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Green Tea Consumption and Its Determinants in Taraba State of Nigeria

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Abstract: Green tea is obtained from unfermented tea leaves. This product is typical of the use of tea in China and Japan. This study examined the green tea consumption and its determinants in Taraba State, Nigeria. Respondents were selected in the study area using Multistage sampling technique. Three villages were randomly selected; they are Mayo-kusuku, Kakara and Kasalasah. Information was obtained from the respondents using well structured questionnaire. Information was collected from 128 respondents and the information collected was used for analysis. Analytical techniques used in the study are descriptive statistics, composite score analysis and ordered probit regression. Sixty seven percent of the respondents that consume green tea are above 30years. The mean age of the respondents is 41years. Majority of green tea consumers are male (92.2%). Majority (89.8%) of green tea consumers in Taraba State are farmers. Also, in the study, 94.1% of the respondents said that they consumed green tea while 6% of the respondents do not consume green tea. The reasons why they do not consume green tea are: they do not like it (2.2%), they do not have money to buy it (13.2%), they do not know where to buy it (7.4%), other reasons (0.7%). Eighty six percent of respondents reported that they consumed between 1 and 7 sachets per week, 8% consumedbetween 8 and 14 sachets per week while 6% consumed more than 15 sachets per week. Sixty two percent of the respondents are in the low level meaning they consume between 1and 2 sachets. Twenty seven percent are in the medium/intermediate level. Respondents in this level consume between 3 and 10 sachets. Twelve percent of the respondents are in the high level meaning they consume between 11 and 36 sachets of green tea. Age (β=0.03), sex of respondent (female: β=1.07), location (Kakara β=1.03; Kasalasah β=1.27) improved green tea consumption while occupation (technical/craftsmanship: β=-2.92), price of green tea (β=-0.29) reduced green tea consumption. This study recommended that appropriate measures should be put in place for farmers to reduce price of green tea so that more people can buy and consume green tea.

Keywords: Green Tea, Level, Consumption, Price, Taraba State

1. Introduction

Camellia sinensis (L.) is a plant species which belongs to the family of *Theaccae*, which encompasses some 200 woody plant species in the warmer regions of Asia and South America. Within the species one may distinguish the China teas, slow growing dwarf trees with a good tolerance of cold weather and other adverse conditions and Assam teas, which are faster growing teas adapted to warmer conditions [1]. The tea plant is mainly cross-pollinated and propagation has, for long, been high seed. Hence, a wide range of characteristics, originating from two types of teas, may be present in any tea orchard [7-9].

The harvesting procedure for tea consists of the removal of young vegetative shoots, preferably in the stage that they show an opened leaf and a bud. The young tips give rise to high quality tea. The harvest as to be repeated regularly every 10 to 14days, depending on the growth of the tea bushes. The important aspect of the harvesting of tea is the need to ensure immediate transportation of the produce to the processing factory.

The main commercial product is black tea, which is prepared by fermentation processes from the young leaves of the plant. The different types of tea are dependent on the

method of processing, curing and fermentation [10, 11]. During the processing, caffeine is liberated in association with tannins. The caffeine content of processed tea leaves may vary from 2.5 to 5.0 percent. The quality of tea depends on the method of processing, and also on the environment under which the produce was grown and harvested. Considerable differences in tea quality are caused by the temperature regimes during growth of the leaves (i e altitude of area of cultivation), the soil type, its pH value, the season of the year at which the tea was harvested. Commercial tea is obtained by blending different tea together. This is done in order to get together the specific requirements of diverse tea marketplaces [12, 13].

Popular types of tea are [14, 15]:

Black tea obtained by post-harvest fermentation of withered and rolled tea leaves through factory processing.

Green tea is obtained from unfermented tea leaves. This product is typical of the use of tea in China and Japan.

Oblong tea obtained from slightly fermented tea leaves, is mostly produced in Taiwan for use in North America.

Brick tea prepared from the residues obtained after the preparation of black and green teas. This product is used mainly in Tibet and other parts of Central Asia.

This study examined the green tea consumption and its determinants in Taraba State, Nigeria.

2. Methodology

The study area isTaraba state. Tea is mostly produced in Taraba State. Three villages were randomly selected; they are Mayo-kusuku, Kakara and Kasalasah. Information was obtained from the respondents using well structured questionnaire. One hundred and fifty copies of questionnaire were distributed but one hundred and thirty six questionnaires were collected back. One hundred and twenty eight information of respondents green tea consumers was eventually used for analysis.

Analytical Techniques

Descriptive Statistics, Composite Score analysis and Ordered probit regression was used in this study.

Descriptive statistics involved the use ofpercentages, mean and histograms.

Composite Score

This was used to measure the level of green tea consumption per week. This was done based on the number of green tea sachets consumed by respondents per week.

A respondent who consumes green tea can score a maximum of 36 and a minimum of 1. The maximum number of green tea consumed by respondents per week is 36sachets and the minimum is 1satchet. The classification into high, medium and low level of green tea consumption is as shown below and as used by [2-5]:

High category=between 36 - (Mean + S.D) points

Medium (intermediate)=between upper and lower categories

Low Category=Between (Mean – S.D) - to 1.

Ordered Probit Model

This was used toanalyse the determinants of green tea consumption. This is a regression model which generalisesprobit regression by allowing more than two discreteoutcomes that are ordered. An Ordered probit model is used to model relationships between a polytomousresponsevariable which has an ordered structure and a set of regressor variables. Using the composite score from the number of tea consumed, the level of green tea consumed was categorised into high, medium/intermediate and low levels which correspond to censoring values 2, 1, and 0 respectively. The standard ordered probitmodel is widely used to analyse discrete data of this variety and is built around a latent regression of the followingform:

$$y^* = \mathrm{x}'\beta + \varepsilon \quad (1)$$

where x and β are standard variables and parameter matrices, and ε is a vector matrix of normally distributederror terms. Obviously predicted grades (y^*) are unobserved. We do, however, observe the following:

$$\mathrm{y} = 0 \text{ if } y^* \leq 0 \quad (2)$$

$$\mathrm{y} = 1 \text{ if } 0 < y^* \leq \mu_1 \quad (3)$$

$$\mathrm{y} = 2 \text{ if } \mu_1 < y* \leq \mu_2 \quad (4)$$

where μ_1 and μ_2, are the cut points i.e. the threshold variables in the probit model. The threshold variables areunknown and they indicate the discrete category that the latent variable falls into.

The likelihood for the level ofgreen tea consumption is

$$\mathrm{L} = [\Phi(0 - \mathrm{Xi}\beta)]zi_1(\Phi(\mu 1 - \mathrm{Xi}\beta) - \Phi(0 - \mathrm{Xi}\beta)]zi_2 [1 - \Phi(\mathrm{Xi}\beta - \mu 1)]zi_3 \quad (5)$$

$$z_{ij} = \begin{Bmatrix} 1 if y = jf \\ 0 \; otherwise \; forj = 0{,}1 \; and \; 2 \end{Bmatrix} \quad (6)$$

where for the *i*th respondent, $y_i$is the observed outcome and $x_i$is a vector of explanatory variables. The unknownparameters βj are typically estimated by maximum likelihood.

y=level of green tea consumption, (0=low level, 1=medium/intermediate level, 2=high level).

x_1=Age of respondents (years), x_2=Married (yes=1, 0 otherwise), x_3=Widowed (yes=1, 0 otherwise), x_4=Divorced (yes=1, 0 otherwise), x_5=Sex of household head male (yes=1, 0 otherwise), x_6=Sex of household head female (yes=1, 0 otherwise), x_7=Farming (yes=1, 0 otherwise), x_8=Trading (yes=1, 0 otherwise), x_9=Technical/Craftsmanship (yes=1, 0 otherwise), x_{10}=Civil service/paid job (yes=1, 0 otherwise), x_{11}=No formal education (yes=1, 0 otherwise), x_{12}=Primary education (yes=1, 0 otherwise), x_{13}=Secondary education (yes=1, 0 otherwise), x_{14}=Tertiary education (yes=1, 0 otherwise), x_{15}=Regularly consume of tea (yes=1,0 otherwise), x_{16}=Occasionally consume tea (yes=1,

otherwise=0), x_{17}=Moderatelyconsume tea (yes=1, otherwise=0), x_{17}=Mayo-Kusukucommunity (yes=1, otherwise=0), x_{18}=Kakara community (yes=1, otherwise=0), x_{19}=Kasalasah community (yes=1, otherwise=0), x_{20}=no substitute (yes=1, otherwise=0), x_{21}=black tea (yes=1, otherwise=0), x_{22}=white tea (yes=1, otherwise=0).

This statistical tool was used to compare the probability of a respondent falling into a high, intermediate and low level of tea consumption. The model becomes usefulgiven the distribution of the dependent variable as concerned in the analysis. This model has been extensively usedin studies [3-6].

3. Result and Discussion

Table 1 presented the socio economic characteristics of respondents that consumed green tea in Taraba State. Sixty seven percent of the respondents that consumed green tea are above 30years. Older people consume green tea because of its health benefit. The mean age of the respondents is 41years. Majority of green tea consumers are male (92.2%). In the study 26% of the respondents have no formal education, 25% have primary education, and 31% have secondary education while 19% have tertiary education. Eighty four percent of the green tea consumers are married. Majority (89.8%) of green tea consumers in Taraba State are farmers. This means that the farmers consume what they produce. Seven percent of the consumers are in civil service/paid jobs. Also in the study, 81% of green tea consumers belong to cooperative societies.

Table 1. *Socio economic characteristics of Respondents.*

Variable	Frequency	%
Age		
≤30	42	32.8
31-60	65	50.8
>60	21	16.4
Mean=41		
Sex		
Male	118	92.2
Female	10	7.8
Educational status		
No formal education	33	25.8
Primary	32	25.0
Secondary	39	30.5
Tertiary	24	18.8
Marital status		
Single	19	14.8
Married	108	84.4
Widowed/divorced	1	0.8
Occupation		
Farming	115	89.8
Trading	3	2.3
Technical/Craftsmanship	1	0.8
Civil service/paid job	9	7.1
Membership of Cooperative society		
Yes	104	81.25
No	24	18.8
N=128		

Source: Field survey, 2019

In table 2, 94.1% of the respondents claimed that they consumed green tea. This revealed that in the three communities considered in Taraba State, majority of the people consume green tea. Six percent of the respondents do not consume green tea. The reasons why they do not consume green tea are: they do not like it (2.2%), they do not have money to buy it (13.2%), they do not know where to buy it (7.4%), other reasons (0.7%). Sixty percent of the respondents regularly consume tea, while 34% occasionally consume it and 5% moderately consume green tea. Also in table 2 the substitute of green tea are black and white tea. Ninety six percent consume black tea in place of green tea while 4% consume white tea in place of green tea. Eighty six percent of respondents reported that they consumed between 1 and 7 sachets per week, 8% consumedbetween 8 and 14 sachets per week while 6% consumed more than 15 sachets per week. The mean of green tea sachets consumed per week is 4. Seventy two percent of the respondents affirmed that they encounter problems in buying tea. The problems encountered are: no money to buy it, not always available and it is very expensive. Sixty six percent encountered the problem of lack of money to buy green tea.

Table 2. *Consumption of Tea.*

Variable	Frequency	Percentage
Do you consume Green Tea		
Yes	128	94.1
No	8	5.9
Frequency of green tea consumption		
Regularly	77	60.2
Occasionally	44	34.4
Moderately	7	5.4
What other type of tea do you consume in place of green tea		
Black Tea	123	96.1
White Tea	5	3.9
How many sachets of green tea do you consume/ week		
1-7	110	85.9
8-14	10	7.8
≥15	8	6.3
Mean	4	
Encounter problems in buyinggreen tea		
Yes	92	71.9
No	36	28.1
Types of problem encountered		
No money to buy it	84	65.6
Not always available	15	11.7
It is very expensive	29	22.7
N=128		

Source: Field survey, 2019

High category=36 to (4.38+ 6.38)=36-10.76

Medium (intermediate)=10-3

Low Category=Between (6.38 – 4.38) points to 1 points=2 -1

Table 3 presented the level of green tea consumption per week. Sixty two percent of the respondents are in the low level meaning they consume between 1and 2 sachets. Twenty seven percent are in the medium/intermediate level. Respondents in this level consume between 3 and 10 sachets. Twelve percent of the respondents are in the high level

meaning they consume between 11 and 36 sachets of green tea.

Table 3. *Green Tea sachet consumption per week.*

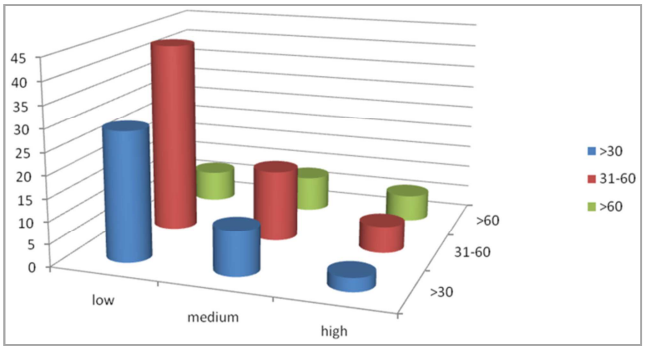
Level of consumption	Frequency	%
Low	79	61.7
Medium	34	26.6
High	15	11.7
N=128		

Source: Field survey, 2019

Figures 1-6 presented the level of green tea consumption by socio economic characteristics.

Figure 1 presented the level of green tea consumption by age. In low and medium/intermediate category we have more of middle age respondents (31-60years). In the high category we have more middle aged and older respondents.

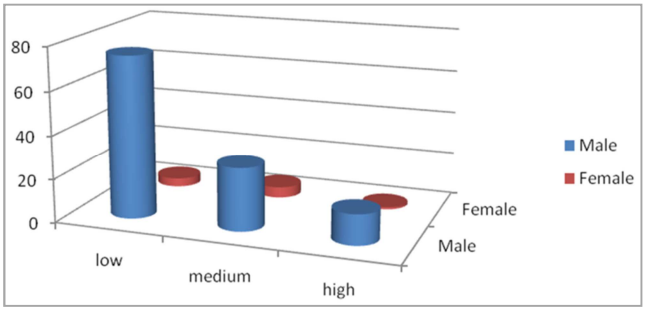
Level of Green Tea Consumption by Socio-economic Characteristics



Source: Field Survey, 2019

Figure 1. *Level of green tea consumption by Age.*

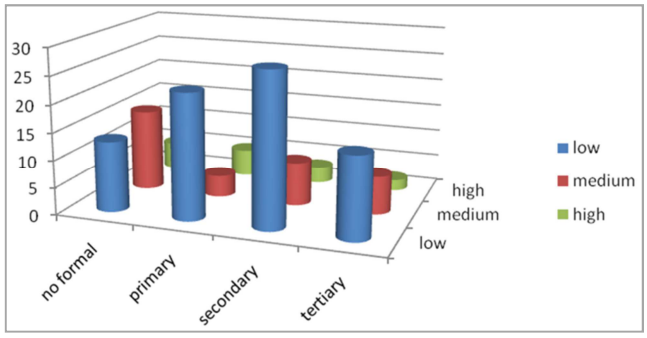
Figure 2 presented the level of green tea consumption by sex. We have more male in the three categories. This is inline with table 2 where we have more male repondents who condumed green tea.



Source: Field Survey, 2019

Figure 2. *Level ofGreen Tea consumption by Sex of respondents.*

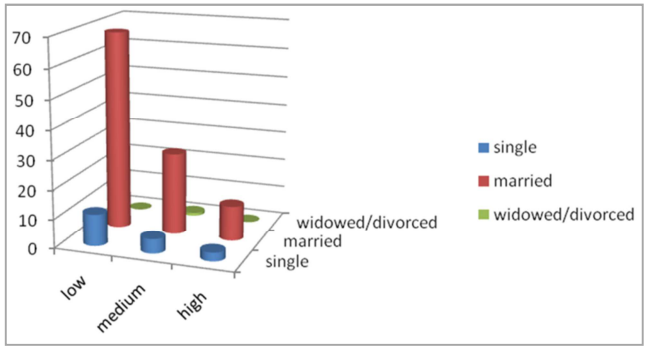
Figure 3 presented the level of green tea consumption by educational level. Respondents that have secondary education are more in the low category, respondents with no formal education were more in the medium and high category. How educated you are didnotdetermine how you consume green tea.



Source: Field Survey, 2019

Figure 3. *Level of Green tea Consumption by Educational Level.*

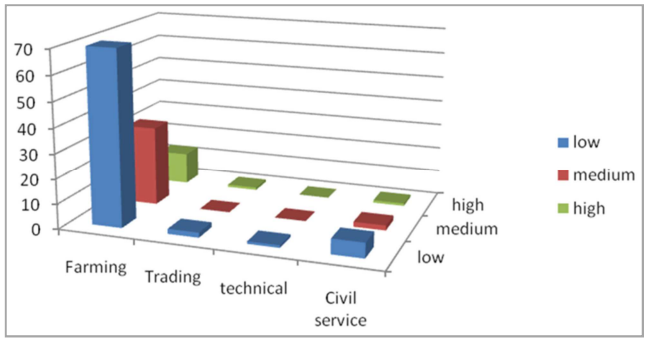
Figure 4 presented the level of green tea consumption by marital status. In the study there are more married repondents in thelow and medium/intermediete categories.



Source: Field Survey, 2019

Figure 4. *Level of Green Tea Consumption by Marital status.*

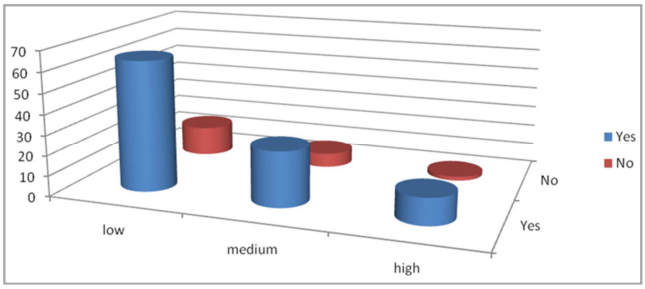
Figure 5 presented the level of green tea consumption by types of occupation. Respondents who are farmers had the highest percentage in the three categories. Farmers produce green tea and they also consume it.



Source: Field Survey, 2019

Figure 5. *Level of Green Tea Consumption by Type of Occupation.*

Figure 6 presented the level of green tea consumption by membershipof cooperative society. Respondents who are members had the highest precentage in the three categories but more in the low category.



Source: Field Survey, 2019

Figure 6. *Level of Green Tea Consumption by membershipof cooperative society.*

Determinants of green tea consumption

Table 4 presented the determinants of green tea consumption in Taraba State, Nigeria. The three levels of green tea consumption– low, medium/intermediate and high formed the dependent variables as ordered 0, 1 and 2 respectively while 19 explanatory variables were considered in the model. Six variables were statistically significant at various levels. They are age, sex of respondent (male), marital status (married), employment type (technical/craftsmanship), price of green tea and location. The likelihood ratio chi-square of 35.25 shows that all predictors' regression coefficients in the model are simultaneously zero and in tests of nested models, with a p-value of 0.0058 revealedthat the model is statistically significant at 1%. Pseudo-R^2 was 0.1528; that is, 15.28% of the level of green tea consumption was explained by the selected explanatory variables. The value of this pseudo-R^2 suggests a reasonable efficiency of the model. A positive sign on a parameter indicates that the higher the values of the variable, the higher the probability of the level of green tea consumption. Similarly, a negative value of the coefficient implies that the higher the value of the variable the lower the probability of the level of green tea consumption. The table also included estimates of the threshold parameter μ_1 and μ_2. These are shown as cut1 and cut 2.

The cut points are the threshold parameters used to match probabilities with each of the discreet outcomes. The cut 1 is the estimated cut-point on the latent variable that differentiates the low level category from the intermediate and high level categories when the other predictors are evaluated at zero. The cut 2 differentiates between the low and the intermediate and high level. The aim is to test for equality of the standard errors of the cut point to determine if they are significantly different from each other. The test of equality reveals that we can reject the null hypothesis of equality among the different cut points in the model at $p<0.01$. Thus, the ordered outcomes differ from one another.

The age of women was positively related to the level of green tea consumption and statistically significant at 1% level of significance. This shows that as the age of respondents increases their level of green tea consumption increases. People tend to consume more green tea as they age because of its health benefits.

Sex of respondents (female) was positive and significant at 5% ($p<0.05$) as compared to male respondents. The probability of consuming green tea by women who may increase compared to male respondents. Women nowadays tend to be more aware about their health and since green tea has health benefits they tend to consume it more.

Table 4. *Determinants of green tea consumption.*

Predictor variables	Coefficients	Standard error	Z	P>(z)
Age	0.0299***	0.0094	3.18	0.001
Sex (b: male) Female	1.0689**	0.5085	2.10	0.036
Educational Level (b: no formal education) primary education	0.1358	0.3949	0.34	0.731
Secondary education	-0.0419	0.3747	-0.11	0.911
Tertiary education	-0.0225	0.4127	-0.05	0.957
Marital Status (b: single) Married	-1.0656***	0.3779	-2.82	0.005
Widowed/divorced	0.4165	1.2305	0.34	0.735
Occupation (b: farmer) Trading	-0.5824	0.9013	-0.65	0.518
Technical/Craftsmanship	-2.9174*	155.22	-0.02	0.985
Civil service/paid job	0.1987	0.5571	0.36	0.721
Price of green tea	-0.2908*	0.1671	-1.74	0.082
Time of green tea consumption (b: regularly) occasionally	-0.0897	0.2778	-0.32	0.747
Moderately	-1.3507	0.8421	-1.60	0.109
Green tea substitute (b: no substitute) black tea	0.0759	0.4280	0.18	0.859
White tea	0.8734	1.1672	0.75	0.454
Location (b: Mayo-Kusuku) Kakara	1.0329**	0.4671	2.21	0.027
Kasalasah community	1.2743***	0.4076	3.13	0.002
cut1	-4.1289	4.2667		
cut 2	-3.0485	4.2621		
Chi-square	35.25			
Probability	0.0058			
Pseudo R-square	0.1528			

*** P<0.01 significant at 1%, ** P<0.05 significant at 5%,* P<0.1significant at 10%
Source: Author's computation, Field Survey, 2019b: base category

Coefficient of married respondents was negative and significant at 1% ($p<0.01$). This result revealed that respondents who are married have lower probability of consuming green tea compared to single and widowed/divorced respondents.

Employment type (technical/craftsmanship) was negatively significant at 10% ($p<0.1$). This means that the level of green tea consumption decreased with increase in the number of respondents engaged only in technical/craftsmanship when compared to respondents that are farmers in Taraba state. Nigeria. Most of the consumers of green tea are farmers (table 2) and they have higher probability of consuming more compared to respondents that are in technical/craftsmanship occupation.

The price of green tea was negatively related to the level of level of green tea consumption and statistically significant at 10% level of significance. This shows that as the price of green tea increases the level of green tea consumption reduces.

Respondents in the Kakara and Kasalasah communities, their coefficients were positive and significant at 5% ($p<0.05$) and 1% ($p<0.01$) compared to their counterparts in the Mayo-Kusuku. Respondents in these communities have a higher probability of consuming green tea as compared to their counterparts in Mayo-kusuku community.

4. Conclusion

This study provides empirical evidence on green tea consumption and its determinants. Sixty seven percent of the respondents that consume green tea are above 30years. Older people consume green tea because of its health benefit. The mean age of the respondents is 41years. Majority of green tea consumers are male (92.2%). In the study, 26% of the respondents have no formal education, 25% have primary education, and 31% have secondary education while 19% have tertiary education. In table 2, 94.1% of the respondents claimed that they consumed green tea. This revealed that in the three communities considered in Taraba State majority of the people consume green tea. Sixty percent of the respondents regularly consume tea, while 34% occasionally consume it and 5% moderately consume green tea. Also in table 2 the substitute of green tea are black and white tea. Ninety six percent consume black tea in place of green tea while 4% consume white tea in place of green tea. Sixty two percent of the respondents are in the low level meaning they consume between 1and 2 sachetsper week Twenty seven percent are in the medium/intermediate level. Respondents in this level consume between 3 and 10 sachets. Twelve percent of the respondents are in the high level meaning they consume between 11 and 36 sachets of green tea. Age, sex of respondent, location (Kakaraand Kasalasah) improved green tea consumption while occupation (technical/craftsmanship), price of green teareduced green tea consumption. This study recommended that appropriate measures should be put in place for farmers to reduce price of green tea so that more people can buy and consume green tea.

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