Forest Resources Income, Poverty and Income inequality:

Evidence from Rural Households in South-western Nigeria

A Thesis Submitted in Fulfilment of the Requirements for the Degree of

Doctor of Philosophy (PhD) in Agricultural Economics

By

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Declaration

I, Fatai Abiola AZEEZ, do hereby declare that the work contained in this thesis is a record of my own research. All other scholars' works referred to have been duly referenced and acknowledged. I also declare that this thesis has not been presented in any previous application for an award of a higher degree.

Name: **Fatai Abiola AZEEZ**

Signature: ………………………………….

Date: …………………………………..

Certification

This thesis entitled "Forest Resources Income, Poverty and Income inequality: Evidence from Rural Households in South-western" meets the regulation governing the award of degree of Doctor of Philosophy of the University of Fort Hare and is approved for its contribution to scientific knowledge and literary presentation.

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Prof. A. Mushunje Date

Main Promoter

Dedication

'To Almighty Allah (SWT) be the glory, great thing He hath done and still doing in my life!'

Acknowledgement

Completing a doctoral study is indeed a great journey and of inestimable experiences.

(Fatai Abiola AZEEZ)   Date ....

Abstract

This thesis explores economic contributions of forest resources in relation to rural households' welfare and inequality as well as forest resources management. The thesis consists of an introductory chapter, study locations, literature review on major concepts of the study and findings on different forest extraction activities impacts on rural households livelihood in South-western region Nigeria, which make up the rest of the thesis chapters.

Chapter one presents an introductory summary of poverty and income inequality scenario in Nigeria and the influence of forest resources in mitigating the twin menace of poverty and income inequality. The chapter identifies different challenges facing forest indigenous households, outlines specific objectives of the study, presents conceptual framework of the study as well as detail description of the study locations. The chapter concludes by highlighting the summary of methodological approaches undertaken by respective chapters of the thesis.

Chapter two presents the literature reviews particularly on three major components of the study namely; poverty, income inequality and forest resources income in that order. The chapter elucidates some key concepts in each of the above named components as they relate to one another. The rest of the chapters of the thesis are divided into six self-contained studies based on specific objectives and methodologies that were set to unravel the broad operational objective of the study.

In **Chapter three** of this study, a detailed and consolidated methodology was presented. Some of the major features highlighted in this chapter include the study area starting with the regional setting with respect to specific states from which respondents were selected. Other are sampling frame and procedure, analytical tools and models' specification among others.

Chapter four captures and profiles forest resources income that rural households in the study area are currently engaged in. It also analyses forest extraction participation and the rate of returns from forest related enterprises among rural households. Descriptive analysis seems to indicate that plank marketing, vegetables selling or farming, furniture making, fuel wood collection, fruit collection and charcoal businesses were most prominent in the total sampled population while bush meat, dried fish, broom production and marketing, honey production and marketing, wood craft, snail collection, medicinal plants collection, pole and

leaves marketing in that order were moderately prominent. On the other hand, gum, dye, fibre, insect and spices businesses were the least prominent. What motivates rural households to participate in forest extractions? Logit regression model results from this study suggests that five policy driven variables such as education of household head, marital status, household size, forest access and forest management laws have significant effects on the rate of participation decision of the household in forest-related enterprises (FREs). In addition, the Gross margin for the enterprises was 48.5 meaning that FREs has the potential of returning 48.5% profit of the total investment worth to the households on monthly basis. So, the study recommends that developmental policy conception and application that will enhance the value chain for these businesses is expected to boost forest related enterprises returns in the study area. However, determining the profitability index of such FREs may not be a sufficient condition to conclude that forest extraction activities are capable of lifting the forest entrepreneurs out of their poverty situations. Rather, further efforts are required to measure the economic impact of forests extraction businesses on poverty status of the rural households in the study area.

In **Chapter five**, similar approach as in **Chapter four** was adopted in determining factors that contributes to households' participation in FREs hoping that similar factors would also influence their participation in FREs if another methodological approach is used. However, Heckman's two-step procedure results from this study seem to suggest otherwise, where labour cost, market availability and membership of association have significant effects on the level of participation of the household in forest related businesses. Also, the study reveals that the higher the market activities index and the poverty index, the higher the level of participation of the household in forest-related businesses. Furthermore, Tobit regression model reveals that forest management laws, age of the household head, labour cost and forest products availability have significant effect on forest income of the households. The study identified a significant impact of forest availability on forest income earnings and recommends that policy makers should look towards the industrialisation and general development of forestry activities in order to improve on the share of region's value-added in the sector.

Therefore, **Chapter six** provides empirical data on the contributions of forest resources income on poverty status of rural households in the study area. In doing that, both descriptive statistics and Foster-Greer-Thorbecke (FGT 1984) weighted poverty index were used to

estimate poverty index among forest rural households with and without forest income. The results showed that 68% of the rural households are living below the poverty line in the region. Disaggregated to State level, the highest proportion is found in Osun State (77%), followed by Ogun State (70%) and Oyo State with about 50%. The study also revealed the minimum cost required to bring these poor households to the poverty line across states. General profile of respondents revealed that less than 35% of the total sampled rural households in the region that earned their living from forest income were non poor while more than 65% were poor of whom about 38% were extremely poor and 62% were moderately poor. Moreover, regarding the impact of forest income on the poverty status of the households, the results of the findings show that forest related enterprises has reduced poverty incidence in the study area by 17% whereas both the extremely and moderately poor households have been reduced by 8% and 10% respectively. This showed that forest income is capable of stemming the tide of poverty in the region even though with a relative magnitude.

Moreover, is it all the FREs being engaged in by the forest entrepreneurs in the study site that can reduce income inequality? If not all, which among them that can reduce it and which other ones that cannot? By extension, which of the forest enterprises income is the most correlated with total household income? Thus, **Chapter seven** analyses forest related enterprises as well as income inequality among forest–related entrepreneurs in providing adequate answer to these fundamental questions. Descriptive statistics thus far suggests that plank marketing, vegetables marketing and farming, furniture making, fuel wood, fruit and charcoal businesses were found to be prominent in the total sampled population while bush meat, dried fish, broom, honey, wood craft, snail, medicinal plants, pole and leaves businesses in that order were moderately prominent. Also, gum, dye, fibre, insect and spices businesses were the least prominent. About 34.25% of the total sampled households were non poor, 42.75% were moderately poor and 23% were extremely poor. Returns from some FREs are high and capable of improving the household living while some FREs yield very low returns and could not substantially cater for the household. Also, Gini coefficient decomposable technique results indicates that aggregate income inequality for the region was 0.73 and that, engaging in diverse income earning sources would reduce income inequality across the sample. Likewise, forest enterprises income is the most correlated with total household income with a correlation coefficient of 0.72 followed by commerce income with a correlation coefficient of 0.91. The study therefore recommends that forest-based approaches,

such as market development for forest products like wood, bush meat, wood crafts, furniture making and pole should be aided.

Furthermore, the study goes further in **Chapter eight** to assess the sources and the impact of income inequality among rural households with a view that forest income may likely have cushion effect on distributional income gap among forest rural households. So, linear regression model results from this study indicates that an increase in age, market access and labour cost would increase the income inequality of the forest related entrepreneurs while an increase in forest management laws would decrease it. Also Gini coefficient results suggest that almost 70% of the poor households are unequally distributed in terms of their conventional income measure (i.e. with exclusion of forest income), whereas the inclusion of forest income reduces the inequality gap to 59%, a relative drop of 11%. The study recommends that more incentives and encouragements should be given to rural forest entrepreneurs to foster improved commercialization and value chain of forest products in the region.

However, given credence to forest resources income and its potential to reduce poverty and income inequality (as revealed in **Chapter six, seven and eight**), there seem to be more pressure on forests and as such, it portends a very great danger to the sustainability of the forests resources in particular, and the ecosystem in general. Therefore, **Chapter nine** of this thesis concludes that forests has capacity of improving the livelihood of the poor particularly those that venture into forest income generating activities. Also, forest regeneration, increased awareness and enlightenment campaign, practising of tungya system, setting aside certain portion of forest, strict guard of forest domain, forest protection, reforestation and clearing of environment were key in protecting forest resources from going into extinction and sustaining the ecosystem. Similarly, management of NTFPs has propensity of improving peoples' welfare unlike timber forest products while forest management mechanisms related to timber products favour forest conservation at the expense of surrounding communities' welfare (poverty and income). Therefore, given the high dependence level of rural communities on forests and its attendant effects on the resources, balancing forest preservation and management mechanisms will go a long way towards creating a sustainable forest conservation model for rural communities.

Finally, **Chapter ten** thus presents research summary, conclusions and policy recommendations for this study.

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Abbreviations

AfDB	Africa Development Bank
DAC	Development Assistance Committee
DHS	Demographic Health Survey
FAO	Food and Agriculture organizations
FREs	Forest Related Enterprises
GMR	Global Monitoring Report
GNI	Gross National Income
HDI	Human Development Index
IEA	International Energy Agency
IHDI	Inequality- Adjusted Human Development Index
ILO	International Labour Organization
IMF	International Monetary Fund
IPGRI	International Plant Genetic Resources Institute
IUCN	International Union for Conservation of Nature
MPI	Multidimensional Poverty Index
NBS	National Bureau of Statistics
NDE	Agriculture Employment Programme
NHDI	Nigeria's Human Development Index
NLSS	National Living Standards Survey
NPC	National Planning Commission
NTFPs	Non Timber Forest products
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PPP	Purchasing Power Parity

UNDP	United Nations Development Programme
UNFF	United Nations Forum on Forest
WRI	World Resources Institute
WHO	World Health Organization
UNFPA	United Nations Population Fund
WDR	World Development Report
WBG	World Bank Group
WRI	World Resources Institute

Chapter 1: Introduction

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1.0. Introduction

Poverty is a global occurrence, which affects continents, nations and peoples differently. It troubles people in varying degrees and levels, at different times and categories. That is, there is no nation in the world that is absolutely free from poverty but the degree of incidence and intensity differ (Oyeyomi, 2003:16). Nations in sub-Saharan Africa, South Asia and Latin America witnessed the highest level of poverty which led to their low socio-economic development (Oyeyomi, 2003:16).

Suffering in the midst of plenty is the way Oshewolo (2010) in Yunusa (2012:5) described the poverty situation in Nigeria whereby he wrote that "Poverty holds sway in the midst of plenty, a situation described in Nigeria's political lexicon as a bewildering paradox". In the same vein, Nigeria is currently the largest oil producer in Africa and was the world's fourth-largest exporter of Liquified Natural Gas (LNG) in 2015. For instance, in 2015, Europe imported slightly more than 800,000 b/d of crude oil and condensate from Nigeria, accounting for 41% of Nigerian exports. Yet, in spite of these abundant natural resources, most of her citizens are living below poverty line. Empirically, not less than 70% of its population is poor in spite of the huge endowments in terms of natural, mineral and human resources (Yunusa, 2012:5).

Corroborating this claim, the World Bank President, Jim Yong Kim, at the IMF/World Bank Spring Meetings, reported in 2014 that Nigeria is one of the top five countries that has the largest number of poor. Nigeria was ranked third in the world where seven per cent of the world poor live in while India was ranked number one with 33 per cent of the world poor. China was ranked second with 13 per cent of the world's poor. Bangladesh has six per cent share of the world's poor while the Democratic Republic of Congo has five per cent of the world's poor population. Jim Yong Kim further said that these five countries are home to 760 million of the world's poor[1].

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[1] Transcript of World Bank Group President Jim Yong Kim Opening Press Conference at the IMF-World Bank Spring Meetings 2014Washington, DC, United States. Also contained in The Nigerian Observer: A National Daily Newspaper published an articles entitled 'Nigeria And The World Bank Poverty Index Where Does That Leave Us?' Published on 27th March, 2015

Similarly, the increasing rate of income inequality in Nigeria has constituted a major burden and a source of worry to policy makers for a long time believing that even if the country's economy improves and the income distribution remains unchanged, Nigeria poverty will also remain unabated. Evidence from the National Bureau of Statistics (NBS) (2012:88) revealed that inequality in Nigeria increased between 2004 and 2010 both in rural and urban areas and this can be associated to the rising dimension of poverty. Although, there was a larger increase in inequality in rural areas than in urban areas. For example, rural inequality rose from 0.37 to 0.41 between 2003-2004 and 2009-2010 while urban inequality also rose from 0.38 to 0.41 within the same period, a percentage change of 9.2 and 6.9 in rural and urban areas respectively since 2003-2004 (NBS, 2012:88).

Furthermore, the NBS (2012) also disclosed that as the nation's income inequality increased from 0.429 in 2004 to 0.447 in 2010, poverty incidences were 58.3 and 69 percent in 2005 and 2010 respectively. The inequality gap in Nigeria is considered very wide compared to some other countries of the world such as Sweden and Slovenia with Gini coefficient of 0.25 as well as Britain, Portugal, Italy, and the Baltic States, all with a Gini-coefficient of about 0.32 (Fritzell and V-M ritakallio, 2011:11).

According to National Planning Commission [NPC] (2010) in Holmes *et al.* (2012:9), Nigeria is the most populous country on the continent of Africa. Of this population, 49% are female representing some 80.2 million while outstanding 51% are male. It is also one of the most unequal countries in the world with respect to income distribution. Idowu *et al.* (2011:163–176) and British Council (2012) declared that more than half of the most poor of the population were denied access to the shares of the naturally endowed resources while they hold just only 10% of the national income.

United Nations Development Programme [UNDP] (2009) cited in Holmes *et al.* (2012:9) posited that income inequality and asset sharing, unequal access to basic infrastructure and services and socio-cultural norms are the major determinants of poverty vulnerability and inequality in Nigeria. The report further reiterates that between 1985 and 2004, inequality in Nigeria rose from 0.43 to 0.49, while others said that there was a downturn in 1990 from 0.491 to 0.438 (Ortiz and Cummins, 2011:48): nevertheless, it is still high. If this Gini index is considered to reflect the level of inequality in the country, it then means that the Nigeria's Human Development Index value would grossly go down from 0.423 to 0.246 (UNDP, 2009). Highest inequality rate in most parts of Nigerian States is caused by rapid growing

population density and increasing poverty gap margin, whereby a very few cabals dominated over the control of national wealth at the expense of the larger percentage of poor Nigerians. These cabals; (approximately 20% of the population) possess 65% of the national wealth (UNDP, 2009).

In the same vein, in spite of assumptions that poverty may be declining (NPC, 2010), continued rise in income inequality however made Nigeria's national poverty line to be increasing. According to the National Bureau of Statistics report NBS (2012), around 112.519 million out of a projected 163 million Nigerian live in relative poverty. Looking at it from the angle of absolute poverty, the country's poverty profile was put at 60.9%; the dollar per day measure puts the poverty profile at 61.2% and the subjective measure put the poverty profile at 93.9%, possibly, the Harmonized National Living Standard Survey (HNLSS) which put the country's poverty profile at 69.0% might strike the balance. The report put a big question as to what then happened to the much celebrated GDP growth rate averaging 7.4% in the last decade? There is certainly a sharp disconnect between growth and poverty in which majority of Nigerians as a result of marginalization are rendered poorer (NBS, 2012).

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 masses whom have been economically marginalized (Sunderlin *et al.,* 2008). The enduring contributions of forests to solve the problem of poverty and inequality particularly among rural community then mean that forests are immensely valuable for sustainable livelihood and it plays a greater role in developing countries than it does in developed ones [United Nations Forum on Forest (UNFF, 2013)].

Forest products play an important role in supporting rural livelihoods and food security in many developing countries such that the integrity of forests becomes vital mostly because of the dependence of the poor on forest resources (Richardson *et al.,* 2011:3). In assessing the role of forests and non-timber forest products in sustaining livelihood in most of developing countries, Richardson *et al.* (2011:3) categorized forest uses into groups, including food, fuel, shelter, erosion control, and water conservation. The authors assessed the total amount of foods produced from trees, the wild foods gathered, animals hunted from forests, the forest resources used in generating non-farm income and wage employment and estimated that about 60 to 70% of the population in developing countries including Nigeria live and work near forested areas.

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 reserves 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. The report estimated approximately 300 million people worldwide that earn part or all of their living from harvesting food and other products from tropical forests for income generation. FAO (2011) report has also documented important roles of non-timber forest products (NTFPs) which include income generation for welfare improvement.

Furthermore, NTFPs contribute significantly to household income and food security in Nigeria's rural areas and thus, play an important role in poverty reduction (Richardson *et al.*, 2011:4). They noted that income from sale of forest products constitutes a substantial amount of total household income in Nigeria. Most rural households usually get wild fruits, vegetables, and edible insects from the forests for household consumption and/or commercial purpose. Similarly, Jimoh and Haruna (2007:28-33) reported that majority of rural and urban households in many developing countries depend on NTFPs to meet their needs in terms of food and nutrition, health, construction material and income from sale of these products. They thus asserted that NTFPs have potentials to contribute approximately 68% of total monthly household income within Gambari Forest Reserve, Nigeria. Egunjobi (1996) in John Ikoku (2013:3) also stated some of the NTFPs activities that rural households explore to include; mat and basket-making, cane, furniture production, fuel wood sales, pestle and mortar and wood craft fetch a lot of money to rural households. Others are; sales of leaves of various species, chewing 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.

1.1. Problem statement

The income gap between the rich and the poor in Nigeria has been enlarged over time as some Nigerians are living in affluence, expending their wealth on gold, expensive lace, gigantic buildings and exotic cars, while others are living in abject poverty. Majority are finding it difficult to eat one meal a day let alone affording to give their wards basic education, adequate health services among other basic requirements of life due to unfair distribution of income (Adegoke, 2013). The author noted that there is presence of huge marginalization of the downtrodden which further widened the gap between the rich and the poor.

The realization of this fact required the establishment of series of poverty alleviation initiatives by every successive government in Nigeria but much less priority and commitment have been placed at micro or regional level poverty alleviation (Oyeyomi, 2003). It is however amazing and disturbing to note that despite the abundant natural resources that the country has been endowed with, the role of forests particularly to rural households in terms of income, food, fuel, shelter, erosion control, and wage employment is not well recognized since little is known about factors that influence such immense contributions derivable from forest to improve livelihood of the rural dwellers (Heubach *et al.,* 2011).

Besides, to the best of the researchers' awareness based on literature search, no attempt has been made, to date, to measure forest income role in mitigating poverty and inequality particularly in the South –western region of Nigeria. This assertion is justfied by the findings of Fonta *et al.* (2011) which led to their work in 2013 entitled 'measuring the role of forest income in mitigating poverty and inequality'[2]. Even so, the shortcoming on this scenario is that, their case study was South-eastern Nigeria. It is therefore unequivocally clear and evidenced from both quantitative and qualitative studies that, there is a knowledge gap on forest role on poverty mitigation and income inequality as far as South-western region of the country in concerned. It remains a neglected hub of attention among the researchers. So, this observed knowledge gap is clearly a shortcoming when it comes to developing informed policies for sustainable income, development strategies and social justice.

Furthermore, there is need to understand all the types of income sources available to a forest household. Otherwise, the role of forest economic activities in the household economy would never be clarified (UNFF, 2013). Similarly, a critical question should be asked about the specific contribution of various forest income sources in reducing disparity in income distribution among forest related entrepreneurs because such roles of specific forest resource types still remain obscure (UNFF, 2013). Certainly, this challenge does not only limit the ability of policy makers in efficiently allocating scarce forest resources, but also hinders their ability to accurately determine how many such allocation might impact vulnerable and poor rural communities (Shackleton and Paumgarten, 2011). Thus, there is an urgent need for better data on the specific contributions of forest income sources to assist governments and

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[2] Fonta, W.M. and Ayuk, E.T., 2013. Measuring the role of forest income in mitigating poverty and inequality: evidence from south-eastern Nigeria.*Forests, Trees and Livelihoods*, *22*(2), pp.86-105.

policymakers concerning the identification of the target groups that will enhance more equitable distribution of income among rural households, and most especially for judicious allocation of resources among forest related entrepreneurs to improve on the distributional impacts of forest income on their welfare.

In addition, it is somehow difficult to be specific about the effect of dependence of rural households on forest resources (UNFF, 2013). The picture that emerges about forest dependency effect, however, is somewhat inconsistent and inconclusive, since lack of precise data renders findings speculative and idiosyncratic (FRA/FAO, 2010). Nigeria falls short of the basic standard of acquiring regular and up to date data on the forest resources utilization because most of the information documented could not properly reflect the actual situation but merely indicative (FRA/FAO, 2010).

Finally, the consequence of this inadequate information has created tensions between forest conservation strategies and the poor populations that depended on forests for their livelihoods (Usman and Adefalu, 2010). Therefore, there should be a point of balance between using forest as a source of livelihood at the same time conserving the forest and its biodiversity (Usman and Adefalu, 2010). Consequently upon this, establishing the relationship between management of forest resources and socio-economic characteristics of rural households who are directly or indirectly dependent on economic importance of these resources for their livelihood is not only necessary but also imperative and apt.

Hence, attempts such as those undertaken in this study to develop a systematic assessment of the relationship between forest resources extraction, households' welfare and forest management becomes extremely important. Essentially, it becomes pertinent to establish a balance between household's welfare and forest preservation as well as its economic contribution in alleviating poverty and its twin menace (income inequality) that have established themselves as palpable and endemic scourge among rural populace in Nigeria. This study takes these concerns very seriously by setting forth the following objectives to proffer adequate and appropriate explanations to the above stated challenges while some critical questions were appropriately answered as laid out below.

1.2. Operational research objectives

The broad objective of this study is to assess the economic importance of forest resources on welfare and inequality status of rural households in south-western Nigeria while the specific

objectives are six-pronged, as summarised below, and detailed in separate studies that constitute the rest of the chapters of this study;

1. To capture and profile forest resources income generating activities that rural households are currently engaging in.

2. To analyse forest extraction participation and the rate of returns from forest related enterprises among rural households.

3. To measure the economic impact of forests on welfare of the rural households in the study area.

4. To determine the factors that contribute to income inequality among rural households in the study area.

5. To assess the impact of forest income on income inequality among rural households in the study area.

6. To evaluate the safety nets roles of forest in relation to forest management and conservation in the study area.

1.3. Operational research questions

In view of the above objectives, this study provides answers to the following research questions:

1. What are the identified income sources among the rural households living around forest in South-western Nigeria?

2. What are the factors influencing forest extraction participation and what is the rate of returns from forest related enterprises?

3. What is the economic impact of forests on poverty status of the rural households?

4. What are the factors that contribute to income inequality among rural households?

5. What is the impact of forest income on income inequality among rural households?

6. What is the relationship between safety nets roles of forest and forest conservation strategies?

1.4. Thesis statement

Owing to the above, the basic thesis of this work stands on the premise that forest resources have economic contributions that can improve rural households' welfare and to reduce inequality among them.

1.5. Significance of the study

The motivation of this study is based on the fact that forests have been playing important roles in alleviating poverty and income inequality (Richardson *et al.*, 2011). Part of such important contributions include; forests provide a very important safety net function and as mitigating factors against livelihood threats for the poor. Another reason is that, forests have unexploited potentials to actually lift some rural people out of poverty. But owing to the fact that the safety net functions of forests are, in some respects, poorly understood and recognized, these distinctive forest roles are unknown to many policymakers and planners and to worsening the scenario, the scientific community has not explained them well (Sunderlin *et al.*, 2008; UNFF, 2013).

One reason for this is that the contribution of forests to poor households is largely unrecorded in national statistics, most of it being for subsistence or for trade in local markets in addition to the fact that, larger share of wealth realizable from timber skews to the side of richer of the society while some aspects of timber resources actually inhibit their potential to assist the less privileged (Sunderlin *et al.,* 2003:1). So, forests can increase their contributions to poverty alleviation, provided that decision-makers recognise these facts and act appropriately on their potentials (Sunderlin *et al.*, 2003:2). It is important therefore to investigate this assertion in order to recognize and appropriately value the economic contributions of forests to human welfare and development. That is, the forest sub-sector must be examined to understand its economic potential for contributing to poverty alleviation and income inequality among rural households.

The policy makers cannot show indifference to the potentials of forests which substantially offer opportunity to more than 300 million people around the world, especially the poor, (Fonta *et al.,* 2010a:1). There is general belief that poverty is more widespread and prevalent in rural than urban areas (International Fund for Agricultural Development [IFAD], 2001) and that inequality is higher in rural than urban Nigeria (Oyekale *et al.,* 2006:17).

In view of the above, the importance of undertaking this study cannot be overemphasized. This study is therefore significant in view of its perceived contribution to the existing

knowledge base, literatures on the subject matter and the developmental plan of Nigeria towards reducing poverty and income inequality particularly among the rural dwellers who source their livings primarily from forest resources income. This however will provide useful micro level evidence on economic contributions of forest to rural households' welfare and income inequality.

1.6. Delineations and limitations of the study

Forest resources income in this study encompasses: income from trade in timber and non-timber forest products (NTFPs) and employment in the informal sector of small and medium forest enterprises (including logging and wood furniture); while such other economic contributions to the formal sector employment, national economies, international trade, economic value of ecosystem services from forests was not covered. The description of rural households exclusively covers those that earn their income through forest resources activities in the forest community areas. The value of NTFPs consumed within a household was not included in income estimate because of gross record deficit.

One major limitation of the study was that the accuracy of the data depends on the information given by respondents. Most households do not keep records of their operations and finances, hence the dependence of the research on verbal information from respondents, who depend on memory recall. Any bias on their part would affect the results. However, all the appropriate scientific approaches to ensure that the confidence levels are high enough were implemented.

It is also worth noting that one of the limitations of empirical analysis is that the behaviour of only 450 households in a random sample is under consideration and generalised to the rest of poor rural households in South-western Nigeria. Due to the different contexts of the regions, the findings of this study cannot be generalised to the rest of Nigeria. Therefore, there is need to complement the result of this study with similar studies in other regions in order to broaden the scope of application of the results of this study.

1.7. Research method

This section presents a transitory summary of the research design which describes the techniques used and how the study was conducted and analysed in relation to respective objectives of the study in each chapter of this thesis.

1.7.1 Methodology

Research methodology is an approach adopted in a research which provides the information that will indicate the validity of the research. It tells what to be done to answer the research questions including where and how it is being carried out. It also justifies the experimental design and indicates what materials to be used, describes the research protocol and explains the required statistical tools and packages to analyse the data for the study. Some of the major features in this section include research design, preparation of questionnaire and pre-testing, sampling procedure and data collection, data or information, unit of analysis, data analysis and analytical techniques.

1.7.2. Research design

Research design is a strategy that is used to guide inquiry. It articulates what data is required, from whom, and how it is going to answer the research question (Jalil, 2013). This study adopts a cross sectional survey research design to collect quantitative data. Cross-sectional data, or a cross section of a study population in statistics and econometrics is a type of data collected by observing many subjects (such as individuals, firms, countries, or regions) at the same point of time, or without regard to differences in time (Brady *et al.,* 2008).

Cross-sectional data was used with the purpose of investigating how rural households generate income through forest resources and the impacts of such income generating activities on their households' wellbeing and income distribution inequality, what constitute the disparity in their income, barriers to invest in forest resources enterprises, what economic benefits derivable from investing and what relationship exists between forest income, poverty situation and income distribution inequality among rural households.

1.7.3. Preparation of questionnaire and pre-testing

A structured questionnaire was prepared and carefully designed to elicit sufficient information from respondents through personal interview. *(See some of the information in sub-section 1.7.5.).* Questions were simple and precise. Open ended questions were avoided as much as possible, as the analysis was mostly quantitative in nature. The numbers of questions were relatively minimal in order to avoid overburdening the respondents. After the design of the questionnaire, a pilot field work exercise was carried out with a few selected households from the study area, before bringing it into its final form[3].

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[3] *See the full format of the questionnaire in the appendix*

1.7.4. Sampling and data collection

A survey was developed, pre-tested and administered to residents of randomly selected populated villages within some selected local government areas of each of these three states. Some of these villages were marked around the local government areas with each village settlement having less than 30 households. This feature of rural settlements made data collection time consuming and costly. Research assistants were undergraduate/industrial training students recruited from the Forestry Research Institute of Nigeria Headquaters/ Federal College of Forestry Ibadan, Oyo state, TAI Solarin College of Education, Ijebu Ode, Ogun state and Federal Polytechnic Ede, Osun state. They were trained to conduct face-to-face interviews in local languages. In each state, a research team leader was chosen who introduced the research team to the village leaders and subsequently to the village residents as the survey progresses.

Prior before the survey day, a reconnaissance visit was earlier made to familiarize the researchers with the village heads. Meetings were held to explain the purpose of the study and to seek permission from the local leadership. This approach helped to elicit cooperation and truthful responses from households during the interviews. The ethical rules guiding this research conduct and the required protocols and procedures required were followed. For instance, respondents were adequately sensitized about the nature of this research work before copies of questionnaire were administered. No personal information required from the respondents and data collected was treated with utmost confidentiality. The essence and benefits of this research, consequent upon implementation of recommendations were explained to the respondents.

1.7.5. Data or Information

Based on the reviewed literature related to the topic so far, such information or data obtained from the respondents include but not limited to: income sources and types, input sources, social capita, socio-economic characteristics of the respondents, network capacity, community variables, household variables, market data, etc. These were re-classified into "Dependent and Explanatory variables" based on the analysis to be performed to achieve each of the objectives. *See Table1.1* for more details on variable descriptions.

Table 1.1: Data types and variables

Variables	Variable Descriptions
Demographic Features	
Age	Age of the household head (years)
Sex	Sex of household head (1 if male, 0 otherwise)
Education	Educational level of household head (years of schooling)
Household size	Household size (adult equivalent)
Household income types & sources	
Commerce income	Per capita commercial income
Agricultural income	Per capita farm income
Forest income	Per capita forest income
Employment income	Per capita employment income
Remittance income	Per capita remittance income
Transfers income	Per capita transfer income
Wage income	Per capita wage Income
Income inequality and poverty	
Family land	Households that utilized family owned land for extracting forest and other product: = 1 if family land and 0 otherwise
Forest distance	Distance in kilometres from household to the forest
Forest association membership	Household that belong to a forest related group = 1 if member, and 0 otherwise
Total land	Landholding size [hectares (Ha)]
Total land squared	Square of landholding size (Ha)
Assets	Value of assets owned in naira
Population size	No. of people in a particular sampled area
House/Market distance to district town	Distance in km
Poverty status	Proportion of sampled population below the chosen poverty line
Total income	Total per capita household income

1.7.6. Unit of analysis

Unit of analysis is the "who" or the "what" that the researcher is analysing for the study which could be an individual, group of people, or even an entire programme (Trochim, 2002),. Here, the forest based rural households and other small or medium scale informal employees in forest ventures constitute the unit of analysis for this study.

1.7.7. Analysis

Data were inputted into and managed in the Statistical Package for Social Scientists (SPSS) version 22.0. Econometric models used in separate studies were captured and defined in each chapter. So, below are the summary of the statistical models used. The majority of the analysis, which included the following analytical techniques, were done using a combination of SPSS, STATA 13.0 and Microsoft EXCEL.

1.7.8 Summary of analytical techniques

Analytical technique is a systemic research procedure of examining the complex relationships between variables. This study sourced all the relevant data needed for each of the objectives from the respective respondents. This was then analysed using the corresponding technique(s) that best fits each of the objective. However, some of the analytical techniques that were used during the research work are as summarily highlighted below:

Objective 1: To profile and capture forest resources income that rural households are currently engaging.

- Descriptive statistics

Objective 2: To analyse forest extraction participation and the rate of returns from forest related enterprises among rural households.

- Descriptive statistics
- Logit model
- Budgetary analysis

Objective 3: To measure the economic impact of forests on welfare of the rural households.

- Descriptive statistics
- Foster-Greer-Thorbecke poverty index (FGT, 1984)

Objective 4: To determine the factors that contributes to income inequality and poverty among rural households.

- Descriptive statistics
- Heckman's two step
- Tobit regression analysis

Objective 5: To assess the impact of forest income on income inequality among rural households.

- Descriptive statistics
- Gini-coefficient decomposable technique

Objective 6: To evaluate the relationship between safety nets roles of forest and forest conservation.

- Descriptive statistics
- Foster-Greer-Thorbecke poverty index (FGT, 1984)
- Budgetary analysis
- Directional tests (Somer`s d)

1.8 Summary

This chapter presents the broad introduction and summarizes the conception of the study. It articulates the problem statement and sets objectives for the study out of which some of the research questions were outlined. While justifying the importance of this study, appropriate methodological approach of how each specific objective of the study would be analysed were highlighted in line with the required informations needed for the analysis.

1.9. Organisation of the Study

Chapter one presents the introduction of the research study, specifically looking at poverty and income inequality issues as they affect average Nigerians particularly the downtrodden and how forests serve as mitigating factors to arrest the scenario. Other major features highlighted in this chapter include the general back-ground of the study in terms of the problem identification within the context of the study area and how these issues were conceptualised and analysed using appropriate methodological approaches, Chapter two discussed literature review on the three cardinal components of the study - poverty, income inequality and forest resources.

Chapter three presents a detailed and consolidated methodology which highlighted the study area starting with the regional setting with respect to specific states from which respondents were selected. Other major issues highlighted in this chapter include sampling frame and procedure, analytical tools and models' specification among others.

Chapter four presents a first self-contained study which assesses forest extraction income participation and return analysis in the study area. In Chapter five, the study presents a second self-contained study which is the analysis of rural households' income and participation in forest- related enterprises while Chapter six presents a third self-contained study measuring the economic benefits of forests in relation to households' welfare and forest dependence in the study site.

Chapter seven presents a fourth self-contained study which analyses forest-related enterprises and income inequalities among rural households. Similarly, sources and impact of income inequalities among forest related entrepreneurs were determined in the fifth self-contained study in Chapter eight while Chapter nine ends the self-contained studies by evaluating the safety net role of forests in relation to forest management and conservation in the studt site. Finally, Chapter ten concludes the study by presenting the research summary, conclusions, recommendations and areas of further study.

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Chapter 2: Literature Review

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2.0. Introduction

This section presents the theoretical, the empirical and the conceptual frameworks of the studya. Likewise, it presents a detailed literature review of some major components of the study - poverty, inequality and forest resources in terms of their definitions, measurement as well as their background information.

2..1. Theoretical framework

Conventionally, the economic contribution of forestry is to be measured in terms of its share in Gross Domestic Product, in the balance of payments, significance of export revenues, industrial output, percentage of people employed or deriving income, linkages with other sectors, percentage of land under forest, etc. However, this way of assessing the economic contribution frequently tends to leave out significant portions through unrecorded products such as wood, wild fruits, furniture, domestic utensils, construction materials or fish (Jakes *et al*., 1990; FAO 1993). It is worth stressing that forests provide essential livelihoods for local and indigenous populations and an important source of income/employment for the many poor people and that forests resources are not sufficiently weighted in conventional national accounting.

In the past, forests were mainly viewed as sources of wood and game. However, more recently forest resources have been seen as instrumental in developing countries' efforts to achieve development goals. Among the dominant opinions was that of Westoby (1962) who held that forests have an economic "driving force" quality because a wide range of products are derived from timber, generating strong multiplier effects on the rest of the economy (Westoby, 1962).

Later, Westoby (1987) revised his thesis stating that "the famous multipliers were missing and that few new poles were created". In his revision, he departed from the idea of forests as a source of wood for industry and moved towards the contention that forests played a role in improving the well-being of the poor. Until the nineteen seventies and eighties, the paradigm of forests in development had a strong serviceable perspective where forests were seen as sources of raw materials (mainly wood) and the prevailing paradigm was the domination of man over nature. This vision has evolved in the last decade, to accommodate the view of coexistence of man and nature, and to look for interventions that can assure the continuing

functioning of the ecosystem. It represents an integrative view and recognizes multiple uses that include environmental services (e.g. carbon sequestration) (Davies *et al.*, 2011).

In other words, the new viewpoints give larger emphasis to ecological issues and improve understanding of the multiple roles of forests in people's livelihoods; land use systems and planning; and, their interaction with the society (Wiersum, 1989).

With reference to the environment-poverty relationship, a great deal of the theoretical debate is centred on the "natural resources depletion and the poverty trap", and ways to escape from it (Wunder, 2000). However, as mentioned by Lipton (1992), it should be admitted that this field seems to be considerably under-researched. The environment-poverty trap can be described as the following circuit: as poverty increases, natural resources are degraded and as they degrade, the prospects for future livelihood decrease thus environmental degradation produces more poverty which accelerate the cycle (Pearce & Warford, 1993).

Using Streeten's words, "the poor not only contribute to natural resources depletion, but also suffer from it. They are both cause and victim of environmental destruction" (Streeten, 2000:39). Lipton (1991) states that "the deterioration of environment is made worse by the efforts of the poor to became less poor", implying that the pressure on the environment tends to be higher as the number of poor people increases as well as their demands for better livelihood.

As a counterbalance, there are those who believe that poverty by definition means low consumption and low waste, thus as long as population density is low, the pressure on the environment will also be low (Wolvekamp, 1999). The author further stated that the neo-classical perspective characterizes this phenomenon as the poor having high discount rates and thus they are interested in the short-term utilization of resources. Accoring to Gupta (1990), in a study conducted in India on portfolio analysis for different technologies among the poor, showed that the shorter the time frame in which households appraise their choices the less likely are the later to be sustainable.

As reviewed by Wiersum (1989), the changing views on the role of forestry to people's livelihood were related with the theories of the environment- poverty relationships that were used to conduct the analysis. In this regard, it is observed that some of the existing dominant paradigms on the forest's role to poverty reduction revolve around sustainability of

ecosystem, sustainable livelihoods analysis of forest resources and increasing economic status of the poor.

Considering this fact as well as the immense role of forest resources in increasing economic status of the poor, forest extraction plays an important role in poverty reduction especially among rural dwellers (Kabubo-Mariara and Gachoki, 2008). Although, there is a prize for poverty mitigation mainly through forest extraction process because such relationship may harmfully affect the ecosystem.

2.2. Empirical framework

Forest resources are prime constituent of the natural resource base of any community, region or country upon which the socio-economic well-being of the people of those communities depends most especially in Sub-Sahara Africa. Tropical forests have vast economic significance to both the rural and urban poor (Amsallem, 2003).

Similarly, forest plays a very important role for poverty alleviation in natural resource-rich environments (Angelsen & Wunder 2003; Fisher 2004; Pattanayak *et al.* 2004; Mamo *et al.* 2007; Vedeld *et al.* 2007; World Bank 2007; Kabubo-Mariara & Gachoki 2008; Kamanga *et al.* 2009; Lopez-Feldman *et al.* 2011; Rayamajhi *et al.* 2012; World Bank 2013). Currently, not less than 300 million people, particularly the poor, depend largely on forest products gathering for daily subsistence and survival. Notwithstanding, the relationship between poverty and forest dependence is multifaceted, and the empirical evidence to date is inconclusive (Angelsen & Wunder 2003; Shively 2004; Angelsen *et al.* 2011).

Even though many resource economists argue that the forest has potentials as well as limitations for poverty alleviation (Neumann & Hirch 2000; Pattanayak & Sills 2001; Angelsen & Wunder 2003; Shively 2004), other opposing views argue that the forest may essentially alleviate poverty or reduce poverty with high earnings (Cavendish 1999; Campbell *et al.* 2002; Adhikari *et al*. 2004; Fisher 2004; Shackleton & Shackleton 2004; Vedeld *et al*. 2004; Adhikari 2005; Lopez-Feldman *et al*. 2007, 2011; Paumgarten 2007; Shackleton *et al.* 2007; Kabubo-Mariara & Gachoki 2008; Fonta *et al.* 2010a; Debela *et al.* 2012; Uberhuaga *et al*. 2012).

Many studies have quantitatively investigated the roles of forest in mitigating poverty and income distribution inequality issues. For example, Jodha (1986) conducted few studies for a few Asian and Latin American countries; Reddy & Chakravarty (1999) for that of India;

while Cooper (2008) did for Nepal. Others include Lopez-Feldman *et al.* (2007 and 2011) for Mexico and Uberhuaga *et al.* (2012) for Bolivia. All of them observed that forest income has great potentials for reducing both poverty and income inequality.

Although, quite very few studies have been conducted on the contributions of forest income in Sub- Sahara Africa. Out of such few, the results have shown that there were slight mixed standpoints. 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% and 44% 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 increases by as much as 12%. In Malawi as well, Jumbe and Angelsen (2007) found out that forest income has contrasted welfare impacts across study villages and that forest dependence is poverty neutral. 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. 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% and 20.3% respectively, depending on the poverty line and measure used. 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.

2.3. Conceptual framework

This section presents a conceptual framework for this study showing the relationships between forest resources, income inequality and poverty as shown in figure 2.1 to harmonize the evaluative approach adopted in analysing the broad operational research objective of the study.
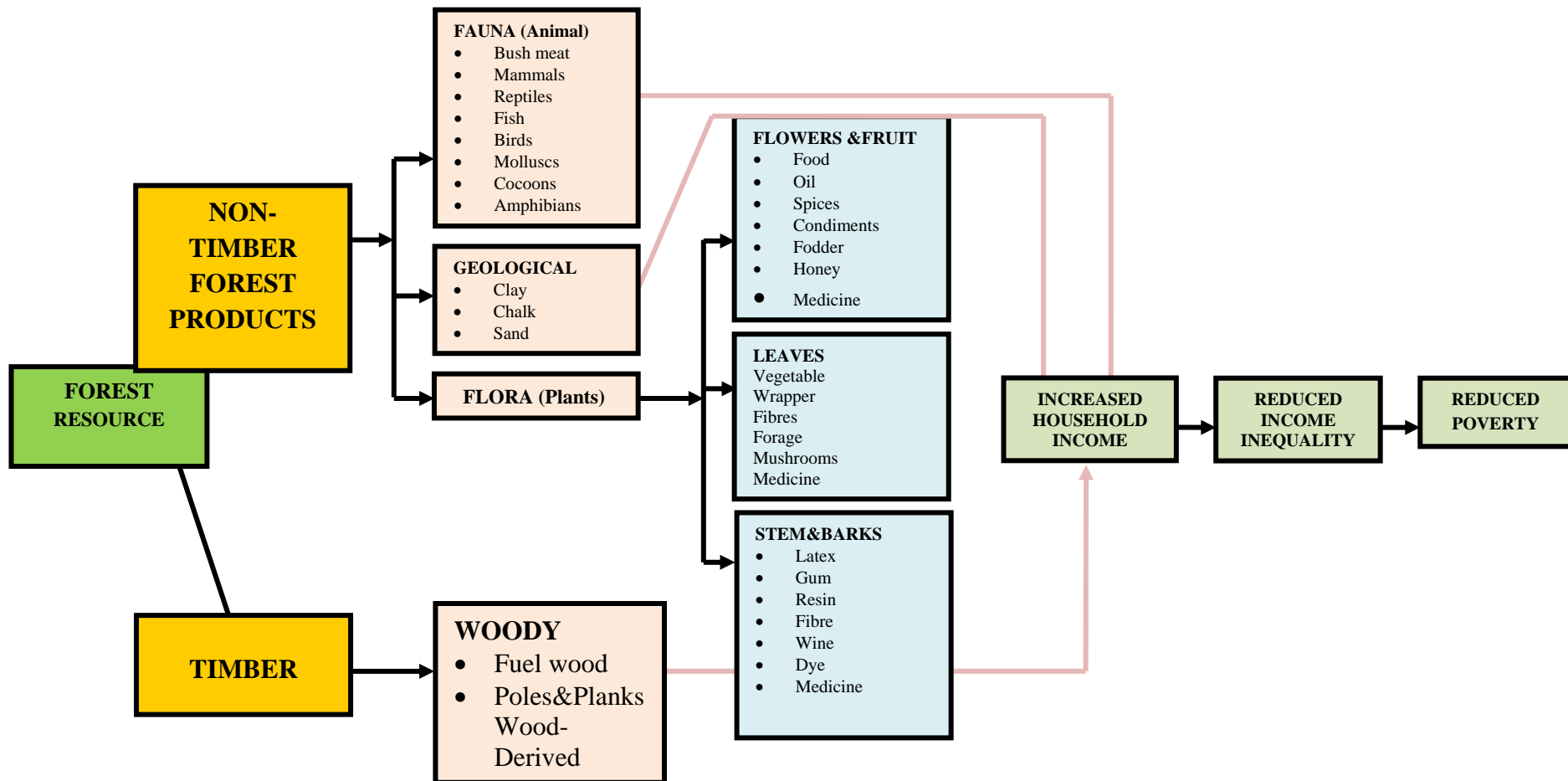
Fig.2.1: Flow Chart showing the relationships between forest resources, income inequality and poverty
Source: Computed by the author, 2016

This study chooses its conceptual framework based on poverty-growth-inequality relationship theory as espoused by Bourguignon (2004). Inequality affects poverty, and it is very important relative to economic growth. In other words, inequality and poverty affect each other directly and indirectly through their connection with economic growth. Poverty, inequality and growth interrelate with one another through a set of two-way links. For example inequality can indirectly influence poverty as inequality affects growth and growth in turn influences poverty. Therefore, redistribution of income can influence strategies aimed at poverty reduction and growth acceleration (Bourguignon, 2004). Furthermore, Kolenikov and Shorrocks (2003) restated that poverty and income inequality are very much interrelated and it has been argued that income inequality is an indicator as well as a strong cause of poverty. When economic growth increases, poverty rate decreases, but as income inequality increases, the incidence of poverty also increases.

So, in line with the above relationship between economic growth, inequality and poverty, this study considers economic impacts of forest resources in reducing income inequality and poverty among forest indigenous households. According to Kaimowitz (2003), most rural households in Sub-Saharan Africa consider forest extractions as important means of generating income to improve their livelihoods, as sources of food, medicine, shelter, building materials, fuels, and cash income. Kaimowitz (2003:46) also estimated that more than 15 million people in Sub-Saharan Africa earn their income from forest-related enterprises such as fuel wood and charcoal sales, small-scale saw-milling, commercial hunting, and handicraft production.

Forest resources are broadly categorized into two main components; Timber and Non-timber Forest Products (NTFPs). Timber provides all sort of wood- derived products such as industrial round wood and derived sawn timber, wood chips, wood based panels and pulp. So, income from timber extraction have tendency to increase rural households per capita income. Although some production and processing of timber is small-scale and for local markets, technology driven, capita and skill intensive, tends to require large economies of scale, and is aimed at specialised consumer markets. Nevertheless, many poor rural families still engage in one form of wood-derived enterprise or another such as furniture making, wood crafts, fuel wood, charcoal, plank and poles trade among others to boost their income.

On the other hand, non-timber forest products can be divided into three categories which include fauna, ecological and floral parts. The fauna (animals) consist of bush meat, mammals, reptiles, fish, birds, molluscs, cocoons, amphibians etc. while the ecological part include clay, chalk and sand. The floral part comprises numerous forest extracts which are also sub-divided into three groups such as flowers and fruit (mushrooms, oil, spices, condiments, fodder, medicine), leaves (vegetable, wrapper, fibres, forage, medicine) and stem and barks (latex, gum, resin, fibre, wine, dye, medicine etc). NTFPs contribute positively to the livelihoods of the poor since they tend to perform a gap-filling function and a primary source of household income. The safety net aspects of NTFPs make them attractive to the poor and also expand their potential for generating increased income (Sunderlin *et al.,* 2003).

In sum, the potential benefits of forest product gathering include daily subsistence and survival, income redistribution and poverty reduction. In line with the assumption of Kolenikov and Shorrocks (2005) as above stated, if all sources of forest resources incomes translate into increased households' income, the level of households' income distributional inequality would reduce and hence reduces their poverty incidence. The primary conceptual framework in this study will therefore make use of the nexus between poverty and inequality as well as forest income as identified in the flow chat in Figure 2.1.

2.4. Concepts of poverty
The definition of poverty varies across countries due to the relativity of what comprises the term "poverty" and therefore, the concepts, the meaning and the standard of measurement of poverty also vary from one society to another (Okosun *et al.*, 2012). The concept of poverty is somehow complex to describe owing to the fact that there is no any universally acceptable definition. This however responsible for the disagreements over the definition of poverty because each author captures the definition as it occurs to him/her or based on how it is being measured or determined.

In buttressing the complexities encountered in finding a universally acceptable definition of poverty, Aboyade (1983) in Oyeyomi (2003) put forward that there seems to be a common consensus that poverty is a difficult concept to handle, and that, it is more easily recognized than defined. Even attempts made to categorize some specific areas at which poverty could be viewed were eventually burdened with disagreement. Although, there is a unique feature in its definition and description which is *"lack of basic human needs for survival"* (Macpherson and Silburn, 1998).

In Nigeria concept, poverty is more than "lack of adequate income, but a mixture of many forms of deprivations that frustrate the realization of human capabilities" (Akindola, 2009:121-150). However, the concept of poverty in the United States is different whereby the parameter to measure poverty is based on a specific income threshold. So, according to the United States Census Bureau, any household whose annual income is lower than the threshold is regarded as poor (Oyeyomi, 2003). This therefore indicates that different societies may measure or view poverty differently even while they are referring to the same concepts or phenomena.

2.5. Definitions of poverty

In strengthening the difficulties met in arriving at a mutual and generally accepted definition of poverty as above noted, different definitions were hypothesized. For instance, poverty could indicate "absence or lack of basic necessities of life" or "lack of command over basic consumption needs such as food, clothing and or shelter", "glaring defects in the economy, etc" (see Oyeyomi, 2003). Poverty is the opposite of wellbeing as defined by Yekini *et al.* (2012:13). Similarly, Schwartz (2005) in Addae-Korankye (2014:148) in his own term refers to poverty as the deprivation of those necessaries as well as pleasures which are taken for granted by other people while Olasupo (2010) in Aliyu and Chukwudi (2015:25) described poverty as humiliation, the sense of being dependent and of being forced to accept rudeness, insults, and indifference when we seek help.

Furthermore, Organisation for Economic Co-operation and Development OECD (2001:33) thus states that dimensions and measures of poverty may be inconsistent, which complicates the task of identifying the poor. Gordon (2005:4) refers to poverty as "lack of sufficient resources to feed and clothe a family, inability to have education, or access clinic for medical attention, lack of assets, not having farm land or job opportunity, lack of access to credit facilities, insecurity, powerlessness, social exclusion, susceptibility to violence, and it often implies living in marginal or fragile environments, without access to clean water or sanitation".

However, considering the level of divergence with respect to poverty definition, this study chooses to agree with the perspective of the United Nations Human Development Report (1998), which defined poverty as a complex phenomenon that generally refers to inadequacy of resources and deprivation of choices that would enable people to enjoy decent living conditions.

The simple reason for the choice of this perspective is premised on how to summarize the divergent views on poverty definitions and perceptions as described above. For instance, there exist some major and common components in most of the definitions which include: --

- *Lack of human basic needs*: Such as food, clothing, housing, clean water, health services etc.
- *Lack of capabilities*: Such as social status, psychological wellbeing, self-esteem, political involvement, freedom of expression, access to education and health services among others.
- *Lack of human development*: Such as life expectancy, low mortality rate, educational attainment, standard of living etc.

Even so, defining poverty using only one of the these components might not be sufficient. Thus, all these components of poverty definitions could be summarily regarded as 'deprivation of opportunities that would enable people to enjoy decent living conditions' as defined by the United Nations Human Development (1998). In sum, this definition of poverty gives all-encompassing but summarized description of what constitute the situation or type of poverty that exists among average Nigerians and how it can be viewed or described.

2.6. Theoretical framework on measurement of poverty

Supposing the degree of variance of poverty definition is a function of its measurement, various definitions would require specific measurement and would have been measured differently. Poverty measure is very crucial because it serves as a key social indicator and also determines eligibility for benefits for many government assistance programmes. Poverty measurement is a critical tool to provide extensive analysis on the changing nature of poverty issues in relation to the time and space and to determine programme benefit standards. One best way to approach this issue based on the multi- dimensionality of poverty concepts is to determine an acceptable poverty line in accordance with the study area where poverty is to be measured.

2.6.1. Poverty lines

Poverty lines signify "the value of basic (food and non-food) needs required to meet the least socially-acceptable standard of living within a particular society" [Central Bank of Nigeria (CBN), (2000)]. So, poverty line serves as a threshold upon which the standard of living of any individual or household is measured. Therefore, individuals or households whose income or consumption falls below the poverty line are considered as poor. In other words, poverty

line is very useful and important for the determination of the proportion of poor and non-poor over time among societies. According to OECD (2001), the most widely used poverty lines for international comparisons are US$1 a day for low-income countries, US$2 for middle income, and US$4 for transition economies.

Although, the US dollar poverty line standard has a downside in the sense that the exchange rate for the international currencies is not stable and some other countries of the world have their currencies greater in value than the US dollars such that if the equivalence of those currencies were converted into US dollar, the values will be more than US$1 that is used as determinant. This suggests that every country is entitled to set her own poverty line based on the prevailing socio-economic conditions of that particular country. The simple reason is that this US$1 standard would actually create confusion and difficulties in fixing poverty line on the basis of an individual nation's currency particularly those of the developed economy (see Oyeyomi, 2003).

Poverty line serves as fulcrum and helps the policy makers to focus their attention on the living conditions of the poor which may inform policy decisions about targeting development or poverty programmes. There are two main functions of poverty lines. The first one is that they determine the minimum living standard before an individual is considered "poor" or otherwise. The second function has to do with interpersonal comparisons, such as for families of different sizes and compositions, rural or urban poverty, time and location differentials. The second function has been favoured by the Economists than the first one (Ravallion, 1992).

There are two major approaches of drawing poverty lines such as *objective approach* (which do not use information or individual perceptions of welfare) and *subjective approach* (which use information or individual perceptions of welfare). Considering the two approaches, one can interpret the poverty line as "the cost of a given level of utility". This definition encompasses these two approaches as well as the consumer-demand based methods of welfare measurement that economists have traditionally favoured as explained by Ravallion (1992). He thus considered various practical methods of setting poverty lines some of which include: food-energy requirements; cost-of-basic need; food component and non-food component among others. All these practical methods of setting poverty lines are considered to be objective in nature.

Food-energy requirements: This method involves defining the consumption expenditure or income level at which food energy is fairly adequate to meet specified food energy requirements. The simple way to determine this is to calculate the mean income or expenditure of a sub-sample of households whose estimated caloric intakes are almost equal to the specified requirements. Though, this step is somehow tasking due to the varying amount of food-energy requirements of a given individual over a certain period of time. This method spontaneously captures a budget for both food and non-food consumption provided that one is able to determine the total consumption expenditure at which a person usually reaches the caloric requirement.

 Cost-of-basic need: Here, a consumption bundle that is considered to be adequate for basic consumption is specified and its cost is then valued for each of the subgroups being compared in the poverty profile. This method was espoused by Rowntree in 1899 in York during one of his studies and it has then been widely used in most poverty studies across the world (Ravallion, 1992).

The food component: This is another method of setting poverty line and is almost generally attached to nutritional requirements for good health. Food component method does not associate with monetary poverty line because food items are assumed to be yielding the same nutrition. In practice, a diet is chosen which is in line with usual consumption patterns, about which one might expect to arrive at a consensus in most settings.

Non-food component: The usual way of determining this is to divide the food component of the poverty line by some estimate of the budget share allocated to food. For instance, in United States of America, Orshansky (1963) advanced a poverty line that assumes a food share of one third, which was the average food share in the U.S. during that time. So, the total poverty line is set at three times the food poverty line.

Conversely, there is another method of setting poverty lines which is subjective in nature and it is practically based on answers to the minimum income question (MIQ), such as from: "what income level do you personally consider to be absolutely minimal? That is, below which income level you cannot fulfil basic human needs". So, with this, it is easy to define as poor everyone whose actual income is less than the amount they give as answer to this question (Kapteyn *et al.,* 1988).

Nevertheless, this method is usually characterized with some discrepancies in the resulting poverty measures because people with the same income, or some other agreed measure of economic welfare, will be measured differently. This method can be applied easily in a number of OECD countries as there were drawbacks when (MIQ) was attempted in developing countries because the concept of income is hardly defined most especially (but not only) in rural areas. The reason is that one is not certain of getting reasonable responses to the (MIQ). Therefore, quantitative idea of the "adequacy" of consumption is a more promising one in a developing country setting as proposed by Pradhan and Ravallion (1997). The method assumes that each individual has his or her own reasonably well-defined consumption norms at the time of being surveyed.

Furthermore, the most common indicators used in practice are based on household consumption expenditure and household income. This approach embedded in the World Development Report; and generally dictates a preference for consumption as the welfare indicator. The perspective of using "opportunities" and "rights" is more applicable to developed countries most especially Europe, where preference is given to income as the welfare indicator (Atkinson, 1991). Many analysts that are using household data for developing countries preferred current consumption as the indicator of living standard to income while making welfare comparisons. Ravallion (1992) thus observed two discrete suggestions for welfare measurement: One is that the current consumption will almost certainly be a better indicator than current income of existing living standard and the other one is that current consumption may then also be a good indicator of long-term well-being, as it encapsulates both the inflow and or outflow of incomes at different times (past, present and future).

All the same, in spite of numerous ways of obtaining poverty line, in the course of this study, this study pitched its tent to adopt the standard practise of using per capita expenditure as a measure of living standard rather than per capita income. This preference is premised on the fact that literatures have revealed that choosing income as a measure of welfare is susceptible to a lot of errors, particularly in Sub-Saharan African countries (Datt and Jolliffe, 1999). Inconsistency in income of the poor might be a good reason for this preference. It is also somewhat difficult to predict the regularity and stability of such income particularly in underdeveloped rural economies which largely depend on rain-fed agriculture. Since most of the poor households lack good record ability, they based most of their household activities on

memory recall which could hardly be relied upon to capture the frequency of income variation.

Furthermore, noting the fact that income differs on yearly and seasonal basis subject to farm production and prices, another cogent reason is that, most people are often unwilling to declare their true income status. Besides, it is not the amount of income as such that is important but the amount spent on consumption because not all the incomes will be used for households consumption as there might be some savings or debts over the time. Thus, analysing poverty by restricting to household income may not show the true welfare status of such households. For instance, one household that save large part of its income rather than spending it on consumption that will reflect its better-quality standard of living and another household which borrow to supplement its consumption will definitely overvalue or undervalue the welfare measure of each of them. Therefore, per capita expenditure approach has been widely used in most poverty studies in Nigeria (Okunmadewa *et al.,* 2005; Olaniyan and Bankole, 2005; Oni and Yusuf*,* 2006).

In addition, another important factor worthy of note in defining poverty line based on literature is to consider the category of poverty one is looking at whether absolute or relative poverty. Absolute poverty occurs when a household lacks minimum physical requirements for existence.

Further, an objective approach is required in measuring absolute poverty because its poverty line has a fixed value. Examples of such approach include; food-energy intake, cost-of-needs, food components and non-food components etc. as above explained. Therefore, to determine absolute poverty line, total household expenditures must be obtained including food (purchased and own produced) and non-food (rent, subsidy on all items, owners apartment, charity etc.). Finally, per capita household expenditure would therefore be obtained by dividing the total household expenditures by the household size.

Moreover, absolute poverty line might be however difficult to calculate due to absence and or inadequacy of required data on quantity of both physical and intangible household consumption expenditure. Relative poverty on the other hand refers to a situation in which a persons' or households' provision of goods is lower than that of others (Rogers 2015). The approach for defining poverty line for relative poverty is subjective in nature. Example here is *setting the two-thirds of the mean per capita household expenditure*. The in-depth theoretical framework of categorisation of poverty will be discussed afterward.

By and large, since the objective of setting a poverty line is basically to be able to get a threshold that offers a consistent poverty profile in order to achieve accurate comparison among households. this study therefore adopts the relative poverty line of the two-thirds of the mean per capita household expenditure (at the time of the survey) as the chosen poverty line for the study regardless of some drawbacks associated with its subjectivity and arbitrariness. Though, the drawbacks could be taken care of by adjusting some costs of basic needs in the economy (e.g. the cost of the recommended dietary intake or some internationally acceptable measures like US$1 per day). Having set this, any household whose per capita consumption expenditure is below this poverty line is regarded as poor while those above it are considered non-poor.

2.7. Measuring poverty

Assume that information is available on a welfare measure, such as *per capita consumption expenditure*, and on a *poverty line*, for each household or individual; the next thing is to explain how to construct measures of the extent of poverty. Poverty measurements try to recognize individuals or households that are poor. The most commonly used measurements is the *headcount index*.

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; $P_o = \frac{N_p}{N}$

Where N_p= the number of poor and N= the total sampled population. For example, if a sampled population is 500 individuals and the N_p (those considered poor) is 50 people, it then means that P_0 (i.e. the *headcount index)* is 0.1, that is, 10%.

P_0 can be written thus: $P_o = \frac{1}{N} \sum_{i=1}^{N} 1(y, < z)$

Now, $I\ (\cdot)$ is an indicator function that has a value of 1 if (y, < 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.

In spite of the fact that the headcount index is simple to construct and easy to understand, it is being criticized of having some flaws because it does not take into consideration the intensity of poverty of the measured sample. For instance, the amount of the poverty hit suffered by different individuals or households might not be captured by the headcount particularly when such hit becomes lessened probably by a way of transfer from rich to such poor individuals or

households. It therefore defy the Dalton's (1920) transfer principle which states that transfers from a richer to a poorer person should improve the measure of welfare. Summarily, with the headcount, the index remains unchanged regardless of the transfer even when it is assumed to have improved the welfare of such poor individuals or households so that there could be a shift in distribution of welfare. Ravallion (1997) posited that such shift in distribution of welfare is not found in reality.

Part of criticisms that trailed the headcount index as a measure of poverty is that it does not point out how poor the poor are, and so remain unchanged if people below the poverty line turn out to be poorer. Therefore, benefits have to be offered to people below the poverty line in order to reduce the headcount index since little can raise them to match the poverty line. Lastly, only individuals' poverty estimates can reflect the true poverty figure and not the households since there may be variations in welfare status of all individuals that make up the households. Since per capita expenditure is calculated based on total household expenditures divided by the number of household size, thus, a large populated household cannot be compared with a small populated one with equal total household expenditures. The only relevant and reliable figures for policy analysis are those that estimated individuals' poverty. Though, households' survey data are usually considered in measuring poverty with supposition that all members of a given household enjoy equal welfare. This assumption is not correct in reality as age, sex and caloric intake of individuals of the same household might be responsible. One measure of poverty that overcomes the deficiency of the headcount ratio is the *poverty gap measure*.

Poverty gap measure: To some extent, poverty gap index is a general fairly way of measuring poverty because it reflects the degree to which average poor persons fall below poverty line and expresses it as a percentage of the poverty line. That is, poverty gap (G_i) = poverty line (z) minus actual income (y_i) for poor persons; the gap is considered to be zero for everyone else.

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

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

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

Recall that the poverty gap reveals the degree to which average poor persons fall below the poverty line. Given this, the calculated poverty gaps is divided by the poverty line and averaged to give poverty gap index (P_1). This measures the mean of the poverty gaps of the

population (where the poverty gap of non-poor is zero) and it indicates the least amount needed to lift the poor up to poverty line. That is, the minimum cost needed to be transferred to the poor to eliminate the poverty is the sum of all the poverty gaps in a population. So, to alleviate poverty among the poor, transfer has to be made to the value of the amount that would place every individual in the population to the poverty line (i.e. zero poverty gap) provided that the transfers were perfectly targeted. Perfect targeting means that the degree of individual poverty is well known and each poor person gets exactly the amount he/she needs to be lifted out of poverty. The poverty gap index still violates Dalton's transfer principle. The measure does not reflect changes in inequality among the poor. For instance, different poor individuals may have the same poverty gap index (e.g. through transfer) but its effects on their poverty gap rate may differ due to unequal per capita expenditure.

Moreover, poverty gap index is also applicable for non-monetary indicators provided that the distance is distinct. For instance, educational attainment whereby number of years of education needed or required to reach a defined threshold could be considered as "gap". The deficiency of this measure in some respects is that it is not quantifiable, for example, when binary indicators such as literacy are used, in which case one need to resort to the concept of the headcount.

To take into account the inequality among the poor and the distance separating the poor from the poverty line (the poverty gap), there is need for the use of *squared poverty gap index*.

Squared poverty gap index: It is a weighted sum of poverty gaps (as a proportion of the poverty line), where the weights are the proportionate poverty gaps themselves. That is, a higher weight is placed on those households farther away from the poverty line while the lower weight is also placed on those that are closer to the poverty line unlike poverty gap index that weighted the gaps equally. Therefore, when you square the poverty gap index, the measure indirectly puts more weight on observations that are far below the poverty line. Squared poverty gap index captures most of the limitations and deficiencies identified in both headcount and poverty gap measure as it may be considered as one of a family of measures proposed by Foster, Greer and Thorbecke (FGT) (1984). Though, it is not easy to interpret but it is commonly used among other alternative measures.

Thus, squared poverty gap index may be written as:

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

Where α = a measure of the sensitivity of the index to poverty,

z = poverty line,

x_i = the value of expenditure per capita for the ith 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 $\alpha = 1$.

Squared poverty gap index encapsulates the three measures of the *Foster-Greer-Thorbecke (FGT)* class of poverty as above described because it does not only indicate the incidence of poverty but also measure its depth as well as its severity. For example, there might be high incidence of poverty in some households but low poverty gap and vice-versa. That is one of the important reasons why poverty is better to be measured on the basis of individuals rather than households because there may be some members of a particular household whose poverty incidence is low but hitherto suffering from high severe poverty. Therefore, poverty alleviation policies or programmes must be holistic to be able to deal practically with the scourge without leaving any stone unturned.

2.8. Global perspectives of poverty

The whole world has progressively converted to a global village whereby it would be difficult for any particular country to operate in isolation. Activities of countries have been internationalized in such a way that there is direct or indirect interference on issues among countries of the world with respect to their economies, politics, social, migration and security just to mention but few. Usually, some actions in one country have important influence on some other countries, if not the entire world. Therefore, the need to rise up to some of the shared challenges of the world should be accorded the rightful priority on global perspectives. Poverty has been identified as one of such issues that attracts the global attention and has been a major issue on both national and international scale discussions, predominantly among the developing countries (Addae-Korankye, 2014:148).

Poverty leaves no country of the world unaffected no matter the prevalence and the degree. The continued rising gap between the rich and the poor is a testimony to the fact that poverty has established itself as a contagious scourge that require the synergy within and among the countries of the world. Given credence to the fact that poverty is a global phenomenon and multidimensional in nature, there is no doubting the fact that a single or one- directional strategy cannot eradicate the scourge. Instead, the quintessence of comprehensive action on poverty is holistically required through redeployment and proper administration of wealth, demonstration of fairness and equity within and across countries, regions, sectors, and groups in society. This approach will engender world peace, unity and growth and development across the countries of the world. Therefore, the rich will be adequately protected while the poor will not be disenfranchised (Addae-Korankye, 2014:148).

According to Oyeyomi (2003:75), the complex nature of poverty issue might perhaps necessitated the improved commitment of the World Bank in rising up to the global challenges through its potential and resources to lift or keep an individual out of poverty and seek strong economic growth, and sustainable development of the nations of the world. Notwithstanding, every sector, region, country and even the continent of the world has benefited in one way or the other through collaborative efforts and assistance of the World Bank in terms of economic growth, capacity building assistance, security, environmental related issues, health supports and interventions, educational development and host of sustainable development programmes. Oyeyomi (2003:75) reiterated that the World Bank has been regular in her efforts towards effective poverty alleviation.

The most recent World Bank Group Global Monitoring Report, (2014/2015) carried out by the World Bank on ending poverty and sharing prosperity revealed that a year ago, the report proposed two goals to measure success in promoting sustainable economic development, and to monitor its own efficiency in bringing results. The first goal is to basically end extreme poverty, by reducing the proportion of people living on less than $1.25 a day to less than 3 percent of the global population by 2030. While the second goal is to promote shared prosperity by improving the living standards of the bottom 40 percent of the population in every country. Essentially, the goals have to be followed in such a way that the future of the planet and its resources are sustainably secured. The goals also should ensure that there is promotion of social inclusion, and limit the economic problems that future generation inherit. This World Bank Group Global Monitoring Report, (2014/2015) written jointly by the World Bank and the International Monetary Fund (IMF) with essential inputs from the Organisation

for Economic Co-operation and Development (OECD) stress the concern and focus of the international community in reducing the world poverty. The report comprises three unique features:

• It introduces the WBG's twin goals and presents the first explanation of the challenge of ending extreme poverty and promoting globally shared prosperity. The Report monitors the policies and institutions important to achieving them, though the report on the status of the Millennium Development Goals (MDGs) is on-going.

• The report emphasises the MDGs focus on the developing world, the WBG's goal of shared prosperity worldwide and it gives sign of moving toward the post-2015 development goals. Shared prosperity is as much a concern in high-income countries as in developing economies. The report also stresses the performance of the bottom 40 percent in all countries, including high-income countries.

• The third feature is that, while noting the fact that economic growth needs macroeconomic stability, effective investments in human and physical capita plus infrastructure, and well monitored enterprise regulation, well-functioning financial institutions, the Global Monitoring report emphases attention on three key elements of economic policy that make economic growth encompassing and sustainable, within and across generations. These include; larger investments in human capita targeted towards the poor, judicious use of safety nets, and policies to make growth greener.

The WBG's twin goals of ending poverty and boosting shared prosperity retain an emphasis on growth and economic dynamism, while underscoring two important principles: the world should pay special attention to the living standards of the poorer segments of the population, and it should secure the future of the planet and its resources so that current prosperity does not come at the cost of future generations.

The WBG's twin goals are motivated by the experience of the past two decades in making progress toward the MDGs, as well as evolving development challenges. The success in achieving the (MDG 1.a) include halving extreme poverty in 2010, five years ahead of schedule, has encouraged the WBG to set a more determined goal. In 2011, just over a billion people were still living in extreme poverty, that is, about 14.5 percent of the world's population. The first goal sets to almost eradicate extreme poverty during the next fifteen years, that is, to not more than 3 percent by 2030. The report further stated that global poverty

alleviation has been typically due to development in the fast growing economies of East Asia and to a lesser extent South Asia; regional patterns indicate that there may be problems in ending poverty by 2030.

Growth is the major driver of poverty reduction, and was instrumental in halving extreme poverty between 1990 and 2010. Unless economic growth patterns change, however, ending poverty by 2030 is unsure to become a reality. How long would it take to lift 1 billion people out of extreme poverty? Annual per capita consumption growth of 4 percent in every country around the world, combined with no change in income distribution in each country, would result in a reduction of global poverty to about 3 percent of the world's population by 2030. Even though this scenario underlines the view that ending global poverty is not impossible, it is achievable only with strong effort and commitment from all countries. Even under this situation, however, poverty in Sub-Saharan Africa would remain just over 19 percent in 2030, accounting for nearly 80 percent of the global poor in that year. Six countries would still have poverty rates above 30 percent in 2030: Burundi, the Democratic Republic of Congo, Haiti, Madagascar, Malawi, and Zambia.

2.9. Perspectives of poverty in Africa

Based on World Bank (2007) statistics, the amount of the population living in a given household with expenditure or income per individual below the poverty line has been decreasing in the world's regions ever since 1990. Nevertheless, much less of such decrease in terms of incidence and persistent of poverty has been noticed in African region. It could be recognized that the incidence of poverty in Africa is by far higher than what is obtainable in Europe, Central Asia and in other continents (Addae-Korankye, 2014:149).

Within Africa continent, there are disparities of poverty situation across sub-regions such as Northern and Southern parts of Africa due inequality in terms distribution of physical and natural resources. Sub-Sahara African countries is still in precarious situation given the proportion of people living below $1 a day (45 percent) when compared with other regions of the world. Addae-Korankye (2014:149) further posited that countries like Uganda, Mali, Nigeria, Zambia, Niger, Madagascar, Zimbabwe, Burundi and Rwanda have more than 50 percent of their population living below $1 a day in 2002. More of such poverty incidence concentrates in rural areas than urban areas. Lack of adequate human basic needs such as per capita income, access to health care services, access to safe water, shelter access to education

and access to sanitation facilities also were consider as poverty indicator largely noticeable in most of the countries in Sub-Sahara Africa.

The most recent World Bank Group Global Monitoring Report, (2014/2015) carried out by the World Bank on ending poverty and sharing prosperity however explained the worsening position of poverty scenario in Sub-Sahara Africa. According to the report, it stated that in 1990, the extent of extreme poverty was highest in East Asia; but today, Sub-Saharan Africa and South Asia account for about 80 percent of the global poor. According to the 2011 estimates, extreme poverty in Sub-Saharan Africa was around 47 percent. Almost three-fifths of the world's extreme poor are concentrated in just five countries: Bangladesh, China, the Democratic Republic of Congo, India, and Nigeria. While another five countries are added (Ethiopia, Indonesia, Madagascar, Pakistan, and Tanzania), the figure would comprise just over 70 percent of the extreme poor as far as global poverty is concerned.

United Nations (2012) looks at poverty mainly in monetary terms at the household level and the provisions of basic infrastructure and public services at the community level. Their submission is that there are certain consumptions that households can access due to their monetary poverty status and others that they cannot access and depends on the publicly provided amenities. The poverty profile in terms of measure of standard of living begins with accessing where the poor live. By means of the head count poverty rate (using the $1.25 poverty line for extreme poverty), they found that 47.5% of the poor are in Sub-Saharan Africa.

Grouping the world into various sub-continental regions, they adopted some poverty indicators to profile the world poverty. One of them is monetary indicators (using poverty line of $1.25 per person per day). Other poverty indicators include; nutrition which was measured in terms of those who suffer hunger, education which was measured in terms of children out of school and adult illiteracy and health related which was also measured in terms of access to primary health care and number of people living with HIV/AIDS, deaths as a result of malaria, under-five mortality, maternal mortality and child (under-five) stunting and lack of basic sanitation, which was captured by open defecation. Of all the indicators, health deprivations recorded the highest in their extreme poverty profiling, measured.

Notwithstanding, this type of sophisticated poverty profiling suggests a broad spotlight for global development agenda. However, it has to be narrowed down to accommodate national and sub-national policy framework. Economic Community of West African States ECOWAS

and United Nations Statistics Division embarked on an exercise in 2007 to profile poverty in the ECOWAS region. Their approach seems more useful and relevant to African sub region context in that they first considered poverty at the ECOWAS aggregate level, but also disaggregate into national and even sub-national levels. The report initially identified three types of datasets useful for poverty profiling at various levels some of which include; surveys on income and expenditure; surveys on non-monetary dimensions of poverty such as education, health, assets and access to public services; and surveys on subjective evaluations of poverty. According to the report, the monetary poverty estimates was first measured which compares first across countries and then over time. It also differentiates rural and urban poverty across different countries[4].

Cross countries poverty comparison with respect to region and time analysis is however cumbersome due to some non-comparable features such as construction of consumption aggregates; adjusting for differences in the cost of living and demographic compositions of households; and setting of a poverty line. These challenges were of course not visible when dealing with a single country and attempting to do comparison across sub-national geographic units[5].

Furthermore, the report compared consumption poverty measures by household-size, occupational profile, education and gender. In terms of household size, it was established that larger households are associated with higher poverty. Comparison of poverty by occupational profile also showed that low skilled workers recorded higher poverty rate, especially in agriculture. By education, households whose heads have no education were found as while those with post-secondary education recorded more gradually decreasing poverty rate. Leibbrandt and Woolard (2001:41-73) and Lehohla (2012) reported that almost all West African countries excluding South Africa, female-headed households contributed to less poverty than male-headed ones.

Similarly, Anyanwu (2012:159) courtesy African development Bank attempted an in-depth profiling of a single African country (Nigeria) using the same methodology employed by ECOWAS and UNSD whereby a consumption-based poverty indicator was firstly measured

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[4] (see *State of poverty and its manifestation in the nine provinces of South Africa March 2014 by Human Sciences Research Council Economic Performance and Development*)

[5] (see *State of poverty and its manifestation in the nine provinces of South Africa March 2014 by Human Sciences Research Council Economic Performance and Development*)

to compare over time and geographic disaggregation in Nigeria. He then compared poverty within the different other dimensions such as education, age group, occupational characteristics, gender, religious affiliation and marital status. Thus, an econometric model of probability of poverty in Nigerian households revealed that poverty decreases with age of household head, urban location, post-secondary education and certain geopolitical zones of the country. This therefore implied that higher probability of poverty is associated with household composition and lack of education. The result however revealed that there was no significant relationship between type of occupation and poverty. Possibly, this might be due to strong connection between occupational characteristics and level of education of most households in Nigeria.

Consequently, this review of African poverty profile conspicuously concealed the health and nutrition deprivation as a form of poverty which are too substantial to be under estimated in poverty profiling. Perhaps the potency of this econometric approach employed by Anyanwu (2012:159) may not be able to adequately account for very small area disaggregation that may be required for this exercise. Also, in danger of running the risk of too many dummy variables, such models may not be able to further break down demographic profile in order to appreciate child poverty[6].

2.10. Nigeria's human development index

Nigeria among other countries in Sub-Saharan Africa have to strengthen their efforts in waging war against deprivation and prevent disasters from setting back recent development advances, according to the global 2014 Human Development Report (HDR), launched on 18th of August, 2014 by the United Nations Development Programme (UNDP[7]).The report addressed the issue of human vulnerability and highlighted policies to maximise people's future opportunities. The 2014 HDR, entitled "Sustaining Human Progress: Reducing Vulnerabilities and Building Resilience," shows that between 2000 and 2013, Sub-Saharan Africa had the second highest rate of progress in the Human Development Index (HDI), which combines achievements in income, health and education. In spite of this progress, Sub-Saharan Africa is the most unequal region in the world, according to UNDP's Coefficient on human inequality.

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[6] (see *state of poverty and its manifestation in the nine provinces of South Africa March 2014 by Human Sciences Research Council Economic Performance and Development*)

[7] (see *www.undp.org - Human Development Report 2014: Makes a Case for Sustaining Human Progress by Reducing Vulnerabilities and Building Resilience.18 Aug 2014*)

The report further indicates that out of about 585 million people, approximately 72 percent of the region's population, are either living in multidimensional poverty - with corresponding deprivations in education, health and living standards – or at risk of falling back into poverty. These categories of people experience permanent deprivation as they frequently do not notice improvements in their standard of living because they have limited political participation, livelihood options and access to basic social services, and even when they do escape poverty, they can decline rapidly into precariousness when crises hit.[8]

Nigeria's HDI value for 2013 is 0.504 which is still among the low human development category—putting the country at 152 out of 187 countries and territories. Though, there was a bit increase (of 8.1 percent or an average annual increase of about 0.98 percent) in Nigeria's HDI from 0.466 to 0.504 between 2005 and 2013. This thus put Nigeria and Cameroon on the same HDI pedestal.

Table 2.1 below reviews Nigeria's progress in each of the HDI indicators. Between 1980 and 2013, Nigeria's life expectancy at birth increased by 6.9 years, mean years of schooling increased by 0.2 years and expected years of schooling increased by 2.3 years. Nigeria's Gross National Income (GNI) per capita increased by about 25.7 percent during this period (UNDP, 2014).

Table 2.1: Nigeria's HDI trends

Year	Life expectancy at birth	Expected years of schooling	Mean years of schooling	GNI per capita (2011 PPP$)	HDI value
1980	45.6	6.7		4.259	
1985	46.4	8.6		3.202	
1990	46.1	6.7		2.668	
1995	46.1	7.2		2.594	
2000	46.6	8.0		2.711	
2005	48.7	9.0	5.0	3.830	0.466
2010	51.3	9.0	5.2	4.716	0.492
2011	51.7	9.0	5.2	4.949	0.496
2012	52.1	9.0	5.2	5.176	0.500
2013	52.5	9.0	5.2	5.353	0.504

Source: UNDP, 2014

The Human Development Index (HDI) is a summary measure for assessing long-term progress in three basic dimensions of human development: (1) A long and healthy life

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[8] *(see www.undp.org - Human Development Report 2014: Makes a Case for Sustaining Human Progress by Reducing Vulnerabilities and Building Resilience.18 Aug 2014)*

measured by life expectancy. (2) Access to knowledge measured by- (i) mean years of education among the adult population, that is, the average number of years of education received in a life-time by people aged 25 years and older; and (ii) expected years of schooling for children of school-entry age, that is, the total number of years of schooling a child of school-entry age can expect to receive if prevailing patterns of age-specific enrolment rates does not change throughout the child's life. (3) A decent standard of living is measured by Gross National Income (GNI) per capita expressed in constant 2011 international dollars converted using purchasing power parity (PPP) rates (UNDP, 2014).

The HDI measure is based primarily on international data from the United Nations Population Division, the United Nations Educational, Scientific and Cultural Organization Institute for Statistics and the World Bank and this will give room for systematic cross-country comparability as much as possible.

The United nation Development Programme Report presents the 2014 Human Development Index (HDI) in terms of values and ranks for 187 countries and UN-recognized territories, along with the Inequality-adjusted HDI for 145 countries and the Multidimensional Poverty Index for 91 countries among other statistics.[9]

2.11. Category of poverty

Poverty can be categorized as either relative or absolute on one hand, while on another, it can be categorized as permanent or transient. According to Aliyu (2003), absolute poverty can be referred to as 'inability of a person to or group of people to satisfy their basic needs for human survival in terms of feeding, health, education, housing, transportation, employment, among others'. Similarly, absolute poverty could be viewed from the dimension of permanency or transience. This dimension offers differences in poverty with respect to time or duration on the one hand, as well as prevalence and intensity on the other hand. Aliyu (2003) further put forward that poverty may be differentiated on the basis of factors such as time or duration (i.e. long - or short - term or recurring).

Absolute poverty is based on the cost of a set of goods and services considered necessary to have a satisfactory life (Foster, 1998). It is usually based on the cost of purchasing a minimum 'basket' of goods required for human survival (Townsend, 2000). He generally

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[9] *(see Human Development Report website: http://hdr.undp.org/en/data)*

summarizes it as lack of basic subsistence needs (for food, clothing, and shelter). Absolute poverty is a condition that can be described by severe deprivation of basic human needs such as food, hygienic water and environment, shelter, health care services delivery, basic education and information. It is not only a function of income but also access to social services (Oyeyomi, 2003).

Aiyedogbon and Ohwofasa (2012:271) viewed absolute poverty in terms of the least or basic necessities required affording marginal standards of food, clothing, healthcare and shelter. Considering various ways of explaining absolute poverty and using the measure of less than US$1 per day poverty line to reflect the percentage of Nigerians living in absolute poverty, the national Bureau of Statistics indicated that up to 51.6 percent of Nigerians were living below US$1 per day in 2004, while the figure rose to 61.2 percent in 2010. Although, the World Bank poverty line measure that was used during the course of the survey has been modified to have increased from previous US$1 to US$1.25 (NBS, 2012). Nevertheless, it is still alarming to record that about 99,284,512 Nigerians were living in absolute poverty as at 2010 (NBS, 2012).

Relative poverty approach is somehow subjective because its definition of poverty is premised on a comparison between the standard of living of those that are poor and other members of the society that are not poor, usually involving some measure of the average standard of living of the whole society where poverty is being measured (Sen, 1981; Aiyedogbon and Ohwofasa, 2012:271). In other word, it compares the welfare of majority in a particular society. For instance, households whose expenditures are greater than two-thirds of the total households' per capita expenditure are regarded as non-poor while those below it are poor. On the other hand, those households with expenditures less than one-third of the total households' per capita expenditure are regarded as core-poor i.e. extremely poor.

In addition, households whose expenditures are greater than one-third of total households' per capita expenditure but less than two-thirds of the total expenditure are regarded as moderate poor. In other words, poor households could be further categorized into extreme poor and moderate poor. The same thing is applicable to the non-poor households as there could be very rich as well as moderately rich households according to their average per capita expenditure measures (Aiyedogbon and Ohwofasa, 2012:271). According to (NBS, 2012), it was revealed that Nigeria's relative poverty measurement in 2004 was put at 54.4 percent but rose to 69 percent in 2010. The implication is that not less than 112,518,507 Nigerians were

living in relative poverty as at 2010.

Many distinctions have been made from literatures with respect to an 'absolute poverty line' and a 'relative poverty line'. While absolute poverty line is based on a fixed real value over a period of time, relative poverty line is expressed on the basis of income distribution in a particular society. Every society sets different absolute or relative poverty line as deemed fit for the society. For instance, the European Union set a poverty line that a household with less than 60 per cent of the median income may be reckoned as poor in the relative sense while that of United States is premised on family pre-tax income and an absolute poverty threshold. In the case of India, the absolute poverty line adopted for rural is quite different from that of urban areas (Subramanian, 2011).

2.12. Approaches to poverty alleviation

According to Mustapha (2011), there are many approaches to poverty alleviation, some of which include:

Economic Growth Approach: Due to the low capacity of labour to absorb more work force in the industrial sector, comprehensive based economic growth ought to be encouraged. This should focus on capita formation in terms of capita stock and human capita. Human capita formation has to do with education, health, nutrition and housing needs of labour. The investment in these capitas will definitely improve the quality of labour and thus its productivity. Therefore to guarantee development that alleviate poverty, the share of human capita as a source of growth in output ought to be given the priority that it deserves.

*Basic Needs Approach***:** Provision of basic needs such as food, water, health, shelter, sanitation, care, basic education, transportation among others has to be accorded the rightful attention. Otherwise, this approach may not have any direct and substantial influence on the poor due to their integral disadvantage in terms of political power and the ability to influence the choice and responsiveness to adopt government programmes and projects.

Rural Development Approach: This approach recognizes the rural areas as a very important and unique sector in terms of poverty alleviation. This being so due to the fact that majority of the poor in developing countries are rural based (Oyekale *et al.,* 2006:17). Besides, most rural dwellers engaged in an informal sector as their means of living as the level of paid employment in this sector is very low. This thus means that, traditional measures of alleviating poverty may not easily work in the rural sector without fundamental changes in the assets ownership structure, credit structure, etc. Emphasis in this approach to

development has focused on the integrated approach to rural development. This approach recognizes that poverty is multi – dimensional and therefore, requires a multi – pronged approach. The approach encompasses different dimensions of poverty in terms of basic needs such as shelter, safe drinking water, education, health care, employment and income generating opportunities to the rural dwellers in general and the poor in particular. It also takes care of their capabilities to be involved in various social and political activities without leaving their psychological aspects as well as human development index. Therefore, to alleviate poverty, the approach must be holistic in nature. the disadvantage of this approach to poverty reduction is that it is difficult to focus attention on the real poor given that poverty in the rural area is pervasive. In other words it makes targeting of poverty reduction programmes very cumbersome.

Target Approach: This approach favours directing poverty alleviation programmes at specific groups within the country. It includes such programmes as Social Safety Nets, Micro Credits, and School Meal programme etc.

2.13. Some key factors contributing to poverty in Nigeria

2.13.1. Unemployment
Unemployment is considered as one of the factors causing poverty in Nigeria. There is a positive relationship between unemployment and poverty as job opportunity serves as a means of livelihood. Nigeria hosts good number of unemployed people estimated to be 4.9 percent and thus rated 61st across the countries of the world as contained in CIA (2009a); (see Ucha, 2010:51).

Similarly, African Development Indicators report of the World Bank stated that unemployment is imminent as long as there is a problem with educational system which is a driver of employment opportunity particularly in formal sector (Teshome, 2008) in Ucha (2010:51).

2.13.2. Corruption
If the description of corruption by Transparency International as "the abuse of entrusted power for private gain" is taken, it then means that corruption is the canker worm that has eaten deep the fabrics of growth and development in Nigeria. Little or no development could be achieved without equity and fairness in the political system which has hitherto been bastardized in Nigeria Government funds are being misappropriated on a daily basis by the

political leaders and resulted into under developed economy. Hence, the rate of unemployment is increasing on a geometrical line[10] (Ucha, 2010:46).

2.13.3. Non-diversification of the economy – oil over-dependency

Nigerian economy had been driven by agricultural sector before the discovery of oil in 1970. The oil sector constituted not more than 1 percent of the country's export revenue in 1958 but later increased to 97 and 97.5 percent in 1984 and 2008 respectively. Nigeria derived 81 percent of government revenues and about 25 percent of GDP. Nigeria depends deeply on exporting oil while very low attention was given to other natural resources and they have been suffering accordingly. The implication of this was that it rendered a lot of business unfertile particularly the agricultural sector which was the major means of income before the detection of oil. The downside of overdependence on oil resulted into crisis, ethnic militia, kidnapping, vandalisation of oil pipelines orchestrated by the indigenes of the region where oil has been tapped who claimed to be marginalized by the federal government of Nigeria. According to Nigeria's National Bureau of Statistics, the share of the oil and gas sector in GDP has typically been between 25 to 30 percent in most of the recent years. Despite increased national output in non-oil sectors, the oil boom has obliterated the non-oil sectors' potentials and hence aggravating the poverty situation of the country (Ucha, 2010:46).

2.13.4. Inequality

Inequality as a concentration of a distribution, whether one is considering income, consumption or some other welfare indicators or attributes (Oyekale *et al.,* 2007:45-54). The level of disparity in terms of income distribution in Nigeria was very high and this increased the dimension of poverty in the country (Oluwatayo, 2008:1). The income inequality between the people in rural and urban areas in Nigeria is remarkably high, as those rural dwellers based primarily on farming but unfortunately their primary occupations have been quite neglected. So, there were gross disincentives for the farmers to invest in agriculture any longer and this makes them more vulnerable to poverty and leads to some social and economic vices in the country (Oluwatayo, 2008:2).

2.14. Poverty indicators

Despite the fact that poverty is a multidimensional phenomenon, there exist a number of factors through which poverty can be identified. These factors serve as indicators and function like mirror to poverty, i.e. they are always found in relationship with poverty.

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[10] See http://www.transparency.org/news_room/faq/corruption_faq

Coudouel *et al.* (2002) in Adekoya (2014:329) categorized these indicators into two main parts which include; monetary and non-monetary indicators. The former is premised on income or consumption expenditure while the latter is non- fiscal in terms of its measurement such as social status, psychological, life expectancy, educational attainment, self-esteemed or a combination of these. In essence, a variety of poverty frameworks or index such as material, money- metric and multidimensional concepts could be useful to identify and understood poverty (Hulme *et al.*, 2001:20) in Ajodo-Adebanjoko and Walter (2014:364).

2.14.1. Monetary indicator

Giving credence to the above two categories of poverty indicators, scholars who espouse the monetary approach view poverty as a lack of income, expenditure or consumption and would measure it in that respect. The monetary indicator sees poverty as a deprivation of some basic human needs at the individual or household level. Material deprivation can be viewed in monetary terms and make the quantitative analysis of poverty easier and allow the chances of comparing poverty level across countries over a period of time[11]. However, income and expenditure are important variables in the analysis of poverty as both rural and urban poverty in Nigeria were increasing at alarming rate between 1980 and 2004 [Africa Development Bank (AfDB *et al.*, 2009; NPC, 2010)]. While the rural poverty rose from 28.3% to 63.3%, the urban poverty increased from 17.2% to 43.2% in the years under consideration (UNDP, 2009; Holmes *et al.*, 2012:9). According to the National Bureau of Statistics (2010), the Nigeria's poverty statistics also revealed that Nigeria's national poverty line was 54% out of whom 22% were considered to be extremely poor (i.e. about 75 million people) (NPC, 2010). This type of income poverty is an example of monetary indicator.

Having also considered material deprivation of some basic human needs such as food and nutrition, safe drinking water, access to health care, shelter among other basic needs as a monetary indicator, malnutrition and poor health are also serious pointer to a poverty situation. NPC and ICF Macro (2009) reported that there was slow growth rates of under five years children in Nigeria. According to the reports, about 41% of children under five are stunted while 23% are severely stunted due to malnutrition. UNICEF (2011) cited in Holmes *et al.* (2012:11) also put forward that rural children are more likely to be stunted (45%) than urban children (31%) and that there is a wide variation in the nutritional status of children

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[11] *See details of income and consumption expenditure approach for measuring poverty under "Measurement of poverty" in chapter 2.7.*

across the zones, with the North West recorded the highest (53%) and the lowest in the South east (22%) (NPC and ICF Macro, 2009). This is necessary for monitoring the proportion of people that are poor within a given time due to lack of basic necessities as monetary indicator of poverty in the society.

2.14.2. Non-monetary indicators

The non- monetary indicator viewed poverty in accordance with the observation of Sen (1999) who saw poverty beyond lack of basic human needs alone but to include failure to achieve basic capabilities such as sufficient nutrition, sound health, skills acquisition, economic, social and political participation, freedom of expression, self-esteemed, community activities participation, life expectancy among others. This conceptualization indicates the fact that poverty is multi–dimensional. It also offers more benefits than the income/consumption conceptualization.

The reason is simply that the poor are likely to be poor not only in terms of income or consumption but in several ways. Though, the common perspective of poverty is to view it as lack of basic needs and services or lack of minimum standard of living. Conversely, Bevan and Joireman (1997) in Ajodo-Adebanjoko and Walter (2014:365) were of the opinion that poverty transcends only material deprivation but also capability and human development deprivations. That concept of poverty is used to cover a wide-ranging set of interrelated life-chances which vary and are valued differently in the diverse cultures and sub-cultures of the world. Therefore, the conception of what comprises 'basic needs' has been extended to include not only food, water, shelter, and clothing, but also access to other assets such as education, basic healthcare, credit, participation in the political process, security and dignity. This thus implied that poverty has been considered in a more holistic dimension.

Within this context of multidimensionality of poverty, the World Development Report 2000/2001 summarizes various dimensions of poverty as a lack of opportunity, empowerment and security. The poor masses have lost windows of opportunity which render them practically inactive in the society. While their lack of empowerment limits their choices in almost everything, their lack of security makes them susceptible to diseases, violence and lots of other social vices. In the same way, quoting a United Nations statement thus: "Poverty is a denial of choices and opportunities, a violation of human dignity. It means lack of basic capacity to participate effectively in society. It means not having enough to feed and clothe a family, not having a school or clinic to go to; not having the land on which to grow one's

food or a job to earn one's living, not having access to credit. It means insecurity, powerlessness and exclusion of individuals, households and communities. It means susceptibility to violence, and it often implies living on marginal or fragile environments, without access to clean water or sanitation" (World Bank, 2001); in Ucha (2010:46).

The non-monetary indicators lent credibility to the multi-dimensional approaches which capture the full range of deprivations that constitute poverty, and capable of giving 'power' to the weak and 'voice' to the poor as described by World Bank (2001) but lack the precision and comparability of income/consumption measures. The followings are some examples of non-monetary indicators:

2.14.2.1. Education poverty
Poverty incidence is highly connected with educational attainment in Nigeria. For example, an illiterate headed household suffers great deprivation of social capability of high degree due to lack of education (Ojowu *et al.,* 2007; Holmes *et al.,* 2012:10). Nigeria's basic education statistics showed that over 7 million children are out of primary school, of whom girls take largest proportion of about 62% (NPC, 2010). This therefore means that literacy level for male children (82.5%) is higher than their female counterparts (64.3%) (UNGASS, 2010). There is still a significant gender gap in certain regions. The North West and North East are fairly backward with highest percentage of illiteracy. The two regions recorded average of 70% female and 50% male illiteracy level while South - south has the lowest percentage of those who have never been to school (15% among females and 8% among males) (NPC and ICF Macro, 2009; Holmes *et al.,* 2012:11).

2.14.2.2. Health poverty
The 2008 Demographic Health Survey (DHS) shows that net attendance at primary education is 62.1% (NPC and ICF Macro, 2009). Approximately 15 million children under 14 are working to support their family and pay their school fees (UNICEF Nigeria, 2006). But there is a wide dichotomy between rural and urban areas in terms of health issue across the geographical zones. For instance, in urban areas, for every one thousand live births, there was one hundred and twenty one under five mortality rate whereas; it was one hundred and ninety one such cases in the rural areas (NPC and ICF Macro, 2009). At geopolitical zones level, South-west recorded the least (i.e. 59 deaths in every 1000 births), while North-east had the highest (i.e. 109 deaths in every 1000 births).

2.14.2.3. Child protection deprivations

According to UNDP (2010); Holmes *et al.* (2012:9), more than 17% of the population is under the age of six (NPC and ICF Macro, 2009). The need for child's protection has been threatened by poverty. Their survival has been put on the line which reflected in high rates of child and infant mortality. The report also stated that Nigerian children are extremely prone to basic human requirement to survive as well as capabilities to maintain a satisfactory living. They suffer from variety of diseases due to poor environments, population density, poor health service delivery, domestic violence, social assaults, discriminations, cultural afflictions, orphanhood, conflicts and poor parenthood among others (UNDP, 2010). The reports further indicated that about 15 million Nigeria children under the age of 14 are working across the country (UNICEF, 2006). They are brutally abused by working often long hours in semi-formal and informal businesses, for the wages or salaries that are commensurate to the labour or services rendered. Most often than none, these poor and unfortunate children get traumatized and develop psychological problems that may render them difficult to be rehabilitated and or reintegrated. This certainly has negative implications for their human capita development as well as their access to resources.

2.15. Multidimensional poverty index (MPI)

The Multidimensional Poverty Index (MPI) measures multiple deprivations in the same households in terms of education, health and living standards (UNDP, 2014:1-24). While each of the education and health dimension is based on two indicators, the standard of living dimension is based on six indicators. However, all of these indicators required to construct the MPI for a household are taken from the same household survey. The indicators are weighted to create a deprivation score serving as poverty threshold and the deprivation scores are computed for each household in the survey. A deprivation score of 33.3 percent (that is, one-third of the weighted indicators), is used to distinguish between the poor and non-poor. Any household (and individual in it) with deprivation score greater or equal to 33.3 percent is categorized as multidimensionally poor. Households with a deprivation mark greater than or equal to 20 percent but less than 33.3 percent are near multidimensional poverty (Kovacevic and Calderon, 2014:1-24).

The Nigeria/UNDP (2014) indicated that the latest available statistics for Nigeria MPI estimation was that of 2011. According to the data, 43.3 percent of the Nigeria population are multidimensionally poor while an additional 17.0 percent are near multidimensional poverty. The extent of deprivation in Nigeria, which is the average of deprivation scores experienced

by people in multidimensional poverty, is 55.2 percent. The MPI, which is the proportion of the population that is multi-dimensionally poor, adjusted by the intensity of the deprivations, is 0.239. Ethiopia and Democratic Republic of Congo have MPIs of 0.537 and 0.399 respectively.

Comparing income poverty, measured by the proportion of the population living below purchasing power parity US$1.25 per day, and multidimensional poverty. Table 2.2 reveals that the multidimensional poverty headcount is 24.7 percentage points lower than income poverty. This implies that individuals living below the income poverty line may have access to non-income resources. Also, the percentages of Nigeria's population that is near poverty (with a deprivation mark between 20 and 30 percent) and that live in severe poverty (with a deprivation score of 50 percent or more) are also presented. The contributions of deprivations in each dimension to overall poverty give the details of people living in poverty in Nigeria including Ethiopia and Democratic Republic of Congo for comparison.

Table 2.2: Nigeria MPI relative to selected countries

	Survey year	MPI value	Head-count (%)	Intensity of deprivations (%)	Population share (%)			Contribution to overall Poverty of deprivations in (%)		
					Near poverty	In severe poverty	Below income poverty line	Health	Education	Living Standards
Nigeria	2011	0.239	43.3	55.2	17.0	25.7	68.0	32.6	26.9	40.4
Ethiopia	2011	0.537	88.2	60.9	6.7	67.0	30.7	25.2	27.4	47.4
DRC	2010	0.399	74.4	53.7	15.5	46.2	87.7	25.5	18.5	55.9

Source: UNDP, 2014

2.16. Overview of reviewed literature on determinants of poverty

Ucha (2010:54) agreed that poverty is multi-dimensional and it is difficult to disconnect the various dimensions of poverty from the various causes of poverty. The study reviewed six key determinants of poverty in Nigeria. These include unemployment, corruption, non-diversification of the economy, income inequality, laziness, and a poor education system. These determinants are often related to each other and also influence each other. Unemployment, poor education and poverty perpetuate as vicious cycle. For example, nowadays, uneducated individuals lack the opportunity of being offer good jobs, and the poor masses cannot afford to go to school which continually renders them poor unemployed masses. This is also enough to dissuade the propensity to seek further education. Jobs are been fixed on the basis of personal influence and not on merit. The study thus recommends

that education at all levels must be given priority and more investments need to be made in the agricultural sector and other promising sectors of the economy.

Aiyedogbon and Ohwofasa (2012:278) conducted a research entitled "Poverty and Unemployment in Nigeria". The study employed Ordinary Least Squares (OLS) secondary data (1987-2011) sourced from the Central Bank of Nigeria. In their empirical findings, the study employed incidence of poverty as a function of unemployment, agricultural, manufacturing and services contributions to real GDP, population and inflation rate in which the growth rate of the variables were modelled. The results of the study revealed that unemployment, agricultural and services contributions to real GDP as well as population have positive determining influence on poverty level in Nigeria. Though, agricultural sector was found to statistically insignificant. On the other hand, manufacturing sector contribution to real GDP, and inflation rate exhibited negative relationship on poverty level in Nigeria with only manufacturing sector appearing significant. The study did infer the influence of population as being positively correlated to poverty. The author therefore recommended that holistic effort should be made by governments at all levels to create jobs in order to arrest unemployment incidence. The federal and state governments should endeavour to intensify the advocacy on birth control while the agricultural and other key sectors of the economy be boosted to contribute meaningfully in reducing poverty in Nigeria.

Okoroafor and Chinweoke (2013:114) examined the impact of poverty on economic growth in Nigeria. Economic growth had often been seen as the panacea to alleviating the rising incidence of poverty in Nigeria for the period, 1990 – 2011. Secondary data were used and the Ordinary Least Squares (OLS) technique was adopted in the study using a multiple regression model to determine the effect of poverty and discomfort index on the economic growth of Nigeria. The regression model was anchored on the theory of "pro – poor growth" Mahbub UL-Haq (1997) which showed that growth and increased income did not automatically result in well-being among the population. Empirical results from the single – equation regression model, though contrary to economic expectations, show a zero– correlation between poverty, discomfort index and economic growth in Nigeria. None of the parameter estimates of Human Development Index (HDI) and Discomfort Index is statically significant in explaining economic growth in Nigeria. This result is attributable to poor attitude of the government towards human capita development and hence, Nigeria is a nation in paradox – wealthy nation, poor people. Thus, the study then recommend among others, that government should direct attention towards making human capita development a priority

by investing in quality education as well as encouraging entrepreneurship development among Nigerians through small scale business.

Ajodo-Adebanjoko and Walter (2014:370) examined poverty and challenges of insecurity. The data for this study were derived from a number of sources. Data for the study were obtained from both the National Bureau of Statistics NBS (2012) and United Nations Development Indicators for various years. The model used is regression analysis. They hypothesised that poverty (X_t) does not cause insecurity (Y_t), insecurity (Y_t) does not cause poverty (X_t), there is no short-run or long-run relationship between X_t and Y_t and that the past values of insecurity does not affect poverty. The unrestricted vector auto regression (VAR) model was employed to be able to ascertain whether the past values of degree of insecurity also positively related to poverty. They analysed their observations using granger causality test, Cointegration test and vector autogressive. The result shows that insecurity affects poverty significantly. Given the unrepentant rising in Nigerian population living in poverty and presumed growing economy, the study therefore recommends that Nigeria should eschew violence noting from the result of the study that insecurity is a determining factor of poverty. The more we collectively shun violence, the less the proportion of people living below poverty line.

Ibietan *et al.* (2014:5) reviewed some key determinants of achieving poverty alleviation in Nigeria. They posited that the dependence on foreign development assistance for the alleviation of poverty is not exactly the best option for Nigeria, not just as a country, but for Africa as a whole. The problem is not the absence of aid, but the perceived dependence that it may cause. Corruption, poor policy implementation, bad governance were identified as determinant of persistent poverty in Nigeria. This therefore suggests the necessary action that needs to be taken which is revitalization of the poverty alleviation schemes that were already in existence and ensure that proper accountability and transparency are evident in their activities. On the other hand, the authors did not object to such development assistance models but it should rather be used to complement the poverty alleviation schemes and programmes. They put forward that higher levels of transparency and accountability should be enthroned in governance, while negative and detrimental tendencies such as corruption, bad governance, fraud, thefts, money laundering, and other vices should be avoided.

Oyeranti and Olayiwola (2005:41) noted that certain indicators of performance specify that little impact has only been noticed through the domestic and international poverty reduction

measures on the living conditions of the poor. They assessed these poverty measures and came to term that the strategies were badly implemented and even had no particular focus on the poor in terms of design and implementation. Another factor observed by the author is that, the states and the local governments which have responsibilities for health care and education at the grassroots level and programmes which affect poverty alleviation, have much less share in the Federation Account. This points to the fact that efficient design of poverty reduction programmes in Nigeria requires that the poor must be identified and targeted and policies adopted should be consistent and sustainable. The three clusters of focus – opportunity, empowerment and security- are necessary and there must be complementarities among them. If all these three clusters can be addressed in the poverty alleviation strategy, the United Nations Decade of Eradication of Poverty will be feasible and realizable in Nigeria.

Oni and Fashogbon (2013:131) investigated the linkage between food poverty and livelihood activities, capabilities and assets; and socio-economic factors; and agro-ecological variations at the household level in rural Nigeria. The study used nation-wide cross-sectional data of the Nigerian Living Standard Survey (NLSS). The rural households' food poverty status was determined using per capita expenditure on food in the study. Foster, Greer and Thorbecke-FGT (1984) was adopted with slight modification using per capita food expenditure of households (FAO, 2006; Omonona and Agoi, 2007). Results show that, on the whole, farming is the predominant livelihood activity. The distribution of livelihood activities clearly shows that the primary sector of livelihood activities (farming and mining - extraction) is predominantly occupied by men, while the secondary sector (manufacturing - processing) and the tertiary sector (services - trade) are quite favoured by women. Female-headed households are more food secure than their male counterpart. The main determinants of rural household food poverty in Nigeria are: livelihood activities-farming; livelihood capabilities- credit access; socio-economic factors - household size, years of formal education, marital status and age of household head; and agro-ecological variation. The study, therefore, suggests that food security policy that is agro-ecologically specific, with gender-oriented development of primary livelihood (farming) activities should be given paramount attention in the rural sector of Nigeria.

Ogwumike and Akinnibosun (2013:372) in his study examined the determinants of poverty among farming households in Nigeria. The determinants of poverty include socioeconomic characteristics of the household, physical assets and community factors which include

location of residence and geopolitical zone. Method used in the study includes binary model and logit regression to analyse the determinants of poverty among households. The major findings of the study revealed that the farmer's income is inversely related to the poverty status of the household; and that a one per cent increase in income from farming activities will reduce the probability of a farming household being poor by 16 per cent. The differential impacts of the marginal effects of the geo-political zones on the probability of reducing poverty among farming households show that policies should take the peculiar features of the zones into consideration in advancing measures to reduce poverty. The study hence suggests the following; improving the fertility of the land and output. The provision of basic infrastructure in the rural areas. Also, access to credit facilities by farmers could be enhanced through cooperative societies in the rural areas.

Akighir *et al.* (2011:95) assessed the poverty level among rice millers Benue state Nigeria. The study showed that participation in rice milling has the potential of poverty reduction. The major tools employed for data analysis were descriptive statistics (percentages), Foster, Green and Thornbecke (FGT) index and logistic regression analysis. This method subsumes the headcount ratio and poverty measurement of the population below the poverty line while the poverty gap measures the depth of poverty. It was found out that the poverty level of the respondents has improved as a result of involving in rice milling activities. The study thus recommends; Augmentation of their business size is necessary as an income transfer policy that will bring the moderately poor millers to the poverty line. Also, enabling environment should be created by the government for rice milers so that more people will participate in rice milling and generates income that can lead to about 34% reduction in the poverty level of the rice millers.

Oni and Yusuf (2006) examined the determinants of expected poverty as measure of vulnerability among rural households in Nigeria. The study used data obtained from the merged General Household Survey (GHS) and the National Consumer Survey (NCS) of 1996. The cross-sectional data were augmented with certain covariate factors. The data were analysed using 3 stage Feasible Generalized Least Squares (FGLS). Both characteristic and covariate factors affect the expected log per-capita consumption of rural Nigerians. Among others, the followings were found to be the determinant of poverty; no formal education, farming, older head of household, large household size and male headed household. The appropriate policy for mitigating against expected poverty in the rural part of Nigeria include; consumption smoothening strategies, raising per capita consumption of rural households,

aggressive human capita development and family planning policy are the key mitigating factors against expected poverty.

Aigbokhan (2008) carried out study on growth, inequality and poverty in Nigeria and observed the effects of age and education of household head, household size, and sector of residence on poverty. The study used simple regression analysis for the analysis. Other determinants that could have been considered but for lack of relevant data from the survey data set are institutions (corruption, deficit, land ownership), access to credit, and sectoral/regional growth rate. Education, being a measure of human capita, is hypothesized to be positively correlated with income, and therefore welfare. Years of educational attainment of household head was used for no formal schooling (for primary, secondary, and post-secondary). Household size influences household welfare. The larger the size the larger the resources required to meet basic needs of food and other necessities. Household size-squared is also included, because the relationship between per capita expenditure and household size appears non-linear. Age of household head also influences household welfare. Welfare rises with age as more human capita (education and/or working experience) is accumulated. Income, however, tends to fall after retirement and when in old age.

Olaniyan and Bankole (2005) in their study found the effects of human capita and capabilities on rural poverty in Nigeria, The analysis indicates that poverty is widespread in rural Nigeria and those engaged in farm activities are poorer than those engaged in non-farming activities. Probit model was used to estimate the significant effects of human capita and capabilities in determining poverty status of rural households in Nigeria. The study therefore found that the educational level of the household head was statistically significant as it reduced the probability of the household being poor. Also, human capita has a decreasing effect on the probability of being poor among all rural households, whether they are engaged in farm activities or non-farm activities. In addition, households whose heads are engaged in farming activity have a higher probability of being poor. So a conscious effort at the policy level should be made to mitigate poverty by increasing the human capita of individuals through provision of adequate education to individuals especially in rural areas, provision of social services, infrastructure and public goods. It should be noted that any increase in public incomes in the rural area would inevitably lead to significant decrease in rural poverty.

Summarizing the review of literature on the subject under reference, it can be deduced that there is a strong correlation between socio economic characteristics of the rural people who

formed the majority of the population and their poverty status. Socio-economic such as age, gender (female), family size and level of education of households' head are found to be significant with household level of poverty in virtually all the of findings as above reviewed. Of all these factors, education of households' head most especially plays a central role in determining the household being poor or otherwise. Similar attention was placed on household size as a key determinant of poverty as this factor determines the per capita consumption/expenditure in relation to the household income. The level of dependent ratio is very high such that it places a heavy weight on the household income. It is worth mentioning that income from off farm income generating activities was more than the farm activities. Most studies revealed that there is a higher probability of being poor for any rural household whose head does not have certain level of education or engage in any other off-farm activities to augment the wavering returns from farming activities to fulfil their daily needs.

It is worthy to note here that raising income opportunity of the poor and improving quality of life is very crucial in mitigating poverty through proper income distribution and aggressive human capita development for rural dwellers. Going by the results of most findings that poverty is a rural phenomenon, poor farming activities and non-diversification of Nigeria economy posit greater danger to livelihood of rural community because agriculture remains their primary source of living. The results of most studies therefore justify the fact that majority of the rural poor engage in agricultural activities than in any other business.

Further to the above, assessment of livelihood sources is important for designing of poverty alleviation programs and formulating rural development strategies. The excess of poverty alleviation strategies being adopted in Nigeria seems to be skewed towards agricultural related activities. They lack focus on other sectors that can enhance empowerment, human development, fostering growth and equity as well as community development. This being so, due to bad governance, poor policy formulation and implementation, corruption, high unemployment rate, population density, inflation rate, insecurity and myriad of social vices. Thus, several recommendations were made based on the results of respective findings.

Furthermore, in terms of methodological approach, most studies under review and lot of similar studies usually adopt different types of regression models for the analysis in assessing the determinants of poverty depending on what constitute their dependent as well as explanatory variables. Examples include; Ordinary Lead Square regression (OLS) simple linear regression and multiple linear regression, Feasible Generalised Least Square (FGLS),

binomial, logit, probit model, binary model, multinomial regression analysis models among others. Therefore, using Tobit regression model for the purpose of this study in determining the influence of forest extraction on forest entrepreneurs' household income as applied by Fonta and Ayuk (2013) and several related studies will be appropriate. This is particularly important because it provides very useful policy intuitions that will look towards the industrialisation and general development of forestry activities in order to improve on the welfare of forest indigenous people and the share of the region value-added in the sector. This is somehow unique in the sense that it creates a knowledge base on the subject matter for subsequent findings in South-western Nigeria.

Table 2.3: Summary of reviewed literature

Author	Title	Method used	Determinants of poverty	Recommendations
Ucha (2010)	Poverty in Nigeria: Some Dimensions and Contributing Factors	Review: Secondary data source	U=Unemployment, corruption, non-diversification of the economy, income inequality, laziness, and a poor education system.	Education at all levels must be given priority and more investments need to be made in the agricultural sector and other promising sectors of the economy.
Aiyedogbon and Ohwofasa (2012)	Poverty and youth Unemployment in Nigeria,	Ordinary Least Squares (OLS), secondary data (1987-2011) sourced from the Central Bank of Nigeria, Statistical Bulletin (2010), and Annual Report and Statement of Account (various issues).	Unemployment, poor agricultural activities, manufacturing and services contributions to real GDP, population and inflation rate	Holistic approach by governments at all levels to create jobs, intensive advocacy on birth control, boosting agricultural and other key sectors of the economy.
(Okoroafor and Chinweoke, 2013)	Poverty And Economic Growth In Nigeria 1990 – 2011	Secondary data. and the Ordinary Least Squares (OLS) technique using a multiple regression model	Poor attitude of the government towards human capita development (ICD)	Human capita development priority by investing in quality education and encouraging entrepreneurship development among Nigerians through small scale business
Ajodo-Adebanjoko	Poverty And The Challenges Of	Secondary Data (National	Insecurity	Eschew violence

and Walter (2014)	Insecurity To Development	Bureau of Statistics (NBS 2012) and United Nations Development Indicators for various years. The model used is regression analysis, granger causality test, Cointegration test and vector autogressive.		
Ibietan *et al.* (2014)	Poverty Alleviation and the Efficacy of Development Assistance Models in Nigeria: An Appraisal	Review: Secondary data source	Corruption, poor policy implementation, bad governance, fraud, thefts, money laundering, and other vices	Revitalization of the poverty alleviation schemes that were already in existence, Ensuring proper accountability and transparency
Oyeranti and Olayiwola (2005)	Policies And Programmes For Poverty Reduction In Rural Nigeria	Review: Secondary data source	Opportunity, empowerment and security	Gender equity, tackling of social barriers, support for poor people's social capita needs, enhance empowerment of the poor, helping poor people to manage risk
Oni and Fashogbon (2014)	Food Poverty And Livelihoods Issues In Rural Nigeria	Cross-sectional data of the Nigerian Living Standard Survey (NLSS) and Foster, Greer and Thorbecke-FGT (1984)	Farming, credit access; socio-economic factors - household size, years of formal education, marital status and age of household head; and agro-ecological variation	Food security policy that is agro-ecologically specific, with gender-oriented development of primary livelihood (farming)activities should be given paramount attention in the rural sector of Nigeria.
Ogwumike and Akinnibosun (2013)	Determinants of Poverty among Farming Households in Nigeria	Binary model and logit regression to analyse the determinants of poverty among household	Socioeconomic characteristics of the household, physical assets and community factors which include location of residence and geopolitical zone	Improving the fertility of the land and output. provision of basic infrastructure in the rural areas. Also, access to credit facilities by farmers

Akighir *et al.* (2011)	Assessment Of Poverty Level Among Rice Millers In Kwande Local Government Area Of Benue State, Nigeria	Review: Secondary data source	participation in rice milling	Augmentation of their business size such as income transfer policy. Also, enabling environment should be created by the government
Oni and Yusuf (2006)	The determinants of expected poverty as measure of vulnerability among rural households in Nigeria	Merged General Household Survey (GHS) and the National Consumer Survey (NCS) of 1996. The cross-sectional data and 3 stage Feasible Generalized Least Squares (FGLS).	Characteristic and covariate factors , no formal education, farming, older head of household, large household size and male headed household	Consumption smoothening strategies, raising per capita consumption of rural households, aggressive human capita development and aggressive family planning policy
Aigbokhan (2008)	Growth, inequality and poverty in Nigeria	Simple regression analysis	Age and education of household head, household size, and sector of residence	Improved welfare (basic needs of food and other necessities) human capita (education), proper income distribution and working experience
Olaniyan and Bankole (2005)	Effects of human capita and capabilities on rural poverty in Nigeria	Probit model	educational level of the household head, , human capita	Increase in human capita of individuals through provision of adequate education to individuals especially in rural areas, provision of social services, infrastructure and public goods

2.17. Inequality

There are emerging facts from literature that the quest of the international community to reduce poverty will remain a myth unless there is reduction in inequality which has been the bane of growth in most nations of the world. Reducing poverty, undeniably, hinges on the level and nature of growth; as any country that desire to grow more rapidly has to meet the poverty targets. On the other hand growth alone does not guarantee poverty reduction as equal distribution of wealth or resources plays a vital role in the attainment of any poverty reduction strategy. According to Ginkel (2000), higher inequality considerably obliterates the

impact growth has in poverty alleviation. Besides, recent evidence reveals that very high inequality reduces growth rate. The author further stressed that reducing the level of inequality is the only panacea through which the expected levels of growth could reduce poverty to the extent necessary to meet the international targets.

2.17.1. Definitions and dimensions of inequality

Inequality describes the differences between individuals or households in terms of opportunities and outcomes. Inequality describes not only the income gap between the rich and the poor but also entails differences in access to capabilities in terms of educational attainment, health services, land use, land ownership, and other welfare improving assets and services. Inequality is a pivot to both social and economic growth and development (Suri *et al.,* 2009). Babatunde (2008) conceived income inequality as the unfair distribution in income between and within individuals and groups in any society. It is regarded as a welfare indicator because it is used to measure the level of income or consumption of individuals in the society. Income inequality is income variance between the rich and the poor, which results in unfair income distribution. Similarly as different income sources account for income inequality. Income may be derived from many sources such as wages and salaries, farm income, livestock income, entrepreneur income, transfers, and rentals, depending on one's position in life. This will help to identify which of different sources of income actually reduces or increases the inequality in income (Cletus and Ikpeze, 2014, 2014:60).

It has been discussed among several scholars and authors that income inequality is one of the most persistent and existing problems of our time (see Rohác, 2012) cited by (Ncube *et al.,* 2013:5). Wilkinson and Pickett (2010) in Ncube *et al.,* (2013:5) offered many evidences to buttress his point that income inequality intensely has an impact on people's welfare. For instance, greater inequality seems to lead to general social disorder*;* killing rates, violence and lot of social vices are tend to be on high side in a highly unequal societies. However, the reverse is the case in a society where there is trust, and general wellbeing of the people is given priority (Wilkinson and Pickett, 2012). It was also put forward that equality is not just necessary for economic stability but also for ethical and social cohesion. For example, the bane of the growing inequality contributed to perverse economic and financial crisis which led to the huge debts witnessed by most banks across the world in 2008 as published by the International Monetary Fund[12].

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[12] *(see African Development Bank Group Working paper published in December, 2013)*

In addition, Rajan (2010) thus reiterated the fact that the growing income inequality was a main factor responsible for most financial crisis and the current economic recession. That means, it is not by coincidence both the 1929 and 2008 major economic crisis accident that both major modern crises – the first beginning in 1929, the second in 2008 – corresponded with momentous levels of inequality (see Ncube *et al.,* 2013:5). While Van Treeck and Sturn (2012) appraised the evidence that income inequality is a cause of the recent great economic recession. In the same way, the UK Prime Minister, David Cameron (2009) noted that more unequal countries perform worse using all sorts of welfare indicators. So, income inequality is not only important in its own right but also key to reducing poverty.

2.17.3. Causes of inequality

Arising from literature, factors that are causing rising in poverty and inequality across the nations of the world cannot be easily generalized because the situation in each nation depends on specific country conditions and policy mixtures. Even so, there are some recurring common factors associated with the recent rise in inequality. Although, some traditional causes of inequality such as land concentration, urban bias and inequality in education explicate most of the variation in cross-country inequities but they do not explain the recent escalation within countries (Ginkel, 2002).

Similarly, there are facts according to the literature that established that fighting poverty will require a two-branched strategy to reduce inequality: Firstly, measures to reduce structural inequality are indispensable. Major land reform programmes, for example South Korea and Taiwan have demonstrated their capability to earnestly prevent inequality and activate rapid growth. Though, reforms may necessitate major political mayhems, but inequality can be reduced through improving access to common-pool land, more equitable agricultural contracts as well as a reform of the land market.

Besides, promoting growth in agriculture and labour-intensive industry (that is, sectors with a high labour engagement) is equally a significant step in low-income societies. Higher public expenditures on health, education, basic infrastructure, and income transfers, as well as access to financial markets would also help, especially over the medium term. Secondly, economic approaches or policies that will enhance fair distribution among citizenry must be accorded a rightful priority to combat the rise in inequality. Part of such priorities include: avoidance of severe adjustment policies that will affect the poor; strong distributional considerations in the design and regulation of privatization and domestic financial

liberalization, enactment of policies to reduce the output volatility caused by financial shocks, including capita controls; and, lastly, implementing policies to control wage inequities. Avoiding increases in levels of inequality is much easier than subsequently trying to reduce them (Ginkel, 2002).

2.17.4. Relationship between income inequality, poverty and growth

After long years of inattention, inequality has been brought out of the cold. Inequality has re-entered the mainstream development policy agenda by featuring prominently in the World Bank's World Development Report 2001. Inequality affects poverty, and it is very important relative to economic growth. In other word, inequality and poverty affect each other directly and indirectly through their connection with economic growth. Poverty, inequality and growth interrelate with one another through a set of two-way links. Some of these links (A, B and C in Figure 2.2 below) can be explored independently; nonetheless regularly one influences other causing indirect effects. For example inequality can indirectly influence poverty as inequality affects growth (B) and growth in turn influences poverty. There is a triangular relationship among inequality, growth and poverty. Therefore, redistribution of income can influence strategies aimed at poverty reduction and growth acceleration (Bourguignon, 2004).
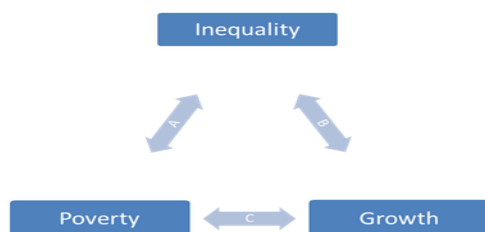
Fig 2.2: Relationship between income inequality, poverty and growth
Source: Felix, 2002

Identifying the relationship between income inequality and poverty, Cheema and Sial (2012) used Pakistan scenario for the period between 1992/93 and 2007/08 as a case study for their explanations in relation to the significance between the twin plights of most nations if not the entire world. According to them, inequality plays significant roles in affecting poverty. Comparable positive and significant effects have been reported by Ravallion and Chen (1997); Adams (2004) and Ram (2007) in cross-country studies: Wodon (1999) for Bangladesh; Lombardo (2008) for Italy; Deolalikar (2002) for Thailand; Fosu (2009) for Sub-Saharan African (SSA) countries compared to non-SSA ones; Fosu (2009) for the major

regions of the world and for a select global sample of 80 countries; and Anyanwu and Erhijakpor (2010) for a cross-section of African countries[13].

Considering the report of Fosu (2009), he explored the extent to which inequality affects the impact of income growth on the rates of poverty changes in sub-Saharan Africa (SSA) compared to non-SSA. The study revealed that the effect of growth of GDP on poverty reduction is a decreasing function of initial inequality. Though the same effects were observed for both regions, but there were significant differences in the responsiveness of poverty to income growth, which thus depends on inequality.

However, income-growth elasticity is significantly small for SSA, which implies relatively low poverty-reduction sensitivity to growth compared with the rest of the developing world. Kolawole *et al.* (2015) suggested that there is a need to understand country-specific inequality characteristics for poverty-reduction strategies to be effective because there is significant difference in the projected values of income-growth elasticity across a large number of SSA countries.

As argued by Ravallion and Chen (1997), high initial inequality matters, since at a high level of inequality, poverty will be more insensitive to growth. Considering a cross-sectional data of Middle East and North Africa (MENA) countries for the period 1985-2009, as an example, income inequality levels really significantly reduce economic growth. The report found out that a one percentage change in income inequality would translate into 0.57% reduction in economic growth. A negative and significant coefficient for the Gini index for economic growth indicates that greater inequality is related with lesser economic growth in the MENA region. Therefore, income inequality is actually not good for the aim of achieving higher and sustained economic growth in the MENA region (Ncube *et al.,* 2014).

2.17.5. Measurement of inequality

According to Haughton and Khandker handbook on poverty and inequality published by the World Bank in 2009, the concept of inequality is broader than that of poverty because it captures the whole population, not just the proportion of the population that falls below a given poverty line. That is, measuring inequality is not a function of the mean of the distribution. So, this characteristic of mean independence is identified to be a desirable feature of an inequality measure. This being so due to the fact that inequality measures are

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[13] *(see African Development Bank Group Working paper published in December, 2013)*

usually considered not just for expenditure distribution but also other continuous and basic variables such as income, land, assets, tax payments, and so on. Several studies used various ways of measuring inequality but one of the simplest ways is to use *quintile approach* by dividing the population into fifths (quintiles) from poorest to richest, and estimating the levels or amounts of income (or expenditure) that accrue to each level. This method is easy to infer and understand even though a more technical approach may sometimes be required instead of figure representation (Atkinson, 1983; Duclos and Araar, 2006).

Another simple and popular method of measuring inequality is *decile dispersion ratio* which presents the ratio of the average consumption or income of the richest 10 percent of the population to the average consumption or income of the poorest 10 percent. The ratios of other percentiles can also be estimated such as average consumption or income of the richest 5 percent to the average consumption or income of the poorest 5 percent and the same thing for other percentiles. This approach is usually expressed as the income of the richest top 10 percent as a multiple of those in the poorest decile. Meanwhile, the decile dispersion ratio disregards the information about the distribution of income within the top and bottom deciles as well as the incomes in the middle of the income distribution.

Other widely used measures of economic inequality are the *percentage of people living with under US$2 a day* (at 2005 international prices) and the share of national income held by the wealthiest 10% of the population (Pasquale, 2012).

But in line with the assertion of Aighoikhan (2000), in Olaniyan and Awoyemi (2005:4) that, in Nigeria as in many developing countries, *Gini coefficient* is the generally used measurements of income inequality. Gini coefficient measures the extent to which the distribution of income or consumption expenditure among individuals' households within an economy differs from a perfectly equal distribution (World Bank, 2000/2001). Therefore, it is used as a sign of income inequality within countries. Essentially, it measures the area between the Lorenz curve, a standard indicator of the distribution of income within a community, and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line.

Gini coefficient is based on the Lorenz curve, a cumulative frequency curve that compares the distribution of a specific variable (for instance, income) with the uniform distribution that represents equality.
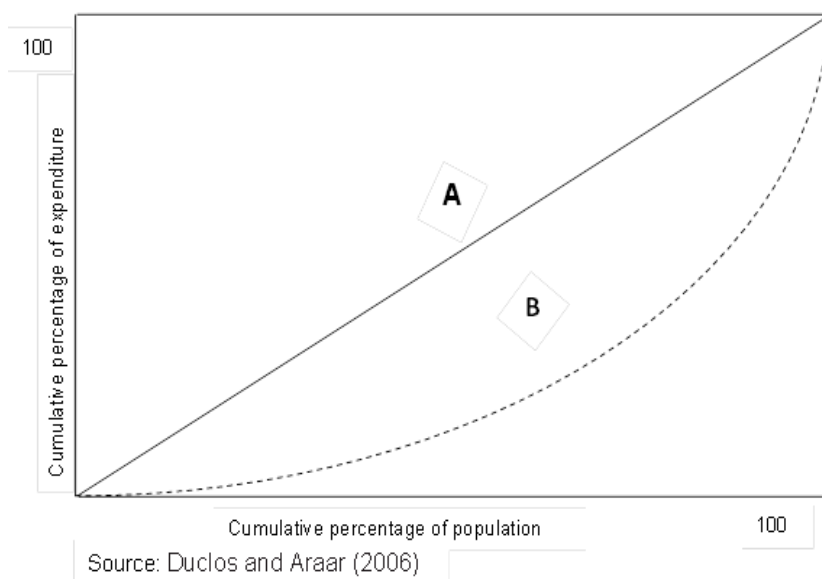
Figure 2.3: Lorenz curve

Lorenz curve graph (*Figure 2.3)* is plotted to construct the Gini coefficient such that the *cumulative* percentage of households (from poor to rich) will be on the horizontal axis while the *cumulative* percentage of expenditure (or income) will be on the vertical axis as shown in the figure above. The cumulative is up to 100%, meaning that both axes are equally long. At every point on the diagram, the percentage of expenditure or income is exactly equal to the percentage of the population. For instance; while the point halfway along the diagonal line represents 50% of the expenditure or income to exactly 50% of the population; its three quarter represents 75% of the population. In essence, the diagonal line is a representative of perfect equality in size distribution of income. Each percentage group of income recipients is receiving that same percentage of the total income for example; the bottom 40% receives only 5% of the total income, while the top 5% receives only 5% of the total income.

The Lorenz curve shows the actual quantitative relationship between the percentage of income recipients and the percentage of the total income that is received in a given period. The farther away the Lorenz curve line from the diagonal (perfect equality), the higher the degree of inequality represented. The extreme case of perfect inequality would be represented by the congruence of the Lorenz curve with the bottom horizontal and right hand vertical axes because no country exhibits either perfect equality or perfect inequality in its distribution of income, the Lorenz curves for different countries will lie somewhere to the right of the diagonal. The diagonal line of the Lorenz curve as shown above means perfect equality while the Gini coefficient is represented as A/(A + B), where A and B are the areas shown in Figure 2.3.

If A = 0, the Gini coefficient becomes 0, which means perfect equality.

Whereas if B = 0, the Gini coefficient becomes 1, which means complete inequality.

In other words, a Gini Coefficient of zero indicates perfect equality where everyone has an exactly equal income. But when there is maximal inequality, it then means that all the incomes belong to only one person. If all people have non-negative income or wealth, the Gini coefficient can theoretically range from 0 to I; it is sometimes expressed as a percentage ranging between 0 and 100. From the literature and based on the usual tradition of the World Bank, the Gini index is usually multiplied by 100, in which case it would be reported as a percentage. Though, it is practically impossible to reach both extreme values. A low Gini coefficient designates a more equal distribution with 0 corresponding to complete equality, while higher Gini coefficient designates more unequal distribution, with I corresponding to complete inequality when used as a measure of income inequality, the most unequal society will be one in which a single person receives 100% of the total income. The Gini Coefficient is otherwise called the Gini index (i.e. a measure of statistical dispersion).

Formally, let *xi* be a point on the x-axis, and *yi* a point on the y-axis. Then

$$Gini = 1 - \sum_{i=1}^{N} (x_i - x_{i-1}) (y_i + y_{i-1})$$

(1)

When there are N equal intervals on the x-axis, then the equation can be written thus:

$$Gini = 1 - \frac{1}{N} \sum_{i-1}^{N} (y_i + y_{i-1})$$

(2)

In terms of inequality measure, some conditions are desirable to be satisfied some of which include; mean independence, population size independence, symmetry, Pigou-Dalton transfer sensitivity, decomposability and statistical testability (Shorrocks, 1980).

The Gini coefficient does not satisfy the whole conditions. However, it was noted that Gini coefficient satisfy most of these conditions except two for example;

• ***Mean independence:*** If all incomes were doubled, the measure would not change. The Gini coefficient satisfies this condition.

• ***Population size independence****:* If the population were to change, the measure of inequality should not change, all otherwise equal. The Gini coefficient also satisfies this.

Symmetry: If any two persons exchange incomes, there should be no change in the measure of inequality. This condition has equally been satisfied by the Gini.

• **Pigou-Dalton transfer sensitivity:** That is, Pigou (1912) - Dalton (1920) transfers principle or, equivalently, the Lorenz criterion. According to the Pigou-Dalton transfer's principle, transferring income from a richer person to a poorer person preserving the rank-order of incomes will either decrease inequality or leave inequality unchanged. So, Pigou-Dalton Transfer sensitivity condition has been satisfied too by the Gini.

 • *Decomposability:* Inequality may be broken down by population groups or income sources or in other dimensions. The Gini index is not easily decomposable or additive across groups. That is, the total Gini of a given society is not equal to the sum of the Gini coefficients of subgroups within that particular society.

• *Statistical testability:* One should be able to test for the significance of changes in the index over time. This is less of a problem than it used to be because confidence intervals can normally be generated using bootstrap techniques (Cavendish, 1999).

It should be noted that the Gini index is a generally used measure because it satisfies all the desirable criteria of a good measure of inequality except the decomposability criteria. There are a number of measures of inequality that satisfy all six criteria. Among the most widely used are the *Theil indexes and the mean log deviation measure*. Both belong to the family of *generalized entropy* (GE$_\alpha$) inequality measures (see Cowell and Kuga, 1981; Shorrocks, 1984; Atkinson, 1970) measure. However, the two measures are almost similar because the Atkinson index is just an increasing transform of the GE$_\alpha$ measures. Hence both GE$_\alpha$ and Atkinson rank income identically (Cowell and Kuga, 1981; see Olaniyan and Awoyemi, 2005).

The general formula is given by:

$$GE(\alpha) = \frac{1}{\alpha(\alpha - 1)} \left\{ \frac{1}{N} \sum_{i-1}^{N} \left(\frac{y_i}{\bar{y}} \right)^{\alpha} - 1 \right\}$$

(3)

Where *y* = the mean income per person (or expenditure per capita). The values of GE measures vary between zero and infinity; zero represents equal distribution and higher values representing higher levels of inequality.
The parameter α represents the weight given to distances between incomes at different parts of the income distribution, and can take any real value.

For lower values of α, GE is more sensitive to changes in the lower end of the distribution, and for higher values GE is more sensitive to changes that affect the upper end. The most common values of α used are 0, 1, and 2. (Cavendish, 1999).

GE(1) is Theil's T index, which may be written as;

$$GE(1) = \frac{1}{N} \sum_{i-1}^{N} \frac{y_i}{y} \ln \left(\frac{y_i}{\bar{y}}\right)$$

(4)

GE(0), is Theil's L, otherwise called mean log deviation measure, which may be written as;

$$GE(0) = \frac{1}{N} \sum_{i-1}^{N} \ln \left(\frac{\bar{y}}{y_i}\right)$$

(5)

Although the Theil Index does not have a direct intuitive explanation, it is somewhat widely used in analysis because it has the desirable property of decomposability. Taking the example of income inequality, in a perfectly equal society for every individual their share of total income will be equal to their share of the population. The Theil Index measures inequality by the extent to which an actual society deviates from this, and is based on computing for everyone the ratio of their income share to their population share.

If the population is divided into several groups such that everyone belongs to one and only one group, taking for instance the education level, the property of decomposability is that the overall inequality can be expressed as a sum of two terms capturing within and between group inequalities. The within-inequality indicates how much inequality is due to differences between individuals in each of these groups while the between-inequality quantifies how much inequality is due to differences in the average incomes of each group. This can be valuable in identifying correlates of inequality.

Below is another inequality measure known as Atkinson's Inequality Measures.

Atkinson's Inequality Measures was proposed by Atkinson (1983) which suggested another class of inequality measures that are used from time to time. This class also has a weighting parameter ε which measures aversion to inequality.

$$A_\epsilon = 1 - \{\frac{1}{N} \sum_{i-1}^{N} \left(\frac{y_i}{\bar{y}}\right)^{1-\epsilon}\}^{\frac{1}{(1-\epsilon)}}, \epsilon \neq 1$$

(6)

$$= 1 - \prod_{i-1}^{N} \left(y_i^{\left(\frac{1}{N}\right)} \right) , \in = 1$$

(7)

Inequality measures can either be normative or positive (Cavendish, 1999). Normative measures are derived by imposing limitations on the inequality function derived from explicitly stated ethical beliefs underlying the societies' concern for inequality whereas it is the indices that summarise description of statistical dispersion in income distribution in the case of positive measures but do not exclusively satisfy the basic ethical criteria for use as inequality indices (Cavendish, 1999). However both normative and positive inequality measure have been commonly used in several studies (Kanbur, 1984) in Olaniyan and Awoyemi (2005:6). Examples of normative measures include the generalised entropy class of inequality index and the Atkinson index while examples of positive measures include relative mean deviation, coefficient of variation, variance of logarithms, Gini coefficients etc.

A key shortcoming of the Gini coefficient is that it seems to be more responsive to changes in distribution among the middle classes and is not as sensitive at the extremes. This insensitivity is highest with respect to the total income of the poorest. Moreover, two populations can have the same average incomes and Gini coefficients but different income distributions that allow their Lorenz curves to intersect or cross. Nonetheless, the Gini coefficient is probably the most widely quoted measure of inequality.

Although, there is no fast and hard rule for measuring inequality as there exist several ways from the literature through which inequality can be measured based on the objectives of the study. Reardon and Taylor (1996) proposed a simulation method to decompose the FGT poverty coefficient by income sources (see Fonta & Ayuk, 2013:5).

Therefore, to determine the impact of forest income on inequality in line with some of the objectives of this study, the Gini coefficient decomposable technique proposed by Lerman and Yitzhaki (1985) is adopted. Meanwhile this study focuses on identifying the extent to which specific income sources contribute to overall income inequality. The study employs the Gini coefficient to reveal the contribution of each individual income source to overall income inequality see for instance, (Adams, 2001; McKay, 2002; Huang *et al.,* 2005). This method involves the estimation of the overall Gini-coefficient of total income, which can be decomposed according to the various income sources. Following Lerman and Yitzhaki (1985), the Gini coefficient (GT) of total household income is given by:

$$G_T = \sum_{k=1}^{K} S_k G_k R_k$$

<div align="right">(8)</div>

Where S_k represent the share of household forest income on total income, that is, how important the income source is in total income. G_k measures the Gini coefficient of each income source, that is, how equally (or unequally) distributed the income source is and R_k measures the Gini correlation between each income source and the distribution of total income. In other word, how the income source and the distribution of total income are correlated (Acosta *et al.,* 2008). Lerman and Yitzhaki (1985) showed that by using this method of Gini decomposition, the effects of a small change in income from any source, e.g. source k can be estimated, while income from all other known sources are kept constant.

2.17.6. World income inequality perspectives

Income inequality and wealth distribution are two different concepts, given that income inequality emphasizes absolutely on the income issues while wealth distribution looks at how the ownership of assets in a certain society is shared among its members. Though, both measures help to plan the economic gap within a country's wealthiest and poorest citizens. Over a decade ago, economic inequality has been rising, predominantly in developed countries where, historically, it had been more contained (Pasquale, 2012).

Considering the World Bank (2001) data, income inequality seems to be lower in Northern Europe, with countries for example Norway, Sweden, and Finland having the lowest Gini coefficients among the countries of the world. It is also amazing that some much less affluent countries such as Afghanistan and Ethiopia show low Gini coefficient. The highest levels of income inequality were found, in the last ten years, in countries such as the Central African Republic, Honduras, Angola, Haiti, South Africa and Namibia.

Pasquale (2012) further reviewed the World Bank (2001) report and stated that in terms of absolute poverty, Liberia is the leading country in terms of the highest percentages of people living with less than US$2 a day (at 2005 international prices,) preceded by a long sequence of African countries, including Madagascar and Malawi. In the Seychelles, Comoros, Namibia, South Africa and Haiti, the 10% of the population at the top of the economic ladder control the highest share of national income compared to the rest of the world.

2.17.7. Theoretical framework of income inequality

Many literature surveys theorize the significance of the nexus between inequality and saving. Most of these literature premised their arguments on both classical and Keynesian theoretical

expositions on income inequality. The classical economists support inequality in income positing that income equality promotes higher income for the working classes and increase their consumption rate as well as population growth because there is no need for saving. They opined than income inequality is a needed inducement to grow the economy. On the other hand, the Keynesian economists discourage income inequality because it encourages savings. They postulate that saving reduces consumption rate, lowers the demand and leads to economic stagnation due to high rate of savings. And according to the Marxian economists, income inequality promotes capitaism because it destined less consumption for the poor masses and stale the production process due to reduced demand for the stocked goods. Hence, snowballing over-production and under consumption and the capitaist economy would move towards secular stagnations. So, Keynes hypothesis prefers consumption to savings.

Though, both classical and Keynesian philosophies are complementary because income inequality leads to prudence and fall in inducement to invest as a result of declining marginal efficiency of capita. Economic growth requires the balancing of the two forces which is possible in a high wage, low profit economy and investment free society (see Adegoke, 2013:19). According to Gu *et al.* (2015), inequality affects saving in different ways in most economies due to their differing degrees of financial development, with different implications for trade balance and financial risk. Regarding the global inequality problem, rising inequalities act as its sources through cross-country saving differences, and global financial crises emerge as its consequences.

Another simple theory, different from existing studies is based on the aggregate analysis of an extended post-Keynesian model. According to the World Economy paper titled "A New Theory with Evidence from OECD and Asian Countries" authored by Gu *et al.* (2015), it was revealed that income inequality is associated with the saving rate positively if savers' funds are allocated by the financial sector to investing firms for production as in China and other Asian countries, but negatively if lent to spending households for consumption as in the USA and other OECD countries. The traditional post-Keynesian model predicts only a positive link as spending is subject to income, but this simple theory can also account for a negative one by harbouring habitual credit use for deficit spending by consumers (Krueger and Perri, 2006; Iacoviello, 2008).

Theoretical studies of connection between income inequality and savings in the literature are relied on particular assumptions to derive some definite results. For example, a concave

consumption function is required to show that more unequal societies may grow faster through higher saving (Foellmi, 2008), and a special utility function that depends on relative rather than absolute consumption is needed to show that aggregate saving is independent of income distribution (Alvarez-Cuadrado and El-Attar, 2012).

Several factors were found in the literature to be responsible for inequality in various countries some of which include urban-rural disparity, level of education, age, gender and regional differences among others (Akita *et al.,* 1999). Considering Kuznets 1955 hypothesis on relationship between economic development and income distribution, it says that - at the initial stage of economic development, inequality will increase and then falls as the country develops. This phenomenon is likened by Kuznets to an inverted U-curve. But, Bruno *et al.* (1998) viewed it differently and they put forward that high degree of inequality in income distribution can have a negative effect on growth and increase poverty. This means that high income inequality can reduce growth leading to increase in poverty. So, there is a strong negative relationship between initial income inequality and future growth and poverty reduction in both developing and developed countries.

2.18. Forest resouces income

2.18.1. Contributions of forests to household income
Majority of rural households in most parts of Sub-Sahara Africa considered forests as a key source of their livelihood whether as sources of food, medicine, shelter, building materials, fuels, and cash income (Richardson *et al.,* 2011). It is estimated that more than 15 million people in Sub-Sahara Africa earn their income from forest-related businesses such as timber, fuel wood and charcoal sales, roof thatching materials, construction poles, honey, mushroom, resins, fish, insects, fruits and nuts, medicinal plants, small-scale saw-milling, commercial hunting, handicraft production, forest tree extracts such as bark, roots, tubers, leaves, flowers, seeds, from trees and other wild plants, and by hunting wild animals, for sale and consumption (Kaimowitz, 2003:46) cited in Richardson *et al.* (2011:1). The author further maintained that the world food security goal relies on the integrity of forests mostly because of the dependence of the poor on forest resources.

Individuals living in the neighbouring forest communities explore the potentials of forest products to smooth income and consumption; they may act as a source of natural insurance or safety net, and may help the household to cope with challenges of poverty, insufficient or loss

of agricultural yields, natural disasters, and other unfavourable circumstances associated with high-risk rural environments (Paumgarten, 2005).

In addition, forest and forest trees are sources of a variety of foods that complement agricultural produce (Inoni, 2009). Preponderance of rural and urban households in developing countries are dependent upon forest flora and fauna to meet part of their nutritional needs. Though, forest foods not often provide the bulk of staple items that people eat; but they add variety to diets, improve palatability and provide essential vitamins, minerals, protein and calories. Similarly, during farming off season when there is occasion of low yields and stored food supplies have diminished and or at the inception of new crops harvest or during emergencies such as floods, famines and droughts, forest foods become major alternative or supplement at such periods (Inoni, 2009).

According to TEEB (2010), forest has both cash and non-cash benefits. Non-cash benefits comprise variety of aids derived from forest which cannot be quantified in terms of direct economic or monetary value. These include; environmental services – ecological services, biodiversity – protection of forest habitat, protection of hydrological services – for irrigation, forest-based tourism, carbon storage and sequestrations, forest multiplier effects etc. Forests thus produce both material and non-material benefits. The author reiterated that the material benefits of forests generally tend to be better recognized among governments and policymakers while the non-cash value of forests are often "invisible" and not considered in decisions on natural resource use, including land use. For instance, government most often put value on agricultural produce to reflect the economic impact of agriculture in national GDP while failing to recognise the value of non-cash benefits of forests with respect to the land use where the agricultural practices are being undertaken. Hence, governments and others may choose to promote agriculture over forests without recognizing the full costs of these actions in terms of forest cover and environmental and other invaluable benefits provided by forests or to make other decisions that exacerbate resource degradation (TEEB, 2010).

2.18.2. Role of forests on poverty mitigation

The role of forests in avoiding or mitigating and in some respects, eliminating poverty, that is, help lifting people out of poverty has proved to be a lot more composite than was previously assumed. Formerly, the common assumption about forest was that forest products could only be a source of mitigating poverty even as their production increased. But the

reality is that with a few highly unusual exceptions, only timber sales would do that, and timber production is too capita intensive for most of the world's forest-based poor, even if governments were prepared to allow them to become loggers as suggested by the United Nations Forum on Forest (2013).

Essentially, the forum further maintained that timber can help people lift themselves out of poverty but this potential is partly unrealised because high-value timber tends to attract powerful competitors and due to the fact that certain characteristics of timber make it relatively inaccessible to the poorest of the poor. In most cases, forests are not primarily focused towards wealth creation but the welfare contributions they offer that are so important (UNFF, 2013). Many of the NTFPs' case examples show how profoundly forests reinforce local livelihoods due to their relative accessibility and low capita requirements that make them valuable safety nets. They are not just for hard times, but are for regular sustenance for men and women, rich and poor as well as for rural and urban people except the very affluent. So, the kinds of earnings derived from forests are far more important than their timber values. But this is the actual reason why the contribution of forests to national GDP has been so invisible (UNFF, 2013).

According to Sunderlin *et al.* (2008), NTFPs have a special but indistinct role in mitigating poverty. Although, their relative accessibility and low capita needs makes them valuable safety nets. On the other hand, these same qualities may make them poverty traps because those in remote areas are unlikely to get out of poverty in one bound. Rather, we should recognise the importance of employing synergy among forests and often other forces in other sectors in order to move the chronically poor to the transient poor, and the transient poor to the non-poor. Though, this is unrealistic in a single generation, as a rule.

All told, striking equilibrium between forest dependence and agriculture has to change before poverty reduction can take place. According to Shepherd (2012), the intensification of agriculture as new markets come on stream, and the change in forest use as a result of agricultural investments, may be at least a 20-year process. For instance, in Uganda, forest-based cash is raised first and foremost from the sale of fuel wood and charcoal (36% of total sales), followed by the sale of house-building materials (30%) and forest foods (21%). So, money generated from the forest and from other sources can be used to invest in livestock which is likely to have a rapid multiplier of wealth provided there are no droughts and wars So, such income can be used to develop other sectors as well (Shepherd, 2012). These

investments provide some soft landing to cushion the effect of shocks both at short and long term basis.

Though a larger proportion of forest income goes to support the household through direct consumption rather than through cash sales. Thus the main role of forest to rural households is to provide energy security, shelter and furniture, food and nutritional, health among other basic necessities of life. All of these aspects of forest income reduce the susceptibility of the household to the unexpected circumstances (UNFF, 2013). In addition, forests increase livelihood resilience, provide household's security to take some risks in terms of undertaking income-generating activities through agriculture, employment, investment in livestock or tree planting. To a large extent, households make their plans for an exit from poverty (UNFF, 2013).

Non Timber Forest Products (NTFPs) provide succour for most women to generate cash to be able to foot the bills of school fees and other school expenses for their children; while some fathers with certain advantage engage in the sale of timber or cattle, to cater for their children needs (Shepherd *et al.,* 2013).

According to Shepherd (2010), villagers often find pathways out of poverty used to employ a dual strategy by adopting a symbiotic relationship between forest and agriculture. For example, in tropical dry forests, the pathway out of poverty is often most simply achieved through cattle investment, using the forest as fodder whereas, in tropical moist forests where forest fallows are important in the agricultural cycle, fallows are often slowly enriched and turned into high value tree crop stands over time. This has been the pattern throughout South-East Asia. Similar method are being employed in Papua and also in Island of Anjouan in the Comoro Islands near Madagascar where it has resulted in the conversion of the lower slopes of the mountains almost entirely into agroforestry areas combining high value tree-crops with domestic fruit trees such as mango and breadfruit. The case is not different in the hills of Doi Mae Salong and the North-west Thailand (Shepherd, 2010).

2.18.3. Non-cash benefits from forests
Non-cash benefits comprise variety of aids derived from forest which cannot be quantified in terms of direct economic or monetary value. These include; environmental services – ecological services, biodiversity – protection of forest habitat, protection of hydrological services – for irrigation, forest-based tourism, carbon storage and sequestrations, forest multiplier effects etc. Forests thus produce both material and non-material benefits (Sukhdev

et al., 2010). The material benefits of forests generally tend to be better recognized among governments and policymakers while the non-cash value of forests are often 'invisible' and not considered in decisions on natural resource use, including land use. For instance, government most often put value on agricultural produce to reflect the economic impact of agriculture in national GDP while failing to recognise the value of non-cash benefits of forests with respect to the land use where the agricultural practices are being undertaken. Hence, governments and others may choose to promote agriculture over forests without recognizing the full costs of these actions in terms of forest cover and environmental and other invaluable benefits provided by forests or to make other decisions that exacerbate resource degradation (Sukhdev *et al.*, 2010).

Furthermore, carbon storage and sequestration schemes seek to mitigate the contribution of tropical forests to global warming either by reducing forest degradation and deforestation or via reforestation or some combination of both such as REDD+ and others, represent policies that recognize the environmental protection functions of forests (Strassburg *et al.*, 2009).

According to Balmford *et al.* (2011), political attention has however begun to focus on the role of forests in climate change mitigation, but the awareness of the role of forests and their non-timber, non-wood values and their environmental service and recreation values are still very low and grossly under-valued. A good example is forest-based tourism such as CAMPFIRE project in Zimbabwe, the Annapurna Conservation Area Project in Nepal, international ecotourism operations in Ecuador and nationally dominated tourism to forest areas in Brazil. This added substantial value to the livelihood of not only the local people where these natural tourisms are situated but also in terms of image boosting, multiplier effects to the nationalities of such places, while not minding the direct and indirect economic benefits to the places concerned.

So, valuation methodologies that reflect forest goods and services represent yet another avenue for recognizing the material and non-material benefits of forests (Balmford *et al.*, 2011). Similarly, national accounting that incorporates data on forest products related to environmental and recreation services and fodder, food, fuel and medicinal values would facilitate better documentation of the full value of forests.

Another option to enhance the non-cash benefits of forests is to ensure sustainable financing that promotes a broad view of sustainable forest management, including the cultural, environmental, provisioning and recreational benefits of forests. Some countries have

adopted national forest programs on sustainable forest management or are in the process of developing or revising policies to reflect sustainable forest management goals include Brazil, Cameroon, Cyprus, Finland, Ghana, Jamaica, New Zealand and the Philippines United Nations Forum on Forest (UNFF, 2013).

Furthermore, in some societies, communally owned forest is meant to support individual's farm holdings whether agronomic practices or animal husbandry. For instance, the value of browse by animals for most part of the year is the main value of forests appreciated by pastoralists in the tropical dry forests of the Sahel and cattle-keepers in East Africa. It translates into high food, cash and store-of-wealth values for their animals; therefore, wherever and whenever these pastoralists have rights and access to forest, they manage and maintain it very well like their precious assets (Kerkhof and Foley, 2000; PROFOR, 2008).

Likewise, for some farmers who practise forest fallowing systems, the renewing power of forest brings improved soil fertility for those farming in transitioning / intensifying farming systems particularly where population density is low. Forest fallowing looks after distant farmer plots while those nearer to the house begin to be farmed with manure/fertiliser (see Kusters and Belcher, 2004). Similarly, farmers in many terraced farming systems in the world pasture animals in the forest, and bring them onto the terraces at night to deposit manure for soil fertility, or chain them where the manure is needed and bring chop fodder to them (Dev and Adhikari, 2007). In the same vein, those living near tidal rivers and the sea, mangrove forest have a special value. Such forests not only protect farms inland from floods, but provide crustaceae and nurseries for young fish which grow up among the mangrove roots before they swim to the sea. Such livelihood systems always include a substantial fishing component (Shepherd *et al.,* 2009).

2.18.4. Forests and job creation

The world of forestry is complex and multifaceted, comprising numerous business structures and spanning both the formal and informal sectors of the economy. Forest-based enterprises serve ever widening groups of customers and end-users with a vast array of forest-based products and services and are significant contributors to employment and economic well-being around the world (Kozak, 2007) in UNFF (2013). As such, they are seen to be important elements of strategies aimed at pro-poor economic growth in developing regions, especially in the tropics where extreme poverty conditions are widespread, high quality forest resources are abundant, and domestic markets are growing in importance. But like that for

NTFPs, it is hard to gather precise records on small and medium forest enterprises (SMFEs). While it is difficult to quantify the economic contributions that SMFEs make, it is estimated that more than 20 million individuals are employed by such enterprises (Alao and Kuje, 2012:50). It is also known that these numbers are much higher – perhaps six or seven fold – when the ubiquitous informal sector that exists in developing economies is taken into account . It is disturbing, the reason why the economic contributions that SMFEs provide have not yet been enumerated and why this sector is oftentimes overlooked in development strategies (Kozak, 2007:7).

Although, Nketiah *et al.* (2011) asserts that SMFEs offer job opportunities to a large proportion of Ghana's population and serve as a main, additional or alternative income source for at least 3 million people in the country. Furthermore, Tens or may be hundreds of thousands of people are employed in the wood fuel production and trade industry (Nketiah *et al.,* 2011; see UNFF, 2013:63-64). In the same vein, Osei-Tutu (2010) states that the timber and furniture industries employing 17,000 chainsaw milling crews, with an average of 6 people in each operation; 264,000 people involved in the chainsaw milled lumber-haulage sector; 21,000 people involved in chainsaw lumber, 1,300 chainsaw lumber brokers, each of which engage about 3 people; and 30,000 small scale carpentry firms employing about 200,000 people. Also, considering the efficacy of non-timber forest products as one of the large employers of labour in Ghana, about 600,000 women in shea butter collection and 300,000 local bush meat hunters are adequately engaged (see Obeng *et al.,* 2012; UNFF, 2013:63-64).

Fredericks *et al.* (2012) in the same manner estimated about 750 formal SMEs in Guyana's wood based sector, including forest extraction companies, sawmills, charcoal licensees, firewood producers, furniture manufacturers, timber and saw -pit dealers. About 90% of SMFEs are either individually or family owned most of which focus on the local market. SMFEs cover 31% of the productive forest area but employ 75% of employees in productive forest concessions which translate into 50% of government generated revenue.

2.18.5. Forest - based approach to poverty alleviation

It becomes imperative upon Nigerian society to look towards the direction of forest as a new approach to alleviate poverty and presents strategies that may enhance those potentials. The following enabling factors and strategies are reviewed as suggested by Sunderlin *et al.* (2003:6-7).

2.18.5.1. Enabling factors and strategies

At the inception of the twenty-first century, poverty remains a huge challenge in developing countries with 1.2 billion people living on less than US$1 a day (World Bank, 2001). In such situations, all hands must be on deck to face this moral challenge, and the forest sector must be examined to understand its potential for contributing to poverty alleviation. Forests play a significant role in alleviating poverty, mainly in terms of their safety net function, but thus far, seems to fall short of their potential to eliminate poverty. This being so due to misplacement of priority of the policy and development planners in poverty alleviation initiatives and programmes. Enabling conditions and strategies must be put in place and accorded the needful and rightful priorities.

Summarily, various forest uses provide both opportunities and obstacles to alleviating poverty. Some socio-political and environmental changes may favour a greater role for forests which include: decentralisation; more secure forest tenure; democratisation; better governance; over-harvesting and retreat by concessionaires; growing urban markets; market deregulation and liberalisation; new technologies; and greater willingness to pay for environmental services. A pro-poor outcome stands the best chance if it is pursued through policy reform. A forest-based poverty alleviation strategy should include the following elements: establishing a people-centered agenda; removing tenure and regulatory restrictions; improving marketing arrangements for marginal people; creating partnerships between the poor and forest enterprises; redesigning transfer payments, and integrating forest-based poverty efforts into rural development and poverty reduction strategies.

2.18.5.2. Enabling conditions

a. Decentralisation: Decentralisation of authority and resource control increases access to forest resources, though by no means guarantees, the possibility of greater local access to forest rents. It has been observed that this process is now gaining attention in many developing countries. Although, in some unsatisfactory cases, mechanisms to exclude the poor have merely been redesigned

b. Forest tenure change: This involves intensive redistribution of forest resources. This will give the poor the advantage and opportunity to have adequate access to forest wealth. Redistribution of forest resources through this condition forest tenure exchange in developing countries has resulted in 22 percent of total forest area being owned by or reserved for communities and indigenous groups. Also, this may not guarantee absolute poverty alleviation but may improve chances (White and Martin, 2002:7).

c. Democratisation: This process is very essential as one of the factors through which forest-based approach to poverty alleviation could be enhanced and maximized. Democratisation potentially increases the bargaining power of rural communities concerning the state and large enterprises. For example, rural residents should have freedom to stake a claim to forest lands and resources than they were earlier before.

d. Anti-corruption campaigns: Corruption is always a bane of progress and development whereas the poor are the worst hit of corruption effects. Corrupt practices in the forest sector usually work against the interests of the poor (Hill, 2000). As a result of this democratisation, movements against corruption can boost opportunities for the rural poor to get a larger share of forest wealth.

e. Retreat of concessionaires: After over-harvesting timber, those that hold a concession or a right granted by the government to engage in forest enterprises (concessionaires) may not renew their concessions. So, this presents an opportunity for forest communities to intercede and compete for access rights prior to the maturing of marketable timber stems. This often happen in many tropical countries.

f. Growing markets: There must be opportunity for market leverage. Smallholder farmers require rapidly growing urban markets opportunities, especially those who live in peri-urban areas, to market forest products. Increased scarcity of forest products, such as fuel wood, makes it more profitable to grow forest products on-farm.

g. Market deregulation and liberalisation: Market deregulation and liberalisation favour forest based poverty alleviation. For example, it can be a force that will remove unnecessary bureaucratic bottlenecks and eliminate such regulations that prevent growing trees on farms. This enables the practice of agroforestry systems which, in the past, has been more controlled than the growing of annual crops. Similarly, it can lead to reform of forestry marketing regulations that have inclined towards discrimination against small producers. Trade liberalisation does not always favour the interests of the poor, and government monopolies can easily be replaced by private ones. Thus, there is still a need for government intervention to protect vulnerable people against these negative effects (Mayers and Vermeulen, 2009:4).

h. New technologies: New technologies must be put in place to afford the relatively poor individual to procure small manageable sawmills with lower capita requirements. This favours a more decentralized production system for sawn wood. In principle, this should

make it easier to involve local entrepreneurs. Technological changes in the plywood industry allow use of smaller diameter trees and more species. Given that control over less valuable commercial forests has been granted to local communities, at least in the past, this technological change could increase the value of these forests. However, this also risks speeding up deforestation by making new areas and species commercially profitable for logging.

i. Growing global environmental threats: If forests are to better serve the goal of poverty alleviation, then there must be conscious and dedicated efforts by the developed countries to compensate forest dwellers in developing countries for environmental services through carbon sequestration and conservation concessions. Because the growing threat of global warming and biodiversity loss orchestrated by unsystematic forest harvest demands for such compensation. However, these changing socio-economic, political, and environmental conditions merely present opportunities to enhance the role of forests in alleviating poverty and do not guarantee a positive outcome.

2.18.5.3. Forest -based strategies for poverty alleviation
The followings strategies are considered as most favourable potentials towards achieving poverty alleviation through forestry.

a. People-centered forestry: Better use of forest resources to alleviate poverty needs, among other things, that forestry be masses oriented (FAO and DFID, 2001:4; Warner, 2000:9). That is, poor people in forested areas must have control and influence in determining their fortunes and livelihoods. In actual fact, forest indigenous people should be the main stakeholders where forests continue to be essential to livelihoods, while forest management practices should also be given significant attention in order to ensure continued provision of the essential needs of such forest dependent people on a sustainable basis (Warner 2000:9).

People's relations with others are as important to understanding their use of the forest as are their direct forest management activities (Peluso, 1999:38). Therefore, forest policy formulation and implementation should formally recognise that, forest resources access and control usually engender conflicts; interventions are needed to protect the interests of those who are powerless.

b. Removal of tenure and regulatory restrictions: Barrier on tenancy and other strict regulations make it difficult for the local people to invest in long term forest contracts. Essentially, there is need for a pro-poor forest use strategy that will ensure the transfer of

public forest lands to local control so that local people can enter into long-term business contracts (Scherr *et al.,* 2001: 44 and 59). It is crucial as well, to remove excessive regulations and regulations that discriminate against smallholder and artisan production and trade of forest products (Scherr *et al.,* 2001: 48 and 59; Arnold; 2001:14; FAO and DFID, 2001:14; Mayers and Vermeulen, 2009:4).

As a rule, people should be allowed to decide whether to plant or harvest trees on their own land. If really there is necessity at all to have management procedures due to the important of external benefits, such procedures should be made simple. In some cases, overharvesting and exhausting high-value timber rents by large enterprises may render unnecessary the enforcement of regulations designed to exclude the poor. Decentralizing control of forest resources will help and pro poor even though it does not guarantee positive outcome for the poor because local governments can be inefficient and corrupt or local elites may monopolise the benefits. However, under good governance, devolution can improve the chances of a pro-poor outcome.

c. Improving marketing arrangements: Market access is very essential in any business plan and policy. Forest market policies that subsidise or provide privileged access to large scale producers and processors must be eliminated so as to create a level playing field for marginal producers (Scherr *et al.,* 2001:52 and 59; FAO and DFID, 2001:18).

Further measures to redress unfairness include elimination of tied credit deals and minimum volume or area requirements; establishment of special sorting yards and services that provide information on prices and markets; and active involvement of local producers in policy negotiations that affect forest markets (Scherr *et al.,* 2001:53-55). Intervention strategies must distinguish between people who are involved in forest product activities because they lack other income sources and those who are responding to market opportunities (Arnold and Townson, 1998:1).

d. Partnerships: An effective and close partnership between smallholders or communities (poor people) and the private sector (commercial companies} would be an important step forward and needs to be based on each group's comparative advantages. The poor can supply cheap labour and land while companies have easier access to capita, knowledge, technologies, and markets. Mayers (2000) and Desmond and Race (2000) noted that genuine partnerships facilitate secure contractual obligations between communities and companies in that the former get an adequate economic return and the latter invest because they are assured

a supply of wood. They further maintained that the bargaining power of individuals and communities is often weak while the producer associations and alternative market outlets take the advantage to strengthen their power.

At this juncture, NGOs have a crucial role to play in strengthening the negotiating power of farm foresters and producer associations by making the contract process transparent and by assisting the flow of information. Government is also an important player since an enabling environment is required for effective partnerships to take root (FAO and CIFOR, 2002).

e. Redesigning transfer payments: Lack of secure land tenure and high transaction costs of contracts with smallholders debar the poor to be involved in compensation agreements for the provision of environmental services. Besides, many of these poor even lack adequate information regarding these income-earning possibilities and are in most cases powerless and voiceless. Poor people are in charge of most tropical forest land so carrying them along is crucial for achieving goals related to climate mitigation. One approach is to compensate governments for not logging an area (conservation concessions). Another is to pay local people for not deforesting and for safeguarding biologically diverse forests on their land (conservation easements). Under these arrangements, direct payments are made on the basis of a monitored quality of the forest resource. So, there should be demand for these services. Improvement of transfer payment initiatives must be supported by policy research (Gutman, 2001:10).

f. Integration of forestry into rural development and poverty reduction strategies: Eliminating poverty in forested regions will involve not just the forest sector, but other sectors such as agriculture, infrastructure, sanitation, health, and education. As such, forest based poverty alleviation must be part of an overall rural development strategy. It cannot stand alone. By the same token, efforts in other sectors must recognise the current role of forests in mitigating and avoiding poverty and its potentially enlarged role in poverty elimination. At the national and local level, forests must be seen as an important asset to fight poverty (Gordon *et al.,* 1999:20). A crucial point of departure for this strategy is to review national Poverty Reduction Strategy Documents (PRSD) to assure that, where relevant, they recognise the importance of forests and include measures such as those proposed above.

2.19. Deforestation and diminishing global biodiversity

According to the World Resources Institute (WRI), more than half of the world's forest cover has been lost from 62 million km2 to 33 million km2 (Sunderlin *et al.,* 2005). The magnitude of global biodiversity situation is certainly endangered million times higher than any time of its history. Virtually each year, the tropic loses more than 15 million ha of natural forest which is more than the area of Nepal or Arkansas in the United States (FAO, 2006), 2004 IUCN Red List currently put the figure of the lost species in developing countries particularly in tropical areas to be 15,589. As a matter of fact, the life and livelihood of 400 million people out of which 50 million are forest indigenous people- who depend on forests for subsistence has been put under serious threat due to deforestation and forest degradation The list enumerated that 12% of world's known birds, 23% of mammals, and 32% of amphibians are also endangered species (Baillie *et al.,* 2004).

Though, the over dependency of people on local ecosystems for their livelihoods are somehow responsible for the degradation of biodiversity and thus mostly affected by the consequence of this biodiversity loss. Biodiversity conservation is however essential to maintain the ecosystem, sustain the environment, improve livelihood and consequently to eradicate poverty and hunger. This is one of the objectives of Millennium Development Goals (Goal 7) that has been receiving international community attention in collaboration with intergovernmental bodies in ensuring that biodiversity issues are prioritized at regional, national and international level (Convention on Biological Diversity [CBD], 2009).

2.20. Socio-economic status and peoples' attitude towards forest resources conservation

Socio-economic characteristics of an individual or group of individuals indicate their environmental concern and how they manage such environment in relation to their daily activities. Meanwhile, socio-economic such as education, income and occupational prestige, that is, social class of individuals are positively related with their perception on their environmental management (Ukwetang *et al.*, 2013:69). It is evidenced in the literature that education is one of the factors affecting peoples' attitude towards conservation and management of forest resources. The higher the level of education of the people, the more positive attitude they have to adjacent conservation areas. Likewise, income source and economic potentials of individuals suggest how better or otherwise people conserve or exploit forest resources. For instance, management of forest is a source of employment to many people and they will show more concern to daunt forest exploitation as a way of protecting their income source, while on the other hand, that same forest is a source of livelihood to

some who will also ensure that those forest resources are tapped by all means (see Ukwetang, 2013:67).

However, Galbreath and Avers (2009) in Ukwetang *et al.* (2013:69) having classified socio-economic status of people into three - high, medium and low, noted that high socio-economic status do not have much pressure on forest resources as such is typified by diverse means of livelihood rather than depending solely on forest resources. Although, some highly place individuals engage in mechanized agriculture leading to total clear cut down of large expanse of forested lands thereby causing a huge loss of the forest and its resources. The medium socio-economic class causes damage to the forest through several economic projects and actions depending on their level of engagement in such activities.

So, the low socio-economic status in the society constitutes the main forest dependent people who impact negatively on forest resources. They depend entirely on forest resources for their livelihood. This group of people do not have the urge to embrace forest conservation measures as they see it as waste of time. Their ultimate concern is how to earn a living through the forest. Galbreath and Avers (2009) in Ukwetang *et al.* (2013:69) thus stated that there is need for all the categories of people (social classes) in the society to be conscious of the need to sustain our environment and conserve our forest and its resources, otherwise, the risk of sustainable livelihood, most especially for the teeming rural population who depend mainly on forest is very high.

2.21. Sustainability supply chains and forests

While intensification upsurges commodity supplies, upsurges in local yields and productivity may over time generate profits and efficiencies that arouse further agricultural expansion and forest encroachment, especially where demand for the commodity is growing and labour is available (Angelsen, 2010; Rudel *et al.,* 2009). Further, high-yield commodity agricultural expansion can decrease the total land area used, but this can circumvent existing agricultural or degraded lands and encourage deforestation in primary forest areas. For example, high-yield palm oil development in Peru has primarily targeted primary forest sites, demonstrating the inadequacy of intensification alone as a mechanism for avoided deforestation (Gutiérrez-Vélez *et al.,* 2011:3). One part of the solution is to develop regulatory or incentive mechanisms that overcome the problems of low productivity and high costs associated with agricultural expansion in degraded lands. Thus, innovations that support

agricultural intensification must be complemented by institutions and incentives that prevent expansion into forested areas (Wollenberg *et al.,* 2011:13; see UNFF, 2013:75).

There is already evidence that commodity agriculture production in tropical forest regions can increase independently of deforestation, through intensification (increased yields per unit area) or by spatially disaggregating agricultural expansion from forest areas. In the Brazilian state of Mato Grosso between the first and second half of the decade 2001-2010, higher productivity increased soy production by 22% with a corresponding decline in deforestation-causing soy cropland expansion (Macedo *et al.,* 2012:7). Such statistics provide grounds for optimism in meeting the challenges of tropical forest and agriculture landscapes, but there is a consensus that a combination of more secure tenure rights and effective institutions are critical to implement the policies that will lead to deforestation-reducing land-use changes.

2.22. Conclusion

Poverty is one of the most important developmental challenges facing Nigeria considering different categories of indicators. Income and expenditure are important variables in the analysis of poverty as both rural and urban poverty in Nigeria were increasing at alarming rate. Likewise, the level of disparity in terms of income distribution in Nigeria was very high and this increased the dimension of poverty in the country. The income inequality between the people in rural and urban areas in Nigeria is remarkably high, as those rural dwellers based primarily on farming but unfortunately their primary occupations have been quite neglected.

Although, some poverty alleviation approaches have been undertaken to address poverty and to overcome inequality, but rather than abating, the incidence of poverty and income inequality have continued to be on the increase, thus many households have sunk deeper into poverty.

However, majority of rural households in Nigeria and most parts of Sub-Sahara Africa considered forests as a key source of their livelihood whether as sources of food, medicine, shelter, building materials, fuels, and cash income. Individuals living in the neighbouring forest communities explore the potentials of forest products to smooth income and consumption; they may act as a source of natural insurance or safety net, and may help the household to cope with challenges of poverty and income inequality.

Forests provide both cash and non-cash benefits notwithstanding they are seen to be important elements of livelihood coping strategies most especially the non- timber forest products. It becomes imperative upon Nigerian society to look towards the direction of forest as a new approach to alleviate poverty and presents strategies that may enhance those potentials.

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Chapter 3: Research Methods And Analytical Techniques

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3.1. Area of study

This research was carried out in Nigeria. It is situated in the West African region and lies between longitudes 3 degrees and 14 degrees and latitudes 4 degrees and 14 degrees. It has a land mass of 923,768 sq.km [Central Intelligency Agency (CIA), 2009a] cited in Agunwamba *et al.* (2009:7-8). Nigeria is bordered by Benin, Cameroon, Chad, Niger and 853km of coastline on the Gulf of Guinea, the Federal Republic of Nigeria covers 910,768 square kilometres of land in West Africa.

Formally and informally, Nigeria has six regional zones: North - east, North- west, North-central, South-east, South- west and South-south (*see Figure 3.1*). These regional divisions reflect varying ecologies and climates, along with differing population characteristics. Analyses of Nigeria as a whole often overlook the varied realities of distinct regions, across which the distribution of natural resources, ethnic and religious groups, and a myriad of other factors may differ (Agunwamba *et al.,* 2009:8).

Nigeria has vegetation that supports various crops like cereals, tree crops, roots and tubers, vegetables among others. The country is divided into two patterns of savannah to the north and forest to the south. According to the U.N. FAO (2005 & 2010), 9.9% or about 9,041,000 ha of Nigeria is forested, according to FAO. 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 (U.N. FAO, 2005 & 2010). In terms of biodiversity and Protected Areas, Nigeria has some 1417 known species of amphibians, birds, mammals and reptiles according to figures from the World Conservation Monitoring Centre. Of these, 1.2% are endemic, meaning that they exist in no other country, and 3.5% are threatened. Nigeria is well endowed with forest resources, accounting for about 2.5 percent of the Gross Domestic Products. These resources provide employment for over 2 million people through supply of fuel wood and poles and more than 80000 people working in the log processing industries, especially in the forest zones of the south (U.N. FAO, 2005 & 2010).

The study area where data were collected is south - western region of Nigeria, one of the six geo-political zones in the country. The area lies between longitude 30^0 and 7^0E and latitude 4^0

and 9^0N and thus, west of the lower Niger and south of the Niger Trough (Agunwamba *et al.,* 2009:9). This area includes Osun, Oyo, Ogun, Lagos, Ondo and Ekiti states. The total land area is about 191,843 square kilometers (Agunwamba *et al.,* 2009:9). As in the other parts of the country, the climate of south-western Nigeria is dominated by the influence of three major wind currents, namely: the maritime tropical air mass, the continental tropical air mass and the equatorial easterlies (Iloeje, 1981).
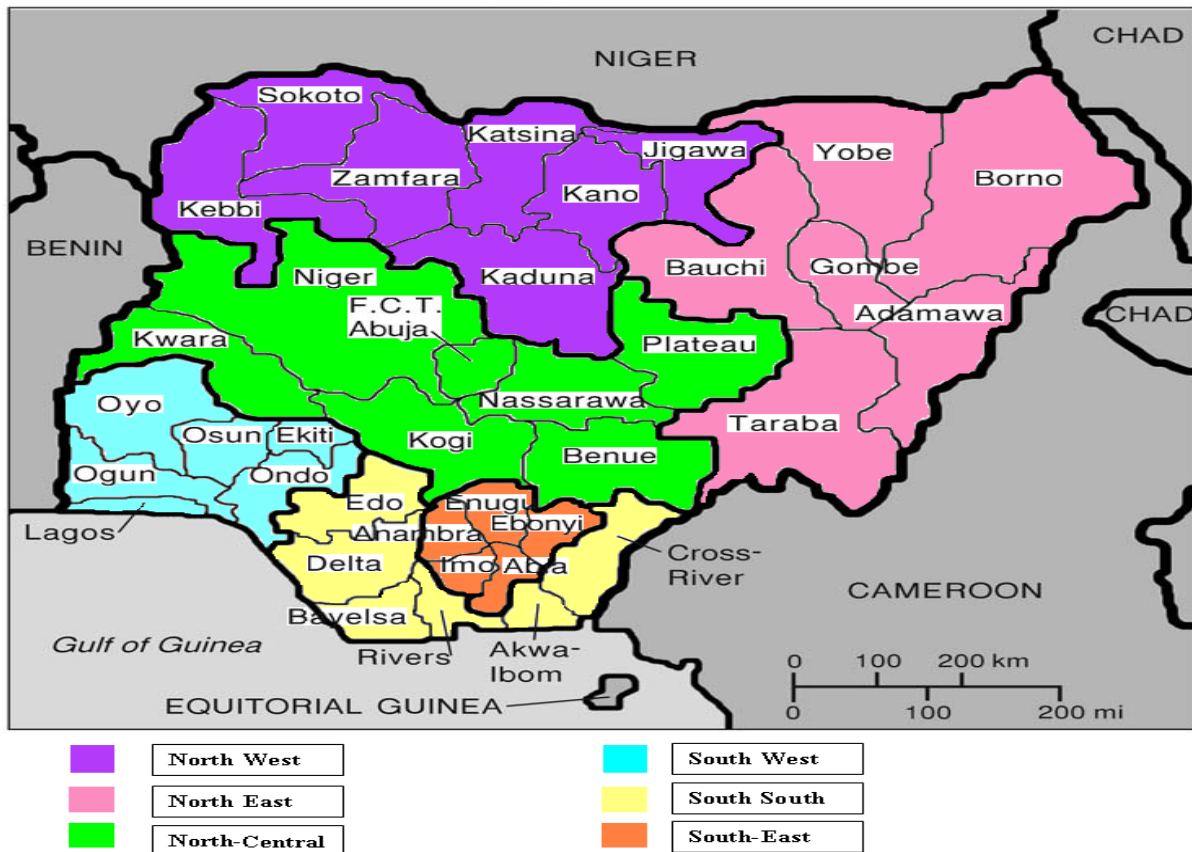
Fig. 3.1: Map of Nigeria's States and Regions[adapted from (Agunwamba et al., 2009:9)]
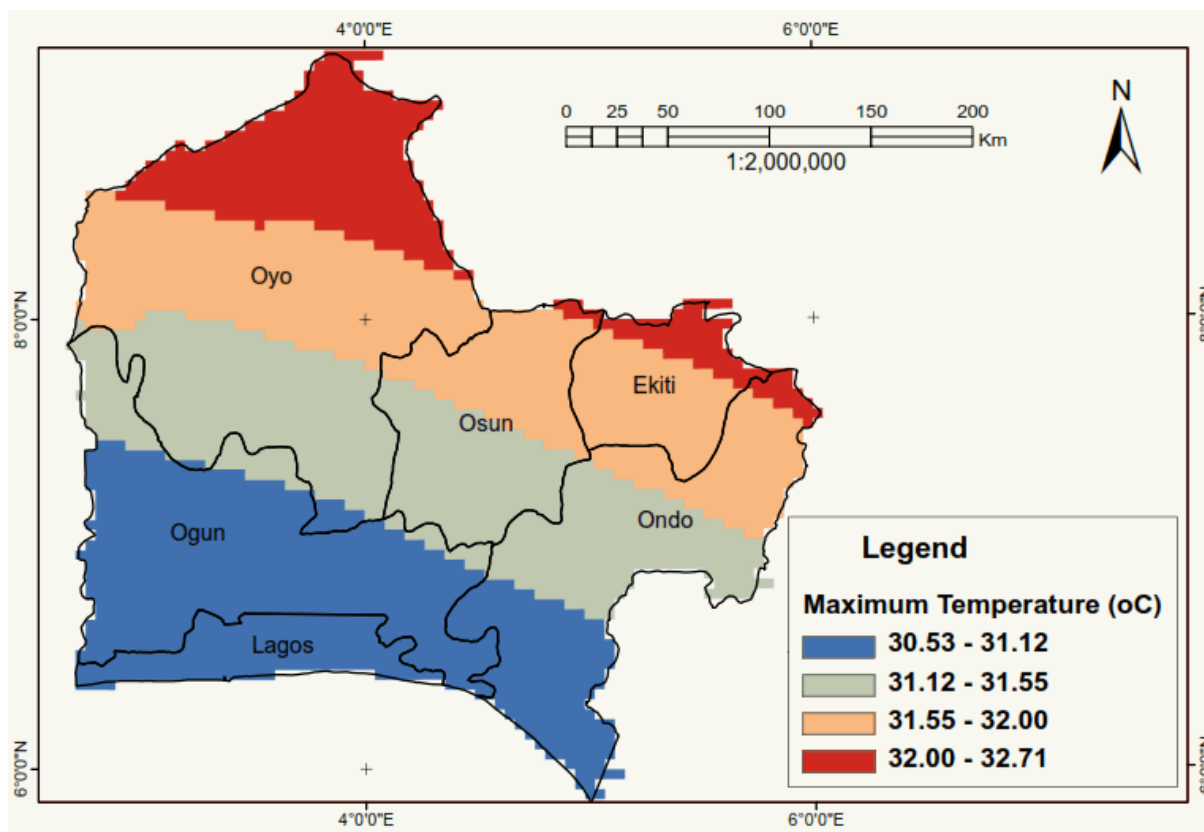
Fig. 3.2:Map of South-west Nigeria

3.1.1 Brief information about the states covered for data collection

The local government areas covered for this study in Ogun state are: Ijebu-Ode, Odeda, Ewekoro, Abeokuta South, Ifo and Ado Odo/Ota local government areas while Aiyedaade, Boripe, Ejigbo, Ife South, Aiyedire and Ede North local government areas were covered in Osun state. In Oyo state, the local government areas include: Afijio, kajola, Ibadan North-east, Akinyele, Itesiwaju and Ibarapa North[14].

In these three states, due to the dual ownership of natural forests (local authorities and state governments), state forest services decide the level and type of logging activities that may be allowed within and outside the forests[15]. They also decide how much forestland should be set aside for other activities, such as: recreation; wildlife preservation; hunting; grazing; and mining. However, these decisions are rarely based on the value of different activities, or even how much wood is readily available. More often than not, they are based on political pressures and influence of the so-called cabals. In the South-west of Nigeria, forest services

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[14] *(National Population commission Nigeria, published April 2010, retrieved 24 June 2013)*

[15] *FAO Corporate documents repository Title: The forest revenue system and government expenditure on forestry in Nigeria, produced by Forestry department. http://www.fao.org/docrep*

are forced to aim at revenue targets that are not in tune with either good forest management practices or the interests of the community particularly the downtrodden[16].

In recent times however, most states in the high forest zone (South-west of Nigeria) have achieved tremendously in managing their forests, because of extensive exploitation of Teak plantations. These achievements in Ondo, Ogun, Ekiti, Osun and Oyo states might not have actually resulted from administrative ingenuity though, but rather from uncontrolled logging operations caused by arbitrary target setting and an unmitigated drive for revenue generation[17].

Fig. 3.3.1: Map of Oyo State

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[16] *FAO Corporate documents repository Title: The forest revenue system and government expenditure on forestry in Nigeria, produced by Forestry department. http://www.fao.org/docrep*

[17] *FAO Corporate documents repository Title: The forest revenue system and government expenditure on forestry in Nigeria, produced by Forestry department. http://www.fao.org/docrep*

Fig. 3.3.2: Map of Osun State
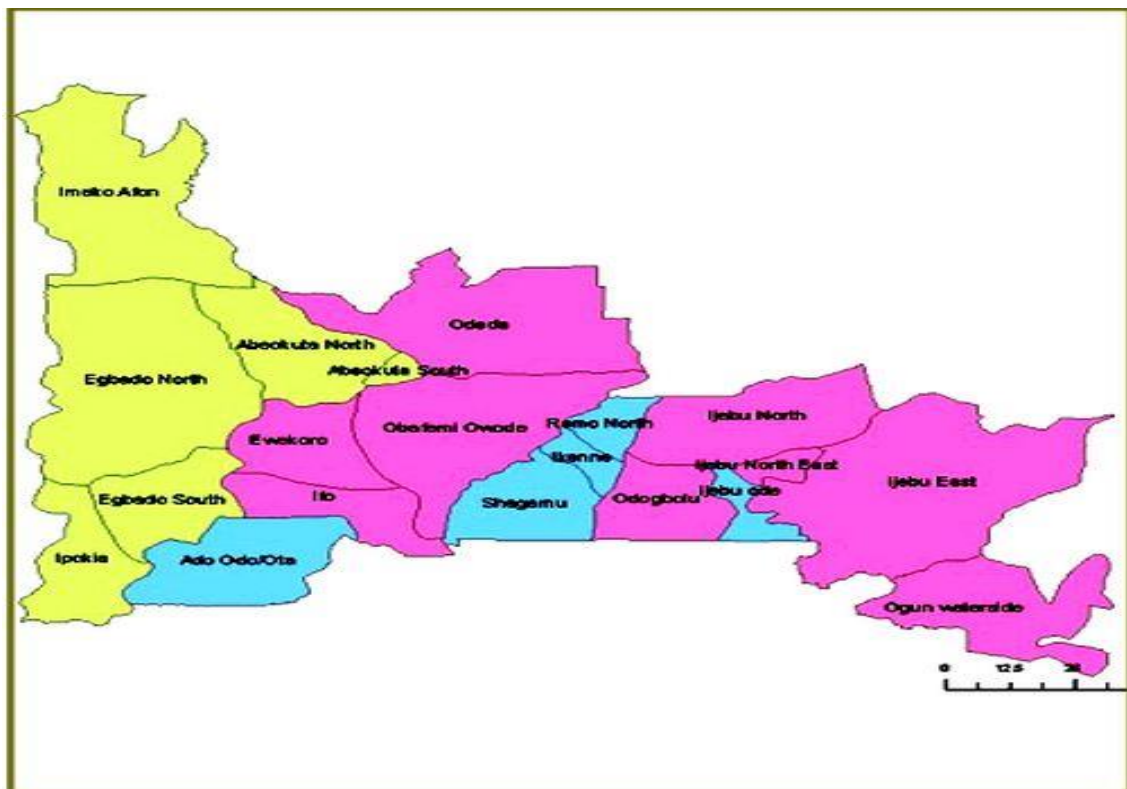
Fig. 3.3.3:Map of Ogun State

3.2. Sampling frame and procedure

The sample frame for the study involved a field survey which entailed detailed appraisal of the specific objectives. These objectives were carried out through the use of structured questionnaires to collect data from relevant stakeholders such as saw-millers, timber

contractors, loggers, farmers who practise agro-forestry system, various forest products entrepreneurs (such as fuel wood, charcoal vegetables and fruits, honey, poles, , bush meat, rattan sellers etc), wood craftsmen, basket weavers and rural dwellers within and around the forest community who source their living through forestry activities in form of an informal employment such as local forest guards, salespeople, casual workers etc.

A multi-stage random sampling approach was adopted in selecting the respondents' sample (rural forest households) 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, Local Government Areas (LGAs) were purposively selected in each earlier selected state based on their potentials in forestry using proportionate to size sampling method. At this stage, one forested village was sampled in each of the seven selected LGAs in Oyo states (out of thirty three LGAs) while one forested village was also covered in each of the four selected LGAs in Ogun state (out of twenty one LGAs). Likewise, seven forested villages were sampled from thirty LGAs that make up of Osun state totaling eighteen villages in eighteen LGAs. In the third stage, twenty-five households were randomly selected from each of the respective villages vis-a-vis Local Government Areas previously selected. A total of four hundred and fifty households were interviewed for the study. The questinnaire was structured to elicit information on individual basis about the contributions of forest income with respect to their livelihood.

3.3. Analytical tools and models' specification

3.3.1. Gross margin estimate
GM %= TR-TC ÷ TR × 100

Where GM= Gross Margin as a percentage

TR=Total Revenue

TC = Total Cost

3.3.2. Logit model
Logit analysis was employed to know the determinants of forest related enterprises participation in the study area. The model measures the parameters on the conditional probability of being a woodcraft entrepreneur, assuming a non-normal distribution of being such an entrepreneur. The implicit relationship between the binary status variable (W_i) and its determinants (Q_i) is specified as:

$W_i = B_i Q_i + v_i$

Where $W_i = 1$ for X_i d. Z, O otherwise; I = 1 -------- N

Q_i is a vector of explanatory variable and β is the vector of respective parameters. The logit procedure computes in maximum likelihood estimation of β given the non-linear probability distribution of the random error v, see Agresti, 2002.

The Logit model is estimated in the form:

$$L_i = L_\cup\left[\frac{P_i}{1 - P_i}\right] = \beta_i + \beta_2 X_i$$

Where L_i = log of odds ratio (logit)

P_i = Probability of participation

$1 - P_i$ = Probability of not participation

B_i = Intercept

B_2 = Slope (co-efficient)

X_i is a vector of explanatory variables and is described as follows:

X_1 = Age of respondent (in years)

X_2 = Gender of respondent (Dummy, Male = 1, Female = 0)

X_3 = Marital Status (single/widow/separated = 0, married =1)

X_4 = Educational level (years of education)

X_5 = Household size (in numbers)

X_6 = Family income per month (in naira)

X_7 = Farm size (in hectares)

X_8 = Labour cost (in naira)

X_9 = Income from forest enterprises (in Naira)

X_{10} = Availability of forest products (Forest product is available = 1, Forest product is not available = 0)

X_{11} = Forest product use (Forest enterprise = 1, Consumption and land = 0)

X_{12} = Transportation (private = 1, commercial = 0)

X_{13} = Forest management laws (Community = 1, Government = 0)

X_{14} = Forest enterprise (Formal = 1, Informal =0)

X_{15} = Profit making (In Naira/month)

X_{16} = Infrastructural Facilities (Available = 1, Not available = 0)

X_{17} = Market access (Available = 1, Not available = 0)

3.3.3. Heckman's two-step procedure

The Heckman's two-step model was used to estimate determinants of household participation in forest related enterprises as well as the degree of their participation. It involves estimation of two equations: Selection equation in the first step and outcome equation in the second step (Heckman, 1979). First is whether a household participates in forest related enterprises or not, then second is the level of participation (number of forest related businesses and their magnitude). The number of related business and magnitude of the enterprise(s) is a function of the household determination to participate in forest related enterprise. It is however evident in the literature that, estimation of such relationships is typically difficult due to bias in sample selection.

The two-steps include; first a Probit model for participation or selection equation is estimated. This step estimates the probability of group participation as shown in the equation 1 below.

$$P_i = \delta Z_i + \varepsilon_{i,} \quad E\left(\frac{\varepsilon_i}{Z}\right) = 0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where, P_i is a dummy for participation in forest related enterprise while Z_i is a vector of variables that influence participation choice.

The next equation explains the level of participation.

$$Y_i = X_i'\beta + \mu_i, \quad E\left(\frac{\mu_i}{X}\right) = 0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2)$$

Where; Y_i indicates the level of participation measured in terms of number and magnitude of forest related enterprise engaged in by a household, X_i is a vector of variables that explain the levels of participation, ε_i and μ_i are the error terms. The model assumes that Z and X are observable exogenous variables and X is a subset of Z. If the correlation between ε_i and μ_i is not zero it brings about the selection bias problem. After estimating the selection equation a non-selection bias is computed using equation 3 below.

$$E\left(\frac{\varepsilon_i}{P_i}, Z_i\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

which is called Inverse Mills Ratio (IMR) λ_i when $P_i = 1$. Then the new lambda is used in the selection equation (6) as an explanatory variable. The new equation for the second stage regression is therefore:

$$E\, Y_i =, P_i = 1 = \beta X_i + \rho \lambda_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(4)$$

Equation (4) gives the expected number of enterprises Y_i given vectors of observable factors Z_i and given that the household has already made the decision to participate in forest related

business. This can be explained by vector of observable characteristics X_i and the Inverse Mills Ratio evaluated as, λ_i.

If $P_i = 0$, then there is no evidence of the selection bias and the regression reverts to OLS. But if $P_i \neq 0$, then there were omitted variables in the initial model correlated with X_i which is corrected by including IMR in the second regression.

The two steps are specified as follows

Step 1. Selection equation (Probit):

$$Y_i = \beta_0 + \beta_1 X_i + \in_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.............(5)$$

Y_i = Participation

β = Coefficient of X_i

X_i = Explanatory variables

$\in_i$ = Error term

X_1 = Age of household head (years), X_2 = Sex, X_3 = Years of education, X_4 = Marital status, X_5 = Household size, X_6 = Farm Size, X_7 = Other sources of income, X_8 = Forest products availability, X_9 = Access to market, X_{10} = Labour cost (Naira) X_{11} = Membership association

Step 2. Outcome equation:

$$Y_i = \beta_0 + \beta_1 X_i + \rho\lambda_i + \in_i \dots.............\dots\dots\dots\dots\dots\dots\dots...(6)$$

Where:

Y_i = Level of Participation

β = Coefficient of X_i,

X_i = (IPS, SEI, IFA, IMA),

$\in_i$ = Error term

IPS= Index of poverty (proportion of family members below a pre-set poverty line, other source of income).

SEI= Index of socio-economic characteristic of the households (such as age, sex, marital status, educational level, family size, years of experience, farm size).

IFA= Index of forest resource availability (such as forest products availability, forest income, forest distance, institutional laws, cultural beliefs, awareness, transportation).

IMA= Market activities index (such as market access, price, social capita, market distance, infrastructural facilities) (Idowu *et al.,* 2013).

3.3.4. Tobit model

To evaluate the influence of forest resources extraction on the income of rural households, forest resources income (FRI) was used as a dependent variable in the Tobit model which meant the amount realized from forest related enterprises that would lift the rural households to or above a pre-set poverty line. FRI was computed as a percentage total household income. The variable was zero if the FRI was lower than the amount needed to lift the household out of poverty line and was equal to 100 if the per capita expenditure of the households is more than the amount set as poverty line. Tobit regression model which is based on maximum likelihood technique (Gujarati, 2003) was used. The specification of the Tobit regression model is given as:

$$Y_i^* = X_i\,\beta + \varepsilon_i \quad \text{..(7)}$$

Where Y_i^* is a latent variable for the ith forest entrepreneur that is observed for values greater than Y_i and censored for values less than or equal to 0. The Tobit model can be generalized to take account of censoring both from below and from above. X is a vector of independent variables postulated to influence forest income. The β's are parameters associated with the independent variables to be estimated. The ε is the independently distributed error term assumed to be normally distributed with a mean of zero and a constant variance. Of course, we could collapse all positive observations on Y_i and treat this as a binomial probit or logit estimation problem, but doing so would discard the information on the amount generated by entrepreneur as at a certain time. Hence observed Y is defined by the following generic equation:

$Y_i = 0$ if $y_i^* \leq 0$.

$Y_i = y_i^*$ if $y_i^* > 0$. That is,

$Y_i = Y_i^*$ if $Y* > 0$

$Y_i = Y_i^*$ if $Y* \leq 0$…………..(8)

Usually, the Tobit model assumes that $Y_i = 0$ which means that the data is censored at zero. Though, forest resources income ranges between 0-100 percent, thus substituting Y_i in equation 8 above, it gives;

$Y_i = Y_i^*$ if $0 < Y^{**} < 100$

$Y_i = 0$ if $Y_i \leq 0$

$Y_i = 100$ if $Y^* \geq 100$ ……..………………………………………….......................(9)

The model assumes that there is a certain income equal to $Xi\,\beta + \varepsilon i$ which is observed only when the forest income is between 0 and 100; otherwise qualifies as an unobserved latent

variable. The dependent variable is not normally distributed since its values range between 0 and 100. The empirical Tobit model for this study therefore takes the following form:

$$Y_i^* = \beta_0 + \sum_n^n = 1\, \beta_n X_i + \varepsilon_i$$

$Y_i^* = \beta_0 + \beta_i X_1 + \beta_1 X_2 + \beta_2 X_3 + \beta_3 X_4 + ... \beta_n X_n + ...(10)$

(Y_i^*) Forest Income $= \beta_0 + \beta_1$age $+ \beta_2$gender $+ \beta_3$education $+ \beta_4$ marital status $+ \beta_5$ householdsize$+\beta_6$farmsize$+\beta_7$yearsofexperience$+\beta_8$forestproductavailability$+\beta_9$forestdistance distance$+\beta_{10}+\beta_{11}$transportation+forest law$+\beta_{12}$cultural belief$+\beta_{13}$market access$+\beta_{14}$market distance$+\beta_{15}$price$+\beta_{16}$labourcost$+\beta_{17}$socialcapita$+\beta_{18}$nfrastucturalfacility$+\varepsilon$......................(11)

It is worth nothing that estimating the model using OLS would produce both inconsistent and biased estimates (Gujarati, 2003). This is because OLS underestimates the true effect of the parameters by reducing the slope (Goetz, 1995). Therefore, the maximum likelihood estimation is recommended for Tobit analysis.

3.3.5. Foster-Greer-Thorbecke poverty index (FGT, 1984)

The FGT index is very easy to decompose by income effects, and it also satisfies Sen's axioms of transfer and monotonicity (Sen, 1976). That is, the index increases whenever a pure transfer is made from a poor person to someone with more income, and there is a reduction in a poor person's income, holding other incomes constant. The FGT index allows for the quantitative measurement of poverty status among subgroups of a population (i.e., incorporating any degree of concern about poverty) and has been widely used (Kakwani, 2000). Poverty line was computed as the 2/3rd of the mean per capita annual expenditure of all members of the sampled households. The headcount ratio measures the ratio of the number of poor individuals or simply measures the poverty incidence (i.e., the percent of the poor in the total sample). The analysis of poverty incidence using FGT measure usually starts with ranking of expenditures in ascending order $Y_i \le Y, \le ... \le; Y_n$: The FGT index is given by:

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

Where α 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 ith person's household is x_i, and the poverty gap for individual i is $G_i = z - x_i$ (with $G_i = 0$ when $x_i > z$).

The FGT class is based on the normalized gap $g_i = (z-y_i)/z$ of a poor person i, which is the income shortfall expressed as a share of the poverty line. Viewing g_i^α as the measure of

individual poverty for a poor person and 0 as the respective measure for non-poor persons, P_α is the average poverty in the given population. The case $\alpha = 0$ yields a distribution of individual poverty levels in which each poor person has poverty level 1; the average across the entire population is simply the headcount ratio P_0 or H. The case $\alpha = 1$ uses the normalized gap g_i as a poor person's poverty level, thereby differentiating among the poor; the average becomes the poverty gap measure P_1 or HI. The case $\alpha = 2$ squares the normalized gap and thus weights the gaps by the gaps; this yields the squared gap measure P_2. As α tends to infinity, the condition of the poorest poor is all that matters.

The parameter α has an interpretation as an indicator of "poverty aversion" in that a person whose normalized gap is twice as large has 2^α times the level of individual poverty. Alternatively, α is the elasticity of individual poverty with respect to the normalized gap, so that a 1% increase in the gap of a poor person leads to an α% increase in the individual's poverty level. The parametric class of measures gave analysts and policymakers an instrument to evaluate poverty under different magnifying glasses with varying sensitivity to distributional issues. The FGT paper emphasized the squared gap measure P_2, noting its simplicity and the fact that many arguments used in support of Sen's measure also apply to P_2. Sen (1976) had used a general additive form for poverty measures in which poverty is a normalization factor times the weighted sum of the normalized gaps of the poor. The author used rank orders as weights—so that the poorest person in a population of q poor persons is assigned a weight of q, the next has a weight of q-1, and so forth until the least poor person is assigned a weight of 1.

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; $P_o = \frac{N_p}{N}$ (2)

Where

P_o = = 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:

$$P_o = \frac{1}{N} \sum_{i=1}^{N} 1(y, < z) \tag{3}$$

Now, $I(\cdot)$ is an indicator function that has a value of 1 if $(y, < z)$ 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 will be calculated as poverty gap (G_i) = poverty line (z) minus actual income (y_i) for poor persons; the gap is 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 is divided by the poverty line and averaged to give poverty gap index (P_1).

Thus, squared poverty gap index may be written as;

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

Where α = a measure of the sensitivity of the index to poverty,

z = poverty line,

x_i = the value of expenditure per capita for the ith 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 $\alpha = 1$

3.3.6.1. Gini - coefficient

The Gini-coefficient is a measure of statistical dispersion most prominently used as a measure to show the degree of income distribution or inequality of wealth distribution between different households in a population.

$$I_{gini}(Y) = \frac{2}{n^2} \mu \sum_{i=1}^{n} \left(i - \frac{n+2}{2}\right) Y_i \qquad (1)$$

Where: n = number of observations, μ = mean of the distribution, Y_i = income of the ith household, and I is the corresponding rank of income.

3.3.6.2. Gini coefficient decomposable technique

This method involves the estimation of the overall Gini-coefficient of total income, which can be decomposed according to the various income sources. According to Shorrocks (1982), if Y is the total income and it consists of income from k sources, viz. $y_1, y_2 .... y_k$ .Total income Y is thus given as:

$$Y = \sum_{k=1}^{k} Y_k \qquad (2)$$

Following Lerman and Yitzhaki (1985), the Gini coefficient of total household income is given by:

$$G_T = \sum_{k=1}^{K} S_k G_k R_k \qquad (3)$$

Where S_k represents the share of household forest income on total income, that is, how important the income source is in total income. G_k measures the Gini coefficient of each income source, that is, how equally (or unequally) distributed the income source is and R_k measures the Gini correlation between each income source and the distribution of total income. In other word, how the income source and the distribution of total income are correlated (Acosta *et al.,* 2008). Lerman and Yitzhaki (1985) showed that by using this method of Gini decomposition, the effects of a small change in income from any source, e.g. source k can be estimated, while income from all other known sources are kept constant.

Thus, the contribution of income source *k* to total income inequality is given as $S_k\ G_k\ R_k\ /G,$ but the relative concentration coefficient of income source *k* in total income inequality is stated as:

$$g_k = G_k\ R_k\ /\ G \qquad (4)$$

Income sources with a relative concentration coefficient > 1 contribute to increasing total inequality, but those income sources with a relative concentration coefficient < 1 contribute

to decreasing total inequality. The source elasticity of inequality, indicating the percentage effect of a 1% change in income from source k on the overall Gini coefficient, is given as:

$$(S_k G_k R_k /G) - S_k \qquad (5)$$

In the same way, the inequality elasticity of sum of income sources must be equal to zero. To be precise, if all the income sources changed by the same percentages, the overall inequality (G) remains unaffected.

Additionally, another way to estimate income inequality is through regression-based decomposition method (Babatunde, 2008). This method uses the per capita income or expenditure as a function of explanatory variables to determine how much income inequality is accounted for by each explanatory variables and how much is unexplained, as measured by the error term. The regression-based decomposition method is done by stating an income function as:

$$Y = X\beta + \varepsilon \qquad (6)$$

Where Y is the per capita income or expenditure, X is the matrix of explanatory variables; ε is the stochastic error term. The explanatory variables are exogenous individual, household characteristics, which determine income level. Such exogenous explanatory variables include; household's head education, household size, farm size, alternative income sources, market variables etc. Since the econometric results yield estimates of the income flows attributed to household variables, they allow the decomposition of inequality by factor income. The income contributed by the socioeconomic variables as given in the estimated regression equation is given as:

$$Y = \sum_{k=1}^{k} Y_k \quad \text{for all } i\text{th variables} \qquad (7)$$

The income flow can then be used to directly calculate decomposition component for all regression variables and the contribution of each of the socio-economic factors (X_i) to Gini inequality can be estimated.

3.3.7. Lorenz curve

The Lorenz curve shows the actual quantitative relationship between the percentage of income recipients and the percentage of the total income that is received in a given period. The farther away the Lorenz curve line from the diagonal (perfect equality), the higher the degree of inequality represented. The extreme case of perfect inequality would be represented by the congruence of the Lorenz curve with the bottom horizontal and right hand vertical

axes. The diagonal line of the Lorenz curve as shown above means perfect equality while the Gini coefficient is represented as A/(A + B), where A and B are the areas shown in figure 6.1. If A = 0, the Gini coefficient becomes 0, which means perfect equality. Whereas if B = 0, the Gini coefficient becomes 1, which means complete inequality. Below is the graphical representation of the Gini coefficient where the area of the whole triangle is defined as 1.

Source: Duclos and Araar (2006)

Fig. 3.4: Lorenz curve

3.3.8. Regression model

The regression model that was used for this study is specified as: $Y(g) = f(X_i, \mu)$,

where: $Y(g)$ is the household income inequality which is dependent on the explanatory variables $X_1, X_2, X_3, X_4, \ldots\ldots X_n$. i.e. how much income inequality is accounted for by each of the explanatory variables and how much is unexplained as measured by the error term μ.

X_1 = Age of household head (Year, most recent birthday)   -

X_2 = Sex (Dummy) Male = 1, Female = 2

X_3 = Educational level (year of education)   +

X_4 = Household size (Number of Household members) ±

X_5 = Farm size   ±

X_6 = Year of experience   +

X_6 = Number of forest Enterprises   +

X_7 = Distance from the forest   -

X_8 = Transportation   ±

X_9 = Cultural or religious belief   _

X_{10} = Forest management related Laws   _

X_{11} = Market access   _

X_{12} = Forest inputs cost   ±

X_{13} = Forest product availability   ±

X_{14} = Infrastructural facilities   ±

X_{15} = Labour cost   _

X_{16} = Other sources of income   ±

X_{17} = House hold dependents   ±

μ = The error term

3.3.9. Model specification

Somer`s d directional tests was applied to capture the relationship between forest extraction, poverty and activities of forest users in relation to forest conservation and management strategies. Somers' d is an ordinal measure of association introduced by Somers (1962). It can be described in terms of Kendall's $Y_{i\alpha}$ (Kendall and Gibbons, 1990). Given a sequence of bivariate random variables $(X, Y) = \{(X_i, Y_i)\}$, sampled using a sampling scheme for sampling pairs of bivariate pairs from a population of pairs of bivariate pairs.

Kendall's $Y_{i\alpha}$ is defined as;

$$Y_i (X, Y) = E [sign (X_i - X_j) \ sign (Y_i - Y_j)] \ ....(1)$$

(Where E [·] denotes expectation), or, equivalently, as the difference between the probability that the two X, Y– pairs are concordant and the probability that the two X, Y– pairs are discordant. A pair of X, Y– pairs is said to be concordant if the larger X– value is paired with the larger Y– value, and is said to be discordant if the larger X– value is paired with the smaller Y– value. Somers' D of Y with respect to X is defined as;

$$D(Y \mid X) = Y_{i\alpha} (X, Y)/ \ Y_i (X, X) \ ....(2)$$

Or, equivalently, as the difference between the two conditional probabilities of concordance and discordance, assuming that the 2X– values are unequal. Note that Kendall's $Y_{i\alpha}$ is symmetric in X and Y, whereas Somers' D is asymmetric in X and Y.

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Chapter 4: Forest Extraction Income Participation and Return Analysis in South-western Nigeria

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Abstract

This study investigates the determinants of participation of poor rural households in forest resources extraction income and return (profit) to such enterprises in South-western region of Nigeria. A multi-stage random sampling approach was adopted in selecting the respondents' sample for the study. A total of four hundred and fifty households were interviewed for the study. Data were collected through the aid of structured questionnaires. Descriptive analysis and two empirical models (Logit model and Budgetary analysis) were used to estimate the required variables. The data indicate that plank, vegetables, furniture making, fuel wood, fruit and charcoal businesses were found to be prominent in total sampled population while bush meat, dried fish,broom, honey, wood craft, snail, medicinal plants, pole and leaves businesses in that order were moderately prominent. On the other hand, gum, dye, fibre, insect and spices businesses were the least prominent. The study also suggests that five policy driven variables such as education, marital status, household size, forest access and forest management laws have significant effects on the rate of participation of the household in forest-related businesses. Furthermore, the Gross Margin for the enterprises was 48.5 meaning that FREs has the potential of returning 48.5% profit of the total investment worth to the households on monthly basis. So, the study recommends that developmental policy conception and application (such as launching of Nigeria Incentive-Based Risk Sharing System for Forestry Lending (NIRSFOL) through the Central Bank of Nigeria that will enhance the value chain for these businesses and to boost forest related enterprises returns in the study area.

Keywords: Forest income extraction; rural household; participation in forest-related enterprises; gross margin; logit model, South-western Nigeria

4.1. Introduction

Majority of rural households in most parts of Sub-Sahara Africa considered forests as a key source of their livelihood whether as sources of food, medicine, shelter, building materials, fuels and cash income (Richardson *et al.,* 2011). It is estimated that more than 15 million people in Sub-Sahara Africa earn their income from forest-related businesses such as timber, fuel wood and charcoal sales, roof thatching materials, construction poles, honey, mushroom, resins, fish, insects, fruits and nuts, medicinal plants, small-scale saw-milling, commercial hunting, handicraft production, forest tree extracts such as bark, roots, tubers, leaves, flowers, seeds, from trees and other wild plants, and by hunting wild animals, for sale and consumption (Kaimowitz, 2003:46) as cited in Richardson *et al.* (2011:1). The author further maintained that the world food security goal relies on the integrity of forests mostly because of the dependence of the poor on forest resources.

Individuals living in the neighbouring forest communities explore the potentials of forest products to smooth income and consumption; they may act as a source of natural insurance or safety net, and may help the household to cope with challenges of poverty, insufficient or loss

of agricultural yields, natural disasters, and other unfavourable circumstances associated with high-risk rural environments (Paumgarten, 2005).

In addition, forest and forest trees are sources of a variety of foods that complement agricultural produce (Inoni, 2009). Preponderance of rural and urban households in developing countries are dependent upon forest flora and fauna to meet part of their nutritional needs. Though, forest foods not often provide the bulk of staple items that people eat; but they add variety to diets, improve palatability and provide essential vitamins, minerals, proteins and calories. Similarly, during farming off season when there is occasion of low yields and stored food supplies have diminished and or at the inception of new crops harvest or during emergencies such as floods, famines and droughts, forest foods become major alternative or supplement at such periods (Inoni, 2009).

According to TEEB (2010), forest has both cash and non- cash benefits. Non -cash benefits comprise variety of aids derived from forest which cannot be quantified in terms of direct economic or monetary value. These include; environmental services – ecological services, biodiversity – protection of forest habitat, protection of hydrological services – for irrigation, forest-based tourism, carbon storage and sequestrations, forest multiplier effects etc. Forests thus produce both material and non-material benefits. The author reiterated that the material benefits of forests generally tend to be better recognized among governments and policymakers while the non-cash value of forests are often 'invisible' and not considered in decisions on natural resource use, including land use. For instance, government most often put value on agricultural produce to reflect the economic impact of agriculture in national GDP while failing to recognise the value of non - cash benefits of forests with respect to the land use where the agricultural practices are being undertaken. Hence, governments and others may choose to promote agriculture over forests without recognizing the full costs of these actions in terms of forest cover and environmental and other invaluable benefits provided by forests or to make other decisions that exacerbate resource degradation (TEEB, 2010).

Another factor is that forests are under - valued because non-timber forest resources are usually gathered for subsistence livelihood or traded informally and do not register as market transactions that are valued, with the exception of some commercially valuable products such as medicinal substances and mushrooms, among others. The aggregate value of Non Timber Forest Products (NTFPs) or Non Wood Forest Products (NWFPs) is often substantial but not

collected or recorded by national governments; therefore, records on non -cash contributions of forests tends to be impromptu and case -study based, resulting in unreliable data at national and global scales (Barik and Mishra, 2008).

In fact, while attempting to estimate forest contribution to human livelihood; it may be difficult to obtain correct data for policy and developmental plan unless holistic approach is employed to actually take into consideration the non-cash contributions of forests to inform governments and policymakers on the true value of forest resources. Part of such holistic approach includes cross-sectoral policies that encourage sustainable forest management and incorporate economic and livelihood objectives towards recognizing the non-material benefits of forests. For example, carbon storage and sequestration schemes seek to mitigate the contribution of tropical forests to global warming either by reducing forest degradation and deforestation or via reforestation or some combination of both such as REDD+ and others, represent policies that recognize the environmental protection functions of forests (Barik and Mishra, 2008).

According to Balmford *et al.* (2011), political attention has however begun to focus on the role of forests in climate change mitigation, but the awareness of the role of forests and their non-timber, non-wood values and their environmental service and recreation values are still very low and grossly under-valued. A good example is forest-based tourism such as Campfire Project in Zimbabwe; the Annapurna Conservation Area Project in Nepal; International Ecotourism Operations in Ecuador; and Nationally Dominated Tourism to Forest Areas in Brazil. This added substantial value to the livelihood of not only the local people where these natural tourisms are situated but also in terms of image boosting, multiplier effects to the nationalities of such places, while not minding the direct and indirect economic benefits to the places concerned.

So, valuation methodologies that reflect forest goods and services represent yet another avenue for recognizing the material and non-material benefits of forests (Balmford *et al.,* 2011). Similarly, national accounting that incorporates data on forest products related to environmental and recreation services and fodder, food, fuel and medicinal values would facilitate better documentation of the full value of forests. Another option to enhance the non-cash benefits of forests is to ensure sustainable financing that promotes a broad view of sustainable forest management, including the cultural, environmental, provisioning and recreational benefits of forests. Some countries have adopted national forest programs on

sustainable forest management or are in the process of developing or revising policies to reflect sustainable forest management goals include Brazil, Cameroon, Cyprus, Finland, Ghana, Jamaica, New Zealand and the Philippines United Nations Forum on Forest (UNFF, 2013).

According to UNFF (2013), although the mixture of cash and non cash benefits from both timber and non timber forest products constitutes the economy of the household, but there is a great deal of social variation in income opportunity – among rural households in terms of restriction of certain class of people to extract some forest products (e.g. timber). That is, there is a socio-economic discrimination on access to some forest resources by some rural households (Neumann and Hirsch, 2000).

Besides, Data gaps and absence of reliable information are major problem in estimating the precise economic contributions (profitability index) of forest related enterprises among rural households (UNFF, 2013). This has therefore created a major concern among the policy makers and it is against this backdrop, this study aims at investigating the determinants of participation of poor rural households in forest resources extraction income. That is, the issues surrounding the discrimination associated with the commercialization of forest products should be investigated so that there will be appropriate formulation of policies that will enhance the chances of the rural poor who formed the majority of Nigerian population on access to forest resources in order to reduce poverty in the land. Also, the study goes further to estimate the return (profit) to forest-related enterprises, within the context of the vulnerable group of rural households in South- western Nigeria.

Moreover, in line with the above stated objectives, the study provides empirical answers to the following questions such as: (i) what are the various forest related enterprises that rural households are engaging in the study area? (ii) what are the determinants of forest income participation in the study area? (iii) what are the economic contributions of FREs to the rural households' income in the study area?

4.2. Related literature
The world of forestry is complex and multifaceted, comprising numerous business structures and spanning both the formal and informal sectors of the economy (Kozak, 2007) cited in UNFF (2013). Forest-based enterprises serve ever widening groups of customers and end-users with a vast array of forest-based products and services and are significant contributors to employment and economic well-being around the world. As such, they are seen to be

important elements of strategies aimed at pro-poor economic growth in developing regions, especially in the tropics where extreme poverty conditions are widespread, high quality forest resources are abundant, and domestic markets are growing in importance. But like that for NTFPs, it is hard to gather precise records on small and medium forest enterprises (SMFEs). While it is difficult to quantify the economic contributions that SMFEs make, it is estimated that more than 20 million individuals are employed by such enterprises (Alao and Kuje, 2012:50). It is also known that these numbers are much higher – perhaps six or seven fold – when the ubiquitous informal sector that exists in developing economies is taken into account (Kozak, 2007:7).

It is disturbing, the reason why the economic contributions that SMFEs provide have not yet been enumerated and why this sector is oftentimes overlooked in development strategies (Kozak, 2007). Although, Nketiah *et al.* (2011) asserts that SMFEs offer job opportunities to a large proportion of Ghana's population and serve as a main, additional or alternative income source for at least 3 million people in the country. Nketiah *et al.* (2011) as contained in UNFF (2013:63-64) estimates that tens or maybe hundreds of thousands of people are employed in the wood fuel production and trade industry.

In the same vein, Osei - Tutu *et al.* (2010) states that the timber and furniture industries employing 17,000 chainsaw milling crews, with an average of 6 people in each operation; 264,000 people involved in the chainsaw milled lumber - haulage sector; 21,000 people involved in chainsaw lumber, 1,300 chainsaw lumber brokers, each of which engage about 3 people; and 30,000 small scale carpentry firms employing about 200,000 people. Also, considering the efficacy of non-timber forest products as one of the large employers of labour in Ghana, about 600,000 women in shea butter collection and 300,000 local bush meat hunters are adequately engaged (Obeng *et al.,* 2012; UNFF, 2013:63-64).

Fredericks *et al.* (2012) in the same manner estimated about 750 formal SMEs in Guyana's wood based sector, including forest extraction companies, sawmills, charcoal licensees, firewood producers, furniture manufacturers, timber and saw-pit dealers. About 90% of SMFEs are either individually or family owned most of which focus on the local market. SMFEs cover 31% of the productive forest area but employ 75% of employees in productive forest concessions which translate into 50% of government generated revenue.

Globally, according to Shackleton *et al.* (2011), forest enterprises offer an estimated 45 million formal and informal employment, and approximately 0.5 to1 billions farmers who

grow farm trees or manage "remnant" forests for subsistence and cash income are being engaged. While Macqueen (2008) corroborates these statistics, he states that SMFEs contribute more than 50% of forest - related jobs in many developing countries, and that more than 45 million people manage or work for forest enterprises worldwide (see Estruch *et al.,* 2013:3).

Kozak (2007:10) declared that SMFEs is a key source of employment and revenue in developed and developing countries. Contrary to the declining trend in global employment rate in relation to wood processing industries, United State household wood furniture sub-sector and the Swedish sawmilling sub-sector remain stable and rising. He thus estimates that SMFEs employ more than 20 million persons worldwide and projected that the figure could be as high as 140 million if the informal sector is included. He estimates that SMFEs contributed over US $130 billion of gross value - added in the US and over 37.4% of total employment in the sawn wood products processing sector. He also noted that this statistics has the tendency to be increasing for firms with less than 100 employees and particularly those with less than 20 employees.

Furthermore, the European Union (EU) estimates that 90% of forestry industries employ fewer than 20 workers. EU thus based its estimate on the findings of Macqueen (2007) on the number of SMFE employees as a total of forestry employment was: 49.5-70% in Brazil, 50% in China, 75% in Guyana, 97.1% in India, 25% in South Africa, and 60% in Uganda. According to Kozak (2007); Alao and Kuje (2012:50), the growth of small SMFEs is outstripping medium SMFEs as they noted high growth in the value - added sector and low growth in the commodity sector due to competitiveness, economies of scale and high capita requirements.

Alao and Kuje (2012:53) posited that the viability of SMFEs such as furniture industries is very enduring. This has been succinctly shown by the outcome of their findings on economies of small-scale furniture production in some part of northern Nigeria. The study found that small-scale furniture production in the study area is profitable because of its high rate of return on investment (that is, RORI of 3.29%), thus for every one naira invested in furniture production in the study area N3.29 will be realized as profit which is an indication that the venture is viable.

4.3. Methodological approaches

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 300 and 70E and latitude 40 and 90N 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). Specifically, the study area where data were collected include: Ogun, Osun and Oyo States. See Chapter three sub-section 3.1. for more detailed information about the study area.

4.3.1. Sampling method

The required sample size was determined using proportionate to size sampling method by Anderson *et al.* (2007) as used by Kangogo *et al.* (2013).

$$n = \frac{pqZ^2}{E^2}$$

Where n = sample size,

p = percentage of the population,

q= 1-p,

z= confidence Interval (α = 0.05),

E = Marginal error. Meanwhile, the proportion of the population is unknown,

p=0.5, q = 1-0.5= 0.5, Z = 1.96 and E = $\pm$ 0.046.

$$n = \frac{(0.5)(0.5)(1.96)^2}{(0.046)^2} = 450$$

See Chapter 3 sub-section 3.2. for details on sampling frame and procedure for this study.

4.3.2. Data collection and analysis

Data were collected through the aid of structured questionnaires, which were administered to capture information on individual levels about the socio-economic characteristics of the households who venture into forest related enterprises, income from forest enterprises, availability of forest products, transportation cost, forest management laws, their level of participation, market access, infrastructural facilities among others. Secondary data were extracted from textbooks, journals, Conference Proceedings and internet. SPSS and STATA programmes were used for the analysis to profile various forest extraction activities being engaged in by the rural households and to determine factors influencing households' participation in forest extraction income.

4.3.3. Empirical models

Descriptive analysis and two empirical models (Logit model and Budgetary analysis) were used to estimate the required variables. Descriptive analysis describes and profiles various forest extraction income being engaged in by the rural households in the study site. Logit model was used to determine factors influencing the participation of rural households in forest – related enterprises while budgetary analysis was used to estimate profitability index of the enterprises.

4.3.4. Estimate and model specification

4.3.4.1. Gross margin estimate

GM %= TR-TC ÷ TR × 100

Where GM= Gross Margin as a percentage

TR=Total Revenue

TC = Total Cost

4.3.4.2. Logit model

Logit analysis was employed to examine the determinants of forest related enterprises participation in the study area. The model measures the parameters on the conditional probability of being a forest based entrepreneur, assuming a non-normal distribution of being such an entrepreneur. The implicit relationship between the binary status variable (W_i) and its determinants (Q_i) is specified as:

$W_i = B_i Q_i + v_i$

Where W_i = 1 for X_i d. Z, 0 otherwise; I = 1 -------- N

Q_i is a vector of explanatory variable and β is the vector of respective parameters. The logit procedure computes in maximum likelihood estimation of β given the non-linear probability distribution of the random error v, see Agresti (2002).

The Logit model is estimated in the form:

$$L_i = L_U\left[\frac{P_i}{1 - P_i}\right] = \beta_i + \beta_2 X_i$$

Where L_i = log of odds ratio (logit)

P_i = Probability of participation in FREs

$1 - P_i$ = Probability of not participation in FREs

B_i = Intercept

B_2 = Slope (co-efficient)

X_i is a vector of explanatory variables and is described as follows:

X_1 = Age of household's head (in years)

X_2 = Sex of respondent (Dummy, Male = 1, Female = 0)

X_3 = Marital Status (single/widow/separated = 0, married =1)

X_4 = Educational level (years of education)

X_5 = Household size (in numbers)

X_6 = Labour cost (in naira)

X_7 = Income from forest enterprises (in Naira)

X_8 = Availability of forest products (Forest product is available = 1, Forest product is not available = 0)

X_9 = Forest management laws (Community = 1, Government = 0)

X_{10} = Forest enterprise (Formal = 1, Informal =0)

X_{11} = Market access (Available = 1, Not available = 0)

4.4. Results and discussion

4.4.1. Sample households statistics

This section presents the socio economic characteristics of the rural households that engage in forest related enterprises as reported in Table 4.1 below. Out of 450 sampled households as reflected in sub-section 4.3.1 , 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 80% of the respondents are still in their working age.

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 41per cent) had secondary education while only 23.8 per cent had primary or elementary school and about 13.4 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 per cent as single, 4 per cent as divorced and 11.6 per cent separated. Furthermore, about 66 per cent of the sample had between 3- 4 children within the household while about 16 per cent had less than or equal to two children.

Table 4.1: Distribution of rural households by socio-economic characteristics

Item	Frequency	Percentage
Household's Head Age		
≤ 20	3	0.7
21 – 40	168	37.4
41 - 60	212	47.2
61 - 80	66	14.7
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
No. of Male Adults		
<2	313	69.7
3 - 4	16	3.60
5 - 6	109	24.3
7 - 8	11	2.40
No. of Female Adults		
<2	339	75.5
3 - 4	17	3.8
5 - 6	93	20.7
Religion		
Islam	213	47.4
Christianity	223	49.7
Traditional	13	2.9

Source: Calculated from field survey, 2016

Meanwhile, of the total number of children within the sampled households, 69.7% and 75.5% constitute less than or equal to two male adults and female adults respectively. It was also revealed from Table 4.1 that 47.4% of the respondents were Muslims while 49.7% were Christians and less than 3% 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.

4.4.2. Sample households' profile of various forest related enterprises

Table 4.2 profiles most of the various forest-related enterprises that rural households are undertaking in the study area as captured by this study. Although field experience reveals that some of the forest-based entrepreneurs do combine several forest products for sales in order to boost their enterprises. For example, medicinal plants marketers offer a lot of Non Timber Forest Products (NTFPs) such as various plants roots, leaves, barks and seeds as traditional herbs and medicine; snails; insects and animals, honey among others. Following the FREs profile as reported in Table 4.2, plank selling, vegetables selling, furniture making, fuel wood, fruit and charcoal businesses were found to be prominent in total sampled population

Table 4.2: Profile of various forest related enterprises, sample households

Forest Related Enterprises (FREs)	Total	Poverty index					
		Extremely Poor		Moderately Poor		Non- Poor	
		No. of (EP)	% of (EP)	No. of (MP)	% of (MP)	No. of NP)	% of (NP)
Plank	76	4	5.3%	33	43.4%	39	51.3%
Mat making	15	6	40.0%	5	33.3%	4	26.7%
Furniture	49	11	22.4%	18	36.7%	20	40.8%
Wood craft	28	8	28.6%	8	28.6%	12	42.9%
Charcoal	41	16	39.0%	15	36.6%	10	24.4%
Fuel wood	47	17	36.2%	20	42.6%	10	21.3%
Paste & mortar	17	4	23.5%	5	29.4%	8	47.1%
Chew stick	18	8	44.4%	5	27.8%	5	27.8%
Bush meat	37	1	2.7%	21	56.8%	15	40.5%
Snail	26	4	15.4%	16	61.5%	6	23.1%
Fish	33	11	33.3%	11	33.3%	11	33.3%
Fruit	44	12	27.3%	16	36.4%	16	36.4%
Medicinal plants	25	7	25.0%	15	53.6%	6	21.4%
Gum	1	1	100.0%	0	0.0%	0	0.0%
Broom	32	6	18.8%	22	68.8%	4	12.5%
Poles	21	3	14.3%	9	42.9%	9	42.9%
Locust bean	10	4	40.0%	2	20.0%	10	40.0%
Insect	7	2	28.6%	4	57.1%	1	14.3%
Spices	10	2	20.0%	7	70.0%	1	10.0%
Leaves	20	6	30.0%	14	70.0%	0	0.0%
Mushroom	11	6	54.5%	4	36.4%	1	9.1%
Honey	29	6	20.7%	12	41.4%	11	37.9%
Cane	24	1	4.2%	17	70.8%	6	25.0%
Vegetables	63	15	23.8%	29	46.0%	19	30.2%
Fibre	5	0	0.0%	4	80.0%	1	20%
Local wine	18	5	27.8%	7	38.9%	6	33.3%
Dye	5	3	60.0%	2	40.0%	0	0.0%
TOTAL	400	92	23%	171	42.75%	137	34.25%

Source: Calculated by the authors from the field survey 2016
Note: EP means extremely poor, MP means moderately poor and NP means non-poor

while bush meat, dried fish, broom, honey, wood craft, snail, medicinal plants, pole and leaves businesses in that order were moderately prominent. On the other hand, gum, dye, fibre, insect and spices businesses were the least prominent.

As revealed in Table 4.2, the rural households were categorized into three types based on their respective poverty index such as extremely poor, moderately poor and non poor as classified by Sen (1981) and Dubihlela and Sekhampu (2014). Meanwhile, per capita household expenditure was obtained by dividing the total household expenditures by the household size. Then, we set the two-thirds of the mean per capita household expenditure as the poverty line for each household. For instance, households whose expenditures are greater than two-thirds of the total households' per capita expenditure are regarded as non-poor while those below it are poor. On the other hand, those households with expenditures less than one-third of the total households' per capita expenditure are regarded as core-poor i.e. extremely poor. In addition, households whose expenditures are greater than one-third of total households' per capita expenditure but less than two-thirds of the total expenditure are regarded as moderately poor.

However, following this method of poverty classification to determine household income generation from FREs with respect to prominence rate of various FREs in the study site, Table 4.2 therefore reveals that plank, vegetables, furniture making, fuel wood, fruit and charcoal businesses take the lead in terms of prominence and income generation among the forest related entrepreneurs in the region.

4.4.3. Determinants of participation in forest extraction income

Table 4.3 presents the estimated parameters and the statistically significant variables explaining the participation rate of rural household in forest extraction income. The diagnostic test as shown in Table 4.3 records a log likelihood of about 59.34 reporting the log likelihood of coefficients estimates assuming that they are normally distributed. Chi-squared test was significant at 1% suggesting that the model had a goodness of fit to the observed variables and there is a high degree of association between the dependent and independent variables. Also, the test reports R^2 of about 0.261 suggesting that the explanatory variables were about 26% relevant in explaining the participation decision in forest-related enterprises. Furthermore, five key policy driven variables were statistically significant at 1% and 5% levels of significance. These include: education, marital status, household size, forest access and forest management laws. This therefore suggests that education, marital status,

household, forest access and forest management laws have a significant effect on the choice of participation of the household in forest-related business.

Table 4.3: Determinant of rural households' participation in forest extraction

Variable	Coefficient	Standard Error	Z	P-value
Constant	-0.8906	1.6653	-0.53	0.593
Age	0.3719	0.3896	0.95	0.34
Sex	-1.0155	0.6034	-1.68	0.092
Marital status	0.8400**	0.3791	2.22	0.027
Education	0.6799**	0.2972	2.29	0.022
Household size	0.1802**	0.0717	2.51	0.012
Forest income	3.72E-06	3.47E-06	-1.07	0.283
Labour cost	-0.2307	0.1867	-1.24	0.216
Forest access	1.5008***	0.5407	-2.78	0.006
Forest Mgt. laws	-1.2775**	0.5329	-2.4	0.017
Forest enterprises	-0.3522	0.6618	-0.53	0.595
Market access	0.4231	0.67881	0.62	0.533
Log likelihood	-59.340			
χ^2	41.91			
Probability of χ^2	0.0007***			
Pseudo R^2	0.261			
N	390			

***, ** Significant at 1% and 5% respectively

Source: Calculated from field survey, 2016

The marital status of rural households shows a positive and significant association with probability of participating in forest generating activities with a marginal effect of 0.84 meaning that if marital status of rural households is increased by one, the likelihood of participation in forest income generating activities increased by 0.84. In particular, being positively signed, it indicates that married households are more likely to participate in forest extraction about 0.84 time frequency more than non married households. For the married class, most of the households in the region who engage in one FRE or the other confirmed that they inherited the business from their parents as a family job. So, majority of them have been engaging in the businesses even before they got married. Similarly, the positive relationship between marital status and participation in FREs may not be out of place since marital status has a strong connection with raising of children which could later become a source of family labour that will support forest products extraction activities to boost the family income. Besides, wives in most rural households do normally assist their spouses in both economic and domestic activities which would enhance their choice of participation than

single households. Faleyimu and Agbeja (2004) recorded similar submission where about 96.88% of the respondents participating in wood carving were married while 3.12% were single. This thus corroborates the findings of this study which argued that marital status has a strong positive connection with the rate at which rural households participate in forest income generating activities in the study area.

Similarly, the coefficient of educational level of household head is positive and significantly associated with the probability of participation in FREs with a marginal effect of 0.68. That is, if the year of education of the household's head is increased by one, the likelihood of participating in FREs is increased by 0.68. This implies that households' head years of education has the probability of influencing the choice of participating in forest extraction to a large extent as it reflects in Table 4.1. It is plausible because educated households' heads may apply some entrepreneurial skills and marketing strategies to their advantages across the entire value chain of the business. This is quite in agreement with the findings of Jumbe and Angelsen (2007) in Malawi who recorded that more educated households have higher share of forest income and participate in forest businesses by a magnitude of 90% than uneducated households. Although, it runs contrary to the outcome of the findings of Fonta and Ayuk (2013) which stated that the lower the educational level of the household head, the higher the likelihood of participating in forest extraction income in South-eastern Nigeria..

Furthermore, household size is also positive and significantly associated with the probability of participation in FREs with a marginal effect of 0.18 meaning that if the household size is increased by one, the likelihood of participating in forest income generating activities is increased by 0.18. This is not surprising, perhaps because forest gathering activities are labour intensive. A larger household would therefore employ the services of its family members in the gathering and marketing activities and such households may derive more resources from using the forest. This is in line with the findings of Jumbe and Angelsen (2007) in Malawi which stated that the larger the household size, the higher the participation rate of the household in forest related income.

In the same vein, the estimated coefficient for forest products access is positive and statistically significant with a marginal effect of 1.5. This implies that a unit increase in forest products access, increased the likelihood of rural household to participate in FREs by 1.5 since they are likely to access their products without hitch. This is reasonable, and conform with the common notion that an increase in forest products access would improve the

participation rate since there would be high potential for increased turnover and would subsequently bring high income to the household. Besides, such households would have greater accessibility to the forest products and less time and less resources would be spent on collecting forest products. This supports the findings of Fonta and Ayuk (2013) which indicated similar submission.

Lastly, forest management laws is negatively associated with forest extraction activities in the study area. This suggests that an increase in one component of forest management laws may likely decrease the participation rate of rural household in forest extraction activities by magnitude of 1.2775. In particular, being negatively signed, it implies that the more stringent those forest management laws are, the lower the tendency to extract forest resources most especially, from the forest reserves. Similar observation was noted by Kaimowitz (2003) who argued that greater enforcement of forest management laws have the potential to negatively affect rural income because such legislation often prohibits forestry activities participation such as small-scale timber production, fuel wood collection, and hunting that millions of poor rural households depend on.

In essence, these findings thus suggest that if households' head education, number of married households, households size and forest access increase while the forest management laws become less stringent, more rural households would be willing to participate in forest extraction activities as all these factors trigger the choices and the rate of participation in FREs in the study area. However, this study did not reveal the significance relationship in other variables such as age, forest income, labour cost, market access and forest enterprise. That is not to say that they are not equally important but as far as the results of this study are concerned, they are less significant even though some of their signs follow *a priori* expectation.

4.4.4. Gross margin analysis

This section presents Gross margin analysis estimating the profitability index of the forest-related enterprises as shown in Table 4.4. Gross margin is the difference between revenue and cost of goods sold (COGS), divided by revenue, expressed as a percentage. Generally, it is calculated as the selling price of an item, less the cost of goods sold (production or acquisition costs, essentially).That is, Gross margin was calculated by subtracting the costs of goods sold from the total revenue. As in Table 4.4 for example, if the FREs has ₦710351 in revenue and ₦365744 in costs of goods sold, we would subtract ₦365744 from ₦710351to

get ₦344607. To calculate the Gross margin, divide the result by the revenue. Then, express the result as a percentage by multiplying the answer with 100 to give the profitability index.

Table 4.4: Gross margin analysis

Total Revenue (Total sales and other variations)	**TR**	**₦710351**
Total Variable Cost	TVC	₦274244
Total Fixed Cost	TFC	₦91500
Total Cost (Cost of revenue and other variations)	TC = TVC + TFC	₦365744
Gross Income (GI)	GI = TR - TC	₦344607
Gross Margin GM %	GI ÷ TR × 100	344607 ÷ 710351×100 = 48.5
Profitability Index		0.485

Source: Computed by the authors, 2016
Note: Total revenue is the addition of all marketable forest products and other variations (credit, promotions etc)

As shown above, the budgetary analysis indicates that every forest related entrepreneur on the average, would realize a total revenue of ₦710351 per month. The total variable cost and the total fixed cost were ₦274244 and ₦91500 respectively. The Gross margin was 48.5 as observed in Table 4.4 which means that FREs has the potential of returning 48.5% profit of the total investment worth to the households on monthly basis. Then, the profitability index of 0.485 implies that for every ₦1 spent by the forest related entrepreneurs in the study area on their respective forest related businesses, 48.5 kobo was realized as profit on the aggregate. This findings gave a strong support for the earlier works by Azeez *et al.* (2011; 2015) where similar approach was used and 10% and 75% of the total investment worth were realized respectively as profits for any ₦1 spent on the investments.

Moreover, the study also conforms with the findings of Awe *et al.* (2012) on Irvingia kernels marketing in Akure, Ondo State which stated that, for every one naira spent by the sellers, there was a return of 65 kobo. Similarly, the study equally compares favourably with a study by Okunmadewa *et al.* (2000) on sun-dried meat trading which had marketing efficiency of 1.14. Another related finding is Alao and Kuje (2012) on economies of small-scale furniture production in some part of northern Nigeria. The study found that small-scale furniture production in the study area is profitable because of its high rate of return on investment (that is, RORI of 3.29%). Thus, for every one naira invested in furniture production in the study area ₦3.29 will be realized as profit which is an indication that the venture is viable. In summary, forest related businesses are profitable ventures with higher market efficiency in South-western region Nigeria

4.5. Study summary

The first objective of this study was to profile various forest related enterprises that rural households are engaging in the study area. The descriptive results indicate that plank, vegetables, furniture making, fuel wood, fruit and charcoal businesses were found to be prominent relative to total sampled population while bush meat, dried fish, broom, honey, wood craft, snail, medicinal plants, pole and leaves businesses in that order were moderately prominent. Also, gum, dye, fibre, insect and spices businesses were the least prominent.

Secondly, the study assessed the determinants of forest income participation. Results from logit regression model suggest that education, marital status, household size, forest access and forest management laws have a significant effect on the household participation in forest-related businesses.

Lastly, the third objective determined the economic contributions of FREs to the rural households' income where the Gross margin for the enterprises was found to be 48.5 meaning that FREs has the potential of returning 48.5% profit of the total investment worth to the households on monthly basis in the study area.

4.6. Conclusion

This study analysed forest extraction income participation and returns in South-western region Nigeria. The data indicates that plank, vegetables, furniture making, fuel wood, fruit and charcoal businesses were found to be prominent relative to total sample population while bush meat, dried fish, broom, honey, wood craft, snail, medicinal plants, pole and leaves businesses in that order were moderately prominent. On the other hand, gum, dye, fibre, insect and spices businesses were the least prominent. The study also suggests that five policy driven variables such as education, marital status, household, forest access and forest management law have a significant effect on the choice of participation of the household in the forest related business. Furthermore, the Gross margin for the enterprises was 48.5 meaning that FREs has the potential of returning 48.5% profit of the total investment worth to the households on monthly basis. Then, the profitability index of 0.485 implies that for every ₦1 spent by the forest related entrepreneurs in the study area on their respective businesses, 48.5 kobo was realized as profit on the aggregate. Therefore, FREs (most especially the most prominent ones) are veritable and prosperous businesses worthy of venturing into by the rural households since theyt can return almost half of the business capita as profit.

4.7. Policy implications

Arising from the above, policy measure such as micro lending programs, creation and crafting of a veritable market for the products and other incentives to assist the poor forest based entrepreneurs should be given a needful attention and priority.

Likewise, education in form of enlightenement and knowledge acquisition of the grass root people should be enhanced to facilitate the process of engagement of the rural people in forest extraction business. Furthermore, forest access and forest management laws are two important but conflicting factors determining the choice of household participation because of over dependency on forest resources. However, Government should ensure the creation of robust economic strategies to diversify the means of livelihood in form of alternative income sources for the teeming rural populace. This will ensure some level of equilibrium between poverty mitigation and sustainable forest management.

Finally, forest extraction income was found to be profitable and has higher market efficiency in the region. So, developmental policy conception and application that will enhance the value addition across all the value chain of these businesses is expected to boost the forest related enterprises returns. For example, the Federal Government of Nigeria should launch a proposal such as: "Nigeria Incentive-Based Risk Sharing System For Forestry Lending (NIRSFOL)" through the Central Bank of Nigeria (CBN) with the aim of achieving the linking of forestry value chains and the financial value chain. This is expected to boost the forestry activities through lending from the commercial banks and to also facilitate the processing of such forest products to attract more income to the forest based entrepreneurs.

4.8. References

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Chapter 5: Rural Households' Income and Participation in Forest- Related Enterprises in South-western Nigeria

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Abstract

This study analyses rural households' income and participation in forest- related enterprises in South- western Nigeria. A multi-stage random sampling approach was adopted in selecting the respondents' sample of the study. Descriptive analysis was used to describe the socio-economic characteristics of the respondents and Heckman's two-step procedure was used to determine factors influencing participation in forest-related enterprises and level of participation by rural households while Tobit model was used to examine the influence of forest extraction on forest entrepreneurs' household income. The study suggests that labour cost, market availability and membership of association have significant effects on the level of participation of the household in forest related businesses. Also, the study reveals that the higher the market activities index and the poverty index, the higher the level of participation of the household in forest-related businesses. Furthermore, Tobit regression model reveals that forest management laws, age, labour cost and forest products availability have significant effect on forest income of the household. The study identified a significant impact of forest availability on forest income earnings and recommends that policy makers should look towards the industrialisation and general development of forestry activities in order to improve on the share of region value-added in the sector.

Keywords: Poverty; forest-related enterprises; rural household, forest income; South-western Nigeria

5. Introduction

Nigerians are suffering in the midst of enormous natural resources. Such is the illogical description of Nigeria's poverty situation as suggested by Ibeanu (2008) cited in Ibietan *et al.* (2014). Literature seems to suggest that instead of seeking for external aid from international communities, Nigeria as a country has the capacity and opportunities for alleviating poverty on her own. Nigeria resources are more than enough for her needs but not enough for her greed. The challenges of greed and indecisive attention constitute the bane of the progress of the Nigerian State. It has been debated among scholars as well as bureaucrats that there is no reason whatsoever for Nigerians to be poor in spite of huge human and natural endowments of various kinds. Taking the enormous incomes from crude oil and gas alone as an example, Gberevbie *et al.,* (2008:2) posited that Nigeria realized the sum of $300 billion from crude oil between 1970 and 1990. Besides, the total sum of ₦ 998.4 billion was realized from crude oil by the government in 2003 and there was nothing tangible to justify the earning so far in terms of development. Really, Onuba (2012) and Aghedo (2012) in Omoyibo (2013:29) further reiterated the paradoxical claims of Nigeria annual economic growth that failed to lift her citizens out of poverty. They posited that Gross Domestic Products (GDP) per capita is $2400 and over 50% of Nigerians live on less than $1.25 a day. As suggested above, it is quite obvious that Nigeria is not a poor country by nature but only bedeviled by lack of good management of her natural resources which led to poverty, resource inequality, unemployment, collapsed educational system, low productivity among others (Ucha, 2010).

At the heart of the poverty tragedy in Nigeria is that the administration of the abundant natural resources is not so obvious to the teeming masses of Nigeria. This situation reinforces the paradox of affliction in the face of affluence (Ibeanu, 2008) due to elite conspiracy and complicity in resource management (Onah and Ibietan, 2010) cited in Ibietan *et al.* (2014).

Furthermore, Nigeria poverty statistics between 1980 and 2004 indicated that the increasing rate of both rural and urban poverty in Nigeria has more than doubled ranging from 28.3% to 63.3% and from 17.2% to 43.2% in rural and urban areas respectively [United Nations Development Programme (UNDP), 2009] as contained in Holmes *et al.* (2012:9). This however made Nigeria's national poverty line to become 54 percent of the 140 million population live in poverty (about 75 million people) [National Population Commission] (NPC), 2010] in Holmes *et al.* (2012:9) of whom 22% were regarded as 'core poor', i.e. extremely poor in 2004 (UNDP, 2009) in Holmes *et al.* (2012:9).

Later in 2010, the percentage of people living below poverty line in rural area in 2004 reduced from 73.4% to 69.0% in 2010 while those in urban reduced from 52.2% to 51.2% between 2004 and 2010 [National Bureau of Statistics (NBS), 2010:86]. This indicates that rural poverty declined faster than urban. In addition to the headcount poverty, other measures of poverty have also declined while overall poverty incidence was 62.6 percent in 2010. That is, there is a slight improvement over the 2004 poverty rate, when the population below the poverty line was estimated at 64.2 percent. Though, poverty declined by 2.4 percent but the number of poor increased by 27 percent (NBS, 2010:86). This is very challenging with respect to national development and the fact that rural poor are the major victims of this scenario in Nigeria.

In addition, giving the fact that natural forests and poverty are commonly found in the same place in most areas of the world is no coincidence, that is, poverty is a common phenomenon among community dwellers in and around the natural forests of the world; hundreds of millions of people thus depend on forests for survival (Byron and Arnold, 1999; Calibre Consultants and SSC, 2000) in UNFF (2013:10).

According to Forest Resources Assessment of Food and Agricultural Organization [FRA/FAO], (2010:5), Nigeria is well endowed with forest resources, accounting for about 2.5 percent of the Gross Domestic Products. These resources provide employment for over 2 million people through supply of fuel wood and poles and more than 80,000 people working in the log processing industries, especially in the forest zones of southern Nigeria.

The resources flourish in the high forests, woodlands, bush lands, plantations and trees on farmlands. The forests occupy about 10 million hectares representing almost 10 percent of the total land area of 92,377 hectares (FRA/FAO, 2010:5). The forests provide a wide range of non-wood products and environmental functions, though not adequately quantified and are under-estimated in national accounting (FRA/FAO, 2010). In addition, it is somehow difficult to be specific about the effect of dependence of rural households on forest resources (UNFF, 2013). The picture that emerges about forest dependency effect, however, is somewhat inconsistent and inconclusive, since lack of precise data renders findings speculative and idiosyncratic (FRA/FAO, 2010). Nigeria falls short of the basic standard of acquiring regular and up to date data on the forest resources utilization because most of the information documented may not properly reflect the actual situation but merely indicative (FRA/FAO, 2010).

On the other hand, the significance of forest related income, particularly to rural households, is not well documented. In other word, little is known about factors that influence such immense contributions derivable from forest to improve livelihood of the rural dwellers (Heubach *et al.,* 2011). To tackle this problem, efforts must be geared towards improving understanding of the immense contributions of forest resources as an anti-poverty alternative strategy to rural household livelihood whose primary source of earnings are forest related enterprises. It is against this backdrop, this study assesses rural households' income and participation in forest related enterprises in South- western Nigeria.

Specifically, the study determines the factors influencing participation in forest related enterprises, in the study area. Likewise, appropriate answers were given to the following questions: (i) what are the socioeconomic characteristics of rural households that engage in forest related enterprises in the study area? (ii) what are the factors influencing the participation in forest related enterprise and the level of participation of rural households that participate in forest related enterprises in the study area? and (iii) what are the contributions of forest extraction on households' income in the study area?

The remainder of the chapter is organized as follows: The next section presents methodology and discussion on results. The final section concludes and discusses recommendations for policymaking.

5.1. Methodological approaches

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 300 and 70E and latitude 40 and 90N 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). Specifically, the study area where data were collected include: Ogun, Osun and Oyo States. See Chapter three sub-section 3.1. for more detailed information about the study area.

5.1.1. Sampling method

In this study, the required sample size was determined using proportionate to size sampling method (PPS) where the varying **size** of each sample within the population was taken into account when selecting the sample. See Chapter 3 sub-section 3.2. for details on sampling frame and procedure.

In order to calculate the sample size from the whole population, the study used the PPS formula proposed by by Anderson *et al.* (2007) and has been used by Kangogo *et al.* (2013) as;

$$n = \frac{pqZ^2}{E^2}$$

Where n = sample size, p = percentage of the population (p = 0.5), q = 1-p, z = confidence Interval (1.96), and E = Marginal error (± 0.046). Therefore, the sample size used was 450 respondents.

5.1.2. Data analysis and model specification

Descriptive analysis using frequency distribution and percentage analysis was used to describe the socio-economic characteristics and statistics of the rural households. For the empirical models, two empirical models (Heckman's two-step procedure and Tobit model) were used for the analysis. Specifically, Heckman's two-step procedure was used to determine factors influencing household's participation in forest related enterprises, level of participation while Tobit model was used to examine the influence of forest extraction on rural households' income.

5.1.3. Heckman's two-step procedure

The Heckman's two-step model was used to estimate determinants of household participation in forest related enterprises as well as the degree of their participation. It involves estimation of two equations: Selection equation in the first step and outcome equation in second step

(Heckman, 1979). First is whether a household participates in forest related enterprises or not, then second is the level of participation (number of forest related businesses and their magnitude). The number of related business and magnitude of the enterprise(s) is a function of the household determination to participate in forest related enterprise. It is however evident in the literature that, estimation of such relationships is typically difficult due to bias in sample selection.

The two-steps include; first a Probit model for participation or selection equation is estimated. This step estimates the probability of group participation as shown in the equation 1 below.

$$P_i = \delta Z_i + \varepsilon_i, \quad E\left(\frac{\varepsilon_i}{Z}\right) = 0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where, P_i is a dummy for participation in forest related enterprise while Z_i is a vector of variables that influence participation choice.

The next equation explains the level of participation.

$$Y_i = X_i'\beta + \mu_i, \quad E\left(\frac{\mu_i}{X}\right) = 0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Where; Y_i indicates the level of participation measured in terms of number and magnitude of forest related enterprise engaged in by a household, X_i is a vector of variables that explain the levels of participation, ε_i and μ_i are the error terms. The model assumes that Z and X are observable exogenous variables and X is a subset of Z. If the correlation between ε_i and μ_i is not zero it brings about the selection bias problem. After estimating the selection equation a non-selection bias is computed using equation 3 below.

$$E\left(\frac{\varepsilon_i}{P_i}, Z_i\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

which is called Inverse Mills Ratio (IMR) λ_i when $P_i = 1$. Then the new lambda is used in the selection equation (6) as an explanatory variable. The new equation for the second stage regression is therefore:

$$E\,Y_i =, P_i = 1 = \beta X_i + \rho\lambda_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (4)$$

Equation (4) gives the expected number of enterprises Y_i given vectors of observable factors Z_i and given that the household has already made the decision to participate in forest related business. This can be explained by vector of observable characteristics X_i and the Inverse Mills Ratio evaluated as, λ_i.

If $P_i = 0$, then there is no evidence of the selection bias and the regression reverts to OLS. But

if $P_i \neq 0$, then there were omitted variables in the initial model correlated with X_i which is corrected by including IMR in the second regression.

The two steps are specified as follows

Step 1. Selection equation (Probit):

$$Y_i = \beta_0 + \beta_1 X_i + \epsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Y_i = Participation

β = Coefficient of X_i

X_i = Explanatory variables

ϵ_i = Error term

X_1 = Age of household head (years), X_2 = Sex, X_3 = Years of education, X_4 = Marital status, X_5 = Household size, X_6 = Farm Size, X_7 = Other sources of income, X_8 = Forest products availability, X_9 = Access to market, X_{10} = Labour cost (Naira) X_{11} = Membership association

Step 2. Outcome equation:

$$Y_i = \beta_0 + \beta_1 X_i + \rho \lambda_i + \epsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Where:

Y_i = Level of Participation

β = Coefficient of X_i,

X_i = (IPS, SEI, IFA, IMA),

ϵ_i = Error term

IPS= Index of poverty (proportion of family members below a pre-set poverty line, other source of income).

SEI= Index of socio-economic characteristic of the households (such as age, sex, marital status, educational level, family size, years of experience, farm size).

IFA= Index of forest resource availability (such as forest products availability, forest income, forest distance, institutional laws, cultural beliefs, awareness, transportation).

IMA= Market activities index (such as market access, price, social capita, market distance, infrastructural facilities) (Idowu *et al.,* 2013).

Table 5.1: Description of variables used in Heckman's two-step procedure

Variable	Description	Measurement	Sign
Participation	Forest entrepreneurship	1=Yes,0=No, (Dummy)	
Participation Level	Level of Participation	Number of FREs	+/-
Age	Age of Entrepreneur	Years (continuous)	+
Sex	Sex of the Entrepreneur	1=Male,0=Female (Dummy)	+/-
Yr education	Years of formal education	Years (discrete)	-
Marital status	Household head marital status	1=Married, Single/separated=0	+/-
Household size	Number of household members	Number of member	+/-
Farm Size	Total Household farm size	hectares (continuous)	+
Other income source	household alternative work,	1= Farming, 0= Otherwise	+
Forest products	availability of forest products	1=Yes 0= No (Dummy)	+
Market access	Access to market	1=Yes 0= No (Dummy)	
Labour cost	Cost of labour	Nigeria Naira (continuous)	-
Association Membership	Membership of association	1= member, 0 =otherwise (Dummy)	

5.1.4. Tobit model

To evaluate the influence of forest resources extraction on the income of rural households, forest resources income (FRI) was used as a dependent variable in the Tobit model which meant the amount realized from forest related enterprises that would lift the rural households to or above a pre-set poverty line. FRI was computed as a percentage of total household income. The variable was zero if the FRI was lower than the amount needed to lift the household out of poverty line and was equal to 100 if the per capita expenditure of the households is more than the amount set as poverty line. Tobit regression model which is based on maximum likelihood technique (Gujarati, 2003) was used. The specification of the Tobit regression model is given as:

$$Y_i^* = X_i \beta + \varepsilon_i \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(7)$$

Where Y_i^* is a latent variable for the ith forest entrepreneur that is observed for values greater than Y_i and censored for values less than or equal to 0. The Tobit model can be generalized to take account of censoring both from below and from above. X is a vector of independent variables postulated to influence forest income. The β's are parameters associated with the independent variables to be estimated. The ε is the independently distributed error term assumed to be normally distributed with a mean of zero and a constant variance. Of course, we could collapse all positive observations on Y_i and treat this as a binomial probit or logit estimation problem, but doing so would discard the information on the amount generated by entrepreneur as at a certain time. Hence observed Y is defined by the following generic equation:

$Y_i = 0$ if $y_i^* \leq 0$.

$Y_i = y_i^*$ if $y_i^* > 0$. That is,

$Y_i = Y_i^*$ if $Y* > 0$

$Y_i = Y_i^*$ if $Y* \leq 0$…………...…...................(8)

Usually, the Tobit model assumes that $Y_i = 0$ which means that the data is censored at zero. Though, forest resources income ranges between 0-100 percent, thus substituting Y_i in equation 8 above, it gives;

$Y_i = Y_i^*$ if $0 < Y^{*} < 100$

$Y_i = 0$ if $Y_i \leq 0$

$Y_i = 100$ if $Y^* \geq 100$ ……...……………………………………………........................(9)

The model assumes that there is a certain income equal to $Xi\ \beta + \varepsilon i$ which is observed only when the forest income is between 0 and 100; otherwise qualifies as an unobserved latent variable. The dependent variable is not normally distributed since its values range between 0 and 100. The empirical Tobit model for this study therefore takes the following form:

$$Y_i^* = \beta_0 + \sum_{n}^{n} = 1\ \beta_n X_i + \varepsilon_i$$

$Y_i^* = \beta_0 + \beta_i X_1 + \beta_1 X_2 + \beta_2 X_3 + \beta_3 X_4 + ... \beta_n X_n +$..(10)

(Y_i^*) Forest Income $= \beta_0 + \beta_1 age + \beta_2 gender + \beta_3 education + \beta_4$ marital status $+ \beta_5$ householdsize$+\beta_6$farmsize$+\beta_7$yearsofexperience$+\beta_8$forestproductavailability$+\beta 9$forestdistance distance$+\beta_{10}+\beta_{11}$transportation$+$forest law$+\beta_{12}$cultural belief$+\beta_{13}$market access$+\beta_{14}$market distance$+\beta_{15}$price$+\beta_{16}$labourcost$+\beta_{17}$socialcapita$+\beta_{18}$nfrastucturalfacility$+\varepsilon$.....................(11)

It is worth nothing that estimating the model using OLS would produce both inconsistent and biased estimates (Gujarati, 2003). This is because OLS underestimates the true effect of the parameters by reducing the slope (Goetz, 1995). Therefore, the maximum likelihood estimation is recommended for Tobit analysis.

Table 5.2: Description of variables used in Tobit model analysis

Variable	Description	Measurement	Sign
Forest Income	Total amount generated	Nigeria Naira (continuous)	+/-
Age	Age of Entrepreneur	Years (discrete)	+
Sex	Sex of the Entrepreneur	1=Male,0=Female (Dummy)	+/-
Yr Education	Years of formal education	Years (discrete)	-
Marital status	Household head marital status	Married=1, single/separated (dummy)	+/-
Household size	Number of household members	Number of member	+/-
Farm Size	Total Household farm size	hectares (continuous)	+
Yr Experience	Years of Experience	years (discrete) +	
Forest products	Availability of forest products	1=Yes 0= No (Dummy)	+
Forest distance	Forest distance	kilometre (continuous	-
Transportation	Cost of transport	Nigeria naira	-
forest mgt laws	Forest management laws	1= institution, 0 = community	-
Cultural beliefs	Cultural beliefs ranging from	1=Yes 0= No (Dummy)	
Market access	Access to market	1=Yes 0= No (Dummy)	
Market distance	Distance to market	kilometre (continuous)	-
Other income source	Household alternative work	1= Farming, 0= Otherwise	+
Price	price of inputs	Nigeria Naira	+/-
Labour cost	Cost of labour	Nigeria Naira (continuous) `	-
Association membership	Membership of association	1= If member,0= if otherwise (Dummy)	
Infrastructural	infrastructural facilities ranging from	not at all to very much	
Poverty status	Poverty status proportion of household member whose per capita incomes fall below a pre-set poverty line[18]		

5.2. Results and discussion

5.2.1. Socio-economic characteristics of forest users' households

The section presents the socio economic characteristics of the rural households that engage in forest related enterprises as reported in Table 5.3. Considering the proportion to size sampling method adapted for this study as reflected in sub-section 5.1.1, the distribution of age of the households' head 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 80% of the respondents are still in their working age.

Also, male headed households represent about 60.4 per cent of the sample while less than 22 per cent of household heads had tertiary 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-western Nigeria are well educated. Large proportion of households (about 41per cent) had secondary education while only 23 per cent had primary or elementary school and about

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[18] *setting the two-thirds of the mean per capita household expenditure*

13 per cent had no formal education. In terms of marital status, almost three quarter of the sampled households were married while the remaining one quarter shares 12 per cent as

Table 5.3: Distribution of socioeconomic characteristics of forest users' households

Item	Frequency	Percentage
Household's Head Age		
≤ 20	3	0.7
21 – 40	168	37.4
41 - 60	212	47.2
61 - 80	66	14.7
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
No. of Male Adults		
<2	313	69.7
3 - 4	16	3.60
5 - 6	109	24.3
7 - 8	11	2.40
No. of Female Adults		
<2	339	75.5
3 - 4	17	3.8
5 - 6	93	20.7
Religion		
Islam	213	47.4
Christianity	223	49.7
Traditional	13	2.9

Source: Calculated from field survey, 2016

single, 4 per cent as divorced and 11.6 per cent separated. Furthermore, about 66 per cent of the sample had between 3- 4 children within the household while about 16 per cent had less than or equal to two children.

Meanwhile, of the total number of children within the sampled households, 69.7% and 75.5% constitute less than or equal to two male adults and female adults respectively. It was also

revealed from the Table 5.3 that 47.4% of the respondents were Muslims while 49.7% were Christians and less than 3% were practising traditional religion. This therefore indicates that religious factors may not have much impact in venturing into forest related businesses giving credence to the two most commonly practised religions in the study area, that is Islam and Christianity which abhors the traditional use of forest products through trado-medicine or alternative medicine. Thus, religion may not be a key factor influencing the participation of the households in FREs as well as their level of participation.

5.2.2. Rural households' participation in forest extraction

Table 4.4 presents the estimated parameters and the statistically significant variables explaining the participation choice. The diagnostic test as shown in Table 5.4 records a log likelihood of about 65.024 reporting the log likelihood of coefficients estimates assuming that they are normally distributed. Chi-square test was significant at both 1% and 5% suggesting that the model had a goodness of fit to the observed variables and there is a high degree of association between the dependent and independent variables. Also, the test reports R^2 of

Table 5.4: Factors that influence rural households' participation in forest extraction

Variable	Coefficient	Standard Error	Z	P-value
Constant	2.6245	1.1212	2.34	0.019
Age	0.3164	0.1885	1.68	0.093
Sex	0.0507	0.2701	0.19	0.851
Education	-0.0704	0.1425	-0.49	0.621
Marital Status	-0.0273	0.1914	-0.14	0.886
Household size	-0.0633	0.0472	-1.34	0.180
Other income	0.1125	0.3291	0.34	0.732
Forest availability	0.2495	0.2495	-0.65	0.513
Market availability	-0.8566**	0.3673	-1.79	0.020
Labour cost	-0.5181**	0.3743	-1.38	0.016
Membership Assoc.	2.112***	0.3933	-5.37	0.000
Log likelihood	-65.024			
χ^2	92.24			
Probability of χ^2	0.0000***			
Pseudo R^2	0.4160			
N	390			

***, ** Significant at 1% and 5% respectively

Source: Calculated from field survey, 2016

about 0.4150 confirming that the explanatory variables were 42% relevant in explaining the participation decision in forest related enterprises. The Z test statistics reveals that three key

policy driven variables were statistically significant such as market availability, labour cost and membership of association. This therefore suggests that the market availability, the labour cost and membership of association have a significant effect on the choice of participation of the household in forest related businesses.

Availability of market is one of the key policy driven variables which is about 86% negatively associated with participation in resource extraction decision. The negative association of the coefficient means that for every unit increase in market access, there is a decrease in participation in resource extraction holding other things constant. Respondents from the study area argued that easy access to natural resource markets leads to market flooding forcing prices down since saleable products are common pool open access resources freely available. Usually, over infiltration of markets in the neighbourhood crashes the market price due to high level of competition in the market typical for raw homogeneous forest produce.

As a result, more households would tend to be indifferent in participating in the business in order to avoid selling their forest products below the cost price or to evade unhealthy rivalry. However, contrary observations were noted by some authors (Dewees, 1995; Dove, 1995; Gilmour, 1995; Shively, 1999) who posited that access to market could accelerate participation of households in establishing farm forests through two distinct channels—providing market for products of farm forests and creating alternative off-farm income generating avenues which compels households to set their own sources of fuel wood and other forest products. Similarly, Emtage and Suh (2004) argued that market access would encourage farm households to plant high value timber and fruit trees, not only to satisfy their monetary needs but also for subsistence requirements provided that markets work fairly well. The study therefore argues that for homogenous raw forest products, access to markets may crash market prices capable of sending a negative signal towards participation in forests extraction.

The results also reveal a negative and significant relationship between participation in resource extraction and labour cost by magnitude of 52%. The negative association of the coefficient means that for every unit increase in labour cost, there is a decrease in participation in resource extraction all things being equal. This is logical since increase in labour cost will increase the cost of production because households have to pay more on labour across various production and transaction stages (such as establishing forest

plantation, harvesting, gathering, processing, packaging, transporting, loading/unloading, supervising/monitoring, selling etc.) which may dissuade many households in participating in forest resources extractions. This may be so especially for some labour–intensive and technical forest activities (e.g. logging) where manual skidding and forwarding or semi-mechanised operations are required since all these expenses will increase the cost to be incurred by the households and thus reduce their participation in forest extractions. These findings comply considerably with the assertion of Dos Santos (2015) who presumed that reduced labour cost would lead to increased participation and productivity on timber harvesting practices for experienced and inexperienced crews in Tanzania because the timber harvesters (employers) tend to get high returns.

Similarly, the parameter estimate for the membership of association was also significant and positively associated with probability of participation. The positive association means that a unit increase in membership of association by the household would result into an increase in participation in forest resources extractions. Based on oral interview with most respondents in the study site, households members who joined one forest association or the other gained a lot of experiences from the group because it helps them to develop ability to solve collective action problems peculiar to common pool resource management. It also helps them to facilitate institutional and communal performance towards common pool resource management and a source of relevant information, including information on policy changes that directly affect forest communities.

Similar to these findings, Fonta and Ayuk (2013) inferred that increase in membership of association will increase participation rate in forest resources extraction. Likewise, Jumbe and Angelsen (2007) noted that positive impacts of social capita is vital for inducing greater participation. Shackleton and Campbell (2001) also attributed the success of the forest co-management programme in Chimaliro Malawi to the respect people have towards local chiefs. This invariably indicates that 'social capita' is key to a successful operation of forest management programmes.

The probit regression model is represented as follows:
Participation = 2.6246 + 0.3165age + 0.0508sex − 0.0705 education − 0.0274 marital status − 0.0634household size + 0.1125 other income − 0.1634 forest availability − 0.8566 market availability − 0.5181 labour cost + 2.112 association membership.

5.2.3. Level of participation in forest related enterprises (FREs)

Here, the study reports the factors that are contributing to the level at which individual rural households are involved in forest related enterprises (FREs) as presented in Table 5.5 below. The results indicate that the error terms of the selection and outcome equations are correlated as shown by the highly significant chi-square p-value of 0.000 and the significance of the inverse Mills ratio. This justifies the use of Heckman's procedure. The fact that lambda is significant and positive shows that the level at which forest household participates in forest related enterprises would increase as long as those factors influencing the participation in FREs are favourable.

This means that there is correlation between households which self-select themselves into FREs and the level of their participation. Furthermore, the table also suggests that market activities index and index of poverty have a significant relationship on the level of participation of the households in the forest related businesses in the study area.

Table 5.5: Factors that influence level of participation in FREs - (Outcome equation)

Variable	Coefficient	Standard Error	Z	P-value
Constant	0.9183	1.212921	0.76	0.449
SEI	0.0347	0.045682	0.76	0.447
IPS	0.1320***	0.383903	4.34	0.000
IFA	-4.01E-06	2.94E-06	-1.36	0.173
IMA	0.0219**	0.064529	3.95	0.002
Mills Ratio				
Lambda	0.003**			
Rho	-0.79			
Sigma	0.951			
χ^2	62.29			
Probability of χ^2	0.0000***			
N	390			

***, ** significant at 1% and 5% respectively

Source: Calculated from field survey, 2016

The outcome regression estimate is expressed thus:

Y_i = 0.9183 + 0.0347 SEI + 0.1320 IPS - 4.01E-06 IFA + 0.0219 IMA

Where Y_i is the level of household participating in the forest related businesses. The estimate suggests that keeping all other predictors constant, for a unit increase in SEI, IPS and IMA, we expect 0.0347, 0.1320 and 0.0219 respective increase in the log-odds and 4.01E-06

decrease in the log-odds of IFA on the level of participation accordingly. IPS= Index of poverty (proportion of family members below a pre-set poverty line, other sources of income) being one of the policy relevant variables has positive relationship with the level of participation in forest related enterprises. This being so since forest has however been identified and considered as a preference for poverty alleviation as it often serves as soft landing and last resort for economically marginalized people (William *et al.*, 2003).

IPS= Index of poverty (proportion of family members below a pre-set poverty line, other sources of income) being one of the policy relevant variables has positive relationship with the level of participation in forest related enterprises by a magnitude of 13%. This being so since forest has however been identified and considered as a preference for poverty alleviation as it often serves as soft landing and last resort for economically marginalized people (William *et al.*, 2003).

So, rural poor tends to involve more in forest extraction as noted by Jimoh (2006) that income from sale of forest products such as wild fruits, vegetables, firewood, charcoal and edible insects from the forests contribute significantly to household income and food security and thus, play an important role in poverty reduction especially among rural dwellers as supported by Kabubo-Mariara and Gachoki (2008). Forests contribute in the diversification of household income sources as some households adopt a number of specialized forest strategies to augment their livelihoods; these include forest grazing, forest crop farming and forest gathering activities to corroborate one another[19]. Though according to Inoni (2009), many authors have argued that poor households with small income earning alternatives tend to spend more time and effort collecting forest products (Lopez, 1997; Durraiappah, 1998 and Baland *et al.*, 2004). But as this study suggests, increase in alternative income sources would increase the propensity of the households to reinvest in forest related activities to expand the scope of the business as long as there is a comparative advantage in forest enterprises, hence, increase the participation level.

Another policy relevant variable that influences level of participation in FREs by rural households as shown in Table 5.5 is market activities index IMA. The results reveal a

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[19] CEEPA (2009): Making the Link Between Forests and Poverty Reduction A Resource Valuation Study from Kenya: Policy Brief of the Centre for Environmental Economics and Policy in Africa, University of Pretoria, South Africa.

positive and significant relationship between IMA and level of participation in resource extractions by a magnitude of 2%. The positive association of the coefficient implies that improvement in IMA index variables (such as price, social capita, market distance and infrastructural facilities) would result into an increase in participation level in resource extractions because households would have greater opportunity to access forests products, they spend less time and resources in collecting them (forest products) and market their products with ease (Fisher, 2004).

Specifically, considering price variable as one of the IMA index and giving credence to easy access to natural resource markets which normally leads to market flooding and price crash, forest products are usually sold at depressed prices which becomes disincentives to the forest households. This therefore translates into poor returns to rural households who sell most of their forest products at poor farm-gate prices. This perfect competitive market structure forces most forest entrepreneurs to adopt value added pricing strategy (VAPS) in differentiating their forest products by adding features or services (such as sorting/grading, packaging, advertising, incentives, good customer relations etc.) that other competitors may not have in order to command higher price for their forest products. This strategy was not only meant to just increase their sales and prices but also to make their customers loyal to them because they offer services they (customers) can not find in other places.

Therefore, VAPS is usually used as a common tool by most forest entrepreneurs in the study site to outsmart their counterparts since every household is interested in maximizing profit from the sales of his/her forest products. Consequent upon that, increase in price of forest products(through value addition) is positively associated with increased level of participation in FREs. This view has also been supported by Inoni (2009) who argued that price of fruits among other factors such as household size as well as educational level are statistically significant determinants of wild fruits harvesting in rural communities in Delta State, Nigeria.

Furthermore, a focus group discussion (FGD) conducted during the survey revealed that, those forest entrepreneurs who adopt VAPS got the experience and the initiatives through various forest group associations they belong to. It helps them to develop ability to solve collective action problems peculiar to common pool resource mobilization. It is equally seen as a means of facilitating institutional and communal incentives that motivate common pool resource mobilization as well as being an important source of relevant information, including

information on policy changes that directly affect not only forest enterprises but also forest communities as explained by Fonta & Ayuk (2013) and Adhikari (2005).

Another market activities index variable subset that increases the level of participation is market distance. The closer the market to the forest is, the less efforts and resources to transport the products to the market. Thus far, given the competitive nature of markets for forest related raw products that are almost homogenous, distance to market will significantly affect the net benefit that the participants will get. Similar notable remarks were made by Jumbe and Angelsen (2007) in their findings on determinants of forest dependency and participation in Malawi that 'the shorter the distance for forest products market in Liwonde, the greater the inducement for commercialization of forest products'.

Furthermore, level of participation increases when the necessary infrastructural facilities such as storage facilities, means of transportation, implements etc. are in place. These infrastructural facilities such as improved sanitation facilities, stores, water source, road access, electricity, communications etc. would aid the level of participation across all the value chain of the business because the goal of VAPS could hardly be achieved in absence of good infrastructural facilities. This argument is supported by the findings of Charlery *et al.* (2016) which stated that the poorest households gained most from the basic infrastructural facilities, making it a pro-poor development intervention. Other authors like Henk Gnade (2013) and Inoni (2009) also shared similar view. In sum, this paper therefore argues that value added pricing strategy (VAPS) is a unique tool in forest related businesses that can change the course of business from low-price profile to high-price profile particularly when markets for such businesses are perfectly competitive in nature or markets that are almost homogenous.

Summarily, these findings thus suggest that poverty is one of the factors that determine the level at which rural household participate in FREs. Similarly, the study also suggests that if market conditions such as market access, price, market distance, infrastructural facilities are improved, majority of forest indigenous people would tend to participate in FREs more than ever before while social capita factors should also not be undermined.

5.2.4. Influence of forest resources extraction on households' income
This section presents the analysis of influence of forest extraction on the households' income using Tobit regression model as summarised in Table 4.6 below. The Tobit regression suggests that forest management laws, age, labour cost and forest product availability have

Table 5.6: Influence of forest extraction on households' income

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Variable	Coefficient	Standard Error	Z	P-value
Constant	1.0526	0.2281	4.61	0.000
Age	-0.0991**	0.0348	2.85	0.005
Sex	0.0406	0.0489	0.83	0.408
Education	0.0349	0.0251	1.39	0.166
Marital status	-0.0116	0.0370	0.31	0.754
Labour cost	-0.0787***	0.0177	4.44	0.000
Market access	0.0130	0.0595	0.22	0.827
Forest availability	0.1263 **	0.0453	2.79	0.006
Transportation	-0.0831	0.0518	-1.6	0.111
Forest distance	-0.0109	0.0186	0.59	0.559
Market distance	-0.0228	0.0291	0.78	0.434
Price	-0.00709	0.0220	0.32	0.748
Forest mgt. laws	0.1744***	0.0456	3.82	0.000
Log Likelihood	-46.851			
χ^2	28			
Probability of χ^2	0.0000***			
Pseudo R^2	0.5245			
N	390			

***, ** significant at 1% and 5% respectively

Source: Calculated from field survey, 2016

a significant effect on the forest income of the household. The diagnostic statistical test also validated the goodness of fit of the model since chi-square test statistics is significant at 5%. The test records R^2 of about 0.5245 which therefore confirms that the explanatory variables are 52% relevant in explaining the forest income earnings of the households.

The share of income derived from forest activities is the dependent variable, the age of the households' head was negative and statistically significant. This negative association thus means that forest extraction income decreases as the head of household's age progresses. The negative coefficient of age as shown from Table 5.6 implies that for a one standard deviation positive change in age of household head holding other predictor variables constant, there is a decrease in household forest income by 0.0991 standard deviations. Vedeld *et al*. (2004) and Kohlin *et al*. (2001) note a similar negative association when they argue that older people may have less time and physical strength to engage in forest activities. In contrast, Kabubo-Mariara and Gachoki (2008) notes a positive association suggesting that young households may be more willing to venture into cropping than forest gathering.

Likewise, the study identifies about 8% significant negative impact of labour cost on the forest income of the household which implies that a unit standard deviation increase in labour cost lowers the household returns from the forest business by 8% and vice- versa if all things being equal. Household that enjoys the services of family labour may have some respites in this regard as family labour would reduce the cost of labour and consequently increase such household's income from forest related businesses.

This study equally identifies about 13% significant positive impact of forest availability on forest income earnings. Forest income increases usually in the midst of available forest resources since there would be high potential for increased turnover and would subsequently bring high income. This simply observes the economic principle of return – to – scale, that is, the higher the income, the higher the willingness to supply, because such households would have greater accessibility to the forest products as explained by Azeez *et al.* (2011).

Furthermore, forest management laws is positively associated with forest income earnings in the study area. This means that a one standard deviation positive change in forest management laws holding other predictor variables constant, increases household forest income by 0.1744 standard deviations. It is observed therefore that improved forest management laws will increase households forest income when carried out with management and practice standards designed to protect natural resources. Agroforestry is a good example of such forest management practices that provide additional income to the household and thus reduce deforestation. In contrast, Kaimowitz (2003) however noted that greater enforcement of forestry and conservation laws have the potential to negatively affect rural income because such legislation often prohibits forestry activities such as small-scale timber production, fuel wood collection, and hunting that millions of poor rural households depend on.

The Tobit regression model is represented thus:
Forest income = 1.0526 - 0.0992age + 0.04063sex – 0.034961education - 0.01161marital status - 0.07874labour cost + 0.12633forest availability- 0.0831transportation – 0.01094forest distance - 0.02287market distance - 0.00709 price + 0.1745 forest management laws.

5.3. Study summary
The first objective was to determine factors influencing the participation in forest related enterprise and the level of participation of rural households that participate in forest related enterprises using Heckman's two-step procedure which involves estimation of two equations: Selection equation in the first step and outcome equation in the second step. The selection

equation (probit) results suggests that market availability, labour cost and membership of association have a significant effect on the choice of participation of the household in forest related businesses. Whereas the outcome equation on the other hand suggests that market activities index and index of poverty have a significant relationship on the level of participation of the households in the forest related businesses in the study area.

The second objective assesed the influence of forest extraction on households' income using Tobit regression model. The results therefore suggests that forest management laws, age, labour cost and forest product availability have a significant effect on the forest income of the household.

5.4. Conclussion

This study analysed households' income and participation in forest- related enterprises in South-western Nigeria using Heckman's two stage model to estimate the probability of households' participation as well as level of participation in forest related enterprises while Tobit model was used to determine the influence of forest extraction on households' income.

In terms of participation decision, the study reveals negative relationship between the probability of participation in forest related enterprises and labour cost as well as market access by magnitude of 52% and 86% respectively while there was a positive and significant relationship between participation in resource extraction and membership of association.

Regarding the level of participation, the study shows that improvement in IMA index variables (such as price, social capita, market distance and infrastructural facilities) would trigger participation level in resource extractions because households would have greater opportunity to access forests products, they spend less time and resources in collecting them (forest products) and market their products with ease. The paper further argues that value added pricing strategy (VAPS) is a unique tool in forest related businesses that can change the course of business from low-price profile to high-price profile particularly in averting the effect of market flooding which usually crash the market prices of forest related raw products that are almost homogenous. Likewise, poverty index (such as proportion of family members below a pre-set poverty line and other sources of income) also reveal positive and significant relationship with level of participation in FREs in the study site.

Furthermore, Tobit regression model reveals that age, labour cost, forest management laws and forest products availability have significant effect on the forest income of the household.

The coefficient of age shows that age is a negative and significant factor since a one standard deviation positive change in age of household head holding other predictor variables constant, decreases household forest income by 10% standard deviations. The study also identifies about 7.8% negative and significant impact of labour cost on forest income of the household while forest management laws being positively signed implies that improved forest management laws will increase households forest income if such management laws are carried out with cautions to protect natural resources.

Finally, this paper reveals positive and significant impact of forest products availability on household forest income meaning that a unit standard deviation increase in forest products availability holding other predictor variable constant will increase household forest income in the study area.

5.5. Policy implications

Arising from the above conclusions as revealed by this study, Government should assist forest indigenous people who engage in logging and other labour intensive forest operations by providing them with the required, affordable and improved technologies (machineries and technical know-how) to reduce cost of production and ease their works instead of hiring too much labourers who most often use traditional methods. This will not only improve the participation but also reduce the cost of production and enhance productivity. Market unions should also take responsibility for improving on market flooding and price related upheavals. This will encourage rural households to actively participate in forest-related businesses and correct market failures, which becomes disincentives to the forest entrepreneurs in the study area. In addition, improved social capita system among forest related entrepreneurs should be a serious concern for the policy planners.

Fostering collective action between forest-related entrepreneurs and relevant forestry agencies and organizations to improve access to markets, finance, better prices, inputs and infrastructural facilities will be a better policy approach to improve on market activities index (IMA) in the region. Similarly, measures to reduce poverty among rural households in Nigeria should be targeted at improving working conditions of forest entrepreneurs (especially the rural downtrodden), provision of basic infrastructure in the rural areas in particular, are necessary requirements for improvement in the level of participation of the rural households in FREs.

Furthermore, promoting the participation of younger population in small and medium-scale forest ventures and market-oriented activities in agroforestry, tree-growing and securing adequate skills and training should be a good policy target. Likewise, adopting good forest management laws and practices will improve the chances of forest income generation and finally, Government should extend the outreach of forest certification schemes and codes of conduct that include social and labour aspects relevant to small-scale forestry to promote sustainable forest use.

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Chapter 6: Measuring the Economic Benefits of Forests in Relation to Households' Welfare and Forest Dependence in South-western Nigeria

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Abstract

This study provides empirical findings on the contributions of forest resources income on poverty among rural households in South-western Nigeria. A multi-stage random sampling approach was adopted in selecting the respondents' sample of the study. A total of four hundred and fifty households were interviewed for the study. Data were collected through the aid of structured questionnaires. Descriptive analysis and empirical model [Foster-Greer-Thorbecke (FGT 1984) poverty index] were used to estimate poverty index among forest rural households with and without forest income. The results showed that 68% of the rural households are living below the poverty line in the region. Disaggregated to state level, the highest proportion is found in Osun state (77%), followed by Ogun state (70%) and Oyo state with about 50%. The study also revealed the minimum amount required to bring these poor households to the poverty line across states. General profile of respondents revealed that less than 35% of the total sampled rural households in the region that earned their living from forest income were non poor while more than 65% were poor of whom about 38% were extremely poor and 62% were moderately poor. Moreover, regarding the impact of forest income on the poverty status of the households, the results of the findings show that forest related enterprises reduced poverty incidence in the study area by 17% whereas both the extremely and moderately poor households have been reduced by 8% and 10% respectively. This showed that forest income is capable of stemming the tide of poverty in the region even though with a relative magnitude.

Keywords: Poverty; rural households; forest income; South-western Nigeria; FGT regression model

6. 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, 2008a). Going by the antiquity of Nigerian fortune in the early 1970s, 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. Ironically, Nigeria happened to be the sixth largest exporter of oil and at the same time the third largest after China and India that recorded the largest proportion of poor people in the world (Okon, 2012:32).

Okon (2012:32-33) highlighted the plain reality and miserable performance of Nigeria in the socio-economic spheres of life: The author said that Nigeria holds an unambiguous dichotomy of wealth and poverty. Despite the fact that the country is blessed with abundant natural resources, its economy has been retrogressed to the point that it cannot yet meet the basic human needs of its population. The negative correlation between the growth of the GDP and the increasing poverty incidence rates in the country is evident by the wide-ranging gap in the distribution of Nigeria's wealth.

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%; the dollar per day measure puts the poverty profile at 61.2% and the subjective measure put the poverty profile at 93.9%, possibly, the Harmonized National Living Standard Survey (HNLSS) which put the country's poverty profile at 69.0% might strike the balance. Although, the World Bank poverty line measure that was used during the course of the survey has been modified to have increased from previous US$1 to US$1.25 (NBS, 2012). Nevertheless, it is still alarming to record that about 99,284,512 Nigerians were living in absolute poverty as at 2010 (NBS, 2012). The report put a big question as to what then happened to the much celebrated GDP growth rate averaging 7.4% in the last decade? There is certainly a sharp disconnect between growth and poverty in which majority of Nigerians as a result of marginalization are rendering poorer (NBS, 2011).

The preponderance of Nigeria's poor are rural, female, but cut across age bracket. Most of these people are farmers who lare argely dependent on renewable natural resources for their living. There is high percentage of the poor in rural areas (64 percent) than those in urban areas (35 percent) (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 masses whom have been economically marginalized (Sunderlin *et al.,* 2003:1). The enduring contributions of forests to solve the problem of poverty and inequality particularly among rural community then mean that forests are immensely valuable for sustainable livelihood and it plays a greater role in developing countries than it does in developed ones United Nations Forum on Forest (UNFF, 2013:3).

Forest products support rural livelihoods and food security in many developing countries such that the integrity of forests becomes vital mostly because of the dependence of the poor on forest resources (Richardson *et al.,* 2011:3). In assessing the role of forests and non-timber forest products in sustaining livelihood in most of developing countries, Richardson *et al.* (2011:3) categorized forest uses into groups, including food, fuel, shelter, erosion control, and water conservation. The authors assessed the total amount of foods produced from trees, the wild foods gathered, and animals hunted from forests, and the forest resources used in generating non-farm income and wage employment and estimated that between 60 and 70% of the population in developing countries live and work near forested areas.

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. The FAO (2011) estimated approximately 300 million people worldwide that earn part or all of their living from harvesting food and other products from tropical forests for income generation.

In essence, forest resources are prime constituent of the natural resource base of any community, region or country upon which the socio-economic well-being of the people of those communities depends most especially in Sub-Sahara Africa. Tropical forests have vast economic significance to both the rural and urban poor (Amsallem, 2003).

Many studies have quantitatively investigated the roles of forest in mitigating poverty and income distribution inequality issues. For example, Jodha (1986) conducted few studies for a few Asian and Latin American countries; Reddy & Chakravarty (1999) for that of India; while Cooper (2008) did for Nepal. Others include Lopez-Feldman *et al.* (2007 and 2011) for Mexico and Uberhuaga *et al.* (2012) for Bolivia. All of them observed that forest income has great potentials for reducing both poverty and income inequality.

Although, quite very few studies have been conducted on the contributions of forest income in Sub- Sahara Africa. Out of such few, the results have shown that there were slight mixed standpoints. 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% and 44% 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 increases by as much as 12%. In Malawi as well, Jumbe and Angelsen (2007) found out that forest income has contrasted welfare impacts across study villages and that forest dependence is poverty neutral. 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. 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% and 20.3% respectively, depending on the poverty line and measure used. Nonetheless, the disadvantage 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, no attempt has been made, to date, to quantitatively measure forest role in mitigating poverty in the South–western region of Nigeria. It is therefore unequivocally clear and evidenced from both quantitative and qualitative studies 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 deficiency when it comes to developing informed policies for sustainable welfare programme, development strategies and social justice. 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.

6.1 Specific objectives:
- To assess the poverty status of rural households in the study area
- To assess the economic impact of forests on poverty status of the rural households in the study area.

The remainder of the chapters is organized as follows: The next section gives exposition on methodology and discussion on results. The final section concludes and discusses recommendations for policymaking.

6.2. Methodological approaches
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 300 and 70E and latitude 40 and 90N 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). Specifically, the study area where data were collected include: Ogun, Osun and Oyo States. See Chapter three sub-section 3.1. for more detailed information about the study area.

6.2.1. Sampling method

In this study, the required sample size was determined using proportionate to size sampling method (PPS) where the varying size of each sample within the population was taken into account when selecting the sample. See Chapter 3 sub-section 3.2. for details on sampling frame and procedure.

In order to calculate the sample size from the whole population, the study used the PPS formula proposed by by Anderson *et al.* (2007) and has been used by Kangogo *et al.* (2013) as;

$$n = \frac{pqZ^2}{E^2}$$

Where n = sample size, p = percentage of the population (p = 0.5), q = 1-p, z = confidence Interval (1.96), and E = Marginal error (± 0.046). Therefore, the sample size used was 450 respondents.

6.2.2. Analytical tools and model specification

SPSS computer programme was used to analyse households' socio-economic characteristics while STATA programme was used to determine the households' level of poverty of the respondents using FGT analytical model.

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 and Ayuk (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. This method subsumes the headcount ratio and poverty measurement of the population below the poverty line while the poverty gap measures the depth of poverty.

In accordance with the set objectives of the study, the following models are specified;

6.2.2.1. Foster-Greer-Thorbecke poverty index (FGT, 1984):

The FGT index is very easy to decompose by income effects, and it also satisfies Sen's axioms of transfer and monotonicity (Sen, 1976). That is, the index increases whenever a pure transfer is made from a poor person to someone with more income, and there is a reduction in a poor person's income, holding other incomes constant. The FGT index allows for the quantitative measurement of poverty status among subgroups of a population (i.e., incorporating any degree of concern about poverty) and has been widely used (Kakwani, 2000). Poverty line was computed as the 2/3rd of the mean per capita annual expenditure of all members of the sampled households. The headcount ratio measures the ratio of the number of poor individuals or simply measures the poverty incidence (i.e., the percent of the poor in the total sample). The analysis of poverty incidence using FGT measure usually starts with ranking of expenditures in ascending order $Y_i \leq Y, \leq ... \leq; Y_n$: The FGT index is given by:

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

Where α 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 ith person's household is x_i, and the poverty gap for individual i is $G_i = z - x_i$ (with $G_i = 0$ when $x_i > z$).

The FGT class is based on the normalized gap $g_i = (z-y_i)/z$ of a poor person i, which is the income shortfall expressed as a share of the poverty line. Viewing $g_i{}^\alpha$ as the measure of individual poverty for a poor person and 0 as the respective measure for non-poor persons, P_α is the average poverty in the given population. The case $\alpha = 0$ yields a distribution of individual poverty levels in which each poor person has poverty level 1; the average across the entire population is simply the headcount ratio P_0 or H. The case $\alpha = 1$ uses the normalized gap g_i as a poor person's poverty level, thereby differentiating among the poor; the average becomes the poverty gap measure P_1 or HI. The case $\alpha = 2$ squares the normalized gap and thus weights the gaps by the gaps; this yields the squared gap measure P_2. As α tends to infinity, the condition of the poorest poor is all that matters.

The parameter α has an interpretation as an indicator of "poverty aversion" in that a person whose normalized gap is twice as large has 2^α times the level of individual poverty. Alternatively, α is the elasticity of individual poverty with respect to the normalized gap, so that a 1% increase in the gap of a poor person leads to an α% increase in the individual's

poverty level. The parametric class of measures gave analysts and policymakers an instrument to evaluate poverty under different magnifying glasses with varying sensitivity to distributional issues. The FGT paper emphasized the squared gap measure P_2, noting its simplicity and the fact that many arguments used in support of Sen's measure also apply to P_2. Sen (1976) had used a general additive form for poverty measures in which poverty is a normalization factor times the weighted sum of the normalized gaps of the poor. The author used rank orders as weights—so that the poorest person in a population of q poor persons is assigned a weight of q, the next has a weight of q-1, and so forth until the least poor person is assigned a weight of 1.

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; $P_o = \frac{N_p}{N}$ (2)

Where

P_o = = 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:

$$P_o = \frac{1}{N} \sum_{i=1}^{N} 1(y, < z)$$ (3)

Now, $I(\cdot)$ is an indicator function that has a value of 1 if (y, < 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 will be calculated as poverty gap (G_i) = poverty line (z) minus actual income (y_i) for poor persons; the gap is considered to be zero for everyone else.

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

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

$$P_1 = \frac{1}{N} \sum_{i=1}^{N} \frac{G_i}{z} \qquad (5)$$

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

Thus, squared poverty gap index may be written as;

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

Where α = a measure of the sensitivity of the index to poverty,

z = poverty line,

x_i = the value of expenditure per capita for the ith 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 $\alpha = 1$

6.3. Results and discussion

6.3.1. Sample households statistics

This section presents the socio economic characteristics of the rural households that engage in forest related enterprises as reported in Table 6.1 below. Considering the proportion to size sampling method adapted for this study as reflected in sub-section 6.2.1, 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.

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 41per

cent) had secondary education while only 23 per cent had primary or elementary school and about 13 per cent had no formal education.

Table 6.1: Distribution of socio-economic characteristics of rural households

Item	Frequency	Percentage
Household's Head Age		
≤ 20	3	0.7
21 – 40	168	37.4
41 - 60	212	47.2
61 - 80	66	14.7
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
No. of Male Adults		
<2	313	69.7
3 - 4	16	3.60
5 - 6	109	24.3
7 - 8	11	2.40
No. of Female Adults		
<2	339	75.5
3 - 4	17	3.8
5 - 6	93	20.7
Religion		
Islam	213	47.4
Christianity	223	49.7
Traditional	13	2.9

Source: Calculated from field survey, 2016

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 per cent as single, 4 per cent as divorced and 11.6 per cent separated. Furthermore, about 66 per cent of the sample had between 3- 4 children within the household while about 16 per cent had less than or equal to two children. Meanwhile, of the total number of children within the sampled households, 69.7% and 75.5%

constitute less than or equal to two male adults and female adults respectively. It was also revealed from the Table 6.1 that 47.4% of the respondents were Muslims while 49.7% were Christians and less than 3% were practising traditional religion. This therefore indicates that religious factors may not have much impact in venturing into forest related businesses and does not affect their poverty status 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.

6.3.2. Rural households based on poverty status

This section presents the summary of descriptive statistics of poverty incidence of rural households with and without forest income in the study site. As revealed in Table 6.2, the rural households were categorized into three types based on their respective poverty index such as extremely poor, moderately poor and non poor as classified by Sen (1981) and Dubihlela and Sekhampu (2014). Meanwhile, per capita household expenditure was obtained by dividing the total household expenditures by the household size. Then, we set the two-thirds of the mean per capita household expenditure as the poverty line for each household. For instance, households whose expenditures are greater than two-thirds of the total households' per capita expenditure are regarded as non-poor while those below it are poor.

Table 6.2. Distribution of poverty status of rural households

Poverty index	N	Mean	Std. Deviation	Total (%)	N	Mean	Std. Deviation	Total (%)
	FREs as primary income source				FREs combined with other businesses			
Extremely poor	111	30830	44792	24.7%	77	14044	16381	23.5%
Moderately poor	183	62885	78974	40.8%	138	53034	74819	42%
Non- poor	155	117392	180388	34.5%	113	126800.	149622	34.5%
Total	449				328			

Source: Calculated from field survey, 2016

Note: FREs means Forest Related Enterprises; Total sample size of the households who engaged in FREs was 450 among whom 328 respondents combined other business with FREs as alternative income source and 121 respondents do not have other income source except FREs while 1 respondent was missing.

On the other hand, those households with expenditures less than one-third of the total households' per capita expenditure are regarded as core-poor i.e. extremely poor. In addition, households whose expenditures are greater than one-third of total households' per capita expenditure but less than two-thirds of the total expenditure are regarded as moderately poor.

From Table 6.2, it was shown that out of total rural households with exclusively forest income in the sample, less than 35% of them were non poor while about 41% were

moderately poor and approximately 25% were extremely poor. On the other side, about 24% households that combined forest income with other sources of income were extremely poor while 42% were moderately poor and also less than 35% were non poor. On the aggregate, the average total households that were poor (i.e. extremely and moderately poor) on each side was 65.5%. 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%) 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 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 59.1% which is close to 65.5% 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.

6.3.3. 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 6.3 below. Using the headcount index (P_0) to measure the proportion of the population that is poor, the results showed that 68% of the rural households[20] are living below the 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 capita 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).

 poverty line. This therefore indicates that close to three-quarter of the sampled households had their monthly per capita expenditures that is less than ₦ 18,331[21].

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[20] *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.*

[21] *₦18331 set as 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*

Table 6.3: Decomposition of poverty by states and socio-economic characteristics

State	Poverty incidence	Poverty gap	Poverty severity
Oyo	0.4968	0.2484	0.4415
Osun	0.7703	0.5272	0.3532
Ogun	0.7055	0.4865	0.3095
Age	Poverty incidence	Poverty gap index	Poverty severity
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
Sex	Poverty incidence	Poverty gap index	Poverty severity
Male	0.6089	0.4776	0.2904
Female	0.7247	0.5068	0.336
Education	Poverty incidence	Poverty gap index	Poverty severity
Noformal 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
Marital status	Poverty incidence	Poverty gap index	Poverty severity
Single	0.7593	0.6136	0.4444
Married	0.6308	0.4656	0.2847
Divorced	0.6111	0.4778	0.2845
Seperated	0.7115	0.6303	0.4474
Religion	Poverty incidence	Poverty gap index	Poverty severity
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, 2016

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% and 70% of rural households average monthly

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answer was calculated. That is, setting the two-thirds of the mean per capita household expenditure. It coincidentally matched the present Nigerian workers' minimum wage (2016)

expenditures respectively were not up to ₦18,331. Oyo state was thus recorded lowest of about 50% 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 compared 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.

The poverty gap *index* (P_1) measures the extent to which individuals fall below the poverty line (the poverty gaps) as a proportion of the poverty line. It provides information regarding how far away households are from the poverty line. This measure captures the average sum of the differences between the poverty line and actual consumption levels of all people living below that line. It also reflects the per capita cost of eradicating poverty[22]. In other words, it gives the total resources that would be required to bring every poor person up to the poverty line. The sum of these poverty gaps gives the minimum cost of eliminating poverty, if transfers were perfectly targeted. Table 5.3 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 ₦18331) per household per month to close the poverty gaps in the state while a sum of ₦9,664 (that is (P_1) 0.5272 × ₦183315) 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 × ₦18331) 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.

The squared poverty gap index [(also known as the *poverty severity index*, (P_2)] averages the squares of the poverty gaps relative to the poverty line. It is a measure of a distributional sensitive index that can detect the expenditure distribution among the poor. It is one of the Foster-Greer-Thorbecke (FGT) class of poverty measures that allow one to vary the amount

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[22] *See Haughton and Khandker (2009): Measures of Poverty, Chapter 4, pp. 67*

of weight that one puts on the income (or expenditure) level of the poorest members in society. The FGT poverty measures are additively decomposable. It is also possible to separate changes in the FGT measures into a component resulting from rising average incomes, and a component resulting from changes in the distribution of income[23].

Table 6.3 revealed that the severity of poverty (P_2) among households surveyed are 0.4415, 0.3532 and 0.3095 in Oyo, Osun and Ogun states respectively. This indicates that poverty is more severe in Oyo state followed by Osun 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 put on the income (or expenditure) level of the poorest household varies since all households of a given state may not have equal standard of living. For example, Oyo state recorded the least poverty gap while Osun state was the highest contrary to their respective poverty severity index. This therefore means that their poverty gaps were not weighted equally because some households in Oyo state are more severely poor than those in Osun state. In other word, the sensitivity of the index to poverty (α) is greater in Oyo than that of Osun state. For all $\alpha > 0$, the measure is strictly decreasing in the living standard of the poor (i.e., the higher the value of α, the greater the poorer one is). When parameter $\alpha = 0$, P_0 is simply the headcount index. When $\alpha = 1$, the index is the poverty gap index P_1, and when α is set equal to 2, P_2 is the poverty severity index.

Table 6.3 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 aged households than the older aged households. The same thing was applicable to their poverty gap index as well as poverty severity index.

Male-headed households had less poverty than their female-headed counterpart 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 the businesses that responsible for such[24]. It could also be as a result of the fact that in most parts of rural Nigeria, female-headed

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[23] *As in 3*

[24] Shackleton (2011): Opportunities for enhancing poor women's socioeconomic empowerment in the value chains of three African non-timber forest products (NTFPs): *International Forestry Review Vol.**13**(2), pp. 142*

households are always involved in many other trading occupations (Omonona, 2009). This is however in contrast with the findings of Ogwumike and Akinnibosun (2013) which stated that female-headed households had less poverty than their male-headed counterpart.

Households' years of education reduces poverty as those with tertiary education have less poverty than those with little or no formal education. Unsurprisingly, poverty is lower when the level of education increases. Therefore, this result is not surprising 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 others 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 6.3 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, in terms of poverty headcount, there was no much distinction between Muslims and Christians venturing into forest related businesses. 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.

On the other hand, traditional worshippers recorded high poverty incidence but relatively similar poverty gap and poverty severity with Muslim households. This similarity may not be unconnected with their religious beliefs of having large family size and other factors. For example, in Islam, some bush meats are taboos. Food consumed by Muslim devotees must be

Halal (permissible) (Omar and Jaafar, 2011). Likewise, most traditional healers have the belief of not attaching economic benefit to some of their healing activities unlike modern dispensaries if the authors' personal observations are to be followed.

6.3.4. Socio-economic benefits of forest income on households' welfare

In Table 6.4, 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 their study entitled 'Measuring the role of forest income in mitigating poverty and inequality: evidence from south-eastern Nigeria'. The simple explanation for this 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 of 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 6.4: Effects of forest income on households' welfare

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, 2016

First, in terms of poverty headcount measure and poverty gap, almost 68% 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%, a relative drop of 4%. The poverty gap indices was conventionally measured to be 73% but reduced to about 66% with a drop of about 7% when forest income was included. However, poverty severity indices recorded a relatively large drop, that is, a fall of about 18% 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).

6.3.5. Decomposition of socio-economic benefits of forest on poverty status by states

This section presents the decomposition of socio-economic benefits of FREs on poverty status of the respondent by state grouping. The results show that there was a dichotomy in the poverty status when decomposed across Oyo, Ogun and Osun states in the region as observed from Table 6.5 below. As earlier noted, the poverty line calculated for the region as at the time of this survey is N18331 equivalent to US$92[25]. Using this index to determine the poverty status of the rural households with and without forest, the results showed that there is no significant difference in terms of poverty headcount measure across these states with and without forest income.

Table 6.5: FGT analysis with FREs and without FREs for each state

Poverty index	Oyo		Ogun		Osun	
	With FREs	Without FREs	With FREs	Without FREs	With FREs	Without FREs
Poverty incidence	0.65	0.66	0.63	0.66	0.58	0.62
P_0 differentials		0.01		0.03		0.04
Poverty Gap index	0.64	0.79	0.67	0.79	0.60	0.72
P_1 differentials		0.15		0.12		0.12
Poverty Severity index	0.49	0.71	0.52	0.70	0.46	0.64
P_2 differentials		0.22		0.18		0.18

Source: Calculated from field survey, 2016

But to a certain extent, their poverty gap and poverty severity indices show some significant differentials. For instance, with inclusion of forest income, there was a poverty reduction to the magnitude of 15%, 12% and 12% for Oyo, Ogun and Osun states respectively in terms of poverty gap indices. Also, poverty severity of forest income households was lesser compare to those other households without forest income ranging from 22%, 18% and 18% in Oyo, Ogun and Osun states respectively as observed in Table 6.5 above. This means that there is

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[25] The dollar to naira exchange rate as at the time of this survey February, 2016 was officially NGN199.25 to US$1but NGN347 to US$1 at the black market. Nigerian Naira To US Dollar Black Market Rate. Central Bank of Nigeria (CBN) said the post-devaluation band for the naira is "appropriately priced", but black market dealers out on the street are trading it at around 3-5 per cent below its floor.

much influence of forest income on the welfare of households in Oyo state than in Ogun and Osun states while these two states stood at par. As earlier noted in Table 6.3, these findings therefore suggest that forest indigenous people in Oyo state usually maximise their entrepreneurship potentials and inclinations with respect to forest related enterprise which led to some levels of improvements as far as their well being is concerned.

However, the same reason (inability of the government to pay salaries and allowances of people who are predominantly civil servants) that was earlier advanced for the poor standard of living of most households in Osun state due to th e dwindling economic situation of the state might be responsible for their inability to explore much benefits from forest related businesses to improve their welfare. Similarly, the same scenario (as in Osun state) was found in Ogun state which therefore suggests that more attention is required in terms of maximising forest potentials in the state to improve the welfare of the so-called forest indigenous people in particular and other rural populace in general.

6.4. Study summary

Firstly, the study assessed the poverty status of rural households in the study area using FGT 1984 poverty index. The results showed that 68% of the rural households are living below the poverty line in the region. When the sample was disaggregated on state basis, the highest proportion is found in Osun state (77%), followed by Ogun state (70%) and Oyo state with about 50%. The study also revealed the minimum cost required to bring these poor households to the poverty line across states.

Secondly, the study also assessed the economic benefits of forests on poverty status of the rural households. FGT 1984 poverty index results also suggest that forest related enterprises has reduced poverty incidence in the study area by 17% whereas both the extremely and moderately poor households have been reduced by 8% and 10% respectively. This showed that forest income is capable of stemming the tide of poverty in the region even though with a relative magnitude.

6.5. 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 65.5% of the rural households are living below the poverty line in the region. At state level, the highest

proportion is Osun state (77%), followed by Ogun state (70%) and Oyo state with about 50%. 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 0.4415, 0.3532 and 0.3095 in Oyo, Osun and Ogun states respectively. This indicates that poverty is more severe in Oyo state followed by Osun state but less severe in Ogun state.

Generally, less than 35% of the total sampled rural households in the region that earned their living from forest income were non poor while more than 65% were poor of whom about 38% were extremely poor and 62% were moderately poor. Moreover, regarding the impact of forest income on the poverty status of the households, our findings show that forest related enterprises has reduced poverty incidence in the study area by 17% whereas both the extremely and moderately poor households have been reduced by 8% and 10% respectively. This showed that forest income is capable of stemming the tide of poverty in the region even though with a relative magnitude. Specifically, in terms of poverty headcount measure, almost 68% 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%, a relative drop of 4%. The poverty gap indices was conventionally measured to be 73% but reduced to about 66% with a drop of about 7% when forest income was included.

However, poverty severity indices recorded a relatively large drop, that is, a fall of about 18% with inclusion of forest income. At state level for instance, with inclusion of forest income, there was a poverty reduction to the magnitude of 15%, 12% and 12% for Oyo, Ogun and Osun states respectively in terms of poverty gap indices. Also, poverty severity was lesser compare to those other households without forest income ranging from 22%, 18% and 18% in Oyo, Ogun and Osun states respectively. This means that there is much influence of forest income on the welfare of households in Oyo state than in Ogun and Osun states while these two states stood at pal.

6.6. Policy implications
Owing to the above findings, three major policy recommendations can be posited. First, the fact that our results suggest 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 grass root who have been economically marginalized from previous poverty alleviation schemes.

Secondly, the study results also suggest 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 must increase opportunities for entrepreneurship and employment in forestry without afflicingt the environment or cause deforestation. That is to say, 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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Chapter 7: Forest-Related Enterprises and Income Inequalities among Rural Households in South-western Nigeria.

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Abstract

This paper analyses forest income inequality among forest–related entrepreneurs in South-western Nigeria. A multi-stage random sampling approach was adopted in selecting the respondents' sample of the study. A total of four hundred and fifty households were interviewed with the aid of structured questionnaires. Descriptive statistics and Gini coefficient decomposable technique were used to estimate income inequalities among forest entrepreneurs in the study area. Plank, vegetables, furniture making, fuel wood, fruit and charcoal businesses were found to be prominent relative to total sampled population while bush meat, dried fish, broom, honey, wood craft, snail, medicinal plants, pole and leaves businesses in that order were moderately prominent. Also, gum, dye, fibre, insect and spices businesses were the least prominent. About 34.25% of the total sampled households were non poor, 42.75% were moderately poor and 23% were extremely poor. Returns from some FREs are high and capable of improving the household well-being while some FREs yield very low returns and could not substantially cater for the household. Also, aggregate income inequality for the region was found to be 0.73 and that, engaging in diverse income sources would reduce income inequality across the sample. Finally, forest enterprises income is the most correlated with total household income with a correlation coefficient of 0.72 followed by commerce income with a correlation coefficient of 0.91. The study therefore recommends that forest-based approaches, such as market development for forest products like wood, bush meat, wood crafts, furniture making and pole should be aided.

Keywords: *Forest-related enterprises; rural household; income inequality; income source, South-western Nigeria*

7. Introduction

Nigerian households are not just poor but suffering immensely from inequality in terms of assets, basic human needs as well as human capability deprivation including exposure to violence as well as pervasive insecurity (World Bank, 2000). There is no doubting the fact that income inequality is pervasive in most developing countries of the world including Nigeria (An Hodgson, 2012). Nigeria Gini index was found to fall within the range of 0.5 and 0.7 compare to some other countries with relatively impartial distributions such as Greece, Germany among others having their Gini index between 0.20 and 0.35 (Euromonitor International, 2011). Nigeria is among the thirty most unequal countries in the world with respect to income distribution, the poorest half of the population possesses not more than 10% of national wealth (Idowu *et al.*, 2011; British Council, 2012; Mbanasor *et al.*, 2013:200). Going by the United Nations Development Programme [UNDP] (2009), Nigeria inequality rose between 1985 and 2004 (from 0.43 to 0.49), although some say it had been declined in 1990 from 0.491 to 0.438 (Ortiz and Cummins, 2011: 48) yet, it is still high. If inequality is used as a parameter to estimate the Nigeria's Human Development Index, the value falls considerably, from 0.423 to 0.246 (UNDP, 2009). This declining Human Development Index value is a reflection of the rate of poverty orchestrated by a fast increasing population and an unfair distribution of income, whereby a larger percentage of

Nigeria's wealth is concentrated in the hands of the most well-off people of not more than 20% of the population possessing about 65% of the national wealth (UNDP, 2009).

However, considering the natural endowment in Nigeria, forests have rescued majority of hopeless masses to reduce the inequality and contributed immensely to influence patterns of economic development, sustaining livelihoods, and promoting sustainable growth. Forest resources are prime constituent of the natural resource base of any community, region or country upon which the socio-economic well-being of the people of those communities depends most especially in Sub-Saharan Africa including Nigeria (Richardson *et al.,* 2011:3).

Moreover, in assessing the role of forests and non-timber forest products in sustaining livelihood in most of developing countries, Richardson *et al.* (2011:3) categorized forest uses into groups, including food, fuel, shelter, erosion control, and water conservation. They assessed the total amount of foods produced from trees, the wild foods gathered, and animals hunted from forests, and the forest resources used in generating non-farm income and wage employment and estimated that between 60 and 70% of the population in developing countries live and work near forested areas. 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 reserves 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 (Richardson *et al.,* 2011:3).

Furthermore, several studies have corroborated the important roles of forests to include income generation for welfare improvement. Yet, the challenges of disproportionate income distribution among rural households still remain unabated despite being opportune to explore variety of income sources through forest related enterprises (FAO, 2011). Similarly, in spite of rising evidence about the importance of forest products in various dimensions and as the livelihood diversification options and strategies of rural households, the roles of specific forest resource types still remain obscure (UNFF, 2013). This lack of understanding does not only limit the ability of policy makers in efficiently allocating scarce forest resources, but also hinders their ability to accurately determine how many such allocation might impact vulnerable and poor rural communities (Paumgarten, 2005). Therefore, there is an urgent need for better data on the specific contributions of forests income sources that reduce or increase disparity in income distribution among forest related entrepreneurs in order to assist

governments and policymakers concerning the identification of the target groups that will enhance more equitable distribution of income among rural households and most especially for judicious allocation of resources among forest related entrepreneurs.

Arising from above, some questions are needed to be asked about various forest related enterprises that rural households are engaging in; most prominent forest related enterprises in the study area; the income sources that reduce or increase the disparity in income distribution and the effects of such income sources on forest related entrepreneurs in the study area. It is against this backdrop that the study seeks to investigate income inequality among forest–related enterprises with a view that such investigation would trigger opportunity to identify and improve on the distributional impacts of forest income on household welfare in South-western Nigeria.

7.1. Specific objectives:

- To profile and capture various forests related enterprises that rural households are engaging in.

- To determine which of the forest income sources reduces or increases the disparity in income distribution and the effects of such income sources on forest related entrepreneurs in the study site.

7.2. Methodology

7.3 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 300 and 70E and latitude 40 and 90N 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). Specifically, the study area where data were collected include: Ogun, Osun and Oyo States. See Chapter three sub-section 3.1. for more detailed information about the study area.

7.3.1. Analytical technique and model specification

Descriptive analysis and Gini coefficient decomposable technique were used to estimate the required variables. Descriptive analysis describes the socio-economic characteristics of the respondents and profiles variety of forest resources related enterprises that rural households are currently engaging in using SPSS and STATA computer programs. Chapter 3 sub-section 3.2. presents information on sampling frame and procedure for this study. However, to

determine the forest income sources that contribute to overall inequality in line with the second objective of this study, the Gini coefficient decomposable technique proposed by Lerman and Yitzhaki (1985) was adopted to reveal the contribution of each individual income source to overall income inequality as used by Adams (2001); McKay (2002); Huang *et al.* (2005); Babatunde (2008) and Wilson *et al.* (2010).

The Gini-coefficient is a measure of statistical dispersion most prominently used as a measure to show the degree of income distribution or inequality of wealth distribution between different households in a population.

$$I_{gini}\ (Y) = \frac{2}{n^2}\ \mu \sum\nolimits_{i=1}^{n} \left(i - \frac{n+2}{2}\ \right) Y_i \qquad (1)$$

Where: n = number of observations, μ = mean of the distribution, Y_i = income of the ith household, and I is the corresponding rank of income.

7.3.2. Gini coefficient decomposable technique

This method involves the estimation of the overall Gini-coefficient of total income, which can be decomposed according to the various income sources. According to Shorrocks (1982), if Y is the total income and it consists of income from k sources, viz. $y_1, y_2 .... y_k$ .Total income *Y* is thus given as:

$$Y = \sum_{k=1}^{k} Y_k \qquad (2)$$

Following Lerman and Yitzhaki (1985), the Gini coefficient of total household income is given by:

$$G_T = \sum_{k=1}^{K} S_k G_k R_k \qquad (3)$$

Where S_k represents the share of household forest income on total income, that is, how important the income source is in total income. G_k measures the Gini coefficient of each income source, that is, how equally (or unequally) distributed the income source is and R_k measures the Gini correlation between each income source and the distribution of total income. In other word, how the income source and the distribution of total income are correlated (Acosta *et al.,* 2008). Lerman and Yitzhaki (1985) showed that by using this method of Gini decomposition, the effects of a small change in income from any source, e.g. source k can be estimated, while income from all other known sources are kept constant.

Thus, the contribution of income source k to total income inequality is given as $S_k G_k R_k /G$, but the relative concentration coefficient of income source k in total income inequality is stated as:

$$g_k = G_k R_k / G \qquad (4)$$

Income sources with a relative concentration coefficient > 1 contribute to increasing total inequality, but those income sources with a relative concentration coefficient < 1 contribute to decreasing total inequality. The source elasticity of inequality, indicating the percentage effect of a 1% change in income from source k on the overall Gini coefficient, is given as:

$$(S_k G_k R_k /G) - S_k \qquad (5)$$

In the same way, the inequality elasticity of sum of income sources must be equal to zero. To be precise, if all the income sources changed by the same percentages, the overall inequality (G) remains unaffected.

Additionally, another way to estimate income inequality is through regression-based decomposition method (Babatunde, 2008). This method uses the per capita income or expenditure as a function of explanatory variables to determine how much income inequality is accounted for by each explanatory variables and how much is unexplained, as measured by the error term. The regression-based decomposition method is done by stating an income function as:

$$Y = X\beta + \varepsilon \qquad (6)$$

Where Y is the per capita income or expenditure, X is the matrix of explanatory variables; ε is the stochastic error term. The explanatory variables are exogenous individual, household characteristics, which determine income level. Such exogenous explanatory variables include; household's head education, household size, farm size, alternative income sources, market variables etc. Since the econometric results yield estimates of the income flows attributed to household variables, they allow the decomposition of inequality by factor income. The income contributed by the socioeconomic variables as given in the estimated regression equation is given as:

$$Y = \sum_{k=1}^{k} Y_k \quad \text{for all } i\text{th variables} \qquad (7)$$

The income flow can then be used to directly calculate decomposition component for all regression variables and the contribution of each of the socio-economic factors (X_i) to Gini inequality can be estimated.

7.4. Results and discussion

7.4.1. Socio-economic characteristics of rural households

The section presents the socio economic characteristics of the rural households that engage in forest related enterprises as reported in Table 7.1. Considering the proportion to size sampling method adapted for this study as reflected in sub-section 6.2.1, the distribution of age of the households' head 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.

Table 7.1: Socio-economic characteristics of rural households

Item	Frequency	Percentage
Household's Head Age		
≤ 20	3	0.7
21 – 40	168	37.4
41 - 60	212	47.2
61 - 80	66	14.7
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
No. of Male Adults		
≤ 2	313	69.7
3 - 4	16	3.60
5 - 6	109	24.3
7 - 8	11	2.40
No. of Female Adults		
≤ 2	339	75.5
3 - 4	17	3.8
5 - 6	93	20.7
Religion		
Islam	213	47.4
Christianity	223	49.7
Traditional	13	2.9

Source: Calculated from field survey, 2016

This reflects that about 80% of the respondents are still in their working age. 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 41per 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 may possibly have positive effects on the standard of living of most forest indiginous people in the study site.

In terms of marital status, almost three quarter of the sampled households were married while the remaining one quarter shares 12 per cent as single, 4 per cent as divorced and 11.6 per cent separated. Furthermore, about 66 per cent of the sample had between 3- 4 children within the household while about 16 per cent had less than or equal to two children. Meanwhile, of the total number of children within the sampled households, 69.7% and 75.5% constitute less than or equal to two male adults and female adults respectively. It was also revealed from the Table 7.1 that 47.4% of the respondents were Muslims while 49.7% were Christians and less than 3% were practising traditional religion. This therefore indicates that religious factors may not have much impact in venturing into forest related businesses giving credence to the two most commonly practised religions in the study area, that is Islam and Christianity which abhors the traditional use of forest products through trado-medicine or alternative medicine.

7.4.2. Forest- related enterprises (FREs)

Table 7.2 profiles most of the various forest- related enterprises that rural households employ in the study area as captured by this study. Although field experience reveals that some of the forest based entrepreneurs do combine several forest products for sales. For example, medicinal plants marketers offer a lot of Non Timber Forest Products (NTFPs) such as various plants roots, leaves, barks and seeds as traditional herbs and medicine; snails; insects and animals, honey among others.

Following the FREs profile as reported in Table 6.2, plank, vegetables, furniture making, fuel wood, fruit and charcoal businesses were found to be prominent relative to total sampled population while bush meat, dried fish, broom, honey, wood craft, snail, medicinal plants, pole and leaves businesses in that order were moderately prominent. On the other hand, gum, dye, fibre, insect and spices businesses were the least prominent. Following this categorization as observed in Table 6.2 above, 34.25% of the total sampled households were

non poor, 42.75% were moderately poor and 23% were extremely poor. This therefore means that the proportion of poor people (at both moderately and extremely poor categories) in the study area outnumbered the non poor which actually call for serious attention as that of the one given by this study in order to suggest appropriate policy recommendations in proffering necessary solutions to the menace in the study site.

Essentially, these findings then suggest that those households who ventured into some less lucrative businesses like gum, dye, fibre, insect and spices businesses are likely to belong to extremely poor categories while on the other hand, the non-poor households are possibly

Table 7.2: Profile of various forest related enterprises, sample households

Forest Related Enterprises (FREs)	Total	Poverty index					
		Extremely Poor		Moderately Poor		Non- Poor	
		No. of (EP)	% of (EP)	No. of (MP)	% of (MP)	No. of NP)	% of (NP)
Plank	76	4	5.3%	33	43.4%	39	51.3%
Mat making	15	6	40.0%	5	33.3%	4	26.7%
Furniture	49	11	22.4%	18	36.7%	20	40.8%
Wood craft	28	8	28.6%	8	28.6%	12	42.9%
Charcoal	41	16	39.0%	15	36.6%	10	24.4%
Fuel wood	47	17	36.2%	20	42.6%	10	21.3%
Paste & mortar	17	4	23.5%	5	29.4%	8	47.1%
Chew stick	18	8	44.4%	5	27.8%	5	27.8%
Bush meat	37	1	2.7%	21	56.8%	15	40.5%
Snail	26	4	15.4%	16	61.5%	6	23.1%
Fish	33	11	33.3%	11	33.3%	11	33.3%
Fruit	44	12	27.3%	16	36.4%	16	36.4%
Medicinal plants	25	7	25.0%	15	53.6%	6	21.4%
Gum	1	1	100.0%	0	0.0%	0	0.0%
Broom	32	6	18.8%	22	68.8%	4	12.5%
Poles	21	3	14.3%	9	42.9%	9	42.9%
Locust bean	10	4	40.0%	2	20.0%	10	40.0%
Insect	7	2	28.6%	4	57.1%	1	14.3%
Spices	10	2	20.0%	7	70.0%	1	10.0%
Leaves	20	6	30.0%	14	70.0%	0	0.0%
Mushroom	11	6	54.5%	4	36.4%	1	9.1%
Honey	29	6	20.7%	12	41.4%	11	37.9%
Cane	24	1	4.2%	17	70.8%	6	25.0%
Vegetables	63	15	23.8%	29	46.0%	19	30.2%
Fibre	5	0	0.0%	4	80.0%	1	20%
Local wine	18	5	27.8%	7	38.9%	6	33.3%
Dye	5	3	60.0%	2	40.0%	0	0.0%
TOTAL	400	92	23%	171	42.75%	137	34.25%

Source: Calculated from field survey, 2016
Note: *EP indicates Extremely poor household , MP indicates Moderately poor while NP means Non poor*

those plank sellers, furniture makers, fruit, fuel wood, and charcoal sellers. Likewise, those other households who are moderately poor are venturing into bush meat, dried fish, broom, honey, wood craft, snail, medicinal plants, pole and leaves businesses.

Giving credence to income generation from FREs, the estimation of the value of subsistence income is complicated in ways that are similar to the estimation of the potential value of resources. Often, researchers do not attempt to estimate income directly but use other data to demonstrate the importance of forest income to household life. The estimation of cash income is thus more straightforward, especially when there are quality and accurate data for the estimation. Cash income can be estimated directly to determine the standard of living of an individual and a household. Therefore, for the purpose of this study, cash income was used to estimate the contribution of forest related enterprise to subsistence household livelihood as presented in Table 7.2 above.

7.4.3. Prominence rates and subsistence-earnings[26] from FREs

In Table 6.3, the study disaggregates the forest related entrepreneurs on the basis of their welfare categorization. Some are extremely poor, moderately poor while some are non poor based on their poverty index measures. Households whose per capita expenditures are less than one-thirds of the total households' per capita expenditure are regarded as extremely poor while those households that had their 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 as classified by Sen (1981) and adopted by Dubihlela and Sekhampu (2014).

At this juncture, this study considers only two categories of forest households (the extremely poor and the non-poor forest households) for easy determination of the level of households' subsistence income while the moderately poor category serves as a relative base-line of the standard of living of the households.

Basically, households are considered non poor since their per capita monthly expenditure is equal to or greater than the pre- determined poverty line of ₦ 18,331[27].

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[26] *Subsistence earning of rural forest related entrepreneurs with respect to the proportion of non poor as well as extremely poor classes.*

[27] *₦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 7.3: Rate of prominence and subsistence-earnings[28] distribution by FREs

Order of Prominence	FREs	Total	Poverty index			
			No. of (Extremely Poor)	% of (Extremely Poor)	No. of (Non Poor)	% of (Non Poor)
High Returns Forest - Related Enterprises						
1st	Plank	76	4	5.3%	39	51.3%
2nd	Bush meat	37	1	2.7%	15	40.5%
3rd	Poles	21	3	14.3%	9	42.9%
4th	Paste & mortar	17	4	23.5%	8	47.1%
5th	Furniture	49	11	22.4%	20	40.8%
6th	Wood craft	28	8	28.6%	12	42.9%
7th	Locust bean	10	4	40.0%	10	40.0%
8th	Honey	29	6	20.7%	11	37.9%
9th	Fruit	44	12	27.3%	16	36.4%
Middle Returns Forest - Related Enterprises						
1st	Local wine	18	5	27.8%	6	33.3%
2nd	Fish	33	11	33.3%	11	33.3%
3rd	Vegetables	63	15	23.8%	19	30.2%
4th	Cane	24	1	4.2%	6	25.0%
5th	Chew stick	18	8	44.4%	5	27.8%
6th	Charcoal	41	16	39.0%	10	24.4%
7th	Snail	26	4	15.4%	6	23.1%
8th	Fibre	5	0	0.0%	1	20%
9th	Medicinal plants	25	7	25.0%	6	21.4%
10th	Fuel wood	47	17	36.2%	10	21.3%
11th	Broom	32	6	18.8%	4	12.5%
12th	Insect	7	2	28.6%	1	14.3%
Low Returns Forest - Related Enterprises						
1st	Gum	1	1	100.0%	0	0.0%
2nd	Dye	5	3	60.0%	0	0.0%
3rd	Leaves	20	6	30.0%	0	0.0%
4th	Mushroom	11	6	54.5%	1	9.1%
5th	Spices	10	2	20.0%	1	10.0%

Source: Calculated by the authors from the field survey 2016
Note: *EP indicates Extremely poor household while NP means Non poor*

However, by decomposing the rural household on the basis of their respective FREs with respect to the proportion of non poor and extremely poor classes as observed in Table 7.3 below, plank business (51.3% NP; 5.3% EP) was the most lucrative and worthwhile venture among all FREs in the region since it has recorded largest proportion of non poor as well as the least proportion of the extremely poor entrepreneurs in the region.

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[28] *Subsistence earning of rural forest related entrepreneurs with respect to the proportion of non poor as well as extremely poor classes.*

One of the reasons for this might be due to the fact that planks are produced in different dimensions that are priced differently in the market.

For instance, industrial round wood, sawn wood, and wood panels and several bye products such as fire wood. saw dust etc. are obtainable from plank business and might be an additional advantage to the entrepreneurs. So, this suggests that timber processing business in form of plank has certain anti-poor characteristics.

Another possible justification for the lucrativeness of plank business is that some poor are excluded from access to timber wealth precisely because the value of timber in some respects is so high and because the poorer people lack the resources to venture into it. Although plank processing and sales as small and medium-scale forest enterprises (SMFEs) for local markets require relatively much capita, technology, and skills and is aimed at fairly specialised consumer markets (Sunderlin, 2008). The second most prominent and lucrative business in the study site is bush meat (40.5% NP; 2.7% EP). Some of the likely explanations that can be advanced for this outcome might be that rural dwellers consider it as alternative means of saving cost due to availability of abundant bush animals in their domains. As such, there could be some comparative advantages for bush meat over any other. Others may prefer eating bush meat because of its attendant nutritional values.

Many literature confirmed the importance of bush meat and fish as sources of both calories and proteins (Adams *et al.,* 2009; Adams and Piperata, 2014). Although, most human activities such as grazing and hunting bush meets are restricted. The institutional authorities such as federal and state department of forestry that are overseeing the management of this conserved wildlife ensure that there are controlled hunting activities. Nonetheless, bush meets are usually available gotten most especially through natural and community forests.

Furthermore, other prominent and lucrative FREs include; poles (42.9% NP; 14.3% EP), paste and mortar (47.1% NP; 23.5% EP), furniture making (40.8% NP; 22.4% EP) and wood craft business (42.9% NP; 28.6% EP) in that order. These findings are in agreement with the findings of Alao and Kuje (2012) who posited that the viability of small and medium scale forest enterprises (SMFEs) such as furniture industries is very enduring. This has been succinctly shown by the outcome of their findings on economies of small-scale furniture production in some part of northern Nigeria. Conversely still, engaging in some businesses such as gum (0% NP; 100% EP), dye (0% NP; 60% EP), leaves (0% NP; 30% EP), mushroom (9.1% NP; 54% EP) and spices businesses (10% NP; 20% EP) might not be

worthwhile in the region unless they were being combined with other lucrative ones to boost their sales just like the medicinal plants sellers as earlier noted.

Arising from the above, there are two perspectives providing evidences for engaging in FREs relative to its potentials to household subsistence. First is the fact that returns from some FREs are high and capable of improving the household well-being. This argument is in line with the review of related literature by Neumann and Hirsch (2000) in their work titled; 'Commercialisation of Non-Timber Forest Products: Review and Analysis of Research'. They cited study on the trade in medicinal and aromatic plants (MAPs) from Nepal to India in the Gorkha District, Nepal; assessment of whether tagua harvesting in Ecuador is an economically rational activity and the emergence of basket making for tourist and export markets in southern Africa, among others all of which recorded high returns.

On the other hand, some FREs yield very low returns and could not substantially cater for the living of the households. Although, to buttress this point, not all studies report findings were in agreement with relatively high income generation from FREs. For instance, some NTFPs harvested for sale in Port city of Belém yielded a very low remuneration and rattan harvest in Central Kalimantan; Indonesia suffered high return due to low encouragement (Neumann and Hirsch, 2000). So, good attention should be given to those high return enterprises in order to improve on their marketability and overall value addition to command more profits for the entrepreneurs in the study area. On the contrary, that is not to say that those low return ones should be wrecked or neglected. Instead, more incentives are required to the business people to boost their respective businesses.

7.4.4. Forest income and income inequality

This paper analyzes overall income inequality among rural households in South-western region of Nigeria and how individual income sources contribute to the observed inequality as presented in Table 7.4. For this purpose, the study used the Gini decomposition method, which allows the decomposition of the overall Gini coefficient into different components. The decomposition of income inequality by various income sources makes it possible to find out whether forest source plays any important role to improve income distributional pattern among these forest fringe households.

The aggregate income inequality of 0.66 for the region is higher than what was reported in most literature. For instance, Olaniyan and Awoyemi (2005) reported Gini coefficient of 0.52 while Oyekale *et al.* (2006) reported the same 0.52 for the South-west region. This implies

that there is about 14% increase in inequality of the region rural households within a period of a decade. Although, one possible source of discrepancy might be measurement error in the household survey data, e.g. inclusion of information on home consumed forest products among others. It is also possible that the authors' estimate was based on a measure of income that did not include forest resources. Similarly, considering the mean of all income sources inequalities which is 0.93, it equally suggests that the level of inequality among all income sources in the sample is on the high side. The implication of this is that there is a great deal of social variation in income distribution – between and within the rural households in the region.

Moreover, income sources with a relative concentration coefficient that is greater than one contribute to increasing total inequality, but those income sources with a relative concentration coefficient that is less than one contribute to decreasing total inequality for the region, indicating that engaging in diverse income sources would reduce income inequality across the sample. However, not all income sources reduce income inequality as revealed in Table 7.4.

7.4: Gini decomposition of income inequality by income sources

Income Source	Income Share	Gini coefficients	Correlation with total income distribution	Pseudo-Gini coefficients	Percentage contribution to total income inequality	Relative concentration of income source	Source elasticity of total inequality
	(Sk)	(Gk)	(Rk)	$(GkRk)$	$(SkGkRk/G)$	$(GkRk/G)$	$(SkGkRk/G)-Sk$
Forest Enterprises Income	0.664	0.723	0.999	0.723	49.9	0.770	- 0.165
Non Forest Wage Income	0.062	0.978	0.98	0.939	5.8	1.023	- 0.001
Forest Wage Income	0.040	0.996	0.771	0.768	3.1	1.061	- 0.008
Non Farm Income	0.022	0.953	0.972	0.927	2.1	1.016	- 0.001
Farm Income	0.024	0.964	0.969	0.934	2.3	1.027	- 0.001
Self employed Income	0.022	0.976	0.96	0.937	2.1	1.040	- 0.001
Government Income	0.047	0.958	0.974	0.933	4.5	1.021	- 0.001
Commerce Income	0.061	0.918	0.985	0.904	5.7	0.978	- 0.004
Remittance/Transfer Income	0.007	0.964	0.969	0.934	0.7	1.027	- 0.000
Total	1.000	0.658					

Source: Calculated by the authors from the field survey 2016
Note: Estimates are based on monthly per capita expenditures expressed in terms of adult equivalents.

Turning to the source income Gini coefficients, each is higher than the aggregate income Gini. Table 7.4 gives the share of total income inequality attributed to each income source. It is observed that – among the disaggregated income sources – forest enterprises income is the most correlated with total household income with a concentration coefficient of 0.77 followed by commerce income with a correlation coefficient of 0.97. This thus suggests that forest enterprise income and commerce income decreases total inequality and contributed the largest shares to total income inequality. Largely, income from forest related enterprises alone made up largest shares of almost 50% of the aggregate income. Alternatively, non forest wage income, forest informal employment income, other self employed income, government income, farm income and remittance transfer income increase total inequality to a large extent because their respective percentage contributions to total income inequality are very negligible as shown in column 6 of Table 7.4.

In addition, the level of inequality among all other income sources was very implausible and upsetting with forest informal employment income (0.99 Gini coefficients) and other self employed income (0.97 Gini coefficients) were the most unequally distributed income sources in the sample. The relatively lower Gini coefficient of 0.72 for forest enterprises income (when compare with informal employment and self employed income sources with 0.99 and 0.97 Gini coefficients respectively) conforms absolutely with the findings of Fonta and Ayuk (2013) who also reported the same Gini coefficient of 0.718 for forest income as the second highest income source that reduces total inequality in South-eastern Nigeria. Besides, comparing the Gini coefficient of the forest enterprises income source of 0.72 and that of the aggregate income Gini for the region which is 0.66, it therefore means that forest enterprises income has approximately an equalizing effect on total income inequality in the region.

Furthermore, the source elasticities suggest that a 10% increase in forest-related enterprises and commerce income would reduce the overall Gini coefficient by 1.7% and 0.4% respectively while a 10% increase in other income sources would lead to an increase in the overall Gini coefficient by 0.1% except remittance/transfer income with 0% elasticity to total inequality. This is no surprise since forests offer a more egalitarian source of income compared with most other sources at the study sites as conformed with Fisher (2004) with similar result. Although, commerce income being the second income source that also reduce total inequality in the region but it could not be said to have significant effect in matching the

inequality gap in the region. In other word, commerce income was associated with a small reduction in income inequality in the sample site.

On the other hand, the Gini coefficients for wage income (forest - 0.99 and non forest - 0.95) were higher than 0.84 Gini for wage income in Malawi by Fisher (2004). A possible explanation for this phenomenon might either be that, labour was in short supply probably as a result of over migration of rural populace to the cities or perhaps, they are being exploited. Unlike in Bhutan where there was 51.4% contribution of the wage non-farm income to the overall Gini coefficients of rural households (Rahut *et al.,* 2015).

Moreover, non farm income Gini of 0.95 in the sample site was relatively similar to 0.9 Gini for rural household in Malawi, (Fisher, 2004); but lower than 0.52 and 0.67 Gini for some other rural areas in Nigeria as reported by Olaniyan and Awoyemi (2005) and Ayinde *et al*. (2012) respectively. For the farm income however, Gini of 0.96 was at variance with 0.52 by both Fisher (2004) and Olaniyan and Awoyemi (2005) on the one hand and 0.69 by Ayinde *et al*.(2012) on the other hand.

Evidence from literature seems to suggest higher income Gini for remittance /transfer income as this usually neither associate with inequality reduction nor offer much shares to the total income (Yemiru *et al*., 2010; Fisher, 2004; Fonta and Ayuk, 2013). This is not to suggest that the remittance income should be discarded in the econometric analysis of the contribution of diverse income sources to the total income. On the contrary, more opportunity and priority should be given to those income sources that have significant contribution to disparity in income distribution in the rural areas. This however would discourage too much dependency on transfer income and conversely improve productivity among rural dwellers.

7.5. Summary
The first objective of this study was to profile various forest related enterprises that rural households are engaging in the study area. The descriptive results indicate that plank, vegetables, furniture making, fuel wood, fruit and charcoal businesses were found to be prominent relative to total sampled population while bush meat, dried fish, broom, honey, wood craft, snail, medicinal plants, pole and leaves businesses in that order were moderately prominent. Also, gum, dye, fibre, insect and spices businesses were the least prominent.

Secondly, the study determined which of the forest income sources reduces or increases the disparity in income distribution and the effects of such income sources on forest related

entrepreneurs in the study site using Gini coefficient decomposable technique. The results suggest that aggregate income inequality for the region was 0.73 and that, engaging in diverse income sources would reduce income inequality across the sample. Likewise, forest enterprises income was the most correlated with total household income with a correlation coefficient of 0.72 followed by commerce income with a correlation coefficient of 0.91.

7.6. Conclusions

This paper analysed the activities and performances of forest entrepreneurs and the disparity in their income sources in South-western region in Nigeria. The data indicates that plank, vegetables, furniture making, fuel wood, fruit and charcoal businesses were found to be prominent relative to total sampled population while bush meat, dried fish, broom, honey, wood craft, snail, medicinal plants, pole and leaves businesses in that order were moderately prominent. On the other hand, gum, dye, fibre, insect and spices businesses were the least prominent.

The data also indicate that 34.25% of the total sampled households were non poor, 42.75% were moderately poor and 23% were extremely poor. By decomposing the rural household on the basis of their respective FREs with respect to the proportion of non poor as well as extremely poor classes, the study equally revealed that plank business was the most lucrative and worthwhile venture among all FREs in the region with 51.3% non poor and 5.3% extremely poor. The second most prominent and lucrative business in the study site is bush meat having 40.5% non poor and 2.7% extremely poor. Furthermore, the study suggests that engaging in some businesses such as gum, dye leaves mushroom and spices businesses might not be worthwhile in the region unless they are combined as a single steady business. These findings thus suggest two perspectives for engaging in FREs relative to its potentials to household subsistence. First is the fact that returns from some FREs are high and capable of improving the household well-being. On the other hand, some FREs yield very low returns and could not substantially cater for the livelihood of the household.

In addition, the study analyzed overall income inequality among rural households in South-western region of Nigeria and how individual income sources contribute to the observed inequality. The study suggests that the aggregate income inequality for the region is 0.73 and that engaging in diverse income sources would reduce income inequality across the sample. However, – among the disaggregated income sources – forest enterprises income is the most correlated with total household income with a correlation coefficient of 0.72 and followed by

commerce income with a correlation coefficient of (0.91). Alternatively, non forest wage income, forest informal employment income, other self employed income, government income, farm income and remittance transfer income increase total inequality.

7.7. Policy implications

The main policy implication of the study is that forests may have a role in poverty mitigation in South-western region in Nigeria, but to facilitate the process of poverty mitigation, careful targeting and a mix of forest-based and other approaches to poverty mitigation is necessary. Results indicate that plank, bush meat, pole, paste and mortar and furniture making businesses were the most lucrative and worthwhile ventures among all FREs in the region and might alleviate poverty. However, efforts to conserve the region's forests, such as restricted access, might lead to reduced welfare of the households who depend on timber to advance their income. Therefore, a more effective pro-poor (and pro-forest) strategy may be one that assists the poor in diversifying the sources of income to maintain the balance. Towards this end, public investment in the (non-forest) wage-work and self-employment sectors may be warranted, for example, food-for-work interventions, and micro lending programs.

On the other hand, those less prominent and less lucrative FREs such as gum, dye, mushroom, leaves and spices sellers can also be assisted through provision of credit access to expand the scope of their businesses thereby lifting them up in their respective businesses.

The study suggests that there is high degree of inequality among rural households in the region and that forest related enterprises and commerce incomes are the only sources of income that has the capacity to reduce the disparity in income distribution gap. Therefore, forest-based approaches, such as market development for forest products like wood, bush meat, wood crafts, furniture making and pole should be aided. Such approaches can increase local incentives to sustainably manage forest resources on which enterprises depend. But careful implementation is necessary, because the rise in value of forest products may stimulate over-harvesting of resources as explained by (Neumann and Hirsch, 2000). Also, credit facilities should be made friendly accessible to local traders to boost their commerce and consequently divert the attention of some marketers particularly to some low return forest related businesses like gum, dye, mushroom and spices which can minimize economy-environment tradeoffs.

7.8. References

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Chapter 8: Sources and Impact of Income Inequalities among Rural Households: A Case Study of Forest Related Entrepreneurs in South-western Nigeria.

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Abstract

This study assesses the sources and impact of income inequality among forest related entrepreneurs in South-western Nigeria. A multi-stage random sampling approach was adopted in selecting the respondents' sample of the study. A total of four hundred and fifty households were interviewed for the study and data were collected through the aid of structured questionnaire. Linear regression model was used to determine factors that contribute to inequality while Gini-coefficient was used to determine the degree of income inequality among households in the study area. The study suggests that an increase in age, market access and labour cost would increase the predicted probability of the income inequality of the forest related entrepreneurs while an increase in forest management laws would decrease it. Almost 70% of the poor households are unequally distributed in terms of their conventional income measure (i.e. with exclusion of forest income), whereas the inclusion of forest income reduces the inequality gap to 59%, a relative drop of 11%. The study recommends that more incentives and encouragements should be given to rural forest entrepreneurs to foster improved commercialization and value chain of forest products in the region.

Keywords: Forest income; forest entrepreneur; income inequality; rural household; South-western Nigeria

8. Introduction

Income inequality implies disproportion in the rewards to factors of production. Bakare (2011) described income inequality as a situation whereby money received during a certain period, especially as wages or interest on investment in different sizes, degrees or conditions etc. especially in an unjust difference in ranking. National Open University [(NOU) (2008)] cited in Aderounmu (2013) defined income inequality as a means of distributing total national income among individuals in an uneven manner such that the larger share would be appropriated to some people (rich) while the lesser share would be given to the poor. Similarly, Oluwatayo (2008) described income inequality as a measure of the comparative difference in income received by individuals in the population from the lowest to the highest, or, the difference in income levels among individuals in the economy.

Aigbokhan (2008) posited that if economic growth can reduce poverty incidence, the rate of such reduction would have been higher if it were to be through reduction in inequality. The author further reiterated that low income group is associated with deprivation of basic necessities that make people to enjoy descent living and rickety jobs, while the high income group is synonymous with prosperity and capabilities. The middle group shares those characteristics between the two groups.

Income inequality can affect persons in any society (vertical) or groups of persons (horizontal) for example a specific location, village, culture, state, or environment. The notions of income distribution have been a subject of immense concern to economists for a long time. This is because high level of income inequality creates an adverse atmosphere for economic growth and development (British Council, 2012).

In Nigeria, the increasing level of income inequality has also been a concern to policy makers for a long time. For instance, income inequality has increased between 1980s and 1990s as shown by an increase in the Gini-coefficient from 38.1% in 1985 to 44.9% in 1992 as noted by Canagarajah *et al.* (1997) in Babatunde (2008:134). In 1997, the Gini index for Nigeria was 0.580 as reported by World Bank (2003) cited in Babatunde (2008:134) whereas, Oyekale *et al.* (2006:17) stated that the overall Gini index for Nigeria using the 2004 National Living Standard Survey (NLSS) data was 0.580. It was also reported that income inequality was higher in rural areas (Gini – 0.5808) than in urban areas (Gini – 0.5278), and that employment income increases income inequality while agricultural income decreases it. Though, the reverse was the case from the report of Awoyemi and Adeoti (2004: 428-443) who stated that agricultural income was found to be inequality increasing while wage and self-employed income were inequality decreasing.

Evidence from the National Bureau of Statistics (NBS) (2012:88) also revealed that inequality in Nigeria is increasing since 2004 to 2010 both in rural and urban areas and this can be associated to the rising dimension of poverty. Although, there was a larger increase in inequality in rural areas than in urban areas. For example, rural inequality rose from 0.37 to 0.41 between 2003-2004 and 2009-2010 while urban inequality also rose from 0.38 to 0.41 between 2003-2004 and 2009-2010, a percentage change of 9.2 and 6.9 in rural and urban areas respectively since 2003-2004 (NBS, 2012:88).

Furthermore, several institutional reports (World Bank, 1996; IMF, 2015; NBS, 2010) disclosed the Nigerian poverty profile 2010 report that as national income inequality increased from 0.429 in 2004 to 0.447 in 2010, poverty incidences were 28.1, 46.3, 65.6, 58.3 and 69 percent in 1980, 1985, 1996, 2005 and 2010 respectively. This is not surprise since income inequality is positively related to poverty, that is, as the inequality rises, poverty rate also increases. So, there would be high rate of poverty because people at the lower end of income distribution obtain a smaller share of income (McKay, 2002). As a result of the association between income inequality and poverty, reducing income inequality has therefore

become a source of concern for policy analysts and developmental agencies on the best way to address the twin challenges of income inequality and poverty (see Adepoju and Oyewole, 2014).

According to Ogunniyi (1969:3), income inequality is lower within the agricultural sector than the non-agricultural sector because agricultural activities are common in rural areas while non-farming activities dominate the urban area. Likewise, average income from non-agricultural sector was higher than those from agricultural activities and this was linked with differences in organization approach, technology and level of productivity. It was also deduced that, income inequality in agricultural sector was still higher than non-agricultural sector for the undeveloped than the developed countries.

However, many studies have quantitatively investigated the roles of forest in mitigating poverty and income distribution inequality issues. For example, Jodha (1986) conducted few studies for a few Asian and Latin American countries; Reddy & Chakravarty (1999) for that of India; while Cooper (2008) did for Nepal. Others include Lopez-Feldman *et al.* (2007 and 2011) for Mexico and Uberhuaga *et al.* (2012) for Bolivia. All of them observed that forest income has great potentials for reducing both poverty and income inequality.

Although, quite very few studies have been conducted on the contributions of forest income in Sub- Sahara Africa. Out of such few, the results have shown that there were slight mixed standpoints. 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% and 44% 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 increases by as much as 12%. In Malawi as well, Jumbe and Angelsen (2007) found out that forest income has contrasted welfare impacts across study villages and that forest dependence is poverty neutral. 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.

In Nigeria however, to the best of the researchers' awareness based on literature search, no attempt has been made, to date, to measure forest income inequality particularly in the South –western region of Nigeria. Majority if not all of the earlier studies focus on one aspect of inequality or the other. So, in departure from several inequality studies for example, Aigbokhan (2000) conducted a study on 'Poverty, growth and inequity: Nigeria as a case study'; Oyekale *et al*. (2006): 'Measurement and sources of income inequality in rural and urban Nigeria'; Awoyemi and Adeoti (2006): 'Gender inequalities and economic efficiency: New evidence from cassava-based farm holdings in rural South-western Nigeria'; Babatubde (2008): 'Income inequality in rural Nigeria among farming households in Kwara state, Nigeria'; Akinlade *et al*. (2011): 'Impact of Fadama-II project on income and inequality of rural households in Nigeria'; Awe and Rufus (2012): 'Determinants of income distribution in the Nigeria economy'; Ayinde *et al.* (2012): 'Analysis of income inequality in Nigerian agricultural economy in Ekiti State'; Agwu and Orji (2013): 'Empirical analysis of income inequalities and welfare among farmers in South-eastern Nigeria'; Akin-Olagunju and Omonona (2014): 'Income sources, inequality and poverty among rural households in Ibadan, Oyo state, Nigeria; Alawode and Lawal (2014): 'Income inequality and self-rated health in rural Nigeria'; Adigun (2015): 'Explaining poverty and inequality by income sources in rural Nigeria' etc.

Although, Fonta & Ayuk (2013) worked on 'measuring the role of forest income in mitigating poverty and inequality', but the work has not covered South-west region which is the focus of this study. Comparative empirical data on forest income inequality are very essential in order to target resources to specific groups of the population but absence of such micro level data across regions remains a challenge. This study, therefore, seeks to bridge this observed knowledge gap since it is a shortcoming when it comes to developing informed policies for sustainable income, development strategies and social justice for the region. Hence, this study takes these concerns very seriously and hereby investigates the sources and impact of income inequality among forest related entrepreneurs in South-western region in Nigeria.

Specific objectives to achieve this goal include: (i) to determine factors that influence income inequality among rural households and (ii) to determine the contribution of forest income in reducing income inequality among rural households in the study area. Similarly, the study provides appropriate answers to some important questions set forth below:

- What are the sources of disparity in income distribution among rural households?

- What is the contribution of forest income in reducing income inequality among rural households?

The remainder of the chapter is organised as follows: The next section presents the methodology while the final section ends with results, discussion, conclusion and policy implications.

8.1. Methodology

8.1.1. 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 300 and 70E and latitude 40 and 90N 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). Specifically, the study area where data were collected include: Ogun, Osun and Oyo States. See Chapter three sub-section 3.1. for more detailed information about the study area.

8.1.3. Sampling Method

In this study, the required sample size was determined using proportionate to size sampling method (PPS) where the varying size of each sample within the population was taken into account when selecting the sample. See Chapter 3 sub-section 3.2. for details on sampling frame and procedure. In order to calculate the sample size from the whole population, the study used the PPS formula proposed by by Anderson et al. (2007) and has been used by Kangogo *et al.* (2013) as;

$$n = \frac{pqZ^2}{E^2}$$

Where n = sample size, p = percentage of the population (p = 0.5), q = 1-p, z = confidence Interval (1.96), and E = Marginal error (± 0.046). Therefore, the sample size used was 450 respondents.

8.1.4. Analytical technique and model specification

Descriptive analysis and two empirical models (Linear regression and Gini coefficient models) were used to estimate the required variables. Descriptive analysis describes socio-economic characteristics of forest users' households while linear regression function as applied by Ayinde *et al.* (2012) was used to determine the different factors that contribute to inequality in income distribution and to show the effect of this income inequality on welfare of the rural households who engage in forest products related businesses. Likewise, Gini

coefficient model was used to estimate and compare the impact of forest income inequality amo7g rural households.

The regression model that was used for this study is specified as: $Y(g) = f(X_i, \mu)$,

where: $Y(g)$ is the household income inequality which is dependent on the explanatory variables $X_1, X_2, X_3, X_4, \ldots\ldots X_n$. i.e. how much income inequality is accounted for by each of the explanatory variables and how much is unexplained as measured by the error term μ.

X_1 = Age of household head (Year, most recent birthday)   -

X_2 = Sex (Dummy) Male = 1, Female = 0

X_3 = Educational level (year of education)   +

X_4 = Household size (Number of Household members)   ±

X_5 = Number of forest Enterprises   +

X_6 = Distance from the forest (km)   -

X_7 = Transportation cost (Naira)   ±

X_8 = Forest management related laws   _

X_9 = Market access (Dummy) Yes =1, No = 0   _

X_{10} = Forest product availability (Dummy) Yes =1, No = 0   ±

X_{11} = Labour cost (Naira/ man day)   _

  μ = The error term

Another way to estimate income inequality is through regression-based decomposition method (Babatunde, 2008). This method uses the per capita income or expenditure as a function of explanatory variables to determine how much income inequality is accounted for by each explanatory variables and how much is unexplained, as measured by the error term. The regression-based decomposition method is done by stating an income function as:

$$Y = X \beta + \varepsilon$$

Where Y is the per capita income or expenditure, X is the matrix of explanatory variables; β is the stochastic error term. The explanatory variables are exogenous individual, household characteristics, which determine income level. Such exogenous explanatory variables include; education, occupation of head, household size, farm size, assets, market variables etc. Since the econometric results yield estimates of the income flows attributed to household variables, they allow the decomposition of inequality by factor income. The income contributed by the socioeconomic variables as given in the estimated regression equation is given as:

$Y = \sum_{k=1}^{k} Y_k$ for all ith variables

The income flow can then be used to directly calculate decomposition component for all regression variables and the contribution of each of the socio-economic factors (X_i) to Gini inequality can be estimated (see Babatunde, 2008).

8.1.5. Gini-Coefficient

The Gini-coefficient used was for the estimation and comparison of the impact of forest income inequality among rural households. So, the Gini-coefficient is computed as follows:

$$I_{gini}\ (Y) = \frac{2}{n^2}\ \mu \sum_{i=1}^{n} \left(i - \frac{n+2}{2}\right) Y_i$$

Where: n = number of observations,

μ = mean of the distribution,

Y_i = income of the ith household, and

I is the corresponding rank of income.

The Gini-coefficient is a measure of statistical dispersion most prominently used as a measure to show the degree of income distribution or inequality of wealth distribution between different households in a population. Following IMA journal of management mathematics as adapted by Hansen (2010), Gini-coefficient is defined as a ratio with values between zero and one (0-1). A low Gini-coefficient indicates more equal income or wealth distribution, while a high Gini-coefficient indicates more unequal distribution. Zero (0) corresponds to perfect equality while one (1) corresponds to perfect inequality.

Gini coefficient is based on the Lorenz curve, a cumulative frequency curve that compares the distribution of a specific variable (for instance, income) with the uniform distribution that represents equality. Lorenz curve graph is plotted to construct the Gini coefficient such that the cumulative percentage of households (from poor to rich) will be on the horizontal axis while the cumulative percentage of expenditure (or income) will be on the vertical axis as shown in the Figure 6.1 below.

8.1.6. Lorenz curve

The Lorenz curve shows the actual quantitative relationship between the percentage of income recipients and the percentage of the total income that is received in a given period. The farther away the Lorenz curve line from the diagonal (perfect equality), the higher the degree of inequality represented. The extreme case of perfect inequality would be represented by the congruence of the Lorenz curve with the bottom horizontal and right hand vertical

axes. The diagonal line of the Lorenz curve as shown above means perfect equality while the Gini coefficient is represented as A/(A + B), where A and B are the areas shown in figure 6.1. If A = 0, the Gini coefficient becomes 0, which means perfect equality. Whereas if B = 0, the Gini coefficient becomes 1, which means complete inequality. Below is the graphical representation of the Gini coefficient where the area of the whole triangle is defined as 1.

Source: Duclos and Araar (2006)

Fig. 8.1: Lorenz curve

Below are some and types of data required to analyse income inequality (Table 8.1)

Table 8.1: Types of data on income inequality

Data	Indexes
Socio-economic characteristics	Age, sex, marital status, education, family size, etc
Commerce	Per capita commercial income
Community forest	Households that utilized community forestry for forest gathering and other uses : = 1 if use and 0 otherwise
Family land	Households that utilized family owned land for extracting forest and other product: = 1 if family land and 0 otherwise
Forest distance	Distance in kilometres from household to the forest
Agricultural income	Per capita farm Income
Forest income	Per capita forest income
Membership asociation	Household that belong to a forest related group = 1 if member, and 0 otherwise
Employment income	per capita employment income
Remittance income	per capita remittance income
Trading income	per capita trading income
Transfers income	Per capita transfer income
Wage income	Per capita wage Income
Type of forest related enterprise	Timber, pole, logging, fuel wood, charcoal, chew stick, fruits, mushroom, thatch leaves, honey, bush meet, fish, furniture etc.
Total land	Landholding size (hectares [Ha])
Total land squared	Square of landholding size (Ha)
Assets	Value of assets owned
Distance to district town	(Km)
Informal employment	Small and medium scale informal employment
Total income	Total per capita household income

8.2. Results and discussion

8.2.1. Sample household statistics

This section presents the socio economic characteristics of the rural households that engage in forest related enterprises as reported in Table 8.2 below. Considering the proportion to size sampling method adapted for this study as reflected in sub-section 8.1.3, 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 80% of the respondents are still in their working age.

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 41per

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 - western 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 per cent as single, 4 per cent as divorced and 11.6 per cent separated. Furthermore, about 66 per cent of the sample had between 3- 4 children within the household while about 16 per cent had less than or equal to two children.

Table 8.2: Distribution of socio-economic characteristics of forest users' households

Item	Frequency	Percentage
Household's Head Age		
≤ 20	3	0.7
21 – 40	168	37.4
41 - 60	212	47.2
61 - 80	66	14.7
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
No. of Male Adults		
<2	313	69.7
3 - 4	16	3.60
5 - 6	109	24.3
7 - 8	11	2.40
No. of Female Adults		
<2	339	75.5
3 - 4	17	3.8
5 - 6	93	20.7
Religion		
Islam	213	47.4
Christianity	223	49.7
Traditional	13	2.90

Source: Calculated from field survey, 2016

Meanwhile, of the total number of children within the sampled households, 69.7% and 75.5% constitute less than or equal to two male adults and female adults respectively.

It was also revealed from the Table 8.2 that 47.4% of the respondents were Muslims while 49.7% were Christians and less than 3% were practising traditional religion. This therefore indicates that religious factors may not have much impact in venturing into forest related businesses giving 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. Thus, income inequality among forest-related entrepreneurs is not hinged on the type of religion that the rural households practise in the study site.

8.2.2. Determinants of income inequality among forest users rural households
In this section, the study analyzes the determinants of household income inequality. This can help to further understand the causes of income disparity among households in terms of potentials and constraints in forest related enterprises. Therefore, household income inequality was regressed on a set of explanatory variables as observed in Table 8.3. The study uses the same household and contextual characteristics, as it is likely that factors influencing income inequality among rural households engaging in forest related businesses. The study also uses linear regression model similar to the approach used by Fadipe *et al.* (2014) in the analysis of their work entitled: 'Analysis of income determinants among rural households in Kwara state, Nigeria'.

In sum, the study considers a fairly wide range of possible determinants of income distribution, being guided by previous empirical studies. Therefore, below are the reports of the outcomes of most of these possible determinants.

With reference to the overall model fit, R^2 suggests the weighted combination implication of predictor variables in explaining the dependent variable. In this case, an R^2 of 0.96 was obtained as summarised in Table 8.3 suggesting that the weighted combination of predictor variables was jointly significant in explaining the dependent variable. The estimated coefficients are presented in Table 8.3 where labour cost, market access, forest management laws and the age of the household head have significant effect on the income inequality of the forest entrepreneurs in South-western Nigeria. This suggests that an increase in age, market access and labour cost would increase the predicted probability of the income inequality of the forest related

entrepreneurs while an increase in forest management laws would decrease the predicted probability of the income inequality.

Table 8.3: Factors that influence income inequality among forest entrepreneurs' households

Variable	Coefficient	Standard Error	Z	P-value
Constant	-1095	8537	-12.83	0.000
Age	2316**	8733	2.65	0.012
Sex	6298	1193	0.53	0.601
Education	6358	6144	1.03	0.308
Household	-234.3	2132	-0.11	0.913
NFRE	246.0	326.9	0.75	0.456
Forest distance	-6600	5289	-1.25	0.220
Transportation	-7193	1518	-0.47	0.639
Forest mgt. laws	-4046***	1333	-3.03	0.004
Market access	1149***	4470	25.72	0.000
Forest availability	-1382	1204	-1.15	0.258
Labour cost	2726***	5691	4.79	0.000
Probability of F	0.0000*			
R^2	0.9665			
Adj R^2	0.9557			
N	390			

***, **, *: Significant at 1%, 5% and 10% respectively

Source: Calculated from field survey, 2016

The estimated coefficients of age is positive and statistically significant, indicating that population aging would increase the income inequality. This association is in total conformity with the findings of Hae - Young Lee *et al.* (2013) who argue that the accelerating trend of population aging is one of the most important determinants in deepening income inequality in Korea because there was an accelerated rise of aging population (thus a population dominated by aged people) between 1980 and 2012 in Korea who perhaps could not afford to engage in some strenuous works due to their less physical strength compared to younger populations (thus a population dominated by young people) who are very strong and energetic leading to low income inequality.

Equally, the estimated coefficient of forest management law is negative and statistically significant. That is, increase in forest management laws is negatively associated with income inequality meaning that increase in forest management laws reduces income distributional gap among households. This is logical because, forest management laws improve equal

access to harvestable forest products by users. This creates homogenous income sources among users hence reduce their income inequality. With limited forest management laws, access to forest products is calmed by just a few first comers given that most forest products are under open access. This therefore creates heterogeneous income sources among users capable of increasing their income inequality. This relationship may be justified by the postulation of UNFF (2013) which gives credence to increased forest management laws in mitigating poverty and income inequality in rural areas since forest has been considered a common asset of the less privileged who could be easily deprived or denied the access to some forest products should forest management laws are limited or ineffective.

Similarly, Sunderlin *et al.* (2008) posited that improved forest management laws may reduce poverty and income inequality if some forest management practices (such as forest regeneration, selective exploration aforestation, tungya system practice, production of coal briquettes as a substitute for fuel wood, establishment of fuel wood plantations in rural areas etc.) are well considered. This is plausible because such management practises will prevents most forest products from going into extinction and thus open more windows for forest accessibility capable of reducing income inequality.

Furthermore, the estimated coefficient for market access for forest products is positive and statistically significant, implying that increase in market access increases the income inequality in South-western Nigeria. Market access for open access forest products with limited management laws (which was the case from the study area) promote lucrative markets for the first few claimers (households) for harvesting is based on first come first service. This therefore creates high income inequality among users. This positive association may be explained by the declaration of Hou (2012) who declared that market access may partly account for increasing geographic income inequality in China because policies to improve access to domestic markets among different income groups differ such that the lowest income group benefits the least, and the benefit of better access is increasing with income from the lowest to the middle income group and jumps to the highest income group. These policies therefore tend to widen the income inequality between the poorer segment (low to middle income groups) and the richer segment (higher middle to highest income groups).

Furthermore, labour cost also has a positive and significant effect on household income inequality. Increase in hired (skilled) labour cost associated with harvesting forest products

excludes many poor households from participating. If harvestable forest products require services of hired labour (skilled) force at a cost, this therefore promotes unequal access capable of triggering income inequality as revealed by the model results.

8.2.3. Impact of forest income in reducing inequalities

This section introduces the impact of forest income on reducing inequality in South-western Nigeria. The study analyses the income inequality level of the rural households with and without forest income as reported in Table 8.4 below. Usually, in terms of poverty index classification[29], almost 70% of the poor households are unequally distributed in terms of their conventional income measure (i.e. with exclusion of forest income), whereas the inclusion of forest income reduces the inequality gap to 59%, a relative drop of 11%.

Table 8.4: Gini coefficient with and without forest income.

Poverty index	Gini with FREs	Gini without FREs
Poor	0.586	0.695
Non poor	0.615	0.722
Total	0.606	0.711

Source: Calculated from field survey, 2016

This confirms that forest income to total rural per capita household income is inequality-decreasing which therefore require deserved attention and priority in the region. These findings therefore run absolutely in compliance with conclusions forwarded by Fonta and Ayuk (2013) who inferred that forest income is more pro-poor with a higher income equalizing effect than any other income source in South-eastern Nigeria.

Similarly, the study also reveals that income inequality is not only peculiar to the poor alone but rather, it affects the category of the rich too. There is a drop of 10% in their income equality measure with the introduction of forest income into their total per capita household

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[29] *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. As discussed below, households' whose per capita expenditures are less than one-thirds of the total households' per capita expenditure are regarded as extremely poor while those households that had their 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 as classified by Sen (1981) and adopted by* Dubihlela *and Sekhampu (2014). Conversely, households are considered non poor since their per capita monthly expenditure is equal to or greater than the pre- determined poverty line of N 18,331*
₦18331 set as 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).

income. This therefore clarify the fact that income inequality is not restricted to only poor people.

8.2.4. Household income differentials

Similarly, the study identifies some differentials in the households income which correspondingly reveals the impact of forest income on reducing such inequality as also presented in Table 8.5. Following the method of classification of poverty adopted by Sen (1981) as used by Dubihlela and Sekhampu (2014), households are classified into extremely poor, moderately poor and non poor based on their poverty index measures. Households whose per capita expenditures are less than one -thirds of the total households' per capita 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.

Table 8.5: Income differentials - Impact of forest income on reducing inequalities

Poverty index	Gini with forest income	Gini without forest income	Percentage Relative change
Extremely poor	0.571	0.700	12.9%
Moderately poor	0.545	0.683	13.8%
Non poor	0.615	0.722	10.7%

Source: Calculated from field survey, 2016

Furthermore, Table 8.5 suggests that about 70% of the total sampled households have unequal income and invariably, only 30% of them have equal income in the extremely poor category if measured conventionally (i.e. with exclusion of forest income). But if forest income is included, the proportion of extremely poor household with unequal income reduced to 57.12% with 12.9% relative change. In the same vein, using the same phenomenon in the moderately poor category, the differential percentage was13.8% while that of non poor was 10.7% as observed in Table 8.5 (that is, a drop of 12.9%, 13.8% and 10.7% respectively). This decrease in inequality is in conformity with the finding of Fonta and Ayuk (2013) with a difference of 16.4% when the like of this study was carried out in the South-east region in Nigeria. It is thus plausible because 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 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 (see UNFF, 2013).

8.2.5. Variability in inequalities using Lorenz curves

Lastly, the study also analyses variability in inequalities using Lorenz curves as detailed in Figure 8.2a and 8.2b. This variability however corroborates the impact of forest income on income inequalities of the rural households in the South-west Nigeria. Lorenz curves with the data for households' income including or excluding show that addition of forest income to total income reduces the departure of the curve from the line of equal distribution when Figure 8.2a and 8.2b. are compared. The Lorenz curve (Figure 8.2a.) below suggests that 59.5% of the forest income households have unequal income while 40.5% of the households have equal income. Likewise, Figure 8.2b. also suggests that 70.9% of the non forest households are income disproportionate but 29.1% have equal income.

Comparing the two figures, if forest income are excluded from the inequality analysis, the estimated Gini coefficient increases from 0.60 to 0.71 which shows that addition of forest income reduces measured income inequality of 11%, all else equal. This result is in conformity with a number of studies (Reddy and Chakravarty, 1999; Cavendish, 1999; Fisher, 2004; Das, 2010; Fonta and Ayuk, 2013).

Lorenz Curve (left plot)

Cumulative fraction of total.income (y-axis)
Cumulative fraction of Poverty.index (x-axis)

rel.mean.de=0.894
gini.index=   0.595

L(1/2)=   0.106

Lorenz Curve (right plot)

Cumulative fraction of data$without.FREs (y-axis)
Cumulative fraction of data$Poverty.index (x-axis)

rel.mean.de=1.069
gini.index=   0.709

L(1/2)=   0.041
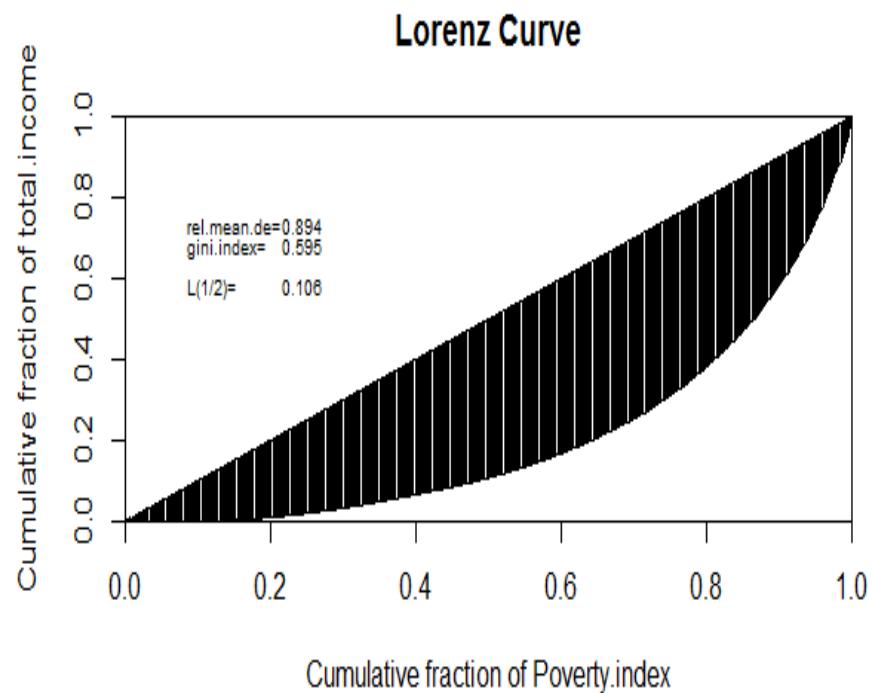
8.2a. Lorenz curve with forest income   8.2b. Lorenz curve without forest income
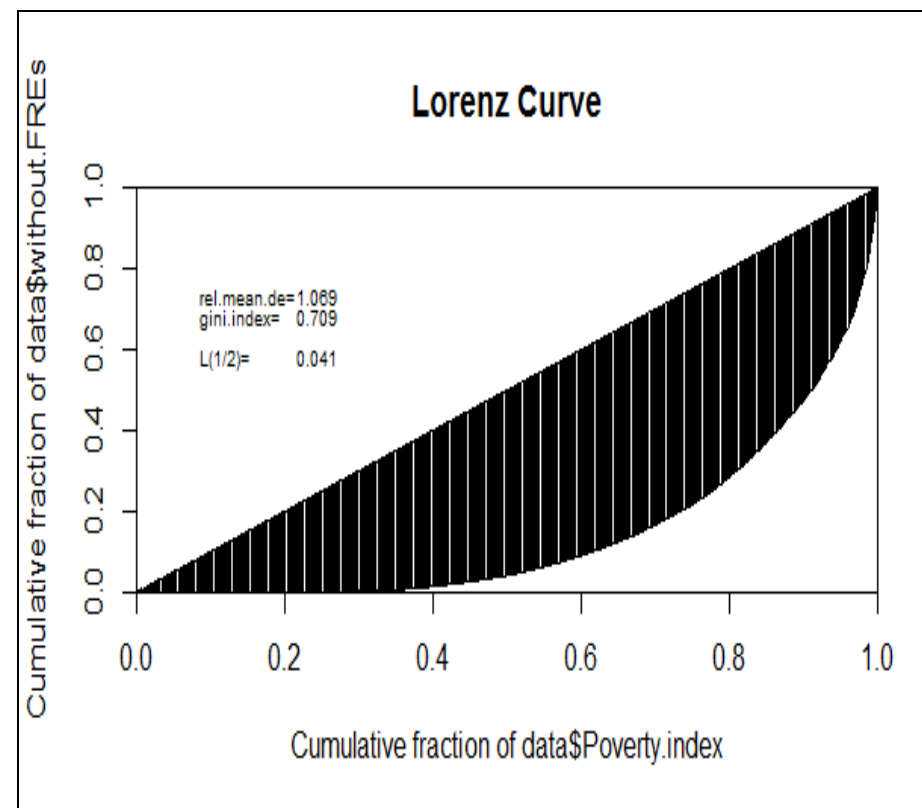
Fig 8.2a. & 8.2b.: Lorenz curves with and without forest income for the region

Note: Lorenz curve shows the degree and extent of inequality in a certain society or region. The diagonal line denotes perfect equality and deviations from the line (the curves) measure the extent of inequality. The further away the curve is, the greater the inequality.

8.3. Summary

The first objective of this study was to determine factors that influence income inequality among rural households. The linear regression model results suggests that an increase in age, market access and labour cost would increase the predicted probability of the income inequality of the forest related entrepreneurs while an increase in forest management laws would decrease it.

The second objective determined the contribution of forest income in reducing income inequality among rural households in the study area and the results of Gini coefficient model suggest that almost 70% of the poor households in the study site are unequally distributed in terms of their conventional income measure (i.e. with exclusion of forest income), whereas the inclusion of forest income reduces the inequality gap to 59%, a relative drop of 11%.

8.4. Conclusion

This study assesses the causes and impact of income inequality on socio economic characteristics of forest related entrepreneurs in South- western Nigeria. In line with previous works in other countries, the study uses household and its contextual characteristics, as it is likely that factors influencing income inequality among rural households engaging in forest related businesses using linear regression model. The study suggests that an increase in age, market access and labour cost would increase the predicted probability of the income inequality of the forest related entrepreneurs while increase in forest management laws would decrease it. In terms of poverty index classification, almost 70% of the poor households are unequally distributed in terms of their conventional income measure (i.e. with exclusion of forest income), whereas the inclusion of forest income reduces the inequality gap to 59%, a relative drop of 11%. These findings reveal a significant income equalising effect of forest products.

8.5. Policy implications

Several policy insights are suggested as follows. The study revealed that age is a critical factor that is capable of increasing the income inequality due to the fact that most rural households who engaged in forest related businesses in the study area are dominated by aged people who could not afford to engage in some strenuous forest activities due to their less physical strength compared to younger populations who are very strong and energetic. Therefore, policies that will support older people (such as provision of required machineries

and improved technology) to improve on their forest activities with less energy should be given priority in order to reduce income inequality.

Results further indicated the positive effects of market access for forest harvestable products on income inequality under limited forest management laws where resources are managed under open access. We argue that the reverse may be true if forest management laws are improved to enhance equal access to forests products by rural households, although this association was not tested in this study. With equal access enforced by forest management laws and supportive markets for harvestable forest products, income inequality is likely to be reduced.

Increased (skilled) labour cost related to forest activities positively influence income inequality by excluding the majority of the rural poor who fail to pay for the skilled labour necessary to promote harvesting of forest produce. Targeted training programmes that empower rural poor households with necessary forest harvesting skills may enhance equal participation (particularly harvesting of non-tiber forest products -, honey, fish, rattan, fruits and fibres, gum, medicinal plants etc.) that may reduce income inequality. For ixample, the Natural Resources Conservation Act 1989: This Natural Resources Conservation Act is the most direct existing piece of legislation on natural resources conservation. The Act establishes the Natural Resources Conservation Council, which is empowered to address soil, water, forestry, fisheries and wildlife conservation by formulating and implementing policies, programmes and projects on conservation of the country's forest resources.

Study results revealed the positive effect of forest management laws on reducing income inequality (negative association – increase in forest management laws reduces income inequality). Thus far, crafting and implementation of sustainable forest management laws supported by government platforms will enhance equal access of forest harvestable products by rural households capable of triggering an income equalizing effect.

Lastly, almost 70% of the poor households are unequally distributed in terms of their conventional income measure (i.e. with exclusion of forest income), whereas the inclusion of forest income reduces the inequality gap to 59%, a relative drop of 11%. Towards this end, more incentives and encouragements should be given to rural forest entrepreneurship to foster improved commercialization and value chain of forest products (through regular publicity, inter-customer networking system, packaging, good pricing system, promotion etc.) in order to reduce the perennial scourge of income inequality among rural households.

8.6. References

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Chapter 9: Shaping forest safety nets with forest management and conservation in South-western Nigeria

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Abstract

The study evaluates the safety nets roles of forests in relation to forest management and conservation in South-western Nigeria. The study was specifically conducted at Gambari forest reserve area of Oyo state while purposive sampling method was employed in choosing the study area due to the high forest regeneration potential in Oyo state. Two hundred copies of structured questionnaire were administered and retrieved. Both qualitative and quantitative (statistics) methods were used for the analysis. The study suggests that forests has capacity of improving the livelihood of the poor particularly those that venture into forest income generating activities. Also, forest regeneration, increased awareness and enlightenment campaign, practising of tungya system, setting aside certain portion of forest, strict guard of forest domain, forest protection, reforestation and clearing of environment were key in protecting forest resources from going into extinction and sustaining the ecosystem. Similarly, management of NTFPs has propensity of improving peoples' welfare unlike timber forest products while forest management mechanisms related to timber products favour forest conservation at the expense of surrounding communities' welfare (poverty and income). Therefore, given the high dependence level of rural communities on forests and its attendant effects on the resources, balancing forest preservation and management mechanisms will go a long way towards creating a sustainable forest conservation model for rural communities.

Keywords: safety nets; poverty; rural household, forest management; conservation strategies; ecosystem

9.0. Introduction

The traditional safety net functions of forest holdings are likely to give way as rural livelihood shifts to a cash-based economy accelerated by changing roles of tropical forest in South-western Nigeria. The danger of this shift, however, is the potential disorder and exacerbation of vulnerability of the poor majority owing to the systematic disappearance of what constituted their safety nets. As global food supplies change partially due to local climate change (Gregory *et al.,* 2005) and global energy crisis (Cassman, 2007), the gap-filling role of forests among the poor of the world will only increase.

All the projections of climate change zoom in on the vulnerability of Africa and its inability to respond to the scale of the problem (Stern, 2006) especially with regard to the poor majority whose livelihoods are directly linked to climate-driven sectors. The Southern Nigeria forests face comparable climate challenges that put at risk future and previous developmental efforts in the region.

Of the ecosystem frameworks in Nigeria, forests are the most environmentally important. *The forest is defined as a large area of land covered with trees and bushes, either growing wild or planted for some purposes* (see Imasuen, 2013).

Nevertheless, the effectiveness and success of protection in any part of the world normally depends on many local factors of economic, social and political nature (Joppa *et al.,* 2008).

Some of the safety nets potentials of forest include (i) It is the home for wild animals like antelopes, monkeys, elephants snakes etc (ii) The wood of the trees provide planks for making furniture, pulp for making paper and match sticks (iii) Forest trees help to prevent soil erosion, and also serves as wind breaks which prevent wind erosion and desert encroachment (iv) Forests provide mechanical herbs for traditional medicine (v) Forest beautifies the environment and also serves as centre for tourist attraction (vi) Forest helps in the purification of the air by removing carbon-dioxide (during photosynthesis) and adding oxygen (during respiration) (vii) Forest provides employment for people including the forest guards, saw millers and the forest lawyers (Imasuen, 2013).

Natural forests in Nigeria are being destroyed by various forms of land use, such as agriculture, grazing and construction activities as a result of rapid urbanization leading to desertification and degradation of the environment (FAO, 2007). Evidence of land conversion to agriculture in some forest reserves abounds without any meaningful effort by the authorities to halt the trend (USAID/Nigeria, 2008).

Products of logging, which has dominated forest commercial activities are predominantly in the hold of governments in the region, but there are also non-timber forest products (NTFPs) that are important resources for subsistence and commercial use. I define NTFPs here *as plant and animal products (with the exclusion of timber) harvested from forests, such as edible plants, animal products, mushrooms, snails and other living animals, edible nuts, gums, medicinal plants, firewood, forage*, etc. (Nkem *et al.,* 2010).

While the forests have many important uses, only proper management such as forest regulation, selective exploration, regeneration, afforestation and taungya system will ensure the continuous supply of forest products and environmental sustainability (Imasuen *et al.,* 2013).

In Nigeria, forest regulation laws are promulgated in form of decrees, edicts and bylaws to prevent people from exploiting the forest at will in order to help to conserve or preserve forest trees. Some of the regulations include: encouraging people to plant trees, prohibition of bush burning, cutting down of timber trees except with an official permit and cutting down of trees in a forest reserve, harvesting of an under-aged trees, i.e. any tree could only be

harvested when it is about 20 or 25 years old and discouragement of illegal felling of trees (Imasuen *et al.,* 2013:55).

Closely linked to the problem identified above, is lack of well-defined programmes as many of the programmes and activities aimed at achieving the objectives are poorly designed, organized and monitored. For instance, the tree planting campaigns are not properly coordinated nationally and the situation becomes complicated by the problem of discontinuity in commitment to the policy due to the rapid turnover of political leadership in the country which hitherto resulted in varying degrees of tailback to the implementation of the programmes (USAID/Nigeria, 2008). The report further stated that priorities are rarely given to areas where urgent actions are needed since they are often used to gain political advantage.

The same is the issue of reforestation initiative where marginal lands are sometimes used as political strategies. Inadequate funding of forest concerned institution is another problem with biodiversity conservation in the country. On the other hand, all protected areas in the country are bounded by communities who continue to encroach on these areas through farming and other activities. Many Fulani cattle herders also regularly move around freely with their animals in some of these reserves. Worsening the situation is the high poverty level in the country as many laws on biodiversity and forestry are difficult to be enforced because of the high level of poverty (USAID/ Nigeria, 2008).

However, there should be a point of symmetry between using forest as a source of livelihood at the same time conserving the forest and its biodiversity (Usman and Adefalu, 2010). In other words, forest policies have to be tailored in a way that the primary focus of maintaining ecosystem integrity, the benefits and services derived from the forests will be linked with the livelihoods of all the stakeholders, especially the downtrodden living in the vicinity of forests, since their livelihoods are mostly dependent on forest resources. Notwithstanding, the United Nations Forum on Forests (2013) affirmed the fact that despite this essential nexus between forests and the livelihoods of poor, efforts were on top gear to put in place policy measures that would integrate both the management of forests and the distribution of benefits from forests. According to the report, forest management policies to minimize environmental and ecological damage on one hand and the exploration of forest benefits in many developing countries on the other hand have been on the fore in order to achieve effective utilization of forest potential but not at the expense of the ecosystem stability.

Consequently upon the foregoing, this study evaluates the role of forest products that so far, serve as safety nets sustaining the livelihoods of forest communities and assess the level of management measure conformity of the residents around the forest communities. The study also goes further to examine the connection between safety nets of forest resources and management strategies in ensuring sustainability of forest resources in the study area.

Similarly, the study provides appropriate answers to some important questions set forth as follows: (i) How does forest resources affect the livelihood of the rural households? (ii) What is the level of management measure compliance of the residents around the forest reserve communities? (ii) What is the connection between forest extraction, poverty and forest conservation and management strategies in the study area?

9.1. Related literature

9.1.1. Forestry and poverty alleviation

Forestry-based approach to poverty alleviation could be in form of poverty avoidance or mitigation, that is, a situation where forest resources serve as a safety net function, or as a gap filler, including a source of petty cash. Alternatively, it could also be in form of poverty elimination, that is, a situation where forests resources help lift the household out of poverty by functioning as a source of savings, investment, accumulation, asset building, and permanent increase in income and welfare (Sunderlin *et al.,* 2003). By these magnitudes, literature seems to imply that depending on foreign aid to solve poverty problem appears to be a misplacement of priority of highest order most especially the African tropical countries where growing of food crops in association with trees have been practiced for years. Therefore, aside from looking towards the direction of seeking for external aid from international communities, Nigeria itself has capacity and opportunity for alleviating poverty on her own. Nigeria is so much blessed by nature giving credence to the abundant natural resources that the country is endowed with which though are not judiciously utilized and well managed.

Forest has been considered one of such natural resources that is undeniably capable of stamping out poverty among teeming Nigeria masses. Nigerian government is tumbling on the same stone on several occasions by organizing series of poverty alleviation programmes and initiatives but the excess of policies and programmes with such poverty reduction mandate put in place to improve the living standards of people most especially the rural communities failed to achieve largely an average performance in the desired objectives.

According to Sunderlin *et al.* (2003), forest has been considered as a preference for poverty alleviation as it often serves as an employer of last resort for the masses whom have been economically marginalized. It therefore becomes imperative upon Nigerian society to look towards the direction of forest as a new approach to alleviate poverty and presents strategies that may enhance those potentials.

9.1.2. Forest reserves and conservation measure

Forest reserves are areas designated by state governments for the protection of timber and other forest resources (Usman and Adefalu, 2010). Harvesting of timber may be allowed under permit and under special concession to people in surrounding communities. Although, harvested timbers are usually replaced with exotic tree species but most of the forest reserves are poorly managed by various State Ministries of Agriculture and Natural Resources (Usman and Adefalu, 2010). Most Nigeria forest reserves were already in place since 1960, though many have been converted to game reserves. For instance, from about 800 forest reserves and about 30 game reserves in the 1980s, the number has now increased to 966. There are also 8 national parks, 12 strict nature reserves and 28 game reserves in the country (Areola, 1982; see Usman and Adefalu, 2010:44-52).

As proposed by the Federal Department of Forestry (2001), that there was the need to limit conservation to areas where there would be little or no local interests because of the activities of forest indigenous people. For instance, a comprehensive survey of the country's wildlife in 1962 showed that the wildlife population was falling rapidly as a result of overhunting. This resulted in the creation of game reserves including the Yankari game reserve, Borgu game reserve, Zugurma game reserve, Upper Ogun game reserve, Kanaku game reserve, Lame game reserve, Okhoma game reserve and Ohosu game reserve, among others. Some of these game reserves were later declared as National parks. For instance, Borgu game reserve and Zugurma game reserve became the Kainji Lake National Park in 1975. Other national parks later created include Yankari National Park, Old Oyo National Park, Gashaka Gumti, Chad Basin, Cross River, Okomu and Kamuku National Parks. Yankari has now reverted to the control of Bauchi State Government as a game reserve (Usman and Adefalu, 2010:44-52).

There is however, no single government agency solely devoted to biodiversity conservation in the country because the indiscriminate felling of trees has continued in virtually every part of the country. For instance, the Federal Department of Forestry (2001) estimated that Nigerian forests are being depleted at an annual rate of 3.5%. Nigeria used to have about 20%

of its area covered with natural forests but, this has been reduced to about 10%. It lost about 60% of its natural forests to agricultural encroachment, excessive logging and urbanization which resulted into serious reduction in timber resources. There is the fear that what is left of the forests and the wildlife may be completely lost within the next few years if care is not taken. At present, Nigerians continue to find evidences of serious soil erosion in many parts of the country while the rate of afforestation continues to be far slower than the rate of exploitation not to talk of agricultural practices and bush burning which contribute to the degradation of the environment. Overgrazing and indiscriminate use of pesticides and fertilizers also result in degradation of biodiversity in Nigeria (Usman and Adefalu, 2010:44-52).

9.2. Study approach

9.2.1.The logical framework of the study

Blending livelihood and forest management, which by themselves are complex issues, only demonstrate the complexity in tackling an integration of the two especially in a supportive role. This would definitely incline to simple form of linearity in a logical framework such as the sustainable livelihood framework or vulnerability assessment concept. The sustainable livelihood framework has been used in discussing the role of forest in several other studies using the different capital pools that forest provide (see for example Soini, 2005; Kusters *et al.,* 2006).

Coming from the well-established important role of forests and forest resources for rural livelihoods, especially in Africa (see for example Sunderland and Ndoye, 2004; Shackleton *et al.,* 2008), this study is meant to provide a new information on the role of forests for adaptation to changing ecosystem. The logical framework commences with the forest potentials sustainable livelihood followed by exploring how best these potentials can be safeguarded and managed to be able to provide the opportunity to acquire other services or products outside the forest., that can ensure sustainability of the resources.

To explore the potentials of these essential resources, the study looked at the forest related enterprises and only those that participate in an informal forest related employment within the forest vicinities. The study later on drew inferences on the association between safety net role of forest and conservation of the forests.

9.3. Study method

The study was conducted at Gambari forest reserve area[30]. Gambari forest reserve is located in Oluyole Local Government Area of Oyo state. It lies between latitude 7^0 22' and 9^0 17' North; and longitude 10^0 2' and 20^0 44'East (Faleyimu and Agbeja, 2004). It is one of the early forest reserves in the state.

Gambari forest reserve is a lowland forest. It is situated at the southern part of Ibadan bounded on the west by River Ona and on the east by the main road of Ibadan to Ijebu-ode (Larinde and Olasupo, 2011). The reserve is bounded by Abanla and Odo-ona settlements in Oluyole Local Government Area of Oyo state in the north and in the south by Mamu and Abatan settlements in Ijebu-ode Local Government Area of Ogun state. Both dry and wet season are experienced in the reserve. Dry season lasts for 3 months (December-February). The average annual rainfall is about 1140mm and average annual temperature is about 26.4^0C (80^0F) (Larinde and Olasupo, 2011).

The reserve has been reduced to secondary high forest dominated by trees like *Mansonia altissima, Triplochiton scleroxylon, Terminalia superba, Celtis zenkeri, Sterculia spp, Terminalia ivorensis* and *Cola spp,* the planted area is dominated by *Tectona grandis* and *Gmelina arborea*. The reserve provides 5 major NTFPs namely fuel wood, sponge, snails, leave and ropes (Larinde and Olasupo, 2011).

The sample frame involved a field survey with the use of structured questionnaires to collect data from relevant stakeholders such as saw-millers, timber contractors, loggers, farmers who practise agro-forestry system, various forest products entrepreneurs (such as fuel wood, charcoal vegetables and fruits, honey, poles, bush meat, rattan sellers etc), wood craftsmen, basket weavers and rural dwellers within and around the forest reserves including Government and community workers in the forest reserve areas.

A purposive sampling method was employed in choosing the study location due to the high forest regeneration potential in Oyo state. Afterward, the study used a two-stage sampling technique. In the first stage, eight forested villages were selected for primary data collection. In the second stage, 25 households were randomly selected in each village using community group records obtained from each community leader and some of the forest reserve officers. This gave a total of 200 forest entrepreneurs in the eight selected villages of the study

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[30] See details on the purpose of selecting Gambari forest reserve as a study area in section 9.3.1.below.

location (115 males and 85 females). Each respondent was interviewed separately and each interview lasted for about 1 hour. The exercise was carried out between December and April 2016.

Some of the information collected include socio-economic characteristics of the forest users, contributions of forest income with respect to their livelihood, forest activities being engaged in, forest control management and strategies among others (Nkem *et al.,* 2010).

Simple descriptive statistics such as frequency and percentages were used to describe the socio-demographic characteristics of the respondents and the distribution of forest control and management compliance. FGT model was used to determine the safety nets impact of forest on the welfare status of the households that involved in forest income generating activities while budgetary analysis was used to determine the investment worth of the forest related entreprises. Likewise, Somer's d directional tests was also used to analyse the relationship between forest extraction, poverty and forest conservation and management strategies.

Besides, survey data are almost always related to households, so to measure the standard of living of forest entrepreneur at the individual level, we must make a critical assumption that all members of a given household enjoy the same level of well-being. However, households are considered poor since their per capita monthly expenditure is less than the pre-determined poverty line of eighteen thousand, three hundred and thirty one naira (₦18331).

This amount (₦18331) set as welfare threshold 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).

9.3.1. Purpose of selecting the study area

Although, Oyo state is a typical example of where timber exploitation has been taking place with less proportionate regeneration but higher than any other South-western states in the region (Faleyimu *et al.,* 2013:3383). In addition, Oyo state is leading among other South west states Nigeria in terms of forest regeneration between 1988 and 2004. Oyo state had the largest forest area with 6745 ha followed by Ondo state with 4910.27 ha. Others were Ogun state (2700 ha), Ekiti state (1456 ha), Lagos state (656 ha) and the least, Osun state with 481 ha. (Faleyimu *et al.,* 2013:3383). Oyo state is agriculturally oriented. Agricultural activities

utilize more than 65% of the total land area of the state. Lowland rainforest accounts for about 6%, while trees/woodlands/shrubs cover about 22% of the total land area of the state.

In terms of ecological zones, Oyo state is divided into three major zones based on the differences in the vegetation type and these are the following:

• The Guinea savannah ecological zone is located in the northern part of the state. The vegetation consists of open woodland, tall grasses (1 to 3 m high) and trees that are less than 15m in height. Animal husbandry dominates this ecological zone.

• The Derived savannah ecological zone is found in the southern half of Oyo state. This zone developed as a result of intense deforestation due to agricultural activities on the forest area. Areas left to re-grow favours grasses and shrubs that are susceptible to fire. Arable cropping dominates this ecological zone.

• The Lowland rainforest ecological zone occupies south of the derived savannah zone. Lowland Rainforest portray three strata/storeys. This comprises of the top with isolated wide spreading crowns; the middle with a large number of species with small crowns; and the under storey made up of woody climbers and short trees with spreading crowns. Most of the tree species are used for timber production. Tree crop agriculture is the dominant land use in this zone. The Lowland rainforest is believed to be rich in biological diversity. This forest type contains many tree species of commercial importance (Ezebilo, 2004).

Specifically, Gambari forest reserves is one of the largest forest reserves in Oyo state. It covers a total land area of 13932.18 hectares. This forest reserve has both the natural and plantation forests presently lay side-by-side in the area. It has a large part of the original natural rainforest consisting of indigenous species such as Terminalia spp, Triplochiton scleroxylon, Irvingia garbonensis, and Treculia africana. Part of these tree species were cleared and replanted with exotic tree species of Gmelina arborea and Tectona grandis which make the forest to be more precious and valuable to the people especially the loggers Aborisade and Aweto, (1990). Besides, most people in and around the state take advantage of these forests to source for fuel wood as energy source for cooking while poles are used for supporting electricity cables, and sawn wood are utilized for production of furniture, pulp, paper and building houses (Faleyimu et al., 2013:3383).
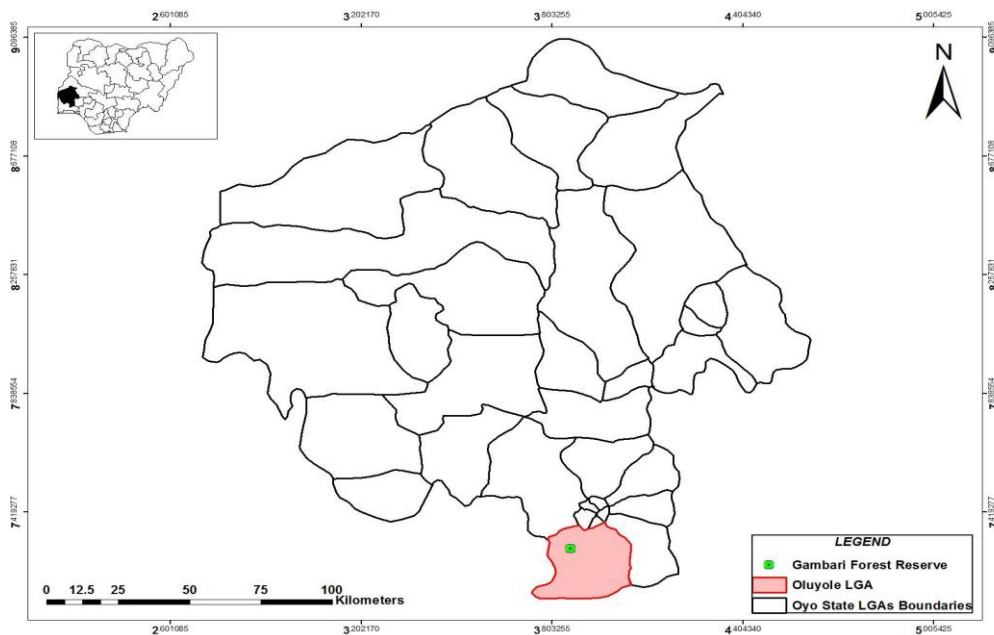
Fig.9.1: Map of Gambari Forest Reserve, Oyo state

9.3.2. Measurement of variables

Information were sought on demographic and social status of the respondents, importance of the reserve to their livelihoods, impression about present control and management system, forest resource use and willingness to participate in forest management practices. Also Focus Group Discussions (FGDs) were conducted to supplement information gathered from the interviews especially from non-literate participants who were not willing to volunteer information freely and clearly as it involved fewer numbers of people.

9.4. Results and discussion

9.4.1. Demographic characteristics of the forest indigenous people

This section presents the demographic characteristics of the of the residents around the Gambari forest reserve communities as reported in Table 9.1 below. The data reveals that most residents were male dominants having the majority of about 57.5% while the female counterparts were 43.5%. This therefore reflects the fact that the socio-economic activities around the forest reserve is not exclusively meant for men alone but it also cuts across the gender brackets. That is, male population were the majority but the distribution of the female residents in the study site were also significant in terms of various forest activities they are engaging in. This assertion is similar to the findings of Larinde and Olasupo (2011) on socio-economic importance of fuel wood production in Gambari forest reserve area, Oyo state, Nigeria where the majority of the respondents (58.8%) were males while 41.2% were females.

Table 9.1: Demographic characteristics of the forest indigenous people

Variable	Frequency	Percentage
Sex		
Male	115	57.5
Female	85	42.5
Total	200	100.0
Age		
≤30	25	12.5
31 - 40	51	25.5
41 - 50	50	25.0
> 50	74	37.0
Total	200	100.0
Marital status		
Single	38	19.0
Married	121	60.50
Divorced/widow/separated	41	20.5
Total	200	100.0
Religion		
Islam	97	48.5
Christianity	98	49.0
Traditional	5	2.5
Total	200	100.0

Source: Calculated from field survey, 2016

The age distribution shows that the average number (37%) of the residents were in their old ages of 50 years and above and about 12.5% could be regarded as youth while more than half of the population were in their middle ages ranging between 31 - 50 years old. The implication of this is that forest activities in the study site is dominated by middle aged population who can actively participate and contribute to the socio-economic situation of the area.

Also, more than 60% of the respondents were married while 19% were single and about 20.5% were either widows, divorced or separated. Furthermore, the respondents that were Muslims accounted for 48.5% and 49% were Christians while only 2.5% were traditional faithful in the study area.. This implies that there is no religious disparity among the residents which perhaps could be a source of strength in terms of their socio-economic development and peaceful co-existence.

9.4.2. Safety nets roles of forests

In order to understand the potential contributions of forests as safety nets particularly for the rural poor, it is important to take into consideration the degree of peoples' dependency on forests and the impacts of these resources on their livelihood (Table 9.2). The study gives credence to the observed relationship between rural households' poverty status and

dependence on forest resources income. The results showed that 65.5% of the rural households in the region are living below the poverty line.

Table 9.2: Impact of forest income on households' welfare

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, 2016

Specifically, in terms of poverty headcount measure, almost 68% 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%, a relative drop of 4%. The poverty gap indices was conventionally measured to be 73% but reduced to about 66% with a drop of about 7% when forest income was included. Similarly, the inclusion of forest income reduces poverty severity measure from 69% (without FREs) to about 51% , a drop of 18%. This means that forests has capacity of improving the livelihood of the poor particularly those that venture into forest income generating activities in the study site. 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).

9.4.3. Exploring the investment worth of forest income generating activities[31]

The common priority of the people who extract forest resources is to get cash return. Therefore, the study investigated the cash returns to forest resources enterprises (FREs) in South-western Nigeria (Table 9.3). The results indicate that Gross margin for some forest enterprises that were captured duringthe survey was 48.5 meaning that FREs has the potential of returning 48.5% profit of the total investment worth to the households on monthly basis. Then, the profitability index of 0.485

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[31] *Plank, vegetables, furniture making, fuel wood, fruit and charcoal businesses were found to be prominent in total sample population while bush meat, dried fish, broom, honey, wood craft, snail, medicinal plants, pole and leaves businesses in that order were moderately prominent. On the other hand, gum, dye, fibre, insect and spices businesses were the least prominent (field survey 2016).*

Table 9.3: Investment worth of forest income generating activities

Total Revenue (Total sales and other variations)	TR	₦710351
Total Variable Cost	TVC	₦274244
Total Fixed Cost	TFC	₦91500
Total Cost (Cost of revenue and other variations)	TC = TVC + TFC	₦365744
Gross Income (GI)	GI = TR - TC	₦344607
Gross Margin GM %	GI ÷ TR × 100	344607 ÷ 710351×100 = 48.5
Profitability Index		0.485

Source: Computed by the authors, 2016
Note:Total revenue is the addition of all marketable forest products and other variations (credit, promotions etc)

implies that for every ₦1 spent by the forest related entrepreneurs in the study area on their respective businesses, 48.5 kobo was realized as profit on the aggregate.

This findings gave a strong support for the earlier works by Azeez *et al.* (2011; 2015) where similar approach was used and 10% and 75% of the total investment worth were realized respectively as profits for any ₦1 spent on the investments. Moreover, the study also conforms with the findings of Awe *et al.* (2012) on Irvingia kernels marketing in Akure, Ondo State which stated that, for every one naira spent by the sellers, there was a return of 65 kobo. Therefore, FREs (most especially the most prominent ones) are veritable and prosperous businesses worthy of venturing into by the rural households since they can return almost half of the business capital as profit.

9.4.4. Management of forests

Good forest management provides opportunity for sustainable livelihood as it was reflected in Table 9.4. The study assessed forest conservation and management strategies in Gambari forest reserve areas of Oyo state[32]. In terms of forests management, the study reveals that forest protection rate (49.4% timber, 21.3% non timber) was appreciable among other factors while clearing of environment improved the management of non timber (48%) than timber (24.5).

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[32] *Oyo state is a typical example of where timber exploitation has been taking place with less proportionate regeneration but higher than any other South-western states in the region (Faleyimu et al., 2013:3383)*

Table 9.4: Forest management measures

Forest management	Timber	Non Timber
Forest protection	49.4	21.3
Reforestation	17.0	4.1
Clearing of environment	24.5	48.5
Watering of plant species	3.8	10.5
Nursery management	5.3	15.6

Source: Calculated from field survey, 2016

Essentially, having agreed with the fact that there is massive illegal extraction of forest resources within the forest reserve and its vicinity based on the oral interview conducted during the survey, unfortunately, there is no commensurate forests regeneration practices to ensure continuous and sustainable forest utilization. The rate at which forests were being regenerated was very inconsequential (17% timber, 4.1% non timber). This explains part of the reasons why most of the protected areas are being depleted as noted by Usman and Adefalu (2010). This thus pose a serious danger to the sustainability of the ecosystem.

9.4.5. Forest users' activities and conservation strategies

While forests have many important uses, only proper conservation will ensure the continuous supply of forest products and environmental sustainability as it was reflected in Table 9.5. With respect to curbing the act of illegal forest extractions, about (45%) of the respondents suggested the need for increased awareness and enlightenment campaign towards the menace while 28.5% suggested a strict monitoring of the forest reserves, more than 20% suggested reduction in extraction levy to accommodate the livelihood of the poor and only 6% suggested a complete ban of the encroachment. All these were suggested towards ensuring protection and management of the ecosystem.

Table 9.5: Distribution of forest users' activities and conservation strategies

Solution to illegal extraction	%	Conservation strategies	%
Awareness	45	Set aside certain portion	18.5
Extraction levy	20.5	Selective exploration	26.5
Ban	6	Regeneration	30
Strict guard	28.5	Tungya system	25

Source: Calculated from field survey, 2016

In addition, considering how to strike balance between the poverty status of the rural poor (most especially the residents around the forest areas) and the forest conservation strategies, about (18.5%) of the respondents suggested that Government should set aside some portions of the forests for them to extract in order to mitigate their poverty conditions. Likewise, about 26.5% supported selective exploration of forests. Similarly, 30% chose regeneration while 25% opined that there should be room for practising tungya system in form of agroforestry within the forest reserve so that the objectives of both the protected areas as well as the livelihood of the poor would be achieved. This means that if all these measures are adequately put in place and at the same time well monitored, the degree of vulnerability of forest sector will be chequered and consiquently, there will be stability in the ecosystem while the livelihood of the poor will not be treathened.

9.4.6. Relationship between forest extraction, poverty and forest conservation and management strategies

This section presents the relationship between poverty and forest products extraction in relation to forest conservation and management strategies using Somer's d directional test to confirm the strength of the association and the direction of the relationship between the set of two variables as shown in Table 9.6. Somer's d is a nonparametric measure of the strength and direction of association that exists between an ordinal dependent variable and an ordinal independent variable. Somers' d is appropriate when the need arises to distinguish between a dependent and independent variables Somers, (1962). Therefore, the study reveals first, whether there was relationship between forest extraction control and poverty status of the respondents. Secondly, the direction of such relationship if any. That is, either the variables

Table 9.6: Relationship between forest extraction, poverty and forest conservation and management strategies

Association between variables	Somer's d	P - value	Decision
Timber products and poverty	0.079	0.005	S
NTFPs products and poverty	-0.008	0.038	S
Timber products and FRI	-0.077	0.032	S
NTFPs products and FRI	0.145	0.062	NS

Source: Calculated from field survey, 2016
Note: S = significant; NS = Non-significant. If the P - values of Somer's d statistics are less than 5% level of significance, it means that there is an association [significant relationship (S)] between the variables. But if the values are greater than 5% level of significance, it means that there is no association [no significant relationship (NS)] between the variables.

increase in value together, or as one variable value increases, the other variable value decreases (monotonic relationship).

From Table 9.6, considering the results of Somer's d directional test, there was a positive relationship between timber product management and poverty. This means that increase in management of timber product would lead to increase poverty status of the forest dependent people. This possibly due to the fact that government usually dominates the control of timber products and might therefore be very difficult for forest users most especially the forest - dwelling indigenous people to have direct access to the protected areas for timber extraction and consequently impact negatively on their welfare. More often than not, products of logging, which has dominated forest commercial activities are predominantly in government hands (Nkem *et al.,* 2010), unlike NTFPs which are surrounded by individual and community practices that in most cases provide direct economic, social, cultural, and environmental benefits (Cocks and Wiersum, 2003; Shackleton and Shackleton, 2004; Stoian, 2005).

One other possible reason that may be responsible for this is that, being a forest reserve community, most rural households within the community might have developed some phobia and apathy for timber management because of its attached strict security regulations and legal implications. This though deviates from the reports of UNFF (2013) on potentials of timber which gives credence to timber management in mitigating poverty. It therefore suggests that the impact of timber management on poverty within protected areas may be different from non-protected areas.

On the other hand, NTFPs management is significant but negatively associated with poverty status of the rural households. This means that management of NTFPs has propensity of improving peoples' welfare unlike timber forest products, which are predominantly in government hands and monitored under strigent rules (Nkem *et al.,* 2010). One posible reason for this negative association might be due to a variety of management measures espoused by various stakeholders in the study site as revealed in Table 9.4. For instance, appropriate clearing of the forest environment (48.5%), protection of forest resources (21.3%), adequate nursery management (15.6%), watering of some plant species (10.5%) and reforestation (4.1%) would increase the chances of NTFPs availability and abundance needed for the livelihoods of the forest dependent people.

Also, since NTFPs management is somehow flexible compare to timber products because it is observed that most rural households usually found one means or the other to hunt for NTFPs

irrespective of the stringent nature of the forest reserve. For instance, NTFPs such as fuel wood, charcoal, fruits and vegetables, chew sticks, snails among others are at the common reach of the rural dwellers living within the forest reserve vicinities. Therefore, the mode of collection and management of NTFPs provide opportunities to improve the welfare of the poor who depend on it as explained by Sunderlin *et al.* (2008).

Finally, the study reveals negative and significant relationship between timber products management and forest resources income meaning that increase in timber products management leads to decrease in forest resources income of the rural household. This is possible particularly if the administration of such management measures are solely in full control of government security apparatus whilst forest conservation and protection regulations are not compromised. For example, Table 9.4 reveals that about 49.4% of management measures focused on timber protection while the rest 50.6% representing others (i.e. reforestation, clearing of environment, watering of plant species and nursery managenet) were also meant to ensure the sustainability of timber products in the study site.

As a result, rural households may not have capacity to encroach the forest at will and may negatively impact their involvement in timber management processes which in turn can reduce their means of income generation because such measures would have created a bottleneck for their timber extraction activities. This claim is in conformity with the findings of Kaimowitz (2003) who argued that greater enforcement of forestry and conservation laws have the potential to negatively affect rural income because such legislation often prohibits forestry activities such as small-scale fuel wood collection, charcoal production and hunting that millions of poor rural households depend on.

In summary, forest management mechanisms related to timber products favour forest conservation at the expense of surrounding communities' welfare (poverty and income) – this therefore needs further adjustment if welfare of the surrounding communities are to be considered.

However, forest management mechanisms related to NTFPs (such as forest protection, clearing of environment, watering of plant species, nursery management and reforestation) provide a win-win situation thus promote forest conservation and household welfare (poverty reduction). Specifically, forest protection method is the most effective forest management mechanism while watering of plant species is the least in the study site as reflected in Table 9.4.

9.5. Summary and conclusion

The objectives of this study include: to evaluates the role of forest products that so far, serve as safety nets sustaining the livelihoods of forest communities, examines the level of management measure compliance of the residents around the forest communities for adaptation in the face of changing ecosystem and assess the connection between safety nets of forest resources and management measure compliance of the residents around the forest communities in ensuring sustainable ecosystem management in the study area.

Firstly, the study concluded that the inclusion of forest income reduces poverty to 64%, 73% and a relative drop of 4%. the headcount The poverty gap indices was conventionally measured to be 73% but reduced to about 66% with a drop of about 7% when forest income was included. Similarly, the inclusion of forest income reduces poverty severity measure from 69% (without FREs) to about 51% , a drop of 18%. This means that forests has capacity of improving the livelihood of the poor particularly those that venture into forest income generating activities in the study site.

Similarly, the study concluded that forest related enterprises are veritable and prosperous businesses worthy of venturing into by the rural households since they can return almost half of the business capital as profit because for every ₦1 spent by the forest related entrepreneurs in the study area on their respective businesses, 48.5 kobo was realized as profit on the aggregate.

Furthermore, with respect to forest management and preservation, forest regeneration, increased awareness and enlightenment campaign, practising of tungya system, setting aside certain portion of forest, strict guard of forest domain, forest protection, reforestation and clearing of environment were key in protecting forest resources from going into extinction and sustaining the ecosystem in the study area.

Lastly, the results of Somer's d directional test suggest that management of NTFPs has propensity of improving peoples' welfare unlike timber forest products while forest management mechanisms related to timber products favour forest conservation at the expense of surrounding communities' welfare (poverty and income).

Therefore, given the high dependence level of rural communities on forests and its attendant effects on the resources, balancing forest preservation and management mechanisms will go a long way towards creating a sustainable forest conservation model for rural communities.

9.6. Recommendations

In line with the above findings, this study recommends the following:

1. Aggressive awareness and enlightenment campaigns on forest products management strategies should be enhanced.

2. Government should endeavour to set aside some portions of forests for the surrounding communities so as to increase the resource control opportunity of the forest indigenous people.

3. Forest community people should be encouraged to practise agroforestry in form of tangya system in order to balance forest conservation strategies and forest dependency.

4. There is need to prioritise management of NTFPs especially by community people among other measures while levies charged on timber products extractions should also be adjusted to accommodate involvement of the rural poor in timber control and management mechanisms.

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Chapter 10: Research Summary, Conclusions and Policy Recommendations

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10.0 Introduction

This chapter summarizes and concludes the study. The chapter is organized in such a way that it first presents a careful mapping of the major broad objectives outlined in the first chapter in relation to the major findings inferred from the analytical chapters of various self contained studies. This leads to the conclusion of the study and policy recommendations. Lastly, the chapter exposes areas of further study towards closing the gap that currently exists in the literature.

10.1 Research Summary

This section summarizes the major findings from the analytical chapters of various self contained studies, in order to make inferences from the major broad objective and the thesis of the study. The first broad objective was to capture and profile forest resources income that rural households in South-western Nigeria are currently engaging in. The major findings, drawn from the analytical chapter, were that plank, vegetables, furniture making, fuel wood, fruit and charcoal businesses were the prominent forest resources income being engaged in by the rural households while bush meat, dried fish, broom, honey, wood craft, snail, medicinal plants, pole and leaves businesses in that order were moderately prominent. On the other hand, gum, dye, fibre, insect and spices businesses were the least prominent.

Also, education, marital status, household size, forest access and forest management laws influence the rate of participation of the household in forest-related businesses. Likewise, the Gross margin for the enterprises was 48.5 meaning that FREs has the potential of returning 48.5% profit of the total investment worth to the households on monthly basis. Therefore, the major conclusion inferred was that FREs (most especially the most prominent ones) are veritable and prosperous businesses worthy of venturing into by the rural households since they can return almost half of the business capita as profit.

Secondly, the study focused on measuring the economic impact of forests on poverty status of the rural households. The prime objective was to assess the poverty status of the rural households who engage in forest activities and also to determine whether the return (profit) from such forest income is capable to lift rural households out of their poverty situation. The study discovered that 68% of the rural households are living below the poverty line in the region. Disaggregated to state level, the highest proportion is found in Osun state (77%),

followed by Ogun state (70%) and Oyo state with about 50%. The study also revealed the minimum cost required to bring these poor households to the poverty line across states (i.e. ₦4,553, ₦9,664 and ₦8,918 per month for Oyo, Osun and Ogun state respectively).

Moreover, regarding the impact of forest income on the poverty status of the households, the results of the findings show that forest related enterprises has reduced poverty incidence in the study area by 17% whereas both the extremely and moderately poor households have been reduced by 8% and 10% respectively. The study therefore concluded that forest income is capable of stemming the tide of poverty in the region even though with a relative magnitude.

Thirdly, another separate study analysed forest-related enterprises and income inequalities among rural households. The major objective here was to determine which of the forest income sources reduces or increases the disparity in income distribution and the effects of such income sources on forest related entrepreneurs in the study site. The major findings and conclusions that were inferred suggest that aggregate income inequality for the region was found to be 0.73 and therefore, engaging in diverse income sources would reduce income inequality across the sample. Also, forest enterprises income is the most income inequality reducing business having a correlation coefficient of 0.72 followed by commerce income with a correlation coefficient of 0.91. Essentially, returns from some FREs are high and capable of improving the household well-being while some FREs yield very low returns and could not substantially cater for the household.

Fourthly, another separate study's objective investigated the sources and impact of income inequalities among rural households: a case study of forest related entrepreneurs. The major findings from the study suggest that an increase in age, market access and labour cost would increase the income inequality of the forest related entrepreneurs while an increase in forest management laws would decrease it. The major conclusion was that almost 70% of the poor households are unequally distributed in terms of their conventional income measure (i.e. with exclusion of forest income), whereas the inclusion of forest income reduces the inequality gap to 59%, a relative drop of 11%.

Fifthly, the study analysed rural households' income and participation in forest- related enterprises. The major objectives of the study were to determine: (i) the factors influencing the participation in forest related enterprise and the level of participation of rural households that participate in forest related enterprises and (ii) the contributions of forest extraction on

households' income. The major findings were that, labour cost, market availability and membership of association influence the level of participation of the household in forest related businesses. Also, the higher the market activities index and the poverty index, the higher the level of participation of the household in forest-related businesses. Likewise, forest management laws, age, labour cost and forest products availability influence the forest income earnings of the households.

Lastly, another separate study evaluates the safety net role of forests role of forest in relation to forest management and conservation in South-western Nigeria. The major objective was to evaluates the role of forest products that so far, serve as safety nets sustaining the livelihoods of forest communities and assess the level of management measure conformity of the residents around the forest communities. The study also goes further to examine the connection between safety nets of forest resources and management strategies in ensuring sustainability of forest resources in the study area

The study suggests that forests has capacity of improving the livelihood of the poor particularly those that venture into forest income generating activities. Also, forest regeneration, increased awareness and enlightenment campaign, practising of tungya system, setting aside certain portion of forest, strict guard of forest domain, forest protection, reforestation and clearing of environment were key in protecting forest resources from going into extinction and sustaining the ecosystem. Similarly, management of NTFPs has propensity of improving peoples' welfare unlike timber forest products while forest management mechanisms related to timber products favour forest conservation at the expense of surrounding communities' welfare (poverty and income).

10.2. Conclusions
This study concludes that education, marital status, household size, forest access and forest management laws are the major factors influencing the rate of participation of the household in forest-related businesses (FREs). Another findings of this study adds that, labour cost, market availability and membership of association influence the level of participation of the household in forest related businesses. Also, the study reveals that the higher the market activities index and the poverty index, the higher the level of participation of the household in FREs.

Likewise, forest management laws, age, labour cost and forest products availability have significant effect on forest income of the households while the Gross margin for all the forest

related enterprises in the region was 48.5 meaning that FREs has the potential of returning 48.5% profit of the total investment worth to the households on monthly basis.

In terms of poverty measure, general profile of respondents revealed that less than 35% of the total sampled rural households in the region that earned their living from forest income were non poor while more than 65% were poor of whom about 38% were extremely poor and 62% were moderately poor in conventional terms. But regarding the impact of forest income on their poverty status, the study shows that FREs has reduced poverty incidence in the study area by 17% whereas both the extremely and moderately poor households have been reduced by 8% and 10% respectively. Essentially, forest income is capable of stemming the tide of poverty in the region even though with a relative magnitude.

Furthermore, returns from some FREs (plank, vegetables, furniture making, fuel wood, fruit and charcoal businesses) are high and capable of improving the household well-being while bush meat, dried fish, broom, honey, wood craft, snail, medicinal plants, pole and leaves sellers in that order can manage to survive as their businesses can not yield as much profit as the first category. On the other hand, some FREs (gum, dye, fibre, insect and spices businesses) yield very low returns and could not substantially cater for the income of the households.

Also, the study indicates that income inequality in the region was high (73%) and that, this inequality gap was reduced to 59% with forest income, that is, a relative drop of 11%. Likewise, forest enterprises income has the highest income inequality equalising effect with a correlation coefficient of 0.72 followed by commerce income with a correlation coefficient of 0.91. Similarly, the study concludes that increase in age, market access and labour cost would increase the income inequality of the forest related entrepreneurs while an increase in forest management laws would decrease it.

Finally, Chapter nine of this thesis concludes by evaluating the role of forest products that so far, serve as safety nets sustaining the livelihoods of forest communities and assess the level of management measure conformity of the residents around the forest communities. The study also goes further to examine the connection between safety nets of forest resources and management strategies in ensuring sustainability of forest resources in the study area. The study suggests that forests has capacity of improving the livelihood of the poor particularly those that venture into forest income generating activities. Also, forest regeneration, increased awareness and enlightenment campaign, practising of tungya system, setting aside

certain portion of forest, strict guard of forest domain, forest protection, reforestation and clearing of environment were key in protecting forest resources from going into extinction and sustaining the ecosystem. Similarly, management of NTFPs has propensity of improving peoples' welfare unlike timber forest products while forest management mechanisms related to timber products favour forest conservation at the expense of surrounding communities' welfare (poverty and income).

In sum, the various studies conclude that ― forest resources have economic contributions to improve rural households' welfare and to reduce inequality among them. However, some forest related enterprises yield high return than others while at the same time some reduce income inequality among forest indigenous people than others. Likewise, various factors are responsible for the rate at which rural households participate in forest resources extractions. Finally, forest resources require adequate management and protection in order to ensure not only their sustainability but also to maintain a balance ecosystem.

10.3. Policy recommendations

In line with the motivation of this study which is based on the important roles of forest in providing a safety net function and as mitigating factors against livelihood threats for the poor, the unexploited forest potentials in lifting some rural people out of poverty, its ability to reduce inequality, and the fact that, all these forest potentials are, in some respects, poorly understood and recognized, these areas shall be the focal points of the policy insights of this study after a thorough investigations of these challenges.

Corroborating this claim, Sunderlin *et al.* (2003:1) explained that the distinctive forest roles are unknown to many policymakers and planners and to worsening the scenario, the scientific community has not explained them well. The policy makers cannot therefore show indifference to all these identified challenges given credence to potentials of forests which substantially offer opportunity to more than 300 million people around the world, especially the poor, (Fonta *et al.,* 2010:1).

In view of the above, this study therefore put forward the following recommendations in view of its perceived contribution to the existing knowledge base, literatures on the subject matter and the developmental plan of Nigeria towards reducing poverty and income inequality particularly among the rural dwellers;

- Micro lending programs, creation and crafting of a veritable market for the products and other incentives to assist the poor forest based entrepreneurs should be given a needful attention and priority. This could be achieved in form of social intervention scheme on local government area basis to ensure adequate and correct targeting of the poor forest based entrepreneurs.

- Government should ensure the creation of robust economic strategies to diversify the means of livelihood in form of alternative income sources for the teeming rural populace. This will ensure some level of equilibrium between poverty mitigation and sustainable forest management.

- Restructuring and reintegration of a series of pro-poor poverty alleviation initiatives (such as decentralisation, of authority, market deregulation and liberalisation, anti-corruption campaigns, retreat of concessionaires, growing markets, new technology etc) that will be all inclusive and targeted mainly on the grass root particularly the younger population.

- Less prominent and less lucrative FREs such as gum, dye, mushroom, leaves and spices sellers can also be assisted by the Government and forest-based stakeholders through provision of credit access to lift them up in their respective businesses while most prominent and high lucrative FREs should be fortified.

- Forest-based approaches, such as market development for forest products like wood, bush meat, wood crafts, furniture making and pole should be aided. But careful implementation is necessary to minimize economy-environment tradeoffs.

- Equal accessibility to forests engendered by forest management laws and supportive markets for harvestable forest products to reduce income inequality.

- Targeted training programmes on improved methods of engaging in the business (handling of some necessary machineries and marketing strategies that empower rural poor households with necessary forest harvesting skills may enhance equal participation (harvesting) that may reduce income inequality.

- More incentives and encouragements should be given to rural forest entrepreneurship to foster improved commercialization and value chain of forest products in order to reduce the perennial scourge of income inequality among rural households.

- Market unions should also take responsibility for improving on market flooding and price related upheavals.

- Improved social capita system among forest related entrepreneurs should be a serious concern for the policy planners.

- Provision of basic infrastructure in the rural areas in particular, are necessary requirements for improvement in the level of participation of the rural households in FREs.
- Government should extend the outreach of forest certification schemes and codes of conduct that include social and labour aspects relevant to small - scale forestry to promote sustainable forest use.
- Government should endeavour to set aside some portions of forests for the surrounding communities so as to increase the resource control opportunity of the forest indigenous people.
- Forest community people should be encouraged to practise agroforestry in form of tangya system and learning of domestic production of some bush animals (molluscs, rabits etc.) in order to balance forest conservation strategies and forest dependency.
- There is need to prioritise management of NTFPs among other measures while levies charged on timber products extractions should also be adjusted to accommodate involvement of the rural poor in timber control and management mechanisms.

10.4. Areas of further study

10.4.1. Basis:

Quite very few studies have been conducted on the contributions of forest income in Sub-Sahara Africa. Out of such few, the results have shown that there were slight mixed standpoints. Majority if not all of the earlier studies in Nigeria eschew this aspect except Fonta & Ayuk (2010) whose case study was in the South-west Nigeria. Based on this, empirical analysis (in a random sample) of this magnitude is still under consideration and generalised to the rest of poor rural households in South-western Nigeria. Also, due to the different contexts of the regions, the findings of this study cannot be generalised to the rest of Nigeria. Therefore, there is need to complement the result of this study with similar studies in other regions in order to broaden the scope of application of the results of this study.

10.4.2. Basis:

This study reveals that management of NTFPs has propensity of improving peoples' welfare unlike timber forest products while forest management mechanisms related to timber products favour forest conservation at the expense of surrounding communities' welfare (poverty and income). This therefore suggests that there should be a point of symmetry between using forest particularly timber products as a source of livelihood at the same time conserving the forest and its biodiversity in order to minimize economy-environment

tradeoffs. The United Nations Forum on Forests (2013) affirmed the fact that considering this essential nexus between forests and the livelihoods of poor, efforts should be made to put in place policy measures that would integrate both the management of forests and the distribution of benefits from forests. That is, forest management policies to minimize forest resources degeneration while exploring the forest benefits and achieving effective utilization of these resources without damaging the ecosystem. This thus means that further studies are required on this issue to harmonize this view for better improvement.

10.5. References

Fonta, M.W., Ogujiuba, K.K. and Amakom, U., 2010. Modeling and understanding the interrelationship between natural resource extraction, poverty and inequality: the case of forestry in sub-Saharan Nigeria.Forthcoming (Nov. 2010), in Environmental Modeling for Sustainable Regional Development: System Approaches and Advanced Methods.

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Appendix I: QUESTIONNAIRE

University of Fort Hare
Together in Excellence

FACULTY OF Science and Agriculture

DEPARTMENT OF Agricultural Economics and Extension

Notice: This questionnaire is specifically meant to elicit information for the sole purpose of academic research findings while the following ethical considerations will be strictly followed: secrecy of the respondent's information; respect to the respondents; freedom to attend to the interviewers or otherwise; sensitization and adequate information on the research work.

Title of the study: Forest Resources Income, Poverty and Income Inequality: Evidence from Rural Households in South-western Nigeria

Date --- HH. No. -------------------------------------.

Village-- Family Name--

Number of HH. respondents--------------------------- Enumerator's name --------------------------------

Start Time of interview------------------------------- End Time of interview------------------------------

Part 1: Demographic characteristics of the household

Demographic Features	Categories				
Head's Age	≤ 20	21 – 40	41 - 60	61 – 80	> 80
Head's Sex	Male	Female			
Head's Year of Education	No Formal Education	Primary	Secondary	Tertiary	
Marital Status	Single	Married	Divorced	Separated	Widow
Household's Size:					
No of children	≤ 2	3 – 4	5 - 6	7 - 8	≥ 9
No. of male adults	≤ 2	3 – 4	5 – 6	7 - 8	≥ 9
No. of female adults	≤ 2	3 – 4	5 – 6	7 - 8	≥ 9
Religion	Islam	Christianity	Traditional	Non- belief	Others

a) Household's average monthly expenditures

Variables	Availability		Types				Cost/month
Land holdings	Yes =1	No =0	Purchase	Inheritance	Lease	Rent	
House rent/maintenance			Single Room	≥ two rooms	Duplex	Flat	
Safe drinking water			Well	Stream	Borehole	Tap	
Toilet			Pit	Bush	Public Toilet	WC	
Security			Self-guard	Community-guard	Police	Others	
Transportation			Private	Public	Hire	Others	
Health services			Self-medication	Herbal	Medical	Spiritual	
Energy/power			Electricity	Lantern	Torchlight	Local light	
Communications/ social amenities			Phones	Radio	Television	others	
Children Education			Primary	Secondary	Tertiary	Artisans/tr aining	
Feeding expenses							
Food stuffs			Yam flour	Gari	Pounded yam	others	
Ingredients			Specify				
Meat/ Fish			Specify				
Beverages/fruits			Specify				
Fuel			Fire wood	Charcoal	Kerosene	Others	
Wears			Clothes	Foot wears	wrist watches	Jewelries/ others	
Sanitations			Specify				
Charity/ donations			Families	Religion	Friends	Others/ specify	
Miscellaneous							
Other household expenses (specify)							

b) Household's access to basic facilities

S/N	Public Infrastructures	Available in this community (Yes/No)	If available do your household members have access to it? (Yes/No)	Terms of Access
1	Primary School			
2	Secondary School			
3	Clinic/Maternity			
4	Electricity			
5	Tarred Road			
6	Tap Water			
7	Sanitation			
8	Public Transportation			
9	Forest Input Market			
10	Forest Output Market			

11	Modern Market
12	Toilet
13	Others (specify)

N.B. terms of access: (payment, free/open access)

Household's average monthly incomes

Income Sources	Activity engaged-in and Income during the last 12 months							
	Activity/Source 1		Activity/Source 2		Activity/Source 3		Activity/Source 4	
	Type	Income	Type	Income	Type	Income	Type	Income
Commerce income								
Forest-related enterprises income								
Agricultural income								
Employment income								
Remittance income								
Transfers income								
Wage income								
Social grants								
Other income								

Part 2: Indexes of FREs participation

1) Do you participate in Forest – Related Enterprises (FRE)? (a)Yes ☐ (b) No ☐

2) If yes, is FRE your primary occupation? (a)Yes ☐ (b) No ☐

3) If No, what other business(s) are you combining with it?

   (a) Trading ☐ (b) formal employment ☐ (c) non-formal employment ☐ (d) artisanship ☐ (e) farming ☐ others, specify ………………

4) How did you get into the business? (a) family job ☐ (b) personal interest ☐ (c) learning ☐ (d) by coincidence ☐ (e) initiation by others ☐

5) Are the forest products available all year round? (a) Yes ☐ (b) No ☐

6) If No, what period of the year do you experience shortage of products? (a) winter ☐ (b) summer ☐ (c) unpredictable ☐

7) How farther is forest to your house? (a) < 1km ☐ (b) (1 -2)km ☐ (c) (3-4)km ☐ (d) (5-6)km ☐ (e) ≥ 7km ☐ , be specific …………………………………..

8) Where do you normally get your forest products? (a) forest ☐ (b)local market (c) farm ☐ (d) shop ☐ (e) another town ☐ (f) others, specify …………………………

9) Do you have ready market for the sale of your products? (a) Yes ☐ (b) No ☐

10) How farther is market to your house? (a) < 1km ☐ (b) (1 -2)km ☐ (c) (3-4)km (d) (5-6)km (e) ≥ 7km, , be specific …………………………………..

11) How frequent do you replenish your stock? (a) daily ☐ (b) weekly ☐ (c) fortnightly ☐ (d) monthly ☐ (d) not regular (e) others, specify…………..

12) Where do you sell your market? (a) shop ☐ (b) market (c) hawking ☐ (d) store ☐ (e) others, specify…………………..

13) What is your means of transportation? Personal vehicle ☐ (b) public transport ☐ (c) hired vehicle (d) all of the above ☐ (e) none of the above ☐

14) How much do you spend on transport/month? (a) < ₦200 ☐ (b) ₦200-400 ☐ (c) ₦500- 700 ☐ (d) ₦800-900 ☐ (e) ≥₦1000

15) Which labour do you employ?(a) family ☐ (b) hired ☐ (c) self ☐ (d) all of the above (e) none ☐

16) How much do you spend on labour per month? (a) < ₦2000 ☐ (b) ₦2000-4000 ☐ (c) ₦5000-7000 ☐ (d) ₦8000-9000 ☐ (e) ≥₦10000 ☐

17) Do you belong to any FRE group/association? (a) Yes ☐ (b) No ☐

    If yes, Specify; (a) government ☐ (b) NGO ☐ (c) community ☐ (d) market group ☐ (e) farmers group ☐

18) What benefits do you get FRE group/association? (a) money incentives ☐ (b) moral support ☐ (c) spiritual support ☐ (d) others, specify…………………...

19) What constraints do you experience from the group? (a) entry barrier ☐ (b) exit barrier ☐ (c) cost implication ☐ (d) strict regulations ☐ (e) others, specify…………….

20) Do you have access to the forest to exploit the products? (a) Yes ☐ (b) No ☐

21) If yes, which type of forest do you have access to? (a) family forest ☐ (b) community forest ☐ (c) forest reserves ☐ (d) all ☐ (e) none ☐

22) Are there any preferential treatments among forest related entrepreneurs in accessing the forest products? Yes ☐ (b) No ☐

23) If yes, indicate the cause(s) (a) personal social status ☐ (b) bribery ☐ (c) group membership influence ☐ (d) due payment ☐ (e) indigeneship ☐ others, specify

Part 3: Level of participation in Forest –Related Enterprises

1) To what extent have you been engaged in FRE? Please, tick the following numbers of FREs you are engaging in; Then, fill-in the rest column gaps

FREs	Cost of input	Av. Revenue	FREs	Cost of input	Av. Revenue
Planks	☐		Broom	☐	
Mat-making	☐		Poles	☐	
Furniture	☐		Locust bean	☐	
Wood craft	☐		Insects	☐	
Charcoal	☐		Insects	☐	
Fuelwood	☐		Spices	☐	

Paste&mortar	☐	Employment	☐
Chew stick	☐	Leaves	☐
Bush meat	☐	Mushroom	☐
Snail	☐	Honey	☐
Fish	☐	Cane	☐
Fruit& seeds	☐	Vegetables	☐
Medicinal Plants &animals	☐	Fibres/cotton	☐
Gum	☐	Local wine	☐
Dye	☐	Condiments	☐
Latex	☐	Rope & string	☐
Forage&folder	☐		
Others	☐		

Facilities and Implements	
Shop	Maintenance
Implements	Miscllaneous
Labour	Others

Transport	

2) What is your average FRE business turn-over per month? ....

3) How much do you realize from other income sources/ month? ....

4) How long have you been in the business? (a) < 1yr ☐ (b) (1-5) yrs ☐ (c) (6-10) Yrs ☐ (d) (10 – 15) yrs ☐ (e) ≥ 16 yrs ☐

5) Is there any institutional laws/regulations affecting your participation in the enterprise? (a) Yes ☐ (b) No ☐

6) If any, indicate; (a) government ☐ (b) community ☐ (c) religion/cultural belief ☐ (d) association ☐ (e) others, specify……………………

7) What is the level of awareness of your business in your community? (a) very much ☐ (b) much ☐ (c) moderate ☐ (d) very little ☐ (e) little

8) What facility(ies) do you enjoy that enhance your business? (a) Shop ☐ (b) store ☐ (c) working implements ☐ (d) social amenities ☐ (e) others specify…………

9) How could you categorize the status of your enterprise(s)? (a) large scale ☐ (b) relatively large ☐ (c) medium ☐ (d) small ☐ (e) very small ☐

10) How costly is the forest inputs price? (a) very high ☐ (b) high ☐ (c) moderate ☐ (d) cheap ☐ (e) very cheap ☐

Part 4: Income sources and inequality

Demographic features	Age, sex, Head education, marital status and household's size		
Number of FREs		Own forest land (ha)	
Forest distances (km)		Communal forest land (ha)	
Income Sources	Turn-over/month	Income Sources	Turn-over/month
Forest enterprises income		Other self-employed income	
Forest related wage income		Government income	
Non forest wage income		Commerce income	
Forest informal employment income		Farm income	
Other self employment income		Remittance/transfer income	

Part 5: Relationship between Forest extraction, Poverty & Forest Conservation Strategies

1) Who controls access to these forest resources in this community and the type of management procedures?

Resources	Control	Type of Management
Timber		
Non-Timber Forest products		
Forest Facilities		

Note: Control:

(a) Government agents (b) Community leaders (c) Society group (d) Individuals

Types of management:

(a) forest protection, (b) cleaning of environment, (c) watering of plant species (d) nursery management (e) reforestation (e) others, specify………………

2) Is there an equal access right to forest resources in this community? A) Yes ☐   B) No ☐

If no, give reasons;

………………………………………………………………………………………………….

3) Do your household have free access to these resources?   A) Yes ☐   B) No ☐

4) If no, why? Please mention …………………………………………………………

……………………………………………………………………………………….

5) Do you aware of any law or regulation guiding this forest reserves? A) Yes ☐   B) No ☐

6) Has there been any prosecution for illegal extraction of the forest resources? Yes ☐   B) No ☐

7) If yes, tick the appropriate (a) sue to court ☐ (b) fine ☐ (c) beating ☐ (d) arrest by forest guards ☐ (d) others, specify………………………

8) How can indiscriminate extraction of forest be controlled? (a) enforcement of forest laws ☐ (b) strict guard ☐ (c)extraction levy ☐ (d) ban access to reserve ☐ (e) increased enlightenment ☐

9) Has any member of this household been sanctioned due to forest extraction? A) Yes ☐   B) No ☐

10) If yes why? Which of the sanctions? (a) sue to court ☐ (b) fine ☐ (c) beating ☐ (d) arrest by forest guards ☐ (d) others, specify………………………

11) Do you have any alternative to source for your forest resources? A) Yes ☐   B) No ☐

12) If yes, specify………………………………………………………………

13) If no, how do you survive? (a) farming ☐ (b) petty trading ☐ (c) hired labour ☐ (d) difficult to survive ☐ (e) others, specify…………………………………………………

14) Is there any opportunity to buy any of the forest products from the forest managers? A) Yes ☐ B) No ☐

15) Tick any benefit you derive from the forest reserve

a	Easy access to forest products
b	It creates market opportunity
c	It creates road access
d	Hunting benefit
e	Natural/ecological serenity/ habitat
f	Farming/Agroforestry
e	Others, specify

16) Do forest conservation procedures prevent any member of your household from engaging in forest related activities? A) Yes ☐   B) No ☐

17) If yes, suggest the way out (a) set aside certain portion ☐ (b) remove the rules ☐ (c) reduce the price ☐ (d) practicing tungya farming system ☐ (e) others, specify ………………………

Thanks for your cooperation and support

APPENDIX II

University of Fort Hare Ethical Clearance Certificate

University of Fort Hare
Together in Excellence

ETHICAL CLEARANCE CERTIFICATE
REC-270710-028-RA Level 01

Certificate Reference Number: MUS22SAZE01

Project title: **Forest Resources income, Poverty and Income Inequality: Evidence form Rural Households in South-western Nigeria.**

Nature of Project: PhD in Agricultural Economics

Principal Researcher: Fatai Abiola Azeez

Supervisor: Prof A Mushunje
Co-supervisor: Dr A Taruvinga

On behalf of the University of Fort Hare's Research Ethics Committee (UREC) I hereby give ethical approval in respect of the undertakings contained in the above-mentioned project and research instrument(s). Should any other instruments be used, these require separate authorization. The Researcher may therefore commence with the research as from the date of this certificate, using the reference number indicated above.

Please note that the UREC must be informed immediately of

- Any material change in the conditions or undertakings mentioned in the document
- Any material breaches of ethical undertakings or events that impact upon the ethical conduct of the research

The Principal Researcher must report to the UREC in the prescribed format, where applicable, annually, and at the end of the project, in respect of ethical compliance.

Special conditions: Research that includes children as per the official regulations of the act must take the following into account:
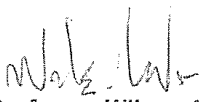
Note: The UREC is aware of the provisions of s71 of the National Health Act 61 of 2003 and that matters pertaining to obtaining the Minister's consent are under discussion and remain unresolved. Nonetheless, as was decided at a meeting between the National Health Research Ethics Committee and stakeholders on 6 June 2013, university ethics committees may continue to grant ethical clearance for research involving children without the Minister's consent, provided that the prescripts of the previous rules have been met. This certificate is granted in terms of this agreement.

The UREC retains the right to

- Withdraw or amend this Ethical Clearance Certificate if
  - Any unethical principal or practices are revealed or suspected
  - Relevant information has been withheld or misrepresented
  - Regulatory changes of whatsoever nature so require
  - The conditions contained in the Certificate have not been adhered to

- Request access to any information or data at any time during the course or after completion of the project.

- In addition to the need to comply with the highest level of ethical conduct principle investigators must report back annually as an evaluation and monitoring mechanism on the progress being made by the research. Such a report must be sent to the Dean of Research's office

The Ethics Committee wished you well in your research.

Yours sincerely

Professor Wilson Akpan
Acting Dean of Research

02 November 2016