



ROLES OF WOMEN IN OIL PALM FRUIT PROCESSING IN IMO STATE, NIGERIA

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ABSTRACT

The study assessed roles of women in the processing of oil palm fruit in Imo State, Nigeria. Specifically, the study described socio-economic characteristics of women palm fruit processors; identified processing methods and equipment used by them to process oil palm fruits; identified their roles in oil palm fruit processing; determined socio-economic factors that influence amount of income realized from palm fruit processing; and identified constraints faced by them in oil palm fruit processing. Multi-stage sampling procedure was used to select 150 women processors. Data collected through use of structured questionnaire, were analyzed using descriptive statistics and multiple regression model. Results showed that mean age, household size and annual income from palm fruit processing of the respondents were 54 years, 7 persons and ₦127,985.71 respectively. Also, 64.0%, of them were married, with as much as 82.0% attaining diverse levels of formal education. Result also showed that 74.0% of the women used mortar and pestle in processing oil palm fruits. Results further showed that 80.0% and 68.0% of the women processors were involved in picking palm fruits from the bunch/threshing and carrying of palm fruit to processing site. Result of the multiple regression analysis using double-log functional form as lead equation posted R^2 value of 0.710 and showed that education level, method of processing, membership of association, credit access, labour cost and price of product were significant determinants of income realized by women from palm fruit processing. Major problems constraining women processors were inadequate finance (82.0%) and credit facilities (72.0%). It was recommended that financial assistance should be given to women processors of palm fruit through loans from agricultural banks and other financial institutions. This should be done at low interest rates to encourage borrowing, which would lead to increase in income of women processors.

Keywords: Oil palm fruit, Imo State, Processing equipment, Sampling, Women.

INTRODUCTION

Oil palm (*Elaeis guineensis*) belongs to the family Arecaceae and is the most widely known of the palm species. It is native to West and Southwest Africa and produces more oil per hectare than any other oil crop in the world (Ada-Okungbowa *et al.*, 2013). In Nigeria, oil palm trees are normally found growing in the wild, semi wild or in oil palm plantations. Oil palm is one of the cash crops that has contributed immensely to the growth of Nigeria's economy and has huge potential to serve as a major source of foreign exchange (Ochiabuto, 2000).

Palm fruits can be harvested from three-year-old oil palm trees, and if well-tended, palm seedlings usually reach maturity at about six years. Mature palms can yield more than 20 tonnes of fresh palm fruit bunches per hectare a year. When processed, oil palm fruit give rise to two distinct oils; palm kernel oil which is obtained from the kernel of the fruit, and palm oil which is extracted from the mesocarp of the fruit (Ibitoye, 2014). Palm kernel oil and palm oil



have several industrial and domestic applications which makes their demand to be high globally. Indeed, palm oil is the largest traded edible oil in the world accounting for 37% of total oils produced worldwide (Sahel, 2017). However, aside palm oil and palm kernel oil, other products derived from palm fruit processing include palm kernel cake which is used in livestock feed formulation and palm fibre used as fuel for cooking.

Stemming from the high global demand for palm oil and palm kernel oil, palm fruit processing has become an important source of income and livelihood among many rural dwellers in South-east Nigeria, especially rural women. Ahmed (2001) noted that oil palm provides direct employment to more than 4 million farmers in about 20 oil palm growing states in Nigeria and indirectly to other millions of people involved in processing and marketing of oil palm fruit and its products. The oil palm sub-sector has been identified as a potential productive sector that could be used to diversify the economy after years of neglect (Ibitoye, 2014). However, evidence from CBN/NISER (2002) study suggests that the potential of the oil palm crop in bringing about turn around in economic fortunes of the country is hampered by low level of participation and involvement of important stakeholders due to among various constraints, the drudgery associated with its processing.

Women in Nigeria make up to 60-80 percent of the agricultural labour force (Ogunlela and Mukhtar, 2009). The participation of women in any economic activity is of great importance in all aspects of agriculture related endeavor including processing of oil palm fresh fruit bunches. Enete and Amusa (2010) observed that in Nigeria, women are directly involved in pre- and post-harvest handling of most of the agricultural produce from the point of production to urban centers where most consumption take place and tend to dominate with respect to oil palm processing and marketing activities. Along the oil palm value chain, women have defined roles and constitute major component of the work force (Omoti, 2003). In most areas, women have the responsibility of managing grove palms owned by individual families. They organize labour for carrying harvested fresh fruit bunches, picking palm fruits and bunches for oil extraction. Women are also involved in the extraction of palm oil. Other activities performed by women include kernel oil extraction, local soap production and marketing of oil palm products.

In Nigeria, important activities required to process palm fruit bunch into its derivatives are mostly done by traditional (local) method. The traditional method is tedious, laborious, time consuming, inefficient and yield very low (Omoti, 2003). The success or failure of a processing method depends largely upon how labour and other associated resources are used. An efficient processing technique directly increases the quality and quantity of food available for consumption and trade, and indirectly enhances income and welfare of the processors (Ukpabi, 2004).

Unamma *et al.* (2004) asserted that many constraints have limited gender participation in the production and processing of many agricultural commodities including oil palm fruit. They posited that in this respect women had suffered more incapacitations than men. This study intended to:

- i. describe socio-economic characteristics of women palm fruit processors in Imo State, Nigeria;
- ii. identify processing methods and equipment used by women to process oil palm fruits;
- iii. identify roles of women in oil palm processing;
- iv. determine socio-economic factors that influence amount of income realized from palm fruit processing by women;
- v. identify constraints faced by women in oil palm fruit processing.



MATERIALS AND METHODS

The Study Area

The study was carried out in Imo State, Nigeria. The state is made up of twenty-seven Local Government Areas (LGAs) clustered within three agricultural zones namely Okigwe, Orlu and Owerri zones. Imo State lies between latitudes 5° 44' and 5° 54' North of the equator and longitudes 6° 54' and 7° 70' East of the Greenwich meridian. The state occupies a total land area of 5,530 square kilometers lying between lower River Niger and upper Imo River from where it derived its name. The state has a population of 3, 927, 563 persons with a population density of 711.6 per square kilometer (NPC, 2006). The state is bordered by Abia State to the east, the river Niger to the west, Anambra State to the north and Rivers State to the south. Farming is the major occupation of the rural communities, with mixed farming as the predominant type of farming system in the area.

Sampling Technique

Multistage random sampling technique was used to select respondents for the study. The first stage of sampling involved random selection of one LGA from each of the three agricultural zones to give three LGAs. The second stage involved random selection of five autonomous communities from each of the selected LGA. This gave 15 autonomous communities. Thirdly, 2 villages were randomly selected from each of the chosen autonomous communities which gave total of 30 villages. Lastly, 5 female oil palm fruit processors were randomly selected from each village. Thus, 150 female oil palm fruit processors were selected to serve as respondents for the study.

Method of Data Collection

Primary data were used for this study. The primary data were obtained using pre-tested and structured questionnaire administered on the respondents. Data were obtained on respondents' socio-economic characteristics such as age, marital status, household size, education level, processing experience, annual palm fruit processing income, credit access and association membership. Data were also collected on quantity of palm fruit processed, labour cost, price of product., processing methods, types of processing equipment used, processing roles or activities practiced, and constraints faced.

Analytical Technique

Descriptive statistics was used to describe socio-economic characteristics of the respondents, identify processing methods for oil palm fruits, roles in oil palm processing and problems constraining oil palm fruit processing. Ordinary least square (OLS) multiple regression model was used to determine the socio-economic factors that influence amount of income realized from palm fruit processing by women (objective iv). This model was considered appropriate because more than two variables are involved and the responses to the dependent variable (Y) can assume continuous values. The model is implicitly expressed as:

$$Y = F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, e).$$

where;

Y = Annual income from palm fruit processing (Naira); X_1 = education level (number of years spent in school); X_2 = method of processing (modern = 1; otherwise = 0); X_3 = quantity of palm fruit processed (Kg); X_4 = household size (number of persons feeding from same pot); X_5 = age of the processor (in years); X_6 = membership of association (member = 1; otherwise = 0); X_7 = credit access (Yes = 1; no = 0); X_8 = labour cost (Naira); X_9 = price of product (Naira); e = error term.



RESULTS AND DISCUSSION

Socio-economic Characteristics of Respondents

The distribution of the respondents according to socio-economic characteristics is presented in Table 1. The table shows that 36.0% of the women processors were within the age range of 51-60 years with mean age of 50 years. This is an indication that the women processors were aging and this may have negative implication on quantity of palm fruits processed in the study area. This finding lends credence to Nwauwa (2011) assertion that youths despise oil palm fruit processing and perceive it as a strenuous and tasking enterprise, and hence do not participate prominently in it. This result compares favourably with findings of Olagunju (2008) in South Western Nigeria. Also, 64.0% of the women processors were married, while 22.0% of them were widows. According to Adebo *et al.* (2015) gross earnings from palm oil production were enough incentive that influence and encourage married couples' choice and devotion to palm fruit processing as a vocation with the capacity to boost household welfare.

With respect to household size, the table shows that the mean household size of the respondents was 6 persons. According to Ogbonna (2018a) household size has major implication on the provision of family labour and is the most important input for unpaid labour. This result suggests support from household members in carrying out palm fruit processing activities. Table 1 further shows that cumulatively, 82.0% of the women processors had attained diverse level of formal education ranging from primary school education to tertiary education, suggesting that new oil palm fruit processing technologies can be easily transferred to and adopted by the women as most of them can read and write. Literacy (ability to read and write) enables farmers to better utilize effectively and efficiently available resources in an area for increased income and welfare (Osondu *et al.*, 2015a). High education level enhances business ideas, skills, innovation and managerial ability for business sustainability (Osondu *et al.*, 2015b). Meanwhile, mean years of oil palm fruit processing experience of the women was 18 years, indicating that the women were well versed in oil palm fruit processing. Years of experience in a particular enterprise can influence adoption of improved practices that will enhance income generation from that enterprise (Ogbonna (2018b).

With respect to annual income from palm fruit processing, Table 1 shows that 40.0% of the women earned below 100, 000 Naira with mean annual income of ₦ 127,985.71. The incomes households earn have serious implications on their adoption of innovations, welfare and food security status (Ogbonna, 2018c). Furthermore, 58.0% of the women processors had no access to credit facilities, while 42.0% of them had access to credit. Ijioma and Osondu (2015) and Ogbonna (2018b) observed that credit facilitates access to and adoption of agricultural innovations and investment opportunities, leading to increased farm productivity and income. It enables palm fruit processors to purchase inputs, hire labour and procure equipment for increased agricultural production and income. Without access to credit resource poor women processors tend to remain at the same low processing level.



Table 1: Distribution of the women according to socio-economic characteristics

Variables	Frequency	Percentage	Mean
Age (years)			
21-30	6	4.0	50.3
31-40	15	10.0	
41-50	48	32.0	
51-60	54	36.0	
61-70	18	12.0	
Above 70	9	6.0	
Marital status			
Single	18	12.0	
Married	96	64.0	
Widowed	33	22.0	
Separated/divorced	3	2.0	
Household size (number)			
1-5	51	34.0	6.1
6-10	75	50.0	
11 – 15	24	16.0	
Education level			
No formal education	27	18.0	
Primary school education	45	30.0	
Secondary School education	69	46.0	
Tertiary school education	9	6.0	
Processing experience (Years)			
1 – 10	30	20.0	18.2
11 – 20	60	40.0	
21 – 30	45	30.0	
Above 30	15	10.0	
Annual processing income (₦)			
Below 100, 000	60	40.0	127,985.71
100, 000- 199, 999	45	30.0	
200, 000-299, 999	36	24.0	
300000 and above	9	6.0	
Credit access			
Yes	63	42.0	
No	87	58.0	

Source: Field survey data, 2021

Processing Methods for Oil Palm Fruits used by Women

Distribution of women processors based on oil palm processing method used is presented in Table 2. Results shows that a good proportion (58.0%) of the processors used manual/traditional method in processing their oil palm fruits, 36.0% used both traditional and modern methods, while 6.0% of them used mechanized method in this regard. The implication of this is that oil palm fruit processing in the study area is still tedious and labour intensive and as such processing scale would still remain low except majority adopt modern processing methods.



Table 2: Distribution of women processors based on oil palm processing method used

Method	Frequency	Percentage
Manual/Traditional	87	58.0
Mechanized/modern	9	6.0
Both traditional and modern	54	36.0
Total	150	100.0

Source: Field survey data, 2021

Types of Equipment Utilized by Women Oil Palm Fruit Processors

Distribution of women processors based on types of oil palm fruit processing equipment used is presented in Table 3. Table 3 shows that majority (74.0%) of the women used mortar and pestle in processing their oil palm fruits, while, 64.0%, 58.0%, 52.0% and 30.0% of the women processors used manual presser, palm nut cracker, hydraulic hand press and motorized hydraulic press equipment in processing oil palm fruits. The implication of this is that some women processors in the area are yet to adopt use of modern processing equipment. These are improved versions of the traditional practices which Adamu *et al.* (2012) referred to as intermediate technology that consisted of the use of some machines and extraction of oil with hydraulic presses. This result compares favourably with finding of Adebo *et al.* (2015) among oil palm fruit processors in Ekiti State.

Table 3: Distribution of women processors based on oil palm processing equipment used

Processing equipment	*Frequency	Percentage
Lacerator/bunch thresher	36	24.0
Motorized hydraulic press	45	30.0
Palm nut cracker	87	58.0
Mortar and Pestle	111	74.0
Combined digester	27	18.0
Hydraulic hand press	78	52.0
Manual presser	96	64.0
Total	150	100.0

*Multiple responses recorded

Source: Field survey data, 2021

Role of Women in Oil Palm Fruit Processing

Table 4 presents distribution of women according to roles in oil palm fruit processing. The table shows that 80.0%, 68.0%, 62.0%, 54.0% and 50.0% of the processors were involved in picking of fruits from bunch/threshing, carrying of palm fruit to processing site, boiling of palm fruits, separation of fibre and cracking of palm kernels to extract the nuts respectively. Meanwhile few (22.0%) and none of the women were involved in pounding/pressing and harvesting of palm fruits respectively. This is probably due to the drudgery associated with these two activities making them the domain of males. This result shows that women participate prominently in oil palm fruit processing and play leading roles in oil palm fruit processing. Akangbe *et al.* (2011) outlined steps in palm oil production and observed that women played dominant roles in oil palm processing extraction involved predominantly traditional practices except where digesters were used.

Table 4: Distribution of women processors according to roles played in oil palm fruit processing

Processing Activities	*Frequency	Percentage
Harvesting of palm fruits	0	0.0
Carrying of palm fruit to processing site	102	68.0
Picking of fruits from bunch/threshing	120	80.0
Boiling of palm fruits	93	62.0
Pounding/pressing of palm fruits	33	22.0
Separation of fibre	111	54.0
Cracking of palm kernels	75	50.0

*Multiple responses recorded

Source: Field survey data, 2021

Factors that influenced Income Realized by Women from Palm Fruit Processing

The estimates of the factors influencing amount of income realized from palm fruit processing by women are presented in Table 5. All the tried functional forms of the regression model were significant at 1.0% alpha level, implying that any of the functional forms can be used for predictive purposes. However, the double-log functional form gave the best fit to the data judging from having highest R^2 value of 0.710, F-value of 10.491 that is significant at 1.0% alpha level and highest number of significant coefficients. The coefficient of multiple determination (R^2) of 0.710 implies that 71.0% of the variation in amount of income realized from palm fruit processing by women was explained by the joint action of the independent variables included in the model. The significant variables that explained variation in amount of income from processing of palm fruit are educational level, method of processing, membership of association, credit access, labour cost and price of product.

The coefficient of education level (0.146) was positive and significant at 10.0% alpha level, implying that the amount of income realized by women from processing palm fruit increased as their education level increased. According to Onyebinama (2004), a person's level of educational attainment is likely to affect his or her degree of business alertness and ability to seize business initiatives and advantages for increased income. This result lends credence to Osondu *et al.* (2014) assertion that education exposes a person to the right methods of utilizing available resources and has positive effect on the business acumen of entrepreneurs.

The coefficient of method of processing (0.137) was positive and significant at 10.0% alpha level, implying that the amount of income realized by women from processing palm fruit increased as a result of increase in use of modern processing technique. This implies that increasing the processors' use of modern techniques resulted to 0.137 unit increase in income realized from oil palm fruit processing. This agrees with Odii (2003) assertion that improvement in agricultural technology leads to improvement in farm productivity and income.

Membership of association had a positive coefficient (0.378) that was significant at 5.0% alpha level, indicating that being a member of cooperative society increases income from processing of palm fruit. This could be due to the benefits accruing from being a member of cooperative society such as access to information on better processing techniques and credit to procure modern processing equipment.

The coefficient (0.758) of access to credit was positive and statistically significant at 1.0% alpha level. This implies direct relationship between access to credit and palm fruit processing income of the women processors and lends credence to Osondu (2015) assertion that acquisition and proper utilization of credit in agricultural enterprises promotes productivity and enhances level of profit realized from such enterprises.

The coefficient of labour cost (-0.278) exerted a negative significant effect at 5.0% alpha level on income. This implies that the higher the cost of labour used in the processing of oil palm fruit, the lower the income realized by women processors. Also, high labour cost could lead to sub-optimal use of labour which is an important input in oil palm fruit processing. This result lends credence to the findings of Nwaru and Ekumankama (2002) that as input prices rise, reduced inputs are used, which results to reduction in income.

The coefficient of price of product (0.083) was positive and significant at 10.0% alpha level, implying that the income arising from palm fruit processing would increase as the price of the processed product increases. According to Atagher (2013) appropriate pricing of output is necessary to improve farmer's gross margin, income and welfare through poverty reduction. Optimal pricing of processed product will produce optimal results in income and serve as an incentive to produce more. Poor pricing of processed product will tend to reduce income and serve as a disincentive for further processing *ceteris paribus*.

Table 5: Determinants of income of women from palm fruit processing

Variables	Linear	Exponential	Semi log	Double log+
Constant	-26073.752** (-2.342)	8.116*** (21.657)	-116586.720** (-2.586)	4.950*** (3.388)
Education level	2859.591* (1.801)	0.071 (1.322)	5517.047 (1.410)	0.146* (1.950)
Method of processing	2385.183 (0.703)	0.079 (0.689)	4487.678 (0.927)	0.137* (1.874)
Quantity of palm fruit processed	-0.674 (-0.007)	0.002 (0.792)	900.303 (0.323)	0.124 (1.375)
Household size	629.671 (0.797)	0.032 (1.188)	4178.868 (1.215)	0.174 (1.564)
Age of processor	-10.669 (-0.093)	0.003 (0.771)	360.185 (0.079)	0.130 (0.879)
Membership of association	8193.182** (2.323)	0.265** (2.232)	12832.059** (2.595)	0.378** (2.358)
Credit Access	15379.114*** (4.444)	0.517*** (4.434)	23229.310*** (4.651)	0.758*** (4.681)
Labour cost	-0.374** (-2.520)	0.017** (2.151)	9197.751** (2.238)	-0.278** (-2.090)
Price of product	0.184* (1.726)	6.326E-006* (1.760)	2934.727* (1.899)	0.083* (1.677)
R ²	0.683	0.678	0.682	0.710
Adjusted R ²	0.612	0.606	0.610	0.643
F-value	9.574***	9.365***	9.511***	10.491***

***, **, * statistically significant at 1.0%, 5.0% and 10.0% risk levels, respectively. Figures in parentheses are the t-ratios; + = Lead equation.

Source: Field Survey, 2021.

Constraints Faced by Women in Oil Palm Fruit Processing

The distribution of respondents according to the constraints faced in oil palm processing is presented in Table 6. The result showed inadequate finance (82.0%) and credit facilities (72.0%) as the major constraints faced by women oil palm processors. Also, 62.0%, 54.0%, 52.0% and 50.0% of the women indicated high cost of processing equipment, fluctuation of



product price, labour shortage and water shortage respectively as constraints facing them in oil palm processing business. The least problem constraining the women processors (22.0%) was shortage of firewood. This is because majority of the processors were accustomed to using the fibre obtained after extracting the oil from the fresh fruit bunches and making it a very good substitute for firewood. This result compares favorably with the findings of Ekunwe *et al.* (2009), which reported inadequate finance as the most serious constraint facing palm oil processors in Ovia North East area of Edo State.

Table 6: Constraints faced by women in oil palm fruit processing

Constraints	*Frequency	Percentage
Inadequate finance	123	82.0
Inadequate credit facilities	108	72.0
Unavailability of land	69	46.0
High cost of processing equipment	93	62.0
Labour shortage	78	52.0
No electric power supply	60	40.0
Water shortage	75	50.0
Fluctuation of product price	81	54.0
Shortage of firewood	33	22.0
Low supply of palm fruits	72	48.0

*Multiple responses recorded

Source: Field survey data, 2021

CONCLUSION AND RECOMMENDATIONS

Based on findings of this study it is concluded that women played important diverse role in palm fruit processing in the study area and that significant determinants of income realized by women from palm fruit processing were educational level, method of processing, membership of association, credit access, labour cost and price of product. The following recommendations are made from findings of the study:

1. Financial assistance should be given to women processors of palm fruit through loans from agricultural banks or any other related financial institution. This should be done at low interest rates to encourage borrowing, which would lead to increase in income and hence, improve the standard of living of women processors.
2. Co-operative societies should be formed by women processors and the Government should make extension services available to processors in order to encourage them to join these societies and enlighten them on the benefits of these societies, since it was found that belonging to co-operative society significantly influenced the income of the processors. Also, co-operative societies would facilitate the actualization of the first recommendation through loans and other means of assistance.
3. In order to accelerate the income realized by women from palm fruit processing in the state, the government should endeavour to build roads in the area where they do not exist and maintain already existing ones for easy access to raw materials and thus reduce transportation cost in order to boost the income of the processors. Government should subsidize the cost of palm fruit processing equipment in order to promote its use among women palm fruit processors and enhance their income.
4. Social amenities like electricity should be regularly supplied, while pipe borne water should also be provided in areas where palm fruit is processed to facilitate palm oil production.



Females should be encouraged to go into oil palm processing by awareness creation through various media (seminars, workshop, television, radio, newspaper).

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