ANALYSIS OF INCOME INEQUALITY AND POVERTY INCIDENCE AMONG OIL PALM FARMERS IN AKWA IBOM STATE, NIGERIA

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ABSTRACT

This study analyzed the income inequality and poverty incidence among oil palm farmers in Ikot Ekpene agricultural zone, Akwa Ibom State, Nigeria. A multistage sampling technique was employed to select one hundred oil palm farmers spread across the five local government areas in Ikot Ekpene Agricultural Zone. A structured questionnaire was administered to the oil palm farmers to obtain the necessary information. The study used descriptive and econometric tools to analyze information gathered. The analysis of the poverty incidence and income inequality revealed a poverty incidence of 0.56 and a Gini coefficient of 0.58. Poverty depth and severity stood at 0.41 and 0.22 respectively. The result also revealed that poverty incidence existed more among female farmers (52% of the poor); those with fewer years of formal education (89% of the poor); those whose ages range from 41 to 80 years (79% of the poor), those with less access to farm credit (84% of the poor), less access to extension services (70% of the poor) and married farmers (61% of the poor) as well as those with household size greater than 6 members (59% of the poor). The empirical results revealed that; gender ($p<0.05$), household size ($p<0.01$), the dependency ratio ($p<0.01$) and the existence of contract arrangement ($p<0.05$) were positive determinants of poverty incidence while the level of formal education ($p<0.05$), farm size ($p<0.05$), non-farm income ($p<0.05$), household asset ($p<0.10$), social organization ($p<0.01$), farming experience ($p<0.05$) and owned processing unit ($p<10$) were negative drivers of poverty incidence among oil palm farmers in the zone. Based on these findings, it is recommended that social capital formation should be encouraged among oil palm farmers in the State. Also, the State government should prohibit all forms of contractual arrangements between oil palm farmers and merchants and rather set up and monitor central markets for oil palm transactions in the State.

Keywords: Oil palm, Farmers, Income inequality, Akwa Ibom State, Poverty

INTRODUCTION

In the 1960s, Nigeria was the world's largest producer of palm oil accounting for about 43% of the global palm oil production. Obsolete technology and insufficient investment in the sub-sector, as well as the destruction of several oil palm estates during the civil war (1967 – 1970), partly contributed to Nigeria's inability to meet up with the global rise in demand for palm oil (PIND, 2011). In the 1970s, Asia overtook Africa as the major oil palm producing region in the world. Currently, the domestic consumption of palm oil has exceeded supply in the West Africa region (Ofosu-Budu and Sarpong 2013). According to the United States Department of Agriculture (USDA), the Global Palm Oil Production in 2016 stood at 58.8 million tons, with Indonesia, contributing about 60% of the global production and Nigeria, being the largest producers in West Africa accounted for only 7%.In Nigeria, about 80% of production originates from

dispersed smallholders who harvest semi-wild plants and uses manual processing techniques. Several thousand smallholders are spread over an estimated land area ranging from 1.65 million hectares to 2.4 million hectares and a maximum of 3 million hectares (PIND, 2011).

Akwa Ibom State, located in the south-south region of Nigeria is one of the areas where oil palm crop is produced in large quantity (Akpan *et al.,* 2018 and Akpan *et al.,* 2019). Oil palm has a great economic value to the indigenous of this area and is mostly cultivated for its commercial benefits. Palm oil production and its derivatives are common business enterprises among rural dwellers in most oil palm producing communities of Akwa Ibom State.

As opined by Adebo *et al.,* (2015), oil palm production is a strong weapon used to fight hunger and poverty in the rural areas and it also played a major role in the dietary needs of most Nigerians. In spite of the benefits of oil palm production and the fact that the State is rated as the highest oil palm producing State in the country; oil palm farmers have not been able to transform these opportunities to better welfare and improved income (Patrick, *et al.,*2013).This is evident in increasing rural poverty among farming households in the State (Akpan *et al.,* 2016b) and frequent shortage of red palm oil in the market as well as an increase in the number of moribund micro-processing units across the State. Hence, there is an overwhelming need to investigate the degree of poverty and income disparity among oil palm farmers in the State as an initial starting point of intervention in the sub-sector.

Poverty and income disparity are highly influenced by the socioeconomic, environmental and political factors in the society. Researchers have confirmed that extremely skewed income inequality is one of the major sources and positive correlate of poverty incidence (Blau and Kahn, 2005 and Bedard and Ferrall, 2003). Hence, given the present predicament in the oil palm sub-sector in the State; reducing income inequality and severe poverty among oil palm farmers have become critical challenges in the development of oil palm production in the State and the country at large. To key into the federal government policy drive of economic diversification by using oil palm production as one of the major instruments, there are needs to identify the extent of income disparity and poverty level as well as those factors that influence the manifestation of poverty among oil palm farmers in the State.

There are a plethora of researches on income inequality and poverty incidence of farming households in Nigeria. Some of the researches focused on the entire farm households and other on crop/animal-specific farm families. For instance, Ogbonna *et al.,* (2012) identified level of education, social group membership, farming experience and participation in an agricultural workshop as negative drivers of rural poverty among farming households in the southeastern region. However, the household dependency ratio had a positive relationship with rural poverty. In the central region of Nigeria, Asogwa *et al.,* (2012) showed that farm total economic efficiency, household income, household farm size, age, educational level, farming experience, access to credit, gainful employment for household members, and membership of farm association, extension contact as well as farm assets significantly

influenced poverty among farming households. Besides, Amoke *et al.,* (2012) revealed the income inequality index of 0.3519 for the female-headed farm households and 0.5469 for the male counterparts in Akinyele local government area of Oyo State. Also, poverty incidence, depth and severity were higher among the male-headed households than the female counterparts. The result further showed that, increase in the number of dependants and household size increase the probability of being poor while increasing access to credit and contact with extension agents reduced household's poverty status. Similarly, Olawuyi and Adetunji (2013) and Igbalajobi *et al.,* (2013) showed that gender, marital status age, household size, access to credit, farm income, years spent in school, farm size and non-farm jobs were found to be important and significant factors determining poverty among households in Western Nigeria. Akpan *et al.,* (2016a) in the southern region revealed income inequality index of 0.4009 for the male youth farmers and 0.3797 for female youth farmers while youths' years in social organization, level of formal education, age of youths; non-farm income, farm size, contact with extension agents and the commercial purpose of involving in agricultural production reduced the probability of poverty incidence among youth farmers. However, household size and dependent ratio were positive drivers of poverty among rural youth farmers in the State. Furthermore, Akpan *et al.,* (2016b) found an income inequality index of 0.4210 for the male-headed farming households and 0.4531 for the female counterparts while household head's farming experience, years in social organization, level of formal education, farm and non-farm income were negative drivers of rural poverty among rural farming households in the State. However, the farmers' age, household size, the structure of land ownership and gender were positive drivers of poverty. Moreover, Enimu (2018) discovered poverty depth and severity of crop farmers in Bayelsa State as 0.072 and 0.038 respectively. Also, age, educational level, household size, farming experience, farm size, household income, household expenditure and membership of the cooperative were found to be significant determinants of poverty status among farmers in the region.

From the literature reviewed, it is obvious that there is rare study on poverty and income inequality that focused on oil palm farmers in the country. The oil palm sub-sector has suffered severe neglect since the discovery and exploitation of crude oil in Nigeria. The sub-sector occupies a major position in the provision of livelihood means and poverty reduction, especially among vulnerable resource-poor rural dwellers of southern Nigeria. A study that aimed to reveal the levels of income inequality and poverty among oil palm farmers is necessary and aligns with the federal government diversification policy. Hence, the study was specifically designed to calculate the indices of incomes inequality and poverty levels as well as estimate determinants of poverty among oil palm farmers in the Ikot Ekpene Agricultural Zone in Akwa Ibom State, Nigeria.

RESEARCH METHODOLOGY

Study Area: This study was carried out in Ikot Ekpene Agricultural zone of Akwa Ibom State, Nigeria. The zone consists of

five (5) Local Government Areas, namely: Ikot Ekpene, Ikono, Essien Udim, Ini and Obot Akara. It has a population of 734,168 consisting of 373,301 male and 360,867 female (National Population Census, 2006). The climate of the zone is tropical with high relative humidity all year round. The zonal means annual rainfall ranges from 2000mm to 2500mm. The area is agrarian and crops like oil palm, cassava, fluted pumpkin, and waterleaf are grown in commercial quantities. There many oil palm mills located across the five (5) local governments that make up the zone.

Sample Size Selection

From Cochran (1963), a representative sample size from a large population of farmers in Ikot Ekpene agricultural zone was obtained using the equation (1) specified as thus:

$$S_n = \frac{z^2\rho(1-\rho)}{D^2} \dots\dots\dots\dots\dots\dots\dots (1)$$

Where S_n is the required sample size from a large population; "Z" is the standard normal variate (at 95% confidence interval, type 1 error; 1.96). "ρ" is the expected proportion of oil palm farmers in the farming population of Ikot Ekpene agricultural zone (From the record of Akwa Ibom State Agricultural Development Programme "AKADEP" there are about 10,000 to 20,000 part-time and full-time farmers in Ikot Ekpene agricultural zone. Also, a total of 1530 oil palm farmers were found in the record of AKADEP in the zone). "D" is the absolute error or precision at a 5% type 1 error. The sample size is derived as shown in equation (2).

$$S_n = \frac{(1.96)^2\left(\frac{1530}{20,000}\right)\left(1-\left(\frac{1530}{20,000}\right)\right)}{(0.05)^2} \dots\dots (2)$$

$$S_n = \frac{(1.96)^2 0.153(1-0.153)}{(0.05)^2} = 107.28 \dots\dots (3)$$

To obtain a proportional sampling among the selected villages, the sample size was rounded up to 100 respondents.

Sampling Frame and Sample Size

A multistage sampling technique was used in the study. The sampling frame consisted of all the oil palm farmers in the five local government areas that constitute the zone. From the office of the Akwa Ibom State Agricultural Development Programme, the distribution of oil palm farmers in the zone is shown in Table 1. The first stage involved the purposive selection of 10 villages noted for intensive production of oil palm fruits in each of the local government areas that make up the zone. The second stage involved the use of a simple random sampling method to proportionally select about 6.50% of the oil palm farmers from the total number of oil palm farmers from each of the local government areas in the zone.

TABLE 1: DISTRIBUTION OF OIL PALM FARMERS IN THE STUDY AREA

L.G.A in the Zone	Number of oil Palm Farmers	Proportion of total	6.5% of each L.G.A
Ikot Ekpene	500	0.327	33.0
ObotAkara	250	0.163	16.0
EssienUdim	300	0.196	20.0
Ini	220	0.144	14.0
Ikono	260	0.170	17.0
Total	**1530**	**1.000**	**100.0**

Source: Computed by author, 2018.

The selection was done across the ten villages in each local government area. That is, 33oil palm farmers were selected from Ikot Ekpene, 16 from Obot Akara, 20 from Essien Udim, 14 from Ini and 17 from Ikono local government areas. The selected oil palm farmers came from the list provided by the AKADEP officials in the zone. The selected farmers were traced and interviewed appropriately in line with the study designed. A total number of 100 oil palm farmers were successfully interviewed and information derived used for analysis.

METHOD OF DATA COLLECTION

Data for the study was collected using a structured questionnaire and was complemented by personal interviews to ensure consistency and accuracy of data collected. A series of cross-sectional data were collected, scrutinized and used in the data analysis.

Analytical techniques

Measurement of income inequality among oil palm farmers in Ikot Ekpene agricultural Zone

The study used the Gini coefficient to measure income inequality among oil palm farmers in the study area. The Gini coefficient ratio ranges from 0 to 1. The Gini index is the Gini coefficient expressed as a percentage. Gini coefficient of 0 corresponds to perfect income equality (i.e. every farmer has the same income) and 1 corresponds to perfect income inequality (i.e. One farmer has all the income, while everyone else has zero income). The specification is described in equation 4, (Bellù, 2006).

$$G = \left|1 - \sum_{k=1}^{n}(X_k - X_{k-1})(Y_k + Y_{K-1})\right| \ldots\ldots\ldots\ldots (4)$$

Where:

G = Gini coefficient

X_k = Cumulated proportion of population variable

Y_k = Cumulated proportion of income variable

Level of poverty among oil palm farmers in the study area

The Foster-Greer-Thorbecke (FGT) model was used to analyze the poverty status of oil palm farmers in the study area. The FGT poverty index is generally expressed as thus:

$$P_\alpha = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{Z - Y_i}{Z}\right)^\alpha \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where:

n = total number of households in the population

q = the number of poor households

Z = the poverty line for the households

Y_i = Per capita household income for the i^{th} farmer

α = poverty aversion parameter and takes on value 0, 1, 2

$\left(\frac{Z-Y_i}{Z}\right)$= proportion shortfall in income below the poverty line.

According to Foster-Greer-Thorbecke (FGT), the poverty index was decomposed into the incidence of poverty, Poverty depth or Poverty gap index and poverty severity index.

Measurement of Poverty Line: This was done to separate oil palm farmers into poor and non-poor groups. As a benchmark, two-third of the mean per-capita income was used as a threshold. Households or farmers

whose mean per-capita income fall below the poverty line are regarded as being poor while those with their per-capita income is at or above the benchmark are non-poor.

Determinants of poverty among oil palm farmers in Ikot Ekpene agricultural Zone

A binary Logit model was used to identify significant factors that influence oil palm farmers' poverty incidence in the zone. Implicitly, the specified model is shown in equation 6. The Logit Model which captures oil palm farmers' poverty incidence is given below;

$$POV = \left(\frac{P_i}{1-P_i}\right) = Z_i = \beta_0 + \beta_1 AGE + \beta_2 GEN + \beta_3 LAB + \beta_4 HHS + +\beta_5 EDU + \beta_6 DEP + \beta_7 FAS + \beta_8 NFB + \beta_9 HHA + \beta_{10} MAR + \beta_{11} SOC + \beta_{12} COT + \beta_{13} EXP + \beta_{14} PRO + U_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Variables used in equation (6) are defined as follows:

POV = Poverty incidence among oil palm farmers (dummy; 1 for poor farmers, i.e. below the poverty line and 0 for non-poor farmers i.e. above the poverty line)
AGE = Age of oil palm farmer (Years)
GEN = Gender of the farmer (1=Female, and 0 for male farmers)
LAB = Amount spent on labour (Naira)
HHS = Household size (number)
EDU = Formal education of a farmer (years)
DEP = Dependency ratio (number of Children less than 15 years plus adult greater than 65 years divided by the household size)
FAS = Farm size of farmers (ha)
NFB = Non-farm income (Naira)
HHA = Household asset (Naira)
MAR = Marital status (dummy, 1 for married and 0 otherwise)
SOC = Membership of a social group (number of years)
COT = Contract arrangement of any form (Amount in Naira stake as contract sum)
EXP = Farming experience (years)
PRO = Ownership of processing unit (dummy; 1 for owned and 0 otherwise)
U = stochastic error term
P_i = Probability to engage in agricultural activity
Ln = Natural logarithm function

RESULTS AND DISCUSSION

The level of poverty incidence and income inequality among oil palm farmers in Ikot Ekpene Agricultural Zone

Poverty levels among oil palm farmers in the study area were analyzed using the three indicators of poverty mentioned previously in the Foster, Greer and Thorbecke (FGT) model. The indicators were: the incidence of poverty, poverty depth and severity of poverty. The result shown in Table 2 revealed that the index of prevalence or incidence of poverty among oil palm farmers stood at 0.560. This means that about 56.00% of oil palm farmers are swallowed by the scourge of poverty in the region. Alternatively, about 56.00% of oil palm farmers have their per capita household income less than the poverty line income. The result also showed that the majority of oil palm farmers in Akwa Ibom State are vulnerable to poverty. This implies that oil palm production is under a serious threat as the sustainability of the business is not guaranteed in the region. Increase in poverty among farmers is capable of inducing massive job diversification and this could be the situation with oil palm enterprises. Premised on this finding, an urgent policy

aimed at increasing farm income of oil palm farmers is strongly suggested to the government of Akwa Ibom State. This will help to curtail rural-urban migration and agricultural diversification as well as reduce the menace of poverty among oil palm farmers in the region.

The result also revealed the poverty depths of 0.4088 for oil palm farmers in the study area. The result implies that about 40.88% increase in per capita income is needed to bring poor oil palm farmers from the trough of poverty to the poverty line household income. This again showed the extent of poverty among oil palm farmers in the region. The majority of the oil palm farmers are deep into the well of poverty in Akwa Ibom State.

TABLE2: POVERTY AND INCOME INEQUALITY PARAMETERS OF OIL PALM FARMERS IN IKOT EKPENE AGRICULTURAL ZONE

Degree of Poverty	Index
Incidence of poverty	0.5600
Poverty depth	0.4088
Poverty severity index	0.2227
Poverty line expenditure(Naira)	4677.74
Population Mean per capita expenditure (Naira)	7016.607
Total respondents	100
Farming households under the poverty line	56
Farming household above the poverty line	44
Income inequality parameters	
Gini Coefficient	0.578319
Gini Coefficient index (%)	57.8319

Source: Computed by authors, 2018.

The index of severity of poverty among oil palm farmers stood at 0.2227 or 22.27%. This implies that oil palm farmers would need to increase their per capita income by 22.27% to escape from severe poverty. This means that about 22.27% of per capita income is required to push the oil palm farmer's population trap in severe poverty to the region of less poverty.

Poverty index based on the socioeconomic qualities of oil Palm farmers in Ikot Ekpene Agricultural Zone, Akwa Ibom State

The estimated poverty indices based on the socioeconomic characteristics of the oil palm farmers are presented in Table 3. The result showed that the prevalence of poverty was higher among households with many members (33.00%) than those with fewer members (23.00%).

TABLE 3: POVERTY INDICES BASED ON THE SOCIOECONOMIC QUALITIES OF OIL PALM FARMERS IN AKWA IBOM STATE

Socioeconomic Characteristics	Prevalence of Poverty	Poverty Depth	Severity of Poverty
Gender (dummy)			
Female	0.2900	0.1134	0.0611
Male	0.2700	0.1135	0.0635
Age Distribution (Years)			
25 – 40	0.1200	0.0423	0.0206
41 – 80	0.4400	0.1866	0.1041
Marital status (dummy)			
Married	0.3400	0.1399	0.0751
Not married	0.2200	0.0890	0.0449
Membership in Social Group (dummy)			
Yes	0.2500	0.0958	0.0469
No	0.3100	0.1332	0.0777
Farming Experience (Years)			
<1 – 10	0.3800	0.1722	0.0958
Greater than 10	0.1800	0.0567	0.2888
Household size (number)			
1 – 6	0.2300	0.1087	0.0578
Greater than 6	0.3300	0.1202	0.0669
Educational qualification (years)			
0 – 12	0.5000	0.2109	0.1174
13 – 16	0.0600	0.0181	0.0729
Non-Farm Income (Naira)			
Zero income	0.2400	0.0997	0.0540
3,000 – 20, 0000	0.2500	0.0970	0.0531
Greater than 20, 000	0.0700	0.0313	0.0176
Access to Agric. Extension			
Yes	0.1700	0.0850	0.0507
No	0.3900	0.1439	0.0739
Access to Farm Credit			
Yes	0.0900	0.0341	0.0175
No	0.4700	0.1948	0.1072

Source: Computed by authors, 2018.

This result implies that households with fewer members will likely have less household expenditures, less dependency ratio and better opportunities to acquire higher education, hence are more exposed to quality alternative income sources compared to a household with many members. The finding also revealed that it would take farming households with many members about 12.02% increment in their per capita income to be at the poverty line income compared to only 10.87% increment to households with less than 6 members. Also, poverty incidence existed more among household heads whose ages range from 41 to 80 years (44.00%) compared to youthful ranges of 25 to 40 years (12.00%). The major reason for this result is that the youthful age range is filled with energy, innovativeness and resourcefulness; and is not saddled with many household responsibilities; while the age range of 41 to 80 years consists of individual who might be weak and are mostly catered for by the younger members

of the society. The finding also shows that it would take youthful age range about 4.00% increase in their household per capita income to escape from the trough of poverty to the poverty line compared to 18.66% for those in the age range of 41 – 80 years.

It is also observed that the oil palm farmers with a higher number of years of formal education (6.00%) are far less poor compared to those with fewer years (50.00%). The reason could be the exposure and degree of technology adoption, which is positively correlated with an increase in years of formal education. Also, it will take oil palm farmer that are more educated about 1.81% and less educated farmers about 21.09% increase in their household income to move away from poverty to the poverty line. This means that more educated oil palm farmers have far more livelihood opportunities compared to less educated ones.

Similarly, the oil palm farmers that are married are more vulnerable to poverty compared to those that are not married. About 60.71% of the poor oil palm farmers (representing about 34.00% poverty incidence) are married; while 39.29% (representing 22.00% of poverty incidence) are not married. This implies that married oil palm farmers have a high incidence of poverty compared to those that are not married. The result also revealed that it would take married oil palm farmers about13.99% increase in their per household income to be at the poverty line income compared to less index value of 8.90% for those not married. Increase in household responsibilities and financial obligations of married farmers could help to explain this result.

The finding also shows that the female oil palm farmers are more susceptible to poverty compared to the male folk. The incidence of poverty stood at 29.00%, for the female farmers while it was 27.00%, for the male farmers. However, the poverty depth and severity among male and female farmers were approximately the same. The slight differences in poverty incidence between the male and female farmers could be traceable to cultural bias in areas of resource ownership and exclusion of female in certain economic activities in most communities in the State. The finding corroborates Akpan *et al.*, (2016a), but contradicts the submission of Amoke *et al.*, (2012).

Oil palm farmers who are members of social organization are less poor compared to those who are not members of any social organization. About 44.64% of the poor oil palm farmers belong to a social organization (i.e. 25.00% poverty incidence), while 55.36% (representing 31.00% poverty incidence) are non-members. In addition, the result reveals that it would take poor oil palm farmers that are member of a social organization about 9.58% increment in their per capita household income to reach the poverty line; and 4.69% to escape from the severe poverty compared to 13.32% and 7.77% respectively for those that are not members of any social organization. The reason could be attributed to the fact that social capital formation enhances social interactions and exposes members to varieties of income sources.

Furthermore, oil palm farmers with more years of oil palm production experience are less poor compared to those with fewer years of experience. For instance, the study discovered a poverty incidence of 18.00%

for oil palm farmer whose farming experience exceeded 10 years. The index stood at 38.00% for those farmers whose experience is less than 10 years. Similarly, it would take oil palm farmers with more farming experience about 5.67% increment in their per capita household income to reach the poverty line compared to 17.22% for those with lower farming experience. The result suggests that oil palm farmers who have more experience had developed poverty coping strategies over the years compared with the less experienced ones.

The accumulation of non-farm income helped to increase the household's income and expenditure. The finding agreed with the above assertion as households with higher non-farm income are less prone to the scourge of poverty than those with a smaller amount of non-farm income. For instance, about 7.00%, 25.00% and 24.00% of poverty incidence are associated with oil palm farmers with non-farm income ranges: greater than N20, 000; N3, 000 – N20, 000 and zero non- farm income respectively. The result suggests that oil palm farmers in the region have more economic incentives by engaging in non-farming income-generating activities. Perhaps, this result could explain the current increase in agricultural diversification and or rural-urban migration among rural youths in most rural communities of the State, as most of these non-farm income-generating opportunities are abundant in urban areas of the State.

The finding further reveals that oil palm farmers that have access to agricultural extension services (17.00%) were less poor compared to those that do not have (39.00%). The study identified poverty depth and severity of 0.0850 and 0.0507 for farmers that have access to an extension agent compared to more deteriorating figures of 0.1439 and 0.0739 respectively for those farmers without extension services. This means that agricultural extension is one of the key factors needed by oil palm farmers to effectively tackle the issue of poverty in the State. The quality of information transfer and the efficiency of extension service delivery is the key. This is a clarion call for improved service delivery by the extension service system in the State.

The prevalence of poverty was higher among oil palm farmers that do have access to farm credit than those that have access. Only 9.00% of poverty incidence was recorded for those that have access to farm credit, whereas 47.00% poverty incidence occurred among those that do not have access to farm credit. Poverty depth of 3.4% was recorded for farmers that have access to farm credit compared to 19.48% for those without farm credit accessed. Similarly, the severity of poverty stood at 1.75% and 10.72%, for oil palm farmers that accessed farm credit and those who do not respectively.

Income Inequality Index for Oil Palm Farmers in Ikot Ekpene Agricultural Zone, Akwa Ibom State

The estimated Gini coefficient presented in the lower portion of Table 2 showed that income inequality existed among the oil palm farming households in the region. A Gini coefficient index of 57.83% is revealed for the oil palm farmers in the region. This implies that farm income is unevenly distributed among the oil palm farmers in the region. This finding is relatively similar to the report of Agwu and Orji (2013) for farmers in the southeast region and Amoke *et al.,* (2012) for the

western part of Nigeria. Akpan *et al.*, (2016a) obtained a relatively similar figure for male youth farmers in Akwa Ibom State. Akpan *et al.,* (2016b) also obtained similar results for male and female-headed farm households in Akwa Ibom State.

Determinants of Poverty among oil palm farmers in Ikot Ekpene Agricultural Zone in Akwa Ibom State

The estimates of the Logit model are presented in Table 4. The diagnostic statistics of the estimated model revealed that the log-likelihood ratio of 59.41 is significant at 1% probability level. This indicates that the estimated R^2 is statistically significant, implying that the specified Logit model has strong explanatory power, hence goodness of fit. The McFadden R^2 of 0.8427 indicates that about 84.27% of the variability in poverty incidence among oil palm farmers is connected to the specified explanatory variables. This means that important variables that influenced the poverty incidence among oil palm farmers in the study area were included in the specified Logit model.

The result showed the estimated coefficients, log odd coefficient, marginal effect and the probability values. The empirical result revealed that the slope coefficient or the marginal effect of poverty incidence among oil palm farmers increases as the number of female farmers increase. That is, a 10% increase in the number of female oil palm farmers would increase the probability of poverty incidence among female members by 0.132% in the region.

TABLE 4: ESTIMATES OF THE LOGIT MODEL ON DETERMINANTS OF POVERTY AMONG OIL PALM FARMERS IN AKWA IBOM STATE

Variable	Coefficient	Log odd coefficient	Marginal Effect	Z-values
Constant	−1.4086	—	—	−0.9206
Age	0.0440	1.0449	0.0108	1.4571
Gender	0.0535	1.0549	0.0132	2.0968**
Cost of labour	0.0001	1.0001	3.57e-05	0.6610
Household size	0.0899	1.0941	0.0222	3.7013***
Education	−0.0040	0.9960	−0.0009	−2.0737**
Dependency ratio	0.8836	2.4196	0.2177	3.6474***
Farm size	−0.2497	0.7790	−0.0615	−2.4402**
Non-farm income	−2.77e-05	0.9999	−6.83e-06	−2.1333**
Household asset	−1.29e-06	0.9999	−3.19e-07	−1.9220*
Marital status	−0.4161	0.6596	−0.1016	−0.8369
Social organization	−0.0437	0.9572	−0.0108	−2.7487***
Contract arrangement	6.80e-07	1.0000	1.68e-07	2.1012**
Farming experience	−0.0045	0.9955	−0.0011	−2.0990**
Own of process. unit	−1.2371	0.2902	−0.2979	−1.9182*
Diagnostic Statistics				
Log-Likelihood	-58.3051		Log ratio test	59.4081***
McFadden R^2	0.8427		Prediction	98.000%
Akaike Criterion	146.6103		Schwarz C.	185.5370

Source: Computed by authors using 2018. Asterisks *, ** and *** represent significant levels at 10%, 5% and 1% respectively.

Alternatively, a unit increase in the number of female oil palm farmer in the region would increase the log odd of poverty incidence by 1.0549 or 5.49%. The finding showed that the female oil palm farmers are more vulnerable to poverty compared to their male counterparts in the region. A similar result has been reported by several researchers, including Igbalajobi *et al.*, (2013), Salami *et al*., (2017), Adetunji (2013), Olawuyi and Adetunji (2013) and Akpan *et al.*, (2016b). The result also showed that a unit increase in the oil palm farmers' household size would increase the probability of being poor by 0.0222 units. The odd interpretation implies that, for every unit increase in the household size of the oil palm farmers, the odd of poverty incidence among farm families increases by 1.0941 or about 9.41%. The result suggests that oil palm farm households with large size are more prone to poverty compared to those with fewer members. This could be as the result of an increase in household expenditure among other things. This result could be because oil palm production is seasonal. Hence, during the off-season, farm income shrinks and poverty increases correspondingly. The finding corroborates Ogbonna *et al.*, (2012), Asogwa *et al.*, (2012), Amoke *et al.*, (2012), Olawuyi and Adetunji (2013), Igbalajobi *et al.*, (2013), Akpan *et al.*, (2016a), Akpan *et al.*, (2016b), Babatunde*et al.*, (2016) and Enimu(2018).

The marginal effect of education has a significant negative relationship with the incidence of poverty among oil palm farmers in the study area. A unit increase in the educational level of the oil palm farmers' in the study area reduces the probability of being poor by 0.0009 units or reduces the log odd of poverty prevalence among oil palm farmers by 0.40%. The result indicates that increase years of formal education among oil palm farmers in the study area reduces the probability or chances of being trapped in poverty. The result satisfies *a priori* expectation since an increase in years of formal education would expose farmers to better jobs and income-generating opportunities. Educated farmers will likely know how to allocate efficiently farm resources and are more susceptible to technological change. The finding is in line with the empirical results of Duniya and Retwot (2015), Asogwa; (2012), Olawuyi and Adetunji (2013), Igbalajobi *et al.*, (2013) Akpan *et al.*, (2016a) Akpan *et al.*, (2016b) and Enimu (2018)

In addition, the marginal effect of the household dependency ratio is significant and has a positive relationship with the prevalence of poverty among oil palm farmers in the study area. Hence, a unit increase in the dependency ratio of farmers' would increase the probability of incidence of poverty by 0.2177 units or increase the log odd of poverty by 2.4196 units or 141.96%. This means that poverty incidence increases with an increase in the household dependency ratio of oil palm farmers. Again, an increase in dependency ratio is related to the increase in household expenditure. This implies that an increase in the dependency ratio of farmers would likely stiffen household farm investment and tend to reduce the per capita income of the oil palm farmers. Ogbonna *et al.*, (2012), Amoke *et al.*, (2012), Akpan *et al.*, (2016a) submitted a similar result.

The slope coefficient of farm size has a negative relationship with the incidence of poverty among oil palm farmers in the study area. A unit increase in farm size reduces the probability of poverty

incidence by 0.0615 units. The odd interpretation implies that, for every unit increase in the farm size of oil palm farmers, the odd of poverty incidence among farmers reduce by 0.7790 units or 22.10%. This result means that, as oil palm farm increases, more revenue will be expected. This would augment family expenditure and help push away farming household from the scourge of poverty. This finding is in line with the empirical results of Asogwa *et al*.,(2012), Olawuyi and Adetunji (2013), Akpan *et al.,* (2016a) and Enimu (2018).

The result also revealed that the increase in the oil palm farmers' non- farm income reduces the probability of poverty incidence among them. For instance, a unit increase in the farmers' non-farm income would reduce the log odd of poverty incidence among them by 0.999 units or 0.10%. The result implies that as non- farm income increases, the farm family would be able to solve their basic needs thereby averting the issue of poverty. Related results have been published by Asogwa *et al.,* (2012), Olawuyi and Adetunji (2013), Olawuyi and Adetunji (2013), Akpan *et al.,* (2016a) and Akpan *et al.,* (2016b).

In a similar Vein, an increase in oil palm farmers' household asset would reduce the probability of poverty incidence among them. A unit increase in the farmers' household asset would reduce the log odd of poverty incidence among them by 0.999 units or 0.10%. The result implies that, as household asset increases, the farm family income sources correspondingly would increase, thereby increasing the expenditure capacity of the family. With this, the farm family will be able to cater for their basic needs and thus averting the sting of poverty. Similarly, as the farm household assets accumulate, farm families would be able to acquire more lands and increases farm investment. The finding agrees with the reports of Asogwa *et al.,* (2012) and Enimu(2018).

Similarly, the marginal effect of oil palm farmers' membership in a social organization also exhibited a negative correlation with the prevalence of poverty among oil palm farmers in the study area. This implies that a unit increase in years of membership in the social organization of oil palm farmers reduces the probability of incidence of poverty by 0.0108 units. The odd interpretation implies that for every unit increase in years of membership in social organization, the odd of increase poverty incidence among farmers' reduce by 0.9572 or 4.28%. This result implies that social interaction can help reduce the level of poverty among oil palm farmers in the study area. Also, social capital is one way of sharing ideas, information and technology in abroad-based forum. Members bounded by a common ideology can encourage sustainability and enhance improvement in profit and wellbeing. Ogbonna *et al.,* (2012), Asogwa *et al.,*(2012), Akpan *et al.,* (2016a), Akpan *et al.,* (2016b) and Enimu (2018) have all submitted similar results.

Furthermore, a unit increase in the farming experience of the oil palm farmers in the study area reduces the probability of poverty incidence among the oil palm farmers by 0.0011 units. The odd interpretation implies that, for every unit increase in the farming experience of farmers, the odd of poverty incidence among farmers reduces by 0.9955 or 0.45%. This implies that high exposure of oil palm farmers in the business of oil palm production will help to enhance the

perfection in the farming activities which in turn increase farm revenue and invariably reduce the incidence of poverty among them. This result is in line with the findings of Asogwa *et al.,* (2012), Akpan *et al.,* (2016b) and Enimu (2018).

The coefficient of ownership of the processing mill exhibited a negative correlation with poverty incidence among oil palm farmers in the study area. A unit increase in the ownership of the processing mill reduces the probability of poverty incidence by 0.2979 units. On the other way, a unit increase in ownership of processing unit among oil palm farmers will reduce the incidence of poverty by 0.2902 or 70.98%. This implies that the oil palm farmers in the study area can reduce the level of poverty through owning processing mills. The result is supported by Igbalajobi *et al.,* (2013).

The result further shows that contract engagement by the oil palm farmers aggravates the incidence of poverty among them. This means that, as oil palm farmers engage in contractual arrangements with the rich merchants, the probability of poverty incidence among the farmers would increase. This result implies that the rich merchants would end up exploiting the farmers and continue to enslave and deepen them in perpetual poverty.

CONCLUSION AND RECOMMENDATIONS

The result revealed that about 56% of the oil palm farmers in the zone are poor with the poverty depth and severity of 0.4088 and 0.2227 respectively. The poverty was more prevalent among the female oil palm farmers; those in the age category of 41 to 80 years, the married and those who do not belong to social groups. Besides, the incidence of poverty was less for oil palm farmers with more than 10 years experience in the oil palm farming and those with a fewer household size as well as the educated ones. Moreover, the oil palm farmers that earned high amount of non – farm income and those that have more access to extension services, as well as farm credit, were less poor compared to those who do not have. The study also revealed the income inequality index of 0.5783, which implies that income inequality exists among the oil palm farmers in the zone. Furthermore, the study showed that the number of female oil palm farmers, household size, dependency ratio and contractual arrangement are negative determinants of poverty among the oil palm farmers in the zone. On the other hand, the level of formal education, farm size, the amount of non-farm income earned, household asset and social capital, as well as farming experience and ownership of a processing unit, were positive determinants of poverty. Based on the findings, it is recommended that all stakeholders in oil palm sub-sector should promote the formation of social groups among the oil palm farmers in the State. Also, the Akwa Ibom State government should lay more emphasis on the need to control the population as to reduce the burden of large household size. In addition, the adult education programme in the State should be intensified to increase the level of literacy among oil palm farmers in the State. Furthermore, the State government should set up well-coordinated central markets for buying and selling of oil palm products in the State as a way to abolish the contractual arrangement often entered by the oil palm farmers with the rich merchants.

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