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Socioeconomic Factors Influencing The Consumption Of Lake Flies Within The Lake Victoria Region

Oganyo, Mark Omolo

Monica A. Ayieko

Elijah Museve

School of Agricultural and Food Sciences,
Jaramogi Oginga Odinga University of Science and Technology, Kenya

Abstract: ***The motivation of consuming edible insects, particularly lake flies, has the potential of improving the problem that results from the inability to sustainably meet the rising demand for animal-based protein as a result of increased population growth and urbanization. The aim of this study was to identify the selected socio-economic factors influencing consumption of lake flies and how they individually and collectively affect the consumption. A sample size of 385 respondents was derived using purposive and multistage sampling method. The target population is a representative of 8 ministry of livestock staff in each county and 385 households from the area. The study was conducted in Siaya, Homabay, and Kisumu counties along the Kenyan Lake Victoria shores. A survey research design using structured questionnaires and key informant interview guides were used. The qualitative data collected was analyzed using thematic analysis focusing on examining themes or patterns of meaning within data whereas quantitative data was analyzed using inferential and descriptive statistics with the aid of SPSS computer software. Socio-economic factors were found to significantly influence motivation to consume lake flies (r=0.708, M=2.76, P=0.00.Low income, large household and education are found to be the dominant socioeconomic factors influencing lake flies' consumption. The study recommends intensified public awareness creation and public education on the health and nutritional benefits of edible insects to mankind. The study further recommends more attention should also be given to improved processing and preservation techniques by entomologists and nutritionists. Policy makers in National and County governments should provide resources for the promotion of acceptable lake fly socioeconomic factors.***

I. INTRODUCTION

Developing countries are faced with increased population growth and urbanization resulting in high demand for food, especially animal-based protein (FAO, 2013). Kenya, being a developing nation, has a problem of how to sustainably meet the rising demand for animal-based protein in the face of climate change, environmental degradation as well as land and water scarcity (Lensvelt & Steenbekkers, 2014). The current protein from animal sources such as milk, meat, eggs and blood are insufficient, unsustainable and relatively expensive (GoK, 2013). Entomophagy, the collection and consumption of edible insects, has been a partial solution for developing economies like Kenya, with several advantages (Alemu et al., 2017a). Edible insects are nutritious, available and have a lesser ecological footprint (FAO, 2013). Lake flies are one of the edible insects commonly consumed in Western Kenya by the natives living around the peripherals of the lake (Ayieko, 2013) and the insects have contributed some rich culture and tradition in entomophagy before.

The human collection and consumption of insects date back to prehistory (Van Itterbeeck and Van Huis, 2012; Anankware et al., 2013) and according to Yen, A. L. (2015); Tudi et al. (2021); Costa-Neto et al. (2016), insects were consumed in China 3,200 years ago. Attitudes towards the eating of insects are determined by cultural and health issues (Van Huis et al., 2013). People eat insects out of choice, because of their palatability and established place in local food

cultures in many regional diets while others consider edible insects are diseases remedial (FAO, 2012). Presently, over 2,000 insect species are consumed in the whole world (Jongema, 2015). Different insect species are consumed at different stages of their life cycle (Van Huis et al. (2013). Numerous edible insect species have been reported in Africa, Asia, America and Australia, with South Africa, Southeast Asia and North America having the highest registered number of edible insect species, Anankware et al. (2013). In Africa, a lot of other insects are harvested in the wild to feed pigs and poultry on the farm (Kenis & Hein, 2014; Riggi et al., 2014).

The most common edible insects embraced in entomophagy includes beetles (Coleoptera) (31%), caterpillars (Lepidoptera) (18%), bees, wasps and ants (Hymenoptera) (14%), grasshoppers, locusts and crickets (Orthoptera) (13%), cicadas, leafhoppers, plant hoppers, scale insects and true bugs (Hemiptera) (10%), termites (Isoptera) (3%), dragonflies (Odonata) (3%), flies (Diptera) (2 %) and other orders (5%) (FAO, 2013); Van Huis et al., 2013). Kisaka, C. N. (2018) concurs with FAO, 2010 in acknowledging that more than 2.5 billion people in Africa and Asia eat insects as a common dietary habit and their collection and sale is an income-generating activity for many men, women and youth in rural areas.

Insects comprise 70-95% of the total animal species (Yen, A.L., 2015), over one million species have been described and there could be a total of more than six million (Stork et al., 2015). Insects reproduce quickly, are less water and land-dependent, emit fewer greenhouse gases (Van Huis et al., 2013) and can feed on bio wastes which are easily converted to high-quality protein used for animal feed (Yen, 2012; FAO, 2013). They provide proteins (amino acids such as methionine, lysine, and threonine), carbohydrate, fats, minerals (calcium, iron, zinc, phosphorous), some essential vitamins vitamin A, B complex, and C (Akhtar & Isman, 2018). Insects are an important food supplement for undernourished children and people living with HIV/AIDS (Kinyuru et al., 2015). They have a low risk of transmitting zoonotic diseases and their harvesting provides entrepreneurship opportunities (Rao, M. S., 2016). Insect gathering and rearing is an important livelihood diversification strategy in the whole world for developed, transitional and developing economies (FAO, 2013).

In Kenya, lake flies, winged termites, grasshoppers, locusts and crickets have been embraced as part of traditional diets among rural communities (Ayieko et al., 2016). These edible insects have received a major boost after the Food and Agricultural Organization (FAO) recommended them as a way of addressing food insecurity in developing nations (Kelemu et al., 2015). The most seasonally collected edible insect in the Lake Region is the Ephemeroptera and like other insects, it is a good source of protein with low fat content and many important minerals and vitamins (Pambo et al., 2016). Despite their generally small size and delicate nature, lake flies are naturally high in protein, minerals, B vitamins, and essential amino acids, and low in fat which makes them an important portion of the human diet in some cultures (Macadam &Stockan, 2017). Human consumption of lake flies has been documented in 10 countries. The Lake flies in Lake Victoria are particularly important for local inhabitants. Lake flies are collected from Swarms of insects along the shoreline, then are processed through sun drying and subsequently made into flour which is added as a protein ingredient in cakes and bread (Macadam & Stockan, 2017). According to Kisaka, C. N. (2018), whose conclusions correspond to those made by Ayieko et al., 2011, even the landless can harvest, consume and/ or sell the Lake flies to increase their household income and nutrition as collections from other people's land are not prohibited (Ayieko et al., 2011). Generally, consumption of Lake flies has the potential of supplementing animal-based protein, improving food security and contributing to the reduction of environmental pollution from livestock reared for meat.

As of November 2021, 7.9 million people in Kenya lacked sufficient food for consumption. That corresponded to 15.4 percent of the country's population (The Economic survey, 2021). Compared to the previous month, the number of inhabitants in food insecurity decreased by some eight percent. According to Household Food Insecurity Access Prevalence in 2018, 71.3% of households in Kisumu County were either moderately food insecure (26.3%) or severely food insecure (45%), implying a high prevalence of food insecurity in Kisumu. Poverty levels in Homa Bay county stands at 48% compared to the National poverty indicator at 45%. The food poverty index stands at 38.2, 39.8 and 48 percent in Siaya, Kisumu, and Homabay Counties respectively (The Economic survey, 2018).

Insect-based foods have already been adopted in several countries (Mansons et. al., 2018; Roos, 2018). According to the Food and Agriculture Organization (FAO, 2013), the consumption of insects should be encouraged for health, ecosystem and subsistence reasons (social and economic factors). There are a number of socio-economic factors which have been found to determine the dietary habits of consumers. Knowledge level, age, household size, and household income also influence consumer purchase decisions about edible insects. Knowledge level and age have a positive impact on consumption frequency, and food safety concerns and insect shape have a negative impact on consumption frequency. Finally, the estimation results suggest that educating consumers with edible insect knowledge increases their purchase likelihood (Liu et al., 2019).

In Denmark and Australia, factors that are effective in influencing consumer acceptance of entomophagy are information about entomophagy and providing the participants with the opportunity to try insect food, both seem to be equally important when trying to positively influence their attitude toward entomophagy (Eveline, Lensvelt and Steenbekkers,2014). Another study carried in China by Liu, Li, J., and Gómez, (2019) revealed that knowledge level and social demographic factors such as age, household size, household income and region (Northern or Southern China) are the main factors influencing purchase decisions. In Zimbabwe, Manditsera, et al., (2018) found that socio-demographics did not relate to the consumption of edible insects whereas in urban areas, insect consumption was negatively related to education, main livelihood source and monthly income.

In Nigeria, Meludu and Onoja (2018) investigated the determinants of edible insects' consumption level in Kogi

State, Nigeria. The study concluded that insect consumption is a common practice in Kogi State even though on a low scale and therefore recommends among other things, heavy public awareness creation and public education on the health and nutritional benefits of edible insects to mankind and establishment of insect farming training centres by the State Government. Food consumption pattern suddenly changes as a result of changes in income levels, Socio-cultural factors such as religious beliefs, traditional beliefs, food likings, gender, education levels and women's employment have had a noticeable influence on food consumption. Mass media advertisements play an important role in motivating and modifying the dietary habits of consumers (Owino, 2019).

The objectives of this study was to identify the selected socio-economic factors influencing consumption of lake flies and how they individually and collectively affect the consumption

II. MATERIALS AND METHODS

LOCATION OF THE STUDY

This study was conducted in three counties namely: Siaya, Homabay and Kisumu counties. Only respondents bordering the lake shores, 0-3kms were surveyed because they experience the emergence of the lake flies. The lake flies, according to its biological characteristics, do not fly more than three kilometers away from the lake shores upon emergence from the lake.

Siaya County is bordered by Busia County to the North, Kakamega County and Vihiga Counties to the North East and Kisumu County to the South East. It shares a water border with Homabay County which is located south of it. The total area of the county is approximately 2496.1 km^2 and has a population of 993,183(GoK, 2019) KNBS. The County lies between latitude 0^0, 26' and 0^0 18' north and longitude 33^0 58' east and 34^0 33' west. The County is subdivided into 6 sub-counties namely Alego Usonga, Ugenya, Ugunja, Gem, Bondo and Rarieda.

Homabay County lies between latitude $0^0$0.088' south and $0^0$5'15" south and between longitudes 34^0 East and 35^0 East. Homabay County has a population of 1,131,950 (GoK, 2019) KNBS and an area of 4267.1 km^2 inclusive of water surface which on its own covers an area of 1227 $km^{2,}$ and Lake Victoria is a major source of livelihood. The County is located in South Western Kenya along Lake Victoria where it borders Kisumu and Siaya counties to the North, Kisii and Nyamira Counties to the East, Migori County to the South and Lake Victoria and the Republic of Uganda to the West. The county is subdivided into 7 sub-counties namely Homabay town, Mbita, Ndhiwa, Rangwe, Karachuonyo, Kasipul and Kabondo.

Kisumu County lies between latitude $0^0$15' South and $0^0$52' South and between longitudes 34^0 East and 35^0 East. It has a population of 1,155,574 (GoK, 2019) KNBS and a land area of 2085.1 km^2.

Kisumu borders Siaya County to the West, Vihiga County to the North, and Nandi County to the North East, Kericho County to the East and Nyamira County and Homabay County to the South West. The county is subdivided into 7 sub-counties namely Kisumu East, Kisumu West, Kisumu Central, Mohoroni, Nyakach, Nyando and Seme.

A. TARGET POPULATION

The target populations were 24 ministry of livestock staff and 10,187 households, who are residents of Siaya, Kisumu and Homabay Counties respectively, residing in the six wards namely Central Sakwa, West Uyoma, East Seme, West Seme, Kamreri East (Mbita) and Masara (Suba) which were purposively selected due to their proximity to Lake Victoria and history of lake flies consumption. The sampling frame was derived from the six Sub locations, one Sub location selected purposively from each of the six wards, with a total household count of 10,187, (GoK, 2019).

SAMPLE SIZE SELECTION AND SAMPLE SIZE CALCULATION

The target population of this study was the residents of Siaya, Kisumu and Homabay Counties where a multistage sampling procedure was followed. In the first stage, the three Counties were purposively selected because consumption of lake flies was prevalent. In the second stage, two Sub Counties were selected purposively per County depending on their proximity to Lake Victoria. In the third stage, two County Assembly Wards were purposively selected per each selected sub-county. A purposive and simple random sampling technique was used to select respondents.

Three wards were purposively selected due to their proximity to Lake Victoria shores and lake fly consumption history. Two sub-location per ward was purposely selected due to their history of lake fly collection and utilisation to represent a larger section of the region. A simple random sampling using stratified sampling was used to select the respondents from the formulae as shown below to draw sample size.

The formula used for generating samples is by Israel, (2009). The sample size is calculated as follows:

$$n = \frac{N}{1+ N (e)^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.1)$$

Where;

- ✓ n = desired sample size
- ✓ N = Population size of the total households involved in the study
- ✓ e = Desired level of statistical precision. (±5 margin of error the precision level is 0.05)

Using this formula, the sample size is generated as below:

$$n= \frac{10187}{1+ 10187(0.05)^2} =385 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.2)$$

The sample size was 385 respondents

SAMPLING STRATEGY

Stratified sampling was used to select the 385 respondents from the sub-locations. A third of the respondents from each sub-location was purposively selected 1 kilometer, 2 kilometers and 3 kilometers respectively from the lake shores. Any one person found every one km was picked automatically

till a radius of 3 kms. This random sampling technique was important in allowing the researcher to have confidence in a sample that was more likely to be representative of the total target population than non-random sampling methods. This was followed by simple random sampling using systematic sampling.

A systematic sampling interval of respondents was derived from;

Sampling interval = Total sample frame
Sample size.

Sample interval = $\frac{10,187}{385}$ = 26

Purposive sampling was used to select 8 key informants from each County due to their knowledge and involvement in entomophagy.

County	Sub County	Ward	Sub location	Target population (N=10,187)	Sample size (n= 385)
Siaya	Bondo	Central Sakwa	Uyawi	2501	95
	Rarieda	West Uyoma	Kokwiri	1653	62
Kisumu	Seme	East Seme	Kit Mikayi	1781	67
	Seme	West Seme	West Reru	1128	43
Homabay	Mbita	Gembe West	Kamreri East	1339	51
	Suba	Suba West	Masara	1785	67
Total				**10, 187**	**385**

Table 3.1: Sample Size Distribution for Selected Sub Locations

DATA COLLECTION PROCEDURES

Primary data was collected from the respondents by use of a semi-structured questionnaire which was segmented to meet each of the objectives of the study. The questionnaire contains information on consumers' socioeconomic factors, ecological factors and current technologies used for the collection of lake flies. An interview guide was used to collect data from key informants who were sampled purposively from representative ministry of livestock, and key informants from the study area.

VALIDITY OF INSTRUMENTS

A pre-test of instrument was done to assess the ease of understanding of the questions by respondents and their appropriateness under the study context, to establish whether the designed TPB-measures were valid for the extended TPB-constructs, and to minimize the differences in observed and real responses as suggested by (Verbeke, 2015) for verification purposes, the validated instruments were used for fieldwork. This was to ensure clarity in interpretation and assist in improving the instrument before the actual data collection. A selected team of peers and experts in agriculture extension was requested to review the questionnaire and its items. The guidelines for experts review focused on the representativeness of the objectives and variables coverage as well as the ability of the items based on their flows and ability to elicit the intended data and responses. Appropriate adjustments were made on the content item construction and order of the items in the questionnaire based on the suggestions/recommendations for the initial review, before administering it for the pilot study.

DATA ANALYSIS

According to Sekaran (2009), there are three objectives in data analysis; getting a feel for the data, testing the goodness of fit, and answering the research question. Data analysis consists of running various statistical procedures and tests on the data (Cooper & Schindler, 2006). The SPSS software was used to analyze the data. Quantitative data was analyzed using descriptive statistics tabulated in percentages, and frequencies to describe the categories formed from the data. The data was tabulated to permit interpretation. Qualitative data collected (through the open-ended section of the questionnaire) was coded, and repeated themes (responses) or concepts were recorded until saturation is achieved (Fusch & Ness, 2015; Hancock et al., 2016). The study also performed descriptive analysis. Descriptive (frequencies and percentages) was used to portray the sets of categories formed from the data. Descriptive statistics enabled the researcher to meaningfully describe a distribution of measurements and summarize data (Leech et al., 2013; Lang & Altman, 2015).

VARIABLES IN THE STUDY

The socioeconomic variables determined were: formal education, household size, nutrition, level of income, and gender.

III. RESULTS

RESPONSE RATE

The study population was picked from the Ministry of Livestock staff. Out of 385 questionnaires administered, being the sample size of the study, a total of 270 questionnaires were filled and returned, this gave a response rate of 70.12%. According to Kothari (2008), a response rate of above 50 percent is adequate for a descriptive study.

ASSESSMENT OF RELIABILITY OF STUDY MEASURES

The analysis of reliability was done using Cronbach's Alpha which evaluates internal consistency by establishing whether certain items within a scale measure the same construct validity. Since the scores were above 0.7, this infers that the research instrumentation was reliable.

Determinant	No of items	Cronbanch's	Verdict
Socio-economics	8	. 824	Reliable

Table 4.1: Reliability Analysis

Cronbach's alpha results indicate that the data collection instrument had consistency because the value is above the threshold value of 0.7. This result confirms that the instrument was reliable.

DEMOGRAPHICAL PROFILES

This section presents the personal information of the respondents who participated in the research study.

These demographic variables should have been presented all by gender because gender influences consumption of edible insects.

Category	Sub category	Frequency	Percentage
Gender	Male	60	22.2
	Female	210	77.8
Age Distribution	18-35 years	72	26.7
	36-45 years	72	26.7
	44-55 years	90	33.3
	above 56 years	36	13.3
Education level	No formal	72	26.7
	Formal	198	73.3
Distance from the Lake	0-1 km	99	36.7
	1-2 km	97	35.9
	2-3 km	74	27.4

Table 4.2: General Information of Respondents

Table 4.2 shows that male respondents were more than female respondents. The study sought to determine the age distribution of the respondents. The finding shows that a majority of the respondents were above 36 years. The study sought to determine the level of education of households. The findings shows that majority of the respondents had formal education. Table 4.2 indicates that there were more females than males and it was a fairly educated population.

THE STUDY VARIABLES DESCRIPTIVE STATISTICS

This section presents descriptive analysis of the independent variables (socio-economic factors) and dependent variable (Consumption of Lake flies) of the study.

KAISER-MEYER-OLKIN (KMO) AND BARTLETT'S TEST

The table below presents two different tests: the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's test of Sphericity.

Variable	Number of items	KMO Measure of Sampling Adequacy	Bartlett's Test of Sphericity		
			Approx. Chi-Square	Degrees of freedom	p-value
Social Economics	8	0.850	1520.964	21	0.000

Source: Field Research,2022

Table 4.3: Kaiser-Meyer-Olkin (KMO) and Bartlett's Test Results

The results from the table above reveal that the items measuring each of the study variables were from a population with equal variance, given that their KMO Value were above the minimum threshold of 0.6 (Oluwatayo, 2012); hence it was concluded that the research tool was valid for further analysis.

CONSUMPTION OF LAKE FLIES

The study respondents were requested to show their level of agreement with the statements in relation to the consumption of lake flies. The constructs of consumption of lake flies have been analyzed using principal component factor analysis. The factor analysis shows variances in the differences in consumption of Lake flies of consumers. The eigenvalue represents the total amount of variance that can be explained by a given principal component. Component loadings represent the correlation of each item with the principal component were then computed and results are shown in Table 4.4.

FACTOR ANALYSIS FOR CONSUMPTION OF LAKE FLIES

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.183	53.054	53.054	3.183	53.054	53.054
2	1.275	21.254	74.308	1.275	21.254	74.308
3	.614	10.233	84.541			
4	.385	6.419	90.960			
5	.288	4.802	95.762			
6	.254	4.238	100.000			
Extraction Method: Principal Component Analysis.						

Table 4.4: Factor Analysis for Consumption of Lake flies

The eigenvalue is a measure of how much of the common variance of the observed variables a factor explains. Any factor with an eigenvalue ≥1 explains more variance than a single observed variable. Table 4.4 shows that the extracted factors given the Eigen values and that 74.3% of the total variation was explained by two components explain. While component 1 contributed the highest variation of 53.1%, the second component contributed 21.3% of the total variations.

COMPONENT MATRIX FOR CONSUMPTION OF LAKE FLIES

Component Matrix[a]				
	Raw Component		Rescaled Component	
	1	2	1	2
Consumption of lake flies has contributed to improved food security	.437	.374	.612	.524
Curious edible insects have continuous been attracted to consume lake flies	-.611	1.117	-.476	.869
Lake fly consumption is sustainable	.899	.224	.784	.195

Developments of novel products that use insects as ingredients but avoid presenting the form of the insects to enhance lake fly consumption.	1.152	.016	.885	.013
Consumption frequency of lake fly is on the rise	.307	.308	.469	.471
Consumption of lake fly is a stable source of alternative protein	1.144	.179	.902	.141
Extraction Method: Principal Component Analysis.				
a. 2 components extracted.				

Table 4.5: Component Matrix for Consumption of Lake flies

Component matrix in table 4.5 revealed two statements with eigen values greater than 1 were extracted such that the statement developments of novel products that use insects as ingredients but avoid presenting the form of the insects to enhance lake fly consumption and that consumption of lake fly is a stable source of alternative protein with eigen values 1.152 and 1.144 respectively.

FACTOR ANALYSIS FOR SOCIO-ECONOMICS FACTORS

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.330	76.138	76.138	5.330	76.138	76.138
2	.565	8.076	84.214			
3	.478	6.828	91.043			
4	.285	4.070	95.112			
5	.193	2.763	97.875			
6	.099	1.413	99.288			
7	.050	.712	100.000			
Extraction Method: Principal Component Analysis.						

Source: Reseach Data (2022)

Table 4.6: Total Variance Explained in Socio-Economic Factors

In the Table 4.6, a single component was extracted that accounted for 76.138% of the total variation. Based on the above, Social economic component was explained by one factor whose Eigen values are greater than 1, which is My household size has contributed to the consumption of lake fly. Component factors 2 to 7 had eigen values less than 1 and according to Kaiser Criterion, this factor was not retained and therefore only factor 1 was considered in determining the loadings on each of the constructs.

COMPONENT MATRIX FOR SOCIO-ECONOMICS FACTORS

FACTOR LOADING

The study extracted factors by using factor loadings. Factor loadings are weights and correlation between each variable and the factor. The recommended loading for an item according to Hair et al., (2014) is a factor loading of 0.50. Factor dimensionality is relevant when the factor loading is higher. A negative value indicates an inverse impact on the factor. The five loadings for factor 1 were positive to each of the variables in question while two of the loadings were negative. In simple terms low loading means the construct is unique to other constructs in explaining the main variable (for example consumption of lakeflies). Table 4.7 summarizes the outcome of factor loadings:

Component Matrix[a]	
	Component1
	Factor loadings
My household size has contributed to the consumption of lake fly.	.868
In order to consume lake fly, income level is a determinant	.839
Nutritional characteristics determines consumption of lake fly as a source of food	.871
Consumer attitude is a key determinant of type of food I eat.	.889
Age is a major determinant in the consumption of lake fly.	.820
Livestock extension officers have influenced me to consume lake fly as source of protein	-.952
There is sufficient sensitization on lake fly consumption as an alternative source of food.	-.862
Extraction Method: Principal Component Analysis.	
a. 1 components extracted.	

Table 4.7: Component Matrix for Socio-economics Factors

COLLINEARITY DIAGNOSTICS

Collinearity diagnostics test was carried out to ensure that the variables were not having multicollinearity. The test is important in ensuring absence of multicollinearity that ultimately guarantee that the regression estimate not spurious or nonsensical. The results of this analysis are summarized in table 4. 10.

a.							
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions			
				(Constant)	SOCIO	ECO	TECH
1	1	3.910	1.000	.00	.00	.00	.00
	2	.056	8.340	.03	.06	.24	.19
	3	.025	12.525	.07	.38	.59	.14
	4	.009	20.742	.90	.55	.17	.66
Dependent Variable: Consumption of lake flies							

Table 4.8: Collinearity Diagnostics[a]

Here for each regression coefficient its variance is distributed to the different eigen values (Hair, Black, Babin, &Anderson, 2013). According to Hair et al. (2013) for each row with a high Condition Index, you search for values above .90 in the Variance Proportions. If you find two or more

values above .90 in one line you can assume that there is a collinearity problem between those predictors. If only one predictor in a line has a value of .90, this is not a sign for multicollinearity. The higher the collinearity, the greater the discrepancy between bivariate and multivariate contributions of variables.

RESIDUAL STATISTICS

Statement	Factor Loading	Communalities	Decision
Socio-Economic Factors			
Nutritional characteristics determines consumption of lake fly as a source of food	.889	.717	Significant
My household size has contributed to the consumption of lake fly.	.876	.693	Significant
Consumer attitude is a key determinant of type of food I eat.	.902	.673	Significant
In order to consume lake fly, income level is a determinant	.810	.592	Significant
Age is a major determinant in the consumption of lake fly.	.492	.356	Significant
Livestock extension officers have influenced me to consume lake fly as source of protein.	.389	.173	Insignificant
There is sufficient sensitization on lake fly consumption as an alternative source of food.	.323	.007	Insignificant

Table 4.9: Factor Analysis for Social economics based on a Principal Components' Analysis with Varimax Rotation for 5 items

FACTOR LOADING AND COMMUNALITIES RESULTS INDICATE THAT FIVE SOCIO-ECONOMIC FACTORS ARE SUFFICIENT TO MEASURE THE CONSTRUCT

SIAYA COUNTY CORRELATION ANALYSES

This section of the study presents findings on regression, analysis of variance and co-efficient of determination.

		Consumption	Socioeconomic factors
Consumption	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	108	
Socioeconomic factors	Pearson Correlation	.675**	1
	Sig. (2-tailed)	.000	
	N	80	80

** *Correlation is significant at the 0.05 level (2-tailed)*

Table 4.10: Relationship between Independent Variables

The findings in table 4.17 indicate that there is a positive correlation between socio-economic factors and consumption of lake flies at a significant 0.05 level, the strength is average, at 67.5 %. 31.2%.

KISUMU COUNTY REGRESSION PREDICTION MODEL SUMMARY FOR DETERMINANTS OF CONSUMPTION OF LAKE FLIES

A simple linear regression test was run to determine the predictive power of Socio economics factors on the consumption of lake flies as food within the Lake Victoria region in Kisumu County results are shown in Table 4.16.

Model Coefficient	Unstandardized coefficients		Standardized Coefficien	T	Sig.	Collinearity	
	B	Std Error	Beta			Tolerance	VIF
(Constant)	-.808	.577		-1.402	.168		
Socio economics	.375	.173	.363	2.166	.036	.294	3.401
a. Dependent Variable: *Consumption of Lake flies as Food*							

Table 4.11: Kisumu County Regression Prediction Model Summary for determinants of consumption of lake flies

The findings in table 4.16 established that taking socio-economic factors into account , constant factor was -.808 due to variation. Also, a unit change in socio-economic factors while setting the coefficient of other independent variables zero would lead to a change in consumption of lake flies by a factor of .375

Using the bêta (β) coefficient, the established regression model was as follows:

$Y = -.808 + .375X_1$

Where;

Y= Consumption of lake flies -.808= Constant term, $.375X_1$= socio-economic factors.

KISUMU COUNTY CORRELATION ANALYSES

This section of the study presents findings on regression, analysis of variance and co-efficient of determination.

Correlations					
		Consumption	Socioeconomic factors	Ecological factors	Collection
Consumption	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	78			
Socioeconomic factors	Pearson Correlation	.733**	1		
	Sig. (2-tailed)	.000			
	N	54	54		

** *Correlation is significant at the 0.05 level (2-tailed).*

Table 4.12: Relationship between Independent Variables

The findings in Table 4.17 implies that there is a positive correlation between socio-economic factors and consumption

of lake flies at significant 0.05 level, the strength is average, at 73.3 %.

HOMABAY COUNTY REGRESSION PREDICTION MODEL SUMMARY FOR DETERMINANTS OF CONSUMPTION OF LAKE FLIES

Model Coefficient	Unstandardized coefficients		Standardized Coefficients		T	Sig.	Collinearity	
	B	Std Error	Beta				Tolerance	VIF
(Constant)	-.566	-.566			-.973	.335		
Socio economics	.297	.297	.303		1.892	.065	.293	3.413
a. Dependent Variable: *Consumption of Lake flies as Food*								

Table 4.13: Homabay County Regression Prediction Model Summary for determinants of consumption of lake flies

The findings in table 4.18 established that taking socio-economic factors into account and constant factor was -.566 due to variation. A unit change in socio-economic factors would lead to a change in consumption of lake flies by a factor of .297.

Using the bêta (β) coefficient, the established regression model was as follows:

$Y = -.566 + .297X_1$

Where;

Y= Consumption of lake flies -.566= Constant term, $297X_1$= socio-economic factors

HOMABAY COUNTY CORRELATION ANALYSES

This section of the study presents findings on regression, analysis of variance and coefficient of determination.

Correlations					
		Consumption	Socioeconomic factors	Ecological factors	Collection
Consumption	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	84			
Socioeconomic factors	Pearson Correlation	.699**	1		
	Sig. (2-tailed)	.000			
	N	59	59		

***. Correlation is significant at the 0.05 level (2-tailed).*

Table 4.14: Relationship between Independent Variable

The findings in Table 4.19 indicate that there is a positive correlation between socio-economic factors and consumption of lake flies at significant 0.05 level, the strength is average, at 69.9 %.

OVERALL RESULTS OF CORRELATION ANALYSES

This section of the study presents findings on regression, analysis of variance and co-efficient of determination.

Correlations					
		Consumption	Socioeconomic factors	Ecological factors	Collection
Consumption	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	270			
Socioeconomic factors	Pearson Correlation	.704**	1		
	Sig. (2-tailed)	.000			
	N	189	189		

***. Correlation is significant at the 0.05 level (2-tailed).*

Table 4.15: Relationship between Independent Variables

The findings in table 4.20 indicate that there is a positive correlation between socio-economic factors and consumption of lake flies at significant 0.05 level, the strength is average, at 70.4 %.

OVERALL RESULTS OF MODEL SUMMARY FOR DETERMINANTS OF CONSUMPTION OF LAKE FLIES

The probability value of $p<0.05$ indicates that the regression relationship was significant in predicting how socio-economic factors influence the consumption of lake flies.

Multiple regression analysis was the carried out to obtain regression coefficients. From table 4.21, it is revealed that, the tolerance values were <1 and the variance inflation factor (VIF) was <10 and hence there was no multi –collinearity. Due to absence of multi – collinearity, therefore the regression estimates were not spurious or nonsensical. This is as summarized in table 4.21

Coefficients [a]

Model Coefficient	Unstandardized coefficients		Standardized Coefficients		T	Sig.	Collinearity	
	B	Std Error	Beta				Tolerance	VIF
(Constant)	-.820	.190			-4.31	.118		
Socio economics	.485	.053	.437		9.215	.004	.561	1.782
a. Dependent Variable: *Consumption of Lake flies as Food*								

Table 4.16: Overall Results of Model Summary for determinants of consumption of lake flies

DISCUSSION OF REGRESSION RESULTS

The main objective of the study was to assess the determinants of lakefly consumption and its sustainability within the Lake Victoria region. The objectives were to: identify and analyze the selected thematic socioeconomic factors how they influencing the consumption of lake flies within the Lake Victoria region.

TEST OF RESEARCH HYPOTHESES

The first research hypothesis was stated as: H_{01} - Thematic socioeconomic factors do not significantly influence the consumption of Lake Flies within the Lake Victoria

region. The results revealed that social economic factors influence consumption of Lake Flies within the Lake Victoria region with a β value of 0.485 standard error of 0.053; t value of 9.215 and p value 0.040 < 0.05. Hence, the null hypothesis was rejected.The findings reveal that socio-economic factors is statistically significantly related to consumption of lake flies p-value ≤ 0.05.

The findings in table 4.21 established that taking socio-economic factors into account and constant factor -.820 due to variation. A unit change in socio-economic would lead to a change in consumption of lake flies by a factor of .485.

Using the bêta coefficient, the aggregate predictive regression equation was summarized as follows:

$Y = -.820 + .485X_1$

Where;

Y= Consumption of lake flies, .820 = Constant term of multivariate (equation) regression, $.485X_1$= socio-economic factors.

The findings reveal that socio-economic factors were statistically significantly positively related to Consumption of lake flies, p-value ≤ 0.05.. The theoretical foundation of the study. Subjective Norms (SN) are the perceived approval or disapproval that people who are important to the individual (otherwise known as "salient referents" such as one's family members, peers, etc.) hold about a behavior (Ajzen & Fishbein, 1980). In socio economic factors, the subjective norms were operationalized by such factors as formal education, household size, level of income, and gender, of which have been established as significant in influencing consumption of lake flies.

The major gap is that it is evident that the socio-economic factors determinants of lake flies' consumption as food and its sustainability is a concern to food security stakeholders and policymakers seeking to comprehend how to effectively ensure the sustainable alternative source of protein to Kenyans. Previous studies in this area seem to focus on food security only, failing to address salient issues on sustainability of lake flies consumption.

Ministerial Council Policy Guidelines on Novel Foods of Australia and New Zealand, (2016) came up with guidelines for novel food as follows; to ensure that priority is given to the protection and improvement of public health and safety in relation to food matters; to ensure that consumers have access to sufficient information to enable informed and healthy food choices, be consistent with and complement Australian and New Zealand national policies and legislation including those relating to nutrition and health promotion. Draw on the best elements of international regulatory systems (ie protocols, standards, guidelines, assessment processes) and be responsive to future trends and developments, provide a regulatory environment that is timely, cost effective, transparent and consistent with minimum effective regulation, and which encourages fair trade, industry growth, innovation and international trade.

On the African continent, Kenya (led by efforts from ICIPIE and JOOUST) has been developing as a local hub for research and development in this arena, it will be important to involve neighboring countries and partners in the efforts to strengthen the development. Insects have a long history as a part the diets of several ethnic groups in Kenya. Traditionally, the consumption of insects has mainly taken place in western provinces of the country and has included primarily grasshoppers, termites, lake flies and crickets. These species are harvested and prepared solely for human consumption. The utilization of insects as food is strongly influenced by cultural perceptions of what is acceptable to be eaten in modern times. However, learning and understanding how a traditional practice can contribute to food security and sustainable development in Kenya is of equal importance (International Conference on Legislation and Policy, 2016).

An attempt to come up with policy and regulations on novel food like insects in Kenya concluded that Traditional harvesting of insects from the wild needs to be assessed species by species for sustainability and safety. The conference indicated that future legislation will be needed to regulate the harvest for sustainability and consumer safety. This would include: regulates and permits sustainable harvesting, stipulates flexible maximum quantities for each species, specifies areas for harvesting including possible closed seasons for harvest depending on the ecology of the insect, and regulates the amount sold and number of anticipated harvesters (International Conference on Legislation and

FINDINGS FROM THE INTERVIEWS

CONSUMPTION OF LAKE FLIES

Key informants of the study were requested to explain ways they think that lake flies can significantly contribute to food security. The respondents indicated that creating awareness among people even those who think it is an outdated source of food could be a significant contribution. Also, they suggested improving the hygiene during harvesting as the traditional method is a bit unhygienic in so many ways. Lake flies should be collected maximally, processed and stored for the future even when it is not swarming. Lake flies' consumption is easily adapted because harvesting/catching is not complicated as compared to fish. There are no complications in its preparation. It can also be consumed across all ages i.e., babies and even the aged.

The key informants were also requested to give recommendations that can ensure the sustainability of consuming lake flies. In response, firstly the respondents recommended that awareness be created among people living along the shores. Secondly, better preservation methods should also be put in place. Thirdly, awareness should be created among people living along the shores. Fourthly, re-afforestation along the lake shore and practicing non-pollutant fishing and agricultural practices.

The key informants were also requested to explain factors that can contribute to the frequency of lake flies' consumption. The interviewees suggested those good collection methods, knowledge on preparation (value addition) and proper timing on when it swarms. Additionally, they stated that the method of processing, storage conditions and ways/methods of preparing for consumption influence the frequency of lake flies' consumption.

INFLUENCE OF SOCIO-ECONOMIC FACTORS ON CONSUMPTION OF LAKE FLIES

The objective of the study was to analyze the socioeconomic factors influencing the consumption of lake flies as food within the Lake Victoria region. This study sought to establish whether socio-economic factors such as age, level of income, occupational characteristics have influenced the consumption of lake flies as food within the Lake Victoria region. The respondents were requested to show their level of agreement with the statements in relation to the influence of socio-economic factors on the consumption of lake flies as food within the Lake Victoria region.

Firstly, in the open-ended questions, the respondents were requested to indicate in their own view what motivates them to consume lake flies as a source of food. In response, the majority of the responde.nts were of the opinion that they are influenced by their peers, parents as well as grandparents. This was closely followed by the respondents who are motivated by the taste and its cost compared to fish which is the dominant source of protein in the lake region. Another category of the respondents was motivated by the value addition practices like adding milk to lake flies when being prepared which makes it tastier. Moreover, some respondents are motivated by the nutritional value that has no side effects. However, some respondents have never eaten lake flies because they do not have enough knowledge on the benefits.

Secondly, the respondents were asked to explain ways in which education level influences motivation to consume lake flies. In response, the respondents indicate that education level motivation to consume lake flies because the educated can interrogate the nutritional benefits of the lake flies. In this regard, education helps in making an informed decision on whether to consume lake flies or not. In addition, education helps in influencing the person in knowing the benefits of eating lake flies.

Thirdly, the study sought to establish what can influence the sustainability of lake flies consumption as a source of protein. The respondents noted that lake flies normally settle on trees so environmental conservation should be encouraged. The planting of trees allows natural vegetation to thrive, offering shelter to the flies. Moreover, the lake flies should be harvested, processed and stored to use in the times it's not swarming. Respondents were also of the opinion that pollution of water bodies should be mitigated in order to protect the lake flies' habitat.

Information from the key informants of the study regarding socio-economic factors or circumstances that would influence the consumption of lake flies (e.g., income, education or household size) was sought. The key informants were therefore requested to list socio-economic factors that influence lake flies consumption. The respondents indicated that low income, large household and education as the dominant socio-economic factors that influence the consumption of lake flies. Other factors also included supplementing the diet, generating income to better trade; availability and cultural acceptance.

The key informants were also requested to explain how the socio-economic factors stated Influence Lake flies' consumption. In response, "Majority who consumes lake flies are low-income earners, has never gone to school beyond primary school. Large households of about 10 members utilize lake flies to help them with intake when available'. Many of those living along the lake shore are stable financially and do not consume lake flies and rely on alternatives like fish; educated people also do not consume it. Low-income earners having large households find it difficult to provide for the entire family hence supplement their daily food needs with consumption of lake flies.

The key informants were also requested to explain the role of the household head in the consumption of lake flies. The interviewees suggested that household heads spearhead decision-making on the collection or buying of lake flies. The household head can also purchase or borrow from a neighbor who has collected and prepared it. The household makes a decision to purchase the already processed flies and take them to the family for consumption.

IV. DISCUSSION

From the results, socioeconomic factors were found to have a positive but significant ($p < 0.5$) relationship with the consumption of lake flies (β value = 0.485, $p = 0.00 < 0.5$) at a 5% level of significance which implies that socio-economic factors are a significant predictor of consumption of lake flies as food within the Lake region. The response regression analysis R Square of 0.496 implies that socio-economic factors determine 49.6% variations in the consumption of lake flies as food within the Lake Victoria region. In the ANOVA, the probability value of $p<0.05$ indicates that the regression relationship was significant in predicting how socio-economic factors influence the consumption of lake flies as food.

The level at which socio-economic factors influence the consumption of lake flies as food within the Lake Victoria region with β value of .485., such that holding socio-economic factors to a constant zero and other factors constant, consumption of lake flies as food would be at .820. An increase in socio-economic factors by one unit would lead to an increase in consumption of lake flies as food by factor .485 showing socio-economic factors are statistically significant in influencing the consumption of lake flies. Further, socioeconomic factors had a positive influence on the consumption of lake flies ($t = 9.215$, $p <0.05$). In the principal component factor analysis, the following socio-economic factors of lake flies' consumption had a factor loading of > 0.5 ranging between 0.810 and 0.889: nutritional characteristics, household sizes, consumer attitudes and income levels. These findings indicate that the factors were significant in influencing consumption. This result suggests that the socioeconomic factors had a positive significant influence on the consumption of lake flies as food within the Lake Victoria region. This concurs with the finding of (Liu et al., 2019) study on the consumption of edible insects by Chinese consumers that there are a number of socio-economic factors which have been found to determine the dietary habits of consumers. Knowledge level, age, household size, and household income also influence consumer purchase decisions about edible insects. Knowledge level and age have a positive impact on consumption frequency, and food safety concerns

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and insect shape have a negative impact on consumption frequency.

In terms of the correlation coefficient analysis per county regarding socio-economic factors, as shown in table 4.22, the findings were as follows: Kisumu (r=0.830), Homabay (r=0.808), and Siaya (r=0.762). This implies that socio-economic factors influence the consumption of lake flies most in Kisumu County and least in Siaya County.

The respondents further observed that the most outstanding reason why a lot of people may not practice consumption of lake flies is due to the fact that insects are seen as poor people's food in society; for instance, the majority of the respondents believe that insects are meant for those who cannot afford meat. Key informants noted that the practice of lake flies' consumption has been on the decline in the area due to civilization and that it is no longer a common practice among the elites and those currently practicing it were being stigmatized. This finding corroborates the reports of Ebenebe et al. (2015) from South-Eastern Nigeria; that insect eating was greatly associated with poverty as the rich/elites dropped the habits for the poor and the so-called illiterates in the rural communities.

This study sought to establish whether socio-economic factors such as age, level of income, and occupational characteristics have influenced the consumption of lake flies as food within the Lake Victoria region. The variations in socio-economic factors have been analyzed using factor analysis.

Seven questions relating to socio-economic factors contributing to the consumption of lake flies were factor analyzed using principal component analysis with Varimax (orthogonal) rotation. The analysis yielded one factor explaining a total of 76.138% of the variance for the entire set of variables. Factor 1 was labeled household size has contributed to the consumption of lake fly. The communalities of the variables included are rather high overall with one variable (Age is a major determinant in the consumption of lake fly) having a large amount of variance (76%) in common with the other variables in the analysis. This may indicate that the variables chosen for this analysis are only strongly related to each other. The KMO and Bartlett's Test of Sphericity both indicate that the set of variables are adequately related for factor analysis. Substantively, this means that two clear patterns of response among respondents have been identified.

These results correspond with those of another study carried out in China by Liu, Li, J., and Gómez, (2019), which revealed that knowledge level and social demographic factors such as age, household size, household income and region (Northern or Southern China) are the main factors influencing purchase decisions. In Zimbabwe, Manditsera, et al., (2018) found that socio-demographics did not relate to the consumption of edible insects whereas, in urban areas, insect consumption was negatively related to education, main livelihood source and monthly income.

These results are akin to those of Okello, et al., (2013) who argued that consumers (producers in the households) are also interested in earning more income to fulfill other household needs. Participants in the current study see their future (food) security and happiness as dependent on their children getting an education and good jobs which should be facilitated by the benefits of making more money from insects' value chains.

In the open-ended questions, the respondents were asked to explain ways in which education levels influence motivation to consume lake flies. In response, the respondents indicated that education levels motivate the consumption of lake flies because the educated can interrogate the nutritional benefits of the lake flies. In this regard, education helps in making an informed decision on whether to consume lake flies or not. In addition, education helps in influencing the person in knowing the benefits of eating lake flies by letting people know that they can be eaten.

The key informants were also requested to explain how the socio-economic factors stated Influence Lake flies' consumption. From the responses, the majority who consume lake flies are low-income earners, those who have never gone to school beyond primary school and large households of 10 persons or more. These groups eat lake flies to help with the intake of protein when available. The majority of those living along the lakeshore consume alternative animal protein sources such as fish, omena (silver Cyprinid fish) as they are stable financially and do not consume lake flies as a substitute to these protein sources which are more costly to acquire. A low number of educated respondents consume lake flies and the educated need more sensitization to inform them of the nutritional benefits of insect consumption. Low-income earners having large households find it difficult to provide for the entire family hence supplementing their daily food needs with the consumption of lake flies.

The proposition of the need for sensitization to the educated and the possible effectiveness of this intervention is in line with the summation of Fadairo, Olutegbe and Tijani (2015) that states that the basic objective of any form of education is to impart knowledge that would influence a change in attitude, skills, or knowledge.

Information from the key informants of the study regarding socio-economic factors or circumstances that would influence the consumption of lake flies (e.g., income, education or household size) was sought. The key informants were therefore requested to list socio-economic factors that influence lake flies consumption. The respondents indicated that low income, large household sizes and education are the dominant socio-economic factors that influence the consumption of lake flies. Lake flies are also included in supplementing diets, generating income to better trade; availability and cultural acceptance.

The key informants were also requested to explain the role of the household head in the consumption of lake flies. The interviewees suggested that household heads spearhead decision-making on the collection or buying of lake flies. The household head can also purchase or borrow from a neighbor who has collected and prepared it. The household head makes a decision to purchase the already processed lake flies and take them to the family for consumption.

The findings correlate with those of Meludu and Onoja (2018) who investigated the determinants of edible insects' consumption level in Kogi State, Nigeria. The study concluded that insect consumption is a common practice in Kogi State even though on a low scale and therefore recommended among other things, heavy public awareness

creation and public education on the health and nutritional benefits of edible insects to mankind and the establishment of insect farming training centers by the State Government.

Food consumption patterns suddenly change as a result of changes in income levels, and socio-cultural factors such as religious beliefs, traditional beliefs, food likings, gender, education levels and women's employment. These factors have had a noticeable influence on food consumption.

These findings are similar to those of Alamu et al., (2013); Adeoye et al., (2014) who stated that many Nigerian families make a fairly good living from selling insects and most of these insects are gathered from bushes and farmlands by women and children, processed and eaten or sold in school premises and open markets. About sixty-five percent 67(54.5%) of the respondents had only primary school education while 33(26.8%) proceeded to secondary school after primary education. This low-level education among the sellers explains their disdain attitude when their products are referred to as insects.

The findings based on inferential statistics revealed that there is a positive correlation between socio-economic factors and consumption of lake flies at a significant 0.05 level, the strength is average, at 70.4%. In addition, a unit change in socio-economic factors while setting the coefficient of other independent variables to zero would lead to a change in consumption of lake flies by a factor of .485 which is in agreement with the study of Liu, Li, J., and Gómez, (2019) in Southern China which deduced that knowledge level and social demographic factors influence consumption decisions.

The study findings are in agreement with the theoretical foundation of the study. Subjective Norms (SN) are the perceived approval or disapproval that people who are important to the individual (otherwise known as "salient referents" such as one's family members, peers, etc.) hold about a behavior (Ajzen & Fishbein, 1980). In this study, the subjective norms were operationalized by socio-economic factors such as formal education, household size, level of income, and gender, which have been established as significant in influencing the consumption of lake flies.

The research hypothesis was stated as: H_{01} - Thematic socioeconomic factors do not significantly influence the consumption of Lake Flies within the Lake Victoria region. The results revealed that social economic component affects positively and significantly influence consumption of Lake Flies within the Lake Victoria region with a β value of 0.485, standard error of 0.053 t value of 9.215 and p value 0.040 which is < 0.05., a factor loading of > 0.5 ranging between 0.810 and 0.889 and correlation coefficient analysis per county regarding socio-economic factors were Kisumu (r=0.830), Homabay (r=0.808), and Siaya (r=0.76.). Hence, the null hypothesis was rejected.

V. CONCLUSION

This study sought to establish whether socio-economic factors such as age, level of income, occupational characteristics have influenced the consumption of lake flies as food within the Lake Victoria region. The hypothesis was stated as: H_{01} - Thematic socioeconomic factors do not significantly influence the consumption of Lake Flies within the Lake Victoria region. The results revealed that the socio-economic component affects positively and significantly influences consumption of lake flies within the Lake Victoria region with a β value of 0.485 standard error of 0.053; t value of 9.215 and p value 0.040 which is < 0.05., a factor loading of > 0.5 ranging between 0.810 and 0.889 and correlation coefficient analysis per county regarding socio-economic factors were as follows: Kisumu (r=0.830), Homabay (r=0.808), and Siaya (r=0.76.). Hence, the null hypothesis was rejected.

Results show that consumers highly accepted lake flies for food and as an alternative to conventional meat. Past behavior such as insect consumer, education levels, income levels, nutritional benefits, personal trust, fitting with consumer needs as well as risk attitudes were significant acceptance drivers. This is an important result as it implies a need to better understand actual consumer motivations and life values that defines personality and behaviour. This finding suggests we can start to understand why, all too frequently, consumers appear to be knowledgeable about the nutritional and health claims of some foods but they do not respond to them in the manner required.

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