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TRADE-OFF IN CONSUMPTION OF IMPORTED AND TRADITIONAL OWN FOODS AMONGST IGBO FARM HOUSEHOLDS IN NIGERIA

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Abstract

Changing demand against locally produced foods amongst Igbo farm households in South-eastern Nigeria is in the increase. Food items such as rice, fish, and poultry products are among imported foods that presently challenge consumer preferences. It is pertinent across farm household ages and income groups to determine factors that inform trade-off in consumption of imported foods which types are locally produced. A survey of the core Igbo states was carried out following a multi-stage cluster sampling method that selected five of the seven States that are traditional home of the Igbos. A total of 480 farm households were chosen as panel of respondents from whom socio-economic and food consumption information was gathered using a mixture of methods. Data on protein and carbohydrate intakes were gathered by interviewing each household member except infants on the food consumed on a 48–hour-recall approach. The analysed data revealed that foods produced included roots, tubers, cereals, legumes, fats and oil, fish, meat, eggs, fruits, vegetables, and spices. There were significant differences between value of annual per capita nutrition gaps in intake of energy foods and protein (respectively) by Children, Adolescents and Adults in the farm households. The age of the household head was a factor that positively favoured consumption of own foods against their imported brands. The study recommended that households should patronize own products and call for change of tastes, preferences and value as well as adjust their production plans to produce more legumes in their product mix.

Key words**:** *consumption attitude, own products, imported foods, Igbos, Nigeria*

INTRODUCTION

With increasing globalization, spread in education and travels by human population, the lifestyles are seriously changing especially in feeding within and across geographical areas with limited diversity in food products. In south-eastern Nigeria with dominance of starchy roots and tuber crops (21 species), vegetables (116 species), legumes (20 species), nuts/seeds (21 species), fruits (36 species) and 12 species of mushroom [20], spending on foods by rural households has joined this trend especially with exposure to risk of consuming imported foods. This is either in preference or complement to farmers' own products. This changing demand for locally produced foods in South-eastern Nigeria seem likely to be shaped by same factors that have affected developed country's demand for their own locally produced products. These factors amongst others include food availability, seasonality, affordability, convenience, tastes and health concerns. [4] have recognized that there is a trade-off in food choices of wealthy educated households between tastes and health concerns.

Full community participation is needed to understand reasons, plans to alter quality of local products and positively influence their consumption by households especially those involved in producing them. This requires good understanding of customary values of indigenous foods and changing of the attitudes of people who least prefer them to the more or less instant foods imported into the country (especially inmates of the farm households). Most imported foods come into global markets in their processed forms which obviously have elements of value addition. In Nigeria and other less developed economies, low-income and relatively less educated households dominate settlements in the rural areas and inhabitants feed mainly on less healthy diets. This might be as attributed to

relatively high cost of the healthy foods [7,12], while consumption of the better diets by educated consumers often domicile in urban areas are attributed to having superior health knowledge [8, 25].

Amongst the Igbos, it is glowing penchant to brag of feeding and clothing on foreign made items. [5] observed that Nigerian consumers rated made-in-Nigeria products lower than products made in more economically developed nations on basis of superior reliability and technological advancements. Certain food items such as rice, fish, and poultry products are among imported foods that are presently challenging consumer preference for their local production. This has adversely affected the foreign exchange reserve and contribution of Agriculture to the Gross Domestic Product (GDP), and worsened the per capita income of the farmers. Malnutrition cases especially in the rural areas have also been recorded [10].

There is the problem of rural-urban interactions [19] influencing consumption of locally produced foods. What happens to consumption in urban areas gradually has a way of being transmitted to people producing foods in the rural areas and vice versa. Problems faced by producers in developing economies have much to draw from their household socio-economic, cultural, and ecological factors as well as the behaviour of consumers [16] especially when considered in the contemporary shifts of macro-economic transformations and value-chain reforms [8]. Unavoidable increases in population within the core Igbo states with fragile soils, declining land-man ratios, changing patterns in traditional occupation, and exposure of the people to foods from other areas of the country and abroad are encouraging trade-off in consumption of local species and varieties of foods as well with other foods purchased and brought into the area by traders.

This study was to analyze the consumption attitudes of farm households in Igbo rural communities to their own produced foods and to such brand of foods imported into Nigeria. Specifically the study:

(i)identified traditional foods produced locally and their nutritional content;

(ii)estimated the annual per capita nutrition gaps in protein and energy food intakes of children, adolescents and adults of the Igbo rural households;

(iii)determined factors that inform trade-off in consumption of imported foods which types are produced traditionally by Igbo rural households.

MATERIALS AND METHODS

Study Area

This study was carried out in core Igbo inhabited south eastern states of Nigeria. A region located between Latitudes 4^0 $10^/$ N and 7^0 $05^/$ N of the Equator and Longitudes 7^0 $08^/$ E and 9^0 $15^/$ E of the Greenwich Meridian. The Igbos, is a race that number over 23 million with population densities ranging from 300 to over 1,000 persons per square kilometre, and the highest in West Africa dominate the South-eastern Nigeria [18]. Permanent Igbo settlements are widely distributed in six ecological areas within the Igbo culture area. These comprise: the southern half of the scarp lands of South Eastern Nigeria, the southern half of the lower Niger basin, the Midwest lowland, the Niger Delta, the Palm Belt of South-eastern Nigeria and the Cross River Basin [20]. In the present structure of Nigeria into states, these permanent Igbo settlements are in Abia, Anambra, Ebonyi, Enugu, Imo and parts of Delta, and Rivers States of Nigeria.

Sampling Technique

This study adopted a cluster sampling method that selected five of the seven States that are traditional home of the Igbos. The chosen States were Abia, Anambra, Ebonyi, Enugu and Imo. From each of the chosen States, two agrarian local Government Areas (LGAs)-one from the North and the other from the southern part of the state were randomly selected to ensure adequate coverage of the states. The chosen LGAs are: Bende and Ukwa West from Abia State; Ohaji and Obowu from Imo State; Onitsha North and Awka South from Anambra State; Ezza North and Ivo from Ebonyi State; Enugu North and Udi from Enugu State. Two (2) agrarian communities were selected from each chosen

LGA. The communities involved following the above sequence were Akoli Imenyi, Itumbuzo, Omuma Uzo, Umuekechi; Obosima, Avu, Avutu, Otoko; Atani, Odekpe, Umuatu Nibo, Ekwulobia; Ezza, Ngwo, Ishiagu, Mile 2; Obolo, Obolo Afor, Obinagu, and Eke; This gave a total of twenty (20) communities involved in this study. With the assistance of Agricultural Block Extension Supervisors (BES) in the chosen LGAs, twenty eight (28) farm households were randomly selected from each community for Panel formation and primary data gathering. A total of 480 farm households constituted the panel of respondents from whom socio-economic and food consumption as well as behavioural information was gathered at the first visit. Subsequently a form with questions requesting for information on the same food consumption behaviour was administered on members of the panel fortnightly for three months.

Data Gathering

Primary data were gathered from members of the panel of respondents using questionnaire. Data collected included household demographics of age, household size, level of formal education; traditional foods produced by farm households; hectare of land in present and previous cultivation of cultivated traditional foods; annual farm income; preference for foreign type of the locally cultivated foods; number of times product is eaten weekly; price of imported and price of locally produced product; value of foreign type of a locally produced product consumed; value of foreign type of a locally produced product received as gift; and farmer perception of local product quality compared to foreign type consumed.

Data on the protein and carbohydrate intakes was gathered by interviewing each household member except infants (persons who are breast fed) on the food consumed within the last 48 hours. Fifteen infants were encountered in these households. A total of 3,600 individuals as members of 480 households were thus interviewed using the approach of 48–hour-recall of meal(s) eaten. The members were asked the type and quantity of food they ate during each meal in the previous meal and in the day after. The protein and carbohydrate content in each food item (in percentage) was used to estimate the protein and carbohydrate proportion in all the meals consumed per person per day and projected for a year.

Data Analytical Technique

Objective i had its result displayed and discussed with frequency distribution table. Objective iii was addressed with Probit regression analysis of commodity trade-off of consumption function. This model as emphasized by [14] is appropriate when the decision takes one of only two possible values (eg. Yes or No).

$[F_{zi}]$ .... (1)

Given

$Z_i = \beta_0 + \beta_1 X_i$

$Y_i = \beta_i + \beta_2 X_{2i} + \ldots + \beta_k X_{ki} + \mu$ .....(2)

Y^* is unobserved but $Y_i = 0$ if $y_i^* = 1$ then $Y^* \geq 0$

$P(Y_i = 1) = P(Y_i^* \geq 0)$

$P(\mu_i \geq -\beta_1 - \beta_2 X_{2i} \ldots\ldots\ldots - \beta_k X_{kL}$ ....(3)

where i = 1, 2……480 consuming farm households;

β_i= A Vector of unknown coefficients.

X_i = independent variables-characteristic/variable observed on ith individual.

Implicitly, the model was specified as follows:

$C_t = f(Y, T, L_d, G_f, D_p, P_g, K_c, A_g, E_d, \mu_i)$

where:

C_t= Consumption trade-off (Preference for Foreign product-yes=1; Otherwise =0);

Y = Annual Farm income (₦'000);

T = Number of times product was eaten weekly (Proxy for consumer taste);

L_d= Declined hectare of land from previous cultivation (ha);

G_f = Value of foreign type of locally produced product received as gift (₦'000);

D_p= Declined average yield of produced crops (tonne/ha);

P_g= Unit Price gap of imported and locally produced product (₦/tonne);

K_c= Farmer perception of local product quality (lower=1; otherwise= 0);

A_g = Age of head of household (Years);

E_d = Level of formal Education of head of

household (Years);

μ_i = Stochastic error term randomly influencing individual consumption trade-off.

Per Capita Food Quantities

The quantity of different food items consumed weekly were collected in different units of measurement and converted to grain equivalent value. The weekly values so obtained were extrapolated for the month and for the year. The annual per capita values were generated by dividing the annual grain equivalent values by the appropriate total number of household members.

Estimation of protein intake followed procedures of previous works [3,15]. The protein content in each food item consumed was determined and used in estimating the proportion in the total food intake of each member of the household. The per capita daily protein intake was estimated following the model they used, thus:

$$C_i = \sum_{i=1}^{m} a_{ij}\beta j$$

where:

Ci= Per capita daily protein (g) intake level of the ith individual in the study area;

aij = the weight in grams of the average daily intake of the food commodity j by the ith individual;

βj = the standardized food protein content of the j food commodity.

The household protein and carbohydrate intake was estimated as the weighted average of per capita intakes in the households using the male adult equivalent. The male adult equivalent refers to the total food (protein or carbohydrate) requirements of a household divided by the food nutrient requirements of an adult male. The amount of energy provided by carbohydrates is almost constant for all forms as one gramme of it provides 4.0 kilo calorie of energy regardless of the source. The [29] stipulated that an adult male is a male aged 20-45 years. The generated daily per capita food nutrient intakes was weighted to male adult equivalent daily intakes and projected to the annual per capita nutrient intake in the households by multiplying each estimate by 365 days.

Test of hypotheses

To test hypothesis H_0:1 involving interaction between the three mean values of annual per capita quantities of traditional foods produced and consumed and those of their imported types consumed by high, medium, and low income groups:

H_0: $\mu_1 = \mu_2 = \mu_3$

H_1: $\mu_1 \neq \mu_2 \neq \mu_3$

A two-way Analysis of Variance (ANOVA) of the means was carried out. The test of hypothesis H_0:2, about differences among the own-produced foods (A) was obtained by comparing F_A with $F_{t-1,\,(r-1)\,(t-1)}$ at 0.05 alpha level of probability and similarly, differences among the imported food types (B) was tested by comparing F_B with $F_{r-1,\,(r-1)\,(t-1)}$.

The test of hypothesis H_0:3 involving three means of consumption (by age classes) via nutrition gaps of protein and energy foods intake respectively was carried out with one-way ANOVA as follows:

H_0: $\mu_1 = \mu_2 = \mu_3$

H_1: $\mu_1 \neq \mu_2 \neq \mu_3$

A one-way Analysis of Variance of the means (ANOVA) was done.

The test of hypothesis was actually done by comparing computed F-ratio with tabulated $F_{t-1,\,n-t}$ at 0.05 alpha level of probability.

RESULTS AND DISCUSSIONS

Household Demographics

The age, gender, level of education and work earning ability of household members, help in defining their roles and statuses in the functional social setting. These are shown in Tables 1…4.

Table 1 revealed that a good proportion (16.04%) of household of respondents was within the age range of 0 – 5 years and a dominant (40.63%) of the members were aged between 18 and 60 years. The school age cohort of 6 – 17 years constituted 27.92% of the households. The retiree's age

cohort of above 60 years constituted 15.41% of the number of persons in the household. This population structure has worrisome implication on both production and consumption behaviour. The structure revealed a young population with high

dependency ratio that could engender low local production, high commodity demand with inherent difficult in meeting household food demands and informs reliance on imported foods in the area.

Table 1. Distribution of farm households in Igbo Communities by age

Age (Years)	Number (n=480)	Percent (%)
0 - 5	77	16.04
6- 17	134	27.92
18 - 60	195	40.63
61 and above	74	15.41
Total	**480**	**100.00**

Source: Own Calculation.

Revealing the gender composition of the household population by age, Table 2 showed relatively more females (263) than males (229) across the age cohorts in the area. This slight dominance of females, conveys a potential source of more women labour for farm activities and consumption of own foods. Previous studies [1, 21] have recognized participation of more women in food crop production and other economic activities in households. Findings of a study funded by the United Nations Development Programme (UNDP) also revealed that depending on region in Nigeria, that women produce about two-third of food crops [27].

Table 2. Distribution of farm households in Igbo Communities by gender

Age Cohort	Gender	
	Male	Female
0 - 5	33	54
6- 17	66	68
18 - 60	94	101
61 and above	36	40
Total	**229**	**263**

Source : Own Calculation

In terms of acquisition of formal education by heads of the farm households, Table 3 showed that cumulatively, more than 92.00% of heads of farm households or household consumption decision makers in the area had formal education. This revealed increased literacy levels amongst heads of farm households in the Igbo states of Nigeria. Illness-based reports on what influence educational level of head of households and foods consumed had been documented [22]. According to the report, high level of educational attainment of heads of households was associated with more reports of illness based on what was consumed.

This shows that education rightly creates awareness of what constitute good foods to be consumed.

Table 3 revealed that many of the heads of the farm households were people that had at least primary education. Among them, 33.96% had completed their primary education, 17.08% of them had attempted primary education.

Table 3. Distribution of heads of households by level of education attainment

Formal Education of Household Heads	Number of Farmers	Percent (%)
No formal Educ	37	7.71
Pry Sch. Attempted	82	17.08
Pry Sch Completed	163	33.96
Sec Sch. Attempted	77	16.04
Sec Sch Completed	66	13.75
Voc/Teacher Training	38	7.92
Tertiary Educ Attempted	6	1.25
Tertiary Educ Completed	11	2.29
Total	**480**	**100.00**

Source: Own Calculation.

Persons that had secondary education contributed to production and participated in consumption as 16.04% had attempted secondary education and 13.75% had completed secondary education. The heads of households that had tertiary education were the least in proportion as 2.29% and 1.25% had completed and attempted tertiary education respectively in the farm households.

Table 4 showed that the highest mean annual farm income of ₦727,000.00 was from livestock and earned by 101 households in the area, followed by ₦103,000.00 earned from cash crops and earned by 130 households and the least of ₦40,000.00 was earned from food crops by 249 households.

Table 4. Distribution of households by main enterprise and annual farm income in Igbo Communities

Enterprise	Number of Households	Annual income (₦'000)	Mean Annual income (₦'000)
Food crops	249	9,958	39.99
Cash crops	130	13,400	103.08
Livestock	101	73,418	726.91
Total	**480**	**96,776**	**201.62**

Source: Own Calculation

Traditional Foods Produced and their Bundle Types.

Table 5 showed traditional foods produced in farm households by their classes in Igbo farm households. The Table revealed food classes of roots, tubers, cereals, legumes, fats and oil, fish, meat, eggs, fruits, vegetables, and spices.

Table 5. Traditional foods produced by their classes in Igbo farm households

Food Class	Food items/food Bundle
Energy Foods	
Roots	Cassava (foo foo, tapioca/*Nsisa*, Gari, *Eba*); Cocoyam
Tubers	Yam (boiled, roasted, fried, porridge)
Cereals	Rice (boiled, Jellof, fried), Maize (roasted, boiled) , *Akamu*, *Agidi*,
Legumes	Beans (*Akidi*,) breadfruit, Moi moi, *Akara*, Melon/*Egusi* (caked or boiled),
Fats and Oils	Palm oil, Coconut, Pears, Cashew nuts, Ground nuts, Bambara ground nuts(*Okpa)*
Protein Foods	
Fish	Cray fish, Cart fish (fresh, dried), Tilapia (fresh, dried),
Meat	Chicken, Goat meat, Pork, Snail
Eggs	Chicken egg
Vitamins, Minerals and Antioxidant Foods	
Fruits	Banana, Pineapple, pepper, garden eggs, cashew fruit, oranges, *Chrystophylum albicum*, Plantain, Paw paw
Vegetables	(leafy and fruit vegetables) Fluted pumpkins, Bitter leaf, broad leaf pumpkin, *Uha*, Okra,
Spices	*Ogiri*, Curry leaf, Scent leaf

Source: Own Calculation.

The roots, tubers, cereals, legumes, fats and oil are basically energy foods; fish, meat, and eggs, supply mainly proteins while fruits, vegetables, and spices amongst others supply mainly vitamins and antioxidants. The bundle of energy foods included Cassava (foo foo, tapioca/*nsisa*, gari), Yam, Plantain, Maize (*akamu*, *agidi*), rice and cocoyam. Other energy supplying foods are the palm oil, and dried coconuts, local pears and cashew nuts that supply needed oil and fats. Protein sources included Legumes (beans, *akidi*, bambara groundnut (*okpa),* breadfruit (*ukwa*)), chicken eggs, pork, goat meat, snails and fish.

The fruits and vegetables among others included banana, pineapple, pepper, garden eggs, cashew, fluted pumpkins, *uha*, udara (*Chrystophylum albicum)*, okra, and oranges widely eaten in the area supply people with the needed vitamins, antioxidants and [23, 24].

All the foods are primarily eaten to stop hunger and improve livelihood and are the entitlements of the households [6].

Annual per capita quantities of the traditional foods produced and consumed with their imported types consumed

Table 6 showed estimated mean annual quantities of some selected foods produced and consumed. These are staple crops and meat including the quantities of their imported types equally consumed by types of households. The selected food are rice, cooking oil (red palm oil and/or bottled vegetable oil), fish (fresh, frozen and dried), chicken (frozen and live) and spices. The farm households produced these traditional foods and consumed part or all of them. Some others for purposes of satisfying their tastes or preferences went ahead and purchased the imported form of the same foods they produced to meet their household needs. The per capita estimates of traditional foods produced and consumed compared with their imported types consumed gave clue to the dynamics and structure of food trade off behaviour.

Table 6 showed that households in high and medium income groups preferred the imported rice to the rice they produced locally.

The households in the low income group had zero differentials in quantities of the locally produced rice they consumed compared with the quantities of the imported rice they consumed.

This suggests practice of subsistence farming

amongst the low income category of food producers and awakened the need to encourage them to go into commercial farming that guarantee sustainable household food provision.

Comparing own products with their imported brands, the Table revealed a positive own-produced product differential in respect of cooking oil, chicken and spices.

The households consumed more of their produced red palm oil, chicken and locally grown spices while consuming less of imported types of these products.

For fish (a protein source consumed), the consumption mean differential favoured the imported fish (mostly frozen type) and equally signalled household insecurity in respect of fish as food in the region.

Table 6. Mean annual per capita foods (Own produced versus imported types) consumed by income groups in Igbo farm households

Monthly Income Group *	Agricultural Product/Food item	Mean Annual per Capita of locally produced Product consumed	Mean Annual per Capita of Imported Product type consumed	Mean differential From produced Product perspective	Mean differential from Imported Product perspective
High income (n=92) Greater than ₦100,000.00	Rice (kg)	50.0	75.0	-25.0	+25.0
	Cooking oil (l)	12.5	10.0	+ 2.5	- 2.5
	Fish (kg)	9.4	14.7	- 5.3	+ 5.3
	Spices (kg)				
	Chicken (kg)	7.9	5.4	+ 2.5	-2.5
		16.1	6.7	+ 9.4	- 9.4
Medium income (n=160) ₦75,000.00–₦100,000.00	Rice (kg)	30.0	50.0	-20.0	+20.0
	Cooking oil (l)	10.5	6.0	+3.5	-3.5
	Fish (kg)	4.4	6.3	-2.1	+2.1
	Spices (kg)	5.9	5.4	+0.5	-0.5
	Chicken (kg)	7.1	4.7	+2.4	-2.4
Low income (n=228) Less than ₦75,000.00	Rice (kg)	15.0	15.0	0.0	0.0
	Cooking oil (l)	7.5	4.0	+3.5	-3.5
	Fish (kg)	3.1	3.5	-0.4	+0.4
	Spices (kgs)	3.4	3.2	+0.2	-0.2
	Chicken (kgs)	4.1	3.3	+0.8	-0.8

*Based on [2] Classification in "Renaissance Capital Survey on booming Nigerian Middle Class" ₦75,000.00–₦100,000.00 monthly (US$480-US$645 monthly). n varied according to number of respondents that fall to each income category.
Source: Own Calculations

Test of hypothesis 1

Ho:1 There is no significant interaction between the value of annual per capita quantities of traditional foods produced and consumed and their imported types consumed by high, medium, and low income rural farm households.

H_0: $\mu_1 = \mu_2 = \mu_3$

H_1: $\mu_1 \neq \mu_2 \neq \mu_3$

The result of two-way Analysis of Variance (ANOVA) of the means is shown as Table 7 (a) *.

Table 7 (a). Analysis of variance (ANOVA) of traditional foods produced and their types imported and consumed

Source	d.f	SSD	MSD	F-ratio
Own-produced food (A)	2	25090.56	12545.28	1.357
Imported food type (B)	1	36557.44	36547.44	3.954
Error	**2**	**18484.4**	**9242.2**	

Source: Own Computations.

*This hypothesis test could not include quantities of cooking oil consumed as there was conflicting reports of quantities of red palm oil mixed with some imported vegetable oils.

The test of hypothesis about differences among the own-produced foods (A) was obtained by comparing F_A with

$F_{t-1,\,(r-1)\,(t-1)}$ at 0.05 alpha level of probability and similarly, differences among the imported food types (B) was tested by comparing F_B with $F_{r-1,\,(r-1)\,(t-1)}$.

At 0.05 alpha level of probability, $F_{t-1,\,(r-1)\,(t-1)} = F_{1,(2)(1)} = 18.5$

Table 7 (a) showed own produced foods (A) and imported foods (B) with F-ratios of 1.3574, and 3.9544 computed. The ratios were less than 18.5 tabulated at 0.05 alpha levels of probability and appropriate degrees of freedom. The decision was that the interaction between the value of annual per capita quantities of traditional foods produced and consumed and their imported types consumed by high, medium, and low income rural farm households was not significant. The null hypothesis was thus accepted. The decision to combine consumption of traditional foods produced and consumed and their imported types consumed by high, medium, and low income rural farm households was purely the personal choice of the consuming units (households) and their earnings had not much interfering with it.

Per capita food energy distribution and gaps

Traditional energy foods in south-eastern Nigeria are mainly roots and tubers. These were widely grown by the farm households, who also eat much of their produce. The carbohydrates were the least expensive . The amount of energy provided by carbohydrates is almost constant for all forms as one gramme of carbohydrate provides 4.0 kilo calorie of energy regardless of the source.

Table 7 (b). Estimated per capita energy foods (Carbohydrates) consumed by age cohorts in Igbo farm households (Percent)

	Age Cohort (Male and Female)				
Food Group	**Pre-school (< 6 years)**	**Children (6-10 Years)**	**Adolescents (11-17years)**	**Adults (18-60yrs)**	**Aged (> 60 Yrs)**
Roots	38.41	39.10	50.22	54.57	55.51
Tubers	38.55	39.11	36.31	34.70	34,30
Cereals	38.52	39.10	35.29	34.69	34,31
Legumes	33.27	37.51	51.32	52.65	40,12
Fats and Oils	1.86	1.89	2.51	2.53	2.11
Fish	30.27	32.51	50.22	51.65	50,11
Meat	31.27	32.51	50.32	52.65	51,12
Eggs	30.27	37.49	50.12	50.65	49,11
Fruits	32.27	37.51	41.32	42.65	42,12
Vegetables	30.27	31.51	40.22	40.45	40,12
Spices	30.27	31.51	40.12	40.65	40,12
Others	2.66	2.41	3.14	2.33	3.33
Carbohydrate daily per capita (Total)(g)	**59.56**	**62.87**	**72.67**	**73.84**	**70.71**
Carbohydrate daily energy per capita (Kcal)	**238.2**	**251.48**	**290.7**	**295.4**	**282.8**
Carbohydrate Annual per capita (Total) (g)	**21,741.54**	**22,946.93**	**29,105.63**	**26,950.35**	**25,810.84**

Total Carbohydrate = The percentage of total energy available after taking into account that consumed as protein and fat (WHO, 2003) .
Source: Own Estimation.

Table 7 (b) showed energy food intakes by the farm households in the study panel distributed by their relevant age cohorts. The Table showed that the trend in the gap of daily per capita intake of total carbohydrate increased steadily from pre-school through children, adolescents, to the adults but fall slightly with the aged. Across the age cohorts, the daily per capita total carbohydrate intakes and (energy) ranged from 59.56g and (238.24 Kcal) amongst the pre-school infants to 73.84g and (295.36 Kcal) amongst the adults. These values are within anticipated mean (55.75%-75.0% energy goal) per person per day recommended by the [52]. The Table further showed that other food groups such as legumes, fruits, vegetables, spices, fats and oils and protein sources supplied carbohydrates in the daily diets consumed in the households.

Test of hypothesis H_0:3 (a)

H_0:3 There is no significant difference in the annual per capita nutrition gaps in Energy food intakes of Children, Adolescents and Adults in rural farm households.

H_0: $\mu_1 = \mu_2 = \mu_3$

H_1: $\mu_1 \neq \mu_2 \neq \mu_3$

To carry out this test, one way analysis of variance (ANOVA) of the means of energy foods consumed by groups gave the results presented in Table 7 (c).

Since 794.99 (Table 7(c)) computed was greater than the theoretical 3.00 at alpha probability level of 0.05, we concluded that there was a significant difference between the value of annual per capita nutrition gaps in Energy food intakes by Children, Adolescents and Adults in rural farm households of the Igbo communities of South-Eastern Nigeria.

Table 7 (c). Estimated analysis of variance of consumed energy foods by respondents

Source	d.f	SSD	MSD	F-Ratio
Total	479	28178 846		
Treatment	2	21676 035	10838017.5	794.99
Residual (error or within samples)	477	65028 11	13632.727	

Source: Own Calculation.
At 0.05 level $F_{t-1,\ n-t} = 0.05$ at $F_{2,\ 477} = 3.0$

This meant a rejection of null hypothesis (Ho1) and acceptance of the alternative (H_1). Adolescents and adults who do more laborious duties consumed more of the energy

foods to sustain their lives. This observed difference in consumed energy foods might suggest that each age group had access (mainly from roots, tubers and cereals) to the required quantities of carbohydrate food nutrient needed. Any deficit in food production may have been supplemented with foreign brands.

Per capita protein distribution and gaps

The protein intake by age cohorts of members of the farm households in Igbo communities are shown as Table 7 (d). The Table revealed variation in percentage contribution of each food group to their daily and annual per capita intake of protein amongst relevant social age cohorts of the households. It as well revealed a trend in that the households sourced protein in descending order of the following food groups: Legumes, Cereals, Fish, Roots, Tubers, Meat, Eggs, Fruits and Vegetables. Legumes and cereals took the lead in supplying protein in meals of Igbo farm households an evidence of dominance of crops as key sources of protein supplies to the households. This revelation also agreed with the findings of [3, 15] in Edo State, Nigeria.

Further, the Table showed that the adults (18-60 years) and the adolescents (11-17 years) consumed the highest daily (21.15g; 21.09g**)** and annual (7,720.79g; 7,699.65g**)** per capita protein respectively compared with the aged that consumed the least daily (17.76g**)** and annual (6,481.18g**)** per capita protein in the households.

Table 7 (d). Estimated per capita foods protein consumed by age cohorts in Igbo farm households (percent *)

Food Group	Age Cohort (Male and Female)				
	Pre School (<6years)	Children (6-10 years)	Adolescents (11-17 years)	Adults (18-60 years)	Aged (> 60 years)
Roots	10.247	11.689	10.213	9.837	6.332
Tubers	5.782	6.577	5.427	5.631	4.933
Cereals	22.946	10.617	20.873	23.451	20.551
Legumes	31.712	33.642	35.213	33.141	29.162
Fats and Oils	0.000	0.000	0.000	0.000	0.000
Fish	14.894	14.681	13.327	14.806	12.507
Meat (Beef, Chicken, goat meat)	6.049	3.526	6.173	6.665	5.567
Eggs	1.983	13.511	9.411	7.634	5.631
Fruits	0.115	0.126	0.311	0.543	0.441
Vegetables	0.673	0.112	0.132	0.642	0.712
Spices	0.135	0.113	0.116	0.117	0.139
Other animal products	0.112	1.114	1.111	0.121	0.142
Total Protein daily per capita intake (g)	**19.52**	**19.73**	**21.09**	**21.15**	**17.76**
Total Protein Annual per capita intake (g)	**7,123.23**	**7,203.01**	**7,699.65**	**7,720.79**	**6,481.18**

(*estimate based on %/100g of dry matter consumed)
Source: Own Calculations

The children and infants consumed relatively lower daily (19.73g; 19.52g**)** and annual (7,203.01g; 7,123.23g) per capita protein respectively in the area. These protein gaps are against the nutritional recommended requirements for the age groups and the entire households [26]. The protein consumption across the age cohorts in the households was below the recommended 44.4g per person per day which goes to suggest unhealthy gap and critical need of protein in the diets of these households. These gaps might therefore be bridged by the farm households intensively embracing technology of animal husbandry and aquaculture, (especially those that are yet to adopt such).

Test of hypothesis H_0:3 (b)

H_0:3 There is no significant difference in the

annual per capita nutrition gaps in Protein food intakes of Children, Adolescents and Adults in rural farm households.

H_0: $\mu_1 = \mu_2 = \mu_3$

H_1: $\mu_1 \neq \mu_2 \neq \mu_3$

To carry out this test, an analysis of variance (ANOVA) of the means of protein intakes by groups gave the results presented in Table 7(e).

Table 7 (e). Analysis of variance (ANOVA) of per capita protein of different age groups

Total	479	9492958.67		
Treatment	2	5419218	2709609	317.27
Residual (error or within samples)	477	4073740.67	8540.337	

Source: Own Calculations

At 0.05 level $F_{t-1,\ n-t} = 0.05$ at $F_{2,\ 477} = 3.00$

Since 317.27 (Table 7 (e)) computed was greater than the theoretical 3.00 at alpha probability level of 0.05, we concluded that there was a significant difference between the annual per capita nutrition gaps in Protein food intakes by Children, Adolescents and Adults in the rural farm households of south-eastern Nigeria. This meant rejection of null hypothesis (Ho1) and acceptance of the alternative (H_1). The computed 317.27 was about half the computed 794.99 for carbohydrates (Table 7(c)) and goes to suggest that the households consumed far less proteins than they consumed carbohydrates in the area.

Determinants of trade-off in Food Consumption in Farm Households

Estimates of factors that influenced decision to trade-off food consumption in Igbo farm households are shown in Table 8.

The Table showed that education level, declined average yield of produced crops, and annual farm income were factors that negatively but very highly influenced decision to trade-off consumption of foods (decision to prefer own produced foods to the imported alternatives) within the Igbo farm households. Other factors that had significant, negative but moderate influence on household's decision to trade-off locally produced foods with their imported types were: number of times product was eaten weekly, decline area of land from previous cultivation, and unit price gap between imported and locally produced products. Another significant factor that had a slight negative influence on this decision was value of foreign type of locally produced product received as gift. These revelations suggest that, the more educated the food purchasing decision maker is, the more the declined average yield of produced crops, the more the fall in annual farm income, reduced number of times product was eaten weekly, decline in area of land from previous cultivation and increase in the naira value of foreign type of locally produced product received as gift the less the Igbo farm households preferred own products to imported ones.

By these revelations, hypothesis Ho:2 on factors influencing food trade off in respect of level of education, declined average yield of produced crops, annual farm income, number of times product was eaten weekly, decline area of land from previous cultivation, and unit price gap between imported and locally produced products was rejected.

The negative influence of the unit price gap between the locally produced farm products and their imported alternatives strictly showed that the lower the unit price of the product, the more the households consumed it. The importance of prices of food items on household demands and consumption expenditures had long been emphasized [23, 24, 10].

Further, Table 8 showed that most of the significant household-based variables except age of the decision maker (head of households) were negatively signed. In terms of age (with implications of cultural inertia and/or patriotism), the Table revealed that the more aged the household heads are, the more they preferred feeding on own-produced foods to swapping their products with the imported types. By this revelation also, hypothesis Ho:2 in respect of age of household head (decider of foods eaten) was equally rejected.

Table 8. Maximum Likelihood Estimates of First-Stage Probit function of factors influencing rural farm households consumption attitudes to own produced against imported foods in Igbo States, Nigeria.

Variable	Coefficient	Std. Error	t-ratio
Number of times product was eaten weekly	-0.358**	0.18	-1.99
Education Level	0.162***	0.026	-6.12
Value of foreign type of locally produced product received as gift	-0.930*	2.71	-1.45
Declined average yield of produced crops	2.375***	0.775	-3.064
Annual Farm income	3.779***	1.105	-3.42
Decline area of land from previous cultivation	-3.448**	1.227	-2.81
Unit Price gap of imported and locally produced product	-0.633**	0.213	-2.97
Farmer perception of local product quality	1.084	0.912	1.19
Age of head of household	0.334***	0.044	7.59
Constant	4.869***	0.74	6.58
-2lnLikelihood	71.32***		
Sample size (n)	480		

*Significant at 10.0%; ** Significant at 5.0%; ***significant at 1.0% alpha level.
Source: Own Estimations

This however was the only significant factor that favoured consumption of own foods. The decisions of households to feed on own produced food against the available imported ones therefore was hinged on their experience and taste both of which are akin to age and the cultural value they placed on their own produced foods. This cultural value placed on own produced foods might be one reason why farmers in these communities celebrate some of their indigenous crops (yam, *Discorea spp.;* cocoyam, *Colocasia esculanta*) with remarkable annual festivals (new yam festival) and Coco yam ceremonies, with special recognition on farmers who relatively produced much of them.

CONCLUSIONS

The following conclusions were drawn from the findings of this study:
(i)The farm households in the south eastern Nigeria produced many traditional foods as carbohydrates, protein, fats, oil, and vitamin sources;
(ii)There was a positive own-produced product differential in respect of cooking oil, chicken and spices.
(iii)Adolescents and adults who do more labourious duties consumed more of the energy foods than did the infants to sustain their lives.
(iv)There was also significant differences ($P<0.05$) between the annual per capita nutrition gaps in Carbohydrates and Protein food intakes (respectively) by Children, Adolescents and Adults in the rural farm households of south-eastern Nigeria;
(v)The households also consumed far less proteins than they consumed carbohydrates in the area;
(vi)The interaction between the value of annual per capita quantities of traditional foods produced and consumed and their imported types consumed by high, medium, and low income rural farm households was not significant;
(vii)The decisions of households to feed on own produced food against the available imported ones was hinged on their experience and taste both of which are akin to age and the cultural value they placed on their own produced foods.
The findings led us to the following recommendations:
(i)Household heads who relatively are young and who carry out household purchases should follow the footstep of the aged household heads in feeding more on own products than on their imported brands. This indeed is a call for change of tastes, preferences and value system;
(ii)The unhealthy gap across age cohorts and critical need of protein in the diets of the households demand that as farmers, the production plans should be adjusted such that more legumes and livestock form the hub of their enterprise and product mix;

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