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Consumption Of Zobo (*Hibiscus Sabdariffa)* Drinks Among Staff And Students Of A Tertiary Institution In Ibadan, Oyo State Nigeria

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***Abstract**: Using a cross sectional data the consumption pattern of zobo drink (Hibiscus sabdariffa) among staff and students of Tertiary Institution was examined. Simple random sampling (SRS) was used to select 40 students and 40 staff of the Federal College of Forestry Ibadan Oyo State Nigeria. A total number of 80 respondents were selected for the study using a structured questionnaire to source information from the respondents.. Data collected were analyzed using descriptive and multiple regression analysis. The results showed that majority of the respondents among the staff and students were male (50.0%, 67.5%) and with mean age of (37.1years and 21.0 years), majority of the staff and students had tertiary education (95.0%, 100.0%). Majority (77.5%, 87.5%) of the respondents among staff and students consume zobo, (67.5%, 70.0%) and (55.0%, 82.5) of the staff and students showed satisfaction on zobo drink for its nutritive value and Taste. Problems associated with zobo drink consumption include poor storage facility, Hygienic safety, Packaging. The processing method of zobo drink is manual, unsanitary and crude. It was therefore recommended among others that the preparation method of zobo drink should be addressed and its consumption should spread among the respondents for its nutritive and medicinal values.*

***Keywords**: Pattern, Zobo, Consumption, Regression, Medicinal Values, Nigeria*

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I. Introduction

Hibiscus sabdariffa was described by Anjah *et al*., (2012) as an annual herb which belongs to Malvaceae family, grown in the tropics and is widely cultivated in Nigeria mainly in the North-Eastern and Middle-belt regions. The calyces of *Hibiscus sabdariffa* are known to be rich in anthocyanins and contain a mixture of organic acids such as citric, malic and tartaric acids. According to Udom *et al*., (2001), it is reported that there are three common varieties of Roselle grown in Nigeria. Two of these varieties have red calyces while one has green calyces. The green variety is more predominant in the southern part of Nigeria while the other two red varieties are predominant in the Northern and Western part of this country. The calyces from these varieties have a number of uses and promising prospects for industrial purposes (Alegbejo, 2000). Roselle is widely grown in northern parts of Nigeria, where the dried calyx is used for making a popular drink known as 'Zobo' (Falusi, 2007).

Zobo drink is a red liquid drink extracted from the dried reddish purple calyces of the plant *Hibiscus sabdariffa* by boiling in water for about 10-15 minutes and filtration to extract the pigment or embedded flavor and taste like fruit punch. Also, served as a source of vitamin A, riboflavin, niacin, calcium and iron and also low in sugar content. This drink also contains anthocyanins and vitamins C, among others and because of it richness in citric acid, it is used as a cooling herb, providing relief during hot weather by increasing the flow of blood to the skin's surface and dilating the pores to cool the skin. It is used in curing minor stomach ailments, sore throat, strengthening the heart, soothing colds, promoting proper kidney function, helping digestion and helping reduce fever. Roselle drink has diuretic properties that help in the excretion of excess fluids from the body. It has been found to help in weight loss by preventing the absorption of carbohydrates (Olawale, 2011).

Zobo drinks are traditional non- alcoholic beverage which is consumed in most parts of Nigeria, mostly in northern part of Nigeria (Osuntogun, 2004). The economic and religious situation in Nigeria has made the Zobo drink gain wide acceptance in different occasions, being consumed by several millions of people from different socio-economic classes and background. It is used as refreshment, entertainment in parties or as appetizers before the main dish is served and it is also sold in market to various consumers (Onuorah *et al.,* 1987). Zobo drink has been shown to be good source of natural carbohydrate, protein and vitamin C which constitutes the major reason for consuming soft drink and fruit juice (Ogiehor and Nwafor, 2004). Its

consumption will take an active role in bone and teeth formation as it is rich source of vitamin C, calcium, magnesium and zinc (Babalola *et al.,* 2001)

Medicinal value of aqueous extracts from the Roselle plant has been reported to include anti-hypertensive, antiseptic astringent diuretic and purgative activities remedy for cancer, abscesses, cough, dysuria, laxative, scurvy and fever. There is increasing demand for Zobo drinks due to its low prices, nutritional and medicinal properties (Osueke and Ehirim, 2004). The consumption of alcoholic beverages could also be on the decrease in certain areas due to rising religious and health campaigns against such beverages. This has made Zobo drink a potential, ready local alternative to, alcoholic beverages in particular and imported red wines in general. Zobo drink may displace other carbonated beverages in the market due to benefits derived from it which is lacking in other beverages taken for their quenching properties and stimulating effect (Ihekoronye *et al.,* 1985). Carbonated beverages contain high amounts of sugar, calories and caffeine, and provide no valuable nutrition (Damlel, *et al.,* 2011). There is an increase in the consumption of carbonated soft drinks during adolescence (Forshee *et al.,* 2004) and older teens tend to drink more carbonated beverages, fruit drinks, and citrus juices (Moore *et al.,* 2006) which consequently leads to an increase in the prevalence of overweight and obesity worldwide(French *et al.,* 2003; Berkey *et al.,* 2004).

The simplicity in the production, availability of raw materials and the abject poverty in many rural communities as well as the new economic revamping policies of the government has resulted in increased consumption and merchandise of many traditional foods at cottage level in Nigeria, thereby making zobo drink a potential ready local alternative to both alcoholic and non-alcoholic beverages especially imported products e.g red wine (Egbere *et al.,*2007) but at present the production processes are very crude that is neither mechanized or standardized due to poor hygienic practices thereby affecting the consumption rate of the drink. Therefore, in this study the following research objectives were addressed; which are to:

- describe the socio-economic characteristics of the respondents in the study area.
- examine the consumers' acceptability of zobo drink in the study area.
- Identify reasons for consuming zobo drink in the study area.
- examine the level of awareness of zobo drink consumption in the study area.
- identify the constraints associated with zobo drink consumption in the study area
- identify the determinants of zobo drink consumption in the study area.

Methodology

The study was carried out at the Federal College of Forestry (FEDCOFOR), Jericho Ibadan, Oyo State Nigeria. FEDCOFOR was established in 1939 and is located in Jericho Ibadan North-West Local Government area of Oyo State. It is on longitude 3.51^0E and latitude 7.28^0N. The student population in 2016 was 980 while staff population was 350 (FRIN, 2016).

Stratified Random Sampling (SRS) technique was used to randomly select 40 students from four departments and 40 (20 academic and 20 non academic) staff of the Federal college of forestry, Jericho, Ibadan, respectively, making a total number of 80 respondents which was used for the study.

Data Collection

A well structured questionnaire was used to collect information from respondents. Staff and students were the respondents for the study. Questionnaire information include socio-economic information, zobo acceptability, reasons for zobo consumption, level of awareness and constraint associated with zobo consumption for the study.

Data analysis

Descriptive analysis was used to analyze the socio-economic characteristics of the respondents, consumers' acceptability of zobo drink and the constraint associated with zobo drink consumption in the study area while multiple regression analysis was used to analyze the determinant of zobo drink consumption in the study.

The model is specified as follows;

$C = (X_1 + X_2 + X_3 \ldots\ldots\ldots\ldots X_{11} + U)$

Where C= Zobo consumption (quantity/ Litres)

X_1 = Age

X_2 = Educational level

X_3 = Nutritive value (dummy)

X_4 = Selling price (₦)

X_5 = Income (₦)

X_6 = Weather

X_7 = Health status

X_8 = Gender
X_9 = Taste
X_{10} = Family size (Number)
X_{11} = Hygienic safety
a = Constant
U = error term

II. Results and Discussion

Table 1: Socio Economic Characteristics of the Respondents.

Variables	Staff		Students	Total & %
	Frequency	Percentage	Frequency	Percentage
Gender				
Male	20	50.0	27	67.5
Female	20	50.0	13	32.5
Total	**40**	**100.0**	**40**	**100.0**
Age (Yrs)				
Below 20	0	0.0	21	52.5
21-30	8	20.0	18	45
31-40	22	55.0	1	2.5
41-50	9	22.5	0	0.0
51above	1	2.5	0	0.0
Total	**40**	**100.0**	**40**	**100.0**
Mean		**37.08**		**21.03**
Religion				
Christian	34	85.0	37	92.5
Islamic	6	15.0	2	5.0
Traditional	0	0.0	1	2.5
Total	**40**	**100.0**	**40**	**100.0**
Marital Status				
Single	8	20.0	39	97.5
Married	30	75.0	1	2.5
Divorced	1	2.5	0	0.0
Widow	1	2.5	0	0.0
Total	**40**	**100.0**	**40**	**100.0**
Educational level				
Secondary education	2	5.0	0	0.0
Tertiary education	38	95.0	40	100.0
Total	**40**	**100.0**	**40**	**100.0**
Family size				
0-5	38	95.0	21	52.5
6-10	2	5.0	17	42.5
11-15	0	0.0	2	5.0
Total	**40**	**100.0**	**40**	**100.0**
Mean		**3.70**		**4.78**
Income/Allowance (₦)				
<20,000	2	5.0	39	97.5
20,001-100,000	34	85.0	1	2.5
>100,000	4	10.0	0	0.0
Total	**40**	**100.0**	**40**	**100.0**
Mean		**₦81,972.19**		**₦6,937.50**

Source: 2017

Table 1 showed the socio economic characteristics of zobo consumers in the study area. It was revealed that 50.0% male among the staff and 67.5% among the student consume zobo drink while 50.0% female among the staff and 32.5% female student consume zobo drink which implies that consumption of zobo drink were dominated by male in the study area.55.0% of staff fall between 31-40years of age, 22.5% fall between 41-50, 17.5% fall between 21-30years and 5.0% fall between 51years above while 52.5% of students fall between 10-20 years of age, 45.0% falls between 21-30, 2.5% falls between 31-40years with the mean age of staff (37.08) and student (21.03). Also, 75.0% of the members of staff were married, 20.0% single, 2.5% divorced and 2.5% Widow while 97.5% of the students were single and 2.5% married. About 85.0% of the staff was Christians and 15.0% were Muslims. Also, majority, 92.5% of the students were Christian, 5.0% Muslims

and 2.5% were traditional. Educationally, 95.0% of the staff had tertiary education and 5.0% had secondary education while 100.0% of the students had tertiary education, 95.0% of the staff had family size between 1-5, and 5.0% had 6-10 persons with the mean family size of 4 person while 52.5% of the student had family size 1-5, 42.5% had 6-10, and 5.0% had 11-15 family size with the mean of 5 person. 5.0% of the staff had income of ₦40,000, 85.0% had between ₦20,001-₦100,000 and 10.0% earn more than ₦100,000 while 97.5% of the student collect < ₦20,000 as allowance and 2.5% had < ₦100,000 as allowance per month. The mean income of the staff was ₦ 81,972.19 and student was ₦ 6,937.50

Table 2: Consumers' acceptability of Zobo drink

Variable	Staff		Student	Total
	Frequency	Percentage	Frequency	Percentage
Do you drink Zobo				
No	9	22.5	5	12.5
Yes	31	77.5	35	87.5
Total	**40**	**100.0**	**40**	**100.0**
How often do you consume zobo drink				
Daily	0	0	2	5.0
Weekly	2	5.0	10	25.0
Thrice a week	2	5.0	2	5.0
Once aweek	14	35.0	14	35.0
Undecided	22	55.0	12	30.0
Total	**40**	**100.0**	**40**	**100.0**
Mean		**4.35**		**3.60**
Do youspend on consuming Zobo drink (₦)				
≤200	28	70.0	21	52.5
210-400	4	10.0	8	20.0
410-600	4	10.0	2	5.0
610-800	1	2.5	4	10.0
810-1000	3	7.5	4	10.0
≥1000	0	0.0	1	2.5
Total	**40**	**100.0**	**40**	**100.0**
Mean		**246.00**		**369.75**
Is zobo available in your area				
No	6	15.0	4	10.0
Yes	34	85.0	36	90.0
Total	**40**	**100.0**	**40**	**100.0**
Do you prefer Zobo to other drinks				
Preferred	6	15.0	18	45.0
Not preferred	20	50.0	11	27.5
Moderately preferred	14	35.0	11	27.5
Total	**40**	**100.0**	**40**	**100.0**

Source: Field survey, 2017

Table 2 showed that 77.5% of staff and 87.5% of students consume zobo, 35.0% of the staff and student consume zobo once in a week. The percentage of those that consume zobo once a week could be as an indication of low level of awareness of benefits of zobo drink among the respondents. This report agrees with findings of Babalola *et al.*,(2001) that traditional vegetable have been relatively neglected by the scientific and developed communities and their consumption and utilization is limited due to lack of information on their nutritive value. It was also revealed that majority, 70.0% of the staff and 52.5% of the students spent up to ₦200 on zobo drink consumption per week with the mean value of ₦246.00 and ₦369.75 respectively, 15.0% of the staff preferred zobo to other drinks, 50.0% do not prefer and 35.0% moderately preferred while among the students 45.0% preferred zobo to other drink, 27.5% do not prefer and 27.5% moderately preferred zobo consumption to other drinks.

Table 3 Reasons for consuming zobo drink

Variable	Staff		Student	Total
	Frequency	Percentage	Frequency	Percentage
Nutritive value				
No	13	32.5	12	30.0
Yes	27	67.5	28	70.0
Total	**40**	**100.0**	**40**	**100.0**
Price				
No	16	40.0	9	22.5
Yes	24	60.0	31	77.5
Availability				
No	14	35.0	8	20.0
Yes	26	65.0	32	80.0
Total	**40**	**100.0**	**40**	**100.0**
Organoleptic characteristics				
No	23	57.5	24	60.0
Yes	17	42.5	16	40.0
Total	**40**	**100.0**	**40**	
Taste				
No	18	45.0	7	17.5
Yes	22	55.0	33	82.5
Total	**40**	**100.0**	**40**	**100.0**
Satisfaction				
No	14	35.0	10	25.0
Yes	26	65.0	30	75.0
Total	**40**	**100.0**	**40**	**100.0**
Income				
No	32	80.0	22	55.0
Yes	8	20.0	18	45.0
Total	**40**	**100.0**	**40**	**100.0**
Weather				
No	33	82.5	23	57.5
Yes	7	17.5	17	42.5
Total	**40**	**100.0**	**40**	**100.0**
Health status				
No	25	62.5	20	50.0
Yes	15	37.5	20	50.0
Total	**40**	**100.0**	**40**	**100.0**
Religion				
No	37	92.5	30	75.0
Yes	3	7.5	10	25.0
Total	**40**	**100.0**	**40**	**100.0**
Colour				
No	38	95.0	39	97.5
Yes	2	5.0	1	2.5
Total	**40**	**100.0**	**40**	**100.0**
Method of preparation				
No	31	77.5	38	95.0
Yes	9	22.5	2	5.0
Total	**40**	**100.0**	**40**	**100.0**
Hygiene				
No	31	77.5	37	92.5
Yes	9	22.5	3	7.5
Total	**40**	**100.0**	**40**	**100.0**

Source:,2017

From the result of table 3, it was revealed that 67.5% of the staff and 70.0%of student consume zobo drink for its nutritive value, 60.0% of the staff and 77.5% of the student consume zobo drink for its Price, 65.0% of the staff and 80.0% of the student consume zobo drink for its availability, 55.0% of the staff and 82.5% of the students consume zobo drink for its taste and 65.0% of the staff and 75.0% of the students consume zobo drink for its satisfaction. The high percentage of zobo consumers as a result of its nutritional content and price is in agreement with the report of Bolade *et al.*,(2009) that zobo serves as a cheaper alternative to the industrially produced carbonated soft drinks that is available in all parts of the country.

Table 4: Awareness of Zobo drink consumption in the study area

Variable	**Staff**		**Student**	**Total**
	Frequency	**Percentage**	**Frequency**	**Percentage**
Awareness of nutritive value				
Unaware	10	25.0	6	15.0
Aware	30	75.0	34	85.0
Total	**40**	**100.0**	**40**	
100.0				
Medicinal value				
Unaware	7	17.5	6	15.0
Aware	33	82.5	34	85.0
Total	**40**	**100.0**	**40**	
100.0				
Laxative and calming benefits				
Unaware	20	50.0	14	35.0
Aware	20	50.0	26	65.0
Total	**40**	**100.0**	**40**	
100.0				
Energizing benefits				
Unaware	15	37.5	9	22.5
Aware	25	62.5	31	77.5
Total	**40**	**100.0**	**40**	
100.0				
Price				
Unaware	7	17.5	4	10.0
Aware	33	82.5	36	90.0
Total	**40**	**100.0**	**40**	
100.0				

Source, 2017

Table 4 revealed that most of the staff 75.0%, 82.5%, 50.0%, 62.5% and 82.5% were aware of the zobo drink nutritive value, medicinal value, laxative and calming benefit, energizing benefit and of its low price respectively while among the students 85.0%, 85.5%, 65.0%, 77.5% and 90.0% were aware of the nutritive value, medicinal value, laxative and calming benefit, energizing benefit and of the low price respectively. This indicates that majority of the respondent were aware of the benefits of zobo drink and its medicinal value in the study area.

Table 5: Constraints associated with Zobo drink consumption in the study area

Variable	**Staff**		**Student**	**Total**
	Frequency	**Percentage**	**Frequency**	**Percentage**
Poor power supply				
Undecided	1	2.5	3	7.5
Disagree	8	20.0	8	20.0
Agree	31	77.5	29	72.5
Total	**40**	**100.0**	**40**	
100.0				
Hygienic safety				

Undecided	1	2.5	0	0.0
Disagree	8	20.0	13	32.5
Agree	31	77.5	27	67.5
Total	**40**	**100.0**	**40**	
100.0				
Marketing problem				
Undecided	2	5.0	3	7.5
Disagree	20	50.0	16	40.0
Agree	18	45.0	21	52.5
Total	**40**	**100.0**	**40**	
100.0				
Competition with non indigenous beverages				
Undecided	3	7.5	3	7.5
Disagree	14	35.0	18	45.0
Agree	23	57.5	19	47.5
Total	**40**	**100.0**	**40**	
100.0				
Preparation method				
Undecided	6	15.0	4	10.0
Disagree	10	25.0	11	27.5
Agree	24	60.0	25	62.5
Total	**40**	**100.0**	**40**	
100.0				
Poor storage facility				
Undecided	0	0.0	3	7.5
Disagree	4	10.0	6	15.0
Agree	36	90.0	31	77.5
Total	**40**	**100.0**	**40**	
100.0				
Colour				
Undecided	7	17.5	4	10.0
Disagree	23	57.5	19	47.5
Agree	10	25.0	17	42.5
Total	**40**	**100.0**	**40**	
100.0				
Aroma				
Undecided	6	15.0	3	7.5
Disagree	24	60.0	20	50.0
Agree	10	25.0	17	42.5
Total	**40**	**100.0**	**40**	
100.0				
Taste				
Undecided	6	15.0	2	5.0
Disagree	18	45.0	19	47.5
Agree	16	40.0	19	47.5
Total	**40**	**100.0**	**40**	
100.0				
Packaging				
Undecided	0	0.0	7	17.5
Disagree	6	15.0	6	15.0
Agree	34	85.0	27	67.5
Total	**40**	**100.0**	**40**	
100.0				

Source: Author's computation, 2017

Table 5 revealed that major factors of the problems associated with Zobo drink consumption among the staff and student as identified are poor storage facility, packaging, poor power supply, hygienic safety, preparation method, competition with non indigenous beverages and marketing.. This corroborated reports of Nwokocha *et al.,* (2012) that the processing methods of zobo drink were crude, manual and unsanitary.

Table 6: Determinants of zobo drink consumption

Variable	Coefficient	Std. Error	T-value	Significant
Constant	1.332	0.706	1.887	0.064
X_1= Age	0.000	0.003	0.000	0.906
X_2= Educational level	-0.237	0.174	1.362	0.179
X_3= Nutritive value	0.253***	0.077	3.419	0.002
X_4= Selling Price	0.361***	0.071	5.085	0.000
X_5= Income	0.034	0.073	0.466	0.644
X_6= Weather	-0.056	0.088	0.636	0.525
X_7= Health status	0.076	0.073	1.041	0.304
X_8= Gender	0.087*	0.050	1.740	0.086
X_9= Taste	0.220***	0.077	2.857	0.005
X_{10}= Family size	0.001	0.014	0.071	0.930
X_{11}= Hygienic safety	-0.041	0.049	0.837	0.414
R^2	0.723			

Source: Author's computation, 2017. Note: (***) (*) means significant at 1% and 10%

Table 6 revealed that Nutritive value, Selling Price and Taste were positively significant at 1% to the level of zobo consumption by individual consumers, while gender was also significant at 10% and has a positive relationship to the consumption level, these indicates that for every improvement in the above variables could bring a better responsiveness to the level of consumption or the more the respondents will be willing to spend more for the consumption of zobo in the study. R^2 was 0.723 indicating that 72.3% of the variation in the variable included in the analysis could be explain by the model while 27.7% could be explained by the error term.

It was therefore concluded that, Nutritive value, Selling Price, Taste and gender were the major determinants of zobo drink consumption in the study and also the processing method of zobo drink was manual, unsanitary and crude.

Also recommended that:

- There should be awareness on the importance and benefit of Zobo drink
- The preparation method and hygienic safety of zobo drink should be addressed
- The storage and packaging method of zobo drink should be improved
- Government should create an avenue to decrease consumption rate of alcoholic drink and carbonated drink and encourage the consumption of indigenous drinks like Zobo.

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