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Demand Analysis of Fruits and Vegetables on Consumers' Behaviour in Ekiti State, Nigeria

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Abstract **– The study analyzed the demand for fruits and vegetables on buying behaviours in Ekiti State, Nigeria. Specifically, the study described the relevant socio-economic characteristics of the respondents in the study area, itemized the major fruits and vegetables demanded by the respondents and determined the factors influencing consumer behaviours of the respondents. Multi-stage sampling techniques was used to select 90 respondents from the total population of civil servants in Ekiti State. While 45 respondents were selected from high income earners, 45 respondents were also selected from low-income earners. The data were collected through the use of pre-tested questionnaire. Results were analyzed using appropriate descriptive statistics and Ordered Tobit regression analysis. From the result, it was revealed that male respondents dominated civil service work force in Ekiti State, Nigeria and fruits and vegetables were consumed by people of different ages. The respondents were well educated and had varying monthly salaries which a certain part of it was spent on fruits and vegetables. The study also revealed that watermelon, apple, plantain/ banana and citrus were the mostly consumed fruits while pepper and onion were reported to be mostly consumed vegetables in the study area. Result from Ordered Tobit regression revealed that age with (p-value of 0.078), years of service (0.000), price of fruits (0.073) and vegetables (0.005) were statistically significant implying that these variables played key roles in influencing frequency of purchase of fruits and vegetables. Based on the findings obtained in the study, it is suggested that civil servants should endeavour to consume more fruits and vegetables because of its benefits to their health and government should endeavour to increase the salary of workers so as to increase the demand of fruits and vegetables in the market.**

Keywords **– Demand, Fruits, Vegetables, Ordered Tobit.**

I. INTRODUCTION

Fruits and vegetables are rich in vitamins, minerals, and dietary fiber and are also low in calorie required for the normal functioning of human body. The micronutrients supplied by fruits and vegetables are also vital for the optimal functioning of the gastro-intestinal tract as they also enable the body to use other nutrients required for its normal function like energy from fats and carbohydrate (Ibe *et. al.*,2019).

Fruits provides nutritionally important quantities of the water-soluble vitamins, especially folic and ascorbic acids, carotene (the precursor of vitamin A), and minerals. Nutritionists have advised that eating at least five portions of fruits and vegetables a day can help people to maintain good health throughout their lives, protecting them from heart disease and cancer, type 2 diabetes and kidney stones (Babatunde *et. al.*, 2016).

Vegetables are a common crop in Nigeria, grown and consumed by different groups of farmers. According to Adeoye, 2005, the system for sustainable vegetable production should increase the inherent productive capacity of natural and biological resources in step with demand. The use of chemicals in vegetable production has been identified as a major source of health risk and a cause of extensive environmental damage. According to Lumpkin, 2005, food safety is a major concern as many of today's vegetable farmers inappropriately use toxic pesticides at pre- and post-harvest stages and this threatens the health of the farmer and consumers as well as

contaminating the environment. Lumpkin argues that everyone (rich or poor), must have access to safe vegetables. The reduction of the use of chemical inputs through the adoption of organic agricultural production methods will help achieve these goals. In Nigeria however, organic agriculture had existed by default because of the unavailability and sparse use of chemical inputs by farmers. Others adopt the use of animal droppings as manure Dipeolu *et. al.*, 2005 and Dipeolu *et. al.*, 2006. Indeed, Scialabba, 2014 notes that non-certified organic systems (indigenous models that follow organic principles by intent or by default) of several million small farmers may represent at least an equivalent share in subsistence agriculture of developing countries. The most significant motive for choosing organic food is the health factor followed by the environmental and animal welfare factors. Some consumers buy organic food as they perceive a difference in food quality.

Despite the nutritional importance of fruits and vegetables, their intake is still far below the minimum recommendation of the World Health Organization (WHO) of 400g per capita per day (Pem and Jeewon, 2015) in both developed and developing countries. According to a FAO report (2013), combined annual fruit and vegetable consumption in Africa is less than 100kg per person, which amounts to 250g per person per day. Increased consumption of fruits and vegetables has been recommended as a key component of a healthy diet for the prevention of non-communicable chronic diseases. Low consumption of fruits and vegetables has also been ranked the sixth major risk factor for mortality in the world (Ibe *et. al.*, 2019).

Research has provided convincing evidence to support the premise that diets rich in vegetables confer health benefits and may even be protective against the risk of different types of diseases such as cancer, stroke and diabetes. According to Ohen *et. al.*, 2014, there is an increased awareness of the importance of a healthy diet and positive perception of fruits and vegetables. There is a great amount of research work attributed to the attitudes of consumers towards safe food, both in broad sense and with a particular accent towards organic fruits and vegetables.

However, a rapid growth in demand and production of these food categories necessitate continuous research in order to document and understand the evolution of the markets. The necessity to investigate consumer's attitudes towards these food categories is even more expressed in the case of countries where the corresponding markets have emerged only relatively recently. In this case, the underlying knowledge regarding consumer attitudes, perception and behaviour in relation to fruits and vegetable is rather insufficient.

Hence, the key factors influencing purchase of safe fruits and vegetables in Nigeria were income, pesticide residue awareness, education and age whereas consumer's willingness to pay (WTP) for pesticide-free fresh fruits and vegetables was significantly and positively related to income and risk concern and negatively related to education (Ohen *et. al.*,2014).

II. METHODOLOGY

Study Area

The study was conducted in Ekiti State, Nigeria. The State is located in the south western part of Nigeria between latitude 7.667° N and longitude 5.250° E with the capital at Ado-Ekiti. The State is bounded in the north by Kwara State and Kogi State while Osun State occupies the west and Ondo State lies in the south and extends to the eastern part. Ekiti State has 16 Local Government Areas (LGAs) with an overall population of about 2,384,212 people (NPC, 2006) that spread over an approximately 5887.890 km^2.

The region lies at about 250m above sea level and it is characterized by tropical type of climate with the dry season between November and March while the wet season is within March-October of each year. The mean monthly temperature is between 21 °C and 28 °C with high humidity; however, the peak temperature may be higher in the northern area of the State compared to the cooler and wetter south where a more tropical rain forest is found. It is a landlocked State with no coastal boundary, but it is blessed with water resources which include rivers like Ero, Osun, Ose and Ogbese.

Crops produced in the State include cocoa, oil palm, kola, cassava, yam, maize and some fruits and vegetables. Major fruits produced in the State include oranges, grape, lemon, tangerine, plantain/banana, mango, pineapple, pawpaw, walnut, albidium (*agbalumo*) etc. Major vegetables include pepper, tomato, amaranthus, okra, melon, water leaf, bitter leaf, egg plant fluted pumpkin.

Sampling Procedure

The research population comprised of male and female civil servants in Ekiti State. The study adopted a multistage sampling technique. The samples were drawn from a stratified sampling technique which was employed and respondents were randomly selected from each. The two strata identified were: the high- and low-income level (high income earners, grade level 07-15 and low-income earner grade level 01-06. A total of 90 questionnaires were administered, 45 among high income earners and 45 among low income earners.

Data Collection

The primary data set used in this study was collected by administering a pre-tested questionnaire on the sampled civil servants. Information was sought on; socio-economic characteristics of the respondents, major fruits and vegetables demanded and factors influencing demand for fruits and vegetables in the study area.

Data Analysis

Descriptive statistics, such as frequencies count and simple percentages was used the socio-economic characteristics of the respondents and the major fruits and vegetables being demanded for in the study area while ordered probit model was used to analyze the factors influencing demand fruits and vegetables in the study area.

Ordered Tobit Regression Model

The model specification developed is known as consumers' choice model and this model satisfactorily fulfills the criterion which falls within the group of models of qualitative choice. The ordered probit model can be specified as a latent regression thus:

$$Y_1^* = \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \varepsilon_i$$

Where Y_1 = Frequency of Monthly Purchase (This was achieved by dividing the number of purchases made in a month by 31 days).

β = Vector of unknown parameters.

X_1 = Other competing items (Number).

X_2 = Respondent's marital status (Single, married, divorced).

X_3 = Age of the respondent (years).

X_4 = Household size (number).

X_5 = Educational status of the respondents (Years spent in school).

X_6 = Respondent's monthly income (Naira).

X_7 = Number of years in service (Years).

X_8 = Position/ level of respondents (Grade/Step).

X_9 = Price of vegetables (Naira).

X_{10} = Price of fruits (Naira).

ε_i = Error term.

III. Results and Discussion

Socio-Economic Characteristics of the Respondents

Result of socio-economic characteristics of the respondents in the study area is presented in Table 1. It revealed that58.9% of the total respondents sampled were male, indicating that male personnel dominated civil service in Ekiti State. While 40.0% of the respondents were between the ages of 30-40 years, implying that civil service work force is dominated by young people who could be considered to be well educated about the benefits inherent in eating fruits and vegetable. Mean age of the respondents was about 44.5 years, implying that the respondents were young and could still consume both fruits and vegetables. This agrees with Owoeye *et. al.*, 2017 on a study carried out willingness to pay for organic vegetable in Ado Ekiti metropolis, who concluded that 78.3% of the respondents interviewed were less than or equal to 40 years.

The result of educational level of the respondents revealed 81.1% of the respondents had tertiary education, indicating that they were likely to appreciate the importance of fruits and vegetable intake. The result further revealed household size of the respondents, revealing that 56.7% of the respondents had between 4-6 persons in their household while the mean value of 5 persons per household was recorded. The household size is fairly large which may likely increase the quantity of fruits and vegetable consumed. The result further revealed that ₦67,571.43 was the mean monthly income of the respondents, indicating that the consumers could comfortably afford to buy fruits and vegetable.

Result on year spent in service by the respondents showed that 42.2% of the respondents had spent between 6-10 years in service while the mean value of 11.5 years was obtained as years spent in services, meaning that the respondents were experienced in terms of what to consume especially the fruits and vegetables, and thereby improving the demand for fruits and vegetables while 51.1% of the respondents were senior officer category, and it is believed that their salaries would be improved better than the junior officers thereby increasing their demand for fruits and vegetables.

The result further showed that a mean value of ₦1642.86 was spent by the respondents on monthly basis on vegetables while a mean value of ₦1,213.33 was spent of fruits on monthly basis. This is an indication that the respondents knew the benefits of consuming fruits and vegetables.

Table 1. Analysis socio-economics characteristics of the respondents.

Variable	Frequency	Percentage	Mean	Minimum	Maximum
Sex					
Male	53	58.9			
Female	37	41.1			
Age			44.5	25	101
Below 30	3	3.3			
30 – 40	36	40.0			
41 – 50	25	27.8			
51 – 60	25	27.8			
Above 60	1	1.1			
Educational Level					
No formal education	8	8.9			
Primary education	5	5.6			
Secondary education	4	4.4			
Tertiary education	73	81.1			
Household Size			5	1	10
1 – 3	16	17.8			
4 – 6	51	56.7			
7 – 9	2	23.3			
10	2	2.2			
Monthly income (~~N~~)			67,571.43	10,000	150,000
< 50,000	33	36.7			
50,000 – 99,000	34	37.8			
100,000 – 150,000	23	25.6			
Medical Advise					
Yes	38	42.2			
No	52	57.8			
Marital Status					
Single	8	8.9			
Married	81	90			
Widowed	1	1.1			
Years in Service			11.15	1	25
1 – 5	16	17.8			
6 – 10	38	42.2			

Variable	Frequency	Percentage	Mean	Minimum	Maximum
11 – 15	15	16.7			
16 – 20	18	20.0			
21 – 25	3	3.3			
Staff category					
Junior staff	44	48.9			
Senior staff	46	51.1			
Amount spent on Vegetables (₦)			1642.86	200	5000
<1000	15	16.7			
1000 – 1999	33	36.7			
2000 – 2999	33	36.7			
3000 – 4000	6	6.7			
> 4000	3	3.3			
Amount spent on Fruits (₦)			1213.33	100	5000
<500	11	12.2			
500 – 1000	64	71.1			
> 1000	15	16.7			
Amount incurred on fruits and vegetables (₦)					
<2500	19	21.1			
2500 – 5000	56	62.2			
> 5000	15	26.7			

Source: Field Survey, 2021.

Major Fruits and Vegetables Demanded

The result of major fruits and vegetables available in the study area is presented and reported in multiple responses form in Table 2 below where 51.1% of respondents purchased citrus as their major fruits, 32.2% respondents demanded for mango, 73.3% of the respondents opted for banana/plantain, 34.4% of the respondents demanded for paw-paw, 62.2% of respondents chose apple as their favourable fruits, 46.7% respondents chose waterleaf as the major vegetables, 62.2% of the respondents majorly demanded for onions, 44.4% of respondents chose okra as the major vegetable, 72.2 and 76.7 % of respondents admitted that pepper and tomato were majorly demanded, 41.1% respondents indicated melon as major fruit, 30% of respondents' major fruits was spinach, 35.5% of respondents often demanded bitter leaf, while 77.8% of respondents' major fruit demanded for was water melon.

From the above result, the study showed variability in terms of preference, taste, visual attractiveness, price of the product, health, safety considerations, perception and income level, health safety consideration of

respondents as informed by their decision to consume certain fruits and vegetable sources of preference to others. Consequently, the survey showed that four most fruits consumed were citrus, banana/plantain, apple, and water melon, while the three least consumed fruits were mango, paw-paw, and spinach. Similarly, the two most consumed vegetables were onions and pepper, while waterleaf, melon and bitter leaf were reported as the least consumed vegetables. The result of major fruits and vegetables available in the study area is presented and reported in multiple responses form in Table 2 below where 51.1% of respondents purchased citrus as their major fruits, 32.2% respondents demanded for mango, 73.3% of the respondents opted for banana/plantain, 34.4% of the respondents demanded for paw-paw, 62.2% of respondents chose apple as their favourable fruits, 46.7% respondents chose waterleaf as the major vegetables, 62.2% of the respondents majorly demanded for onions, 44.4% of respondents chose okra as the major vegetable, 72.2 and 76.7 % of respondents admitted that pepper and tomato were majorly demanded, 41.1% respondents indicated melon as major fruit, 30% of respondents' major fruits was spinach, 35.5% of respondents often demanded bitter leaf, while 77.8% of respondents' major fruit demanded for was water melon.

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Table 2. Major fruits and vegetables demanded by respondents.

S/N	Fruits and Vegetable	Frequency	Percentage (%)
1	Citrus	46	51.1
2	Mango	29	32.2
3	Banana/Plantain	66	73.3
4	Paw-Paw	31	34.4
5	Apple	56	62.2
6	Water leaf	42	46.7
7	Onions	56	62.2
8	Okra	40	44.4
9	pepper	65	72.2
10	Melon	37	41.1
11	Spinach	27	30
12	Bitter leaf	32	35.6
13	Water melon	70	77.8
14	Tomato	69	76.7

Source: Field Survey, 2021 (Multiple responses).

Factors Influencing Demand for Fruits and Vegetables on Consumer Behaviours

Ordered Tobit regression analysis was performed to determine the factors that influenced consumer demand behaviour for fruits and vegetables in the study area. The likelihood estimates of the ordered Tobit model indicated that chi-square (χ^2) statistic of 71 was highly significant ($P<0.05$) suggesting that the model has a strong explanatory power. The pseudo coefficient of multiple determination (R^2) showed that 74 percent variation in the dependent variable was explained by the included independent variables. This implies that the model showed a good fit to the data. The result revealed that age, years of service, price of fruits and price of vegetable coefficients were statistically significant at 10%, 1%, 10% and 1% level respectively. This implies that these four variables played a significant role in influencing frequency of demand of fruits and vegetables among civil servants in the study area. This contradicts to the study of Owoeye *et. al.*, 2017 who concluded that household size, educational level and monthly income were the factors responsible for consumers' willingness to pay for organic vegetable in Ado Ekiti Metropolis.

The result further showed that category of staff, years of service, educational level and monthly income had positive relationship with frequency of monthly purchase of fruits and vegetables, meaning that a unit increase in these positively correlated variables would enhance frequency of purchase of fruits and vegetables while price of fruits, price of vegetables, marital status, age, other competing items and household size were negatively related with frequency of purchase of fruits and vegetables, implying that a unit increase in these variables would bring about a decrease in frequency of purchase of fruits and vegetables in the study area.

Table 3. Ordered Tobit estimates for determinants of demand behaviour for fruits and vegetables.

Variables	Coefficients	Std. Error	P-Value
Monthly Income	1.77e-14	3.15e-14	0.574
Other competing items	-6.56e-10	1.58e-09	0.678
Age	-1.86e-10*	1.04e-10	0.078
Educational level	6.77e-11	9.86e-10	0.945
Household	-4.77e-10	5.01e-10	0.344
Marital status	-2.89e-09	2.54e-09	0.259
Years of service	0.0322581***	2.07e-10	0.000
Category of staff	2.99e-10	2.05e-09	0.885
Price of fruits	-1.57e-12*	8.63e-13	0.073
Price of vegetables	-3.55e-12***	1.23e-12	0.005
Constant	-2.74e-09	7.22e-09	0.705

Chi-square = 71.0071, Prob(X^2) = 0.0000, Log likelihood = 1546.3848, Pseudo R^2 = 74.0116.

***and * = 1%and 10% level of significance respectively.

Source: Field Survey, 2021.

IV. CONCLUSION AND RECOMMENDATIONS

From the study, it was concluded that male respondents dominated civil service work force in Ekiti State, Ni-

-geria and fruits and vegetables were consumed by people of different ages. The respondents were well educated and had varying monthly salaries which a certain part of it was spent on fruits and vegetables. The study also concluded that watermelon, apple, plantain/ banana and citrus were the mostly consumed fruits while tomato, pepper and onion were reported to be mostly consumed vegetables in the study area. It was also concluded from the study that price of vegetables, price of fruits, years of service and age were the factors greatly influencing demand for fruits and vegetables in the study area. Based on the findings obtained in the study, it is therefore suggested that civil servants should endeavour to consume more fruits and vegetables because of its benefits to their health. More fruits and vegetables should be supplied to the markets by the farmers so as to meet the demand of the buyers. Government should endeavour to increase the salary of workers so as to increase the demand of fruits and vegetables in the market.

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Dr. O.A. Aturamu, was born in Akure, Nigeria on August 19, 1966. He obtained his B. Tech. Animal Production and Health from the prestigious Federal University of Technology, Akure, Nigeria in I988. He bagged an M.Sc degree in Agricultural Economics from University of Ibadan in 1991 and a PhD in Agricultural Economics from Federal University of Technology, Akure in 2004. He was fully employed in College of Education, Ikere-Ekiti, Nigeria from 1993 to 2020 when the College was upgraded to Bamidele Olumilua University of Education, Science and Technology Ikere-Ekiti. He is currently an Associate Professor and Acting Dean, School of agriculture and agricultural technology in the University. He has published many articles in both Local and International journals.

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