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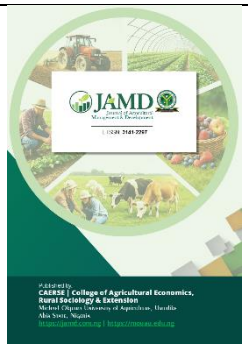

Effect Of Engagement in Selected Fruits Production on Rural Households' Income in Abia State, Nigeria

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ABSTRACT

This study assessed households' engagement in fruits production for livelihoods in Abia State, Nigeria. Multi-stage random sampling techniques were employed to select two hundred and forty (240) households engaged in fruits production in the study area. Data were collected using structured questionnaires and analyzed using both descriptive and inferential statistics including mean, frequency, percentage and ordinary least square regression models. Findings revealed that the most commonly grown fruits included star apple (90.8%), African pear (89.6%), orange (87.5%), pawpaw (81.7%) and mango (81.7%). The mean scores from the engagement index showed a high level of engagement in fruit production, harvesting by rural households with a mean score of 3.2. The regression result showed that the coefficient of age, educational level, farming experience and sex significantly influenced engagement in fruit production at 1% level. The ANOVA results was significant at 1% level which suggest that there is a significant variation in the estimated monthly income earned from fruit production across the different groups of respondents. The study concluded that fruit farming substantially improved household income and is a viable livelihood strategy for households in Abia State. The study recommends promoting fruit production among rural households, particularly targeting educated and experienced farmers, can further strengthen rural economies and improve living standards in Abia State and similar agro-ecological zones in Nigeria.

Introduction

Globally and in developing countries like Nigeria, fruit production plays a critical role in supporting rural livelihoods. It provides multiple pathways for income generation, risk reduction, and improved household welfare. Smallholder farmers, who dominate fruit cultivation, often derive substantial revenue from the sale of fresh fruits, processed products, and by-products, supplementing staple crop income and stabilizing earnings amid seasonal variability in other agricultural activities. In Nigeria, cultivation of indigenous fruits and vegetables has been shown to increase average total farm revenue by about 29.4% for participating

households compared to non-participants, with positive impacts on overall livelihood outcomes through higher profitability and diversified income streams (Olowo *et al.* 2022). Fruit production also enhances food and nutrition security by supplying nutrient-dense foods for direct household consumption while generating cash for purchasing other essentials, thereby reducing vulnerability to poverty and malnutrition.

Furthermore, engagement in fruit farming promotes livelihood diversification, a key strategy for rural households in sub-Saharan Africa facing climate risks, market fluctuations, and limited off-farm opportunities. By integrating fruits into mixed cropping systems or home gardens, households can achieve more stable and resilient income portfolios. Horticultural activities, including fruit production, often create employment opportunities, particularly for women and youth, through labor-intensive tasks in planting, harvesting, processing, and marketing. In many Nigerian contexts, fruits and vegetables contribute to poverty alleviation by offering higher returns per unit of land than traditional staples, with potential for value addition (e.g., juicing, drying) that extends shelf life and opens new markets (Mukaila *et al.* 2022). Fruits and vegetables also contribute directly to the income of both rural and urban dwellers and support the establishment of processing industries that stimulate large-scale production and rural entrepreneurship (Emma-Okafor *et al.* 2015).

Tropical fruit production and trade generate significant income for smallholder producers while supporting food security, relying heavily on small farms. In Nigeria, where agriculture employs a large share of the population and fruits form part of diverse farming systems, such activities help bridge demand-supply gaps and contribute to household resilience, despite high post-harvest losses often estimated at 40–50% or more for perishable fruits and vegetables (FAO, 2021; FMARD, 2016). Abia State, located in Nigeria's southeast geo-political zone, benefits from a humid tropical climate with favorable conditions (cool water sources and suitable soils) for both indigenous fruits like star apple/udara, African pear/ube, bush mango/ugiri and exotic ones, such as orange, mango, pineapple, coconut. Rural households in the state diversify into fruit production to explore opportunities that increase and stabilize income, supplement staple farming, and improve overall household welfare and living standards.

However, despite these potential benefits, empirical information on the extent of rural households' engagement in fruit production and its specific contribution to livelihoods in Abia State remains limited. Rural households in the area pursue diverse income-generating activities to meet needs and societal obligations, yet the role and impact of fruit enterprises are not fully quantified. This study is therefore designed to analyze households' engagement in fruit production for livelihoods in Abia State, Nigeria. Specifically, the study identified common fruits grown by rural households in the area; assessed the extent of engagement of rural households in production of selected fruits in the area; and ascertained the estimated monthly income generated from fruits production by the respondents.

The following hypotheses were tested:
$H0_1$: Socio-economic do not significantly influence engagement in production of selected fruits in the area.
$H0_2$: There is no significant difference in the estimated monthly income from fruits among the rural households.

Methodology

Study Area

The study was carried out in Abia State, Nigeria. Abia State is located in the south-east geo-political zone of Nigeria. The State is located between latitude 7.3941° E and longitude 5.8225° N (National Geospatial-Intelligence Agency, 2017). Abia State people are of Igbo ethnic group who predominates much of the southeastern part of Nigeria. Their traditional language is Igbo and English is widely spoken and serves as the official language governance and business. Abia's 2.4 million people are mainly Christians (National Bureau of Statistic, 2012). In 2006 the National Population Commission allocated 3,727,347 as the Population of Abia State (NPC, 2006). Its climate supports the cultivation of a wide variety of fruits and vegetable crops such as oranges, pineapple, cucumber, coconut, mango etc, as well as rearing of livestock such as sheep, fish, goat and poultry. Farming is a major occupation of Abia state indigenes; some engage in Marketing of Agricultural Produces.

The study adopted a multi-stage random sampling procedure. The first stage involved the random selection of two (2) Agricultural Zones from the three (3) Agricultural Zones in Abia State through simple random

sampling technique. At the second stage, two (2) Local Government Areas were selected from each of the two Agricultural zones by random sampling technique, making it 4 local government areas. The third stage of sampling involved the selection of three (3) communities from each of sampled local government areas by simple random sampling technique. Thus, a total of twelve (12) communities were sampled for the study. Stage four: The fourth stage of sampling involved the purposive selection of the twenty rural households engaged in fruit production from each of the 12 communities sampled for the study. Thus, a sample size of 240 rural households engaged in fruit production were sampled for the study.

Data Analysis

Data obtained for the study were analyzed using both descriptive and inferential statistics such as frequency, percentage, mean, ANOVA and Ordinary Least Square regression analysis (OLS). The rural household fruits producers were asked to rate the extent of their engagement in fruits production in the form Very Much, Much, Moderate, Little, and Nil using a 5-point Likert scale, and the descriptive statistical tools were used to assess the extent of engagement. Any engagement that is equal and above the grand mean is categorized as High engagement and otherwise Low engagement.

$H0_1$: Socio-economic do not significantly influence level of engagement in production of selected fruits in the area was tested using ordinary least square regression analysis.
$H0_2$: There is no significant difference in the estimated monthly income from fruits among the rural households was tested using ANOVA at 95% confidence level.

The four functional forms of OLS in explicit form were specified as:

Linear function:

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + e_i \quad (1)$$

Double log function:

$$Ln\,(Y) = b_0 + b_1Lnx_1 + b_2Lnx_2 + b_3Lnx_3 + b_4Lnx_4 + b_5Lnx_5 + e_i \quad (2)$$

Semi-log function:

$$Y = b_0 + b_1Lnx_1 + b_2Lnx_2 + b_3Lnx_3 + b_4Lnx_4 + b_5Lnx_5 + e_i \quad (3)$$

Exponential function:

$$Ln\,(Y) = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + e_i \quad (4)$$

Where,
Y = engagement in fruit production (mean score)
X_1 = age (years)
X_2 = educational level (years)
X_3 = sex (male=1, female=0)
X_4 = nature of participation in fruits production (part time 1, full time 2)
X_5 = farming experience (years)

The ANOVA model is stated as follows:

$F = MSS_B / MSS_W$

$$F = \frac{\Sigma n_j(\bar{X}_j - \bar{\bar{X}})^2/(k-1)}{\Sigma\Sigma(X - \bar{X}_j)^2/(N-k)}$$

Where,
F = Value by which the statistical significance of the mean differences in the estimated monthly income from fruits among rural household.
MSS_B = Sum of square deviation between the mean rating of estimated monthly income from fruits among rural household.
MSS_W = Sum of square deviation within the mean rating of estimated monthly income from fruits among rural household.

$\overline{X_j}$ = Mean rating of respondents estimated monthly income from fruits among rural household in the study area.
X = Grand mean of estimated monthly income from fruits among rural household in the study area
n_j = Sample size of the respondents in the study area
n = fruits produced
k = number of states under study

The formula explicitly specified:

$$Fcal = \frac{S_B^2}{S_W^2}$$

Where,
Fcal = Calculated F-ratio
S_B^2 = Between-groups variance estimate
S_W^2 = Within-groups variance estimate
Decision rule: If Fcal ≥ Ftab : H_0 otherwise accepted H_0

Results and Discussion

Major Fruits Grown by Households in the Study Area

Table 1 details the distribution of households based on the types of fruits grown in the study area. The result showed that the households in the study area engaged in cashew (77.1%) production, likely due to its economic value, versatile use in snacks, and demand in both local and international markets. Most of the rural households (72.9%) engaged in bush mango (*Ugiri*), this could be due to the prominence of bush mango which reflects its cultural and economic importance, especially for its seeds used in local cuisine. About 73.8% of the households are engaged in avocado pear production, avocado is becoming increasingly popular, likely due to its nutritional benefits and rising market demand. The engagement in coconut production was 81.7%, the high cultivation percentage is attributable to its diverse uses, from oil production to culinary and non-culinary applications. About 81.3% of them are involved in mango production, mango is a staple fruit in many rural households due to its adaptability to tropical climates and wide consumer appeal. Pineapple (65.0%) cultivation is slightly lower than other fruits but remains significant due to its commercial viability and demand in beverages. Majority (87.5%) of the households are engaged in orange production, the high percentage of orange cultivation underscores its role as a common fruit for direct consumption and juice production, about 81.7% of them are involved in pawpaw, the fruit is a widely grown fruit because of its ease of cultivation, short maturation period, and dietary benefits. A very high percentage (90.8%) of the households are engaged in star apple production locally known as udara which reflects its cultural significance and wide consumption, particularly during its harvest season. African Pear (Ube Bekee) (89.6%) of households are engaged in its production; African pear highlights its importance in local diets and its role as a seasonal delicacy. The study showed that households engage in cultivating a variety of fruits, which enhances dietary diversity, food security, and income generation (Iwuchukwu *et al*. 2017). The cultural and economic relevance of these fruits, such as bush mango and African pear, are deeply tied to cultural practices, while others like oranges and cashew are economically driven. The study agrees with Iwuchukwu *et al.* (2017) who found that fruits production requires improvement through the use of different strategies such as funding of its research, use of organic manure which may be costlier than chemical fertilizer and off-season production through irrigation system.

Extent of Engagement of Rural Households in Production of Selected Fruits in the Study Area

Table 2 present the varying levels of household's engagement in selected fruits production in the study area. The grand mean score of 3.2 indicates a moderate level of engagement in fruit production in the area. This suggests that while fruit farming is an important livelihood activity, it is often secondary or supplementary to other income-generating activities. The result showed that households had high level of engagement in the following fruits; oranges ($\bar{x}$ = 3.9), pawpaw ($\bar{x}$= 3.8), coconut ($\bar{x}$ = 3.5), pineapple ($\bar{x}$ = 3.4), and mango ($\bar{x}$ = 3.3). The high level of engagement in these fruits may be likely due to their adaptability to the local climate and strong demand for both fresh consumption and commercial uses. Oranges are noted for their wide cultivation, reflecting their importance in rural households' livelihood strategies. Coconut is valued for its diverse uses, including oil production, culinary applications, and as a raw material for non-food industries. Pineapple fruit significantly increase household income due to its market demand in juice production and as a fresh fruit. Fruits are of high economic profit which is a very useful measure of how attractive the enterprise is for potential investors and entrants into the business. In order to increase food availability, it is

not enough to increase the productivity in agriculture but there is also a great need to lower the losses so as to increase the profitability of both the farmers and marketers (Adebooye, 1997).

Annual Income Generated from Fruits Production by the Respondents in the Study Area

Table 3 presents the distribution of farmers based on the income levels generated from fruit production. The table provides a summary of the mean annual income generated from different fruits by rural households, along with their standard deviations. The mean monthly income for Orange was ₦36,470.87; oranges are the most lucrative fruit and have widespread cultivation and strong demand in the market. Mean monthly income for coconut was ₦35,514.68, slightly lower than oranges. Its high income is likely due to its versatile uses, including oil production and culinary applications. The mean monthly income for pineapple was ₦33,281.27 and avocado pear was ₦31,466.72, this contribute significantly to household income and their popularity can be attributed to their nutritional benefits and increasing market appeal. Star Apple had a monthly income of ₦30,262.56, this seasonal fruit generates a moderate income, reflecting its cultural and regional significance during its peak season. The variability in income from fruits suggests disparities in production scale, market access, or pricing among farmers. Fruits like oranges, coconuts, and pineapples have strong economic potential. Expanding their cultivation and improving post-harvest handling could increase household incomes. Developing underperforming fruits, such as bush mango and African pear, through improved processing and marketing could reduce income gaps.

Households in the study area not only generate their income from fruits but are engaged in mixed crops and livestock system, home gardening provides an opportunity for households in different settings to provide extra food for themselves and their families. These small cropping systems often have a limited commercial outreach, but fruit and vegetable gardening has been on the rise in Nigeria, in both rural and urban communities. Home gardening is also being increasingly recognized as being a strong contributor to household food security (Igwe *et al.*, 2014). According to the Federal Ministry of Agriculture and Rural Development (FMARD) (2016), there are serious annual demand gaps for fruits (1.4 million ton). According to FMARD, this is a result of low yields, high post-harvest losses and increasing demand (FMARD, 2016a).

Table 4 showed the socio-economic variables that significantly influence rural household engagement in fruit production. The four functional forms of the regression model were tried and based on some econometric criteria such as the R^2 value, level of significance and their signs and f-statistics, the lead equation was chosen as the linear function. The R^2 value was 0.465 indication that the variables stated in the model were able to explain 50% of the variation in in fruit production. The f-statistics was 33.737*** was highly significant at 1% level, indicating the overall significance of the model.

The coefficient of age was significant at 1% and positively influences engagement in fruit production, this indicates that older farmers may have accumulated experience and resources that support fruit farming than the younger farmers. This implies that any increase in age will lead to a corresponding increase in the engagement of households in fruit production.

The coefficient of education was highly significant 1% level and positively influenced engagement in fruit production by the households. A unit increase in the level of education increased engagement in fruit production by 0.296. Producers are more disposed to understand new ideas and concepts provided by extension workers and other informants. This underlines the importance of human capital development increases fruit production. This further implied that farmers that have higher education understand the importance of fruit in the diet and tend to engage in fruit production livelihood and for household consumption. These findings is in agreement with Bvenura and Sivakumar (2017) who reported that educated parent who area farmers tend to spend more on fruits production and consumption.

The coefficient of farming experience was highly significant and was directly related to engagement in fruit production. This implies that the more farming experience producers had, the higher the productivity of fruit in the area. Years of experience could mean practical knowledge acquired especially through trial and error and having established the best method. This is in line with the findings of Okeke and Mbah (2021) which stated that the more experienced a farmer is, the more efficient he/she will be in decision- making processes and he/she would be willing to take risks associated with new production technologies.

Table 5 presents the results of an Analysis of Variance (ANOVA) to estimate the differences in the estimated monthly income from fruits among respondents. The ANOVA results was significant at 1% level which suggest that there is a significant variation in the estimated monthly income earned from fruit production across the different groups of respondents. This could imply differences in factors such as scale of fruit

production, type of fruits grown and the type of markets or other resources. These variations may stem from socio-economic characteristics or external influences like environmental conditions and market access.

Conclusion and Recommendations

The study therefore concluded that engagement in fruit production is a viable and profitable livelihood strategy for rural households in Abia State. It serves as an important source of income diversification, enhances household food and nutrition security, and contributes meaningfully to poverty reduction. The study therefore recommends intensified support for fruit farming through improved access to quality planting materials, extension services, post-harvest technologies, and market linkages, especially for high-potential fruits such as orange, coconut, pineapple, and pawpaw. Promoting fruit production among rural households, particularly targeting educated and experienced farmers, can further strengthen rural economies and improve living standards in Abia State and similar agro-ecological zones in Nigeria.

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Appendix

Table 1: **Distribution of households by the major fruits grown in the area**

Types of fruits	Frequency	Percentage
Cashew	185	77.1
Bush mango(ugiri)	175	72.9
Avocado pear	177	73.8
Coconut	196	81.7
Mango	195	81.3
Pineapple	156	65.0
Orange	210	87.5
Pawpaw	196	81.7
Star apple (udara)	218	90.8
African pear (ube bekee)	215	89.6

Source: Field survey, 2024

Table 2: **Distribution of respondents according to the extent of engagement of rural households in production of selected fruits in the area**

Fruit Type	Very Much	Much	Moderate	Little	Nil	Total	Mean
Cashew	39(195)	16(64)	46(138)	30(60)	109(109)	566	2.4
Bush mango(ugiri)	19(95)	30(120)	74(222)	65(130)	52(52)	619	2.6*
Avocado pear	32(160)	55(220)	89(267)	38(76)	26(26)	749	3.1*
Coconut	52(260)	85(340)	56(168)	19(38)	28(28)	834	3.5**
Mango	46(230)	73(292)	55(165)	35(70)	31(31)	788	3.3**
Pineapple	42(210)	74(296)	79(237)	24(48)	21(21)	812	3.4**
Orange	99(495)	76(304)	32(96)	12(24)	21(21)	940	3.9**
Pawpaw	104(520)	49(196)	43(129)	16(32)	28(28)	905	3.8**
Star apple (udara)	61(305)	37(148)	40(120)	68(136)	34(34)	743	3.1*
African pear (ube bekee)	42(210)	36(144)	43(129)	75(150)	44(44)	677	2.8*
Total							31.9
Grand mean							3.2

Source: Field survey, 2024. ** = High engagement. * = Low engagement

Table 3: Distribution of households according to their mean monthly income generated from fruit production

Type of fruit	Mean monthly income	Std Dev
Cashew	27991.7417	35247.06437
Bush mango(ugiri)	21680.0500	34258.86708
Avocado pear	31466.7167	33766.92064
Coconut	35514.6820	33645.89824
Mango	28431.2917	33024.02112
Pineapple	33281.2667	33243.99461
Orange	36470.8708	33526.18033
Pawpaw	29125.0250	32946.88895
Star apple (udara)	30262.5583	36273.23178
African pear (ube bekee)	27620.8958	34032.20646

Source: Field survey, 2024

Table 4: Socioeconomic factors that influence rural households' engagement in food production

Variables	+Linear	Exponential	Semilog	Double log
Constant	17.999 (-4.161) ***	.190 (5.384) ***	-343.887 (-5.531) ***	-.535 (-.867)
Age	.267 (3.003) ***	.015 (.208)	.181 (2.515) ***	.113 (1.455)
Level of education	.296 (3.196) ***	.138 (2.026) ***	.324 (5.044) ***	.142 (2.050) ***
Sex `	-.095 (-1.841)	-.009 (-.152)	.066 (1.006)	-.013 (-.186)
Nature of participation in fruit production	-.066 (-1.303)	-.067 (-1.205)	-.114 (-1.812)	-.134 (-1.961) **
Farming experience	.296 (3.196) ***	-.110 (-1.942) **	-.052 (-.794)	-.134 (-1.898) *
R^2	.465	.294	.260	.136
Adjusted R^2	.451	.275	.237	.109
F-statistic	33.737***	16.145***	11.177***	5.031***

Source: Field survey, 2024. keys: *** = significant at 1%, ** = significant at 5%

Table 5: Analysis of variance showing the significance of difference in the respondents' mean rating of the estimated monthly income from fruits

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	28889876286.731	9	3209986254.081	3.251	.001
Within Groups	2596223730346.948	2629	987532799.676		
Total	2625113606633.679	2638			

Source: Field survey, 2024