Original Research Article

Determinants of Market Outlets Choices Among Smallholder Mango and Passion Fruit Farmers in Kenya

ABSTRACT

Aims: Mango and passion fruit farming is one of the lucrative enterprises in the areas where they are grown and marketed. However, there is need for stability in the market outlets choices made by farmers due to the negative influence of brokers and fear of postharvest loss. This study sought to identify the determinants that influence the choice of market outlet made by mango and passion fruit farmers in Machakos, Makueni, Embu, Uasin Gishu, and Trans Nzoia Counties, Kenya.

Methodology: A descriptive cross-sectional design was used on a target population of 18750 smallholder mango and passion fruit households to get a sample size of 402 households through random cluster sampling. The study considered three market outlets: direct marketing, intermediate marketing, and collective action. A multinomial logit model was used to analyze the determinants of the choice of market outlets.

Results: The descriptive findings revealed that most smallholder mango farmers (72.73%) and passion fruit farmers (91.67%) rely on brokers/intermediaries to market their produce. The multinomial model revealed that market distance, household size, age, and years of schooling among the independent variables led to 52.84% influence on the choice of market outlet. An increase in any of the determinants by a unit increased the likelihood of the farmers' use of broker market outlet as opposed to direct marketing or wholesaling. As farmers' years of schooling increased by one year, the propensity to trade with a broker increased by a factor of 0.027 (*P*-value=0.01), while the tendency to trade with exporters increased by 0.004 (*P*-value=0.1).

Conclusion: There lacks proper regulated market outlets within which mango and passion fruit farmers operate. The government must streamline mango and passion fruit markets to aid in dealing with brokers. Government needs also to improve roads connecting markets in mango growing areas.

Keywords: Mango; Passion fruit; Brokers; Market outlet; Postharvest loss

1.0 INTRODUCTION

Fruit farming forms among the backbone industry that creates wealth for farmers and mitigates poverty in vast rural areas. The sector has long been increasing in importance owing to the increased fruit consumption and availability of export markets globally [1;2]. The sector is among the fastest-growing farming sector and, particularly in Sub-Saharan Africa, contributes considerably to poverty eradication, food and nutrition security, and export revenues [3]. Fruits such as mango, pineapple, avocado, and papaya are

considered the major tropical fruits with mango yielding the greatest production worldwide [4]. Production of most of the tropical fruits takes part in India, which leads in mango and papaya production followed by Thailand, Mexico, China, Brazil and Indonesia. Minor tropical fruits are the logan, mangosteen guava, durian, passion fruit, litchi and rambutan with India and China being the greatest producers [4]. However, the lack of well-functioning market remains a challenge in the fruit sector [5].

Mango (*Mangifera indica*) has the prospect of becoming a leading horticultural commodity, both for domestic needs and for export purposes. Mango is a national superior fruit commodity that can act as a source of vitamins and minerals, increase farmer's income, and support industrial development and exports [6]. The crop is commonly grown in the tropical and subtropical regions of the World [7]. In Kenya, the crop is produced in large quantities in the Eastern Region comprising the counties of Machakos, Makueni and Embu Counties. Otieno [8] indicated that mango farming is prone to attacks by fruit flies that destroys the quality of the fruits available for marketing. In order to avoid the cost of controlling the fruit flies, mango farmers adopt the available market channel to dispose their fruit produce upon maturity.

In addition, the mango market is adversely affected because it is prone to numerous postharvest diseases and is highly perishable in nature. Moreover, being a climacteric fruit, the ripening process in mango fruit occurs very rapidly, which makes them soft and, hence, susceptible to attack by various pathogens [9]. These associated problems further limit their storage, handling, and transport potential over long distances for marketing and consumption, which ultimately affects the global mango trade [9]. Hasan [10] revealed that about 25–45% postharvest loss in mango is reported every harvesting season. Thus, to reduce the associated postharvest loss farmers needs to develop not only a better mechanism to extend the shelf life but also improve on the channel used to market the mango.

The sales from mango marketing in Kenya are marked by fluctuations ranging between 3.5 billion to 5 billion depending on environmental factors, preharvest and postharvest challenges prevailing in any given year [11]. Nevertheless, despite this impressive camouflaged mango production and marketing achievements, poverty levels in the areas where mango is grown like Makueni County have remained quite high, currently standing at 60.6 % [12]. This might be deduced to mean that mango farmers do not benefit much from their mango farming for instance due to the menace caused by middlemen in the mango sector [11]

Passion fruit *(Passiflora edulis)* is widely planted in both tropical and subtropical regions of the World [13]. Passion fruit juice is a rich source of amino acids, trace elements, and carotenoids making it have excellent health benefits. According to Feng [14], fresh fruit consumption continues to dominate the worldwide market, among which passion fruit is one of the fresh fruits that consumers prioritize to buy. Nevertheless, passion fruit still suffer from post-harvest quality problems, such as rapid shrinkage, spoilage, and high respiration [15; 14]. Therefore, an effective means of marketing the product is needed to help dispose the fruits with ease and avoid spoilage.

Smallholder mango and passion fruit farmers may depend on several market outlets to dispose their fruit produce to the market. The farmers may either use brokers, directly sell their produce to the buyers or form groups where they create a pool of their produce and market together. Upon harvesting of their fruits, the farmers are faced with a dilemma of which marketing channel to adopt [8]. The farmers may have the fear of postharvest loss and on the other hand they may like to fetch a higher profit from the sale of their produce. Mulwa [11] established that most mango farmers in Makueni County relied on brokers who at the end exploited them and often took away the profits that should have gone to the farmers. This study therefore sought to identify and analyze the determinants that influence the choice of fruit market outlet made by smallholder mango and passion fruit farmers in Makueni, Machakos, Embu, Uasin Gishu and Trans Nzoia Counties, Kenya.

2.0 METHODOLOGY OF THE STUDY

2.1 Description of the Study Area

The study was conducted in Makueni, Machakos, and Embu Counties, situated in the Eastern region, and Uasin Gishu and Trans Nzoia Counties, located in Rift valley, Kenya. The climatic conditions in the Eastern region are marked by a warm climate and constitute semi-arid areas. The Eastern region receives annual precipitation of 500 to 700 mm [16]. The climatic characteristics are suitable for mango farming. Consequently, the high mango production in the Counties of Makueni, Machakos, and Embu attracts distinct marketing strategies by the farmers to fetch higher profits and avoid possible postharvest loss. Trans Nzoia County is marked by moderate temperatures with an annual rainfall of 900 to 1400 mm per year [17]. Uasin Gishu is characterized by warm to hot temperate conditions and an average rainfall of about 900 to 1100 mm [18]. The North Rift Valley's agriculture sector is supported by the Mau Escarpment's steady rainfall and fertile soils, which facilitates passion fruit growing. The main economic activities are crop farming, maize, passion fruit production, and livestock rearing [18]. Such farming activities lead to high farm output which has to be dispatched. The farmers must seek various marketing tactics to counteract postharvest loss and fetch available profits.

2.2 Research Design and Sampling

A descriptive cross-sectional design was employed in this study. A cross-sectional survey covered the Counties of Machakos, Makueni, Embu, Uasin Gishu, and Trans Nzoia. The design was appropriate in identifying the determinants of market outlet choices among smallholder mango and passion fruit households. The design helped answer the questions of what determinants influence direct marketing, intermediate marketing, and the use of collective action to dispatch the mango and passion fruit by the smallholder households in the selected Counties. The study target population was 18750 smallholder households producing mango and passion fruit. Secondary data was sourced from the Horticultural Crops Directorate report for the 2020 production season. Kothari's [19] sampling formula was used to compute the desired sample size for the study:

$$n = \frac{N}{1 + N(e^2)} = \frac{18750}{1 + 18750(0.05^2)} = 392$$

where,
n= desired sample size
N=population size
e = acceptable error

Since the study covered a large population, ten respondents were added to the 392 obtained above to cater for non-responses, forming a sample size of 402 smallholder households. The sample size assumed a 95% confidence interval and an acceptable error of 5%.

2.3 Sampling Procedure

The study used a cluster random sampling technique. First, the purposive sampling technique was employed to choose the five Counties; Machakos, Makueni, Embu, Uasin Gishu, and Trans Nzoia, since they are the major mango and passion fruit growing areas in the Eastern and North Rift regions of Kenya, respectively. In the second stage, the Counties were clustered heterogeneously concerning the Sub-Counties. In the third stage, the Sub-Counties included in the study were selected randomly from each County. Lastly, from the selected Sub-Counties, a list of smallholder mango and passion fruit households was generated with the help of the Ministry of Agriculture Extension staff to help select respondents for the study through a simple random sampling method. The distribution of the sample size in the different counties (Table 1) was calculated using the following sample size distribution formula:

$$\frac{\text{County number of smallholder households in fruit farming}}{\text{Target population}} \times \text{Sample}$$

Table 1: Distribution of the sample size

County	Number of smallholder households	Sample size
Makueni	6500	139
Machakos	4000	86
Embu	2250	48
Uasin Gishu	4000	86
Trans Nzoia	2000	43
	18750	402

2.4 Data Collection

The marketing outlets considered carried three dimensions (direct marketing, intermediate marketing, and collective action), which are diverse; thus, a semi-structured questionnaire was found fit for collecting primary data. Academic supervisors and stakeholders in the fruit marketing sector helped validate the questionnaire. The study employed the Cronbach alpha coefficient for questions on a scale basis. The scale reliability coefficient was 0.7003, which, as per the rule of thumb by George [20], was acceptable; therefore, the questionnaire was reliable for use. The questionnaire was administered to respondents selected at random from the study area face-to-face

to obtain data on the determinants of market outlet choices among smallholder mango and passion fruit farmers. Due to their high mango production, mango-related data was obtained from three counties, including Makueni, Machakos, and Embu County. Passion fruit-related data was taken from Trans Nzoia and Uasin Gishu Counties to represent the other passion fruit-producing areas in Kenya. The study engaged four enumerators in each of the selected study areas. Respondents included heads of mango and passion fruit-producing households selected in the study area.

2.4. Data Analysis

The data collected was coded and categorized and analysis was done using SPSS 28 and STATA 15 software and econometric analysis was done using a multinomial logit model.

2.4.1. Multinomial Logit Model Specification

The multinomial logit model was found appropriate in analysing the determinants of market outlet choices made by farmers. The multinomial logit regression (MNLR) model is often utilized when the predicted value comprises over and above two categories [21]. It is a popular method for analysing categorical response variables with at least three categories amongst applied researchers. Liu [22] study revealed that the model assumes independence of choices implying it does not allow correlation and substitution between alternatives. It estimates the probability of each particular value of the dependent variable by expressing each variable as a base category of the other two variables. Marketing outlets emphasized in this study includes direct marketing through wholesaling, intermediate marketing through brokers and exporters as well as collective action through producer marketing groups. The marketing choice model is represented as follows:

$$M_{ij} = \mathrm{X_{ij}}\beta_j + E_{ij}$$

where;

M_{ij} is the vector of marketing choices (*j*=1 for producer marketing groups; 2 for intermediate marketing through brokers and 3=direct marketing). $\mathrm{X_{ij}}$ is a vector of independent variables shown in Table 2. β_j is a vector of marketing choices specific parameters to be estimated. E_{ij} is the error term assumed to have a distribution with mean 0 and constant variance. Following Gujarati [23] the multinomial logit model can be given as follows;

$$\mathrm{Prob(Yi = j)} = \frac{\exp(\mathrm{XiBj})}{\sum_{\mathrm{j=0}}^{\mathrm{j}} \exp(\mathrm{XiBj})} \text{ for } = 1,2,3$$

where;

Prob (Yi=j) is the possibility that farmer i adopts market channel j, Xi is the vector of predictors and Bj is the vector of parameter estimates linked with market channel j.

Using collective action through producer marketing groups as the base category and B1 = 0 the probability of other remaining market outlets, 2 and 3 is provided as follows:

$$\text{Prob}(\text{Yi} = \text{j}|\text{Xi}) = \frac{\exp(\text{XiBj})}{1 + \sum_{\text{j}=0}^{\text{j}} \exp(\text{XiBj})} \text{ for all j>0}$$

Marginal effects were calculated using Stata 17 Software application to estimate the magnitude of the anticipated change in likelihood of picking a market outlet with a unit change in an independent variable, because multinomial Logit coefficients are not easily interpretable. Partial derivatives of the possibility of selecting a market channel are the marginal effects [24].

Table 2: Marketing Outlets Variable Description

			Expected outcome on market outlets choices
Variable	Variable description	Measurement	Direct, collective action and intermediate marketing
Age	Age of the farmer	Years	+/−
Education	Years in school	Years	+/−
Experience	Experience of the farmer	Years	+/−
Farm size	Fruit production area	Acres	+/−
Gender	Male=1 Female =2	Dummy	+/−
Group membership	Membership to a cooperative (1=yes, 0=no)	Dummy	+/−
Household Income	Monthly household income	Ksh	+/−

3.0. RESULTS AND DISCUSSION

3.1. Determinants of Smallholder Mango and Passion Fruit Farmers Marketing

The study established that most smallholder mango farmers in the three Counties of Makueni, Machakos and Embu had an average age of 50.5 (±11.88) and an average year of schooling of nine years (±4.6). Most of the mango farmers in the three Counties operated an average size of land of about 7.5 hectares (±5.6). On average, most of the mango farmers had to travel 3.27 kilometers to reach the nearest market. Ninety percent (90.07%) of the mango farmers involved were males, and 9.93% were females, which may imply majority of the household heads were males. The findings revealed that majority of the smallholder mango farmers (72.73%) relied on brokers to sell their produce while 24.51% marketed their produces through direct marketing. Most of the farmers that used brokers or intermediaries were from Makueni (99.22%) and Embu (90.24%) while majority of farmers that relied on direct marketing either as wholesalers or traders were from Machakos (73.49%) [Table 3]. The descriptive statistics concur with those of Ermias (2021) who sought to analyze the determinants affecting the choice of mango market outlets and found that most of the framers were having an average age of 50 years and 10 years of education. Ermias [25] study also revealed

that most of the mango farmers had to travel for an average market distance of 3.9 so as to reach their produce to the market. The findings also concur with those of Musyoka [26] on the choice of market outlet who also found that most of mango farmers relied on brokers to dispatch their mango produce. Musyoka [26] revealed that sales made in local markets and at the farm gate were relatively low compared to brokers.

The study's findings also found that the mean age of the smallholder passion farmers in Trans Nzoia and Uasin Gishu Counties was roughly 44 (±9.23) years and an average year of schooling of 12 (±3.04) years. The average size of land operated by the passion fruit farmers was 6.4 (±5.37) hectares in both Counties, however, Uasin Gishu farmers were found to operate relatively large farms of 6.97 (±6.0) hectares than farmers in Trans Nzoia County who were operating a farm size of 5.3 (±3.65) hectares. The study findings revealed that the smallholder passion farmers in Uasin Gishu and Trans Nzoia Counties could travel a mean distance of 4.33 (±0.23) kilometers to reach the nearest market. The farmers in Uasin Gishu County could travel 4.5 (±0.24) Kilometers to reach the market, which is a far distance compared to the one traveled by the passion fruit farmers in Trans Nzoia County of 4.02 (±0.47) kilometers to the nearest market [Table 4].

Table 3: Descriptive for Determinants of smallholder farmers involved in Mango marketing

Variable	Makueni	Machakos	Embu	Average	F value	Prob >F
Age	50.61 (12.54*)	49.47 (12.12)	52.44 (9.13)	50.57 (11.88)	0.97	0.38
Years of schooling	10.14 (2.88)	3.55 (1.75)	14.27 (2.36)	8.79 (4.6)	329.35	0.00
Land area operated	9.76 (5.64*)	4.57 (3.74)	6.30 (5.47)	7.51 (5.59)	29.28	0.00
Market distance	4.33 (3.69*)	1.94 (1.40)	2.63 (1.36)	3.27 (3.01)	20.76	0.00
Gender					11.00	0.00
Male	92.75	93.02	77.08	90.07		
Female	7.25	6.98	22.92	9.93		
Market outlet used					5.19	0.075
Aggregator/broker	99.22	22.89	90.24	72.73		
Exporter	0.78	0.00	0	0.4		
Wholesaler/traders	0.00	73.49	2.44	24.51		
Another buyer	0.00	3.61	7.32	2.37		

*Figures in the () indicate the standard deviation associated with the mean

In the study, about 90% of passion fruit farmers were males, while only 10% were females. The study findings revealed that majority of passion fruit farmers (92%) relied on brokers to market their produce with only roughly 8% using producer groups. Typically, the industry is dominated by brokers because there are no clear means established on how the produce reaches the market and fetch good prices for the

farmers. The findings on the choice of market outlet concur with Parihat [27] who established that fruit farmers rely mostly on brokers to market their produce since they save farmers on transport costs by collecting the produce from the farms. However, Parihat [27] established that direct marketing increases the farmer's gains in the sale of their fruit produce since there are no intermediaries who would have taken various benefits that would have gone to the farmers. In addition, the descriptives of the current study concur with Abu [28] who established that most of the passion fruit farmers in Johor, Malaysia was in the age bracket of 41 to 50 years. However, the results contradict those of Joseph [29] who found out that most of the smallholder fruit farmers were in the age bracket of 25 to 35 years.

3.2. Determinants of Choice of Market Outlets

Multinomial Logit (MNL) model was used to assess the determinants affecting choice of mango and passion fruit marketing outlets. Direct marketing involving wholesaling was used as the reference group in comparison with the other three choices of market outlets that included the use of brokers, producer marketing groups and exporters. The findings of multinomial logit regression model are shown in Table 5. The Chi-square value of -123.157 indicated that the likelihood ratio statistics are strongly significant, implying that the MNL model had strong explanatory power. The pseudo-R square was 0.5284 implying the explanatory variable explained 52.84% of the variable in the choices of market outlet.

Table 4: Descriptive for determinants of smallholder farmers involved in passion fruit marketing

Variable	Uasin Gishu	Trans Nzoia	Average	T-Value	Prob >t
Age	43.91 (10.23*)	44 (7.09)	43.94 (9.23)	-0.06	0.52
Years of schooling	13.40 (2.31)	9.82 (2.91)	12.17 (3.04)	7.67	0
Land area operated	6.97 (6.0*)	5.3 (3.65)	6.4 (5.37)	1.67	0.05
Market distance	4.5 (0.24*)	4.02 (0.47)	4.33 (0.23)	0.159	0.00
Gender				7.51	0.01
Male	95.35	80.43	90.15		
Female	4.65	19.57	9.85		
Marketing Outlet				22.43	0.00
Aggregator/broker	100	76.09	91.67		
Producer group	0.00	21.74	7.58		
Other buyer	0.00	2.17	0.76		

*Figures in the () indicate the standard deviation associated with the mean

The multinomial logit model shows that six factors (age, years of schooling, household size, area of land under fruit production, off-farm income and distance to the market) significantly influenced the choice of broker market outlet when compared to base category of whole sale outlet. Similarly, five predictor variables including age, years of schooling, area of land under fruit production, off-farm income and membership to cooperative significantly influenced the choice of producer marketing groups when compared to the base category of wholesaling. In addition, four explanatory variables (age, years of schooling, household size and fruit production area) had a significant effect on the choice of exporter market outlets when compared to wholesale market outlet which is the base category. Meanwhile, only three predictors (age, years of schooling and fruit production area) significantly affected the choice of combined market outlets (broker, producer group and exporter) compared with wholesale market outlet the base category (Table 5).

In this study multinomial logit coefficients were subjective to the base outcome. Therefore, examining the marginal effect of changing their values on the probability of witnessing an outcome, as illustrated in Table 6, is a superior way to analyze the effect of variables. The findings of the model showed that farmer's age had a positive relationship with the likelihood of choosing either of the market outlets to sell both passion and mango and counteract possible postharvest losses of fruits. The farmer may either choose brokers or producer group market outlet at 5% significance level or choose exporters at 1% significance level compared to wholesale market outlet. The result implies that as a farmer's age increases by a year, the probability of trading with exporters compared with wholesale market outlet increases by a factor of 0.002 units (Table 6).

When farmers approach old age, they become immobile and are less likely to move to markets in pursuit of direct market or wholesaling of their products. Farmers, therefore, prefer being in producer marketing groups and also involving brokers who collect the produce from their homes. However, the reliability of brokers is unpredictable as well as the continuity of producer groups in marketing; most farmers therefore, experience loss of their fruits after the harvesting season. The findings concur with study by Ketema [30] who stated that as farmers approach old age, they prefer selling their produce to brokers and other buyers as opposed to direct marketing including roadside selling. Similarly, the years spent in school by the farmer have a positive relationship with the probability of choosing either of the market outlets (broker, producer group or exporter) at 1% significance level compared to wholesale market outlet.

Based on the findings of the model it can be stated that schooling informs the farmer of the benefits of diversifying sales to various market outlets which enables the farmer to dispose all the fruit produce upon harvesting and avoid possible fruit losses. The farmers do not rely on a specific channel and therefore, are assured that their produce may find its way to the market. However, one of the disadvantages among both passion and mango farmers is their inability to keep trust with the buyers. The results reveal that an increase in a number of years of schooling increased the propensity to

trade with a broker by 0.027 while the tendency to trade with exporters increased by 0.004 units.

However, the findings contradict with those of Ketema [30]and Kiprop [31] who found out that a rise in the years of schooling increases the possibility of the farmer choosing wholesale market outlet as opposed to the other outlets. Kiprop [31] observed that most of the educated farmers opted to use wholesale market outlet to avoid the influence of brokers who take away the gains intended to the farmer. Ketema [30] established that as the literacy level of the farmers increased the probability of choosing brokers over processors declined by 0.86 units ceteris paribus.

The model findings also showed that the size of the household also determines the decision on market outlet that the farmer adopts in marketing passion and mango. Household size positively influences the possibility of choosing either broker market outlet at 1% significance level or export outlet at 5% significance level compared to wholesaling. The findings reveal that an increase in family size by one person increases the likelihood of selling through brokers by 0.042 units than with wholesale market outlet. Due to the urge of quick income to satisfy various needs of the larger family, farmers as well as other members of the household run for quick money presented to them by brokers. In fear of the postharvest loss that their produce may encounter, fruit farmers rush to brokers and dispose their produce sometimes at lower prices.

However, an increase of the family size by one person decreases the likelihood of selling through producer groups by 0.011 units compared to wholesaling. The findings contradict Temesgen [32] study which reported that most households involved in sesame marketing chain preferred wholesaling as opposed to other market channels. Farmers with large family size choose other methods as opposed to wholesaling.

The findings of the model also showed that the area of land under fruit production negatively influences the likelihood of the farmer to choose either brokers market outlet at 1% significance level, producer group or exporter outlet at 5% significance level compared to wholesaling. The findings concur with Temesgen [32] who discovered that land size cultivated with sesame negatively influenced the choice of the farmer selling through the producer group [32]. The findings of this study reveal that an increase in the area of fruit production by one hectare increases the chances of selling through wholesale market outlet by 0.013 units than with the producer group. Off farm income have a negative relationship with the likelihood of the farmer choosing to market the fruit produce through brokers at 1% significance level or producer group at 5% significance level. This implies that as the farmers' income increases from other farm activities, they opt not to rely on quick selling that involves brokers and prefer to use direct marketing

through wholesaling. The farmer uses the income gotten from other activities to satisfy any particular urgent needs. The current findings reveal that an increase in income from other farm activities by one unit increases the chances of selling through wholesale by 0.087 than with brokers. The findings concur with the report by Isaboke [33] that there was a positive significant relationship between off farm income and direct market choice of market outlet. An increase in income would increase the tendency of using the wholesaling outlet as opposed to using the brokers.

The multinomial logit model findings further showed that farmers membership to a cooperative or a farmer-based organization (FBO) have a negative relationship with the likelihood of the farmer opting to sell the fruit through the producer marketing group compared to wholesaling at 10% significance level. Being a member of a cooperative or farmer-based organization decreases the option of using producer marketing groups by 0.054 and increases the option of selling to wholesalers. The findings concur with those of Amfo [34] who reported that farmer's membership to an FBO had a positive and significant effect to selling to wholesalers as opposed to the producer group. The cooperative, as well as the farmer-based organization directly or indirectly offered a platform to farmers in which they could pool together their produce and sell it in bulk trying to avoid the influence of brokers. The findings concur with those of Isaboke [33] who reported that membership to a mango marketing group was linked with increased possibility of a farmer selling via export channel relative to the broker channel.

Distance to the market positively influences the likelihood of the farmer choosing broker market outlet as opposed to wholesaling at 5% significance level. The results of this study reveal that an increase in the distance to reach the market by one unit increases the chances of the farmer using brokers by 0.022 than wholesaling. Long distances implied that the farmer incurs a higher transport cost for the produce to reach the market, which may render the passion and mango enterprises unprofitable. Additionally, long distances subjected the fruit to high loss due to longer hours used on the road to reach the market. The findings concur with Akrong [35] who found that mango farmers who were nearer to a tarmacked road were more likely to sell via wholesaling or direct market relative to brokers and vice versa. In addition, farmers with large farms and far from the market would prefer engaging exporters to dispose of their produce both locally and outside the country in order to avoid the unreliability and unpredictability nature of brokers that may render their produces to loss.

4.0 CONCLUSION

There lacks stability among farmers in the choice decision for the fruit marketing channel to use. There are no properly devised and regulated market outlets within which fruit farmers market their produce. Most of the mango and passion fruit farmers rely on brokers to market their fruit produce. Brokers are unreliable and unpredictable and subject the farmer to postharvest loss when the market is flooded. Some of the determinants that force farmers to use brokers or intermediaries include distance to the market, size of the household, age and education level in years. The farmers have to cover longer distances to the reach the fruit produce to the market which makes them opt to dispose to brokers as opposed to direct marketing. The National and County

governments should develop and streamline mango and passion fruit markets to help eliminate the brokers that exploit the farmers. Farmers should form and join groups so as to create a bigger bargaining power as they market their fruit produce. In addition, both National and County Departments involved in roads construction and maintenance should ensure there are accessible roads by the fruit farmers from their farms to enable reach the produce to the market.

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Table 5: Multinomial Logit Estimates for Determinants of Choice of Market Outlets in Three Mango and Two Passion Fruit Producing Counties

Reference category:	Broker		Producer Group		Exporter	
Wholesale	Coefficient	Std error	Coefficient	Std error	Coefficient	Std error
Gender	-0.405	0.885	-0.602	1.356	0.631	1.494
Age	0.051 **	0.024	0.075**	0.036	0.144 ***	0.047
Years of schooling	0.673 ***	0.126	0.546 ***	0.156	0.858 ***	0.192
Household size	0.756***	0.194	0.265	0.267	0.716 **	0.277

Internet access	-1.061	1.013	-0.428	1.214	-1.724	1.531
Fruit production area	-0.091 ***	0.029	-0.527 **	0.221	-0.083**	0.041
Off-farm income	-1.829 ***	0.568	-2.214 **	1.034	-0.021	1.197
Cooperative Membership	-0.097	0.572	-2.027*	1.196	-1.188	1.298
Market distance	0.362 **	0.167	0.311	0.216	-0.164	0.352
Access to training	-0.457	0.576	-0.579	0.857	1.048	1.316
Number of observations						
392						
Prob > Chi2						
0.00						
Pseudo R2						
0.5284						
Log-likelihood						-
123.1556						

Note: *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 6: Marginal Effects of the MNL Regression Model for Mango and Passion Fruit Farmers' Choice of Market Outlets in the Five Counties

Reference category:	Broker		Producer Group		Exporter	
Wholesale	dy/dx	Std error	dy/dx	Std error	dy/dx	Std error
Gender	-0.025	0.049	-0.008	0.031	0.016	0.02
Age	0.000	0.001	0.001	0.001	0.002**	0.001
Years of schooling	0.027***	0.004	-0.001	0.001	0.004*	0.002
Household size	0.042***	0.009	-0'011*	0.006	0.001	0.003

Internet access	-0.047	0.047	0.014	0.021	-0.012	0.018
Fruit production area	0.007	0.006	-0.013*	0.007	0.000	0.001
Off-farm income	-0.087*	0.036	-0.019	0.025	0.026	0.017
Cooperative Membership	0.058	0.041	-0.054*	0.033	-0.016	0.019
Market distance	0.022*	0.009	0.000	0.004	-0.008	0.005
Access to training	-0.036	0.035	-0.006	0.02	0.023	0.02

Note: *** significant at 1% level; ** significant at 5% level; * significant at 10% level.