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Influence of Value-Added Orange Fleshed Sweet Potato (OFSP) Product on Livelihood of Rural Women in Abia State, Nigeria

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Abstract

*The study examined the effect of value-added orange fleshed sweet potato (OFSP) products on the livelihood of rural women in Abia state, Nigeria. A total of 96 rural women were selected using multi-staged and purposive sampling technique while structured questionnaire was used to get data from the respondents. Descriptive and inferential statistics were employed for the analysis. Mean age of the rural women was 40.7 years and majority (85.40%) of the women were married, had SSCE (31.30%) with a mean farming experience of (6.9 years), a mean income earned was ₦ 27,208.30 with a mean household size of 5 persons. The study showed that majority of the rural women were unaware of OFSP value-added products especially biscuit (94.79%), OFSP juice ($\bar{x}$ = 3.25). Access to credit ($\bar{x}$ = 3.88) was a major factor influencing OFSP production. Increased income ($\bar{x}$ = 2.14), improvement of their nutrition ($\bar{x}$ = 2.31) and food availability ($\bar{x}$ = 2.23) were the perceived effect of value-added sweet potato products on the livelihood of the rural women . Hypothesis 1 showed that the coefficient of cooperative (2.648***), production experience (10.280***) and family size (3.388***) were significant and positively related to income from sales OFS products. The study concluded that production of value added sweetpotato products by rural women influenced their income, hence rural women should have access to credits, be exposed to capacity building program, and supported by the government to improve their production capacity so that OFSP value added products can be a sustainable source of livelihood.*

Keywords; livelihood, rural women, products, orange flesh sweet potato

Introduction: The orange-flesh sweet potato (OFSP) is an improved breed of sweet potato. It is cultivated in tropical and semi-tropical regions of the world for food and source of income, especially among the rural dwellers (Adebisi *et al.,* 2015). It has considerable potential to contribute to the food-based approach to tackle the problem of vitamin A deficiency, a major public health concern of the poorer sections. These characteristics makes OFSP an excellent food security crop and also considered to be a suitable nutrient intervention because they are rich in b-carotene (Gitanjali and Sarla, 2022). Globally, according to Mendu, Nair & Athe (2019) about 3 million pre-school children have been reported to have ocular signs of vitamin A deficiency. In Nigeria, about 29.5% of her population are affected by the prevalence of vitamin A deficiency hence, World Health Organisation has listed Nigeria as one of the "category one" countries with the highest risk of vitamin A deficiency (Kuku-Shittu *et al.,* 2016).

Orange-fleshed sweetpotato has enabled resource-poor smallholder farmers to successfully grow the crop across a broad range of tropical production systems with few or no inputs. Many improved varieties are drought and heat tolerant, improving chances of success. Orange-fleshed sweetpotato has shown to be a tool for improving the food and nutrition security of vulnerable populations (Consultative Group for International Agricultural Research [CGIAR], 2022). Aside its nutritional advantages, it improves eye sight and is good for diabetic patients. Akinfenwa (2020) opined sweetpotato is economical in terms of production and value addition; its leaves can be used for soup, and its flour be used in bread production to lessen reliance on wheat. On just 500 square meters OFSP can supply the needs of a family, farmers can still grow other crops to meet their diversified food needs at the household level (Akinfenwa, 2020). Moreso, United State Agency International Development [USAID] (2020) roported that OFSP has high yield potential in comparatively shorter growing seasons. On the scale of countries that produces sweet potato Nigeria is ranked second to China with an annual production of 3.46 million metric tons per year (Udemezue, 2019).

The orange fleshed sweet potato (OFSP) varieties was introduced to National Root Crop Research Institute (NRCRI), Umudike, Nigeria between 2005 and 2006 by the International Potato Centre, Lima Peru (Ukpabi *et al.*, 2017), since then effort has been made by National Root Crop Research Institute (NRCRI) and other collaborating institution to disseminate information about the new potato variety (OFSP) to the rural farmers across Abia state Nigeria with the aim of encouraging them to use the product in order to meet their health and economic needs (Chah *et al*., 2020). The International Federation of Red Cross and Red Crescent

(IFRC) (2019) defined livelihood as those acts put together to earn a living and which encompasses people's capabilities, assets, income and activities for securing the necessities of life. Mphande, (2016) stated that when it comes to an individual, a livelihood is the ability of that individual to obtain the basic necessities in life, which are food, water, shelter and clothing. OFSP has been used to produce some value-added products such as jam, soft drink, pickles, bread, chinchin and other foods, which can be a great source of livelihood for the rural dwellers (Ofoeze *et al.*, 2021). Hence, this study seeks to examine the effect of Orange Fleshed Sweet Potato (OFSP) value added products on the livelihood of the rural women in Abia state. Specifically, the study described the socio-economic characteristics the rural women; identified the value added products produced by the rural women; ascertained the perceived effect of value-added OFSP products on the livelihood of the rural women and identified the perceived factors affecting the production of OFSP value added products.

Hypotheses of the study

$H0_1$: There is no significant relationship between the socio-economic characteristics of the rural women and income from sales of OFSP.

Materials And Methods:**Study Area** : This study was carried out Abia State, Nigeria. Abia state resides in the South-East geopolitical zone of Nigeria, it is bordered to the north and northeast by the states of Enugu, and Ebonyi, Imo State to the west, Cross River State to the east, Akwa Ibom State to the southeast, and Rivers State to the south (Wikipedia, 2023). The state was carved out of Imo state in August 27, 1991 and has 17 Local Government Areas (LGAs) and 3 agricultural zones. These agricultural zones consist of Aba, Umuahia and Bende, Ikwuano LGA falls under the Umuahia agricultural zone. The population of Abia state is 2,833,999 (NPC, 2007; INEC 2008). Agriculture is the major occupation of the people and subsistent agriculture is prevalent and about70 percent of the population engage in it. The main crops are yam, cassava, rice, sweetpotato, cocoyam and maize, while the cash crops includes; oil palm, rubber, cocoa, banana, and various types of fruits. Women are actively involved in all stages of operations from land clearing, cultivation, harvesting, processing and marketing and so in small scale agribusiness enterprises.

Sampling Technique : A multi-stage sampling technique was used for this study. In the first stage four LGA were purposively sampled because of their participation in the training on OFSP by National Root Crop Research Institute (NRCRI). The second stage involved the selection of two communities from each of the selected LGAs, these communities have been involved in the sweetpotato value addition training by some agencies. The third stage involved the selection of four (4) villages from each of the communities. Finally, the fourth stage involved the random selection of three (3) rural women from each from each village making it a total of 96 rural women for the study.

Data Analysis: Data from the study were analyzed with Descriptive (frequency counts, percentages and mean scores) and inferential statistics such as multiple regression model and z-test.

Model Specification : Multiple Regression Model: The four functional forms (linear, semi-log, exponential and Cobb Douglas) of production function were be tried and explicitly represented as:

Linear function

$Yi= b_0 + b_1 X_{1i} + b_2 X_{2i} + b_nX_{ni} + u_i$

Y_i= income from sales of OFS (Naira)

b_0 = intercept

b_1……b_n = coefficient of regression

X_1= age (years)

X_2= family size (numbers)

X_3= production experience (years)

X_4= educational level (years)

X_5= cooperative society (yes=1, no=0)

U_i = disturbance error

Double log function (Cobb Douglas)

In(y) = Inb0 +b1Inx1 + b2Inx2 + b3Inx3 +b4Inx4 + b5Inx5 + ei

Semi double log function

Y = Inb0 +b1Inx1 + b2Inx2 + b3Inx3 +b4Inx4 + b5Inx5 + ei

Results and Discussion: Socioeconomic characteristics of rural women: Table 1 presents a result on the distribution of rural women based on their age. The result shows that 65.63% of the women had an age range of 31-45, 22.97% of the women had an age range of 46-60, 9.38% of the women had an age range of 15-30 and 2.10% of the women had an age greater than 60. The mean age of the age is 40.7. This result implies that majority of the women involved in OFSP value additions are within the age range of 31-45, which is within their productive age. Nwakor (2021) indicated that sweet potato farmers' were still in their active age, and this can lead to increase in production of OFSP in the study area. This is an indication that more youths and active people constituted bulk of sweet potato farmers in Abia State, Nigeria (Nwakor, 2021).

Marital Status: Table 1 showed the result of the distribution of rural women based on their marital status. The result reveals that 85.40% of the women are married, 11.50% of the women are single and 3.10% of the women are divorced. This result reveals that majority of the rural women involved in OFSP value addition are married. This result agrees with Agoh, Ukeje, and Nwakor (2020) that married people were more involved in sweetpotato postharvest processing in the

study area, which also implied that the women uses the proceeds from it to keep up with household needs.

Educational level: Table 1 showed the educational status of the rural women within the study area. The result showed that 31.30% of the women have SSCE, 25.00% of the women have FSLC, 18.80% of the women have OND/NCE, 18.80% of the women have carried out their post graduate studies and 6.30% of the women are Bsc/HND graduates. This indicated that majority of the rural women have acquired SSCE and a lower percentage of them are post graduate and Bsc/HND graduates. This implies that the level of literacy or educational exposure of the rural women within the study area is low which can affect the methods they use in producing their OFSP value added products and in turn influence the level of their income.

Farming experience: Table showed the result of the distribution of the rural women based on their farming experience. About 51.04% of the women have a farming experience within the range of 6-10, 35.42% of the women have a farming experience within the range of 1-5 and 13.54% of the women have a farming experience within the range of 11-15. The mean score of the years of farming experience is 6.9 years. This result showed that most of the rural women within the study area are experienced in processing OFSP. This implies that this level of experience can influence their attitude towards adopting practices that will improve their livelihoods. Omoare *et al.,* (2014) noted in their findings that farmers stand better position to adopt new innovations in sweetpotato value addition, because the number of years spent in their practice may give an indication of the practical knowledge acquired on how to overcome certain inherent problems in sweetpotato value addition.

Occupation: Table showed the result on the distribution of the rural women according to their occupation. The result reveals that 45.80% of the women were involved in other occupation, 38.50% of the women are civil servants and 15.60% of the women are trader. This result indicates that majority of the women are involved in other occupation. This implies that the rural women have various means of livelihood that have provided a means in meeting the needs of the household.

Income: The result from table 1 showed the distribution of rural women according to their monthly income. Majority (59.38%) of the women earn within the range of ₦10,000-₦30,000, 28.83% of the women earn less than ₦10,000, 11.46% of the women earn within the range of ₦51,000-₦70,000 and 8.33% of the women earn within the range of N31,000- N50,000. The mean amount of income is ₦27,208.3. Based on the mean amount of the monthly income of the rural women, the level is low and will not be able to make significant impact in terms of meeting household needs.

Household size: The result on table 1 showed the distribution of the rural women based on their household size. The result showed that 64.58% of the women have a household size between 4 and 7, 26.04% of the women have a household size between 1 and 3, 9.38% of the women have a household size between 8 – 11. The mean household size is 5 persons which means that, on average, the rural women in the study have households consisting of five individuals.

Value added products produced by the rural women : The result on table 8 revealed the distribution of rural women according to the value added OFSP products that they produce. From the result, the rural women are producing the following products from sweetpotato, OFSP juice ($\bar{x}$ = 3.25), fried chips ($\bar{x}$ = 2.00), Flour ($\bar{x}$ = 3.10) and OFSP swallow ($\bar{x}$ = 3.09).

Perceived effects of value added OFS products on the livelihood of rural women Table 9: : The result from table 9 shows the distribution of rural women according to the perceived effect of value-added OFSP products on the livelihood of the rural women. The response to all the statements made on the perceived effect of value-added OFSP products on the livelihood of the rural women had mean scores below 2.50 which showed that the livelihood of the rural women in the study area were not affected from value-added OFSP products with a grand mean of ($\bar{x}$ = 2.18) which is below the cut-off mean. The low mean scores suggest that, according to the rural women, the production and sale of value-added OFSP products did not have a substantial impact on their source of income. This could imply that the benefits and positive effects of OFSP value-added products on aspects such as nutrition, income, and empowerment may not have been realized to a significant degree by the rural women in the study area.

Perceived factors affecting the production of OFS value added : Table 10 shows the result of perceived factors affecting the rural women in the production of OFSP value added products. The response to all the statements made on factors affecting the production of OFSP value added product had mean scores above 2.50, which showed that the rural women in the study area were affected by these factors; poor access to credits ($\bar{x}$ = 3.88), poor support from the government ($\bar{x}$ = 3.84), lack of capital to start production ($\bar{x}$ = 3.80), high cost of processing machine ($\bar{x}$ = 3.79), lack of raw material (roots) ($\bar{x}$ = 3.78), poor access to production equipment ($\bar{x}$ = 3.77), storability ($\bar{x}$ = 3.77), poor production knowledge ($\bar{x}$ = 3.70), post-harvest losses ($\bar{x}$ = 3.69), poor market outlet ($\bar{x}$ = 3.67), shelf life ($\bar{x}$ = 3.57), lack of technical-know-how ($\bar{x}$ = 3.46) and poor extension services ($\bar{x}$ = 3.22). This result implies that the rural women are highly affected by these factors, which can significantly affect their rate of producing OFSP value added products. If there is no intervention from external bodies or government, the production and sales of OFSP value added products will begin to decline which will significantly affect the income generated from the sales of the products.

Hypothesis testing : $H0_1$; The socioeconomic characteristics of the rural women does not significantly influenced income from the sales of OFSP.. The four functional forms of the multiple regression model were tried and the Linear model was selected as the lead equation due to the highest number of significant variables and a significant F-value of 121.000 at $P<0.05$ which shows the overall significance of the regression line and a high R^2 value of 0.864 which implies that 86.4% of the total variation in the dependent variable was accounted for by the explanatory variables.

From the result, at $P<0.05$, Production experience (10.280) was significant and positively related to income from sales. The implication of the result is that the more the production experience, the more income the rural women derive from

the sales of OFSP value added products. From the result, at P<0.05, cooperative membership (2.648) was significant and positively related to income from sales, this implies that membership to cooperative helped improve the income of the rural women on the sales of their OFSP value added products, possibly through collective marketing or resource-sharing.

Family size (3.388) was significant and positively related to income from sales. This result suggests that having a larger household might contribute to increased income, possibly by providing additional labor and support in the production and sale of OFSP products. Age (-1.995) was significant and negatively related to income from sales. This result implies that the more advanced the rural women, the less likely they will make significant income from the sales of OFSP value added products. This maybe due to a reduced receptivity to new ideas and innovations, as older individuals may be less inclined to adapt to changes. Maduka, Kalu and Odoemelam (2021) asserted that age affects one's tendency to be very inquisitive and receptive to new ideas/innovations in other to meet personal and family needs.

Conclusion/ Recommendations: The study concludes that the OFSP have not had a significant and positive impact on the livelihoods of the rural women, hence low effect on their livelihood. This suggests a potential gap in the effectiveness of current initiatives in realizing the anticipated benefits of improved nutrition, increased income, and empowerment among these women. Furthermore, production experience, cooperative membership, family size, and age were the factors influencing income from the sales of OFSP value-added products. Based on the major findings of the study, the following recommendations were made;

Access to Credit: To address the issue of poor access to credit, financial institutions and government agencies should develop tailored financial products and support mechanisms for rural women involved in OFSP value-added product production. This can include microloans and grants to help them acquire the necessary resources and equipment. **Government Support:** Government agencies at both the state and federal levels should provide greater support and incentives for OFSP value-added product production. This can include training programs, subsidies for processing machines, and improved access to markets. **Training and Capacity Building:** Given that many rural women have limited formal education, capacity-building programs should be designed to enhance their production knowledge, technical skills, and business acumen. This can empower them to produce high-quality OFSP products and manage their enterprises effectively. **Awareness Campaigns**: Efforts should be made to raise awareness about various OFSP value-added products among rural women. Educational campaigns can help them explore new product categories, expand their market reach, and diversify their income sources.

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Table 1: Distribution of the rural women based on their socioeconomic characteristics

Age(years)	Frequency	Percentage	Mean
15 – 30	9	9.38	40.7
31 – 45	63	65.63	
46 – 60	22	22.92	
> 61	2	2.1	
Total	**96**	**100.00**	
Marital status			
Single	11	11.50	
Married	82	85.40	
Divorced	3	3.10	
Others	-	-	
Total	**96**	**100.00**	
Educational level			
FSLC	24	25.00	13 years
SSCE	30	31.30	
OND/NCE	18	18.80	
Bsc/HND	06	6.30	
Post graduate	18	18.80	
Total	**96**	**100.00**	
Farming experience			
1 – 5	34	35.42	6.9 years
6 – 10	49	51.04	
11 – 15	13	13.54	
> 46	-	-	
Total	**96**	**100.00**	
Occupation			
Civil servant	37	38.50	
Trader	15	15.6	
Other	44	45.8	
Total	**96**	**100.00**	
Income			
<10,000	20	28.83	₦ 27,208.3
10,000-30,000	57	59.38	
31,500-50,000	8	8.33	
51,500-70,000	11	11.46	
>70,000	-	-	
Total	**96**	**100.00**	
Household size			
1 – 3	25	26.04	5 persons
4 – 7	62	64.58	
8 – 11	09	9.38	
Total	**96**	**100.00**	

Source: Field Survey, 2023

Table 8: value added product produced by the rural women

S/N	Value added products	Always	Most times	Sometimes	Never	Mean
1	Biscuit	0(0)	2(8)	4(8)	90(90)	1.08
2	Kunu	0(0)	6(18)	16(32)	74(74)	1.29
3	Fried chips	17(68)	15(45)	12(24)	54(54)	2.00
4	OFSP juice	50(200)	23(69)	20(40)	3(3)	3.25
5	OFSP swallow	43(172)	27(81)	18(36)	8(8)	3.09
6	Flour	42(168)	31(93)	14(28)	9(9)	3.10
7	Puree	10(40)	16(48)	31(62)	39(39)	1.96
8	Bread	9(36)	14(42)	17(34)	56(56)	1.75
9	Noodles	0(0)	0(0)	0(0)	96(96)	1.00
10	Pap	4(16)	23(69)	13(26)	56(56)	1.73
11	Cake	3(12)	17(51)	11(22)	65(65)	1.56
12	Chinchin	11(44)	17(51)	9(18)	59(59)	1.79

Source: Field Survey, 2023

Distribution of respondents by their perceived effect of value-added OFSP products on the livelihood of the rural women

S/N	Value added products	Strongly agree	Agree	Disagree	Strongly disagree	Total	Mean
1	Increased income	10(40)	32(96)	16(32)	38(38)	206	2.14
2	Improved nutrition	19(76)	32(96)	5(10)	40(40)	222	2.31
3	Improved social status	4(16)	28(84)	13(26)	51(51)	177	1.84
4	Increased empowerment	4(16)	36(108)	15(30)	55(55)	209	2.18
5	Create employment	8(32)	32(96)	15(30)	41(41)	199	2.07
6	Income diversification	10(40)	28(84)	15(30)	43(43)	197	2.05
7	Food availability	11(44)	40(120)	5(10)	40(40)	214	2.23
8	Provide shelter	3(12)	30(90)	20(40)	43(43)	185	1.92
9	Educational fees	4(16)	29(87)	21(42)	42(42)	187	1.95
	Grand mean						2.07

Source: Field Survey, 2023

Table 10: Distribution of the perceived factors affecting the production of OFSP value added products

S/N	Value added products	Strongly agree	Agree	Disagree	Strongly disagree	Total	Mean
1	Lack of capital to start production	82(328)	8(24)	3(6)	3(3)	361	3.80
2	Poor production knowledge	75(300)	17(51)	3(6)	1(1)	358	3.70
3	Poor extension services	68(272)	8(24)	4(8)	6(6)	310	3.22
4	Poor access to credits	88(352)	6(18)	1(2)	1(1)	373	3.88
5	Poor support from the government	87(348)	6(18)	0(0)	3(3)	369	3.84
6	Poor access to production equipment	82(328)	9(27)	2(4)	3(3)	362	3.77
7	Lack of technical-know-how	55(220)	35(105)	2(4)	4(4)	333	3.46
8	Shelf life	67(268)	22(66)	2(4)	5(5)	343	3.57
10	Storability	77(308)	17(51)	1(2)	1(1)	364	3.77
11	High cost of processing machine	85(340)	6(18)	1(2)	4(4)	364	3.79
12	Post-harvest losses	78(312)	12(36)	1(2)	5(5)	355	3.69
13	Poor market outlet	77(308)	11(33)	3(6)	5(5)	352	3.67
14	lack of raw material (roots)	80(320)	13(39)	1(2)	2(2)	363	3.78

Source: Field Survey, 2023

Table 11: Summary of the regression result on socioeconomic characteristics of the rural women and income from sales

Variables	Linear	Semi-log	Exponential	Double-log
Constant	-57410.59	9.616	-365181.59	10.441
	(-1.724)*	(22.140)***	(-.996)	(4.356)***
Age	-.084	-.015	-.035	-.069
	(-1.995)*	(-.138)	(-.421)	(-.568)
Family size	.242	.012	.457	.250
	(3.388)**	(.068)	(4.738)***	(1.751)*
Production experience	-691	.482	.368	.083

	(10.280)***	(2.826)***	(4.038)***	(.612)
Educational level	-.060	-.044	-.038	-.027
	(-1.417)	(-.403)	(-.448)	(-.223)
Cooperative	-.128	-.005	.093	.016
	(2.648)***	(-.037)	(1.070)	(.125)
F-stat	**121.000*** **	**5.248*** **	**17.199*** **	**1.340**
R^2	**.864**	**.238**	**.534**	**.087**
R-adjusted	**.857**	**.193**	**.503**	**.296**

Source: Field survey, 2023

$H0_1$ reject at 5% level

Key: ns = not significant; ** = 5% significant; * = 1% significant; () = t-ratios; + = lead equation**