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Consumer's choice of retail outlets for African indigenous vegetables: Empirical evidence among rural and urban households in Kenya

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Abstract: This study evaluated socio-economic, institutional and product characteristics that influence the choice for African indigenous vegetable (AIV) retail outlets among rural and urban households in Kenya. Multistage sampling technique was used to select a sample of 450 respondents from four counties in Kenya. Data was collected using a pre-tested semi-structured questionnaire and a multinomial Probit model was used in the analysis. Findings revealed that local open air markets and green groceries were the most preferred retail outlets in rural and urban households, respectively. Additionally, gender, age and education level of the key decision-maker, household size, varietal diversity, vegetable bunch size, market distance and perceptions regarding AIV retail prices significantly influenced the choice for AIV retail outlets. Interventions that would standardize the quantity of vegetables sold per bunch in both supermarkets and green groceries and a further development of more green grocery retail outlets can increase their preference in urban households. Moreover, strategies that would expand farm gate varietal diversity and reinforce hygiene standards in local open air outlets can enhance their preference in rural households.

ABOUT THE AUTHOR

Eric O. Gido is currently pursuing a PhD in agricultural economics at Humboldt University of Berlin, Germany. His research is based on "Economic analysis of consumer demand for fresh leafy African indigenous vegetables (AIVs) in Kenya." The role of retail outlets on AIV consumption pattern in rural and urban areas in Kenya is one of the sub-themes in this research, which focuses on consumers' choice behavior regarding their preference for different AIV retail outlets. The general aim is to catalogue interventions that can improve the consumption level of AIVs. He has several publications covering areas in agricultural marketing, agricultural production economics, agribusiness management and development economics. He is an assistant lecturer in the Department of Agricultural Economics and Agribusiness Management at Egerton University, Kenya. His teaching experience has covered areas in agricultural production economics, agricultural marketing, farm management and accounting, financial management and managerial economics among others.

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PUBLIC INTEREST STATEMENT

Despite the growth in African indigenous vegetable (AIV) demand, their consumption levels are still low in African diets. This study evaluated socio-economic, institutional and product characteristics that influence consumers' choice for AIV retail outlets among rural and urban households in Kenya. The generated information is important in understanding AIV consumption patterns in order to enhance their consumption level, hence improving household access to micro-nutrients. Findings revealed that local open air outlets and green groceries were the most preferred retail outlets in rural and urban areas, respectively. Preference for supermarkets and green groceries in urban areas can be enhanced through interventions that would focus on price regulations and standardization of the quantity sold per vegetable bunch in both outlets. Improving hygiene standards in local open air outlets and supporting farmers to expand the diversity of AIV varieties can enhance preference for farm gate outlets in rural areas.

1. Introduction

There has been a growing demand for African indigenous vegetables (AIVs) due to their medicinal and nutritional benefits, especially among urban consumers (Irungu, Mburu, Maundu, Grum, & Hoeschle-Zeledon, 2008; Ngugi, Gitau, & Nyoro, 2007). The high demand for AIVs in urban areas has also been expedited by consumption-driven forces such as rapid population growth rate, rural-urban migration, increasing incomes, changes in dietary habits, reliance on markets as the main source of food and availability of AIVs in high-valued retail outlets such as supermarkets and green groceries (International Fund for Agricultural Developmnet, 2011; Irungu et al., 2008; Ngugi et al., 2007). To enhance AIV supply in Kenya, non-governmental organizations and development agencies have intervened to support small-scale farmers in commercializing their vegetable production systems. As a result, the ease of accessing farm inputs and marketing of AIVs in high-valued retail outlets has been substantially attained, through collective action (Farm Africa, 2006; Ngugi et al., 2007).

Despite the aforementioned efforts, marketing inefficiencies considerably constrain AIV supply in Kenya (Abukutsa, 2011; Ngugi et al., 2007). This is attributed to insufficient access to information regarding key market dynamics such as price and quality variations (Ayanwale, Oyedele, Adebooye, & Adeyemo, 2011; Croft, Marshall, & Weller, 2014). Moreover, perishability and seasonality in AIV production constrain their ease of storage and distribution (Abukutsa, 2011; Ayanwale et al., 2011; Smith & Eyzaguirre, 2007). Prior understanding of market dynamics could adequately enhance AIV production, marketing and dissemination of such information could attract more participants along the vegetable value chain. This could be achieved through consolidating collective efforts endeavored towards satisfying AIV supply deficit, thereby enhancing their availability and accessibility by all consumer segments (Ayanwale et al., 2011).

According to Schippers (2000), over 70% of the total vegetables marketed in rural areas were AIVs. Findings by Abukutsa (2002) indicated that AIVs accounted for about 10% of the total vegetables marketed in urban areas. Later, a similar study in urban markets by Ngugi et al. (2007) reported an increased proportion of AIVs to about 30% of the total vegetables marketed in Nairobi, the capital city of Kenya. This trend indicates an increasing market share for AIVs, thus improving efficiency in their production, distribution and consumption could greatly depend upon well-organized marketing systems (Kohls & Uhl, 1985). In addition, there is need to create a strong linkage between AIV production and their market potentials by integrating appropriate approaches along vegetable value chain. This could raise rural incomes and ultimately reduce poverty levels among rural households (Ewbank, Nyang, Webo, & Roothaert, 2007; Ngugi et al., 2007).

Even though a larger proportion of AIVs is produced in rural areas (Ngugi et al., 2007), both formal and informal markets are important retail outlets for their distribution among rural and urban consumers (Muhanji, Roothaert, Webo, & Stanley, 2011). The informal AIV markets outlets are basically undesignated points such as roadside outlets and door-to-door distributions by hawkers. These markets are characterized by lack of market information and formal market institutions, however, there exist some formal partnership between sellers and consumers (Muhanji et al., 2011; Van der Lans, Snoek, de Boer, & Elings, 2012). On the other hand, supermarkets, green groceries and local open air outlets are the major formal retail markets where supply and prices are fairly consistent, vegetables are well graded, packaged and a wider AIV varietal diversity exist (Muhanji et al., 2011). These markets outlets are relatively large, well organized with formalized transaction systems. Moreover, institutional buyers such as hospitals and hotels are other types of formal retail outlets with strict quality standards on the type of vegetables to be supplied (Ngugi et al., 2007; Van der Lans et al., 2012). Due to variations in product handling during marketing, higher quality vegetables are perceived to be

sold in constructed market outlets such as supermarkets compared to open air outlets (Rao & Qaim, 2011; Van der Lans et al., 2012). Likewise, convenience and "speed shopping" arrangements that prevails in supermarket outlets attracts consumers who have less time for making food purchases (Van der Lans et al., 2012). However, queuing time at the checkout counter, road-traffic conditions and car parking challenges are major impediments for supermarkets preferences among urban consumers (Florkowski, You, & Huang, 1999).

The dietary importance of AIVs is so far undoubted due to their significant contribution to food, nutritional and medicinal security (Kamga, Kouame, Atangana, Chagomoka, & Ndango, 2013; Singh, Singh, Singh, Chand, & Dam, 2013). Lifestyle diseases and disorders resulting from nutritional deficiency can easily be controlled through adequate consumption of AIVs, which contain higher levels of micro-nutrients compared to exotic vegetables (Birol, Meenakshi, Oparinde, Perez, & Tomlins, 2015; Habwe, Walingo, Abukutsa, & Oluoch, 2009; Singh et al., 2013). To ensure households derive such benefits, it would be important to enhance their accessibility to AIVs through increasing their availability in the most preferred retail outlets. Since consumers' purchasing patterns for food commodities are changing, retail outlets have an important role of influencing households' diets by enhancing convenience in food accessibility.

Previous studies (Alemu, Abrha, & Teklu, 2011; Berhanu, Derek, Kindie, & Belay, 2013; Jari & Fraser, 2009; Mutai, Agunda, Muluvi, Kibet, & Maina, 2013; Sharma, Kumar, & Singh, 2009) on agricultural marketing have widely embraced supply-oriented approach in evaluating producers' preferences for market retail outlets. This approach mainly focuses on supply side of the market without expressively considering that consumers also make choice decisions regarding retail outlets for food purchases. Hence, the findings generated are inadequate in explaining consumers' preferences for the same retail outlets, given that both the consumer and the producer or supplier have diverse and conflicting interests in the same markets.

It is on the foregoing that the objective of the study is to determine socio-economic, institutional and product characteristics that influence the choice for AIV retail outlets in Kenya. The novelty of this study is that a comparison is made between rural and urban households using consumer demand-oriented approach in the analysis. Few studies (Meng, Florkowski, Sarpong, Chinnan, & Resurreccion, 2014; Okello, Lagerkvist, Hess, Ngigi, & Karanja, 2012) on consumer purchasing patterns on food commodities have also embraced a demand-oriented approach. However, such an evaluation has not been extended to AIVs in assessing socio-economic, institutional and product characteristics that influence consumers' preferences for AIV retail outlets, which has remained unaccounted for in Kenya. Findings from this study could inform policy makers, agricultural marketers and food handlers in segmenting market outlets according to consumer preferences, leading to increased AIV consumption for improved household nutritional status. Besides satisfying consumer demand for AIVs, findings from the study could also enhance retailers in making enterprise expansion decisions, improve their products and consumer targeting as well as service delivery in order to improve their business performance. The study hypothesized that socio-economic, institutional and product characteristics do not influence the choice for AIV retail outlets differently in rural and urban households.

The rest of the research article is organized into various sections. Section two presents the material and methods, which includes a description of the study area and sampling design as well as econometric modelling of multinomial Probit regression on consumers' preferences for AIV retail outlets. Section three outlines results and discussion on descriptive statistics and econometric estimations. Finally, section four presents conclusions and policy recommendations based on empirical findings.

2. Materials and methods

2.1. Study area and sampling design

AIV consumers were selected using a stratified multi-stage sampling approach. In the first stage, a purposive sample of four counties in Kenya was made; Nairobi, Nakuru, Kisii and Kakamega. Nairobi and Nakuru counties were purposively chosen to represent urban areas that have developed both traditional and high-valued market outlets. Kisii and Kakamega counties were purposively chosen to represent rural areas with developed traditional retail outlets. In the second stage, a purposive sampling technique was also used to select one sub-county from each county. The third stage involved stratification of market outlets based on information obtained from sub-county agricultural offices. In urban areas, markets were stratified into supermarkets, green groceries and local open air retail outlets while in rural areas, farm gate, green groceries and local open air retail outlets were identified. In the fourth stage, simple random sampling was used to select equal number of respondents from each retail outlet. However, sampling respondents from the stratified markets does not imply that the respective outlets were their most preferred AIV retail outlets. Determination of the sample size was based on the proportionate to size sampling formulae given by Groebner and Shannon (2005) as shown in Equation (1):

$$n = \frac{(Z^2 PQ)}{\varepsilon^2} \tag{1}$$

where n is the sample size and Z is confidence level ($\alpha = 0.05$), which gives a value of 1.96. P is the proportion of the population of interest (AIV consumers), which was set to 0.5 since statistically, a proportion of 0.5 results in a sufficient and reliable sample size, particularly when the population proportion is not known with certainty. Q is the weighting variable computed as $1-P$. ε is the level of precision, which was set at 5% significance level in order to eliminate the 95% bias in sampling. This formulae resulted into 385 respondents. However, to cater for possibilities of incomplete response, the figure was approximated to 450 respondents, which were distributed proportionate to population size at the county level, resulting to 168 and 282 respondents in rural and urban areas, respectively.

2.2. Data

Data was obtained through a consumer survey in the month of July, 2015, using a semi-structured questionnaire. Respondents were interviewed eliciting information on socio-economic and institutional characteristics such as age, gender, education level, occupation, household size, income and experience in AIV consumption. Data was also collected on product characteristics and market dynamics such as access to information, AIV varietal diversity and perceptions regarding vegetable prices, quantity and quality aspects. The dependent variables were retail outlets, which included (1) supermarkets, (2) green groceries and (3) local open air markets for urban households while (1) farm gate, (2) green groceries and (3) local open air outlets for rural households. Cowpea, amaranth, spider plant, African night shade, jute mallow and slender leaf were identified as the major AIVs consumed in Kenya.

2.3. Modelling consumers' preference for AIV retail outlets

The changing trends in AIV consumption habits indicates a diversified preference in consumers' choice for vegetable retail outlets. Consumers' preferences for certain retail outlet can be conceptualized as a utility maximization problem subject to households' institutional and socio-economic characteristics as well as the product attribute (Florkowski et al., 1999). Since alternative retail outlets presented unordered multiple discrete outcome (Jepsen, 2008), the analysis was more appropriate using a multinomial Probit (MNP) model. MNP assumes that consumers' choices results from their preferences (McFadden, 1980) and the chosen alternative provides the highest utility (Gary, Arvind, & Arnaud, 2007). Moreover, the utility generated from each alternative is not observable, but a researcher only observes the alternative chosen.

Multinomial Logit model was equally fit for analysis in this study. However, the model was rejected since it assumes the residuals to be identically and independently distributed from each other.

Moreover, it violates the independence of irrelevant alternative (IIA) assumption, leading to unrealistic predictions. As an alternative, MNP was preferred because the residuals are considered to be independent and normally distributed. In addition, MNP does not have the assumption of IIA, hence acknowledging the possibility that other alternative choices have an influence on the final outcome (Kropko, 2008; Maddala, 1983). Even though evaluating multiple integrals is a major restriction in MNP, this limitation did not constrain the analytical process in this study since the alternative outcomes in both rural and urban areas were limited to three retail outlets. Otherwise, the Monte Carlo simulation techniques would have been applied in the analysis (Maddala, 1983). From a feasible choice set j = 1, 2, 3 of alternative AIV retail outlets available to a sample of households I (i = 1, 2, 3, … n), the deterministic component of an indirect utility function of MNP model can be specified as in Equation (2):

$$u_{ij}^* = x_i' \beta_j + \varepsilon_{ij} \tag{2}$$

where u_{ij}^* is the unobserved utility derived by household i for selecting retail outlet j, x_i denotes a ($1 \times M$) vector of socioeconomic, institutional and product characteristics as explanatory variables identical to a single household and across all alternative retail outlets, β_j is a ($M \times 1$) vector of maximum likelihood estimates which varies across alternative retail outlets, while ε_{ij} is a normally distributed random error term with a mean of zero and is assumed to correlate with error terms associated with other alternative choices. MNP assumes that the error terms for choice of retail outlets follow a multivariate normal distribution and correlate across retail outlet choices. Moreover, the error terms have a covariate matrix Σ which is not restricted to be a diagonal matrix. Since an individual chooses a retail outlet that gives the highest utility, alternative j is selected if u_{ij}^* is highest for j according to Equation (3):

$$Y_i(U_i) = \begin{cases} j \ if \ \max(W_i) = W_{ij} > 0 \\ 0 \ if \ \max(W_i) < 0 \end{cases} \quad for \ i = 1, 2, \ldots, n, \quad and \ j = 1, 2, 3 \tag{3}$$

where Y_i equal to 0 correspond to the base category or a reference alternative in the model, which was the local open air retail outlet in both rural and urban areas. The sign nor magnitude of the parameter estimates β has no direct determination of the marginal effects in the model (Kurt, 2007). However, it gives the marginal change in the logarithms of odds alternatives j over the reference outlet. Marginal effects shows the changes in probabilities for selecting a particular retail outlet due to a unit change in one of the explanatory variables by holding all other regressors constant at their mean value (Powers & Xie, 1999). The marginal effect of each explanatory variable x on the probability of choosing outlet j depends on the coefficient estimated β_{jk} as well as the mean value for all other alternative retail outlets β_k (Greene, 2002). In order to estimate the probability that $P(u_i = 1)$, one or more draws are generated from the density function $u_i^* = |X_i, \beta$ after which partial derivatives are calculated from the draws that fall into the $u_i^* \geq 0$ interval as shown in Equation (4).

$$u_{ij}^* = x_i' \beta_j + \varepsilon_{ij} \tag{4}$$

where u_{ij}^* is the probability of household i selecting retail outlet j, x_i denotes a vector of socioeconomic institutional and product characteristics as explanatory variables, β_j is a vector of maximum likelihood estimates, while ε_{ij} is a normally distributed random error term. Socio-economic institutional and product characteristics used in analyzing the determinants of retail outlet choice were derived from previous studies (Alinda, Kavoi, & Abbott, 2013; Meng et al., 2014; Oghojafor, Ladipo, & Nwagwu, 2012; Oghojafor & Nwagwu, 2013; Okello et al., 2012; Selim, Burhan, & Ali, 2004; Slamet & Nakayasu, 2016; Terano, Yahya, Mohamed, & Saimin, 2015; Tessier et al., 2010).

3. Results and discussion

3.1. Descriptive results
Descriptive statistics of variables used in the analysis are presented in Table 1. To test for significant differences among variables between rural and urban households, a t-test and a Chi-ratio test were

used for continuous and categorical variables, respectively. Key decision makers in urban households were relatively younger (about 41 years) with more years of education (10) compared to rural households who had a mean age of 43 years with approximately 9 years of schooling. Rural households had a mean household size of about 6 members with approximately 23 years of AIV consumption while their urban counterparts were roughly 4 family members with AIV consumption experience of about 19 years. More income (about 45%) was allocated to food consumption in rural households than in urban households, which was approximately 35%. Retail outlets in rural areas were significantly located far away from the homestead with an average walking distance of about 35 min compared to 18 min in urban areas. About 80% of rural households perceived the quantity of AIVs sold per bunch was relatively big in size compared to approximately 54% of urban households. Contrary, roughly 75% of rural households perceived vegetable retail prices were less affordable compared to about 89% of urban households.

Table 2 presents results on household preferences for different retail outlets in rural and urban households. In rural households, local open air was the most preferred retail outlet, while green groceries were the least preferred outlets. Availability of numerous retailers in local open air outlets is perhaps one of the key reasons for its high preference in rural households. Besides, local open air outlets are usually located in central market places, where other food and non-food items can be accessed as well. In urban households, green groceries were the most preferred retail outlets, followed by supermarkets. High preferences for green groceries and supermarket outlets indicates that, quality is an important aspect in vegetable consumption among urban households.

3.2. Econometric results

The estimated marginal effects from the MNP model analysis, standard errors and the *p*-level of significance are presented in Tables 3 and 4 for rural and urban households, respectively. The χ^2 results $\left[\chi^2(26) = 104.27, \quad p \prec 0.00001\right]$ and $\left[\chi^2(26) = 158.15, \quad p \prec 0.00001\right]$ in rural and urban households, respectively were statistically significant. This implied that the explanatory power of MNP model had a strong effect. The Pseudo R^2 was 0.3066 and 0.5328 in rural and urban households respectively, an indication that independent variables of the model adequately explained the variability in choice among alternative AIV retail outlets. The marginal effects were significant for some independent variables and were interpreted in terms of how a unit change in the explanatory variable influence the probability of a household selecting a particular retail outlet. Gender of the household head was significant with conflicting choice effects in rural and urban households. Rural female decision makers were 17.14% less likely to select local open air outlet, while their urban counterparts were 23.29% more likely to select green groceries as the most preferred vegetable retail outlets. Local open air retail outlets have a higher likelihood of selling dusty or muddy vegetables, particularly during adverse weather conditions, due to lack of sheltered market structures. Women preferred green grocery outlets in urban areas possibly because they are easily accessible and fairly distributed in urban residential areas compared to other retail outlets. Moreover, the housed nature of green groceries enhances handling of more clean vegetables and these outlets are easily and more accessible during sunny and rainy seasons. A similar study by Akpinar (2012) on fresh fruits and vegetable purchases revealed that more male than female respondents preferred supermarkets and green groceries to farm gate retail outlets. Contrary, more female than male respondents preferred farm gates to supermarkets and green grocery retail outlets.

In rural households, an increase in household size by one family member was significant and positively influenced the probability of selecting farm gate outlets by 5.94%, however, it constrained green grocery choice by 2.95% likelihood. Similarly in urban areas, one additional family member to the household size increased the probability of selecting local open air outlets by 4.93% but reduced preferences for supermarket outlets by 2.71% likelihood. Households with high membership are more likely to purchase large vegetable quantities, hence they would prefer retail outlets with relatively low prices in order to minimize their food expenditure. Farm gate prices for most agricultural commodities are relatively lower compared to other retail outlets, probably due to minimal transportation and handling costs. Therefore, rural households with many family members would prefer

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Table 1. Definition of variables and descriptive statistics				
Variable	**Definition of variables and their measurements**	**Rural households**	**Urban households**	**Significance**
Continuous variables		Mean		*t*-value
Age	Age of the decision maker *a* in years	43.22	40.62	2.03**
Educ	Years of schooling of the decision-maker	9.45	10.37	−1.88*
H_size	Number of family members in the household	5.56	4.38	5.65***
Yr_cons	Years of AIV consumption in the household	23.45	18.78	3.62***
V_divesity	Number of AIV varieties accessible at the retail outlets	5.67	6.00	−1.69*
Mrkt_dist	Distance to the nearest market (in hours)	35.39	18.00	7.41***
Categorical variables		Percentage		χ^2-value
Gender	% of male decision *a* makers	34.3	30.1	0.72
Income	% of income allocated to food items (in KES)	45.4	34.7	2.29**
Occup	% of household with AIV cook having formal employment	19.3	21.8	0.43
Bunch_qty	% of respondents who perceive vegetable bunch as fairly big in size	80.4	53.9	31.90***
Price_per	% of respondents who perceive AIV prices to be affordable	74.6	85.2	5.37***
Mrkt_Info	% of respondents with access to market information	89.3	88.7	0.03
V_quality	% of respondents who perceive vegetable quality to be fairly good	95.8	97.5	0.99

Notes: *t*-test and χ^2-test were used for continuous and discrete variables, respectively.

[a]Decision-maker is a member of the household responsible for making key decisions on matters concerning food consumption.

*indicates significance level at 10% respectively.

**indicates significance level at 5% respectively.

***indicates significance level at 1% respectively.

Table 2. Households' preferences for different retail outlets in percentages				
Type of household	**Retail outlets**			
	Farm gate	**Local open air**	**Green grocery**	**Supermarket**
Rural	34.6	38.3	27.2	–
Urban	–	30.6	36.8	32.6

Table 3. MNP results on determinants influencing retail outlet choice in rural households

Variable	Farm gate		Green grocery		Local open air	
	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
Gender	0.0403	0.0923	0.1311	0.0962	−0.1714*	0.0884
H_size	0.0594***	0.0212	−0.0295*	0.0170	−0.0299	0.0190
Age	0.0083*	0.0042	0.0026	0.0039	−0.0109**	0.0038
Education	0.0199*	0.0100	0.0185*	0.0106	−0.0384***	0.0100
Occupation	−0.1855	0.0928	0.1591	0.1179	0.0264	0.1194
Income	−0.0856*	0.0407	0.0567	0.0452	0.0289	0.0405
Experience	−0.0077	0.0033	0.0064	0.0036	0.0013	0.0036
V_divesity	0.0659***	0.0237	−0.0516	0.0264	−0.0143	0.0226
Bunch_qty	−0.0314	0.1288	−0.3941***	0.1322	0.4255***	0.0612
Mrkt_dist	−0.0662*	0.0380	−0.0504	0.0432	0.1166***	0.0443
Price_per	−0.1724	0.0875	0.2715	0.1077	−0.0991	0.0959
Mrkt_info	−0.1949	0.1526	0.1990	0.1046	−0.0041	0.1282
V_quality	0.0873	0.1884	−0.1520	0.2297	0.0647	0.1511
Wald χ^2 (26) = 104.27						
Prob. > χ^2 = 0.0000						
Pseudo R^2 = 0.3066						
Log pseudo likelihood = −140.31295						

Note: Std. Err. indicates standard errors.

*Level of significance at 10% respectively.

**Level of significance at 5% respectively.

***Level of significance at 1% respectively.

farm gate outlets as opposed to green groceries. On the other hand, vegetable prices in supermarkets are slightly less affordable, especially during the peak seasons, possibly due to contractual production and supply arrangements that have fixed price component. Thus, urban households with large family membership would avoid supermarket outlets as this choice tend to come with a higher expenditure on vegetables. Consequently, prices in local open air outlets becomes more affordable among urban households. This results are consistent with those of Meng et al. (2014) and Terano et al. (2015) with regards to local open air and supermarket retail outlet choice, respectively.

An increase in age of the key decision-maker by one year increased the chances of selecting farm gate outlets by 0.83% and reduced the likelihood of choosing local open air outlet by 1.09% in rural. Similarly in urban households, this change increased the probability of selecting green groceries by 1.83% and reduced the likelihood of selecting local open air outlets by 2.23%. Elderly people are likely to be more experienced in AIV purchases and consumption, hence they are more informed about reliable retail outlets that offer better quality vegetables. Their less preference for local open air outlets in both rural and urban households could be attributed to perceived low standards of hygiene observed in such unconstructed market outlets (Van der Lans et al., 2012). According to studies by Espinoza, Liberali, and D'Angelo (2004), Jabbar and Admassu (2009) and Chamhuri and Batt (2013), consumers choice of retail outlets can be influenced by the environment around the retail outlet, especially with regards to the level of cleanliness and quality of food being sold. Rural households' preference for farm gate outlets would be attributed to availability of quality vegetables in terms of freshness, where in most cases, vegetables are harvested when consumers place orders to producers (Slamet & Nakayasu, 2016). Likewise, the need for quality products in addition customer loyalty (Suryadarma, Poesoro, Akhmadi, Budiyati, & Rosfadhila, 2010), perhaps due to numerous years of transactions, would probably be a reason for elderly households' preference for green

Table 4. MNP results on determinants influencing retail outlet choice in urban households

Variable	Supermarket		Green grocery		Local open air	
	dy/dx	Std. Err.	dy/dx	Std. Err.	dy/dx	Std. Err.
Gender	−0.0999	0.0682	0.2329***	0.0823	−0.1330	0.0841
H_size	−0.0271*	0.0144	−0.0222	0.0241	0.0493**	0.0216
Age	0.0040	0.0025	0.0183***	0.0048	−0.0223***	0.0044
Education	0.0072	0.0053	0.0087	0.0102	−0.0159	0.0101
Occupation	0.0575	0.0597	−0.0204	0.1090	−0.0371	0.1049
Income	−0.0251	0.0321	0.0605	0.0573	−0.0354	0.0579
Experience	−0.0065	0.0041	−0.0155	0.0051	0.0220	0.0044
V_divesity	−0.0207	0.0158	0.0013	0.0213	0.0194	0.0216
Bunch_qty	−0.6047***	0.0673	0.2243***	0.0749	0.3804***	0.0597
Mrkt_dist	−0.2017**	0.0961	0.0225	0.0821	0.1792	0.0629
Price_per	0.3560**	0.1647	−0.3817***	0.1017	0.0257	0.1388
Mrkt_info	−0.2378	0.2186	0.0585	0.1740	0.1793	0.1065
V_quality	0.0647	0.0451	0.1644	0.1888	−0.2291	0.1878
Wald χ^2 (26) = 158.15						
Prob. > χ^2 = 0.0000						
Pseudo R^2 = 0.5328						
Log pseudo likelihood = −145.97142						

Note: Std. Err. indicates standard errors.

*Level of significance at 10% respectively.

**Level of significance at 5% respectively.

***Level of significance at 1% respectively.

grocery outlets in urban areas. A similar study by Terano et al. (2015) indicated that, respondents who were less than 35 years old were more likely to purchase fresh food products from modern retail outlets such as supermarkets and hypermarkets.

The effect of education of the household key decision-maker on retail outlet choice was twofold in rural households. First, an increase in education level by one year enhanced the likelihood of selecting farm gate outlets and green groceries by 1.99 and 1.85%, respectively. Secondly, higher level of education by one year reduced the likelihood of selecting local open air retail outlets by 3.84%. Higher level of education is important in enhancing people's ability to critically evaluate alternatives available to them in order to rationally choose the most preferred option. The highlighted variations in preferences among local open air outlets, green groceries and farm gate outlets by more educated rural households is probably based on a comparative explorations regarding the nature of retail outlets as well as the characteristics of commodities transacted in both markets. According to Sanlier and Seren Karakus (2010), variety and good quality of food are key issues that concern more educated households. Compared to local open air retail outlets, households who purchase AIVs at the farm gate are likely to access higher levels of nutrients due to the fresh nature of vegetables in these outlets. Contrary to this findings, other studies (Akpinar, 2012; Slamet & Nakayasu, 2016; Terano et al., 2015) revealed that more educated respondents were more likely to purchase fresh food products, including fresh fruits and vegetables, from modern market outlets.

A percent increase in the proportion of income allocated to food items had a significant negative effect on consumers' choice for farm gate outlets for AIV purchases with a probability of 8.56% among rural households. Although farm gate prices are usually perceived to be more affordable, such an incentive is not adequate enough to motivate high income consumers to make farm gate

vegetable purchases. Perhaps such an increase in the proportion of income allocated to food enhances their purchasing power to afford other AIV complements like fish and meet, which are really sold at farm gate outlets. Therefore, this enhances their preference for other retail outlets, which are located in common market centers, where they would also purchase such food complements at the same time (Farhangmehr, Marques, & Silva, 2000; Meng et al., 2014). In addition, high income households are more likely to be busy at their working places and therefore left with little time to make arrangements for farm gate purchases in rural areas. Possibly this can be attributed to inadequate and untimely access to information regarding possible farm gate outlets besides the type of varieties available at these outlets. Similar findings were obtained from a study by Akpinar (2012) on consumers' preferences for fresh fruit and vegetables supply chains, which revealed that the tendency for preferring supermarkets and hypermarkets increased as the level of household income increases. Moreover, study by Slamet and Nakayasu (2016) indicated that lower income households were more likely to purchase vegetables at kiosks and peddles.

AIV varietal diversity at the retail outlets was important in influencing the choice for farm gate outlets in rural households. Results indicate that an increase in the number of AIV varieties at the retail outlet by one unit enhanced the probability of households selecting farm gate outlets by 6.59%. Farmers produce many varieties but only supply a few of them to retailers in other market outlets. This is possibly because such retailers specialize in transacting varieties that are more common and highly demanded such as cowpea and African night shade. This implies that more AIV varieties are likely to be sold at farm gates compared to other retail outlets. Therefore, consumers who are more informed about the importance of a diversified vegetable diet are likely to show higher preferences for farm gate outlets due to increased AIV varietal diversity for their choice. Contrary to this findings, studies by Mui, Badarulzaman, and Ahmad (2003) and Chamhuri and Batt (2013), indicated that a wide variety of food and non-food items are usually available in modern retail outlets and this was the main criteria for shopping in such outlets.

Households' who perceived the quantity of vegetables sold per bunch was relatively small had a likelihood of not selecting green groceries by 39.41% and supermarket by 60.47% in rural and urban households, respectively. Contrary, households' who perceived the quantity of vegetables sold per bunch was relatively big had a 42.55% probability of preferring local open air outlets in rural areas. Similarly, urban households had a 22.43 and 38.04% likelihood of selecting green groceries and local open air outlets, respectively. Generally, consumers are more likely to purchase food products from retail outlets where large quantities per unit are usually available for sale (Terano et al., 2015). In urban areas, green groceries and local open air outlets are numerous in number such that no single retailer can influence a unity quantity and price in the market. Besides, retailers in these outlets are close to each other with possibilities of consumers rejecting retailers whose vegetable bunches are smaller in quantity. Contrary, the sizes of vegetable bunches sold in supermarkets are constant across the year perhaps due to consistent and guaranteed supply resulting from contract farming arrangements made with producers from different agro-ecological zones. As a consequence, supermarket bunches may seem smaller in size compared to those sold in other retail outlets, especially during peak seasons, when there is surplus vegetable production. On the other hand, green groceries are fewer and sparsely distributed in rural areas, with possibilities of retailers sourcing their products from local open air outlets at the ordinary consumer's retail price. For green grocery retailers to make profit and remain in business, then either the price per bunch is increased or the size of the bunch is reduced in order to increase the number of units to be sold. This makes them less preferred outlets, compared to local open air outlets, especially among households with larger family membership.

The probability of selecting farm gate and local open air outlets in rural households reduced by 6.62 and 11.66%, respectively as the time it takes to walk to the nearest market increased by one hour. Likewise, an increase in the time it takes to walk to the nearest market by one hour reduced the likelihood of selecting supermarket outlets by 20.17% in urban households. Even though larger proportions of AIVs are grown in rural areas, AIV producers are fewer and perhaps unevenly

distributed. This is probably due to farm and farmer characteristics such as availability of water and farmers' objectives and preferences for particular farm enterprises. This implies that, some rural households have a locational disadvantage in accessing farm gate outlets compared to other existing alternative retail outlets. Local open air outlets are usually located in certain designated centers with some located far away from some households. Given that daily vegetable consumption is recommended, such outlets becomes less accessible for frequent vegetable purchases. In urban areas, most supermarkets are located in major towns far away from residential areas, making them less accessible and therefore, less preferred vegetable retail outlets for urban households. A similar, study by Maruyama and Wu (2014) revealed that consumers prefer shopping from traditional retail outlets, which are closely located near their residential areas as opposed to modern retail outlets, which require more travelling time.

Perception regarding the retail price per AIV batch was significant and had conflicting preference for retail outlets in urban households. Urban households who perceived the unit price offered on AIVs was more affordable had a 35.60% likelihood of choosing supermarket outlets. However, the probability of not selecting green grocery outlets was 38.17% among urban households who perceived the unit price offered on vegetable was less affordable. Consumers' choice for retail outlets are linked to the price of the product with regard to price affordability and fairness (Terano et al., 2015). Modern retail outlets such as supermarkets and green groceries have fixed prices, which denies consumers an opportunity for price bargaining as opposed to traditional market formats (Chamhuri & Batt, 2013; Maruyama & Trung, 2007; Terano et al., 2015). Generally, supermarkets have stable retail prices across vegetable seasons possibly due to long term engagement plans they create with producers, who are their major suppliers. This makes them more reliable retail outlets especially for urban households who have long term and fixed expenditure plans on food items. Such production and supply contracts rarely exist between vegetable producers and green grocery retailers making their retail prices to fluctuate between peak and off-peak vegetable seasons. Despite this debate on price perception, Maruyama and Trung (2007) indicated that safer and better quality products are superior attributes that motivate choice for supermarket outlets.

4. Conclusion and recommendations

The study evaluated the socio-economic, institutional and product characteristics that influence the choice for AIV retail outlets in rural and urban households in Kenya. The study hypothesized that socio-economic, institutional and product characteristics does not influence the choice for AIV retail outlets differently in rural and urban households. However, the study hypothesis was rejected, implying that socio-economic, institutional and product characteristics significantly influence the choice for AIV retail outlets differently in rural and urban households. Findings were that local open air was the most preferred retail outlet in rural households, followed by farm gate outlets while green groceries were the least preferred retail outlets. On the other hand, green groceries were the most preferred retail outlets in urban households, followed by supermarkets while local open air outlets were least preferred. Econometric results revealed that gender, age and education level of the household decision-maker significantly influenced the choice for AIV retail outlets. Other significant variables include; household size, varietal diversity, bunch size, market distance and perceptions regarding AIV retail prices. Even though other variables were significant, this study draws attention to vegetable retail prices, vegetable quality and quantity aspects as well as varietal diversity at the market outlets as important factors in determining AIV retail outlet choice in rural and urban households. Interventions in retail outlet choice should focus on market targeting and improve household nutritional levels through AIV consumption.

In rural areas, local open air outlets were less preferred by older and more educated male household decision makers. However, they were more preferred among distantly located households who perceived the quantity of vegetables sold per bunch in this outlet was fairly big. On the other hand, local open air outlets in urban areas were less preferred by aged household decision makers, but more preferred among families with large household sizes who perceived these outlets had relatively large vegetable bunches. Therefore, strategies that would focus on formulating, implementing and reinforcing hygiene standards in local open air retail outlets would adequately enhance their preference in both rural and

urban areas. This could be achieved through construction of market shades and drainage systems as well as ensuring marketers sell clean vegetables, which are well displayed, packaged and handled. Facilities such as plastic crates could be encouraged for carrying, transporting and handling AIVs as they relatively keep vegetables fresh for a longer period of time as compared to the commonly used plastic and gunny bags, which enhance vegetable fermentation due to accumulation of heat in the bags.

Among rural households, green groceries were preferred by more educated household decision makers. Contrary, smaller vegetable bunches were major impediments for their preference. Similarly, in urban households, older decision makers who preferred large vegetable bunches were more likely to choose green groceries as a retail outlet. However, green groceries were less preferred among households who perceived their unit price to be less affordable. In this regard, policy interventions that would standardize the size of vegetable bunches across vegetable seasons in all retail outlets and enhance development of more grocery retail outlets would improve preference for green groceries among rural and urban households.

In rural areas, farm gate retail outlets were preferred among older and more educated household decision makers with large family membership. Moreover, high varietal diversity at the farm gate was a key motivational factor for their preference. However, they were less preferred among households that were located far away from the farm gate outlet as well as those with higher proportions of income allocated for food consumption. Strategies that would expand AIV varietal diversity at the farm gate outlets would enhance their choice among rural households. Policies that would enhance investment in research and production of certified seeds for various AIV varieties and supplying them to farmers for use would enhance AIV varietal diversity. Moreover, educating farmers, through existing agricultural extension service providers would be key in enhancing AIV varietal diversity at the farm gate.

Finally, supermarkets were less preferred by distantly located households with large family membership and also those who perceived the size of vegetable bunches were relatively small. Despite this, their fair and stable vegetable retail prices was a motivation for supermarket preferences, especially when vegetables are scarce. Interventions that would standardize the unit quantity of a vegetable bunch across vegetable seasons would motivate consumers' preference for supermarkets in urban households. In addition, promotional strategies that would encourage more supermarkets to sell AIVs would increase vegetable accessibility thereby enhancing supermarket choice among urban households.

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