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RESEARCH REVIEW

CONSUMPTION OF FRUITS AND VEGETABLES AMONG YOUTHS: A CASE OF LAGOS STATE, NIGERIA

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ABSTRACT

This study was carried out to analyse the consumption of fruits and vegetables among youths in Lagos State, Nigeria. A multistage sampling technique was used to select 284 youths from different tertiary institutions where youths can be adequately and appropriately selected in Lagos State, Nigeria. The data collected were analyzed using descriptive statistics and multivariate Tobit regression model. The result showed that the fruits and vegetables mostly consumed among youths were orange, watermelon, pineapple, banana, apple, cucumber, tomato, onion, carrot and okra. It also showed that the frequency of consuming the different FVs among youths varied from once a month to between 1 – 4 times a week. It finally showed age of youths, sex of youths, the price of the different FVs and the monthly income/allowance of youths as the major factors that influenced their consumption of different FVs. The study thus recommended that if the nutritional and health security of youths will be guaranteed, then policymakers should ensure that appropriate pricing policies are formulated.

KEYWORDS

Expenditure, Fruits, Vegetables, Consumption Pattern, Tertiary Institution

1. INTRODUCTION

The prevalence of malnutrition and other diseases in developing countries, including Nigeria, is very high. In fact, a study submitted that Nigeria is faced with a growing triple burden of malnutrition (Ecker et al., 2020). The reason for which is not far-fetched as the diets which are mostly consumed by individuals in Nigeria lack diversity and contains too many calories from staple foods and too few from nutritious foods (Ecker et al., 2021). Furthermore, the dietary diversification in the country is solely driven by an increased desire to consume more expensive, non-staple, "empty" or insufficient caloric diets rather than diversification into high-value, nutritious foods (Ecker et al., 2020). In addition, the attending risks associated with consuming these diets has been adjudged to be far greater than the combined risks of unsafe sex, usage of tobacco, alcohol and drugs. These risks have led to a rise in nutritional related health problems like diet-related obesity, and chronic diseases like diabetes and hypertension among the populace, most especially the younger generations (Global Panel on Agriculture and Food Systems for Nutrition, 2016).

The eating habits of many Nigerian youths – who are expected to be active, lively and who have been touted to take up the helms of affairs both in the society and the home, is believed to be imbalanced (Obayelu et al., 2019). This is because their diets are very typically characterized by high intakes of energy-dense, nutrient-poor foods, including sweet and salty foods, ultra-processed foods, sugar-sweetened beverages and fast foods, as well as low intake or consumption of high nutrient foods, especially fruits and vegetables (FVs) (Akseer et al., 2017; Keats et al., 2018). Furthermore, many youths even in the face of increased awareness for healthier lifestyle still substitute diets rich in FVs with fast foods and pastries (Olatona et al., 2018). The low consumption of FVs observed among youths is not only a major contributor to the global burden of disease, but it can have lasting impacts on their future health outcomes (Lim et al., 2012). This can further leave profound impacts on their quality of life, nutritional security and increase their risk of premature deaths as well as hamper their health at a future time (Bundy et al., 2017; WHO, 2017).

Furthermore, while the development of healthy eating habits among youths is believed to be a foundation for good health in adulthood, Caprille and Rossi noted that eating healthy is five times costlier than consuming energy-dense diets (Caprille and Rossi, 2021). This could however be a contributing factor to the shortfall in the intake of FVs, despite its numerous sources and benefits for food and nutritional security. Other factors such as the income or monthly allowance of youths, sex, parents' income, and availability also affects consumption expenditure on FVs (Adenegan and Adeoye, 2011; Layade and Adeoye, 2014). Hence, in a bid to reduce the devastating effect of low intake of FVs, improve health and nutritional security and increase FVs consumption, the UN launched the International Year of Fruits and Vegetables (IYFV-2021) to raise awareness of the impact of FVs in food security and human health (FAO, 2021). This is because an increased intake of FVs not only provides a diversified and micronutrient rich diet but it is also instrumental in treating and preventing several diseases that affects different individuals, particularly, the youths (Sachdeva et al., 2013; Tavassoli et al., 2015). In addition, the intake of FVs in adequate amount can help reduce or reverse the typical degenerative changes that occur with growing old, protect the body from infections and reduce the risks associated with nutritional deficiencies (MyPlate, 2011; Nwamarah et al., 2014; WHO, 2014).

Furthermore, previous studies on FVs among youths or adolescents in Nigeria had been on nutritional knowledge, fruits and vegetables consumption patterns among undergraduate students, knowledge and consumption of fruits and vegetables among secondary school students, demand for selected fruits among students of a tertiary institution, and factors influencing fruit consumption among undergraduates (Onyeji and Ejike, 2020; Silva et al., 2017; Obayelu et al., 2019; Fadeye et al., 2019). These studies either focused on the pattern or frequency of consuming FVs or how price and income changes affect the behaviour of youths towards FVs. This particular study however goes a step further by not only identifying the consumption pattern of FVs at a disaggregated level but it also determined the factors that influenced the consumption of the different fruits and vegetables at a disaggregated level. Understanding the consumption for FVs and the different factors that influenced FVs

consumption is crucial for policy makers to know what FVs to prioritize and how their prices and the income of youths influence their purchasing behavior with respect to the different FVs. Therefore, it is against this background that this study investigated the consumption of FVs among youths in Lagos State, Nigeria.

2. MATERIALS AND METHODS

2.1 Study Area

This study was carried out in Lagos State, Nigeria. Lagos State, which of Nigeria's 36 States is the most populous and smallest in area, is located between latitude 6° 22'N and 6° 2'N and longitude 2° 42'N and 3° 2'E of the equator, and borders Ogun State, and borders Ogun State to the east and north making it the only Nigeria State to border only one State (Ayeni, 2017; Aliyu and Amadu, 2017; Tangwa et al., 2019). Lagos State with an estimated population of 15,388,000 people, has the largest proportion of young adults between the ages of 15 and 35 in the country (Federal Ministry of Youth and Sports Development, 2019; Macrotrends, 2022). The State has different higher institutions, comprising of Federal-owned, State-owned and Private-owned institutions, where youths can be adequately and appropriately surveyed. Lagos State offers a wide range of fresh FVs that are widely sold at several markets by market agents or vendors to the majority of the population. In addition, there are several supermarkets where FVs are imported from different parts of the world to supplement local production in Lagos State. These markets offer a wide range of FVs (including tropical fruits, leafy greens, tomatoes, peppers and onions), which are consumed by people of all ages, tribe and region who consider these FVs an integral part of a healthy diet.

2.2 Data Collection

A multistage sampling technique was used for this study. The first stage involved a stratification of the tertiary institutions in the State into Private-, State- and Federal-owned institutions. In the second stage, two tertiary institutions were randomly selected from each stratum. The third stage involved a random selection of a Faculty/School/College from each institution. The fourth stage involved a random selection of a Department from each Faculty/School/College, respectively. In the fifth stage, a Level was randomly selected from each Department. Finally, the sixth stage involved the sampling of all students in each respective Level to arrive at a sample size of 284 respondents. However, for this study, only 272 copies of the questionnaires collected were found useful for analysis and discussion. Primary data were collected from each respondent using a well-structured questionnaire. The information collected include the socio-economic characteristic of respondents, types of FVs consumed, and expenditure on different FVs. It is noteworthy that the FVs used were those available in the market during the survey period.

2.3 Factors Influencing Consumption of Fruits and Vegetables: Multivariate Tobit Regression Model

In the traditional Tobit framework, which models overall/total consumption of fruits or vegetables, the equivalent effect of these censoring sources is assumed to be the same across all FVs. This can pose a problem if for example, consumption of fruits or vegetables, are not reported. A solution to this would be to model the consumption of fruits or vegetables by type. However, if the consumption of fruits or vegetables are modelled independently, significant estimation error could be introduced because unobserved effects at the consumption level are likely to be shared across the type.

Tobit regression is used with left-censored (censored at a low threshold) or right-censored (censored at a high threshold) dependent variable (Tobin, 1958). For consumption of fruits or vegetables, the data was left-censored with a clustering at zero because consumption was not observed in some cases for some fruits or vegetables either because of preference, non-affordability, permanent non-consumption or non-consumption during the survey period. In Tobit regression, the equivalent effect is assumed to be the same, clustered-at-zero observations.

To address the possibility of multiple Tobit regression of the consumption of different types of fruits or vegetables, this study adopts the model used by past studies that has dealt with estimation techniques to model multiple Tobit equations with contemporaneous (cross-equation) error correlation (Huang et al., 1987; Huang, 1999; Trivedi and Zimmer, 2005). The multivariate Tobit model with different dependent variables is expressed as:

$$Y_{ik}^* = X'_{ik}\beta_k + \varepsilon_{ik}, i = 1, 2, \dots, N, \quad k = 1, 2, 3, \dots, 10 \quad (1)$$

$$Y_{ik} = Y_{ik}^* \quad \text{if } Y_{ik}^* > 0$$

$$= 0 \quad \text{if } Y_{ik}^* \leq 0$$

Where N is the number of observations, Y_{ik} is the dependent variable for the k th fruit or vegetable consumed (1 – 10 for consumption expenditure on different FVs such as orange, pineapple, apple, banana, watermelon, cucumber, tomato, onion, carrot, and okra per respondent i) for the i th respondent, X'_{ik} is a vector of independent variables, β_k is a vector of estimable parameters, and ε_{ik} are multivariate normally and independently distributed error terms with zero mean, variance δ^2 , correlation ρ and covariance matrix:

$$\Sigma_{\varepsilon k} = \begin{pmatrix} \sigma_{\varepsilon 1}^2 & \rho_{\varepsilon 2 \varepsilon 1} \sigma_{\varepsilon 2} \sigma_{\varepsilon 1} & \dots & \rho_{\varepsilon 10 \varepsilon 1} \sigma_{\varepsilon 10} \sigma_{\varepsilon 1} \\ \rho_{\varepsilon 1 \varepsilon 2} \sigma_{\varepsilon 1} \sigma_{\varepsilon 2} & \sigma_{\varepsilon 2}^2 & \dots & \rho_{\varepsilon 10 \varepsilon 2} \sigma_{\varepsilon 10} \sigma_{\varepsilon 2} \\ \vdots & \vdots & \ddots & \vdots \\ \rho_{\varepsilon 1 \varepsilon 10} \sigma_{\varepsilon 1} \sigma_{\varepsilon 10} & \rho_{\varepsilon 2 \varepsilon 10} \sigma_{\varepsilon 2} \sigma_{\varepsilon 10} & \dots & \sigma_{\varepsilon 10}^2 \end{pmatrix} \quad (2)$$

The independent variables used for the estimation are as follows:

X_1 = age of respondent (years);

X_2 = sex of respondent (dummy 1 = male and 0 = female);

X_3 = total years of education (years);

X_4 = household size (number);

X_5 = price of fruit or vegetable (₦);

X_6 = monthly allowance of respondent (₦).

3. RESULTS AND DISCUSSION

3.1 Description of the Socio-economic Characteristics of Respondents

The result of the socio-economic characteristics of respondents as presented on Table 1 showed that the average age of respondents was approximately 23 ± 4 years, which implies that respondents are young, and are expected to be agile and active. This result is in congruence with another study which shows that respondents are young and active (Layade and Adeoye, 2014). The result also showed that majority (60.7%) of the respondents were males and had already spent an average of 17 ± 2 years in attaining formal education. In addition, the result showed that respondents had an average household or roommate size of approximately 3 ± 2 members. This can positively or negatively influence respondents' consumption of FVs as it is mostly believed that adolescents can easily be influenced by their peers. The assertion that adolescents are easily influenced by their peers is corroborated by Laursen and Veenstra, who submitted that influence from peers during adolescence is a pervasive force that has the tendency to shape adaptive and maladaptive attitudes and behaviours (Laursen and Veenstra, 2021). Also, the result showed that respondents received an average monthly allowance of $\text{₦}37,691.18 \pm \text{₦}24,351.67$. Respondents, receiving monthly allowance from parents or guardians is due to the fact that many of them are still dependent and rely on their guardians for monthly stipends. This result corresponds to the submission of another study which reported that youths or students received monthly stipends from their guardians (Obayelu et al., 2019). Furthermore, the result showed that of the different fruits consumed, respondents mostly consumed orange (75.0%), apple (70.6%), banana (52.9%), watermelon (44.5%), pineapple (41.5%), and cucumber (41.5%). This result is similar to those of another study, on factors influencing fruit consumption which reported orange, pineapple, apple, banana, pawpaw, watermelon and tangerine as the most consumed fruit among undergraduates (Fadeye et al., 2019). Lastly, the result revealed that among the different vegetables consumed, respondents mostly consumed tomato (94.1%), onion (66.5%), carrot (51.1%), and okra (37.5%).

3.2 Consumption Pattern for FVs among Respondents

The result of the consumption pattern for fruits as presented on Table 2 showed that respondents mostly consumed orange (75.0%), apple (70.6%), banana (52.9%), watermelon (44.5%), pineapple (41.5%), and cucumber (41.5%). The fact that respondents mostly consumed these fruits could be because they are readily available in the market. In addition, according to a study, those fruits are the most common fruits in the food basket of an average Nigerian (Ogundari and Arifalo, 2013). The result further showed that while respondents who mostly consumed watermelon, pineapple, banana and cucumber frequently consume them

either once a month or between 1 – 4 times a week, they frequently consume orange and apple either daily, once a month, or between 1 – 4 times a week. The result finally revealed that respondents mostly consume all fruits fresh (96.7%) and purchase the fruits mostly from the market (81.3%).

Moreover, for vegetables, the result showed that respondents mostly consumed tomato (94.1%), onion (66.5%), carrot (51.1%), and okra (37.5%). The predominance of these vegetables as the most consumed ones could be because they are mostly used in the preparation of stews and other dishes. This result is similar to the results of a study which, reported tomato, onions, carrots, okra, among other vegetables as the frequently consumed vegetables among respondents (Raaijmakers et al., 2018). The result further showed that while respondents who mostly

consumed tomato and onion frequently consume them either daily or between 1 – 4 times a week, they frequently consume carrot and okra either once a month, or between 1 – 4 times a week. Finally, the result showed that respondents mostly consume all vegetables cooked (84.9%) and purchase the vegetables from the market (83.1%).

3.3 Determinants of The Consumption of Fvs Among Respondents

The result of the multivariate Tobit model as presented on Table 3 revealed that the log-pseudolikelihood function was -23321.619, the Wald chi-square was 265.22 and the Prob>chi-square was 0.0000 indicating that the entire model was significant at the 1% level of significance. These diagnostic variables and the significance level reveal the fitness of the entire model.

Table 1: Socio-Economic Characteristics of Respondents

Characteristics	Category	Frequency	Percentage
Age	16 – 20	113	41.5
	21 – 25	79	29.0
	26 – 30	80	29.4
	Mean (Standard Deviation)	22.58 (3.84)	
Sex	Male	165	60.7
	Female	107	39.3
Previous level of education	Secondary education	144	52.9
	National Diploma	128	47.1
Total years of education already spent	11 – 15	61	22.4
	16 – 20	204	75.0
	21 – 25	7	2.6
	Mean (Standard Deviation)	16.87 (1.93)	
Household size	1 – 5	246	90.4
	6 – 10	26	9.6
	Mean (Standard Deviation)	3.15 (1.60)	
Monthly allowance (₦)	1,000 – 20,999	104	38.2
	21,000 – 40,999	65	23.9
	41,000 – 60,999	63	23.2
	61,000 – 80,999	25	9.2
	81,000 – 100,999	15	5.5
	Mean (Standard Deviation)	37,691.18 (24,351.67)	
Fruits consumed*	Orange	204	75.0
	Watermelon	121	44.5
	Pawpaw	106	39.0
	Pineapple	113	41.5
	Banana	144	52.9
	Apple	192	70.6
	Tangerine	77	28.3
	Grape	70	25.7
	Cucumber	113	41.5
	Lemon	46	16.9
	Lime	57	21.0
	Garden egg	98	36.0
	Vegetables consumed*	Tomato	256
Onion		181	66.5
Cabbage		75	27.6
Spinach		65	23.9
Lettuce		53	19.5
Carrot		139	51.1
Okra		102	37.5
Pumpkin		87	32.0
Waterleaf		81	29.8
Celosia		64	23.5
Afang		48	17.6
Bitter leaf		74	27.2
Scent leaf		54	19.9
Garlic		78	28.7

Source: Field Survey, 2022

Note: * represents multiple response

Table 2: Consumption pattern for fruits and vegetables

	Orange	Watermelon	Pineapple	Banana	Apple	Cucumber	Tomato	Onion	Carrot	Okra
Consumption	204 (75.0)	121 (44.5)	113 (41.5)	144 (52.9)	192 (70.6)	113 (41.5)	256 (94.1)	181 (66.5)	139 (51.1)	102 (37.5)
Frequency of consumption										
Daily	38 (14.0)	6 (2.2)	9 (3.3)	10 (3.7)	39 (14.3)	6 (2.2)	91 (33.5)	54 (19.9)	9 (3.3)	4 (1.5)
1 – 2 times a week	65 (23.9)	38 (14.0)	45 (16.5)	47 (17.3)	34 (12.5)	24 (8.8)	69 (25.4)	54 (19.9)	44 (16.2)	26 (9.6)
3 – 4 times a week	48 (17.6)	26 (9.6)	14 (5.1)	49 (18.0)	64 (23.5)	22 (8.1)	77 (28.3)	59 (21.7)	33 (12.1)	16 (5.9)
Once a month	53 (19.5)	51 (18.8)	45 (16.5)	38 (14.0)	55 (20.2)	61 (22.4)	19 (7.0)	14 (5.1)	53 (19.5)	56 (20.6)
General consumption pattern										
Consume FVs fresh	263 (96.7)						111 (40.8)			
Consume FVs frozen or cooked	73 (26.8)						231 (84.9)			
Consume FVs as juice	59 (21.7)						8 (2.9)			
Purchase FVs from market	221 (81.3)						226 (83.1)			
Purchase FVs from hawkers	126 (46.3)						108 (39.7)			
Purchase FVs at farmgate	3 (1.1)						4 (1.5)			
Purchase FVs on order	24 (8.8)						17 (6.3)			

Source: Field Survey, 2022 Note: The figures in parenthesis are the percentages

Table 3: Determinants of consumption of fruits and vegetables

Variable	Orange	Watermelon	Pineapple	Banana	Apple	Cucumber	Tomato	Onion	Carrot	Okra
Age	39.96*** (-2.57)	-48.18** (-2.27)	-19.20 (-0.86)	-46.76 (-0.92)	-45.81 (-1.06)	-42.85** (-2.44)	155.98** (-2.50)	-62.13** (-2.36)	-33.07** (-2.37)	30.52** (-2.03)
Sex	-103.56 (-1.06)	-338.68 (-1.64)	-152.78* (-1.68)	-442.11* (-1.65)	-132.52 (-0.48)	-239.07** (-2.45)	646.38** (-2.24)	-180.56 (-0.80)	187.18** (-2.36)	-0.31 (-0.00)
Years of education	49.33* (1.91)	43.95 (1.27)	1.91 (0.07)	-161.25 (-1.32)	43.44 (0.62)	38.42 (1.61)	167.38** (1.99)	-40.49 (-0.65)	7.20 (0.34)	11.61 (0.59)
Household size	96.74*** (2.67)	179.67 (1.11)	-0.61 (-0.02)	116.19 (0.76)	67.60 (0.75)	14.99 (0.42)	47.30 (0.53)	-95.09 (-1.56)	-22.70 (-0.57)	-9.37 (-0.20)
Monthly allowance	0.00 (0.15)	-0.01 (-1.56)	-0.00** (-2.46)	-0.02*** (-2.63)	0.00 (0.01)	-0.00 (-0.33)	-0.02*** (-2.91)	-0.02*** (-3.05)	-0.00* (-1.93)	-0.00*** (-3.03)
Price	-2.77*** (-2.58)	-1.61 (-0.68)	3.94*** (2.66)	-2.13 (-0.10)	-1.65*** (-4.14)	-0.82 (-1.05)	0.09 (0.04)	0.12 (0.19)	-1.00*** (-4.70)	0.34 (0.13)
Constant	1213.61 (2.15)	1422.65 (1.88)	-1066.79 (-1.14)	6491.28 (1.37)	3073.51 (2.83)	1146.27 (1.97)	3259.06 (1.76)	3875.76 (3.40)	2067.09 (3.25)	658.55 (0.31)
Wald Chi-square	265.22									
Prob>Chi-square	0.0000									
Log-pseudolikelihood	-23321.619									

Source: Data Analysis, 2023.

Note: The figures in parenthesis are the z-values while ***, **, and * represents 1%, 5% and 10% respectively.

3.3.1 Orange

The result revealed that the coefficient of age of respondents was negative and statistically significant at the 1% level of significance. This result implies that an increase in the age of respondents by a year will reduce their likelihood of consuming orange. This, thus, shows that younger respondents will consume more of orange than their older counterparts. This, according to another study is strange because it is expected for older respondents when compared to younger respondents to consume more fruits for health reasons (Ogundari and Arifalo, 2013). The result also showed that the coefficient of years already spent in attaining formal education was positively significant at 10%. This implies that an increase in the years already spent by respondents in attaining formal education by a year will increase their likelihood of consuming orange. The implication of this result is that respondents who had spent more years in attaining formal education will consume more orange than their counterparts. This could be due to the fact that education has the tendency to shape the dietary nutritional choice of individuals. This assertion corroborates the submission of another study which reported that educational attainment has a great influence on the dietary knowledge of respondents and could motivate them towards consuming healthy diets (Hong *et al.*, 2012). In addition, the result showed that the coefficient of household size was positive and statistically significant at 1%. This indicates that an increase in the household size or an addition to the roommates of respondents by

a member will increase their likelihood of consuming orange. This implies that respondents with more roommates or members in their rooms will more likely consume more orange than their counterparts. This is expected because having more members within a household will most likely translate to them consuming more of a particular food item than households with fewer members. This result corroborates those of other studies which reported a positive relationship between household size and demand for fruits (Akinleye, 2009; Ashagidigbi *et al.*, 2019). Lastly, the result showed that the coefficient of price was negatively significant at 1%. The negative relationship between orange and its price suggests that orange is an ordinary good, hence an increase in the price of orange by ₦1 will reduce respondents' likelihood of consuming orange. The implication is that respondents will less likely consume more orange when its price rise.

3.3.2 Watermelon

The result revealed that the coefficient of age of respondents was negative and statistically significant at the 5% level of significance. This imply that an increase in the age of respondents by a year will reduce their likelihood of consuming watermelon, thus suggesting that younger respondents will consume more of watermelon than their older counterparts. This is however odd because a study reported that consuming watermelon is well associated with lowering the risks associated with degenerative

pathologies related with age (Choudhary *et al.*, 2015).

3.3.3 Pineapple

The result showed that the coefficient of sex of respondents was negatively significant at 10%, thus implying that a change in the sex of respondents from male to female will increase their likelihood of consuming pineapple. This result indicates that male respondents will consume less of pineapple than their female counterparts. This is similar to the findings of another study which reported that because of the inherent attributes of pineapple, females consumed more pineapples than their male counterparts (Hernosa *et al.*, 2021). In addition, the result revealed that the coefficient of monthly allowance of respondents was negatively significant at 5% level of significance. This indicates that pineapple is an inferior good, and an increase in the respondents' monthly allowance by ₦1 will decrease their likelihood of consuming pineapple. The implication is that respondents with more monthly allowance will less likely consume pineapple than their counterparts with lesser monthly allowance. This is not farfetched as it is expected for inferior goods that individuals will decrease their consumption as their income increases. This result however contradicts that of another study which reported that increasing students' monthly allowance would make them increase their purchase of FVs (Adenegan and Adeoye, 2011). Lastly, the result showed that the coefficient of price of pineapple was positively significant at 1%. This result suggests that respondents consider pineapple to be a giffen good, hence an increase in the price of pineapple by ₦1 will increase their likelihood of consuming pineapple. The implication is that respondents will more likely consume pineapple when there is an increase in its price. This result corresponds with those of another study which reported that the expenditure on fruits increased with increase in their prices (Ashagidigbi *et al.*, 2019).

3.3.4 Banana

The result showed that the coefficient of sex of respondents was negatively significant at 10%, thus indicating that a change in the sex of respondents from male to female will increase the likelihood of consuming banana. This result indicates that male respondents will consume less of banana than their female counterparts. This result agrees with that of another study which reported that women consumed more banana than their male counterparts (Bechoff *et al.*, 2020). Also, the result revealed that the coefficient of monthly allowance of respondents was negatively significant at 1% level of significance. This result suggests that banana is an inferior good, indicating that an increase in the respondents' monthly allowance by ₦1 will cause them to reduce their consumption of banana. The implication is that respondents with more monthly allowance will less likely consume banana when compared with their counterparts with lesser monthly allowance. This is likely because as income increase, individuals will purchase and consume less of an inferior good. This is however contrary to the findings of another study which reported that banana is a luxury good and undergraduates would purchase more of it when their income increases (Obayelu *et al.*, 2019).

3.3.5 Apple

The result showed that the coefficient of price was negatively significant at 1%, implying that apple is considered by respondents as an ordinary good and as such conforms to the law of demand. It also suggests that an increase in the price of apple by ₦1 will reduce respondents' likelihood of consuming apple. The implication is that respondents will more likely consume more apple when there is a decrease in its price. This result corresponds to that of another study which reported that the high cost of apple deterred respondents from purchasing it, simply because it was considered a fruit for the "Joneses" (Olatona *et al.*, 2018).

3.3.6 Cucumber

The result revealed that the coefficient of age of respondents was negative and statistically significant at the 5% level of significance. This result suggests that an increase in the age of respondents by a year will cause them to reduce their likelihood of consuming cucumber. This, thus shows that younger respondents will consume more of cucumber than their older counterparts. This result is quite odd as it has been proven that consuming cucumber not only slowed down cellular deterioration that are related with age, but it can also fortify the cells of those who consume it (Jat *et al.*, 2021). The result also showed that the coefficient of sex of respondents was negatively significant at 5%, thus indicating that a change in the sex of respondents from male to female will increase the likelihood of consuming cucumber. This result indicates that female respondents will consume more of cucumber than their male counterparts. This is quite similar to the findings of another study which reported that females chose cucumber

more than males simply because they appreciate its refreshing character (Ramirez *et al.*, 2022).

3.3.7 Tomato

The result showed that the coefficient of age of respondents was negatively significant at 5% level of significance. This result indicates that an increase in the age of respondents by 1 year will reduce their likelihood of consuming tomato. This means that younger respondents will likely consume more tomato than their older counterparts. This result is somewhat odd because according to a study, consuming tomato can possibly reduce bone loss that is related with age (Burton-Freeman and Reimers, 2011). The result also revealed that the coefficient of sex of respondents was negatively significant at 5%, thus suggesting that a change in the sex of respondents from male to female will increase the likelihood of consuming tomato. The implication is that males will likely consume less tomato than their female counterparts. This is not far-fetched as tomato is an important kitchen ingredient which is used to prepare various culturally diverse dishes (Burton-Freeman and Reimers, 2011) and females, according to another study are generally the ones who decide on the products for cooking or are mostly the ones cooking (Owureku-Asare *et al.*, 2017). In addition, the result showed that the coefficient of years already spent in attaining formal education was positive and statistically significant at 5%. This indicates that an increase in the years already spent in attaining formal education by respondents by 1 year will increase their likelihood of consuming tomato. This means that respondents who had already spent more years in attaining formal education will likely consume more tomato than their counterparts. This is similar to a study where it was stated that educated fellows regularly consume more novel and healthy foods than their less-educated counterparts (Worsley *et al.*, 2004). Finally, the result showed that the coefficient of monthly allowance was negatively significant at 1%. This suggests that respondents consider this vegetable to be an inferior good, and that an increase in the respondents' monthly allowance by ₦1 will reduce their tendency to consume it. The implication is that with more monthly allowance, respondents will less likely consume tomato. The tendency for youths to purchase and consume less of tomato with an increase in their income or allowance, according to a study is due to the fact that they substitute diets rich in vegetables with fast foods and pastries, when they have an increased income (Olatona *et al.*, 2018).

3.3.8 Onion

The result showed that the coefficient of age of respondents was negatively significant at 5% level of significance. This result implies that an increase in the age of respondents by 1 year will reduce their likelihood of consuming onion. This means that younger respondents will likely consume more onion than their older counterparts. This is similar to a study which reported that younger people consumed more onion than their older counterparts (Khaliukova, 2013). The result in addition showed that the coefficient of monthly allowance was negatively significant at 1%. This suggests that respondents consider onion to be an inferior good, hence an increase in their monthly allowance by ₦1 will reduce their tendency to consume onion. The implication is that with more monthly allowance, respondents will less likely consume onion. This result however contradicts that of another study where it was reported that vegetables are normal goods, hence their consumption would increase with an increase in income (Ogundari and Arifalo, 2013).

3.3.9 Carrot

The result showed that the coefficient of age of respondents was negatively significant at 5% level of significance. This result indicates that an increase in the age of respondents by 1 year will reduce their likelihood of consuming carrot, meaning that younger respondents will likely consume more carrot than their older counterparts. An important reason that can be adduced to this is that consuming carrot at an early age not only has anti-aging benefits but it also has the tendency to protect deficiencies and encourage the normal functioning of cells and bones (FAO, 2001; Varshney and Mishra, 2022). The result also revealed that the coefficient of sex of respondents was negatively significant at 5%, thus suggesting that a change in the sex of respondents from male to female will increase the likelihood of consuming carrot. The implication is that males will likely consume less carrot than their female counterparts. Females consuming more carrots than males could be because carrots are not only eaten raw but can also be boiled, stir-fried or steamed prior to consumption (Bongoni *et al.*, 2015), and females naturally have better knowledge of cooking and are aware that dishes have to be cooked in a certain manner (Bechoff *et al.*, 2020). Furthermore, the result showed that the coefficient of monthly allowance was negatively significant at 10%. This suggests that respondents consider carrot to be an inferior good, and

that an increase in the respondents' monthly allowance by ₦1 will reduce their tendency to consume carrot. The implication is that with more monthly allowance, respondents will less likely consume carrot. This result contradicts that of another study which reported that the consumption of fresh carrots increased with increase in income (Lucier and Lin, 2007). Finally, the result showed that the coefficient of price of carrot was negatively significant at 1%, thus implying that carrot is an ordinary good that obeys the law of demand. The result indicates that an increase in the price of carrot by ₦1 will decrease respondents' likelihood of consuming it. This means that respondents will likely consume more carrot with a fall in its price. This is similar to the findings of another study on demand for fruits which reported that the demand for many of the selected fruits were consistent with economic theory and as such their demand will reduce with an increase in their prices (Obayelu *et al.*, 2019).

3.3.10 Okra

The result showed that the coefficient of age of respondents was negatively significant at 5% level of significance. This suggests that an increase in the age of respondents by 1 year will reduce their likelihood of consuming okra. This means that younger respondents will likely consume more okra than their older counterparts. This result is however contrary to that of another study which reported that young adults spend less on fresh vegetables to be consumed at-home when compared with their older counterparts (Stewart and Lucier, 2009). Finally, the result showed that the coefficient of monthly allowance was negatively significant at 1%. This suggests that respondents consider okra to be an inferior good, hence an increase in the respondents' monthly allowance by ₦1 will reduce their tendency to consume okra. The implication is that with more monthly allowance, respondents will less likely consume okra. This result is similar to that of another study which reported that with an increase in income, there will be a decrease in the expenditure on fresh okra (Khaliukova, 2013).

4. CONCLUSION

This study was carried out to analyse the consumption of FVs among youths in Lagos State, Nigeria. The result concluded that the most consumed fruits and vegetables among youths were orange, watermelon, pineapple, banana, apple, cucumber, tomato, onion, carrot and okra. It also concluded that the frequency of consuming the different FVs among youths varied from once a month to between 1 – 4 times a week. It finally concluded that the major factors that influenced youths' consumption of different FVs were their age, sex, the price of the different FVs and their monthly income/allowance. The study thus recommended that if the health and nutritional security of youths will be guaranteed, then older and male youths must be encouraged to consume FVs. This can be achieved through educational campaigns via television adverts, radio jingles, bulletin promotions, billboards' displays, among other avenues. In addition, since price mostly influenced the consumption of FVs, then pricing policies that will favour the consumption of FVs should be formulated and implemented. This can be achieved through different price support mechanisms that will not only protect the consumption of the most consumed FVs, but that will also encourage the production of FVs. This can also be achieved by reducing the price of FVs relative to less healthy food commodities. Finally, it was observed that monthly income influenced consumption negatively, hence there is a need for a holistic and integrated orientation of youths on the danger of unhealthy eating habits and its impact on their future health. This is necessary to steer youths away from consuming junks and fast foods especially when they experience a boom in their incomes or monthly allowances. It is however noteworthy that implementing these recommendations severally or individually may not fully achieve its intended effects, hence, a combination of the recommendations may be necessary to ensure that the health and nutritional security of youths, who are expected to steer the economic, social and political ship of the country at some point in time, is guaranteed.

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AUTHORS' CONTRIBUTION

Ojedokun A. O. conceived this study, designed the analysis, performed the analysis and wrote the paper, while Lawal Z. A. assisted in the collection of the data used for this study.

CONFLICT OF INTEREST

The authors declare that there have been no competing interests.

REFERENCES

- Adenegan, K.O., and Adeoye, I.B., 2011. Fruit Consumption among University of Ibadan Students, Nigeria. *ARPN Journal of Agricultural and Biological Science*, 6 (6), Pp. 1 – 5.
- Akinleye, S.O., 2009. Food Demand in Northern Nigeria: Implications for Food Policy. *Journal of Social Science*, 18 (3), Pp. 209 – 215.
- Akseer, N., Al-Gashm, S., Mehta, S., Mokdad, A., and Bhutta, Z., 2017. Global and Regional Trends in the Nutritional Status of Young People: A Critical and Neglected Age Group. *Annals of the New York Academy of Sciences*, 1393 (1), Pp. 3 – 20. DOI: 10.1111/nyas.13336
- Aliyu, A.A., and Amadu, L., 2017. Urbanization, Cities, and Health: The Challenges to Nigeria – A Review. *Annals of African Medicine*, 16 (4), Pp. 149 – 158. DOI: 10.4103/aam.aam_1_17.
- Ashagidigbi, W.M., Adebayo, A.S., and Salau, S.A., 2019. Analysis of the Demand for Fruits and Vegetables among Households in Nigeria. *Science Letters*, 7 (2), Pp. 45 – 51.
- Ayeni, A.O., 2017. Increasing Population, Urbanization and Climatic Factors in Lagos State, Nigeria: The Nexus and Implications on Water Demand and Supply. *Journal of Global Initiatives: Policy, Pedagogy, Perspective*, 11 (2), Pp. 6.
- Bechoff, A., Forsythe, L., Njau, M., Martin, A., Audifas, G., Abass, A., and Tomlins, K., 2020. Women Eat More Rice than Banana: The Influence of Gender and Migration on Staple Food Choice in East Africa. *Ecology of Food and Nutrition*, 59 (5), Pp. 506 – 524. <https://doi.org/10.1080/03670244.2020.1755278>
- Bongoni, R., Verkerk, R., Dekker, M. and Steenekkers, L.P.A., 2015. Consumer Behaviour Towards Vegetables: A Study on Domestic Processing of Broccoli and Carrot by Dutch Households. *Journal of Human Nutrition and Dietetics*, 28 (3), Pp. 219 – 225. DOI: 10.1111/jhn.12245
- Bundy, D.A.P., de Silva, N., Horton, S., Patton, G.C., and Jamison, D.T., 2017. *Child and Adolescent Health and Development. Disease Control Priorities (Third edition), Volume 8.* Washington, DC: World Bank. DOI: 10.1596/978-1-4648-0423-6. License: Creative Commons Attribution CC BY 3.0 IGO.
- Burton-Freeman, B., and Reimers, K., 2011. Tomato Consumption and Health: Emerging Benefits. *American Journal of Lifestyle Medicine*, 5, Pp. 182 – 191. DOI: 10.1177/1559827610387488
- Caprille, A., and Rossi, R., 2021. International Year of Fruits and Vegetables: At a Glance. *European Parliamentary Research Service*, PE 689, Pp. 367.
- Choudhary, B.R., Haldhar, S.M., Maheshwari, S.K., Bhargava, R., and Sharma, S.K., 2015. Phytochemicals and Antioxidants in Watermelon (*Citrullus lanatus*) Genotypes under Hot Arid region. *Indian Journal of Agricultural Sciences*, 85 (3), Pp. 414 – 417.
- Ecker, O., Brown, T., and Andam, K.S., 2021. Transforming Nigeria's Agrifood System: Wealthier, but also Healthier. IFPRI Policy brief. International Food Policy Research Institute, Washington, DC. DOI: <https://doi.org/10.2499/9780896294219>
- Ecker, O., Comstock, A., Babatunde, R., and Andam, K., 2020. Poor Dietary Quality Is Nigeria's Key Nutrition Problem. FSP Policy Research Brief 119. East Lansing, MI: Michigan State University. <https://www.canr.msu.edu/fsp/publications/PB%20119.pdf>
- Fadeyi, E.O., Popoola, B.R., Emuoke, D.K., Adeoye, T.A., and Ogundana, M.T., 2019. Factors Influencing Fruit Consumption among Undergraduates in Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria. *Ife Journal of Agriculture*, 31 (2), Pp. 80 – 89.
- Federal Ministry of Youth and Sports Development, 2019. National Youth Policy: Enhancing Youth Development and Participation in the Context of Sustainable Development. Federal Republic of Nigeria. Pp. 111.
- Food and Agriculture Organization (FAO), 2001. Human Vitamin and Mineral Requirements. Report of a Joint FAO/WHO Expert Consultation, Bangkok, Thailand. Food and Agriculture Organization of the United Nations. <http://www.fao.org/3/a-y2809e.pdf>, (accessed February 21, 2017)

- Food and Agriculture Organization of the United Nations (FAO), 2021. International Year of Fruits and Vegetables 2021 – Global Action Plan. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy. Pp. 12.
- Global Panel on Agriculture and Food Systems for Nutrition, 2016. Food Systems and Diets: Facing the Challenges of the 21st Century. London, UK
- Hernosa, S.P., Siregar, L.A.M., Hanum, C., and Supriana, T., 2021. Conjoint Analysis of Consumer Preferences for Pineapple Fruit in Labuhan Batu District, North Sumatra. IOP Conference Series: Earth and Environmental Science, 892, Pp. 1 – 7.
- Hong, S.A., Kim, K., and Kim, M.K., 2012. Educational Attainment and Differences in Fruit and Vegetable Consumption among Middle-aged Adults in the Korean National Health and Nutrition Examination Survey IV. Nutrition Research and Practice, 6 (3), Pp. 263 – 269. <http://dx.doi.org/10.4162/nrp.2012.6.3.263>
- Huang, H.C., 1999. Estimation of SUR Tobit Model via the MCECM Algorithm. Economics Letters, 64 (1), Pp. 25 – 30.
- Huang, H.C., Sloan F.A., and Adamache, K.W., 1987. Estimation of Seemingly Unrelated Tobit Regressions via the EM Algorithm. Journal of Business and Economic Statistics, 5 (4), Pp. 425 – 430.
- Jat, G.S., Behera, T.K., Lata, S., and Kumar, S., 2021. Classical Genetics and Traditional Breeding in Cucumber (*Cucumis sativus* L.). In: (Edr. Haiping Wang) Cucumber Economic Values and Its Cultivation and Breeding. DOI: 10.5772/intechopen.97593
- Keats, E.C., Rappaport, A.I., Shah, S., Oh, C., Jain, R., and Bhutta, Z.A., 2018. The Dietary Intake and Practices of Adolescent Girls in Low- and Middle-Income Countries: A Systematic Review. Nutrients, 10 (10), Pp. 1 – 14. DOI:10.3390/nu10121978
- Khaliukova, O., 2013. Demand Analysis for Tomato, Onion, Peppers, and Fresh Okra in Nigeria. Master's Thesis, University of Tennessee http://trace.tennessee.edu/utk_gradthes/2616
- Laursen, B., and Veenstra, R., 2021. Toward understanding the functions of peer influence: A summary and synthesis of recent empirical research. Journal of Research on Adolescence, 31 (4), Pp. 889 – 907.
- Layade, A.A., and Adeoye, I.B., 2014. Fruit and Vegetable Consumption among Students of Tertiary Institutions in Oyo State. Russian Journal of Agricultural and Socio-Economic Sciences, 30 (6), Pp. 3 – 8. DOI: 10.18551/rjoas.2014-06.01.
- Lucier, G., and Lin, B., 2007. Factors affecting Carrot Consumption in the United States. Outlook Report No. VGS-319-01, US Department of Agriculture, Economic Research Service, March 2007. Pp. 22. <http://www.ers.usda.org/pulications/vgs/2007/03Mar/VGS31901/>
- Macrotrends, 2022. Lagos, Nigeria Metro Area Population 1950 – 2022. <https://www.macrotrends.net/cities/22007/lagos/population#:~:text=The%20current%20metro%20population,a%203.34%25%20increase%20from%202019.> (Accessed on 22/08/2023)
- MyPlate, 2011. Fruits – Health Benefits and Nutrients. US Department of Agriculture. 8 September, 2013 <http://www.choosemyplate.gov/food-groups/fruits-why.html>
- Nwamarah, J.U., Otitoju, G., and Taiwo, O., 2014. Fruit and Vegetable Consumption Pattern and Health Challenges of Elderly (≥60 years) Staff in the University of Nigeria, Nsukka and Enugu Campuses: A Case Study. Pakistan Journal of Nutrition, 13 (11), Pp. 626 – 630.
- Obayelu, O.A., Ibe, R.B., Adegbite, O., and Oladimeji, A., 2019. Demand for Selected Fruits among Students of a Tertiary Institution in Southwest Nigeria. International Journal of Fruit Science, 19 (1), Pp. 45 – 56. DOI: 10.1080/15538362.2018.1533911
- Ogundari, K., and Arifalo, S.F., 2013. Determinants of Household Demand for Fresh Fruit and Vegetable in Nigeria: A Double Hurdle Approach. Quarterly Journal of International Agriculture, 52 (3), Pp. 199 – 216.
- Olatona, F., Sosanya, A., Sholeye, O., Obrutu, O., and Nnoaham, K., 2018. Knowledge of Fruits and Vegetables, Consumption Pattern and Associated Factors among Adults in Lagos State, Nigeria. Research Journal of Health Science, 6 (2), Pp. 50 – 62.
- Onyeji, G.N., and Ejike, C.E.C.C., 2020. Nutritional Knowledge, Fruits and Vegetables Consumption Patterns, among Undergraduates Students of Alex Ekwueme Federal University Ndufu-Alike, Ikwo (AEFUNAI). Journal of Dietitians Association of Nigeria, 11 (1), Pp. 34 – 44.
- Owureku-Asare, M., Ambrose, R.P.K., Oduro, I., and Tortoe, C., 2017. Consumer Knowledge, Preference, and Perceived Quality of Dried Tomato Products in Ghana. Food Science and Nutrition, 5, Pp. 617 – 624. DOI: 10.1002/fsn3.439
- Raaijmakers, I., Snoek, H., Maziya-Dixon, B., and Achterbosch, T., 2018. Drivers of Vegetable Consumption in Urban Nigeria: Food Choice Motives, Knowledge, and Self-Efficacy. Sustainability, 10 (10), Pp. 1 – 14. DOI: 10.3390/su10124771
- Ramirez, J.L., Hampton, A., and Du, X., 2022. Examining the Consumer View of Refreshing Perception, Relevant Fruits, Vegetables, Soft Drinks, and Beers, and Consumer Age and Gender Segmentations. Food Science and Nutrition, 10, Pp. 2516 – 2531. DOI: 10.1002/fsn3.2857
- Sachdeva, S., Sachdeva, T.R., and Sachdeva, R., 2013. Increasing Fruit and Vegetable Consumption: Challenges and Opportunities. Indian Journal of Community Medicine, 38 (4), Pp. 192 – 197. DOI: 10.4103/0970-0218.120146
- Silva, O.O., Ayankogbe, O.O., and Odugbemi, T.O., 2017. Knowledge and Consumption of Fruits and Vegetables among Secondary School Students of Obele Community Junior High School, Surulere, Lagos State, Nigeria. Journal of Clinical Science, 14, Pp. 68 – 73.
- Stewart, H., and Lucier, G., 2009. Younger Consumers Exhibit Less Demand for Fresh Vegetables. Outlook Report No. VGS-333-01, US Department of Agriculture, Economic Research Service, August 2009. Pp. 15.
- Tangwa, G.B., Abayomi, A., Ujewe, S.J., Munung, N.S., Idris, J., and Fagbenro, A., 2019. Lagos the Mega-City: A Report on How the Metropolis Handled an Outbreak of the Ebola Epidemic. Socio-cultural Dimensions of Emerging Infectious Diseases in Africa, Pp. 281 – 298. DOI: 10.1007/978-3-030-17474-3_21
- Tavassoli, E., Ramezankhani, A., Mirmiran, P., Mehrabi, Y., and Hafez, A.A., 2015. Knowledge and Perceptions of Obesity Prevention and Consumption of Fruits and Vegetables among High School Girl Students in Shahrekord. British Journal of Medicine and Medical Research, 6 (2), Pp. 200 – 211.
- Tobin, J., 1958. Estimation of Relationships for Limited Dependent Variables. Econometrica, 26 (1), Pp. 24 – 36.
- Trivedi, P.K., and Zimmer, D.M., 2005. Copula Modeling: An Introduction for Practitioners. Foundations and Trends in Econometrics, 1 (1), Pp. 1 – 111.
- Varshney, K., and Mishra, K., 2022. An Analysis of Health Benefits of Carrot. International Journal of Innovative Research in Engineering and Management, 9 (1), Pp. 211 – 214. <https://doi.org/10.55524/ijirem.2022.9.1.40>
- World Health Organization (WHO), 2014. Promoting Fruit and Vegetable Consumption around the World. Information sheet. 31st October 2014. <http://www.who.int/dietphysicalactivity/en/index>
- World Health Organization (WHO), 2017. Global Accelerated Action for the Health of Adolescents (AA-HA!): Guidance to Support Country Implementation. Geneva: World Health Organization. License: Creative Commons Attribution CC BY-NC-SA 3.0 IGO.
- Worsley, A., Rowswitha, B., Ball, K., and Crawford, D., 2004. The Relationship Between Education and Food Consumption in the 1995 Australian National Nutrition Survey. Public Health Nutrition, 7 (5), Pp. 649 – 663. DOI: 10.1079/PHN2003577