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Socio-Economic Factors Affecting Entomophagy In Nambale Sub County, Kenya

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Abstract: ***Entomophagy describes the practice of eating insects by humans. Globally, there are over 3000 ethnic groups that consume insects. The main aim of this study was to determine the socio economic factors affecting entomophagy in Nambale Sub County, Kenya. The study assumed cross sectional survey design with a sample size of 171. The data was analyzed using descriptive statistics, chi square tests, with the aid of Statistical Package for the Social Science (SPSS) version 20. Multi-linear regression was used to test the significance of association between the independent variables and the dependent variable while correlation was used to quantify the strength of the relationship between the continuous variables. Entomophagy was significantly related with socio-economic factors (p<0.05). Socio-economic factors also had a positive influence on entomophagy (t=2.260, p=0.026) The gender of respondents (OR=2.2;95%C1.74.3), p=0.008) occupation (OR=2.5;95%CI= (1.5.9), p=0.032), education levels (OR=0.9;95%CI= (0.4), p=0.039), land ownership type (OR=3.46;95% CI= (1.92-7.58), p=0.000), household size (OR=2.46;95% CI= (1.33-5.31), p=0.012), size of land (OR=0.67;95% CI= (0.36-2.28), p=0.721). Socio-economic factors have a statistically significant effect on entomophagy in Nambale Sub-County, Kenya. The study recommends that there should be efforts to equip residents of Nambale sub-county with knowledge regarding the benefits of entomophagy on nutrition. It further recommends conservation of traditional insect harvesting sites.***

Keywords: Entomophagy, Nambale Sub County, Kenya, Socio-economic, socio demographic

I. INTRODUCTION

Entomophagy describes the practice of eating insects by humans. Globally, there are around 3000 ethnic groups in at least 133 countries that consume insects (Ramos-Elorduy, 2009). Approximately 1900 species of insect are harvested for consumption by an estimated two billion people, predominantly from newly developed countries in Asia, Africa, and South America (Van Huis, 2013). The Food and Agriculture Organization of the United Nations advocates for entomophagy to meet the food demand associated with projected global population growth, since the global population is expected to reach nine billion by 2050 Van Huis, (2013). Compared with traditional animal-based protein sources (i.e., livestock, poultry, and fish), insects also afford significant environmental and economic benefits. Insect rearing produces substantially less greenhouse gas and ammonia emissions, and requires less water, feed, and space per kilogram of protein than conventional meat production (Vogel, 2010).

Studies have showed that entomophagy was influenced by age, gender, education and occupation (Caparros, 2014). Ecologically, entomophagy was more pronounced in the rural areas than in the urban areas. Other influencing factors in the same study included limited knowledge about nutritional value of insects, waning indigenous knowledge about harvesting edible insects, high rate of depletion of vegetation and forest

cover which is the natural ecology for the insects Anankware et al. (2018).

In the African continent for example, sale of edible insects in the open market is a popular practice (Ramos-Elorduy 2005). Information availability on edible insects has recently been promoted by the western media as a potential contributor to global food security. Part of this increased publicity is due to a report published by the United Nations Food and Agriculture Organization (FAO), entitled Edible Insects: Future Prospects for Food and Feed Security (van Huis et al. 2013), which underlines the benefits of edible insects for human food and animal feed.

Socio-demographic factors, such as sex, age, level of education, and ethnicity can influence food neophobia in general, and acceptance of insects as food in particular (Caparros,2014). In a study describing consumers who were willing to adopt insects as a meat substitute, it was identified that younger males with weak preferences for meat, low levels of neophobia, and concerns over the environmental impact of their food choices, as early adopters. Familiarity with entomophagy also increases consumer readiness to adopt insects as food (Verbeke, 2015).

Multiple studies stress the importance of documenting traditional knowledge of edible insects to restore and promote entomophagy (Yen, 2009) and to avail information to new consumers, especially in urban areas (Gahukar, 2011). Traditional communities are well-enriched with local knowledge of the occurrence, methods of collection, processing and consumption (Riggi *et. al.,* 2016). This information availability among other factors is what is required to promote entomophagy among the different peoples for their socio- economic wellbeing.

Changes in land use due to climate variability and unsustainable environmental methods of harvesting were cited generally among many other factors that contribute to the decline of entomophagical behaviours in Nambale Sub County. It is against the foregoing back drop that this study sought to contribute to body of knowledge by assessing the socio-ecological factors affecting entomophagy in Nambale sub county, Kenya.

This study was guided by the following objectives:

- ✓ To determine the socio-economic factors influencing entomophagy in Nambale Sub County.
- ✓ To analyse the influence of information availability on entomophagy in Nambale Sub County.
- ✓ To establish the influence of climate variability on entomophagy in Nambale Sub County.

II. METHODS AND MATERIALS

AREA OF STUDY

Nambale Sub-County lies in Busia County, Kenya. It has a geographical area of 237.8 square kilometers. The area had a population of 94,637 Busia CIDP, (2017) and lies between Longitudes 12^0 5^0E and 43 2^0E and Latitudes $9^0 4^0$N and $12^0 3^0$N. The average land holding is 1 ha.

TARGET POPULATION

The target population is that in which the investigator would want to make generalization from. Mugenda and Mugenda (2003) defined target population as the entire group an investigator is interested in or the group about which the researcher desires to draw conclusion. The target population was 298 farmers who reside in Nambale Sub County and who were trained on adaptation to climate variability and conservation agriculture. The sampling frame was the list of farmers who practiced conservation agriculture. According to Kothari (2009), a sample size is a subset of the total population from which the general view of the target population is obtained.

SAMPLE SIZE SELECTION

A sample size was therefore a good representation of the population from which the Researcher desired to generalize the research findings.

The sample size was calculated using the Sloven (Altares et al., 2003) formula as shown below:

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

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 then generated as below:

$$n = \frac{298}{1+ 298 (0.05)^2} = \textit{which is approximately 171 to the next integer}$$

According to Sloven (Altares et al., 2003) formula, the sample size of the study was S171 respondents which is based on the target population of 298 respondents.

RESEARCH DESIGN

This study adopted for a descriptive survey design. The study used primary data which was largely quantitative in nature. Primary data was collected using self-administered questionnaire. The questionnaire was made up of structured questions using likert scale. The questionnaire had four parts; first part collected the respondents' demographics and the other parts collected information with respect to the research questions. The questionnaires were delivered to the respondents both by hand (drop and pick).

VALIDITY

The validity of the instruments was checked by supervisors. In this study, content validity (item validity and sampling validity) of the instrument was established before conducting the actual study.

DATA ANALYSIS

Data collected was standardized using various control measures, including checking for completeness and consistency before the data entry process. Questionnaires were coded and each questionnaire given a unique identification number before data entry. These numbers were entered and used as a check out for any inconsistencies in the data. The data was checked by the researcher to ascertain their completeness and internal consistency. The data analysis was done by the help of SPSS version 20 (Statistical package for social scientist). Mean and standard deviation were used to measure central tendency and dispersion respectively. The data was analysed descriptively and presented using frequency tables and charts. Inferential analysis was also carried out including multi-linear regression and correlation analysis to determine strength relationship between criterion and predictor variables.

III. RESULTS

The researcher sought to evaluate gender distributions of the respondents. The results were tabulated in table 1. The study findings show that male respondents were (50)40.3% while female respondents were (74)59.7%. This implies that female gender participates most in harvesting and selling of insects hence they have invaluable information on entomophagy.

Gender	Frequency	Percentage
Male	50	40.3
Female	74	59.7
Total	**124**	**100**

Source: Researcher Data (2020)

Table 1: Gender of the Respondents

AGE BRACKETS OF THE RESPONDENTS

The study sought to establish the age distribution of the respondents. Results are summarized in table 2. Majority of the respondents were in the age bracket of 36-60 years were 80.4%. Those in the age of bracket below 36 years were 16.2% while above 60 years were 3.4%. The implication is that majority of respondents in Nambale Sub County were aged above thirty-six years.

Age Brackets	Frequency	Frequency
Below 36 years	20	16.2
36-60 years	99	80.4
Above 60 years	4	3.4
Total	**123**	**100.0**

Source: Researcher Data (2020)

Table 2: Age Brackets of the Respondents

INFLUENCE OF SOCIO-ECONOMIC FACTORS ON ENTOMOPHAGY

Socio-economic factors has been acknowledged to be one of the factors that influence entomophagy. The study wanted to establish the claim. The respondents were therefore required to rate their responses on a likert scale of 1-5 where: 5= Strongly Agree; 4= Agree; 3= Undecided; 2= Disgree; 1=Strongly Disagree. The analysis in table 4.6 shows that the majority who scored the highest (M=3.02, SD=1.405) agreed that years of experience in bee keeping has enabled them to appreciate entomophagy. This was closely followed by dependence on entomophagy has made farmers to consistently seek information on insects' benefit. (M=2.80, SD=2.245). Futher more resopndents agreed that Income levels significantly influence consumption of edible insects (M=2.57, SD=1.413), and variability in source of income has negative influence on consumption of edible insects. (M=2.50,SD= 1.409). Occupational characteristics has an influence on consumption of edible insects (M=2.47, SD=1.511).

The study findings are in tandem with Adeoye et al., (2014) results which revealed that 80.61% of the respondents are married with majority falling within the age range of 25 and 35 years. Sixty-Five percent (65%) of the respondent had at least primary school education while 29.6% had no formal education. Most of the respondents (42.8%) engage in trading as their main occupation. The survey revealed that socio-economic effects influence entomophagy in Nigeria.

The respondents were requested to show their level of agreement with the statements in relation to influence of socio-economic factors on entomophagy. The results are as shown in table 3.

	N	Mean	Standard deviation
Occupational characteristics has an influence on consumption of edible insects	121	2.47	1.511
Income levels significant influence on consumption of edible insects.	121	2.57	1.413
Dependence on entomophagy has made me to consistently seek information on insects benefit.	121	2.80	2.245
Variability in source of income has negative influence on consumption of edible insects.	121	2.50	1.409
Years of experience in bee keeping has enabled me to appreciate entomophagy.	121	3.02	1.405

Source:Reseacher Data (2020)

Table 3: Influence of Socio-Economic Factors on Entomophagy

Table 4 shows that, out of the 124 respondents, 114 (93.4%) of those involved in edible insect trade 73 (61.3%) were married women while 46 (38.7%) were male and about 53 (44.9%) of them are between the ages of 38 and 47, while a few of them 23 (19.5%) are between the ages of 28 and 37. 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.Amongst residents who practice entomophagy, 65.2% were males compared to 32.9% who were females. The difference was statistically

significant (OR=2.2; 95% CI= (1.7-4.3), p=0.008 as shown in table 4. This result indicates that males were 2.2 times more likely to embrace entomophagy compared to females.

Variables	Attributes	Frequency (n)	Percentage (%)
Gender	Male	46	38.7
	Female	73	61.3
Age in Years	18-27	6	5.1
	28-37	23	19.5
	38-47	53	44.9
	48 and above	36	30.5
Marital Status	Single	3	2.5
	Married	114	93.4
	Widow	5	4.1
Family Type	Male Headed	107	87.0
	Female Headed	16	13.0
Family Size	1-4	40	32.8
	5-9	58	47.5
	10 and Above	24	19.7
Education Level	Never attended any school	19	15.4
	Primary	67	54.5
	Secondary	33	26.8
	Tertiary Institutions	4	3.3
Land Owner	Self	71	58.2
	Father	50	41.0
	Grandfather	1	0.8
Land Size in acres	0-2 acres	68	56.2
	3-4 acres	35	28.9
	Above 5 acres	18	14.9

Source: Research Data (2020)

Table 4: Socio-demographic characteristics of Households in Nambale Sub County

The respondents who were practicing entomophagy only, 31.5% of them adopted compared to 73.0% were unemployed. The difference in proportions were statistically significant (OR=2.5; 95%CI= (1.5-5.9), p=0.032) as shown in Table 5. The education levels of the respondents who practiced entomophagy, 3.3% had tertiary education as compared to 15.4% of those who had no education. The difference was statistically significant (OR=0.9; 95% CI= (0.4-0.9), p=0.039). Those who had secondary education, 26.8% adopted entomophagy compared to 15.4% of those who had no education. The difference was not statistically significant (OR=1.0; 95% CI= (0.3-3.6), p=0.985) as shown in Table 5 Those respondents who had primary education, 54.5% adopted entomophagy compared to 15.4% of those who had no education. The difference was not statistically significant (OR=1.1; 95%CI= (0.2-1.5), p=0.889).

Socio-demographic Factors	Entomophagy Yes n (%)	Entomophagy No n (%)	Odds Ratio (95% C.I)	(X^2) p-values
Gender				
Male	30(65.2)	16(34.8)	2.2(1.7-4.3)	**0.008**
Female	24(32.9)	49(67.1)		
Occupation				
Employed	23(31.5)	50(68.5)	2.5(1.5-5.9)	**0.032**
Unemployed	46(73.0)	17(27.0)		
Educational Level				
None	19(15.4)	90(32.1)	Ref	
Primary	67(54.5)	100(45.7)	1.1(0.2-1.5)	0.889
Secondary	33(26.8)	40(51.3)	1.0(0.3-3.6)	0.985
Tertiary	4(3.3)	21(18.4)	0.9(0.4-0.9)	**0.039**

**P values generated through chi-square test and values in bold were statistically significant at p≤0.05. Odds ratios were generated through binary logistic regression n= number of respondents*

Table 5: Socio-demographic factors and association with entomophagy among the residents of Nambale Sub-County

The land size of the respondents who practice entomophagy, 56.2% had less than 3 acres compared to 43.8% of those respondents who had more than 3 acres. The difference was not statistically significant (OR=0.67; 95% CI= (0.36-2.28), p= 0.721) as shown in Table 6.

Respondents Information	Entomophagy Yes n (%)	Entomophagy No n (%)	Odds Ratio (95% C.I)	(X^2) p-values
Type of land ownership				
Owned by Grandfather	61(41.8)	54(37.0)	Ref	
Others	71(58.2)	34(28.9)	3.46(1.92-7.58)	**0.000**
Size of land				
≤ 3 Acres	68(56.2)	21(17.36)	0.67(0.36-2.28)	0.721
>3 Acres	53(43.8)	43(35.5)	Ref	
Household size				

≤ 9 members	98(80.3)	65(53.3)	Ref	
>10 members	24(19.7)	80(30.3)	2.46(1.33-5.31)	**0.012**

**P values generated through chi-square test and values in bold were statistically significant at p≤0.05. Odds ratios were generated through binary logistic regression n= number of respondents*

Table 6: The relationship between residents' information and entomophagy in Nambale Sub County

CHI-SQUARE TEST ON INFLUENCE OF SOCIO-ECONOMIC FACTORS ON ENTOMOPHAGY

H_0: There is no significant association between socio-economic factors and entomophagy.

H_1: There is significant association between socio-economic factors and entomophagy.

Significance level: 0.05: P-value = 000<0.05,

The p-value is 0.000, was below the critical point of 0.05 (X^2=3.41).

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	493.398[a]	374	.000
Likelihood Ratio	281.554	374	1.000
Linear-by-Linear Association	34.810	1	.000
N of Valid Cases	110		

a. 414 cells (100.0%) have expected count less than 5. The minimum expected count is .01.

Table 7: Chi-Square Tests

RELATIONSHIP BETWEEN INDEPENDENT VARIABLES

This section shows the relationship between dependent variable and independent variables among themselves.

Correlations

		Entomophagy	Socio-economic factors	Information Availability	Climate Variability
Entomophagy	Pearson Correlation	1			
	Sig. (2-tailed)				
	N	106			
Socio-economic factors	Pearson Correlation	.633**	1		
	Sig. (2-tailed)	.000			
	N	106	106		
Information Availability	Pearson Correlation	.760**	.659	1	
	Sig. (2-tailed)	.000	.000		
	N	106	106	106	
Climate Variability	Pearson Correlation	.568**	.413	.439	1
	Sig. (2-tailed)	.000	.000	.000	
	N	106	106	106	106

Source: Reseacher Data (2020)

Table 8: Relationship between Independent Variables

The findings in table 4.15 indicate that there is a positive correlation between socio-economic factors and entomophagy at significant 0.05 level, the strength is average, at 63.3 %. The same findings show that there was a positive correlation between information availability and entomophagy in Nambale Sub County at significant 0.05 level, the strength is though strong, at 76.0%. The findings continue to signify that there is a positive correlation between climate variability and entomophagy in Nambale Sub County at significant 0.05 level, the strength is though average, at 56.8%.

RELATIONSHIP BETWEEN DEPENDENT AND INDEPENDENT VARIABLES

This section shows the strength of relationship between dependent variable and independent variables.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.814[a]	.662	.652	.872

a. Predictors: (Constant), socio-economic factors, information availability, climate variability

b. Dependent Variable: Entomophagy.

Source: Researcher Data (2020)

Table 9: Model Summary

Referring to table 4.16 the study establishes the R^2 to be 0.662 implying that 66.2%, of the population that practice entomophagy in Nambale Sub -County, Kenya is explained by socio-economic factors, information availability, climate variability leaving 33.8% unexplained. This implies to some extent that there is strong explanatory power for the whole regression. Therefore, future researchers should carry out studies to find out other factors (33.8%) influencing entomophagy other than (socio-economic factors, information availability and climate variability) affecting entomophagy in Nambale Sub-County in Kenya.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	152.356	3	50.785	66.679	.000[b]
	Residual	77.687	102	.762		
	Total	230.043125	105			

a. Dependent Variable: Entomophagy

b. Predictors: (Constant), socio-economic factors, information availability, climate variability

Source: Reseacher Data (2020)

Table 10: Relationship between Independent Variables

The probability value of p<0.00 indicates that the regression relationship was highly significant in predicting how socio-economic factors, information availability, climate variability influence entomophagy in Nambale Sub County, Kenya.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.808	.451		-1.792	.76
Socio-economic factors	.208	.092	.176	2.260	.026
Information Availability	.665	.099	.528	6.695	.000

Climate Variability	.537	.133	.264	4.047	.000

a. Dependent Variable: Entomophagy

Source: Researcher (2020)

Table 11: Relationship between Dependent and Independent Variables

Specifically, Information availability has the highest positive influence on entomophagy, followed by climate variability, and socio-economic factors respectively. Individual significance of the predictor variables was tested using t-test. The findings reveal that socio-economic factors, Information availability and climate variability, were individually statistically related to entomophagy p-value<0.05.

The results in the table 4.18 established that taking all factors into account (socio-economic factors, information availability and climate variability) constant factor was -0.808 due to variation. A unit change in socio-economic factors while setting the coefficient of other independent variables zero would lead to a change in entomophagy in Nambale Sub County by a factor of .208; a unit change in information availability while setting the coefficient of other independent variables zero would lead to an increase in entomophagy in Nambale Sub County by a factor of .665; a unit change in climate variability while setting the coefficient of other independent variables zero would lead to an increase in entomophagy in Nambale Sub County by a factor of .537. The findings reveal that socio-economic factors, information availability and climate variability were individually statistically significantly related to entomophagy p-value<0.05. Hence all the null hypotheses were rejected.

MULTIPLE REGRESSION COEFFICIENTS

The predictive model provided by the research findings is as expressed below:

$Y=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\varepsilon$

Where;

Y represents Entomophagy

B_0 represents the constant

X_1 represents Socio – economic factors

X_2 represents Information availability

X_3 represents Climate variability

ε represents the error term

Regression findings in table 4:19, substituting the equation above;

$Y=0.671+0.433X_1+0.326X_2+0.098X_3$.

With the assumption that all the other independent variables are 0.000, then entomophagical practices will be 0.671.

The results of correlation analysis implied that when any of the three variables that is Socio – economic factors, Climate variability and information availability was enhanced the performance of Entomophagy was likely to improve. On the other hand, failure to enhanced economic factors, information availability and Climate variability was likely to weaken the increase of Entomophagy. It was further found that Socio – economic factors and Information availability statistically strongly and positively influenced Entomophagy.

From the coefficient findings provided, it is clear that Socio – economic factors have a major effect on the Entomophagy as it gave a coefficient value of 0.433, (t = 7.166) and a p – value of 0.000. This implies that a 1-unit increase in Socio – economic factors results in 0.433 increase in dependent variable which is Entomophagy practices in Nambale. Similarly, the table indicates that Information availability and Entomophagy are positive, moderate and statistically significantly related at 0.326 (t = 2.912) and a p significance level of 0.05. This implies that a 1-unit increase in the level of Information availability increases entomophagy by 0.326.

Climate variability and Entomophagy were found to be positive weak and significantly related at coefficient values of 0.098, (t =1.188) and a p – value of 0.240. This implies that 1-unit increase in level of Climate variability results in 0.098 increases in Entomophagy.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.671	.288		.327	.024
Socio economic factors	.433	.060	.176	7.166	.000
Information availability	.326	.112	.528	2.912	.005
Climate variability	.098	.082	.264	1.188	.240

Source Researcher (2020)

Table 12: Coefficients of the Variables

COLLINEARITY TEST

As shown in Table 4.20 the results of the collinearity statistics as demonstrated by the Variance Inflated Factor (VIF) showed that the three determinants of entomophagy namely Socio – economic factors (VIF = 1.128), Information availability (VIF =1.499) and Climate variability (VIF=4.975) did not have multicollinearity problems since each has VIF less than 10 (Ringle et al.), in other words, the influence of each of the named predictor variables on entomophagy was not subject to other independent variables.

The test on collinearity is as follows

	TOLERANCE	**VIF (variance inflator factor)**
Socio – economic factors	0.886	1.128
Information availability	0.667	1.499
Climate variability	0.201	4.975

Source Researcher: Data (2020)

Table 13: Collinearity Test

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IV. DISCUSSION

The target population of this study was 298 farmers who reside in Nambale Sub County and who were trained in adaptation to climate variability and conservation agriculture. Out of 171 questionnaires administered, being the sample size of the study, a total of 124 questionnaires were filled and returned, this gave a response rate of 72.51%. Nachmias and Nachmias (2004) have pointed that survey research faces a challenge of low response rate that rarely goes above 50%. They further suggest that a response rate of 50% and above is satisfactory and represents a good basis for data analysis. The response rate of 72.51% is far more than Nachmias and Nachmias recommend.

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. Kothari (2004) recommends that Alpha value threshold should be 0.7. The scale had value a that exceeded a threshold of 0.7. inferring that the research instrumentation was reliable.

This study sought to find out general information which included gender, age category and education level of famers in Nambale Sub County. The study findings show that male respondents were (50)40.3% while female respondents were (74)59.7%. This implies that female gender participates most in harvesting and selling of insects hence they have invaluable information on entomophagy.

The study sought to establish the age distribution of the respondents. Majority of the respondents were in the age bracket of 36-60 years were 80.4%. Those in the age of bracket below 36 years were 16.2% while above 60 years were 3.4%. The implication is that majority of respondents in Nambale Sub County were aged above thirty-six years.

The respondents were requested to indicate their highest education level. Findings indicate that (68) 55.3% of the respondents had primary level of education, (32) 26.0% had secondary education, and (7) 5.6% had post-secondary education while (16) 13.0% of the respondents had no formal education. This implies that majority of respondents were literate enough to interpret and respond to the objectives of the study conclusively.

Majority who scored the highest mean of 3.17 and a standard deviation of 1.723 agreed that value addition of edible insects has enhanced entomophagy. This was closely followed by those who agreed that nutritional benefits of edible insects have increased its demand at a mean of (3.13) and a standard deviation of (1.576). Furthermore resopndents agreed that consumer innovativeness has a strong positive relationship with the acceptance of entomophagy with a mean of (2.84) and a standard deviation of (1.396). Consumption of edible insects has contributed to economic viability to households at a mean of (2.47) and a standard debviation of (1.367), and consumers normally accept products due to educational interventions at a mean of (2.39) and a standard devaiation of (1.410).

The study respondents were requested to show their level of agreement with the statements in relation to entomophagy. Socio-economic factors has been acknowledged to be one of the factors that influence entomophagy. The respondents were therefore required to rate their responses on a likert scale of 1-5 where: 5= Strongly Agree; 4= Agree; 3= Undecided; 2= Disgree; 1=Strongly Disagree. The analysis in table 4.6 shows that the majority who scored the highest (M=3.02, SD=1.405) agreed that years of experience in bee keeping has enabled them to appreciate entomophagy. This was closely followed by dependence on entomophagy has made farmers to consistently seek information on insects' benefit. (M=2.80, SD=2.245). Futher more resopndents agreed that Income levels significantly influence consumption of edible insects (M=2.57, SD=1.413), and variability in source of income has negative influence on consumption of edible insects. (M=2.50,SD= 1.409). Occupational characteristics has an influence on consumption of edible insects (M=2.47, SD=1.511).

The study findings are in tandem with Adeoye et al., (2014), in a study carried in Nigeria which revealed that 80.61% of the respondents were married with majority falling within the age range of 25 and 35 years. Sixty-Five percent (65%) of the respondents had at least primary school education while 29.6% had no formal education. Most of the respondents (42.8%) engage in trading as their main occupation.

Out of the 124 respondents, 114 (93.4%) of those involved in edible insect trade 73 (61.3%) were married women while 46 (38.7%) were male and about 53 (44.9%) of them were between the ages of 38 and 47, while a few of them 23 (19.5%) were between the ages of 28 and 37. This shows that most of the married women 114 (93.4%) in these communities were actively involved in edible insect trade, indicating that the business is mainly a family affair. This corroborates findings of Ajiboye and Fasoranti 1993; Adeduntan and Bada, 2004 who stated that many Nigerian families make 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 and their lack of cooperation with researchers (quest for money in exchange for information) during the questionnaire administration.

Amongst residents who practice entomophagy, 65.2% were males compared to 32.9% who were females. The difference was statistically significant (OR=2.2; 95% CI= (1.7-4.3), p=0.008 as shown in table 4.8. This result indicates that males were 2.2 times more likely to embrace entomophagy compared to females. The respondents who were practicing entomophagy only, 31.5% of them adopted compared to 73.0% who were unemployed. The difference in proportions were statistically significant (OR=2.5; 95%CI= (1.5-5.9), p=0.032) as shown in Table 4.8

The education levels of the respondents who practiced entomophagy, 3.3% had tertiary education as compared to 15.4% of those who had no education. The difference was statistically significant (OR=0.9; 95% CI= (0.4-0.9), p=0.039). Those who had secondary education, 26.8% adopted entomophagy compared to 15.4% of those who had no

education. The difference was not statistically significant (OR=1.0; 95% CI= (0.3-3.6), p=0.985). Those respondents who had primary education, 54.5% adopted entomophagy compared to 15.4% of those who had no education. The difference was not statistically significant (OR=1.1; 95% CI= (0.2-1.5), p=0.889).

The land size of the respondents who practice entomophagy, 56.2% had less than 3 acres compared to 43.8% of those respondents who had more than 3 acres. The difference was not statistically significant (OR=0.67; 95% CI= (0.36-2.28), p= 0.721).

The landownership type of the residents who practice entomophagy, 41.8% had title deed owned by grandfathers compared to 58.2% which we term as others may rented land or did not have title deed or communal. The difference was statistically significant (OR=3.46; 95%CI= (1.92-7.58), p=0.000). This result shows that residents with title deeds of grandfathers are 3.46 times more likely to adopt entomophagy as compared to those land title deeds belonging to others.

The study sought to ascertain the relationship between socio-economic factors and entomophagy in Nambale Sub-County. The p-value is 0.000, which is below the critical point of 0.05 (X^2=3.41). Thus, the null hypothesis is rejected. In other words, Entomophagy and the socio economic factors are related.

The findings indicate that there is a positive correlation between socio-economic factors and entomophagy at significant 0.05 level, the strength is average, at 63.3 %. in Nambale Sub County

The study establishes the R^2 to be 0.662 implying that 66.2%, of the population that practice entomophagy in Nambale Sub -County, Kenya is explained by socio-economic factors. According to the findings, the null hypothesis which stated there was no significant relationship between socio economic factors and entomophagy in Nambale sub county was rejected at t =7.166; p<0.05. This implies that Socio - economic factors have a positive significant effect on entomophagical practices.

V. CONCLUSION AND RECOMMENDATION

The results showed that socio-economic factors and information availability influence entomophagy in Nambale Sub County, Kenya. Climate variability was also found to influence entomophagy. The study recommends that there should be efforts to equip residents of Nambale sub-county with knowledge regarding the benefits of entomophagy both on nutrition and ecological aspects for human kind. The study further recommends conservation of traditional insect harvesting areas in the Sub County. The study further recommends establishment of plantation to promoted the production of this insects for heavy marketing.

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