Table 5.

Table 2. Acreage of farms

Acreage	Frequency	Percent
1> acres	131	61.1
1-2 acres	52	24.4
2 acres and above	16	7.5
No response	15	7
Total	214	100

3.4 Marital Status Respondents

Marital status is critical in determination the level and magnitude of conflicts arising from hereditary

process and which affect on the good agricultural practices in coffee farming [14,15]. Majority of the respondents represented by 74.3% were married whereas 21% were widows while 4.7% were single or separated as illustrated in Fig. 4. This concurs with [17,18] who indicated that male are the designated holders of farms and not female. It is most likely that youth who may dedicate most of their energy in coffee framing as a business are denied a chance to do so because they are believed they cannot be responsible since they are not married, This leaves the elderly to carry on with conventional coffee farming hence retained or reduced production. The findings further show no correlation between marital status and coffee production ($P>0.05$) as shown in Table 5.

3.5 Coffee Farm Acreage

Results in Table 2 shows that 61.1% of the respondents had less than 1 acre of coffee farm while 24.4% had between 1-2 acres, only 7.5% had more than 2 acres with the highest being 8 acres and average of 1.16 acres. This makes Kisii County a more small scale farming area and this has caused very intensive intercropping between perennial and annual food crops. These findings are divergent from [26] point of view that, reduced production is due to reduced use of agro inputs and reduced land size allocated to coffee production. Findings in Table 5 shows that there is significant effect of the area under coffee on coffee production ($P<0.05$). The findings is a clear indication that there is a high chances of competition between coffee plants and other crops in the smaller acreage lands making the yields to reduce due to increased demand for nutrients and space.

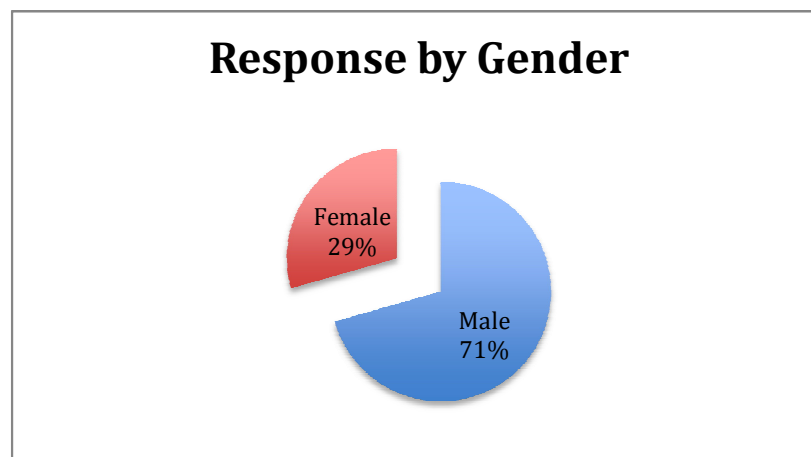


Fig. 2. Response by gender

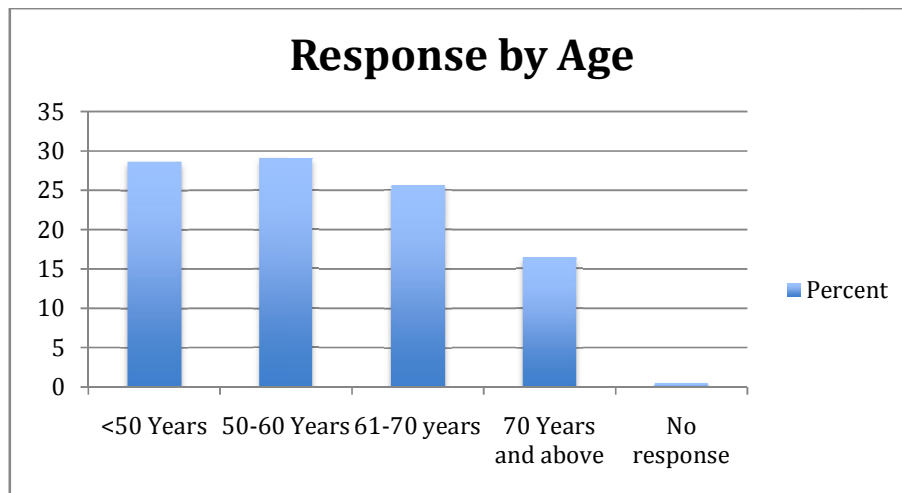


Fig. 3. Age of farm owners

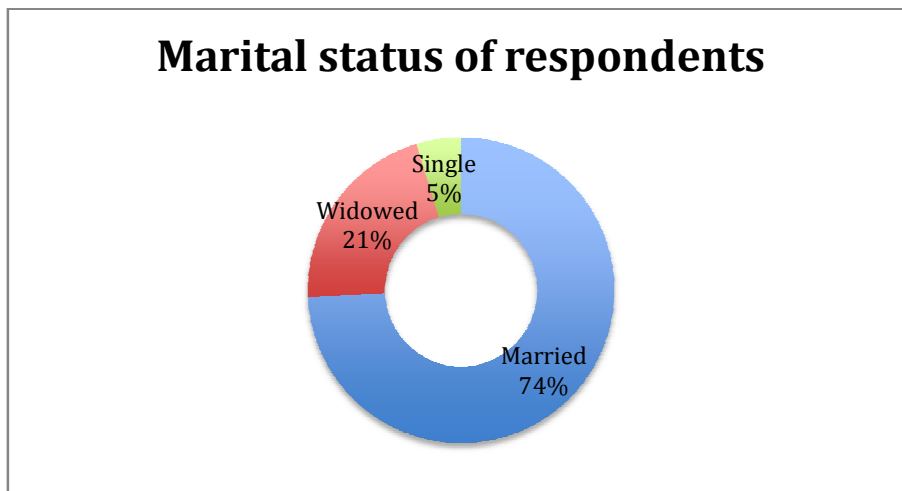


Fig. 4. Marital status of coffee farmer

3.6 Coffee Production

Results of the study shown in Table 3 indicated that the average cherry production per tree per year was 1.77 kilograms, with standard deviation of 3.23. Results further revealed that 61.7% of the population produces less than 1 kg per tree of coffee, while 30.8% produces more than 1 kg of cherry. This confirms reports from [25;26] that farmers produce an average of 1Kg per tree down from optimal productivity of 10 Kg per tree of coffee. Results differs from [31] findings that farm succession has a significant effect on farm performance, it concurs with findings from [26] who found out that decline in production was due to reduced use of inorganic fertilizer. Similarly, the findings agree with [20], who found that,

presence of a successor or a young farmer being mentored enhances farmer attitudes and behavior in regard to farm size, scale and degree of specialization. It is therefore worth saying that the less farm allocated to coffee could be attributed to the less number of youth participating in coffee farming in general and compounded by the lack of specialization due to conventional coffee farming.

Table 3. Coffee production in kg per tree/year

Production per tree	Frequency	Percent
1kg>of cherry/tree	132	61.7
1kg<of cherry/tree	66	30.8
No response	16	7.5
Total	214	100.0

A higher percent of the population acknowledged that there was a decline in coffee production from 1989 at 72%, while 11.7% didn't know the trend and 16.3% avoided to respond whether they knew or not as shown in Table 4. The awareness on the production trend is not an issue from the findings and contradict findings by [32], on knowledge availability in terms of coffee performance, however it agrees on the attitude effect on performance since high population of farmers are aware of production trend yet no action to intervene the situation and this could be reverted when youth and women are fully involved in farming and decision making in the coffee industry value chain as whole

Table 4. Farmer aware of declining production trend

Response	Frequency	Percent
No response	35	16.3
Yes	154	72
No	25	11.7
Total	214	100.0

Table 5. Correlation of farmer gender, age, marital status and coffee production

		Coffee production
Gender	Pearson correlation	-0.012
	Sig. (2-tailed)	0.869
Age	Pearson correlation	0.003
	Sig. (2-tailed)	0.963
Marital status	Pearson correlation	-0.049
	Sig. (2-tailed)	0.513
Area under coffee	Pearson correlation	0.172
	Sig. (2-tailed)	0.023

4. CONCLUSIONS AND RECOMMENDATIONS

Reduced coffee production is a reality that needs a remedy, which may include involvement of the youth and women to its fullness and protecting them while carrying out coffee farming. The findings established few single (4.7%) in the coffee farming, which may indicate that there is an attachment between farming and marital status. The high percentage of elderly male farmers averaging 57% means a reduced energy supplied to the industry yet it needs more energy and versatility in technology adoption. The small farm size averaging 1.77 acres puts pressure on

utilization of the farm especially on the cropping which encourages the farmers to carry out a very intensive intercropping between coffee and food crops. Coffee is labour intensive and denying youth a chance to participate means actually denying coffee industry of the energy and opportunity needed to propel it to optimal production.

In light of the discussions and conclusions of the research findings, farmers need to encourage their children, the single and appointed successors to participate in coffee farm work to let them understand what is needed before final take over of coffee farming business; The community need to treat women and the singles as equal farmers who can produce even in absence of their husbands and irrespective of marital status; Farmers can produce optimally even in the small farms as long as good agricultural practices are adhered to.

4.1 Suggestion for Further Research

Based on the nature and conclusion emanating from the study findings, the study suggests further research to be done on; Influence of different types of fertilizer on coffee production in Kisii county; Factors influencing coffee farming in Kisii county.

COMPETING INTERESTS

Authors have declared that no competing interests exist

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