

# Measuring the Economic Benefits of Forests in Relation to Households' Welfare and Forest Dependence in South-western Nigeria

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**Abstract**— *The study assesses the contributions of forest resources income on poverty among rural households in South-western Nigeria. A multi-stage random sampling approach was adopted while descriptive analysis and [Foster-Greer-Thorbecke (FGT 1984) poverty index] were used. Poverty index results showed that 68 percent of the rural households were living below the poverty line in the region. Disaggregated to state level, the highest proportion was found in Osun state (77 percent), followed by Ogun state (70 percent) and Oyo state with about 50 percent. The minimum cost required to bring those poor households to the poverty line (that is, to eliminate poverty) across states include: ₦4, 553, ₦9, 664 and ₦8918 in Oyo, Osun and Ogun states respectively. This indicates that poverty is more severe in Osun state followed by Oyo state but less severe in Ogun state. Also, forest income has tendency to stem the tide of poverty in the region. Therefore, Government and authority concerned should increase opportunities for entrepreneurship and employment in forestry while avoiding deforestation and forest degradation.*

**Keywords**— *Poverty; rural households; forest income; South-western Nigeria; FGT model.*

## I. INTRODUCTION

The Nigeria poverty scenario became exacerbated on yearly basis and there was scary increase in poverty which led to a very piercing inequality between the rich and the poor in terms of income distribution (World Bank, 2008). Going by the antiquity of Nigerian fortune in the early 70s, Nigeria was one of the richest 50 countries in the early 1970s, but declined to become one of the 25 poorest countries in the twenty first century (Okon, 2012: 32).

According to the National Bureau of Statistics report (NBS) (2011), around 112.519 million out of a projected 163 million Nigerian live in relative poverty. That is, when it comes to comparison of the living standard of people living in a specified society within a given period of time. Looking at it from the angle of absolute poverty, the country's poverty profile was put at 60.9 percent; the dollar per day measure puts the poverty profile at 61.2 percent and the subjective measure put the poverty profile at 93.9 percent, possibly, the Harmonized National Living Standard Survey (HNLSS) which put the country's poverty profile at 69.0 percent might strike the balance (NBS, 2011).

Further, the preponderance of Nigeria's poor are rural, female, but cut across age bracket. Most of these people are farmers who largely dependent on renewable natural resources for their living (World Bank/DFID, 2005). However, hope is not lost since forest has been considered as a preference for poverty alleviation as it often serves as an employer of last resort for the rural poor (Sunderlin *et al.*, 2003:1). Thus, the enduring contributions of forests in solving the problem of poverty and inequality then indicate that forests are massively valuable in achieving sustainable livelihood particularly among rural community [United Nations Forum on Forest (UNFF), 2013: 3].

According to FAO (2011), many households subsist in part by collecting leaves, roots, fruits and nuts from trees and other wild plants, and by hunting wild animals, fish, and insects for consumption and income generation. Many people living in and around forest areas harvest a range of products from forests for sale, trade, or barter, such as wood for timber, fuel wood, roof thatching

materials, construction poles, honey, mushroom, caterpillars, and medicinal plants.

In addition, NTFPs activities that rural households explore include; mat and basket-making, cane, furniture production, pestle and mortar and wood craft which fetch a lot of money to rural households. Others are; sales of leaves of various species, chew sticks from various species, sales of fruits and seeds of all kinds, bush meat, snails and fish in rural and urban markets also generate a lot of income (FAO, 2011).

Although, quite very few studies have been conducted on the contributions of forest income in sub- Sahara Africa but of such few, the results seem to be inconclusive. For instance; in Zimbabwe, poverty and inequality measures were calculated with and without forest income and the results showed that when calculated without forest income, poverty and inequality can be increased by as much as 98 percent and 44 percent respectively, depending on the poverty line and measure used (Cavendish, 1999). Also in Southern Malawi, Fisher (2004) found that by excluding income from forestry when measuring inequality, income inequality in the region increased by as much as 12 percent. In Malawi as well, Jumbe and Angelsen (2007) found out that forest income has contrasted welfare impacts across study villages and that forest dependence was poverty neutral. Likewise, Makoudjou *et al.* (2017) found quite mixed results on the role of forest resources in income inequality in Cameroon. For instance, in terms of logging, overall contribution of forest income increases income inequalities by 3 percent while income from gathering and hunting activities on the contrary contributes to reducing inequalities. In Northern Ethiopia, Babulo *et al.* (2009) found that, including forest environmental incomes in household accounts showed that there was significant decrease in rural poverty and income inequality. This was corroborated by the study in the Democratic Republic of Congo by Nielsen *et al.* (2012) who also found out that Gini coefficient rose significantly when forest income was excluded from inequality comparison.

Also, Fonta & Ayuk (2013) worked on 'measuring the role of forest income in mitigating poverty and inequality' in South- eastern region Nigeria, and the results showed that when poverty and inequality were measured without forest, poverty and inequality can be overstated by as much as 6.8 percent and 20.3 percent respectively,

depending on the poverty line and measure used. Nonetheless, the shortcoming on this work is that, their case study was restricted to South-eastern region alone. Therefore, comparative empirical data on forest income role in mitigating poverty in South-western region Nigeria are very essential in order to complement the data base in other regions to broaden the scope of application of the results of the study.

Regrettably, based on extensive literature search and to the best of the researchers' awareness, it is quite amazing and disturbing to note that, there is a gross paucity of micro level data on forest role in mitigating poverty in South-western region of Nigeria. It is thus evidenced that there is a knowledge gap on measurement of forest role on poverty mitigation as far as South-western region of the country is concerned. So, this observed knowledge gap is clearly a shortcoming when it comes to developing informed policies for sustainable welfare and developmental programme in forestry. Against this backdrop, this study therefore seeks to close these gaps by providing empirical data on the economic benefits of forests in relation to households' welfare and forests dependence in South - western Nigeria. Specifically, the study seeks to assess the poverty status of rural households and the economic benefits of forests on poverty status of the rural households in the study area.

## II. MATERIALS AND METHODS

### 2.1. Study area

This research work was carried out in South-western region of Nigeria. It is one of the six geo-political zones in the country (Agunwamba *et al.*, 2009: 8). The area lies between longitude 30<sup>0</sup> and 7<sup>0</sup>E and latitude 4<sup>0</sup> and 9<sup>0</sup>N and thus, west of the lower Niger and south of the Niger Trough. South-west region includes Osun, Oyo, Ogun, Lagos, Ondo and Ekiti States. The total land area is about 191,843 square kilometers (Agunwamba *et al.*, 2009:8). According to the FAO (2011), 9.9% or about 9,041,000 ha of Nigeria is forested. Nigeria had 382,000 ha of planted forest. The report also stated that there were changes in forest cover between 1990 and 2010 as Nigeria lost an average of 409,650 ha or 2.38% per year. In total, between 1990 and 2010, Nigeria lost 47.5% of its forest cover or around 8,193,000 ha. Nigeria's forests contain 1,085 million metric tons of carbon in living forest biomass (FAO, 2011). Specifically, the study area where data were collected include: Ogun, Osun and Oyo States.

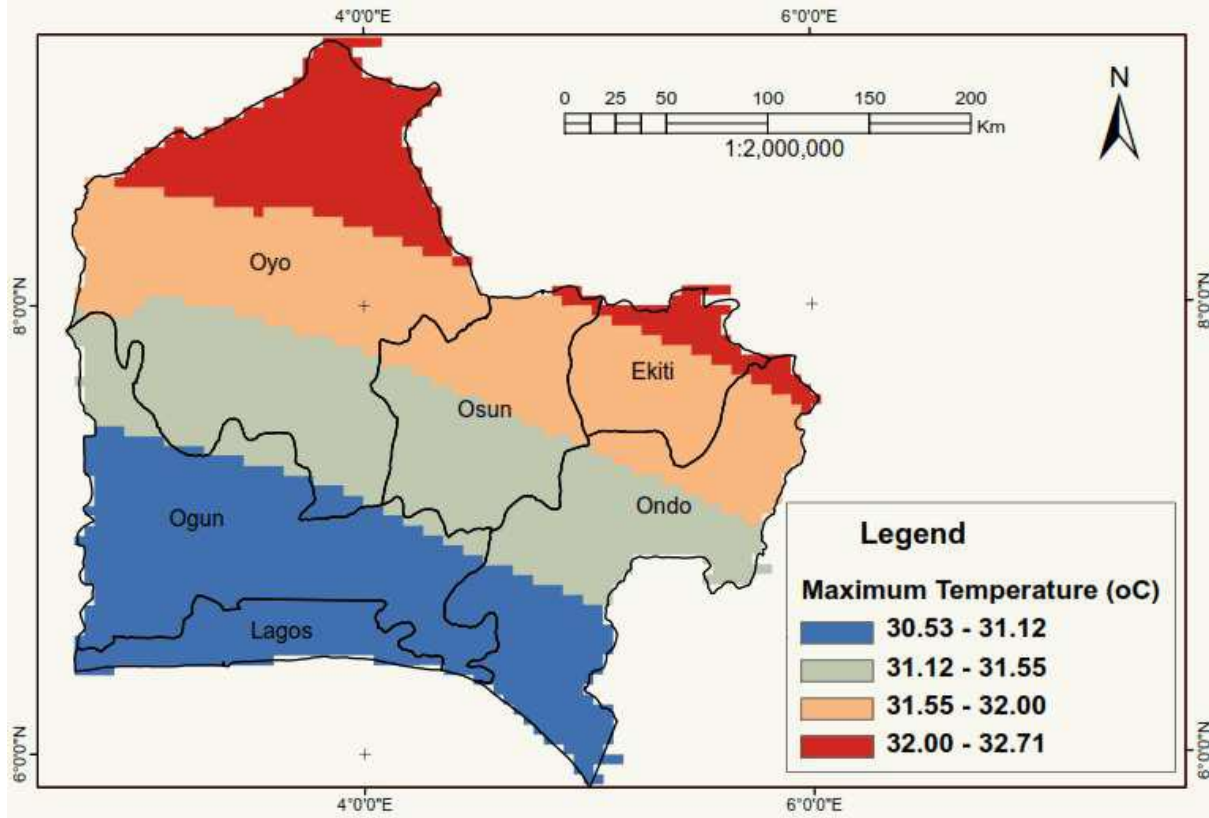


Fig.1: Map of South-west Nigeria

## 2.2. Sampling frame and procedure

The sample frame for the study include rural households' heads who engage in forest-based activities such as plank trading, carpentry/furniture, basketry/mat/bag making, wood carving, rattan and bamboo utilization, rattan and bamboo utilization, charcoal production and selling, fuel wood collection and selling, chew stick, bush meat, snail, fish, fruits and vegetables, medicinal plants, gum and dye, broom, poles, locust bean, spices/ leaves and fibre, mushroom, honey, shea butter, local wine, local wine and farmers who practise agro-forestry system within and around the forest community. The questionnaire was structured to elicit information on individual basis about their involvement in various forest based enterprises with respect to their income. Focus Group Discussion (FGD) method was also adopted in this regard.

A multi-stage random sampling approach was adopted in selecting the respondents for the study. At first stage, three states were randomly selected from the five states that make up the South-west geo-political zone of the country excluding Lagos state due to its cosmopolitan and less forested nature. In the second stage, eighteen Local Government Areas (LGAs) distributed among the three selected states were purposively selected based on their potentials in forestry and their population size. At this stage, one forested village was randomly selected in each selected LGA, for a total of eighteen villages: seven in

Oyo state, four in Ogun state and seven in Osun state. In the third stage, twenty-five households were randomly selected from each village. A total of four hundred and fifty households' heads were interviewed in the eighteen selected villages (271 males and 179 females). Each respondent was interviewed separately and each interview lasted for about 1 hour. The exercise was carried out between December 2016 and April 2017. The questionnaire was structured to elicit information on individual basis about the sources of income and the contributions of forest income with respect to their livelihoods.

## 2.3. Analytical tools and model specification

Descriptive analysis using frequency distribution and percentage analysis was used to discern the respondents' household characteristics and statistics. This describes the socio-economic characteristics of the respondents. For the empirical model, [Foster-Greer-Thorbecke (FGT 1984) poverty index] was used to estimate the required variables accordingly as used by Anyanwu (1997) and Fonta *et al.* (2013). (FGT, 1984) describes the poverty status of the rural households as well as the socio-economic benefits of forest on households' level of poverty. The analysis of poverty incidence using FGT measure usually starts with ranking of expenditures in ascending order  $Y_1 \leq Y_2 \leq \dots \leq Y_n$ : The FGT index is given by:

$$P_{\alpha} = \frac{1}{N} \sum_{i=1}^N \left[ \frac{G_i}{z} \right]^{\alpha}, (\alpha \geq 0) \tag{1}$$

Where  $\alpha$  is a measure of the sensitivity of the index to poverty and the poverty line is  $z$ , the value of expenditure per capita for the  $i$ th person's household is  $x_i$ , and the poverty gap for individual  $i$  is  $G_i = z - x_i$  (with  $G_i = 0$  when  $x_i > z$ ).

Here, to determine the poverty line, the two-thirds of the mean per capita household expenditure of the sample was taken as the poverty line. The following specifications were used to determine poverty level.

Headcount Index: This simply measures the proportion of the population whose welfare fall below poverty line, that is, considered poor. This usually denoted by  $P_0$  and may be represented thus;  $P_0 = \frac{N_p}{N}$  (2)

Where

$P_0$  = the head count ratio

$N_p$  = the number of poor (i.e. numbers of rural household living below the poverty line)

$N$  = the total sampled population

$P_0$  can be written thus:

$$P_0 = \frac{1}{N} \sum_{i=1}^N 1(y_i < z) \tag{3}$$

Now,  $I(\cdot)$  is an indicator function that has a value of 1 if  $(y_i < z)$  is true, and 0 if otherwise. So if expenditure ( $y_i$ ) is less than the poverty line ( $z$ ), then  $I(\cdot)$  equals 1 and the household would be counted as poor. The poverty gap was calculated as poverty gap ( $G_i$ ) = poverty line ( $z$ ) minus actual income ( $y_i$ ) for poor persons; the gap was considered to be zero for everyone else.

The index form is written as;  $G_i = (z - y_i) \times I(y_i < z)$

$$I = \{(Z - Y)/Z\} \tag{4}$$

Where:

$I$  = the poverty gap

$Z$  = the poverty line using the mean household expenditure

$Y$  = the average income of rural poor farm household

The poverty gap index ( $P_1$ ) may be written thus;

$$P_1 = \frac{1}{N} \sum_{i=1}^N \frac{G_i}{z} \tag{5}$$

Given this, the calculated poverty gaps was divided by the poverty line and averaged to give poverty gap index ( $P_1$ ).

Thus, squared poverty gap index may be written as;

$$P_{\alpha} = \frac{1}{N} \sum_{i=1}^N \left[ \frac{G_i}{z} \right]^{\alpha}, (\alpha \geq 0) \tag{6}$$

Where  $\alpha$  = a measure of the sensitivity of the index to poverty,

$z$  = poverty line,

$x_i$  = the value of expenditure per capita for the  $i$ th person's household,

$G_i$  = the poverty gap for individual  $i$ ,

The index function is  $G_i = z - x_i$  (with  $G_i = 0$  when  $x_i > z$ ).

When parameter  $\alpha = 0$ ,  $P_0$  is simply the headcount index.

When  $\alpha = 1$ ,  $P_1$  is the poverty gap index  $P_1$ , and when  $\alpha = 2$ ,  $P_2$  is the poverty severity index.

At whatever time  $\alpha > 0$ , the measure shows that there is decrease in the welfare of the poor (i.e. the lower the welfare, the more one become poor and vice-versa). Similarly, for  $\alpha > 1$ , the index indicates that there is increase in the measured poverty and decrease in the welfare. Hence, the measure is then said to be strictly convex in incomes but weakly convex when  $\alpha = 1$ .

### III. RESULTS AND DISCUSSION

#### 3.1. Sample households statistics

This section presents the socio economic characteristics of the rural households that engage in forest related enterprises. The households' head age distribution shows that 47.2 per cent of the respondents were between 41 - 60 years, followed by 37.4 per cent that corresponds to 21 - 40 years. A total of 14.7 per cent respondents were over 60 years of age whereas only 0.7 per cent of the respondents were less than or equal to 20 years in the study areas. This reflects that about 80percent of the respondents are still in their working age. Table 1 presents the distribution of socioeconomic characteristics of rural households.

Table.1: Distribution of Socioeconomic Characteristics of Rural Households

Item	Frequency	Percentage
Household's Head Age		
Household's Head Sex		
Male	271	60.4
Female	178	39.6
Household's Head Year of Education		

No Formal Education	60	13.4
Primary	107	23.8
Secondary	184	41.0
Tertiary	98	21.8
Marital Status		
Single	54	12.0
Married	325	72.4
Divorced	18	4.0
Separated	52	11.6
Household size		
<2	313	69.7
3 - 4	16	3.60
5 - 6	109	24.3
7 - 8	11	2.40
Religion		
Islam	213	47.4
Christianity	223	49.7
Traditional	13	2.90
Total	449	100

Source: Calculated from field survey, 2017

Male headed households represent about 60.4 per cent of the sample while less than 22 per cent of household heads had tertiary education. Large proportion of households (about 41 per cent) had secondary education while only 23 per cent had primary or elementary school and about 13 per cent had no formal education. It is apt to note that the level of education in the study area is commendable which align with the general perception that households in South West Nigeria are well educated.

In terms of marital status, almost three quarter of the sampled households were married while the remaining one quarter shares 12 percent as single, 4 percent as divorced and 11.6 percent separated. Furthermore, it was revealed from the Table 1 that 47.4 percent of the respondents were Muslims while 49.7 percent were Christians and less than 3 percent were practising traditional religion. This therefore indicates that religious factors may not have much impact in venturing into forest related businesses given credence to the two most commonly practised religions in the study area (Islam and Christianity) which abhors the traditional use of forest products through trado-medicine or alternative medicine most especially when the usage has some fetish beliefs attached to it.

### 3.2. Decomposition of poverty status by states and socio-economic characteristics

In this section, the study decomposes the poverty status of the rural households generally based on their states and socio economic characteristics using FGT model as summarised in Table 2 below. Using the headcount index

( $P_0$ ) to measures the proportion of the population that is poor, the results showed that 68 percent of the rural households<sup>1</sup> are living below the poverty line. This therefore indicates that close to three-quarter of the sampled households had their monthly per capital expenditures that is less than ₦ 18,331<sup>2</sup>. These households however fell within the category of moderately poor because their average monthly expenditures are greater than one-third of total households' per capita expenditure but less than two-thirds of the total households' per capital expenditure while the extremely poor households had their average monthly expenditures that is less than ₦9,166 (that is, one third of the total expenditure).

<sup>1</sup> Survey data are almost always related to households, so, to measure poverty at the individual level, we must make a critical assumption that all members of a given household enjoy the same level of well-being.

<sup>2</sup> ₦18331 set as poverty line for the study area (South-western Nigeria) was calculated by dividing total households' monthly expenditure by total households' size. Then, the two third of the answer was calculated. It coincidentally matched the present Nigerian workers' minimum wage (2016)

Table.2: Decomposition of poverty by states and socio-economic characteristics

State	Poverty incidence	Poverty gap	Poverty severity
Oyo	0.4968	0.2484	0.3532
Osun	0.7703	0.5272	0.4415
Ogun	0.7055	0.4865	0.3095
Region	0.6603	0.6940	0.5965
<b>Age</b>			
Less than 20 yrs	0.6667	0.4903	0.3156
21-40 yrs	0.6667	0.5081	0.3153
41-60yrs	0.6226	0.4353	0.258
61-80yrs	0.7272	0.6008	0.443
<b>Sex</b>			
Male	0.6089	0.4776	0.2904
Female	0.7247	0.5068	0.336
<b>Education</b>			
No formal education	0.8333	0.6736	0.4944
Primary	0.7583	0.5693	0.3703
Secondary	0.625	0.4385	0.26
Tertiary	0.5102	0.3222	0.1682
<b>Marital status</b>			
Single	0.7593	0.6136	0.4444
Married	0.6308	0.4656	0.2847
Divorced	0.6111	0.4778	0.2845
Separated	0.7115	0.6303	0.4474
<b>Religion</b>			
Islam	0.6808	0.504	0.3333
Christianity	0.6188	0.4751	0.2839
Traditional	0.8462	0.5037	0.3414

Source: Calculated from field survey, 2017

By decomposing across states within the study area, the incidence of poverty indicates that the proportion of households living below poverty line is noticeably the highest in Osun state followed by Ogun state where 77 percent and 70 percent of rural households average monthly expenditures respectively were not up to ₦18,331. Oyo state was thus recorded lowest of about 50 percent in terms of poverty head count index. These findings thus suggest that there are some insignificant improvements in living standard of people in Oyo state compare to other two states probably because Oyo state is business oriented and disposed than Ogun and Osun states. Conversely, the results also reveal that poverty incident rate is higher in Osun state perhaps due to the fact that most people in the state are employed in formal sector and there was irregularity in the payments of their

salaries because of cash crunch in the government coffers which dwindled the state economy.

In terms of poverty gap *index* ( $P_1$ ), Table 2 therefore revealed the minimum cost required to bring these poor households to the poverty line across states. For example, in Oyo state, the poverty depth ( $P_1$ ) value of 0.2484 will require ₦4,553 (that is, 0.2484 multiplied by N18331) per household per month to close the poverty gaps in the state while a sum of ₦9,664 (that is ( $P_1$ ) 0.5272  $\times$  N18331) is needed to bring the households in Osun state to the poverty line. Likewise in Ogun state, individual household would require a sum of ₦8,918 (that is, ( $P_1$ ) 0.4865  $\times$  N18331) to eliminate poverty in that state. In other words, if each respective state could mobilise resources or receive transfer of resources equal to corresponding percentages of poverty line for every household and were perfectly targeted and appropriately

allocated to the poor in the amount needed so as to bring each household up to the poverty line, it is expected that poverty could be at least eradicated, even though in theoretical term.

Regarding poverty severity, Table 2 also revealed poverty severity ( $P_2$ ) estimate of 0.3532, 0.4415, and 0.3095 in Oyo, Osun and Ogun states respectively. This indicates that poverty is more severe in Osun state followed by Oyo state but less severe in Ogun state. These results reflect a measure of poverty that takes into account inequality among the poor within the households and the amount of weight that was put on the income (or expenditure) level of the poorest household as it varies across all households. This therefore suggest that economic severity was higher among households in Osun state than Oyo and Ogun states in that order. Part of the possible reasons that may be advanced for this scenario was perhaps due to the fact that Oyo state has a very high forest regeneration inclination compare to any other South-western states in the region (Faleyimu *et al.*, 2013:3383) and may be because of her enhanced forest business potentials.

Table 2 also shows decomposition of index of poverty by socio-economic characteristics of rural households that engage in forest related activities in the study area. Poverty incidence was less among the middle (40 - 50) aged households than the older (61-80) aged households. The same thing was applicable to their poverty gap index as well as poverty severity index. These results might be due to the rate of unemployment particularly among the younger population in the region.

Male-headed households had less poverty than their female-headed counterparts across all poverty measure indices. The reason may be partly due to strength and requisite potentials inherent in men in some more lucrative aspects of forest businesses (e.g. logging) that responsible for such (Shackleton (2011). It could also be as a result of the fact that in most parts of rural Nigeria, female-headed households are always involved in many other trading occupations (Omonona, 2009). Although, this assertion runs contrary to the findings of Ogwumike and Akinnibosun (2013) which stated that female-headed households had less poverty than their male-headed counterparts.

Moreover, households' years of education reduces poverty as those with tertiary education have less poverty than those with little or no formal education. Predictably, poverty is lower when the level of education increases. Therefore, this result is plausible because educated households' heads would apply some entrepreneurial skills and marketing strategies to their advantages. It may be a form of value addition such as advertisement, promotional services, packaging, rebranding and host of other factors across the value chain mechanism. In the

same vein, most of local people may lack skills for appropriate extraction that would allow harvesting, processing, packaging and marketing NTFPs to the full potential of commercialization. This matched the findings of Kimaro and Lulandala (2013) on contribution of non-timber forest products to poverty alleviation and forest conservation in Rufiji District - Tanzania. Though, it is contrary to the findings of Fonta & Ayuk (2013) when measuring the role of forest income in mitigating poverty and inequality for the case of South-eastern Nigeria where years of education was positively correlated with poverty. Furthermore, by decomposing poverty by marital status, Table 2 revealed a very surprising result such that both single and separated households' heads recorded almost the same high poverty results for the headcount, poverty gap index and poverty severity index on one hand, and both married and divorced also recorded almost similar less poverty across all measures of poverty index on the other hand. The reason may be due to the fact that married and divorced were more involved in forest related activities than others in the study area.

Lastly, across poverty measure indices, there was no much distinction among religious faithful in terms of their participation in FREs. However, Muslim households' heads recorded relatively high poverty gap and poverty severity index than their Christian counterparts in the study area. There is a certain assumption to the variance between the two religious faithful which hitherto include; high family size in most Muslim households which could probably increase their per capita expenditure.

### 3.3 Classification of poverty status of rural households with and without forest income

This section presents the classification of poverty incidence of rural households with forest and without forest income in the study site. Following the method of classification of poverty adopted by Sen (1981) as used by Aiyedogbon (2012) and Dubihlela (2014), households are classified into extremely poor, moderately poor and non poor based on their poverty index measures.

However, there are two approaches (monetary and non-monetary indicators) through which this poverty categorization can be measured (Coudouel *et al.*, 2002; Adekoya, 2014:329).

The most common indicators used in practice are based on household consumption expenditure and household income. The study adopts the standard practise of using per capita consumption expenditure as a measure of living standard as used by many authors such as Okunmadewa *et al.* (2005); Olaniyan and Bankole (2005); Oni and Yusuf (2006) and Addae-Korankye (2014) in most poverty studies in Nigeria. Example here is *setting the*

two-thirds of the mean per capita households' expenditure (see Rogers 2015).

Having set this, any household whose per capital consumption expenditure is below this poverty line is regarded as poor while those above it are considered non-poor. Further, households whose per capita expenditures are less than one-thirds of the total households' per capita a, 2014)<sup>3</sup>. Table 3 presents the distribution of poverty status of rural households with and without forest income.

expenditure are regarded as extremely poor while those households with average monthly expenditures greater than one-third of total households' expenditure but less than two-thirds of the total households' expenditure are considered moderately poor (see Sen, 1981; Aiyedogbon, 2012; and Dubihlel

Table.3: Classification of poverty status of rural households with and without forest income

Poverty index	Poverty index with forest income	Poverty index without forest income	Percentage Relative change
Extremely poor	0.541	0.660	11.9%
Moderately poor	0.457	0.563	10.6%
Non poor	0.515	0.612	9.7%
Total	0.614	0.721	10.7%

Source: Calculated from field survey, 2017

<sup>3</sup> Households are considered non poor since their per capital monthly expenditure is equal to or greater than the pre-determined poverty line of N 18,331. Poverty line for the study area (South-western Nigeria) was calculated by dividing total households' monthly per capita expenditure by total households' size. Then, the two third of the answer was calculated. It coincidentally matched the present Nigerian workers' minimum wage (2016).



Table 3 introduces the disparities that exist in terms of the contribution of forest income to the households' poverty status in South-western Nigeria. The results revealed that if forest income was included in the econometric analysis, the proportion of extremely poor household was reduced to 66 percent, about 12 percent relative change. Likewise, using the same phenomenon in the moderately poor category, the disparity in proportion was 10.6 percent while that of non poor was 9.7 percent (that is, a relative drop of 12.9 percent, 13.8 percent and 10.7 percent poverty index respectively).

This decrease in poverty index is in conformity with the finding of Fonta and Ayuk (2013) with a difference of 16.4 percent when the like of this study was carried out in the South-east region in Nigeria. Their findings therefore argued that forest income is more pro-poor and has tendency to mitigate poverty than any other income source in South-eastern Nigeria. Similarly, Tangem (2012) also argued that small and medium scale forest enterprises have the potential to diversify rural livelihoods and improve their standard of living because they require only small initial investment to set up which can make them accessible and attractive to the poor and in turn diversify their economic opportunities and improve their livelihood security (UNFF, 2013). This is not surprising because most rural households found reliance in forest income in terms of "safety net" functions than in non-forest related enterprises. Rural people usually draw on available natural resources to meet emergency shortfalls and to keep them from being worse off in times of need (Belcher, 2005).

In sum, using conventional income measure, the households poverty index was 72 percent whereas the inclusion of forest income reduces the headcount poverty to 61 percent, a relative drop of 10.7 percent. These results are in conformity with Federal Republic of Nigeria study for poverty profile (Africa) final reports published in March 2011, which gave almost the same figure (63.27 percent) for the rural poverty in Nigeria [(see NBS, 2011) Poverty Profile for Nigeria].

For the South-west region, the outcome is also in agreement with such other related studies as revealed

*Table.6.4: FGT analysis with FREs and without FREs for the region*

Poverty index	with FREs	without FREs
Poverty incidence	0.6369	0.6837
Poverty gap	0.6559	0.7320
Poverty severity	0.5051	0.6879

Source: Calculated from field survey, 2017

First, in terms of poverty headcount measure, almost 68 percent of the households are regarded as poor in conservative income measure (i.e. with exclusion of forest

from literature. For example, the Nigeria poverty profile 2010 report by National Bureau of Statistics revealed that in 2010, the South-west geo-political zone recorded the poverty incidence of about 59.1percent which is close to 65.5percent poverty incidence observed in this study with specific reference to rural forest households in the region in 2016. These findings therefore suggest that poverty has established itself as a palpable and endemic scourge among the majority of rural people in Nigeria especially in the South-west region of the country.

#### **3.4. Socio-economic benefits of forest income on households' welfare for the region**

In Table 4, the study presents the socio-economic benefits of forest on poverty status of the households in South-western region Nigeria. Like in many prior studies where a negative correlation between forest dependence and rural household income has been established, this research finding is not exceptional although, the correlation is relatively not much. This however corroborates the findings of Fonta & Ayuk (2013) on the role of forest income in mitigating poverty and inequality in South-eastern Nigeria'. The simple explanation for this positive effect of forest is that the economic value of forest resources transcends the welfare of the poor alone but also takes care of various income groups in the region. This means that it is not only the poor households that depend on forest income but including the rich (Angelsen *et al.*, 2011; Nielsen *et al.*, 2012; UNFF, 2013) although; poor people are relatively more dependent on forest income than wealthier people (Inoni, 2009).

Furthermore, three different ways of constructing extent of poverty using FGT class of poverty measure such as poverty incidence, poverty gap index and poverty severity index were calculated for poverty status with and without forest incomes included in household income accounts. The results showed that forest income is capable of stemming the tide of poverty in the region even though with relative magnitude. Table 4 presents the distribution of FGT analysis with FREs and without FREs for the South-western Nigeria.

income), whereas the inclusion of forest income reduces the headcount poverty to 64 percent, a relative drop of 4 percent. The poverty gap indices was conventionally

measured to be 73 percent but reduced to about 66 percent with a drop of about 7 percent when forest income was included. However, poverty severity indices recorded a relatively large drop, that is, a fall of about 18 percent with inclusion of forest income. This is not surprising, since most rural households found trust in forest income than in non-forest related enterprises. This results run in conformity with the findings of Tangem (2012) who stated that small and medium scale forest enterprises have the potential to diversify rural livelihoods and alleviate poverty because they require only small initial investment to set up which can make them accessible and attractive to the poor and in turn diversify their economic opportunities and improve their livelihood security (UNFF, 2013).

#### IV. CONCLUSION

This study has examined households' welfare and forest dependence in South-western Nigeria. The results give credence to the observed relationship between rural households' poverty status and dependence on forest resources income. Using the headcount index ( $P_0$ ) to measures the proportion of the population that is poor, the results showed that 66 percent of the rural households are living below the poverty line in the region. At state level, the highest proportion is Osun state (77 percent), followed by Ogun state (70 percent) and Oyo state with about 50 percent.

The study also revealed the minimum cost required to bring these poor households to the poverty line across states. For example, in Oyo state, the poverty depth ( $P_1$ ) value of 0.2484 will require ₦4, 553 per household per month to close the poverty gaps while a sum of ₦9,664 is needed in Osun state. In Ogun state, individual household would require a sum of ₦8918 to eliminate poverty. The severity of poverty ( $P_2$ ) among households surveyed are 0.3532, 0.4415, and 0.3095 in Oyo, Osun and Ogun states respectively. This indicates that poverty is more severe in Osun state followed by Oyo state but less severe in Ogun state.

Moreover, classifying the poverty status into extremely poor, moderately poor and non-poor categories, the findings showed that the impact of forest income on the poverty status of the households has improved the welfare of extremely poor households by 12 percent whereas that of the moderately poor households has been improved by approximately 11 percent with the inclusion of forest income. Likewise, the welfare of the non-poor households has been improved by about 10 percent when measured with forest income. In total, the inclusion of forest income in the econometric analysis for the region has improved the welfare of the rural households generally by 11 percent. This showed that forest income is capable of

stemming the tide of poverty in the region even though with a relative magnitude.

In terms of FGT poverty index analysis (that is, poverty incidence, poverty gap and poverty severity), poverty incidence measure showed that almost 68 percent of the households are regarded as poor in conservative income measure (i.e. with exclusion of forest income), whereas the inclusion of forest income reduces the headcount poverty to 64 percent, a relative drop of 4 percent. The poverty gap indices was conventionally measured to be 73 percent but reduced to about 66 percent with a drop of about 7 percent when forest income was included. However, poverty severity indices recorded a relatively large drop, that is, a fall of about 18 percent with inclusion of forest income.

#### V. RECOMMENDATIONS

Owing to the above findings, three major policy recommendations can be posited. First, the fact that the study results suggested that almost three-quarter of the sampled rural households are living below the poverty line in the region, the realization of this fact required the restructuring and reintegration of a series of pro-poor poverty alleviation initiatives that will be all inclusive and targeted mainly on the grassroots who have been economically marginalized from previous poverty alleviation schemes.

Secondly, the study results also suggested that the livelihood of the rural poor seems inextricably attached to forest resources exploitation, and has been considered as a preference for poverty mitigation as it often serves as an employer of last resort for the masses. Government at all strata should therefore diversify the grass root economy by providing alternative sources of incomes that will ensure subsistence benefits, generating formal and informal work opportunities (employment), supporting the development of sustainable small and medium-sized forest enterprises and galvanize reservoirs of economic values that help ameliorate shocks to household incomes in order to mitigate too much pressure and over dependence on forest resources.

Lastly, the study also identify that forest income play a significant function in improving the welfare of rural household and provide a safety net function in South-western Nigeria. Unfortunately, these distinctive roles are poorly understood and recognized by many poverty-based policymakers and planners in Nigeria which needs to be properly fine tuned. However, this positive relationship between forest income and household welfare deserves closer attention due to the high degree of forest dependence in the region. Therefore, Government and authority concerned should increase opportunities for entrepreneurship and employment in forestry while

avoiding deforestation and forest degradation. That is, rural development policies that address the issues of poverty that will be environmentally friendly and ensure correct targeting and judicious distribution of resources must be formulated and adequately implemented.

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