

## Asset-Based Wellbeing of Oil Palm Farmers under PrescoPlc out Grower Scheme In Edo And Delta States, Nigeria

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**Abstract:** Many smallholder farmers in Nigeria are resource-poor and such condition could be changed through contract farming. Thus, the asset-based wellbeing of oil palm farmers under the Prescooil-out-grower scheme was assessed the study used questionnaire to elicit data from 242 respondents (150 participants and 92 non-participants) using a two-stage sampling procedure. Data were analysed using descriptive and inferential statistics. Principal Component Analysis (PCA) was also carried out to derive a wealth index that defined the asset-based wellbeing of households. results showed that, on the average, the scheme participants had significantly higher wealth indices than non-participants, and were also better-off in terms of housing quality (roof type, wall type, flooring type), household infrastructure (access to electricity, cooking source, water source, and access to good toilet facility) and possession of durable goods and other assets (motor vehicle, motorcycles, livestock and furniture). Furthermore, majority of the respondents found to be income poor were also asset poor. Therefore, it is recommended that any effort to improve the wellbeing of farming households in the study area should consider asset-based factors such as housing quality, household infrastructure and durable goods as entry points to poverty alleviation, in addition to income.

**Keywords:** Asset, Oil-Palm, Out-Grower, Wellbeing, Wealth Index

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### I. Introduction

Low household wellbeing, in terms of poverty in all forms, is a widespread phenomenon in the rural areas of Nigeria. The multidimensional poverty head count in Nigeria was 50.9% in 2013, with a population of 88.425 million people in such a state<sup>[1]</sup>. This situation does not exclude oil palm farmers. Majority of the oil palm farmers in Nigeria are resource -poor, thus unable to live above poverty, and have basic household infrastructure and farm assets. This was attributable to production and marketing constraints faced by the smallholder farmers<sup>[21]</sup>.

Similar constraints in other oil palm growing countries have been addressed throughout-grower scheme, as advocated by world bank<sup>[3]</sup> the Prescooil palm out-grower scheme established in 2003 in Nigeria is partly a response in this regard. the scheme helps farmers around the firm's nucleus estates with inputs to establish oil palm plantations and provide ready market for their outputs, thereby enhancing the participants' means of livelihood and general wellbeing. some empirical studies in Ghana<sup>(4,5)</sup> and Indonesia<sup>[6]</sup> have established a link between out-grower schemes and improved farmers' welfare in terms of higher per capita income and enhanced asset buildup. conventional measures of household wellbeing involving the use of household level consumption or income data were employed, though some researchers<sup>[7,8,9]</sup> have proved such indicators to be less reliable in comparison with asset-based household wellbeing or wealth indices derived from assets of households using principal component analysis (PCA).

despite the potential of contract farming to reduce poverty, many schemes in Nigeria including that of Presco have made little effort to assess and substantiate their effect on farmers' wellbeing<sup>[10]</sup>. It is necessary to know how the participants are performing in comparison with non-participants to justify the investment on the scheme. Otherwise, the policy measures that will enhance putting such schemes to their best uses may never be formulated.

it is against this backdrop that this study focused on the Prescooil palm out-grower scheme and aim to estimate and compare the wealth indices of participants and non-participants. The study also seeks to estimate and compare the relative poverty of both groups based on their per capita income.

## II. Literature review

Many studies <sup>[11,1213and14]</sup> on poverty in Nigeria examined the nature of poverty at various scopes and used different methodological approaches. Most of these studies focused on money metric (income or consumption) measures. Some researchers <sup>[15]</sup> noted that conventional measures of household wellbeing use household level consumption expenditure or income data over time or at a point in time, though measurement of relative poverty based on income data has been criticized. Another researcher<sup>[16]</sup> also showed from empirical research that income-based economic status indicators are less reliable than indices that are expenditure-based. a major reason advanced was the relatively high non-response rate for income based measures as well as over or under reporting associated with income items utilized in standard of living household surveys. the households may also have multiple sources of income that makes it difficult for a researcher to obtain comprehensive information about income and/or expenditure due to their seasonality and difficulty of recalling. Expenditure data may also be unreliable where proper records of household purchases are not kept<sup>[17]</sup>.

A measure of assets-based household's wellbeing overcome the limitations of monetary metric measurements and suitable to measure the wellbeing of rural farming households <sup>[18, 19, 20]</sup>the construction of wealth indices is based on assets that rely on principal component analysis (PCA). Filmer and Pritchett<sup>[21]</sup> popularized the use of PCA for estimating wealth levels using assets indicators to replace income or consumption data and concluded that PCA provides plausible and defensible weight for an index of assets to serve as a proxy for wealth. Other researchers <sup>[22,21]</sup> implemented and recommended the use of PCA for estimating poverty level or wealth effect, in addition to measures based on income and/or consumption data. the researchers found that a large proportion of the respondents that were poorly asset-endowed were also poor based on per capita income or expenditure. in addition, the first principal components from principal component analysis (PCA) have been used to estimate different asset indices (housing quality, infrastructure and services, and durable household assets) as measures of the respondents' asset-based wellbeing<sup>24</sup>.

## III. Methodology

The study was carried out in delta and edo states, Nigeria. The study area covered the out-grower locations within 30km radius of PrescoPlc'soil palm nucleus estates in Ajagbodudu(Delta State) as well as Obaretinand Ologbo(Edo State). delta state lies approximately between longitude 5°00 e and 6°45 e of the greenwich meridian and latitude 5°00' n and 6°30' n of the equator. It covers an area of 17,001km<sup>2</sup> and shares boundaries with Imo, Anambraand BayelsaStates as well as edo which lies within longitude 6° 4 e and 6° 43 e of the Greenwich meridian and latitude 5°44' n and 7°34' n of the equator. Edo State has boundaries with Kogito the north and east, delta state to the south and OndoState to the west. The dominant occupation of farmers in the study area is farming, of which harvesting palm fruits from the wild grove and smallholding oil palm cultivation is a significant part. Other crops cultivated include rubber, cassava, cocoyam, vegetables and plantain while communities close to rivers also engage in fishing.

Reconnaissance surveys carried out in august, 2014 around the Presconucleus estates indicated that 315 oil palm farmers in 21 communities had participated in the firm's out-grower scheme. The sampling procedure was two-stage sampling with proportional sampling carried out at the second stage. Firstly, there was selection of eleven communities with a minimum of 12 participants in each of them. The second stage involved the simple random sampling of 60% of the out-growers from the sampling frame, using a table of random numbers. This gave a total sample size of 169 oil palm out-growers. The oil palm farmers outside the scheme in the selected out-growers' communities were found to be 100 during the reconnaissance surveys. A complete enumeration of the non-participants was carried out because of the low population. Out of the 269 copies of the questionnaire administered to respondents, 242(comprising 150 participants and 92 non-participants) were retrieved for analysis, thus giving a response rate of 88 % for participants and 92% for non-participants.

Data obtained from scheme participants and non-participants were evaluated by descriptive statistics such as mean and standard deviation as well as percentages. Principal component analysis (PCA) was also used to estimate different asset indices (housing quality, infrastructure and services, and durable household assets) as a measure of wellbeing. the study used the Kaiser-Meyer-Olkin(KMO) test to measure sampling adequacy of the data set as suggested by Keiser <sup>[25]</sup>; KMO values greater than 0.70 indicate appropriateness of the PCA <sup>[26]</sup>Bartlett's test of Sphericitywas also carried out and tested for un-correlation of the variables in the population matrix. A low significant level implies a strong correlation of the variables to explain the variation in wealth indices among the respondents.

A wealth index (WI) was then computed for each of the scheme participants and non-participants as follows:

$$w_i = \sum_i^k b_i \left( \frac{a_j - x_i}{s_i} \right) \dots \dots \dots (1)$$

where:

- $w_i$  = a standardized  $W_i$  for each household;
- $b_i$  = the weights (scores) assigned to the (k) variables on the first principal component;
- $a_i$  = the asset value of each household on each of the k variables;
- $x_i$  = the mean of each of the k variables; and
- $s_i$  = the standard deviation.

Overall wealth indices ( $W_i$ ) were computed for the scheme participants and non-participants from the wealth index for each household. a negative index (-w,) implies that relative to the community's measure of wealth, the  $j^{th}$  household is poorly asset endowed, and a positive index implies otherwise.

income poverty status was estimated to have a classification of households into poor and non-poor categories. the study used the foster-Greer-Thorbecke's(FGT) weighted poverty index given as:

$$p_{\alpha}(y, z) = \frac{1}{n} \sum_{i=1}^q \left( \frac{z - y_i}{z} \right)^{\alpha} \dots \dots \dots (2)$$

where: n = total number of households in population

q = the number of poor households

z = the poverty line for the households (2/3of the mean per capita income)

$y_i$  = household per capita income

$\alpha$  = poverty aversion parameter and takes on value 0,1,2 for poverty incidence or head count, poverty gap or depth, and poverty severity respectively.

#### **IV. Results and Discussion**

Results in Table 1 show that oil palm farming was male dominated (91.0% for non- participants and 87.0% for participants). The age of respondents ranged from 26 to 78 years with a mean of 47 and 62 years for participants and non-participants respectively. Also, 91.0 % and 88.0% respectively of the non-participants and participants were married while 93.0% of participants 46% of non-participants had secondary school education. Furthermore, years of farming experience in oil palm ranged between 7 and 29 years with a mean of 10 years and 18 years for participants and non-participants respectively. Also, household size ranged from 3 to 12 persons with a mean of 7 for both participants and non-participants. However, 66.0% of the participants belonged to cooperative societies while 59.0% of the non-participants were members. Majority (84.0% and 63.0% respectively) of the participants and non-participants were into part-time oil palm farming while 51.0% and 22.0% respectively had access to credit facilities. participants used (93.0%) of their agricultural land(1.51 out of 1.57 hectares) for oil palm farming compared with 96.0% (1.51 out of 1.57 hectares) used by non-participants.

The mean annual per capita income (MAPCI) for participants and non-participants were ₦166,412.10 and ₦107,254.00 respectively. This translates to daily MAPCI of ₦455.92 (\$2.27) and \$4293.85 (\$1.47) respectively for participants and for non-participants. Average annual income from oil palm farming for participants and non-participants was ₦603,819.32 and ₦336,641.48 representing 56.56% and 49.23% of the total household head's income respectively.

Based on the official exchange rate of ₦200 = \$1at the time of the survey.

**Table 1: Socio-Economic Characteristics of Respondents**

Description		Participants (150)	Nonparticipant(92)	Pooled (242)
Sex (%)	Male	86.67	91.30	88.43
	Female	13.33	8.70	11.57
Age (Years)	Minimum	26.00	32.00	26.00
	Maximum	65.00	78.00	78.00
	Mean	47.36	62.28	53.03
Marital	Married	88.00	91.30	89.26
Status (%)	Single	1.33	1.09	1.24
	Others	10.67	7.61	9.50
Level Of Education (%)	No Formal Education	0.00	13.04	4.95
	Primary School	7.33	41.30	20.24
	Secondary School	44.66	14.13	39.66
	Post- Secondary	48.00		35.12
Farming Experience In Oil Palm (Yrs)	Minimum	7.00	8.00	7.00
	Maximum	15.00	29.00	29.00
	Mean	9.52	18.40	12.90
Household Size (Persons)	Minimum	3.00	3.00	3.00
	Maximum	10.00	12.00	12.00
Coop. Society (%)	Membership	66.00	58.69	63.22
	Non-Membership	34.00	41.30	36.78
Nature Of Oil Palm Farming (%)	Full Time	16.00	36.95	23.96
	Part- Time	84.00	63.05	76.04
Access To Credit (%)	No	49.33	78.26	60.33
	Yes	50.67	21.74	39.67
Agric. Land	Mean (In Ha.)	1.89	1.57	1.77
Oil Palm Farm Size	Mean (In Ha.)	1.76	1.51	1.67
Per Capita Income(₦)		166,412.10	107,254.00	135,743.00

**Source: Field Survey, (2015)**

The descriptive data on asset components (% of respondents owning certain assets) in table 2 indicated that more participants had better housing characteristics than non-participants except in terms of improved floor. about 49.3% of the participants were living in houses with improved wall quality (blocks plastered with cement mortar and/or painted). The analysis also showed that 55.3% had improved floor (flooring with cement,additional covering or tiles). Furthermore, 71.70 % of the participants occupied at least two rooms. In terms of roof quality, 24.6% of the participants had improved roofing sheets like aluminum and asbestos.

Scheme participants with improved cooking source (e.g. kerosene and gas) were 62.0%, 70.0% had improved sanitary facilities such as ventilated covered latrines and flush to sewage. Also, 87% of the participants had access to improved water (covered wells and public/ private boreholes) and 92.7% had access to electricity supply. Access to improved sanitary facilities and safe water has some health implications since it means that they are likely less liable to contact water borne diseases associated with using stream water for drinking and cooking.

A greater proportion of participants acquired more assets (TV - 99.3%, upholstery furniture - 80 %, bicycle - 33.3%, motor-cycle/motor cars - 39.3%, wheel barrow - 95.3%, refrigerator - 95.3%) than non-participants (TV - 52.2%, upholstery furniture - 68.0%, bicycle - 13.0%, motor-cycle /motor cars 18.5% wheel barrow - 78.3% and refrigerator - 50%). however, more non-participants acquired radio (62.2%) and livestock (25.0%) than participants (radio - 47.7% and livestock - 18.7%). overall, more participants appear to have better housing condition, basic infrastructure and services as well as more household consumer durables than non-participants.

**Table 2** Asset Wellbeing Indicators of Scheme Participants and Non-Participants

Asset Component	Participants(N=150) % Of Respondents	Non-Participants (N=92) % Of Respondents
<b>Housing Characteristics</b>		
Improved Roof Quality	24.60	13.00
Improved Wall Quality	49.30	30.40
Improved Floor	55.30	62.00
Dwellings With 2 Rooms And Above	71.70	66.70
<b>Infrastructure And Services</b>		
Improved Cooking Source	62.00	15.20
Improved Sanitary Facility	70.00	51.10
Improved Water Quality	87.30	87.00
Access To Electricity	92.70	89.10
<b>Ownership Of Household Consumer Durable</b>		
Radio	47.70	62.20
TV	99.30	52.20
Upholstery Furniture	80.00	68.00
Bicycle	33.30	13.00
Motor Cycle /Motor Car	39.30	18.50
Livestock	18.70	25.00
Wheel Barrow	95.30	78.30
Refrigerator	95.30	50.00

Source: Computed From Field Survey Data, 2015

The results in table 3 indicate that the value of KMO for participants and non-participants are 0.715 and 0.742 respectively. this means that the data are suitable for the principal component analysis and the model is appropriate which is good to allow for the interpretation of results [21] the results the Bartlett's test of sphericity also in table 3 showed a significance level of 0.00 for both participants and non-participants, which is a probability level small enough to reject the null hypothesis. therefore, it can be concluded that the strength of the relationship among the variables is strong enough and that principal component analysis is appropriate for the data.

Moreover, Table 3 presents the respondents' wealth indices including measures of housing quality (roof, wall, floor space and its condition, and number of rooms per person), household infrastructure (cooking source, sanitary facility, access to electricity, and water source), and durable consumer goods and other assets ( such as TV, bicycle, motorcycle and car). The results showed that wealth indices (Wi) for participants and non-participants were 1.345 and 0.830 respectively. This implies that on the average, both groups were well-endowed in terms of assets or non-asset-poor as shown by the positive values of the wealth indices. However, the participants in the study area were better asset-endowed than the non-participants. This is possibly due to the higher income earned by the participants that could be used to acquire household assets. In addition, the participants in the study area were helped to establish their plantations by fresco pic in cash and kind (through grants). This possibly gave the participants a financial edge over the non-participants, who might have to repay lenders capital plus interest, in case loan was obtained for crops cultivation.

The results of PCA using varimax rotation showing the principal components and variance in wealth indices explained for participants and non-participants are also shown in table 3. Asset wellbeing indicators of participants and non-participants in table 2 respectively accounted for 68.0% and 65.0% of the variance of wealth status based on the Eigene values over Kaiser's criterion of 1. Both housing quality and household infrastructure were found to have greater influence accounting for 35% and 46% of the variation in wealth position of participants and non-participants respectively.

**Table 3:** Wealth Indices of Scheme Participants and Non-Participants

Variable	Participants (N=150)	Non-Participants Test (N=92)	Statistic
Overall Wealth Index(WI)	1.35	0.83	3.52***
Housing Index	1.42	1.16	2.04**
Infrastructure Index	1.33	1.33	0.00
Durable Consumer Goods Index	1.29	0.77	3.73***
KMO For Overall WI	0.72	0.74	
% Of WI Variance Explained <sup>A</sup>	67.68	65.65	
% WI Explained By Indicators <sup>B</sup>	35.50	46.30	
Harriett's Test Of Sphericity <sup>C</sup>	338.85***	531.92***	

\*\*\*Significant at 1 per cent level; significant at 5 per cent level; " % of wealth index variation explained by housing, infrastructure and durable consumer indicators in the 6<sup>th</sup> and 4<sup>th</sup> components for participants and non-participants respectively; <sup>b</sup> % of wealth index variation explained by only housing and

infrastructure indicators in the first and second components; approximate chi-square, df(91) and significance level of 0.000

Both housing quality and household infrastructure of participants in the first and second components contributed about 36 % of the variance (Table 4). Housing quality and household infrastructure in the first and second components also had greater influence on wealth position of non- participants and accounted for over 46 % of the variation (Table 4).

**Table 4**Total Variance in Wealth Index Explained for Scheme Participants and Non-Participants

Component	Initial Eigenvalues(Participants)		Initial Eigen Values(Non-Participants)	
	Total	% Of Variance	Total	% Of Variance
1	3.42	24.43	4.42	31.54
2	1.55	11.07	2.08	14.83
3	1.26	8.99	1.53	10.95
4	1.12	8.02	1.17	8.34
5	1.11	7.94	0.92	6.56
6	1.01	7.23	0.83	5.91
7	0.94	6.73	0.67	4.81
8	0.75	5.32	0.62	4.40
9	0.62	4.45	0.45	3.22
10	0.58	4.17	0.42	2.98
11	0.50	3.56	0.34	2.43
12	0.45	3.21	0.25	1.80
13	0.37	2.63	0.18	1.30
14	0.32	2.25	0.13	0.93

**Source:** Computed From Field Data, 2015

The results of rotated component matrix (tables 5 and 6) vividly indicate that housing quality (roof type, wall type, flooring type), household infrastructure (access to electricity, cooking source, water source, and access to good toilet facility) and possession of durable goods and other assets (motor vehicle, motorcycles, livestock and furniture) have high and positive correlation with the wealth position of scheme participants and non-participants.

**Table 5**Rotated Component Matrixfor Participants

Variable	Component					
	1	2	3	4	5	6
Motor Car	-.01	.01	-.08	.04	-.02	.96
Motor Cycle	-.04	.02	.80	.04	.01	-.10
Radio	-.07	.24	.43	-.46	-.01	.04
Furniture	.01	-.01	.03	.82	.03	.03
Livestock	.14	-.05	.08	-.07	.88	.05
Rooms	.42	.30	.38	.46	-.11	.15
RoofingType	.03	.87	.22	-.07	-.04	.01
Wall_Type	.69	.32	.06	.21	.09	.24
Flooring_Type	.39	.63	-.37	.01	-.01	-.01
Electricity	.59	.25	-.07	.07	-.26	-.14
Cooking_Source	.82	-.10	.13	-.18	-.06	-.05
Water_Source	.77	.01	-.08	.10	.16	.08
Toilet_Facility	.66	.16	-.34	.06	-.00	-.11

**Source:** Computed From Field Data, 2015

**Table 6**Rotated Component Matrixfor Non-Participants

Variable	Component			
	1	2	3	4
Motor_Car	.14	.57	-.38	.16
Bicycle	.11	.14	.82	.15
Radio	.09	.24	-.05	.72
Furniture	.10	-.06	.76	-.02
Wheelbarrow	.23	.58	.17	.34
Rooms	.10	.01	-.11	-.83
Roofing Type	.03	.88	.07	.13
Wall_Type	.78	.02	-.11	-.03
Flooring_Type	.67	.51	.08	-.01
Electricity	.89	.09	.14	-.08
Cooking Source	.13	.82	.04	-.06
Water_Source	.90	.12	.03	-.04
Toilet Facility	.80	.08	.05	.33

**Source:** Computed From Field Data, 2015

Poverty head count was computed on the basis of the individual oil palm farmer's wealth index (table 7). The dividing line between the poor and non-poor was based on the value of estimated wealth index: households with positive values were classified as non-poor while those with negative values were regarded as poorly endowed. Thirty-six percent of the participants and about 49% of non-participants were poorly asset endowed. this implies that more of the participants (64%) were better endowed with assets than non-participants. the findings on the variation of poverty incidence based on wealth indices between the participants and non-participants agree with the results of the asset-based wellbeing indicators presented in tables 2 and 3 which showed that participants were better endowed than non-participants in terms of housing quality, infrastructure and services as well as ownership of household consumer durable items.

**Table 7: Poverty Status of Respondents Based on Wealth Index**

Poverty Status	Participants(N= 150)	Non-Participants(N=92)	
	Poverty Rate (%)	Poverty Rate (%)	Test Statistic
Poor (WI < 0)	36.0	48.9	- 1.98**
Non-Poor (WI > 0)	64.0	51.1	1.98**

\*\* Significant At 5 Per Cent Level

FGT poverty measure based on household heads' income was also used to assess the extent of poverty among the oil palm farming households in the study area. The poverty line used was calculated from the mean annual per capita income (MAPCI) of the sampled households and found to be ₦90,495.33, which was two-thirds of the MAPCI. The poverty line was expected to meet the annual minimum basic requirements (food and non-food) of a household member. Households with MAPCI below the poverty line were classified as poor while those with higher MAPCI were classified as being non-poor. Thus, the incidence of poverty ( $p_0$ ) of non-participants and participants was estimated to be 58.0% and 16.4% respectively (table 8). The poverty depth or gap ( $p_i$ ) for non-participants and participants were 0.450 and 0.175 respectively. The poverty depth implies that on average, the poor participants would require 17.5% of the poverty line, equivalent to ₦423,120.19 to get out of poverty and poor non-participants would require 49.56%, amounting to ₦40,722.90. furthermore, the poverty severity ( $p_2$ ) of poor non-participants (28.11%) was higher than poor participants (5.61%). therefore, the results show that the non-participants were relatively poorer with wider poverty gap and greater poverty severity than participants. the disparity in the poverty rates between participants and non-participants is likely due to the observed difference in their income from oil palm farming. however, neither participant nor non-participant lives in core poverty, less than one-third of the MAPCI (₦45,247.67). furthermore, it was found out that over 27 % of the oil palm farmers were both income and asset poor. however, participants and non-participants poor in both assets and income were 13 % and 29 % respectively.

**Table 8Poverty Status of Scheme**

Poverty Status	Participants(N=150)	Non- Participants(N=92)	Poverty Rate (%)	Test Statistic
	Poverty Rate (%)	(%)		
Core Poor	0.00	0.00		
Moderately Poor	16.40	58.00		-6.96***
Depth Of Poverty ( $P_1$ )	17.5	45.00		- 4.55***
Severity Of Poverty ( $P_2$ )	5.61	28.11		.447***
Non-Poor	83.60	42.00		6.96***

**Participants AndNon-Participants Based On Income**

\*\*Significant At 5per Cent Level    \*\*\*Significant At 1 % Level

## V. Conclusion And Recommendations

The study used PCA to create a wealth status index of households for both scheme participants and non-participants. The basic advantage of this hinges on the fact that it avoids several measurement problems such as memory recall bias and seasonality associated with money metric approaches. The adopted approach may be very useful for smallholder farm households that carry out some transactions not based on money and do not keep records of incomes or expenditures.

The study established that the scheme participants were better off in terms of income poverty rate and asset-based wellbeing indicators (housing quality, household infrastructure and ownership of durable consumer goods). Also, majority of the poor households among the participants and non-participants were both asset and income poor.

Therefore, the researcher recommends that any effort to improve the living standards or wellbeing of oil palm farming households in the study area should consider the identified factors: housing quality, household infrastructure and durable consumer goods as entry points to poverty alleviation, in addition to income. the policy implication is also clear: asset-based wellbeing analysis can serve as an effective measure to capture the relative positions of households within a community and can be used also in differentiating the poor from the non-poor for the purpose of development interest.

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