PAYMENT FOR ENVIRONMENTAL SERVICES, RURAL POVERTY REDUCTION AND AGRICULTURAL LAND CONSERVATION IN OYO STATE FARM SETTLEMENTS, NIGERIA

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DOCTOR OF PHILOSOPHY
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PAYMENT FOR ENVIRONMENTAL SERVICES, RURAL POVERTY REDUCTION AND AGRICULTURAL LAND CONSERVATION IN OYO STATE FARM SETTLEMENTS, NIGERIA

By

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ABSTRACT

Despite successive anti-poverty and environmental resources conservation programs by the Nigerian government, the problems of poverty and environmental resources degradation still persist. This study argues that since the two problems are interrelated, the solutions to them must be undertaken simultaneously and in an integrated manner rather than independently of each other. However, one major obstacle to the solution is property rights (i.e. Secured land ownership rights). Past studies argued that without property rights the poor would not be willing to participate in the environmental resources conservation. Besides, studies have indicated that most of the anti-poverty benefits do not reach the target group. Hence, it is inevitably necessary for this study to first of all identify the 'real poor' and the categories of the poor multidimensionally. This was achieved with the aid of Alkire and Foster (2010) and Alkire and Santos (2011) multidimensional poverty assessment methods. The study argues that a credit-based Payment for Environmental Services (PES) has the potential to tackle rural poverty and agricultural land degradation simultaneously, without the poor having absolute ownership rights of the agricultural land. To this end a choice experiment approach was employed to design the multi-attributes of PES. Thus, the perspectives of the poor and their preferences for the options of the PES attributes on rural poverty reduction and agricultural land conservation were identified. Multistage sampling technique was used to choose 317 respondents in Akufo, Ijaye and Ilora farm settlements. The main findings of this study revealed that tenancy security of the land is sufficient to attract the poor to participate in land conservation programs. The study also discovered that PES is a viable mechanism for rural poverty reduction and agricultural land conservation. Thus, there is a need for an institutional arrangement for adequate tenancy security provision as this arrangement will enhance the potentials of PES to mitigate both land degradation and rural poverty concomitantly.

Keywords: multidimensional poverty, payment for environmental services, property rights land degradation

ABSTRAK

Walaupun kerajaan Nigeria telah melaksanakan pelbagai program pembasmian kemiskinan dan pemuliharaan sumber alam sekitar, namun masalah kemiskinan dan kemerosotan sumber alam sekitar masih berterusan. Kajian ini membahaskan bahawa memandang kedua-dua masalah tersebut saling berkaitan, penyelesaiannya perlu dilaksanakan secara serentak dan bersepadu bukannya secara berasingan. Walau bagaimanapun, salah satu halangan utama kepada penyelesaiannya adalah hak pemilikan harta (iaitu hak pemilikan tanah bercagar).Kajian lepas membahaskan bahawa tanpa hak pemilikan harta, golongan miskin tidak akan bersedia untuk mengambil bahagian dalam usaha pemuliharaan sumber alam sekitar. Selain itu, kajian telah menunjukkan bahawa sebahagian besar manfaat pembasmian kemiskinan tidak sampai kepada kumpulan sasaran. Oleh itu, adalah perlu untuk terlebih dahulu mengenal pasti maksud 'kemiskinan sebenar' dan kepelbagaian kategori dimensi kemiskinan. Tujuan ini dapat dicapai dengan bantuan kaedah penilaian kemiskinan pelbagai dimensi Alkire dan Foster (2010), dan Alkire dan Santos (2011) . Kajian ini menegaskan bahawa Pembayaran Berasaskan Kredit untuk Perkhidmatan Alam Sekitar (PES) mempunyai potensi untuk menangani kemiskinan di luar bandar dan kemusnahan tanah pertanian secara serentak, tanpa golongan miskin mempunyai hak milik mutlak ke atas tanah pertanian tersebut. Untuk tujuan ini satu pendekatan eksperimen pilihan digunakan untuk mereka bentuk pelbagai sifat PES. Oleh itu, keutamaan / perspektif golongan miskin terhadap pilihan ke atas sifat-sifat PES bagi pengurangan kadar kemiskinan luar bandar dan pemuliharaan tanah pertanian telah diperolehi. Teknik persampelan pelbagai tahap digunakan untuk memilih 317 responden di penempatan Akufo, Ijaye dan ladang Ilora. Dapatan utama kajian ini menunjukkan bahawa jaminankeselamatan penyewaan tanah adalah mencukupi untuk menarik golongan miskin mengambil bahagian dalam program-program pemuliharaan tanah. Kajian ini juga mendapati bahawa PES merupakan satu mekanisme yang berdaya maju untuk mengurangkan kemiskinan luar bandar dan pemuliharaan tanah pertanian. Oleh itu, keperluan untuk mengatur sebuah institusi bagi memenuhi peruntukan keselamatan penyewaan akan meningkatkan potensi PES untuk mengurangkan kadar kemusnahan tanah dan pengurangan kemiskinan di luar bandar secara seiring.

Kata kunci:kemiskinan multidimensi, bayaran untuk perkhidmatan alam sekitar, hak milik, kemusnahan tanah

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ACGS	Agricultural Credit Guarantee Scheme
ADP	Agriculture Development programme
AES	Agricultural Environmental Services
AF	Alkire and Foster
BL	Back to Land
BLRW	Better Life for Rural Women
CBN	Central Bank of Nigeria
CE	Choice Experiment
CI	Confidence Interval
CIA	Central Intelligence Agency
CONSPOV	Consumption Poverty
CSPI	Correlation Sensitive Poverty Index
CV	Contingent valuation
DFFRI	Directorate of Food, Road and Rural Infrastructure
EA	Enumerated Area
EDUC.POV	Educational Poverty
ES	Environmental Service
FCPE	Free and Compulsory Primary Education
FEAP	Family Economic Advancement Programs
FGT	Foster–Greer–Thorbecke indices
FREQ.	Frequency
FSP	Family Support Programs
FSP	Family Support Programme

GDP	Gross Domestic Product
GRP	Green Revolution Programme
HDI	Human Development Index
HSG/LSD	Housing Standard/Living Standard
IFAD	International Fund for Agricultural Development
ISP	Input Subsidy as a reason for your Participation
LIVGSTD	Living Standard
LOR	Land Ownership Rights
M	Mean
MDGs	Millennium Development Goals
MOC	Member of an Organization
MPI	Multidimensional Poverty Index
MPOV	Multidimensional Poverty
NAFP	National Accelerated Food Production Program
NALDP	National Agricultural Land Development Programme
NAPEP	National Poverty Eradication Programme
NARDCB	Nigerian Agricultural Rural Development Cooperative Bank
NBS	Nigerian Bureau of Statistics
NDDC	Niger-Delta Development Commission
NDE	National Directorate of Employment
NEST	Nigerian Environmental Study/Action Team
NGO	Non-Governmental Organization
NICIS	Non-Increasing Correlation Increasing Switch

NPC	National Population Commission
NRIDCS	Natural Resources Development and Conservation Scheme
OFN	Operation Feed the Nation
OPHI	Oxford Poverty and Human Development Initiative
OYSG	Oyo State Government
PAP	Poverty Alleviation Programs
PBN	Peoples' Bank of Nigeria
PES	Payment for Environmental Services
POC	Provision of Credit
PPP	Purchasing Power Parity
PRC	Poverty Reduction and Conservation of Environment
PRU	Participation in Conservation of land through PES mechanism could Reduce Unemployment
PTC	PES Transaction Costs
RBDA	River Basin Development Authorities
RBP	Rural Banking Programs
RES	Rural Electrification Scheme
RIDS	Rural Infrastructural Development Scheme
RUPES	Rewarding the Upland Poor for Ecosystem Services
SAP	Structural Adjustment Programme
SD	Standard Error
SGPA	Strategic Grains Reserves Program
SOWESS	Social Welfare Scheme
T	T-Value

TBP	Trust Between the Parties
UBN	Unsatisfied Basic Needs Method
UN	United Nation
UNDP	United Nation Development Programme
USD	United State Dollar
WTA	Willingness To Accept
YES	Youth Empowerment Scheme

CHAPTER ONE

INTRODUCTION

1.1 Background and Motivation of the Study

Previous governments in Nigeria have recognized the necessity to tame poverty as it impedes socioeconomic growth and development of her populace. Evidences abound from the previous studies that poverty has reached an endemic level in Nigeria (Abiola & Olaopa, 2008; Adepoju &Yusuf, 2012; IFAD, 2011; World Bank, 2011) in spite of various programs aimed to tackle poverty. From the released statistics by the National Bureau of Statistics (NBS), the former governor of the Central Bank of Nigeria (CBN): Charles Soludo has this to say about the state of poverty in Nigeria.

I have decomposed the relative contributions of each state and geopolitical zone to the worsening poverty, using the NBS figures, and the results for the zones are: North central (4.7%); Northeast (10.2%); Northwest (15.6%); Southeast (37%); South south (14.3%); and Southwest (18%). In total, the 19 Northern states contributed about 30%, while the 17 states in the Southern states contributed 70% of the deterioration in the national poverty index. At the state level, the five states with the worst deterioration (in percentages of deterioration compared to 2004) are: Anambra (238%); Bayelsa (189%); Abia (185%); Oyo (152%); and Enugu (132%).

The states with the most improvement in reducing poverty (percentages of improvement) are: Niger (32%), Kogi and Jigawa (17%); Kwara (13%), Kebbi (10%), and Lagos (7%). The full results show that compared to 2004, poverty worsened dramatically in all Southern states except Lagos in 2010, whereas in the North, it worsened in 11 out of the 19 states. A very interesting symmetry is the fact that, except for Adamawa and Zamfara States, every state where poverty declined in the 2004 survey, it increased in 2010 and vice versa. Can this be true or a typo? The statistics are quite intriguing if the figures are correct, they raise a very important issue pertaining to the size of government spending and poverty. Interestingly, some of the states that spent the most money also had very high deterioration in poverty between 2004 and 2010. Ogun (117%), Edo (119%), Imo (109%), Rivers (101%) and Akwa Ibom (80%)" (This day live, November 26, 2012. Pp.1).

The above shocking revelation is begging for urgent measures. It is therefore not a gainsaying that state of emergency be declared for poverty in Nigeria, with all seriousness to radically reduce this plague, if not total eradication. In furtherance to these revealed facts, it is unarguable that the bulk of the poor people resides in the rural settings (who are mainly farmers depending on the land for their economic activities and livelihood sustainability). These farmers are handicapped as a result of low income associated with the subsistence-intensive agricultural practices that is characterized with poor productivity. As a result of this, it is difficult or almost impossible for them to maintain and sustain agricultural land, the repercussion of it, is the land degradation (Kabubu-Mariara, 2002).

Agricultural land degradation is a serious threat in the Nigerian rural environment to both man and the ecosystem. Mostly, land degradation is caused by the poor management of the land as well as excessive population pressure. This includes, among others: (i) bush burning (ii) indiscriminate tree felling (iii) overgrazing (iv) deforestation and (v) intensive cultivation of agricultural land. Most of the agricultural land in the Nigerian rural settings has lost their soil nutrients to erosion. This in turn leads to other environmental hazards. An empirical study on agricultural land degradation in the South-west geopolitical zone of Nigeria, indicated that, of the 30.00km^2 land mass, 14.8 percent (4.44km) land is seriously affected by both sheet and gully erosion (Titilola & Jeje, 2008). It was observed that soil loss to erosion as a result of poor land management in the Western state of Nigeria, is about 15 tonnes per hectare annually. This translated to about 850,000

hectares being severely rendered un-productive for human activities and agricultural reasons (Titilola & Jeje, 2008). In some few past decades ago, about 18,517km^2 arable land mass was destroyed by about 2000 gully erosion. According to Ofomata (1978) as cited in Titilola and Jeje, (2008), southeastern zone of Nigeria alone recorded 71.25 per cent (53,028km^2) agricultural land mass destruction by accelerated erosion out of 75,488km^2 land mass. Also 15,450km^2 (20.46 %) was badly eroded by sheet erosion while gully erosion destroyed about 1.6 per cent (121km^2). Going by this statistics, food security is highly threatened and rural poverty abounds. To this end, it's obvious that all hands must be on deck to save the rural ecosystem from further damages. It has been proved that, there is a link between poverty and environmental problems, (Conservation Biology, 2007; McCallum, 2012). It was further observed that poverty is the major cause of environmental resource degradation (Bhattacharya & Innes, 2006).

It is therefore imperative that environmental resource conservation by the poor is necessary in rural poverty reduction efforts. Resource conservation is essential as the majority of the rural poor farmers have no property rights over their land (Kabubu-Mariara, 2002).

However, two critical factors must be considered in order to reduce rural poverty and environmental resource degradation. In the light of the above, rural poverty with regards to property rights provision (land ownership rights) is a necessary issue to be given the deserved attention. Also the rural poor need to be provided with the right incentive, such as payment for environmental services (this is an incentive-based mechanism, that

could be employed for conservation of environmental resource and poverty alleviation). Provision of this incentive will spur the rural poor to embark on the agricultural practices that are environmentally viable and economically reasonable.

The paucity of studies on poverty and environmental degradation in Nigeria, especially those that addressed the two simultaneously (that is, poverty and environmental degradation) prompted the need for this study. In the study of Obayelu (2010), he observed that few countries have explicit policies to tackle environment and social development concurrently. For instance, several steps have been taken by various Nigerian governments to address poverty, amongst are various poverty alleviation programs, such as; Better Life for Rural Women (BLRW), Back to Land (BL) National Agriculture Development Programme (ADP), National Poverty Eradication Programme (NAPEP), Family Support Programme (FSP), National Agricultural Land Development Programme (NALDP), to name but a few. All these anti-poverty measures did not have the expected headway in solving the poverty status of the rural poor. The reason for the failure of these heartwarming, anti-poverty programs are (i) Failure to recognize rural poverty and environmental degradation as a 'symbiosis' phenomenon. That is, rural poverty causes environmental degradation and environmental degradation causes rural poverty the more (see figure 1.2). (ii) Non-identification of the 'real poor' who are supposed to be the target group for the antipoverty programme, partly because of (iii) Unidimensional assessment of the poor, which is not adequate enough to identify the 'real poor' (UNDP, 1997). (iv) The defects of (ii) and (iii) led to the wrong strategies of approaching poverty reduction: That is, different dimensions of poverty were not

identified, hence a 'medicine for all' approach for poverty reduction, were proffered to solve poverty. Whereas, treating each of the categories of the poor accordingly should be preferred.

Despite an increase in GDP year-in and year-out, still there is nothing to write home about, as it does not translate to the wellbeing of the poor masses. True to this, the report of the National Bureau of Statistics (2010) noted that despite roaring GDP growth rates, 61 percent of Nigerians in 2010, or (100 million people) still live in absolute poverty. In a related development, Nigeria's current Human Development Index (HDI) rating is 172 out of 182 countries. This puts life expectancy in Nigeria at a frightening level of 52.12 years (World Bank, 2013). This low level of life expectancy could be attributed to poor health, poor living condition, and high illiteracy level that characterized the poverty situation.

Inability of the policy makers to view poverty as a cause of environmental degradation, and the latter being the effect of poverty, attributed to the failure in combating poverty and environmental degrading. The consequence of this laxity on the part of government has led to most of the social and environmental challenges, Nigeria is currently witnessing.

Studies on poverty and environmental resource conservation linkage have shown that, they are conditioned by some factors, such as social, economic, demographic and climatic factors. These include the existence, structure and performance of markets and also including institution such as property rights (Kabubu-Mariara, 2002). For example,

if the farmers (the poor) are unsure about their ownership status of a land, they will not be willing to engage in a sustainable land use practices such as terracing, planting of trees, checking of erosion, avoidance of deforestation, which could encourage productivity.

This leads to the main argument of the study. The study argues that, recognition of the symbiotic relationship of rural poverty and agricultural land degradation is inevitable. Hence, both rural poverty and agricultural land degradation should be solved simultaneously. Rural poverty and land degradation is thus a cause and effect relationship (Andrew &Masozera, 2010). An incentive mechanism called Payment for Environmental Services (PES), see figure 1.1; can mitigate both rural poverty and agricultural land degradation (Kronenberg & Hubacek, 2013; Wunder *et al.*, 2008). Though previous studies (Ajayi *et al*., 2012; Dressler & Roth, 2011) emphasized on the property rights (land ownership rights) as a precondition for the poor to participate in the conservation of the agricultural land. This study proposed that provision of property rights (land ownership rights) may not 'necessarily' be applicable to the poor in the Nigerian rural environment. The reason is that the poor in rural settings in Nigeria have little or no access to credit facilities as well as formal social securities (Anyawu, 2012; Adeoti, 2014), as obtainable in other countries. Since PES attribute offers provision of micro credit to the poor, this may serve as 'bait' for the farmers to participate in the conservation of agricultural land. Another reason this study based its argument upon, was that in Nigeria, land ownership is communal/customarily owned. With this, it is difficult if not impossible for the ownership rights to be given to the farmers. Yet, it is

not impossible for the farmers to participate in agricultural land conservation. Finally, this study deems it necessary to first of all identify the 'real poor', in order to ascertain the right beneficiaries of the PES program. This was in the backdrop of the observation that most of the anti-poverty incentives do not reach the right people (Arcenas & Platais, 2005; Garba, 2006).

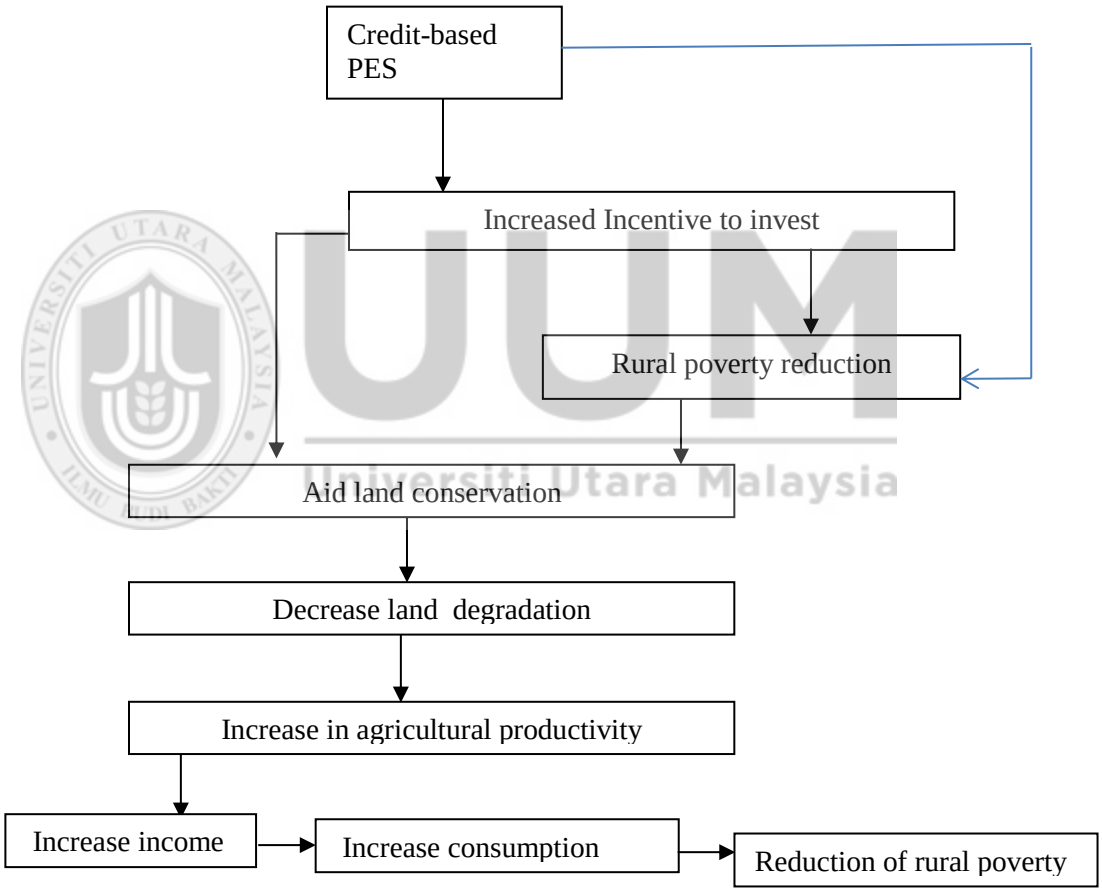


Figure 1.1: *Schematic presentation of how payment for environmental services (PES), can achieve poverty reduction and environmental conservation.*

Source: Modified from Place (2009)

1.2 Poverty and Land Degradation in the Study Area

In Akufo, Ilora and Ijaye farm settlements, farmers are faced with limited or unavailable productive resources, such as formal credit facilities, appropriate incentives, basic infrastructural amenities, imperfect market, coupled with high population of the large size of farm households (Jegasothy, 1999). Lack of a steady source of income, subjected them to one form of poverty or the other. This is because these poor people substantially depend; on forest gathering as their means of livelihood and survival for production of food and fiber (Fonta *et al.*, 2012). Unsurprisingly, much pressure has been on the land, which caused fragmentation of land holdings and high degree of agricultural intensification, reduction in crop yield from low soil fertility.

Figure 1.2, presents a model of the real world situation of the cause and effect of land degradation in the Oyo State farm settlements. The poor farmers in the quest for survival engaged in environmentally unfriendly practices, such as burning of crop residues, deforestation, bush burning, soil mining, etc., all these have led to declining in both cultivable and pasture lands for crop growing and animal grazing. This is because the incentive to invest in the land as to conserve soil fertility is conspicuously absent. Hence, farmers have no option than to make do with the available marginal lands, while fewer live stocks are contending with the humans for crop residues. These residues could have served as a good source of fertilizer for soil replenishment. The whole scenario is a chain of reaction; hence less manure is expected, as the stock of animal that defecate while grazing is becoming fewer.

Consequently, the problem becomes compounded due to non-availability of a market base incentive such as PES (which may spur the farmers to invest on the land), land

ownership, security and natural factors, such as topography which does not help the matter either. To cap it up, these events resulted to the high volume of soil erosion. Thus, intuitively lead to degradation of land, and expectedly gave birth to low agricultural productivity (as a result of the low productive capacity of the soil), and resulting in low income and poverty. There are mixed empirical evidences on the direction of cause and effect of poverty and environmental degradation,yet literature related to this issue such as Duraiapph (1999), Bhattacharya and Innes (2006) agreed that poverty is the cause of environmental degradation, hence this study follows these proponents.

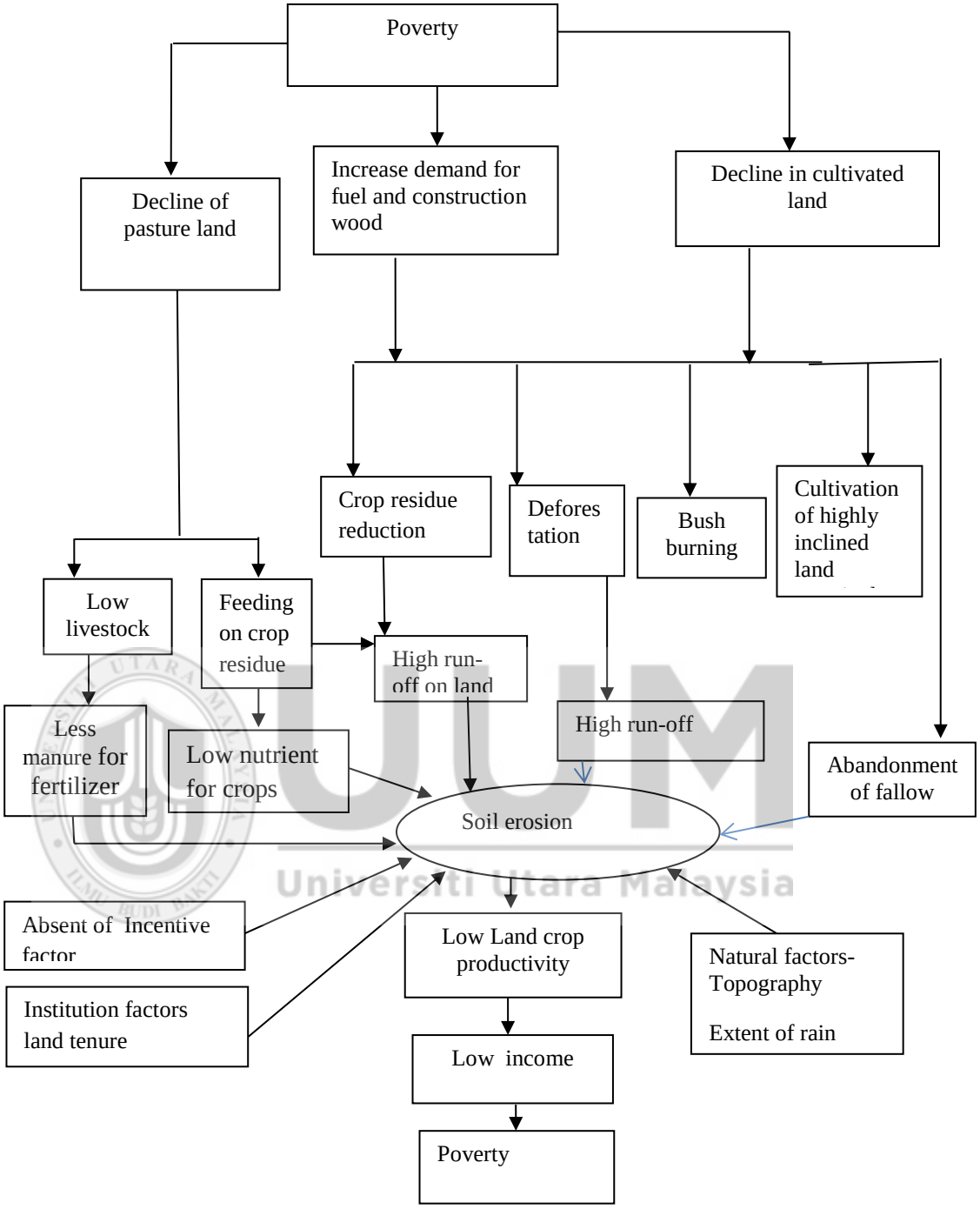


Figure: 1.2: Schematic diagram of Cause and Effect of Poverty and Land Degradation in the Study Area. Source: Expanded from Demeke (2003)

1.3 Problem Statement

In spite of the numerous programs embarked upon by successive Nigerian governments to reduce poverty over the years, impeccable statistics have revealed beyond reasonable doubts, that poverty is still on the high side in the rural environments (IFAD, 2011; Arif, Nazli & Haq 2000; Adepoju & Yusuf, 2012; Adeoti, 2014; Sylvester & Ekpenyoung, 2014). The cause of rural poverty is not unconnected with environmental problems associated with agricultural production (Alayande & Alayande, 2004). Rural poverty reduction and protection of environmental resources are one of the major challenges threatening the Nigerian rural society presently (Alayande & Alayande, 2004). In the past, various Nigerian governments made concerted efforts, in responding to both challenges independently. Sadly, these efforts could not yield the desired goals as expected. This was made evident by the unpalatable statistics of high degree of rural poverty and land degradation (Abiola & Olaopa, 2008; CBN/ World Bank, 2011, IFAD, 2012).

Evidently, literature submitted that poverty is the cause of land degradation (Andrew & Masozera, 2010; Bulthe *et al*., 2008; Gore, 2002), hence they should be addressed simultaneously (Obayelu, 2012). Therefore connecting payment for environmental services (PES) with the rural dwellers could be the entry point of solving these two challenges concomitantly (Kronenberg, 2012; Kronenberg & Hubacek, 2013). Introduction of PES could halt the loss of ecosystem services and thus save the environmental resources from being degraded. Aside saving of the ecosystem, PES can provide opportunity for other source of income which could lead to improved living

standards of the rural poor (Wunder *et al*., 2008; Uchida *et al*., 2007; Molnar *et al*., 2007).

However, authors such as Wendland *et al.*(2010), Zbinden & Lee (2005), Pagiola, Arcenas and Platais (2005) argued that most of the incentive-based program (PES inclusive) benefits does not get to the 'real poor'. They submitted that often the non-poor benefit mostly from the incentives that are meant for the poor. Also in the Nigeria context, most of the Nigerian anti-poverty programs could not achieve the expected headway (Garba, 2006; Iroegbu, 2009). One of the major reasons for the failure of these anti-poverty programs is that the poverty policy was based on the monetary assessment only (Oyekale, 2012).

Income/consumption measurement of poverty had been critically proved to be inadequate to identify the 'real poor' (Sen, 1992; UNDP, 1997; Wagle, 2008). It is therefore evidently necessary to first ascertain the 'real poor' as the gateway for the PES to achieve its objective of rural poverty reduction and environmental resource conservation. Based on this, need for identification of the poor in a multidimensional manner cannot be a trade-off issue. Since multidimensional poverty measurement takes care of other indicators (such as education, living standard, health, social inclusion) other than income/consumption. Having discussed the need for the identification of the 'real poor', land ownership rights (property-rights) also should be given a deserved attention for the enhancement of rural dwellers participation in the PES programs (Hope *et al.,* 2005).

Sequel to the above, there are unequivocally submissions that, property-rights security is a 'needful dose' if rural people will effectively participate in the environmental resource conservation(Corbera&Brown,2008; Pagiola, 2008; Pagiola *et al.,* 2005; Russo

&Candela, 2006; Bulte *et al.*, 2008; Bruce, Wendl &Treves, 2010; Zilberman *et al.*, 2008; Dressler & Roth, 2011; McElweee, 2012; Suyanto *et al.*, 2005; Ajayi, *et al.*, 2012). Both (Baseley, 1995; Tenaw *et al.*, 2009) submitted that, farmers will not be motivated to invest in the land if there is no assurance of secured property rights (land ownership rights).

In line with the above, Basely (1995) advanced three arguments for the positive link between land rights and investment. First is the freedom from expropriation, especially by the public authority, an individual will not be willing to invest if he/she is not sure of what the future holds, in terms of ownership of such an investment. Secondly, if a well-defined land right makes it possible to use land as collateral, this will in turn eliminate funding constraints of an investment. This will encourage an individual to invest in the land. Finally, presence of possibility for gains from trade will encourage investment, that is, if an individual has been insulated with the rights to sell or even transfer his land (Basley, 1995). However, this present study anticipated that provision of property rights may not be a 'compulsory' factor for participating in the PES program by the rural Nigerian farmers.

In view of the above arguments, notwithstanding many studies such as Uchida, *et al*.(2007), Kronenberg and Hubacek (2013), Niesteen and Rice (2004) on incentive-based environmental conservation have ignored the links between poverty and environment, especially with respect to secured property rights and identification of the 'real poor'. As a result of this, existing policy result in marginal group (the poor) being relegated to fragile economic environments.

It is on this premise, that this study is determined to empirically investigate how Credit-based PES could solve rural poverty and agricultural land degradation with regards to property rights (land ownership rights) in the study areas via Agricultural, Environmental Services (AES). The study also investigated the need for the property rights security in the context of rural poverty reduction and agricultural conservation. To the best of the researcher's knowledge, no one has investigated empirically, on poverty reduction-natural resource conservation, with regards to PES, especially with regards to property rights security in the Nigerian rural environment.

Based on the aforementioned explanations, it could be succinctly review that both rural poverty and environmental degradation are intertwined. The duo is a threat to the Nigerian rural environment, hence adequate attention in this direction is inevitable. Thus:

(i) An incentive mechanism (such as PES) to simultaneously reduce rural poverty and environmental resource degradation is needful.

(ii) Absolute property rights (land ownership rights) as the pre-condition for the participation of the poor in the conservation of the environmental resources should be revisited.

(iii) It is suffice to say that the identification of the 'real poor' and its categories cannot be wished away, for the poor to benefit from the environmental resource program (e.g. PES).

This leads to the following research questions;

1.4 Research Questions

The main research question is: Can Credit-based PES potentially reduces rural poverty and agricultural land degradation with regards to property rights (land ownership rights). The specific research questions include:

(i) Who are the poor, in the study area?

(ii) What are the categories of the poor in the study area?

(iii) What are the preferences/perspective of the farmers with respect to the choice of hypothetical Credit-based PES attributes?

(iv) Are property rights a necessary factor in the agricultural land conservation in the study area?

1.5 Research Objectives

This study attempts to address rural poverty and agricultural land degradation with regards to property rights (land ownership rights) simultaneously. Hence, the main objective of this study is to investigate how Credit-based PES can potentially reduce rural poverty and agricultural land degradation, with regards to property rights (ownership rights). To achieve this, acknowledging that identification of the 'real poor' is the gateway for environmental resource conservation is unavoidable. Consequently, grouping of the poor into different categories, as to benefit from the incentive-based PES is essential. Hence, objectively the study endeavored;

(i) To identify the poor and

(ii) To establish categories of the poor in the study area.

To consolidate above objectives, preferred options of the poor for the hypothetical credit-based PES attributes, with regards to rural poverty reduction and environmental resource degradation is of paramount desire. Therefore the study sought;

(iii) To determine the preferences/perspectives of farmers with regards to the choice of hypothetical credit-based PES attributes.

This study will not adequately address rural poverty and environmental resource degradation, if the well echoed need of property rights (land ownership rights) as a pre-condition for conservation of environmental resource is un-attended to. On this background, the study empirically aims to;

(iv) Determine if property rights is a necessary factor in the conservation of the agricultural land in the study area.

1.6 Scope and Limitation of the Study

The extent of this study is within the realm of a holistic approach to rural poverty and environmental degradation, in the selected farm settlement in Oyo state, Nigeria (Afijio, Akufo and Ijaye). Investigation of how Credit-Based PES attributes (i.e. micro credit provision, a task to perform, interest rate, payback period, land, labour and guarantor provisions) can potentially reduce both rural poverty and agricultural land degradation simultaneously was captured. Also the study uncovered the extent of land property rights (land ownership rights) necessary for the participation of the poor in agricultural land conservation. Assessments of poverty in a multidimensional manner are one of the focuses of the study and categorization of the poor is well attended to.

This study is limited in some ways. In the first place the study only covers some selected farm settlements in Oyo state in the south-west geopolitical zone, though the findings could be useful to the other geopolitical zones of Nigeria, but may not be generalized. Secondly, the study focuses mainly on the farm settlements in Oyo State; therefore, the study does not capture poor non-farm settlers, and their environmental degradation problems.

1.7 Significance of the Study

Most of the past literatures focused on addressing poverty and environmental resource degradation independently. This is due to lack of understanding that, both poverty and environmental degradation are intertwined. This study distinguishes itself by recognizing that, there exist cause and effect associations between the two problems. On this note, this study addressed the two problems simultaneously. This was achieved by the introduction of PES (an incentive mechanism) to solve them simultaneously. With this, the study was able to bridge this hitherto existing gap.

In the light of the above, this study was able to uncover the possibility of conserving environmental resources without an absolute property rights (ownership rights). Previously, researchers have observed property rights as the perceived constraint to environmental conservation. This has posed a major setback to the management and sustainability of environmental resource, especially in the rural communities, where the communal land system was in operation.

However, the above couldn't have been achieved, without the recognition of real poor people. Past empirical evidences, have shown that one of the reasons for the failure of

anti-poverty programmes was that the benefit of the programmes does not reach the real poor. This study contributed to poverty by identifying the real poor in a multidimensional manner. Thus, poor dimensional categorization was achieved. With this development, poverty reduction can be addressed in a more holistic manner.

Finally, the study was able to identify all the above research gaps. It also made a concerted effort in offering solutions to the identified gap. Therefore, this study has contributed to the field of development and environmental economics.

1.8 Justification and Rationale of the Study

Justifications of this study centered on the following. First, the study seeks to: Apply PES and Multidimensional Poverty Index (MPI) to an arena of study that was narrowly examined or not even examined in the context of poverty reduction and environmental resource conservation. Application of PES as a mechanism to attack rural poverty and resource degradation simultaneously help in curtailing the menace of poverty as well enhancing resource conservation in rural Nigeria.

Secondly, studies on resource conservation and poverty reduction that employed PES mechanism are very few in Africa; the few studies in East Africa are still at the experimental/rudimentary stage; and none of such study had been done in Nigeria, and western parts of Africa. It is therefore worthwhile to examine the possibility of PES in reducing poverty and natural resource conservation in this region of Africa.

Thirdly, given that no such study had been done in publicly owned asset, undertaking this study would contribute to our understanding of the effectiveness of PES programs, in

achieving nature conservation in publicly owned properties. This benefit could be extended to the other geopolitical zones of Nigeria, especially in the South Western states, which has the same ecological pattern. Thus, the findings of the study may allow for knowledge sharing and proper comparison between and among countries with such programs already in place.

This study will also be a specific target-base type, in the sense that it will explore the PES attributes type that's appropriate for each of the classes of the poor. Hence, the findings of this study in this direction will greatly enhance vibrant and dynamic policies that are concerned with rural poverty reduction and environmental conservation.

Fifthly, a clarion call has been sounded by many international bodies, for the adoption and introduction of a vibrant mechanism, to fight the scourge of poverty and climate change (as a result of miss-management of the environmental resources, which is the primary cause of the global warming (World Bank, 2002; DFID; 2002 EC; 2002;UNDP 2002; World Bank, 2008). This call was made because nature conservation and local economic development could be aided by adopting efficient natural resources conservation and poverty reduction system. The success of such development projects largely depends on the support of local farmers. A major component of this study, therefore, examined local farmers' willingness to accept to participate in the PES program. Appreciating the roles local farmers desire to undertake in the PES program, will assist farm settlement managers and coordinators to plan effectively for the management and sustenance of natural resource conservation measures, in the farm settlements.

According to (Wunder, 2005;Landell-Mills and Poras, 2002) only a limited number of PES projects in the developing world exist, hence this study seeks to contribute to the literature on rural poverty, natural resource conservation, in the developing economy.

1.9 Thesis Organization

This thesis is divided into five chapters. The introductory chapter begins with the background and motivation of the study, which indicated that rural poverty and environmental degradation is a worrisome situation that call for appropriate measures. Next, is the explanation of factors that prompt this study. This is followed by the problem statement, where the research gaps of the study were presented. Also presented in Chapter One are the research questions, research objectives, significance of the study, scope, limitations and assumptions of the study.

Chapter Two critically reviews and discusses relevant literature on poverty and environmental conservation. Discussions on poverty started with the poverty situation in Nigeria and narrow down to the rural poverty in Nigeria, poverty matrix, poverty profile, rural Poverty and Agricultural Production in Nigeria, reviewing antipoverty programs in Nigeria, concepts of unidimensional and multidimensional poverty. Also discussions on Payment for Environmental Services (PES) concept, property rights concept, valuation of environmental goods, and concept of choice experiment were included in this chapter. Finally, this chapter discussed relevant underpinning theories for the study.

Chapter Three presented the methodology of the study. Research frameworks of the study, the relationship between income/consumption-based and multidimensional poverty measurement and the links between PES and environmental conservation/rural poverty

reduction is presented first. Description of the study area, measurement of poverty, procedure for PES design, choice experiment design procedure, sampling technique for the study, conceptual and econometric analytical models, data collection, measurement of variables, operational definitions and techniques of analysis were also included. Chapter Four focuses on the result presentation and its discussions. Finally, in chapter five; summary, conclusion and recommendation of the study are provided.

1.10 Summary

This chapter discussed the background of the study with the reflection on poverty status and environmental degradation in the rural Nigeria. The problem statement section explained the need to simultaneously approach rural poverty reduction and environmental conservation. The need to identify the poor, was emphasized. Property-rights as a necessary factor for investment in land was adequately explained. Chapter one comprehensively explained how poverty leads to land degradation in the farm settlements under examination. This is followed by research questions and objectives of the study. Finally, this chapter, discussed the scope and limitations of the study, as well as thesis organization.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

The literatures that are relevant to this study are discussed in this chapter. For this reason the chapter is divided into seven segments. Firstly, this chapter presents the poverty situation and environmental resource degradation in Nigeria. Aspect of the poverty situation in Nigeria was further divided into (i) Rural poverty and agricultural production in Nigeria (ii) Poverty Matrix (iii) Poverty profile in Nigeria (iv) Revising antipoverty programs in Nigeria (v) challenges of poverty reduction in Nigeria.

This is followed by discussing the concept of poverty, unidimensional, multidimensional poverty and other related issues. Also the concepts of payment for environmental services (PES) and property rights are discussed. Discussion of choice experiment is also included in this chapter. Underpinning theories are also discussed comprehensively in this chapter. The theories are divided into five:

(i) Prospect theory

(ii) Theory of poverty

(iii) Rational choice theory

(iv) Social exchange theory

(v) Property rights theory

2.2 Poverty Resource and Degradation in Nigeria

Poverty 'holds sway', amidst of plenty, a scenario describing Nigeria 'mystifying' absurdity state (i.e rich country, poor people). Various parameters of measurements of poverty, described Nigeria as a poor country even among the committees of states. This could be supported by the statistics from Nigeria's Human Development Index (HDI), which revealed that Nigeria is in the 159th position out of 177 nations with development index of 0.471 in 2012, and 172 out of 182 countries in 2013. Obviously, it's shown that a substantial number of the Nigerian populace are wallowing in poverty. With this development, Nigeria is adjudged as one of the poorest countries in the world, (Oshewolo, 2010; Alkire, Roche & Sumner, 2013). Coming down to the African continent, most of the poverty indicators confirmed that Nigeria is really a home for the poor (Oshewolo, 2010; Adepoju &Yusuf, 2012) therefore it's not surprising to have labeled Nigeria a 'poor nation' among African states. Previously, numerous poverty tackling programs were put in place. Surprisingly enough, their impacts on the poor population has been significantly compromised by corruption, insincere administration, poor inter-sectorial governance system and ethnic conflict to mention but a few.

The Poverty situation in Nigeria is confusing, when the naturally given endowed resources are put into consideration. Though statistics showed that Nigeria has maintained a high rate of economic growth for the past decade, yet there seems not to be

any substantial improvement in the Nigerian poverty situation. A good proportion of national earnings accrued to some groups of people (i.e. the so called elite classes only), while the living standards of the poor continued to decline.

According to the UNDP (2013) reports, in 2005 the Gini index was 46.60 percent whereas in 2013 it was 50.40 percent, meaning an increment in inequality by 3.80 percent nationally. Going by these statistics, Nigeria requires no level of ovation let alone joining the league of the fastest growing economies of world alongside South Africa, Ghana and Ethiopia (Chukuma, 2012).

The unprecedented increasing profile of poverty in Nigeria is assuming a bothersome dimension, as many statistical evidences from various poverty related studies have revealed.This fact was also supported by Adepoju and Yusuf (2012) in their study on rural poverty in Nigeria. They rumbled that the poverty situation remains a great challenge, as about 67 percent of Nigeria's rural population are poor. This is a big threat to the nation's ambitious pursuit to be one of the 20 world largest economy in 2020. Nigeria, the most populous country in the African continent, and the eighth oil producer has more than half of her populace living in undeserved chronic poverty. Likewise, reports from the National Bureau of Statistics (2010) depict that poverty is prevalent, severe and even engorge a substantial percentage of the Nigerian society. (Nwaobi, 2003; Omotola, 2008; Okpe & Abu, 2009) unequivocally agreed that the level of poverty in Nigeria is pathetic, with the obvious resultant effect of disease, hunger, low life expectancy, malnutrition, social exclusion, as well as the general state of human hopelessness.

Garba (2006) submitted that in 1960, when Nigeria got her independence,only about 15 percent out of a population of 42 million were poor, according to United Nations estimates. The non-challant attitude and policy indifference of the Nigerian leaders with respect to population control, made the figure flung to 28 percent in 1980 out of 147 million people. In 2012, more than half of Nigeria population is under chronic poverty out of almost 163 million people. The UN Human Poverty Index report of 1999, ranked Nigeria among the 25 poorest nations in the world. The UNDP (2010) statistic shows that, Nigeria has about 69 million of her populace in poverty in 2004.

According to World Bank (2012) statistics, as cited in the Oxford Poverty and Human Development Initiative (2013), for 2012 report; Nigeria has multidimensional index poverty of 0.471 percentages, while poverty incident was, 54.1 percent. Percentage of population vulnerable to poverty was 17.8 percent; percentage of the population in severe poverty was 33.9 percent. Percentage of income, poor ($1.25 per day) was 68 percent. Percentage of income, poor ($2.00 per day) was 84.5 percent and the percentage of poor (National Poverty Line) was given as 54 percent. The decomposition of these figures into the six geographical regions is presented in table 2.1. This statistic depicts the awful situation of poverty in Nigeria. Considering the substantial amount of revenue from oil and gas since independence.

Poverty is more pronounced in the Nigerian rural areas, where social amenities are either limited or noticeably absent. Majority of the rural dwellers are poor and they mainly depend on agriculture as a means of livelihood. Due to the abandonment of rural infrastructure such as roads in the Nigerian rural areas, both profitability and productivity of the rural farmers are adversely affected. Most of the rural communities are almost

inaccessible, especially during the rainy season as they live in isolated villages. With the increase in the population more pressure is on the environmental resources, which in turn escalates environmental problems such as land degradation.

The breakdown of the total areas of 983,213 square kilometers that Nigeria has shown that the savannah zone alone has; 773,783 square kilometers, while derived savannah shared; 75,707 square kilometers and forest zone has; 133, 717 square kilometers (IFAD, 2012). Unfortunately a substantial proportion of these lands have been subjected to one form of degradation or another, especially in the rural and sub-rural areas.

Out of the over 160 million Nigerian people, more than 70 percent that resides in the rural areas are poor. Poverty and illiteracy are the causes as well as the consequences of environmental degradation. Studies have uncovered the fact, that the poor are rationally conscious of the danger of environmental degradation and its various attendant problems (Boyowa, 2004). Nevertheless, daily survival has the highest priority to them, which unintentionally lead to more environmental resource degradation, with the resultant effect of the vicious cycle of poverty. The various activities of this teeming poor Nigerians, with the environment have done more harm than good. The consequence of the human's un-environmentally friendly activities have led to desertification (this is largely caused by overgrazing), especially in the Northern part of Nigeria, deforestation (a process whereby trees are felled for several purposes, without replanting to replace the ones felled) and gully erosion, are prominent in the Western and Eastern parts of Nigeria respectively. In the Nigerian rural settings, extensive agricultural activities and un-environmental friendly farming practices such as bush burning are the major cause of environmental resource degradation. One of the indelible marks deforestation brought

about is soil erosion, flood and water pollution; these have a significant effect on crops, humans and animals.

Table 2.1:*Multidimensional Poverty across Sub-Nigeria Regions*

Region	MPI	Incidence of poverty (H)	Average intensity of poverty across the poor (A)	Percentage of population vulnerable to poverty	Percentage of population severe poverty	Population share
North Central	0.319	59.6%	53.4%	19.1%	33.8%	14.7%
North East	0.561	86.3%	64.9%	8.2%	67.2%	13.5%
North West	0.497	79.5%	62.5%	10.9%	60.0%	25.3%
South South	0.154	34.3%	45.0%	23.8%	11.6%	14.9%
South East	0.127	28.0%	45.2%	24.3%	9.3%	11.6%
South West	0.120	25.8%	46.5%	23.8%	9.4%	19.9%

Source**:** UNDP/OPHI, (2013)

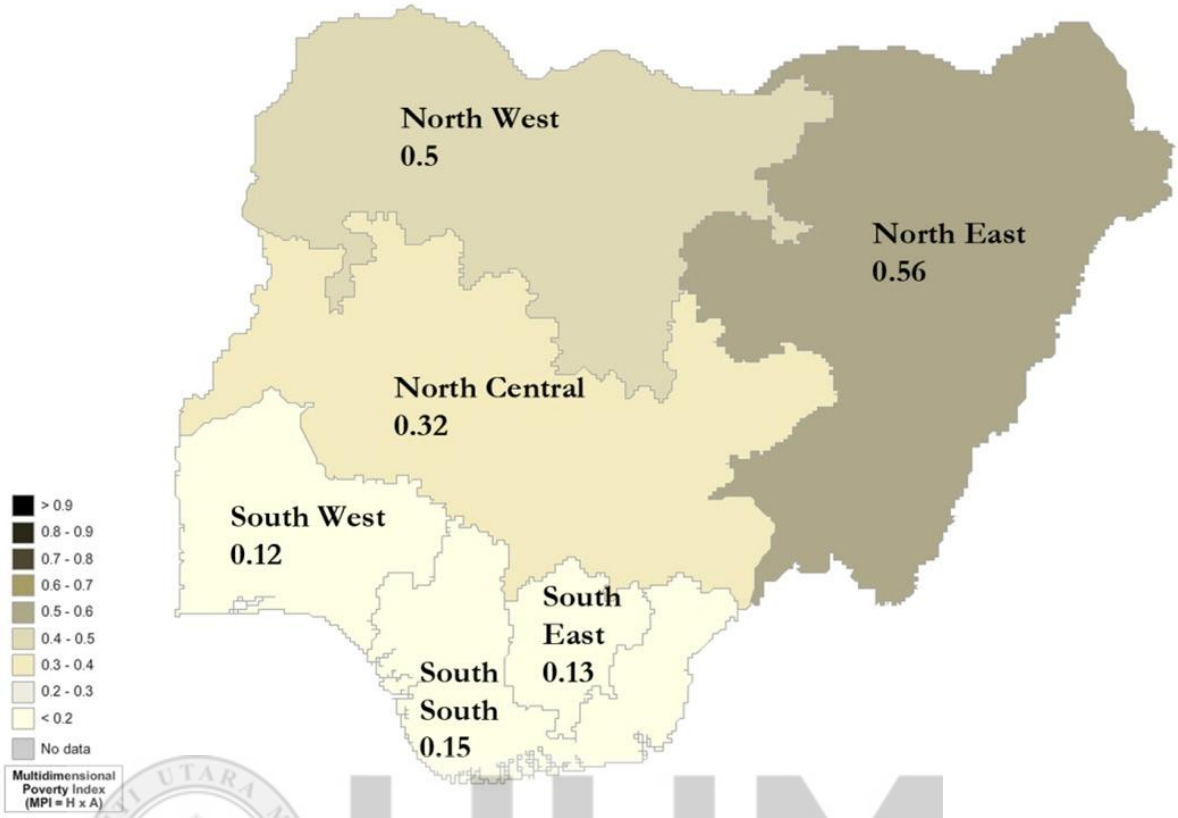


Figure: 2.1: *Geographical Distribution of Multidimensional Poverty in Nigeria*

Source: OPHI/UNDP (2013)

2.2.1 Rural Poverty and Agricultural Production in Nigeria

Population census of 2006, and the follow-up updating figures, provides the current estimate of 166.2 million as the population volume of Nigeria (NBS, 2012). This figure is said to be the largest figure in the African continent, which represents 2.35 percent of the world´s total population. This means that, one person in every 43 people on the planet is a resident of Nigeria (World Bank, 2012).

Before the advent of crude oil, agriculture was the mainstay of the Nigerian economy. Cocoa production and rubber in the West, Palm oil in the East and groundnut pyramid in the North. Nigerian economy is the fastest growing economy in Africa and 26th in the world (NBS, 2014) and essentially depends on the crude oil since the early seventies for its budgetary revenues, notwithstanding Nigeria is still predominantly an agrarian society.

The existence of a wide policy gap between the rural and urban areas in Nigeria, responsible for the abject poverty experienced in the rural communities. There is a disproportion in terms of the developmental projects, this make Nigerian rural dwellers not to feel belonged, to the extent that they often have the notion that governance belongs to a certain class of people in the society. National Bureau of statistic (NBS) poverty profile of 2010, shows that more than 60 percent of the rural people are multidimensional poor, with multidimensional index of 0.3796, the breakdown of this, revealed that south-west geopolitical zone (geopolitical zone of this study) alone has more than 19.9 percent share of the figure. The rural communities in Nigeria are essentially a replica of subsistence living as described by the economist. In the context of rural Nigeria, a good standard of living is a mirage, investment is an illusion and saving is tantamount to building of a castle in the air. Hardly can rural people afford a good three square meal in a day.The widely publicized increase in GDP growth rate in some past years has no noticeable impacts, as it does not transform the rural wellbeing as expected. Chukwuma (2012) argued that much of the acclaimed growth is as a result of favorable international commodity prices, and not as a result of good governance and well dissected economic thoughts of the policy makers. In the same veil, Alayande and Alayande (2004) stressed

that there is a high rate of incidence of poverty in Nigeria's rural areas which could be traced to some environmental problems associated with agricultural production. Okunmadewa (2002) submitted that high vulnerability to health hazards, low level of education, a high fertility rate, lack of access to improved seeds and inputs, and poorly developed social amenities among others, could be responsible for the prevalent poverty incidence rate in the Nigeria rural communities. He stressed further that, the rural poor are not really in the equation of the formal economy, since much of their produce is for their immediate consumption, which could be due to lack of access to credit.

Rural deprivation in Nigeria could be described as one of the most rudimentary dimensions of human misery in the world. As it was noted by Chukwuma (2012), poverty of rural dwellers in Nigeria is more or less an artificial one, this is not because of lack of finance to lift them out of poverty web, and not because of lack of knowledge on how to go about curing the 'disease' called poverty, but simply because of insincerity, corruption, cronyism and rent-seeking behaviors in governance.

Agriculture sector alone contributes almost 41percent, in 2010;22 percent in 2012 and 23 percent in 2014 of the total Gross Domestic Product (GDP), (NBS, 2010; 2014). It also accounts for over 90 percent rural dwellers source of livelihood, and more than 70 percent of the Nigeria labour force is being engaged in one form or the other of agricultural related economic activities. Despite the high comparative advantage Nigeria has in term of production of maize, cassava, yam, cowpea and fish, still the country is one of the major importers of grain, fish and livestock products. Therefore the country is currently witnessing acute food insecurity for her teeming population. However, in the recent time there has been a noticeable improvements in the Nigerian agriculture sector,

thanks to the recent government policies on agriculture. Nevertheless, there are still more expectation from the government and all other concerned stakeholders in the agriculture sector.

Less than half of the cultivable arable land in Nigeria is presently put to cultivation out of more than 70 million of hectares of cultivable arable land (IFAD, 2012). It is disheartening enough to see more than 70 percent of Nigerians, especially the rural people to be in an 'avoidable' poverty, in spite of heavenly endowed agricultural and natural resources. Further insight into poverty saga indicates that the scourge of poverty is more pronounced in the rural agrarian settings, where more than 80 percent of the population is living below standard minimum livelihood, couple with social amenities deprivations. Ironically, these voiceless rural poor farmers are the food hub producers of Nigeria-ever-astronomically increased population. Suffice to say that, apart from the degraded land, which hinders bountiful production, diverse of one form of ill health or the other are the barrier to the brilliant performance of the farmers. The reason is not far fetching, as they lack financial capability, to enhance a good functionality.

In the World Bank (2011) report, social amenities are nothing to write home about in the rural and urban slumps of Nigeria. Many of the past Nigerian government, especially the military government focused mainly on the urban cities; investing in health, education, roads, electricity and water. Because of the developmental neglect, rural people have limited or no access to services like health care, clean and safe drinking water, motorable roads and better housing facility. Absent of social and rural infrastructure, rural amenities, affects substantially profitability of agricultural production. Also lack of rural feeder roads impedes transportation and marketing of agricultural commodities; it also

prevents farmers from selling their produce at reasonable prices, and often leads to spoilage of agricultural produce. Limited accessibility cuts small-scale farmers off from sources of inputs, equipment and new technology, which is one of the reasons for the low yield, farmers are witnessing in the rural settings.

The population increment in the rural communities puts pressure on the fragile marginal land, which triggers further environmental problems and threaten food production. The severity of drought is well pronounced in the north, and erosion caused by heavy rains, floods and oil pollution is common in the south and southeast rural environments.

2.2.2 Poverty Matrix

Poverty has been agreed upon to be a multifaceted phenomenon.Sen (1976);Bourguignon and Chakravarty (2003); Alkire and Santos (2009); Alkire and Roche (2011); Ferreria and Lungo, (2012); and Adeoti (2014) remarked that poverty embraces different dimensions,that associated with human capabilities and functionalities such as health, education, social inclusion, standard of living. Rocha (1998) observed that because there are varieties of poverty situation worldwide, this gave birth to different definitions, measurements and policies. In the same veil, Maxwell (1999) equally asserted that the complex nature of measuring poverty, dictates its complex definition, he observed that severity of this complex is more pronounced where people are allowed to ascertain their poverty status. In the same term with Maxwell (1999) observation, Hulme and Mosley (1996) explained that defining poverty and the composition of the poor are volatile issues in the academic realm. They further stressed that the central point in poverty definition, is a much broader phenomenon which hang on the sets of needs that allow human functionality. A conventional poverty measurement used unidimensional approach.

However (Sen, 1996, 1992, 1993,1999 ,2000; Bourguignon & Chakravarty, 2003; Tsui, 1999, 2002; Glennerster, 2002; Summer, 2004; Alkire, 2002; UNDP, 2000a; 2006b, 2010; Nussbaum, 2000, 2006; Jayasuriva 2000; Gasper, 2002; Hicks, 2004; Wagle, 2008; Walker & Smith, 2002; Battiston, *et al.*,2009; Oriola, 2009; Ataguba, Ichoku & Fonta, 2013; Costa, 2003) acknowledged that income is an insufficient measure of welfare. Their disagreements on the usage of monetary base poverty measurement, is on this background that poor people experience many forms of deprivations beyond the basic needs of survival. The inclusion of other non-monetary indicators in 1980s, studies, such as ill-health, social exclusion, susceptibility to sudden, dramatic decrease in consumption levels, as noted by Maxwell (1999), made the monetary base poverty measurement approach to be unacceptable. Rocha (1998) argued that poverty measurement should have a distinctive clear cut definition with respect to relative and absolute poverty. He described absolute poverty to be inability to attain a minimum standard of living, while relative poverty describes relative deprivation or inequality. The World Bank/UNDP (2000) described absolute poverty as a condition of life degraded by diseases, deprivation, and squalor. Bradshaw (2006) shared the same view, as he described relative poverty as relative deprivation. Gore (2002) viewed poverty as an all-pervasive scenario, in that even when resources are equally distributed, a large proportion of the population is unable to meet up with basic needs of life to function as expected. Gore (2002) submitted that, environmental degradation is caused by pervasive poverty; he argued on the basis that, for the people to survive, they will eat into the environmental resources stock. This in turn adversely affects productivity of major assets on which the livelihood depends.

Human Development Reports of the UNDP identified some essential human functionality,which consequence of their absence will bring about untold poverty. Among these are the ability to live a long, healthy and creative life, to enjoy a decent standard of living, freedom, dignity, self-respect, social inclusion and the respect of others (UNDP, 1997).According to Rocha (1998) measuring poverty is a matter of identifying the essential causes of poverty in a given society. Is it prevalent and affects the majority of the population or is it locally concentrated? Which are its roots? Is it a traditional syndrome or does it result from economic and technological changes or geographical disparity? What is its main characteristic? And who are the poor in terms of some essential features? By and large, the general information on the pattern of poverty is very important, especially when the objective is to accommodate various deprivations that poor people undergo.

2.2.3 Poverty Profile in Nigeria

Gore (2002) asserted that Poverty is still an all-pervasive issue in Nigeria. Poverty incidence in Nigeria has been considerably high since 1980s, as shown by the recent poverty statistics (Omotola, 2008; Ojo, 2008; Oni & Yusuf, 2008; UNDP, 2010; Oyekale, 2012; World Bank, 2014; NBS, 2014). According to the report by the (UNDP, 2010; World Bank, 2012), there was an astronomical increase in the percentage of the core poor from 6.2 percent to 29.3 percent in 1980. However, there was some improvement in the core poor poverty level, between 1980 and 2004, as markedly decline from 29.3 percent to 22.3 percent. However, this improvement was short lived, in 2012, because of yet

another rise in the percentage of the poor from 22.3 percent to 54.1 percent. Omotola (2008) remarked that about 70 percent of the rural population now living in chronic poverty. Aigbokham (2000) recognized in his study that, there is a geographical dimension of poverty. Here he stressed that poverty is predominantly higher in the rural communities than in urban areas. He supported his assertion with the following statistics in 2004; 67 percent of the urban population was accessible to drinkable water, while only 31 percent of rural areas have access to safe drinking water. Percentage of urban population had access to good sanitation services is 53 percent, while rural areas have only 36 percent. When compared with some other countries in Africa, like Cameroon, South Africa, Zambia, and Zimbabwe, Ethiopia, Ghana, the Nigeria situation is worrisome, as rightly observed by World Bank (2008) report. With the above figures, it is obvious that rural dwellers cannot compete favorably with the urban dwellers in terms of living conditions. This may partly explain the reason for the frequent occurrence of diseases among the rural poor in the country.

Aside those mentioned above parameters, Nigeria Human Development Index of 0.471 in 2012 shows that Nigeria was ranked 153th position out of 187 countries.UNDP (2014) report indicates that an increase from 0.466 to 0.504 in Nigeria HDI was recorded between 2005 and 2013.This could be interpreted as an increase of 1.8 percent (i.e. average annual increase of about 0.98 percent). Indicators such as life expectancy, access to social amenities, and access to education formally were employed among other

criteria. According to CIA (2009) report, Nigeria is one of the countries with highest infant mortality rate. The human development index, ranked Nigeria state in the 158th position out of the 159 countries surveyed in 2005. Still in 2011, she was in the 154th position out of 187 countries. The richest 20 percent of the Nigerian population earned total income of 55.7 percent (Earth Trend, 2003). Also the poorest 20 percent of the population has the total income share of 4.4 percent only. What a wide margin? This could adequately provide the answer to the puzzling questions about the cause of the increase in poverty.

Using selected world development indicators, the life expectancy at birth in 2006 was 46.5 and in 2013 it increased to 52.5 (UNDP, 2014). When comparing the percentage of undernourished children in Brazil and Nigeria between 2000 and 2007, with a record of 3.7 percent in Brazil and 27.2 percent for Nigeria, it is quite incredible as it is unjustified considering the bountiful resource-base of Nigeria. Worse still, the mortality rate for children under five years old was given as 191 per 1,000 births in 2006, 139 per 1,000 births in 2008, 134 per 1,000 births in 2009, 129 per 1,000 births in 2010, 124 per 1,000 births in 2011and 135 percent per births in 2012 (World Bank, 2012). These frightening statistics, has placed Nigeria among the countries like the Central African Republic, of Burkina Faso, Burundi, and Congo Democratic republic, that does not have the level of the resources Nigeria has. Evidently, the presented statistics below imply that there is a widespread, high level of mortality rate, which is not unconnected to poverty in the country. Revelation from the table presented below shows that many Nigerians are deeply seated in poverty, amidst of numerous natural endowed resources. Paradoxically,

Nigeria who is in the eighth position among the oil producing countries has the highest proportion of her populace in poverty, in the sub-Saharan African continent.

Table 2.2:*Mortality Rate, under 5 Years (per 1,000 live births)*

Name of Country	2008	2009	2010	2011
Andorra	4	4	4	3
Algeria	34	32	31	30
Albania	17	16	15	14
Afghanistan	110	107	104	101
Angola	167	165	161	158
Antigua and Barbuda	9	9	8	8
Argentina	16	15	15	14
Armenia	20	19	18	18
Australia	5	5	5	5
Austria	5	4	4	4
Azerbaijan	50	49	45	46
Bahamas	16	16	16	16
Bahrain	11	10	10	10
Bangladesh	54	51	49	46
Barbados	19	19	19	20
Belarus	7	7	6	6
Belgium	5	5	4	4
Belize	19	18	18	17
Benin	115	112	109	106
Bhutan	62	59	56	54
Bolivia	57	55	53	51
Bosnia and Herzegovina	8	8	8	8
Brazil	20	18	17	16
Botswana	33	30	28	26
Brunei Darussalam	8	8	7	7
Bulgaria	14	13	13	12
Burkina Faso	155	152	149	146
Burundi	146	144	142	139
Cambodia	54	50	46	43
Cape Verde	25	24	23	21
Canada	6	6	6	6
Cameroon	132	131	129	127
Central African Republic	167	166	165	164
Chad	175	173	171	169
Chile	9	9	9	9
China	19	17	16	15
Colombia	20	19	18	18

Table 2.1:continues

Name of Country	2008	2009	2010	2011
Comoros	85	83	81	79
Congo, Dem.Rep.	174	172	170	168
Congo, Rep.	101	101	100	99

Costa Rica	10	10	10	10
Coted'Ivore	121	119	117	115
Croatia	6	6	5	5
Cuba	6	6	6	6
Cyprus	4	4	3	3
Czech Rep.	5	4	4	4
Denmark	4	4	4	4
Djibouti	94	93	91	90
Dominica	13	12	12	12
Dominican	28	27	26	25
Ecuador	25	25	24	23
Egypt	26	24	23	24
Equatorial Guinea	127	124	122	118
El Salvador	19	18	16	15
Eritrea	75	72	70	68
Estonia	5	5	4	4
Ethiopia	90	86	82	77
Fiji	18	17	17	16
Finland	3	3	3	3
France	4	4	4	4
Gabon	71	69	66	67
Gambia	108	106	103	101
Georgia	23	22	22	21
Germany	4	4	4	4
Ghana	83	81	80	83
Greece	5	5	5	4
Grenada	14	13	13	13
Morocco	37	36	34	33
Mozambique	119	113	108	103
Namibia	54	51	50	52
Nepal	56	53	50	54
Malaysia	7	7	7	7
Nigeria	139	134	129	124
Niger	145	138	131	125
Norway	4	3	3	3
Pakistan	78	76	74	72
Palau	20	19	19	19
Panama	21	21	20	20
Papua New Guinea	62	60	58	60
Peru	22	21	19	18"

Source: World Bank (2012)

2.2.4 Revising Antipoverty Programs in Nigeria

In Nigeria, poverty has been a worrisome issue and hence it is a cause of concern for successive governments (Nwaobi, 2003; Oyekale, 2012; Ataguba *et al.*, 2013).As a result of this, Nigerian government has been battling to find the lasting solution to poverty since independence (Omotola, 2008;Garba, 2006). Having recognized the prevalence of

poverty in the rural communities, government directed initial attention toward rural development. Nwaobi (2003) stressed that failure of these poverty programs which was due to improper implementation, laid the foundation for the subsequent poverty program's failure. Garba (2006) keenly observed that past efforts to alleviate poverty in Nigeria, can be grouped into two main time frames: pre-Structural Adjustment Program (pre-SAP) and Structural Adjustment Program/post-Structural Adjustment Program (post-SAP). During the pre-SAP era, government employed various measures to holistically battle poverty through certain institutional mechanisms, such as Operation Feed the Nation (OFN),Free and Compulsory Primary Education (FCPE),Green Revolution Programme (GRP),River Basin Development Authorities (RBDA),National Agricultural Land Development Authority(NALDA),Agricultural Development Programs (ADP),Agricultural Credit Guarantee Scheme(ACGS),Strategic Grains Reserves Program (SGRP),Rural Electrification Scheme (RES),Rural Banking Programs (RBP), Peoples' Bank of Nigeria (BPN),National Accelerated Food Production program (NAFP),Nigeria Agricultural, Cooperative and Rural Delopment Bank (NACRDB),and the recent National Poverty Eradication Program (NAPEP). The main focus of pre-SAP poverty programs was to address the employment generation, reduction in rural-urban drift, and improvement in agricultural productivity and income. Observers of these programs such as (Garba, 2006; Iroegbu, 2009) claimed that the effects of these poverty programs are

not significant, as the poor were often wrongly targeted. This has been a major problem in addressing issues related to the poor in Nigeria up to this present time. Iroegbu (2009) echoed that influential people hijacked the Green revolution Programme that was primarily designed to benefit the poor. Likewise, in the SAP period various programs were put in place to tackle poverty and its attendant scourge; such program includes;Directorate for Food, Roads and Rural Infrastructure (DFRRI), National Directorate of Employment (NDE), People's Bank of Nigeria (PBN); Community Banks Program, Family Support Programs (FSP), and the Family Economic Advancement Programs (FEAP).Unsurprisingly the seemingly laudable and heartwarming programs cannot see the light of the day as usual in the Nigeria context.

Another promising program is Poverty Alleviation Programs (PAP) in 1999, to fight poverty in a more comprehensive manner.Obadan (2001) affirmed that PAP was designed to provide gainfully job for 200,000 unemployed employable people; creation of a viable and vibrant credit system for farmers; increase adult literacy rate from 51 percent to 70 percent; raise health care delivery system from 40 percent to 70 percent; training and settlement of 60 percent of tertiary institution's graduates; increase children immunization from 40 percent to 100 percent, among others. Another program was introduced due to the failure of PAP, called National Poverty Eradication Programs (NAPEP). Structurally the NAPEP is aimed to target four main sector schemes:

1. Youth Empowerment Scheme (YES): This is saddled with the responsibility of providing unemployed youth opportunities to be gainfully employed, have skill acquisition, wealth creation, and the creation of credit facilities.

2. Rural Infrastructural Development Scheme (RIDS): This is responsible for the rural development; in the area of transportation of agricultural produce, rural electrification, and communication.

3. Social Welfare Scheme (SOWESS):This is to provide basic social services, empowering the rural dwellers economic prowess, and provision of quality primary and special education.

4. Natural Resources Development and Conservation Scheme (NRDCS): This programs aim at promoting, participation and sustaining agricultural development, mineral and water resources. Elumide, Asaolu and Adereti (2006), remarked that, three stages were identified to achieve the ambitious target of NAPEP for wholesomeness eradication of poverty in Nigeria by the year 2010 : first stage is for the renewal of trust and hope in the poor masses of Nigeria, especially the voiceless rural dwellers. Also, setting up of a stage for the revamping of the hitherto bastardized economy, as well as opportunity for wealth creation.

Following the above closely, is the Seven-Point Agenda which aimed at improving the lots of Nigerians, as well as making the country to be in an enviable position among the committee of states, in the rank of first twenty biggest world economies by the year 2020. This includes the following; addressing national gas distribution, power generation, transportation and communication sector. Next, is addressing the Niger-Delta crisis,

through the establishment of Niger Delta ministry and through Niger-Delta Development Commission (NDDC).The third priority is a food security agenda. Human capital development is the fourth area of priority while the fifth key area is land tenure reform. National security comes as the sixth priority, and finally poverty alleviation through wealth creation, as the seventh area of focus.It should be noted that poverty is still perverse, permeating all facets of human life in Nigeria, in spite of all these seemingly appear heartening poverty programs. In the light of this, a bothering question is why the Nigeria poverty issue has defiled all prescribed 'medications'.

2.2.5 Challenges to Poverty Reduction in Nigeria

The rate at which poverty is growing in Nigeria has masked the efficacy of anti-poverty measures, which have been put in place from the independence. Among identified failures is the lack of right mechanisms to target the real poor people, political instability; inconsistence policy; inadequate coordination of poverty programs, miss-management; lack of proper accountability and transparency; lack of sustainability of the programs, faulty designed program; lack of proper and clearly defined policy framework as well as functional duplication of duty, which result to unhealthy rivalry among institutions (Obadan, 2001; Garba, 2006).

The UNDP (2010) advanced some reasons for the failure of the Nigerian anti-poverty programs. Amongst are governance/economic problems. UNDP explained further that the often celebrated GDP growth rate in Nigeria is always at variance with the governance indicators, such as a worthwhile political stability, absence of social unrest/terrorism and economic governance/government efficiency. UNDP reiterated that, poor quality in the governance is a main drawback to poverty reduction/eradication in Nigeria. Another

major plague is corruption in high places; its consequences have immensely contributed to the underdevelopment of Nigeria. Another identified reason for the failure of the past anti-poverty measures was the underdeveloped nature of the inter-sectoral governance system. This is coupled with the improper coordination of collaborative efforts of the state, market and the concerned stakeholders in the fight against poverty. It should be understood, that the fight against poverty should be driven by the objective of a sustainable creation of wealth and equitable distribution, as noted by Cimadamore, Dean, and Siqueira (2005).This, in turn, will help in no small measure to roll back the menace of poverty, as well as inequality reduction.

That being said, it is necessary to say that the politics of poverty are another mountainous task that needed to be surmountable. Adesopo (2008); Ovwasa (2000), argued that the wrong people were given the responsibility of implementation of poverty alleviating. This made them to derive unwarranted benefits from government generosity through their vantage position in the society. Through their actions or inactions, large portion of the population are left in poverty.

2.3 Concept of Poverty Measurement

2.3.1 Defining Poverty

Defining poverty should be the major concern of every poverty related study. In the recent past, experts, practitioners and academics have made concerted efforts to give an appropriate definition of poverty. The major problem is the multifaceted nature of poverty itself; hence it should be treated in like manner.The insufficiency nature of the monetary base poverty measurement (unidirectional poverty measurement) has been

recognized by many economists. This is on the backdrop that unidimensional poverty measurement incorporate uni-variable (income/consumption) in its equation, the controversy is that, how will the other unattended to, deprivation variables will be taken care of? Although it's within the conventional wisdom that higher income, will definitely improve the ability of an individual to achieve his/her basic needs, but it is not the income that matters, it's how it's being spent (Neeved & Islam, 2012).Lipton and Ravallion (1995) as cited in Thorbecke (2008) argued that, for instance, there exist examples of household heads that spend their resources on tobacco, alcohol, gambling or narcotics instead of satisfying the minimum caloric requirements of their children.

In addition to the above, income based-definition assumes that there are provisions of market for all poverty dimensions, and that the respective price predict the utility weights households allocated to these dimensions. This is not so, especially in the developing countries where the market may be imperfect or not exist at all. A good example of such is the inability of small scale entrepreneurs to have access to formal credit facilities, because of lack of collateral. Another good example is an issue of public goods;e.g. immunization programs.

Due to the shortcomings of the unidimensional poverty measurement, Sen (1976,1982, 1985 and 1992) re-defined poverty with respect to capability, this definition gained a wide recognition because of its broad spectrum in capturing all the poverty dimensions. It is now done on the concerns, that it is inevitably necessary to shift from the orthodox unidimensional poverty measurement to an all-encompassing multidimensional poverty measurement (Orshansky 1965; Weinberg 1996; Wagle, 2008).

2.3.2 Poverty Measurement Approach

Poverty measurement can be basically divided into two main aspects- i.e. the basic need approach (i.e.unidimensional poverty measurement) and capability approach (i.e. multidimensional poverty approach), postulated by Sen (1976), each of them is discussed thus:

2.3.2.1 Unidimensional Approach

Sen (1976, 1982, 1985, 1992 & 1999) work on poverty: An Ordinal Approach to Measurement, explained two major steps involved in the measurement of poverty, the two steps are:

(i) Identification of the poor in a given total population and

(ii) Aggregation of the population that are identified to be poor

Most of the studies on poverty measurement employed the use of Sen's two-step procedure of identification and aggregation as the basis for the conceptual framework for poverty measurement.

The applicability of the unidimensional poverty is based on a clearly defined mono-dimensional variable such as income/consumption. The assumption behind the variable is that it is cardinal in nature, but in some cases it may have ordinal significance. In the identification aspect of poverty measurement, there is a need to first establish, a poverty line that corresponds to a minimum level of basic needs, therefore any individual below the poverty line is considered poor. Following the identification of the poor, is the aggregation step; this could be achieved by the use of a numerical poverty measure,

which is a determinant of the overall level of poverty in a distribution of a given poverty line. In this case, using a composite indicator which aggregates across several component variables by multiplying each factor and adding up will solve the problem.

2.3.2.2 Shortcomings of Unidirectional Poverty Method

One of the shortcomings of the income approach is that it is not possible to purchase some non-monetary attributes because of either imperfect market, or out rightly unavailable markets; a good example is the public goods, as it often in the developing countries. To buttress the authenticity of Sen capability approach, an empirical study by (Klasen, 2000; Neeved & Islam, 2012), revealed that there is a significant variance in identification of the poorest section of the population when a unidimensional and multidimensional approach was used. Also in the wellbeing study in Catalonia by Ramos (2005), only one third of the poor in the unidimensional poverty index are also poor in the multidimensional poverty index. Ramos therefore concluded that poverty analysis based on the income related indicators definitely undermined important aspects of wellbeing.

It's therefore obvious that income is not sufficient enough to measure the well being of individuals, as it fails to incorporate other key dimensions of poverty e.g. life expectancy, literacy, sanitation, social exclusion etc. Another disadvantage of the income base approach is that there is no assurance that people with incomes at, or even above the set-out poverty line would really apportion their incomes so as to purchase the minimum basic needs bundle. For this singular reason, there may be a need to look inward for a complementary poverty measurement approach to the unidimensional methods.

2.3.2.3 Multidimensional Approach

Multidimensional poverty distributional data are in the form of *n.d, X n,d,* matrix ,here the typical element *ij* represent the achievement of individual *i* in dimension *j* , with i=1,....,*n* and *j*=1,....,*d*. This equation is in line with Sen (1976, 1985). As usual identification of the poor is the first step, and this is achieved by defining the threshold level for each dimension, below this cutoff point a person is considered deprived.

A second step is to make a decision within the multidimensional context, and to address this question: among those who are deprived in some dimensions, who will be considered multidimensional poor? Here two steps also involved: first, all those that are deprived in an at least one dimension will be considered-this is called the *union approach*. Secondly, a more tasking approach is, where all deprivations in all dimensions is considered will be used-this is called the *intersection approach*. In the Alkire and Foster (2007) poverty measurement approach, this is considered as a second cutoff: that is the number of dimensions in which someone is required to be deprived so as to be identified as multidimensional poor. Aggregation step come next, after identification of the multidimensional poor has been solved.

2.3.2.4 Criticism on Multidimensional Poverty Measurement

As good as the multidimensional poverty measurement is, some of it critics have disagreed in some terms. The main grey area of multidimensional poverty is all about how best to ascertain the magnitude of deprivation, in a clearer manner for the policy makers and poverty analysts to make use of the information presented in policy formulation. Also the skeptics disagreed with the choice of an arbitrary cutoff point, and that the use of relative weights for each dimension is needful. Also Rippin (2010) pointed

out the following as the methodological weaknesses of multidimensional poverty measurements, this later prompt the introduction of the Correlation Sensitive Poverty Index (CSPI).

• MPI assumption of no correlation that exists between the lacked items by the household is an unrealistic assumption. It is better to say that, for example, proper sanitation and safe drinking water are related to health as well as education indicators.

• MPI failed to capture inequality that exists among households. Example is transferring items from a poor to a less poor household, this does not change the poverty index as long as both households remain poor according to the MPI.

• The MPI specific structure is misleading; in that it leads to inflation in the rate of poverty, this will mislead the policy makers and poverty analysts on the real situation of poverty.

In an attempt to solve this problem, Ravallion (2011) developed a 'dashboard approach' whereby we may need to focus our efforts and resources on developing the best possible *distinct* measures of the various dimensions of poverty, aiming for a credible set of multiple indices rather than a single multidimensional index.

2.4 Concept of Multidimensional Poverty

2.4.1 Multidimensional Approach to Poverty Measurement

For over a decade now, much interest and awareness is growing on multidimensional poverty measurement. Bourguignon and Chakravarty (2003) championed the proposals to measure deprivation in more than one dimension, which is an extension of the FGT class

of indices. Also the use of Alkire and Foster (2010), Alike and Santos (2011) multidimensional poverty index is gaining a high recognition internationally. The main reason for these recognitions is due to the universal acknowledgment, that poverty is beyond low incomes, but also includes other dimensions of deprivation. In order to cater for all deprivations that are associated with poverty, measurement of multidimensional poverty are divided into two steps.

a. The Identification Step

The identification step can be divided into two steps: Identification of the deprived is the first step follow by identification of the poor among the deprived.

First Step: Identification of the Deprived

Approach postulated by Bourguignon and Chakravarty (2003) could be used in the identification of the deprived, in utilizing capability failures in terms of shortfalls from certain pre-specified minimum (threshold) levels of attributes as indicators of deprivation. This can be expressed mathematically thus; an individual is deprived with respect to attribute j if $xij \leq z$j. However, Zheng (1997) argued that if the need arises, to jack-up the capabilities of the deprived to a certain minimum level, individuals at the threshold level need not be considered as deprived, since no effort(s) has to be made to make them non-deprived. Consequently, in this case individual i is deprived with respect to attribute j if $xij < z$j.

b. Second Step: Identification of the Poor

Having set the ball rolling by identifying the deprived individual, the next task is to ascertain how much a person should be deprived before he/she is considered poor. Three

approaches of identifying those that are poor are used: the *union*, the *intersection* and the *dual cutoff* method: all these approaches were used by the Alike and Foster (2007, 2011) multidimensional poverty index.

(ii) The Aggregation Step

Aggregation of the poor persons into the population-wide measure could be done by censoring the deprivations of each person (i.e. those that are deprived, but non-poor) when level of *k* is given. In order to achieve this, construction of the second matrix is imperative. This matrix contains the weighted deprivations of all persons who have been considered poor and excludes deprivations of the non-poor. From the *censored* matrix, the censored vector of deprivation counts c (k) is constructed, which differs from the vector of the construction matrix, in that it assigns zero deprivations for those not identified as multidimensional poor. In the unidimensional approach, the above procedure is sufficient enough for the poverty intensity. Whereas in the multidimensional approach, there is a need to further determine additional poverty intensity level.

2.4.2 Multidimensional Poverty Index (MPI)

MPI, is an output of the product of two numbers, (i.e. the headcount H, and the intensity A), of deprivation. These two numbers (i.e. H & A) reflect the percentage of the dimensions in which households are deprived. MPI is purposely designed to support rural poverty reduction/alleviation efforts in the developing countries. The MPI is an index of acute/core multidimensional poverty. It represents deprivation in a very simple manner and core human functioning's (Alkire & Santos 2012; Alkire, Roche & Sumner, 2013). MPI employs the identification and aggregation of poor households with the use of the

developed methodology proposed by Alkire and Foster (2007), commonly referred to as AF. In AF each dimension and indicator within are equally weighted. '*A household is said to be poor multidimensional if and only if, it is deprived in some combinations of indicators whose weighted sum is equal or greater than 30 percent of the dimensions'*. Below are the dimensions, indicators and deprivation criteria with their explanations.

1. Health (each indicator has equal weight at 1/6).

(i) Child Mortality:If any child has died in the family.

(ii) Nutrition: If any adult or child in the family is malnourished.

2. Education (each indicator has equal weight at 1/6).

(i) Years of Schooling: If no household member had completed 5 years of schooling.

(ii) Child School Attendance: If any school-age child is out of school in years 1 to 8.

3. Living standard (each indicator has a weight equal at 1/18).

(i) Electricity: If a household does not have electricity.

(ii) Drinking water: If the household does not have improved drinking water (according to Millennium Development Goal (MDG) guidelines) or safe drinking water is more than a 30-minute walk from home. (iii) Sanitation: If the household does not meet MDG definitions, or is more than 30-minutes' walk.

(iv) Flooring: If the floor is dirt, sand or dung.

(v) Cooking Fuel : If they cook with wood, charcoal, or dung.

(iv) Assets: If the household does not own more than one of: TV, radio, telephone, bike, motorbike or refrigerator and does not own a car or truck.

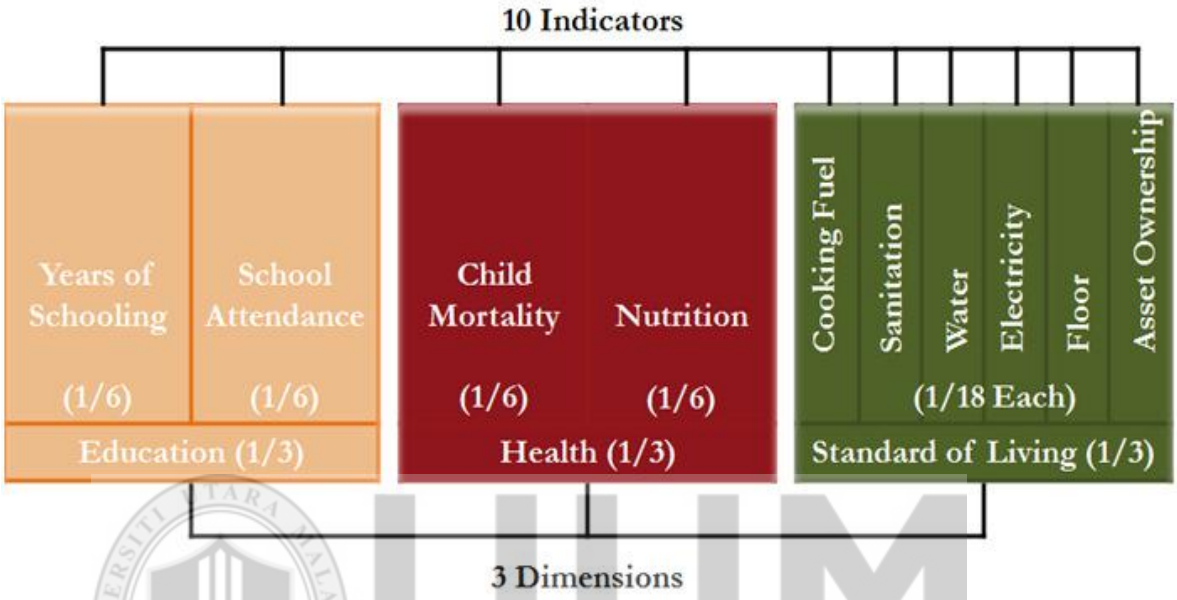


Figure 2.2: *Diagram Showing the MPI three Dimensions and its ten Indicators.*
Source: OPHI, (2013).

2.4.3 Methods of Multidimensional Poverty Measurement

Different methods for the measurement of poverty in a multidimensional manner are discussed below.

2.4.3.1 The Unsatisfied Basic Needs Method (UBN)

UBN approach is concerned about calculating the fraction of the population of the deprived people once the *k*-cutoff is determined, then the number of deprived people in *k* or more dimensions can easily be calculated, it is easy to compute the proportion of the population deprived in *k* or more dimensions.

One major implication of the UBN is that description of households is based on counting the number of deprivations each individual suffered. Here, each of the indicators for the chosen dimensions is assigned with equal weight regardless of its nature and the number of indicators used in the description of each dimension. Feres and Mancero (2001), submitted that if there is more than one indicator corresponding to the same dimension, it means that some dimensions are unequally weighted. This is the implication of assigning equal weights to the chosen indicators, without considering, the nature and the number of indicators used to define each dimension.

Secondly, Alkire and Foster (2007); Gasper (2002); Jayasuriya (2000); Nussbaum (2000), submitted that unidimensional headcount does not take into account the number of deprivations that multidimensional poor people undergo. In UBN approach, the multidimensional headcount value remains unchanged, even if an individual becomes deprived in additional dimension. Remarkably, when the intersection approach is used, and *k*- cutoff value is given, (where k = d) then the multidimensional headcount value is no longer valid in this case. Finally, one of the major drawbacks of the UBN approach is its inability to capture the extent of poverty severity, and to determine each dimension contributions to the overall poverty.

2.4.3.2 Alkire and Foster (2007) Family of Indices Method

Alkire and Foster (2007) employed the use of the *dual cutoff* approach; one of the distinctive features of this method is the proposal of the dimension adjusted FGT measures.The MPI has the mathematical structure of one member of a family of multidimensional poverty measures, called Adjusted Head count Ratio (denoted as M_0). In AF model, both *union* and *intersection* approaches of multidimensional poverty were

incorporated; this made AF method to be more robust than other multidimensional methods.

2.4.3.3 Bourguignon and Chakravarty Method

Bourguignon and Chakraarty (2003) employed the *union* approach in the identification step for the deprived. For the second *cutoff parameter* they equate the value of *k* to be 1, in this wise a person is considered to be multidimensional deprived as long as he/she falls short in any of the considered dimensions. There are similarities between Bourguignon and Chakravarty and Alkire and Foster approach in the identification stage. However, there exists a lot of dissimilarity in the aggregation step.

According to Bourguignon and Chakravarty (2003) approach, aggregation of the poor after identification step, follows this procedure; (i) constant elasticity of substitution: It permits the incorporation of different degrees of substitutions, thus, aggregations of shortfalls across dimensions for each person could be achieved. (ii) Using of standard formula: Having aggregates shortfalls across dimensions of each individual; the next step is to, aggregates across individual's multidimensional deprivations, which could be done by the use of standard FGT formula.

Bourguignon and Chakravarty further examined the substitution and complementary effect of multidimensional poverty, they explained in the light of the outcome of correlation of the dimensions considered.They submitted that if the dimensions are thought to be substitutes, poverty should not decrease. Whereas if dimensions are thought to be complements, poverty should not increase. These two properties are referred to by Bourguignon and Chakravarty (2003) as Non-Decreasing Poverty under Correlation Increasing Switch (NDCIS), and Non-Increasing Poverty under Correlation Increasing

Switch (NICIS), respectively. There is also scope for dimensions to be considered independent, in which case, poverty should not change under the described transformation.

2.4.3.4 The Fuzzy Set Method

Development of the fuzzy set method by Zadeh (1965) was bore out of the need that arise in concisely define certain sets of object accurately (Rippin, 2010).Bourguignon and Chakravarty (2003) concluded that a kind of fuzzy subset is formed by these objects. Coincidentally, this approach is relevant in poverty measurement. Precise definition of poverty and well being is seriously challenging, as described by Zadeh some individuals lack so many resources, that they certainly should be classified as poor, whereas the welfare level of others is as high, that they should certainly not be classified as poor at all. This is evidently obvious when the multidimensional poverty measurement approach is used, since there will be many individuals who will be poor for some judging criteria and will not be poor for others.

The use of fuzzy measures in the poverty context allows for an imprecise borderline between the poor and the non-poor, which seems to be a promising way to capture the vagueness inherent in poverty measurement. According to Qizilbash and Clark (2005). However, even if this approach does not completely solve the problem of arbitrariness: it is not the choice of the poverty line or threshold levels, which is arbitrary, but instead, the choice of the precise boundaries of the imprecise borderline. Notwithstanding, the very advantage of this approach is also the root of the disadvantage, especially in its practical application. The impreciseness of this approach renders poverty comparisons extremely difficult.

2.4.3.5 The Distance Function Method

The Distance Function Method is often used in the study related to efficiency, especially in production economics. It summarizes the range of information as a result of the multiple natures of production into a single dimension.

It was observed that there are similarities in the methodology of this approach and that of analysis of well-being. It attempts to summarize the information from a multidimensional phenomenon into a single dimension. Therefore, the distance function approach does not require any assumptions for prices or behavior. This is certainly a desirable property, even in the context of poverty measurement.

2.4.3.6 The Information Theory Method

Cover and Thomas (2006) provided the following description of the information theory approach: Information theory answers two fundamental questions in communication theory: What is the ultimate data compression (answer: the entropy H), and what is the ultimate transmission rate of communication (answer: the channel capacity C). There exists a specific result concerning the entropy which is extremely valuable in the context of inequality and poverty measurement: two entropies are equal if, and only if, underlying, distributions are identical.

Based on the above, it is not surprising, that the concept of entropy has been used in the analysis of multidimensional poverty often. The reason for this is that, all poverty indices are functions of the distribution of identifying attributes, and the distribution of attributes contains all the information about the attributes. According to Maasoumi (1986) a poverty index should diverge least from the distributional information provided by the distribution of attributes.

Maasoumi (1986), stated that each vector of attributes (...)*ik x,x* is aggregated into a single scalar *xic*. Individual *i* will therefore be classified as poor if and only if his/her scalar *xic* falls below a pre-specified poverty line.

The next thing to be done is to choose the weights δj, γ and also to determine the poverty line. Similarly to distance function approach, identification of poor individual, cannot be established, until the aggregation of respective endowment is ascertained. The information theory approach has the disadvantage, of reducing the attributes of the multidimensionality of poverty to a generalized form of income approach. However, its advantage cannot be over emphasized, in that it can be used easily as a good append in most of the poverty measurement approach. The beauty of the information theory approach is that information efficiency can be obtained, for each class of the derived multidimensional poverty indices.

2.4.3.7 The Multiple Cutoff Methods

The primary aim of this method is to differentiate between different classes of poverty. The extent of the degree of an individual poverty is a function of the number of dimensions in which an individual is being deprived to achieve the threshold basic needs bundle. Therefore, it's sufficient to say that, assuming there are *L* dimensions of multidimensional poverty, it means that there also exist *L* groups of individuals that are poor. This approach met the necessary requirements of both *union* and *intersection* approaches, since it suggest differentiation of individuals, based on the total numbers of the dimension he/she been deprived in, as to determine the severity of poverty.

2.4.4 Empirical Studies that Employed Alkire, Foster and Santos Multidimensional Poverty Index Approach

Alikire and Santos (2010) employed the use of Alkire and Foster (2007, 2009) multidimensional Poverty Index (MPI) approach for the measurement of poverty in 104 developing countries, with the use of micro datasets (household surveys). Out of 5.2 billion people, about 1.7 billion (close to 32%) are poor, according to Alkire and Foster, *dual-cut off* MPI approach. Alkire and Santos (2010) remarked that is not impossible to find an undernourished person (s) in a particular household (an indicator of health dimension). Also, no member has up to five years of education (education indicator), or better still they might live in a household that has experienced a child death, and is deprived in at least three living standard indicators (sanitation, water, cooking fuel, electricity, floor, and assets). In the study of (Battiston *et al.*, 2009) on the multidimensional poverty in six Latin American countries (i.e. Argentina, Brazil, Chile, ElSalvador, Mexico & Uruguay) between the period of fourteen years (i.e. 1992-2006) using hybrid approach (combination of UBN and Alkire &Foster, 2007). The empirical results revealed that El Salvador is the poorest followed by Mexico and Brazil while Chile is the least multidimensional poor country. However El Salvador, Brazil, Mexico and Chile witnessed a substantial reduction of multidimensional poverty, over the period of this study. Also in the study carried out by (Khan *et al.*,2011).On the mapping and measuring of multidimensional poverty in Pakistan, the study finds out that the incidence of multidimensional poverty in Pakistan (1998-1999) was 43.34 percent, severity of multidimensional poor stand at 9.41 percent for the same. The usage of the hybrid approach has helped tremendously to distinguish urban areas from the rural areas in term of multidimensional poverty.

2.5 Multidimensional Poverty Dimensons and the Deprivation Cutoff Decision

1. Education: The 2015 proposal of the Millennium Development Goals (MDGs) has access to universal primary education as its goal number 2 in MDGs agenda. Nigeria is also committed to achieving this objective by 2015, but as things stand, it has cast doubt on the possibility of meeting up with this deadline by the government of Nigeria. Hence, the inclusion of education as one of the dimensions of this study is justified". Education has been seen as a pivot of capability and also in enhancing individual wellbeing, education paves way for an individual participation in the social, political and economic aspects of individual life. Within the educational dimension two complementary indicators are used-completion of primary education and all children of school age are attending school. Completion of primary education is a robust indicator, widely available and provide the closest feasible approximation to levels of education for household members. Likewise the school attendance is the best possible indicator to show if the school aged children are exposed to the formal learning environment.

Deprived cutoff point: Since the household is the unit of analysis a household is considered non-deprived if at least one member has a six years of schooling. Similarly a household is said to be deprived if any of its school-age children are not attending school.

2. Consumption: It is unarguable that income is an important dimension in an individual well-being, without which the desired goods and service could not be purchased (Santos & Ura 2008). The inclusion of consumption at the household level in this study is further justified as it tally with the MDGs goal 1-eradication of poverty and hunger by 2015.

This study, therefore, used the developing countries poverty line of $1.25 as stipulated by the World Bank as the cutoff point.

Deprived Cutoff point: A household is said to be deprived if households with adult equivalent per capita consumption is below $1.25 per day.

3. Fuel used for cooking: Clean cooking fuel contributes to a healthy home environment; a clean cooking fuel will facilitate prevention of respiratory diseases. Type of cooking material is consequential for household, especially women who are often responsible for cooking at home, as noted in Naveed and Islam (2012). Also MDGs recognized the importance of a serene and decent environment, hence is the goal number 7 in MDGs agenda.

Deprived cutoff point*:* All households are considered as being deprived if it uses firewood or coal for cooking.

4. Clean and safe drinking water: This is one of the three standard MDG indicators that are related to health, as well as to standard of living which in particular it affects women and children. Unsafe drinking water does cause illness and death eventually. In the Nigeria rural settings, diarrhea prevalent is common among children under five years of age (Jinadu, Olusi, & Fabiyi, 1991). Therefore, its inclusion in the dimension of the study is justified.

Deprived cutoff point*:* A household is considered non-deprived in this dimension if it has access to covered sources of drinking water.

5. Improved Sanitation:The Nigerian rural communities have little or no access to improved sanitation (UNICEF, 2007), yet is a very important dimension for household wellbeing just as improved sources of water. Access to an improved source of water is also one of the MDG's goals.

Deprived cutoff point: A household is declared deprived if it has the following types of toilet facilities :(i) pit latrine ;(ii) bucket toilet; (iii) use bush/open unused field.

6. Flooring: A household with dirt, sand or dung, un-cemented flooring material is said to be deprived.

7. Assets: A household that lacks at least a television, radio, motor bike. Is considered a deprived household.

8. House: A household with poorly constructed house, is considered deprived. This indicator was used in multidimensional poverty in rural India.

2.6 Payment for Environmental Services Concepts (PES)

According to Derissen and Latacz-Lohmann (2011) Payment for environmental services (PES) is a market incentive mechanism for the provision of public goods within the field of environmental and resource issues. This definition can be more explicit, thus: Payment for environmental services (PES) is an incentive-based mechanisms for sustainable resource conservation and management (i.e. it can be used for preservation, restoration, and creating new environmental services-conservation) as well as for poverty alleviation. There has been the need for a more vibrant resource conservation and management system. PES have been seen by many ecologists, environmental and development

economists as a better option in the arena of environmental/ecological conservation (Hardner & Rice 2002; Ferraro & Kiss, 2002; Niesten & Rice, 2004; Scherr, White & Khare, 2004). Due to many induced human activities on environmental resources, natural habitat and forest are becoming degraded as the environmental services (ES) previously provided free by nature are becoming increasingly disappearing. The main idea of PES is that external environmental services beneficiaries make direct, contract and conditional payments to local landholders and other users in return for adopting practices that secure environmental/ecosystem conservation and restoration (Wunder, 2009).

This conditional method is quite different from other known conservation methods. Instead of presupposing win-win solutions, this approach explicitly recognizes hard trade-offs especially in landscapes with acute land-use pressures. Where PES used as the medium to resolve conflicts through compensation of the parties involved. PES has been adopted in many developed countries as a 'salvaging instrument' for environmental/ecology, conservation and management, but it has not really gained much recognition in the developing nations, as noted by (Landell-Mills & Porras 2002; Pagiola, Bishop & Landell-Mills, 2002). There are various PES initiatives, of which the rewards could either be in-cash, in-kind assistance, exemption from taxes, skills training, and other types of compensation (Warner, 2000). Latin America PES schemes are characterized by cash type compensation, while in the South-Asia, other compensation means were employed. There are main four PES types that are currently in place.

(i) Carbon sequestration and storage (e.g. Northern electricity company paying farmers in the tropics for planting and maintaining additional trees).

(ii) Biodiversity protection (e.g. conservation donors paying local people for setting aside or naturally restoring areas to create a biological corridor).

(iii) Watershed protection (e.g. downstream water users paying upstream farmers for adopting land uses that limit deforestation, soil erosion, flooding risks, etc.).

(iv) Landscape beauty (e.g. a tourism operator paying a local community not to hunt in a forest being used for tourists' wildlife viewing). The above environmental services is not exhaustive as it is possible to design PES for poverty reduction/environmental resource conservation. Examples are wilderness/forest areas, provision of pollination services to agriculture. Only the four identified above exhibit significant commercial scale (Wunder, 2008).

'The critical element in a PES mechanism is that both sellers and buyers of ecosystem services must feel confidence and trust, also that the sellers will receive the agreed upon payments and benefits, and for the buyers, that the ecosystem services for which they are paying are indeed being provided'(Warner,2008).

Finally, for PES packages to be successfully designed and implemented, there is a need to be supported by institutions, legal frameworks, and policies that define the ecosystem services, sellers or providers (who has the right to utilize and benefit), buyers or fee payers, and financial mechanisms (including the fees and taxes that generate funds for payments).

2.6.1 Necessary Conditions for Environmental Services Payment

A widely accepted definition of payments for environmental services (PES) contains the following elements:

i. A voluntary transaction: this mean that it should be at the instance of the individual, who is interested in conserving the environmental resource.

ii. A well-defined environmental service. The terms of the service involved should be explicit enough to be understood by the parties involved.

iii. At least a buyer. It takes at least one service buyer to set up PES.

iv. At least, a seller. It takes at least an environmental service seller to start up PES.

v. If and only if the environmental service provider secures service provision (conditionality).

Wunder (2008) noted that these five PES principles hold for several real-world schemes. However, some PES schemes are self-organized, hence most of these assumptions of PES are not satisfied. "Example is the community and small holder carbon schemes worldwide or mushrooming watershed schemes in Latin America.

2.7 Property Rights Concept

Property rights are a contentious, theoretical construct in economics for determining how a resource is used, and who the owner of that resource is; government, collective bodies, or individuals. Property rights can be regarded as an attribute of an economic good. This attribute has four main broad components, otherwise called bundles of rights.

(i) Right to use the good

(ii) Right to earn income from the good

(iii) Right to transfer the good to others

(iv) Right to enforcement of property rights

In economics, property rights usually refer to the ownership and control over a resource or better, that is, the ability of an individual or collective bodies/persons to control the use of the good.

2.7.1 Property Rights Regimes

Property rights to goods/commodity must be defined, their use must be monitored, and possession of rights must be enforced. The costs involved in defining, monitoring, and enforcing property rights are called transaction cost. Level of transaction costs, determines the various types of property rights institutions that will develop. The following are the types of properties.

1. Open access

2. State property

3. Common property

4. Private property

1. Open-access property: Is property that is not owned by anyone. It is a type of property, that everyone has access to it. For this singular reason, there may be rivalry

among the users. The management of open-access property is not a responsibility of anyone. Hence there is no rule that governs its use, simply because, restricting people may be out rightly impossible or may involve higher costs. Open-access, may be synonymous with the popular tragedy of the commons, since it shares many features with it. Sometimes open-access property exists, because the bonafide owners have not been identified, or because the state has placed legislation on it. However, sometimes the state may decide to convert open-access property to common, public or even private property. Good examples of open-access property are the atmosphere or ocean fisheries.

2. State property (also known as public property). This is a property that is owned by all, but its access and use is controlled by the state. An example is a national park. Also the Oyo state farm settlement is a state owned property, and is being controlled by the ministry of agriculture and natural resource.

3. Common property or collective property: Is property that is owned by a group of people. The management of common property is a collective responsibility of all the owners. Unlike open-access property, common property owners have greater capability to properly manage miss-understandings that may come up, in the course of using the property. This could be achieved through shared benefits and enforcement.

4. Private property: This is a property that is excluded of other people from using it; also there is no rivalry unlike the previously discussed properties. The management of it is exclusively the responsibility of the private owners, or sometimes a group of the appointed legal practitioner on behalf of the owner.

2.7.2 Land Administration and Property Rights Enforcement Challenges in Nigeria

2.7.2.1 Land Administration in Nigeria

It is indisputable that, property rights security is an essential 'ingredient' for conservation of environmental resource and poverty reduction (McElweee, 2012; Ajayi, *et al*., 2012; Dressler& Ruth, 2011). According to Birner and Okumo 2012, administrative challenges pose as the obstacle to tenancy security for the small holders in Nigeria. In Nigeria, the responsibility of enforcing land ownership rights lies on both customary and modern institutions. In the past, the military government used Land Use Decree (now Act) of 1978 as the legal basis for land administration in Nigeria. This Land Use Act of 1978, re-define the roles of each institution in the governance of the land. The philosophy surrounding the Act is summarized in the preface to the Act as:

> *Whereas it is in the public interest that the rights of all Nigerians to the land of Nigeria be Asserted and preserved by law; and whereas it is also in the public interest that the rights of all Nigerians to use and enjoy land in Nigeria and the natural fruit thereof in sufficient quantity to enable them to provide for the sustenance of themselves and their families should be assured, protected and preserved... (Federal Republic of Nigeria, 1978.*

With this development, more authority was given to the state over the customary authority in the administration of land. The act specifically allows property rights security in the rural environment through the issuance of a Customary Certificate of Occupancy by the local government authority. In the other hand, Certificate of Occupancy confers land ownership authority of the land in the urban environment, at the instance of the state governor. As laudable as this Act, previous studies has identified some of its drawbacks, of both the Act and the institutions saddle with the implementation responsibility. Adeniyi, (2011) as cited in Birner and Okuma 2012, argued that a significant proportion of the land in Nigeria is yet to be registered under this Act. Various reasons, such as

institutional, technical, social reasons, lack of political-will by the Nigerian government to implement the promulgated Act led to its failure (Atilola.2010). However, of recent the Federal government of Nigeria constitutes a Presidential Technical Committee to proffer solution to the Nigerian Land Act.

2.7.2.2 Nigerian Land Administration and Its Functions

Broadly, functions of land administration in Nigeria can be divided into four major categories;

i. Juridical ii. Regulatory iii. Fiscal and iv. Informational (Dale& McLaughlin, 1999). These functions centered on tenure, value and use of land (Birner& Okumo, 2012). While, juridical functions relate to issues of land tenure, regulatory functions, land use and fiscal functions takes care of land value. Each of the above has informational management embedded into them. Conventionally, different ministries are saddled with the responsibilities of handling these functions. Ministries of justices handle land ownership matters. Planning, development, environment, agriculture, forestry ministries sees to land use information matters. Issues concerning land value are entrusted to the ministries of finance.

Table 2.3: *Land Administration Functions*

Types of functions performed	Activities Involved
Juridical	- Land rights registration -Adjudication of existing land rights -Land allocation - Land redistribution - Land delimitation - Boundaries demarcation - Boundaries description -Land dispute resolving
Regulatory development	-Developing and enforcing restrictions on land use and its
	-Development and enforcing restrictions on land transfer
Fiscal	-Land taxes collection
	-Land valuation
Information Management	- Cadaster maintenance
enforcement	-Zoning management involving planning and regulation

Source: Birner and Okumo (2012)

2.7.2.3 Evolution of Land Tenure in Nigeria

Both urban and rural land ownership were under the customary institution. The control and administration of the land are within the power of Obas (i.e. Monarchical head of a town), before the declaration of Land Use Acts of 1978. In accordance with the customary institutional arrangement, the eldest male child (i.e. Mogaji) in a family administers land on his family's behalf. Customarily, individual that receives land from the family for residential reason has a freehold tenure on the land. The freehold tenure stands so in permanency. However, one of the major disadvantages of the customary land ownership act is the lack of provable documentation of ownership. Unlike the modern

land ownership institution, female child under family ownership right has no right over the land.

Property regime was introduced by the Land Use Act, 1978, whereby various land holdings (private, public, communal and open access) are allowed. Under the private property rights, non-members of the family are granted rights of usage for the specific period of time. Rights to use the land in perpetuity are given to the strangers, who are expected to pay landowners in cash or in kind (i.e. drinks, kola nuts, etc.).

2.7.2.4 Challenges to Enforcement of Property Rights in Nigeria

Enforcement of property rights (land ownership rights) in Nigeria is not without various obstacles. The challenges cut across both rural and urban land, as well as at both registration and acquisition of land stages. Some of the challenges are:

i. Lack of Procedures for Registration of Rural Land

The obvious remains that procedure for the registration of rural land in the local government does not exist till date. Birner and Okumo (2012) explained that, the rural land users may not aware of this service (i.e.land registration), hence no demand was made. On the other hand, the service provider may lack political will to put up, the necessary mechanism for the execution of the service at local government level.

ii. Non Standard Procedure to Forward Complaint

Often than none, compensation and disbursement of the payments do not get to the landowners. This is complicated, as there is no advocacy organization that can stand for the rural poor.

iii. High Transaction Costs

High transaction costs are one of the factors responsible for the difficulty of enforcing land ownership rights, in Nigeria. All stages involved in acquiring property rights in Nigeria attract high costs. Services of intermediaries, private lawyers and surveyors are often needed; yet the cost of the services is exorbitant for the poor to afford.

It has been contended that property rights can be established, by the regulation of environmental law. This could be done by the use of the instrument of command and control or through the use of a market based-instruments e.g. taxes, transferable quotas.

It has been proposed by Coase (1960) that an explicitly defined and a well coordinated property rights, could go a long way, in resolving environmental degradation. Coase argued that environmental problems could be solved through internalizing externalities. He further stressed that the environmental resources could be conserved for the future, if the private owners could be provided with incentives. However, the critics of this view argued that the above proponent assumes that, it is possible to internalize all environmental benefits. Also, those owners will have perfect information that scale economies are manageable, transaction costs are bearable, and that legal frameworks operate efficiently.

2.8 Valuation of Environmental Goods and Services

Following neoclassical economic theory, the value placed on goods by the consumers, could be quantified by the existing market prices. Individual, rationally will be interested

in paying for a good or service rendered, if he/she derived a maximum utility and if such a good or service has value. With the public goods and services, (i.e.in this case, environmental goods), unavailability of the market or an incomplete market shadows the real prices or values of the public goods, since individual values placed on them cannot be succinctly observed. Majorly, economic valuation can be divided into two main categories: revealed preference and stated preference methods (Freeman, 1993). While revealed preference methods essentially rely on the actual behavior of the consumers in the real world context. On the other hand, the values of goods and services, that are not commonly sold and bought in the market, are estimated by the stated preference method. This is done through the creation of hypothetical scenarios; here the concerned agents make the choice decisions that imitate the reality of the market (Mitchell & Carson, 1989). In the stated preference approach, it is possible to estimate both the use and non-use values. While use values quantifies the utility derived from the consumption of a particular goods or services, through the monetary measurement. Non-use values are prompted when an agent wish to bestow some of the existing assets to the incoming generations. Economists view non-use values as a less tangible value. In the stated preference method, surveys are used to know the preferences of the respondents in terms of the hypothetical scenarios presented to them, which capture the fundamentals of the given situation. However, there are considerable differences among methods, for instance Merino-Castello (2003) presents a classification to showcase the grouping of various methods and their approaches. Mitchell and Carson, (1989) stated that Contingent valuation (CV) is an approach that asks respondents to state their maximum willingness to pay for a hypothetical change in an environmental good or service. However, contingent valuation has been under intense criticisms. Most of the critics of CV argued

on its often poor-implementation (Whittington, 2002), anchoring effects (when respondents based their responses on the characteristic of the scenario), and yea-saying (when respondents too easily accept the proposed payment without regard for their ability to pay).

2.8.1 Choice Experiment

The inherent problems of contingent valuation prompt the use of a multi-attribute valuation to come on board in the environmental goods and services valuations. Both contingent valuation analysis and choice experiment are in the multi-attribute family. The major difference between the contingent and multi-attribute valuation is that, the latter allows multiple attributes valuation, while the formal can only analyze one combination of attribute at a time (Merino-Castello, 2003). In the multi-attribute valuation techniques, there are two main categories of approaches; (i) the preference approaches, this request the respondents to rate alternative scenarios based on the cardinal scale and (ii) the choice-based approaches, which the measuring scale is based on ordinal scale rating among competing products that resembles more closely. Out of the two mentioned approaches, choice experiments are simpler and also reflect the real market situations, which is consistent with the welfare economics. The outcome of the choice experiment is practical, hence the information from the choice experiment can be used to design a multidimensional policy (Hanley, Mourato & Wright, 2001).

Comparing Choice experiment (CE) with the Contingent Valuation (CV). CE has some advantages over CV; it eases the estimation of the value that associated with the individual attributes that environmental good contains. Hence it is possible for the individual to trade-off changes in the level of each of the attributes. Identification of the

marginal value of environmental good attributes is possible; hence CE offers advantage of benefits transfer, if the environmental good attributes could be measured monetarily. CE avoids the 'yea-saying', since the respondents are given the opportunity to choose one of two environmental resources or the status quo option, instead of seeking to change (Bakti & Karim, 2013; Brown *et al.*,1996). CE employs the use of an econometric model that is consistent with the probabilistic choice theory (Bakti & Karim, 2013). According to (Adamowicz *et al.*, 1998b; Adamowicz, 1995, as cited in Hanley, Wright & Adamowicz, 1998). CE may be the solution to the inherent problem with CV designs, because of the advantage of inbuilt test of scope in CE. Finally the CE has advantage of internal consistency tests, as the models can be fitted on sub-sets of the data (Hanley, Wright & Adamowicz, 1998).

Choice experiment (CE) will be used to quantify the hypothetical preferences of the farmers for different set of attributes of PES program packages presented to them. Respondents will be requested to choose their preferred options from a set of mutually exclusive hypothetical attributes. It is expected that each of the respondents is rational in their choices; hence they will choose those options with the highest expected utility (Barr & Mourato, 2012). The CE approach could be seen as the application of both rational utility and value theories. A given set of attributes is used to define each of the alternatives which have one or more levels. It's therefore that the choices presented to the respondents are implicitly trade-offs between the given levels of attributes (Louviere, Hensher & Swait, 2000). The advantage of the hypothetical nature of CE, is that it is a good gateway to preempt the anticipated preference and impacts of the yet to implement policies, with a good number of apparatus.

In this study, a stated preference valuation is suitable as to reveal the preferences of the environmental service providers (hereafter the 'farmers'). The choice of CE by this study stems from the previous related studies. Barr and Mourato (2012) in their study employed a Credit-based approach PES. They argued that the traditional land-use pattern or the convectional agricultural practices, e.g bush burning, indiscriminate tree felling result in degradation of the environmental resource. Consequently, a need for a better land use pattern is inevitable. Also, they submitted that a Credit-based PES will foster the participants to be motivated as it will be a supportive rather than force.

A choice experiment (CE) was employed to examine the respondents' preferences for micro credit (also one of the major attributes of credit-based PES). The main objective of using a CE approach among the local farmers was to investigate the farmers' preferences for the Credit-based attributes (e.g. micro credit provision). Also the CE approach was used to access the respondents' preference for the conditionality of the credit-based PES (e.g. task to perform). Aside the above, the CE was used to understand the perspective of the respondents of Credit-based as an incentive mechanism. This study made use of four attributes, i.e. loan size with three levels; $1, 000, $2, 500, $5,000, maturity period of the loan also has three levels; short (1-2 years), medium (5years) and long (6-10 years). Conditionality attribute has binary levels; 1, if loan is conditional and 0, if the loan is unconditional, and interest rate attributes have four levels; 0 %, 5%, 12%, 18%. Three alternatives (options) were presented to the respondents; option A, B and neither option.

Study, on the benefits of wetland conservation in the southwestern Ethiopia, by Abebe, Seyoum and Feyssa (2014). The study observed that the wetlands are deteriorating, hence conservation of the wetlands is highly imperative. The study examined some major

wetland attributes such as fish stock restoration, water purification and payment levels (bidding) using the choice experiment approach method. It also explored the Willingness To Pay (WTP) for the conservation of the wetland by the household in the locality. The level of each of the employed attributes is stated thus; fish stock restoration: high and medium management approach levels, water purification: buffer strip and sedge meadow establishment levels and payments levels are: 0,5,25 and 35 Ethiopian Birr (ETB).

Goibov et al (2012), studied farmers' preferences for different land use pattern the Nothern Tjikistan. The study employed the use of Agri-environmental attributes. A choice experiment approach of stated preference technique was used to ascertain the preferences of the respondents. CE method was preferred to be used because it provided an opportunity for choices to be made by the respondents between different alternatives (options). Also CE method was used because designing the hypothetical scenario could be done with some degree of flexibility. Six attributes were used in the study, these are: agricultural land use pattern prioritization: current, allocation of land for fruits and cotton equally, vegetable and fruits (mixed cropping) and planting of cotton only (sole cropping) as the levels for agricultural land use pattern prioritizing. Water quality attributes: has 4 levels: 10-25mg/l, 25-55mg/l, 55-75/l and > 75mg/l. Number of trees in a hectare of land has the following levels: no number increase, a 5 % increase, a 10 % increase and 15% increase. Agricultural number of workers attribute levels are: no increase, 5% increase, 10% increase and 15% increase. Loss in number of biodiversity has the following levels: no increase, 5% increase, 10% increase and 15% increase respectively. Payment

attributes levels are: 0,10,20,30 TJS. In all three alternatives (options) were presented to the respondents.

Other related studies such as Adamowicz *et al.* (1998a) applied CE in environmental management problems; Louviere and Woodworth (1993); Louviere (1988, 1992) used CE in marketing and transport economics; and Hanley,*et al* (1998) in environmental management, where the study showed how marginal values of the attributes of environmental assets such as forest and rivers can be estimated from various choices. Vega and Alpízar (2011) used choice experiment in the ex-ante stage of the Costa Rica hydroelectricity project to examine the impact assessment. Barr and Mourato (2012) investigated the fishers' preferences for the design of marine payment for environmental services schemes in Tanzania. Chaminuka *et al.*, (2012), applied CE approach in the Tourist preferences for the ecotourism in rural communities adjacent to Kruger National Park. Schulz, Breustedt and Latacz-Lohmann (2013) also employed Discrete Choice Experiment in Assessing Farmers' Willingness to Accept 'Greening farming' in Germany. In Bravi and Gasca (2014), choice experiment was used in the preferences evaluation with choice experiment in cultural heritage tourism study. Latinopoulous (2014), in the study to estimate the social benefits from improved water supply, used choice experiment in the design of the study.

Finally, this study suggested that OYSG as the ES buyer and could appoint a non-governmental organization (NGO) that has bearing with an environmental protection agenda, such as Nigerian Environmental Study/Action Team (NEST), to be its administering/monitoring agent. Also the fund for this PES program could come from the ecological account of the state.

2.8.2 Theoretical Background of the Choice Modeling Approach

Choice models have its origin from Lancasterian consumer theory (Lancaster, 1966). This theory stipulates that utility derived by individual/potential consumer is attached to the attributes of the goods and not the goods itself. Hanley *et al.,* (2001), further expatiate that each of these attributes can be assigned different levels in turn. Varying these attributes and their combinations, different goods could be created, which gives ample opportunity for a wider coverage of choice by the consumers/potential consumers. Random utility theory is the commonest econometric representative of consumer choices in non-market goods. This can be employed to model multinomial choices where the alternatives are not ordered.

To capture the above explanation, let consider a farmer's choice form different possible hypothetical contracts. Supposing that each hypothetical contract (*j*) consist of k different attributes which, among others include, the amount of loan, loan interest, payback period, task to perform. Assuming that the utility that would be derived by the farmer from hypothetical contract (*j*) is a function of the hypothetical attributes(i.e.,$U_{ij}=U_i(X_j)$,where X_j is a *K* *1 vector of attributes) and the farmer can choose from a set of *j* trips, then he or she will choose hypothetical contract 1 if it will give the highest bundles of the utility of all hypothetical contracts presented to him/her:

$$U_i(X_1) \geq U_i(X_j) \; \forall \; j \in J \qquad (1)$$

Assuming that utility function can be partitioned into two (because utility are determined by a large volume of characteristics by the decision makers, some are known while some are unknown) parts. They are: (i) a deterministic and in principle observable

and (ii) a stochastic and unobservable. The stochastic part follows a pre-determined distribution which is due to unobservable characteristics (Manski, 1977). Consequently, the utility ($U_{ij}(X)$ derived by the farmer *i* from the hypothetical PES contract *j* expressed as:

$$U_{ij} = V_i(X_{ij}) + \varepsilon_{ij} \quad (2)$$

Having the above assumption, the probability of individual *i* choosing alternative 1 over the other alternatives in choice set *j* is equal to:

$$V_i(X_1) + \varepsilon_{j1} \geq V_i(X_j) + \varepsilon_{ij} \longrightarrow V_i(X_1) - V_i(X_j) \geq \varepsilon_{ij} - \varepsilon_{j1} \quad (3)$$

2.9 Theoretical Assumptions of the Study

The study of rural poverty, environmental resource conservation, cut across many disciplines. Economics (development, environmental, ecology, and health), sociology as well as psychology are interested in this field of study. Hence theories in this study are from different disciplines. It is with this background that theories underpinning and supporting this study are summarized under the following heading: economic theories, psychological and sociological theories.

2.9.1 Economic Theories

Economic theory approached the problem of rural poverty reduction, payment for environmental services, property rights and environmental resource conservation from the perspective of rationality and utility derived.

(i) Prospect Theory

This theory was coined by Kahneman and Tversky (1979) as another substitute for the expected utility theory. This theory focuses on gains and a loss within a reference point (situation) rather than to wealth, i.e. under prospect theory value is assigned to gains and losses rather than to final assets. Hence, The study takes into account the shifting nature of the farmers' reference point in actual bidding vehicle choice situation. If the farmer prefers reduction in the interest rate of the bidding vehicle from the less risk bidding vehicle to the high risk (hard to meet up condition) bidding vehicle. The estimated interest rate trade-off rate is Willingness To Accept (WTA). If on the other hand the farmer moves from a higher or more risky bidding vehicle to a less risky bidding vehicle with a reduced risk differential, then the interest trade-off rate is Willingness To Pay (WTP) measure even when the new bidding vehicle is not absolutely free from risk. This theory has been adopted by many studies from the time of its development. The underlying assumption of this theory is that potential decision makers are concerned about the gains and losses of any decision they make and not the ultimate wealth. It also assumed that people are risk-averse in gain situations and risk-seekers in a loss situation. The willingness of the individual to take risk is dictated by how the decisions are framed (Kornhauser, 2008).

For example a policy on environmental conservation may be framed as bonus for individual farmers that embrace modern environmental resources conservation technology (whether the individual has the ownership rights or not) in the form of reduction in tax, supply of agricultural inputs and cash rewarding incentives, and a penalty for individuals that do not embrace such conservation techniques. Intuitively, such framing will go a long way to change the attitude of the land users (especially those

that do not have ownership rights on the land). Those categories of farmer framed as a loss (punishment) will be more willing to take the risk not to comply than those framed as a bonus. It's suffice to say that conservation of natural resources is improving when the farmers seeing the provision of incentives as a gain rather than loss.

If an individual sees the conservation of natural resources as a prospect, and that the individual will derive the utility that will make him/her to be better off in some way. The individual will therefore be willing to pay money or participate to enjoy this service. He/she willingness to pay or participate in such service, reveals the economic values attached to such bundle of services, otherwise he/she might be willing to accept compensation, if the services makes him/her worse off.

Evidences are abounding in some studies that have applied bio prospect theory (a scion of prospect theory) in natural resources conservation (Chen, 2012; Asgary & Levy, 2009). That people will be interested in contributing to the maintenance, conservation and sustainability of environmental resources, when they judge the prospect that will be gained from such decision to be rewarding.

(ii) Theory of Rational Choice

By the definition rational choice theory is the idea that people tend to make choices in a way that maximizes their advantage while minimizing the cost. This theory could be used when there is a need to predict what the behaviors of people can be when they are presented with certain options. The theoretical bases for economic value of market and non-market goods and services are based on rational choice of the consumers, which mirrors the preference set, utility function and consumer surplus. An agent could be viewed to have a set of preferences over various types of goods and services, which could

be logically ordered, in a certain defined manner. One of the beauties of the utility function, is that it tends to allow an agent choose the most preferred consumption bundles of attributes, that gives the highest level of satisfaction. Whenever changes occur, such that the utility derived from the consumption of such goods and services increases, then the consumer surplus could be measured.

At its best, this theory assumes that, when the need arise to make decision, individuals will compare the weight of the would-be-benefits, to the potential adverse outcome, before a choice is made.

The theory assumes that there exist transitive preferences for the decision-makers, and that they are seeking to maximize the utility derived from such bundles of options before them, subject to various constraints (Such as those imposed by income, time, cognitive resources and the like).

Transitive preferences could be explained as follows, if an agent prefers some goods or bundle of goods denoted as *A* to another good or bundle of goods denoted as *B* and also B, is preferred to good or bundle of goods denoted as *C*, then we can conclude, that good or bundle of goods *A* is preferred to that of *C*. But, if the order of preference change, in this case A is said to be preferred to B, B was also preferred to C, and C was preferred to A, this looks irrational. This theory further explains that an agent been rational knows what he/she need or want and therefore make choices among different alternatives presented before him/her to give him/her the desired utility.

The study of Salazar and Lee (1990) on natural resources and rational choice theory is a good example of the application of rational choice theory in environmental economics.

He argued that when consumers are presented with certain bundle of conservative methods/options. They will order the preferences of these options based on their judgmental reasoning, by doing so, they intend remotely to maximize the utility they will derive and minimized the loss. However, their choice of whichever options they choose is strictly conditioned by certain constraints (the constraint may be in term of low/ positive transaction costs, amount of incentive to be offered by the beneficiaries of resources conserved, gravity of punishment if they default, duration involved, social considerations etc.). Decision making on their participation in the resource conservation was mainly based on the amount of benefits they will derive from the incentive offered (cash/loan). Also, Len (1999) submitted that the choice of the consumers was informed by the positive transaction costs.

Summarily, we have preferences that are indexed by a utility, and changes in utility are captured by consumer surplus measures. With the appropriate restrictions, an individual's willingness to pay/accept for a change in environmental quality is based on a theory of rational choice, and is therefore a consistent estimate of preference.

(iii) Property Rights Theory

Scholars have found out that there are four main factors that caused environmental resource destruction: market failure, government failure, population growth and property rights failure (Pearse & Turner, 1990). In the tragedy of the common (Hadin, 1968), submitted that common resources lacking ownership were doomed to be over-exploited. Common resources have been seen as a causal factor behind the destruction of environmental resources, this is because when everybody owned resources no one will have the incentive to manage and conserve it for the future use. In the absence of the

property rights, the externalized of its future scarcity is not internalized by individual users and the outcome is inefficient high intensity utilization. The result of this is over-grazing, indiscriminate forest clearing and over-fishing, which will eventually, leads to resource degradation.

From the Hardin point of view, common property should be governed by the tenets of property rights, which will spur the interests of the land users to engage in its proper management and conservation. Rasmus (2002) corroborated Hardin's submission in his study on property rights, and natural resources management in developing countries. He observed that without a well-defined property rights in the common property, agricultural productivity will be adversely affected, which will lead to low income and inevitable poverty. He suggested that such a right should be a complement to the existing traditional common property system.

The issue of the need for property rights had been emphasized in the study related to poverty reduction. The use of incentive such as PES, need a well-defined property rights, especially in the common property type, without which agricultural productivity will be harmfully affected (Corbera & Brown, 2008; Wendland *et al.*, 2010). It was pinpointed in the argument of Suyanto *et al.*, (2007), that payment for environmental services will not record much success as expected if the property rights of the land users are not enforced, this was tested empirically in Sumatra, Indonesia to be so.

(iv) Theory of Poverty

Bradshaw (2006), Aigbokham (2000) and Roch (1998) approached the theory of poverty from the perspective of the cause of such poverty. Bradshaw submitted that since most of

rural community development effort is to relieve causes or symptoms of poverty. It therefore makes sense to uncover the theory of poverty, that is responsible for the problem. This, will shape the anti-poverty strategies for such poverty type. He mentioned five types of poverty theories as: poverty cause by (i) individual deficiencies, (ii) cultural belief, (iii) political-economic distortion, (iv) geographical disparities and (v) cumulative and cyclical interdependencies.

In the past few decades, literature on poverty suggest that the structure of economic system does not allow the poor to be in the equation of the economic system. Brasdshaw (2006), Tobin (1994), further stressed that poor families, hardly get better jobs. This is complicated by the limited number of jobs available near them, as well as lack of growth in the sector that supporting lower skilled workers. Also households headed by women cannot be sufficient economically because the so called minimum wage is not sufficient enough, and other structural barriers disallowed a better wellbeing. To compound the problem of the poor the political systems in developing countries, does not help the matter, as the interests and participation of the poor is either impossible or is deceptive, (Bradshaw, 2006). Oyekale (2012) and Okunmadewa (2002) supported the view that the incentives that are meant for the rural poor in Nigeria were often diverted by the non-poor, leaving the poor to be in abject poverty.

From the poverty caused by geographical disparities point of view, people, institutions, and cultures in certain areas lack the objective resources needed to generate wellbeing and income and also inability to claim redistribution. Shaw (1996) pointed out that the geography of poverty is a spatial expression of the capitalist system, which is a perfect description of Nigeria rural poverty.

Weber and Jensen (2004) observed that most literature finds a rural differential in poverty. An increasing body of literature holds that advantaged areas stand to grow more than disadvantaged areas, even in periods of general economic growth. These two theories (i.e. political-economic distortion, geographical disparities) relate to this study, in that it recognizes the inherent problems associated with the Nigerian rural communities and its inhabitants economically, politically and geographically.

2.9.2 Sociology and Social Psychology Theories

(i) Social Exchange Theory

This theory was postulated by Homan (1974) and it states that social change and stability involves a process of exchange negotiation between the concerned parties. The theory posits that all human relationships in a social set up, are formed by the use of a subjective cost-benefits analysis and the comparison of the reward and cost and cost alternatives associated with the relationship.

These are the propositions of the theory as provided by Homan (1974)

1. The success proposition: For all actions taking by individuals, the more often a particular action of an individual is rewarded by some benefits, the more likely the individual is to undertake that action. As the farmers are getting more benefits from the conservation of resources in the form of loan/cash/kind incentives, etc., the more they will be willing to participate in natural resource conservation oriented programs.

2. The stimuli proposition: Supposing that in some times past, the existence of a particular stimulus or a well-defined set of stimuli, has prompt the reward(s), for the

actor(s), then the more the similarity of the present stimulus to the past ones, the more, the individual concern, will be willing to embark on the action or some related action(s) in the present time. This is connected to environmental resource conservation, it suggests that if in the past, the benefits that a farmer who participated in resources conservation program, has been receiving from participation, have been rewarding, then the more that is added to the past benefits will likely make them to be more willing to comply will the rules that govern land use and its conservation.

3. The value proposition: The more the value an individual benefited from taking an action; the more likely he/she will like to undertake the action. For environmental resource conservation, if the benefit resource user received from engaging in a conservation program, (e.g. PES) is valuable/tangible enough, then more likely him/her willing to participate more.

Wallace and Wolf (2005) stated that, this theory indicates that people will consistently repeat an action that is rewarding, respond to stimuli (incentive) that has linkage with such rewards and act on the basis of the values given to the action.

Social exchange theory was known to have been applied in the natural resource conservation studies, amongst are, Sekhar (2003), Alexander (2000); Barrow (1997). They provided empirical evidences that, the amount of benefits received will increase the likelihood of participation in resource conservation, that is, if the exchange between the amount of services rendered and the reward received by the service users are equitable or even near-equitable.

Table 2.4: *Summary of Underpinning and Supporting Theories*

Theory	Proposal/Description	Applications	Empirical evidence
Prospect Theory	It discusses gain and loss with respect to a particular situation. An agent will be risk averse whenever there is a gain and a risk-seeker in loss situation.	Risk Preference	Teklewold& Kohlin,(2010);Place& Otsuka,(2002),Braselle etal,(2002);Beseley,(1995).
Social Exchange Theory	It focuses on the subjective cost benefits,with the principle of give and take as its background.	Public goods	Fiallo and Jacobson,(1995);De BoerandBaquete,(1998);Mehta andHeinen,(2001);Sekhar,(2003); Alexander,(2000);Barrow,(1997).
Theory of Poverty	Poverty should be addressed according to the cause of such poverty. Geographical and economic and political distortion is majorly the cause of Nigerian rural poverty.	Policy formulation	Bradshaw,(2006);Omotola,(2008) ;Adesopo,(2008);Tobin,(1994);O yeleke,(2002);Okunmadewa,(200 2);Shaw,(1996);WeberandJensen, (2004);Aigbokhan,(2000);Rocha,(1998).
Rational Choice Theory	Consumers can rank order of preference of events presented to them, subject to certain constraints.	Benefit-driving choice	Slazar and Lee(1999) ,Ulen,(1994).
Property rights Theory	A need for land rights security to aid incentive	Aid investment incentives mechanism e.g. PES	Suyanto*etal*,(2007); Brown,(2008),Treves,(2010)

2.10 **Research Gaps of the Study**

The following are the identified gaps of the study;

(i) Independent approach to tackling of poverty and environmental resource degradation was observed (Obayelu, 2010). This could be responsible for the high rate of poverty and environmental resource degradation, in the Nigerian rural environment.

(ii) Holding onto the concept of property rights (land ownership rights) as a pre-condition for participation in environmental resource conservation was remarked (Kronenberg& Hubacek, 2011). This may not be applicable to Nigerian rural farmers, especially when incentive based (e.g PES) is provided (Namirembe *et al*., 2014).

(iii) Failure to recognize 'symbiotic' nature of poverty and environmental resource was noticed. Hence, failure to annex the dual potentials of PES in tackling poverty and environmental resource degradation concomitantly (Kronenberg &Hubacek, 2013).

(iv) Non-identification of the 'real poor' as an issue or wrong assessment of the poor was observed (Oyekale, 2012; Wagle, 2008). This could be one the likelihood reason for the failure of anti-poverty programmes in Nigeria (Omotola, 2008; Wendland *et al* (2010).

2.11 Summary

Discussions on poverty in an extensive manner in this chapter, has left no doubt that its high time rural poverty should be addressed. Also, Payment for Environmental Services (PES) as an incentive to mitigate both rural poverty and environmental resource degradation simultaneously was discussed. Alkire and Foster (2010), Alkire and Santos (2011) stepwise method were explained and theories behind this study was also uncovered. The need for secured property rights were also attended to in this chapter. With the examination of relevant literature for this study, the research was able to develop and conceptualized the framework for this study. This is presented in chapter three.

CHAPTER THREE

RESARCH METHODOLOGY

3.1 Introduction

This chapter discussed various procedures for achieving the stated objectives in chapter one. This include, providing research and integrated conceptual framework of the study; development of objective-based hypothesis; stating of research design for the study; procedures for sampling techniques, data collection and the instruments, method/techniques of analysis of the data are discussed. This chapter also discussed, theoretical background of the choice modeling approach. Finally, measurement and explanations of variables, operational definition of terms are also included in this chapter.

3.2 Description of study area

Oyo state is one of the states in the South-West geopolitical zone of Nigeria; this satate was created from the old Western state in 1976, alongside with Ogun and Ondo states respectively, by the then military government. Going by the 2006 national population estimates, Oyo state is one of the densely populated states in sub-Saharan-Africa, with a population figure of 5,591,589 (NPC, 2006). The seat of government for the state is the ancient city of Ibadan. The state has thirty three local governments, its share boundary in the north with Kwara state, in the West, partially with Ogun state and the Republic of

Benin respectively, and in the south with Ogun state, and bounded on the East by Osun state. Oyo state has about 28,000 square kilometer land mass cover, with a vast quantity of hard rocks and dome shaped hills.

The state is endowed with a well-drained rivers and gentle rolling low lands and plateau.Climatically, the state is blessed with the equatorial climate type, which is characterized by both wet and dry seasons, as well as a relatively high humidity. Usually the dry season is for the period of five months, and the rest of the year witnessed rainy season. The pattern of the vegetation in the state is that of rainforest in the southern hemisphere and derived guinea savannah in the north. Crops such as cassava, maize, yam, plantain, coffee, cashew, cocoa, and palm tree are majorly grown in Oyo state.

Quite a number of government owned farm settlements are in different locations in the state.The following is where they are located; Akufo, Eruwa, Ijaiye, Ipapo, Ilora, Iresaadu, Lalupon, Ogbomoso, and Sepeteri. Most of these farm settlements are located in the core rural while the rest is in the semi-rural areas. Out of these farm settlements, three of them are functioning well; Ijaye, Ilora and Akufo farm settlements.

- The choice of Oyo state farm settlements for this study, was informed from the casual observation of the well pronounced agricultural land degradation from water and wind erosion, bush burning, indiscriminate tree felling and all sorts of un-environmental friendly practices. The poor or near-poor farmers who are the users of the land, have no form of property rights (land ownership rights) and this situation became worse as the successive governments are not really sensitive to the pathetic situation of the farm settlements.

Figure: 3.1: Map of Nigeria showing Oyo State (study area)

Source:www.maps-streetview.com/Nigeria/Oyo

3.3 Research Framework

According to Hair *et al.,* (2007), a conceptual model is a diagram that connects various variables based on theory and logic showcase for the hypothesis to be tested in the study. This is normally based on relevant theories of the study.

3.3.1 Conceptual Framework of the Study

This study made use of the tested model of previous studies in development and environmental economics studies, examples of such studies are; Place (2009); Kabubu-Mariara (2002), Pagiola (2005) and Wunder (2008). Clamoring by some authors (i.e. Cobera & Brown, 2008; Pagiola *et al.,* 2005; Bruce *et al.,* 2010; Russo & Candela, 2006) of the need for the property rights (for participation in PES programs) made the inclusion of property rights to be possible in this study conceptual framework. This conceptual model of property rights, payment for environmental services (poverty reduction and environmental conservation as the attributes of the PES) was adapted from the study of Place (2009) on Land Tenure and Agricultural Productivity in Africa. However the

model was modified, to investigate the claim that the presence of property rights in the PES program will enhance environmental resource conservation, and also that PES could be the right mechanism to solve environmental degradation and rural poverty. The inclusion of the identification of the 'real poor' is borne out of the background of the submissions by some authors; Russo and Candela (2006); Zbinden and Lee (2005) that non-poor are the beneficiaries of the incentive that are meant for the poor.This is corroborated by Omotola (2008); Pagiola (2005) in poverty related studies in Nigeria and Latin America respectively. Various remarks about the non-benefits of incentives/poverty reduction strategy programs by the poor, prompt this study to question with some reservations, the appropriateness of the instrument of poverty measurement used in the previous studies. To clear doubts on this, this study approached identification of the poor through multidimensional poverty measurement, bearing in mind the multiple deprivations Nigerian rural poor are facing (Omotola, 2008; Chukwuma, 2012; Okunmadewa, 2002; Oyekale, 2011).

Three components were identified as the factors that linked property rights and investment on land (i) freedom from expropriation as suggested by (Basley, 1995). He argued that, with freedom from expropriation, increase security for the farmer is sure. Also, it enhances his willingness to embark on medium-to-long-term conservation investments on his farm. This factor will likely aid any incentive oriented program like PES to achieve its aim. Also property rights provision can be enhanced the more by PES availability, as rightly observed by Brasselle *et al.*,(2002) that, land tenure security influenced conservation investment. Meaning that in the context of this study, PES as an incentive tool can aid investment in the form of resource conservation. An individual will

not want to invest if he/she understands that the fruits of his/her investment will be seized by others. (ii) Feder *et al.*, (1988) argued that if better rights make it easier to use land as collateral, it will improve access to credit for agricultural investment. Hence the provision of credit to farmers will stimulate incentive to invest in land. In Addition, provision of PES incentive (i.e. Credit facilities incentives) will likely be seen as a way of access to loan, which can generate a supplementary income to the farmers (i.e. ES providers), and in turn reduce poverty. Pagiola (2005), Kronenberg and Hubacek (2013) argued that though PES were not primarily designed to solve poverty problems, but it could be, if is well designed for the purpose. (iii) Place (2009) argued on the premise that property rights may stimulate land market, which will enhance the possibilities for gains from trade. Also Besley (1995) observed that investment on land is encouraged if improved transfer rights make it easier for individual to rent or sell his land. With the provision of PES and land market, a productive farmer will likely be encouraged to embrace a conservative program. This will reduce poverty through an increase in agricultural productivity, which will lead to increase in income and low land degradation.

3.3.2 Rural Poverty Reduction as a Process and Outcome of Credit-Based PES

The conceptual framework can be divided into two distinctive phases with regards to Credit-Based PES Potentialities. The divisions are below;

i. Credit-Based PES ⟶ Rural Poverty Reduction (outcome)

ii. Rural Poverty Reduction (process) ⟶ Land degradation Reduction (necessary) ⟶ Reduction in Rural Poverty (outcome).

Each of the above mentioned channels are explained below;

The credit-based PES, Rural Poverty Reduction channel (first phase), depicts that rural poverty reduction is an outcome of the Credit-Based PES process at this phase (see figure 3.2a). This explains the potentiality of Credit-Based PES in reduction of poverty. Adeoti, 2014; Anyawu, 2012, submitted that the rural dwellers have little or no access to credit facilities. Hence, with the provision of micro credit as one of the attributes of the PES program, will facilitate reduction in rural poverty to be achieved via;

i. Expansion in the production frontier of the farmers and

ii. Expending of the micro credit partly for other source of income (as allowed) by the conditionality of Credit-Based PES program (i.e. it states that; credit could be borrowed for any other purpose, in addition to participation in the Credit-Based PES program).

Hence, implementing Credit-Based PES through this channel in the first phase (i.e. Credit-Based PES → Rural Poverty Reduction) could improve the poverty status of the rural poor. However, this could be a daunting task if the 'required' property rights (land ownership rights) and identification of the 'real poor' are not given the deserved priority. Poverty reduction is a continuous phenomenon as figured in the conceptual framework, this leads to the second phase, where the outcome (i.e. rural poverty reduction, reduction) acts partly as a process for the second phase (see figure 3.2b).

The obvious remains that the first phase of the process of rural poverty reduction is not sufficient enough to engulf rural poverty. As assumed in the conceptual frame work, reduction of poverty progressively needs to be achieved by the reduction of

environmental degradation concomitantly (Obayelu, 2010 Kronenberg & Hubacek, 2013). Therefore, the second phase of the process incorporates both rural poverty reduction and environmental resource conservation (i.e. Rural Poverty Reduction (process) ⟶ Land degradation Reduction (necessary) ⟶ Reduction in Rural Poverty (outcome). The above channel leads to decrease in environmental degradation (through land conservation). Also increase in agricultural productivity is evident (all else being equal). Consequently, an increase in income/ consumption leads to reduction of poverty and the other end, as illustrated in the conceptual framework.

It is sufficient to note that, this study follows the schools of thought that support the 'Rural Poverty ⟶ Environmental degradation ⟶ Rural Poverty' nexus. Hence, application of Credit-Based PES en routing the same channels is paramount.

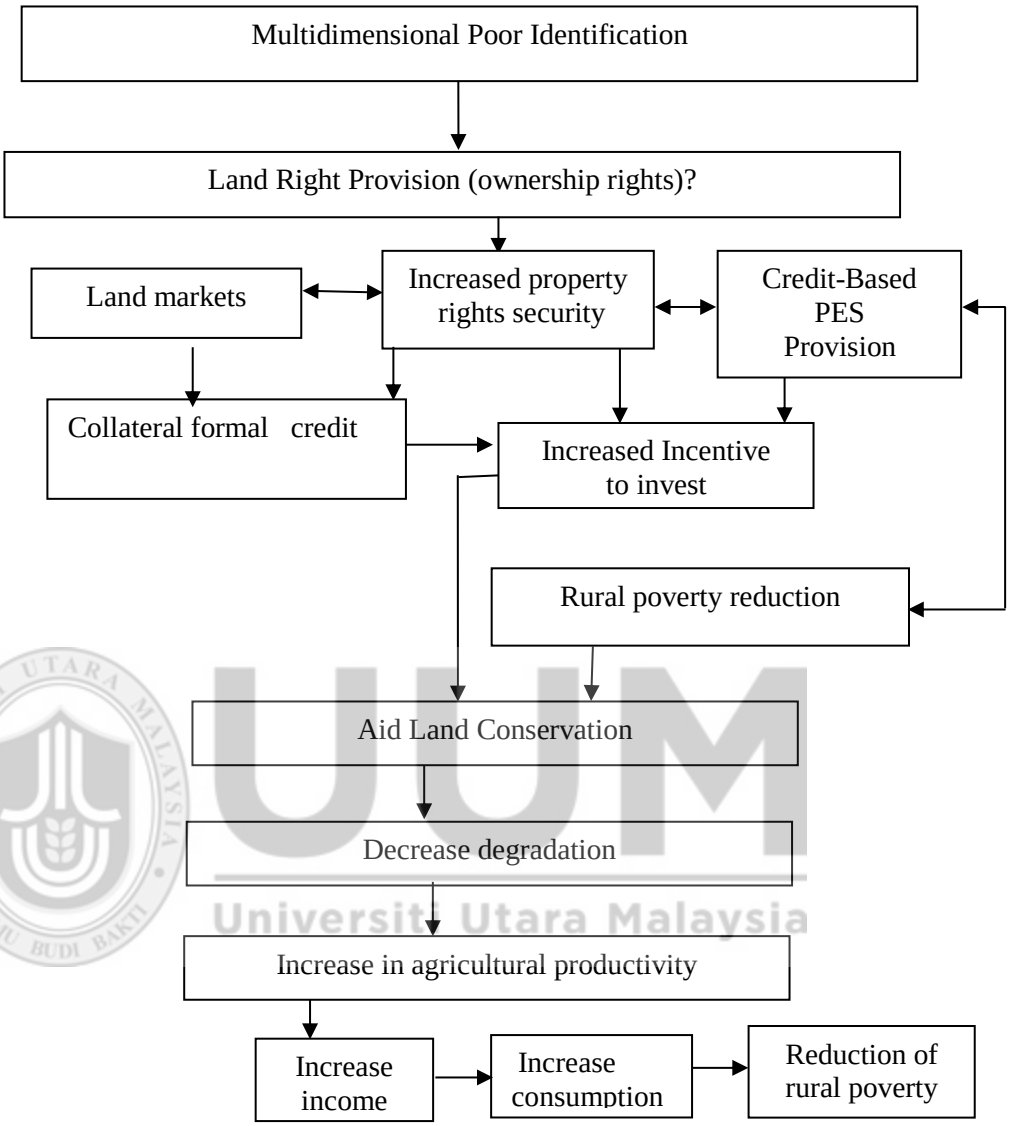


Figure 3.2: *Schematic presentation of the Conceptual Model, linking property rights, payment for environmental services (PES), poverty reduction and environmental conservation*

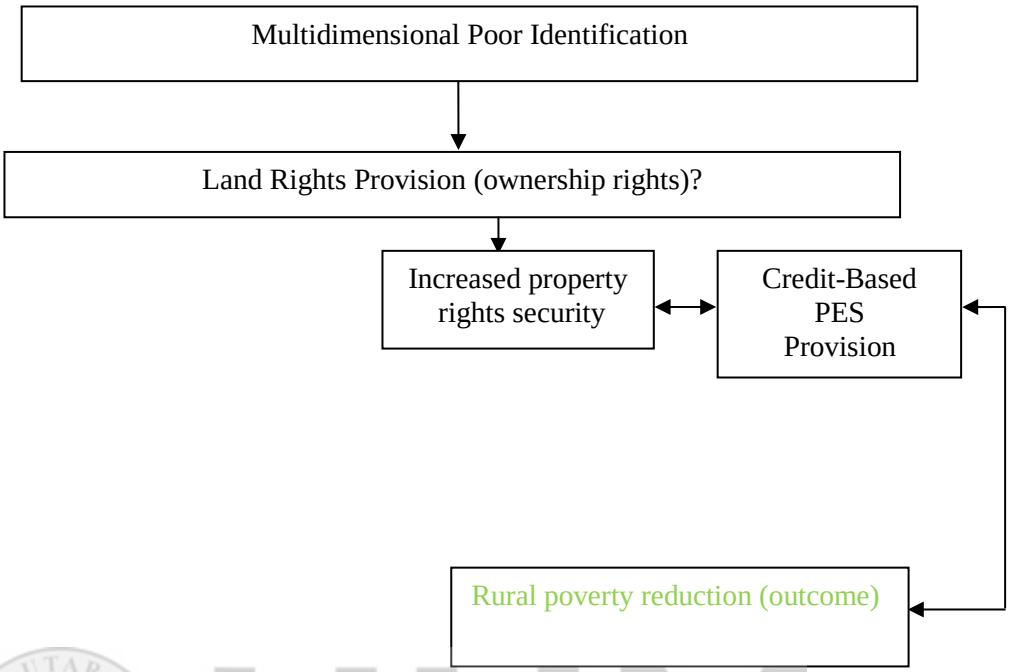


Figure 3.2a: *Schematic Diagram Showing Rural Poverty as an Outcome*

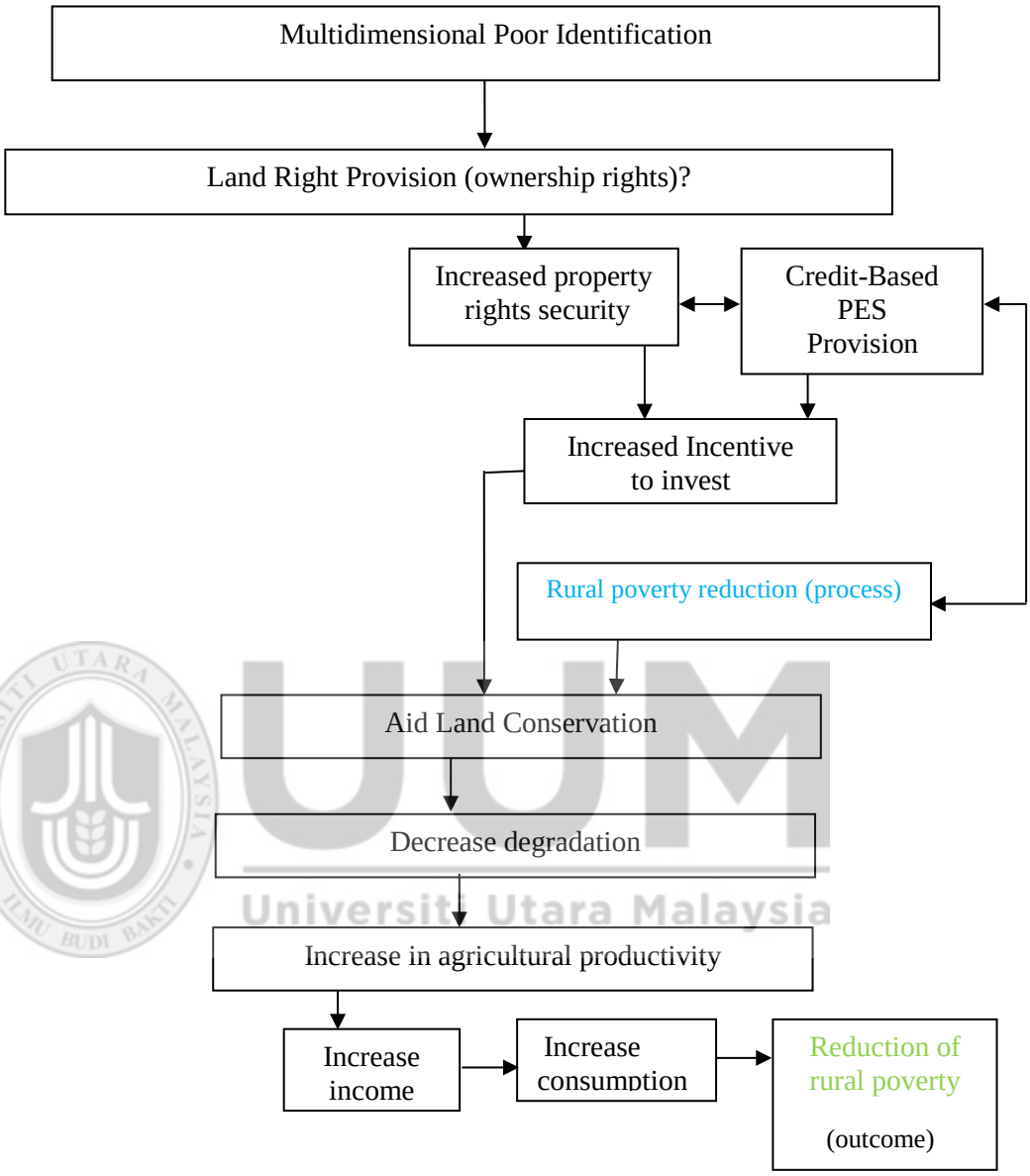


Figure 3.2b: *Diagram Showing Rural Poverty Reduction as a Process and Outcome*

3.4 Hypothesis Development

Research questions set up in chapter one form the basis of forming the following hypotheses. The hypotheses are equally in line with the conceptual framework model of the study.

3.4.1 Relationship between Income/Consumption-based and Multidimensional Poverty Measurement

Most of the studies on poverty employed one dimensional approach, which uses monetary indicators to judge whether a person is poor or not. In the recent past (ten decades or there about), call had been made to approach the measurement of poverty in a multidimensional manner, since poverty itself is a multifaceted phenomenon. Though there are divergent opinions as regards to the differences in the consumption/income-based and capability-based approaches.

Naveed and Islam (2010) in their study used consumption-based poverty line (Official Poverty Line) as well as multidimensional poverty cutoff to identify the poor in Pakistan. The unit of analysis is the household and not individual, hence the estimates obtain are at household level. The main difference between the two poverty estimates is that Official Poverty Line (OPL) provides very conservative estimates of poverty. The estimate of multidimensional poverty shows that 36.2 per cent of households are poor, while that of unidimensional indicates that 17.8 per cent are poor. It is remarkable to note that the unidimensional estimate of poverty makes errors of both types, by declaring multidimensional poor household to be non-poor and multidimensional non-poor households as poor. Also in an attempt to uncover the relationship between

multidimensional poverty and unidimensional poverty estimates, Naveed and Islam (2010), concluded that, though the correlation coefficients are significant statistically, they are low and not providing the basis for accepting the unidimensional poverty measurement as the single and comprehensive criterion for an estimation of poverty.

Wangle (2008), in the study of Multidimensional Poverty: An Alternative Measurement Approach for the United States, find out that multidimensional poverty estimates provide a more comprehensive outcome, though is significantly consistent with those from income/consumption-based approaches. He added that though the characteristics of identifying poor are partially in line with income-based poverty approach, yet multidimensional poverty estimates are more accurate. He therefore concluded that, with this hedge, policymakers have ample opportunity of focusing on different categories of the poor, i.e. poor, very poor and abject poor.

Basarir (2010), in his study on the multidimensional poverty: An empirical study on South Africa, submitted that the unidimensional poverty measure that based on expenditure resulted in a different province deprivation ranking, when compared to the multidimensional ranking for the same province.He concluded out that the decomposability of multidimensional poverty measure is more useful in policy formulation.

According to a study conducted by Ataguba *et al.*,(2013), on multidimensional poverty assessment in Nsukka, Nigeria. It was reported that some degree of correlation exists between measures when multidimensional approach was used, the implication is that

multidimensional poverty assessment is not totally free from flaws, as observed by Rippin (2010).

It could be inferred from the above discussions that literature such as (Russo & Candela, 2006; Zbinden & Lee, 2005) on poverty-environmental degradation nexus, which argued that the real poor are not targeted in the poverty related programs, may be due to monetary-based approach of poverty measurement, which as mentioned cannot capture all deprivations of the poor.

Also, Omotola (2008), Adesopo (2008), Garuba (2006) claimed on the non-targeting the real poor, as the one of the factors responsible for the failure of poverty strategies in Nigeria, this could be true, if the above differences in the poverty measurement is put into consideration.

3.4.2 Links between Property Rights and Payment for Environmental Services

Due to human induced activities like agricultural practices, mining, bush burning, tree felling etc., ecosystem is depleted as the natural resource conservation could not cope with the rate at which human actions deteriorate environmental resources. To compound the problem, there is either faulty/imperfect market or no existing market for such public goods, as the case in developing countries. It was on this premise that payment for environmental service came on board, to solve the problem of market failure in resource conservation. Though PES is a viable incentive mechanism for conservation of ecosystems (Wunder, 2008; Pagiola *et al.*, 2005), its impact may not be felt without the backing of a clear property rights (Place, 2009; Feder, 1988; Braselle *et al.*,2002).

According to (Pagiola *et al.,* 2005; Arriagada & Perrings, 2009) property rights security have been identified as the wheel for which PES rolls in combating of poverty and environmental degradation. Demeke (2003) reiterated that property rights failure is one of the setback in investment on land. Awudu *et al.,* (2008) concluded that, theoretically three main arguments were put forward for the linkages between property rights and security investments. There is possibility that a farmer will undertake a long time investment on land if he has a secured land tenure in place. Also a secured land rights give the land users opportunity to use the land as a collateral security to obtain credit facilities to finance investment in the land. Finally, a well define property rights may improve transfer rights, which confer authority on an individual to rent or sell his/her land.

In the Oyo state farm settlements, virtually all the farmers have none of the ownership rights on the farm holdings they are cultivating. Instead the holdings are acquired from the state ministry of agriculture by some influential persons, who may not have business to do with agriculture. These few influential elites transfer a temporary ownership to those land needy farmers at either cash or kind cost. Although many authors argued that property rights (land ownership rights) is a prerequisite for PES to be effective. This study stands to think in a contrary direction. This study argued on the premise of lack of provision for social security and access to credit facilities, in Nigerian rural settings as the potential 'bait' for PES effectiveness and willingness of the farmers to participate in it. Since PES was able to offer micro credit provision as one of its attributes. Based on the above discussion this hypothesis was formulated:

$H_{0:}$ There exists no significant relationship between property rights (land ownership rights/land tenure security) and the preferences of the respondents in payment for environmental service (PES) attributes in the study area.

3.4.3 Links between Poverty Reduction and Payment for Environmental Services

Primarily, PES were not conceptualized as an incentive mechanism for poverty alleviation, but rather, it was designed as an incentive mechanism to improve conservation and sustenance of natural resources. However, many pro-PES authors have argued that PES can also have a considerable impact on poverty reduction positively (Pagiola, 2005, 2008; Landell-Mills & Porras, 2002). Pagiola (2005) was particularly concerned about (i) the tendency that PES can reduce poverty among the PES participants and (ii) indirectly, on participants within the area where the PES program is being implemented. In most of the places where PES was employed in Latin America and to some extent in East Africa and Southern Asia, contributions of PES to poverty alleviation/reduction are through payment for the services rendered by the service provider/participants. A typical example is that of Rewarding the Upland Poor for Ecosystem Services (RUPES, 2008) and Western Altiplano Natural Resources Management Project in Guatemala; here the poor farmers are targeted directly as the beneficiaries of the PES project. This is in agreement with Pagiola (2005) that PES could be an effective mechanism to reduce poverty if is so designed for the purpose. In an explicit manner, when the resource is being conserved, it will lead to better productivity and improve income 'implying' a better living, hence decrease in poverty. Payment for ES should be for a long time to avoid reversion to the previous damaging practices; this

could be interpreted in the light of sustainability of conservation of the natural resources, which will enhance an 'accumulated' poverty reduction. The issue of whether the non-participating individual will benefit or not from PES programs raised by Pagiola could be answered through the 'trickle-down effect' via labour engagement in PES program. Ninan and Inoue (2013) threw more lights on the links between PES and its function of poverty reduction, the duo examined the value associated with PES in Oku Aizu forest reserve in Japan.

The study revealed that income realized from the implementation of PES ranged between US$17, 016-17,671/ha. From this revealed figure, developing countries such as Nigeria could borrow a leaf from the Japan forest PES conservation program. This will enhance well being of the poor as well to sustain natural resources conservation. Gios and Rizio (2013) itemized some areas of success stories of PES, among, is economic impact: (i) income and employment, (ii) innovation and entrepreneurship; area of personal characteristics (i) identification, (ii) recognition and area of financial impact: (i) input/output flow. Recalling that poverty is a state of multiple deprivations (Sen, 1976), such as social exclusion, unemployment, health problems, shame and humiliation, unacceptable housing/living standard etc. With the introduction of PES, it could serve as a vehicle of life transformation out of the multidimensional poverty cycle. Although, some of the critics of PES affirmed that it should be solely designed and use for ecosystem conservation. They have a reservation for the possibility of PES losing its environmental conservation potency. But in the recent publications of Kronenberg (2012); Kronenberg and Hubacek (2013) affirmed that the dual nature of PES (poverty

reduction and ecosystem conservation characteristics) should be explored in its totality, on the premises that the design of PES to achieve certain objective(s) is what matter.

3.4.4 Links between Environmental Resource Conservation and Payment for Environmental Services

Agricultural land degradation caused by over exploitation, unhealthy farming practices such as deforestation, bush burning and the likes, are responsible for eroding natural environmental resources in arable lands. This is predominant in the developing countries, where farmers solely depend on land for their livelihood (Swinton & Quiroz, 2003; Suyanto, Khususiyah & Leimona 2007). The effect of this is the reduction in the soil carrying capacity, which will lead to poor/low agricultural productivity. PES could therefore be used as the market-based incentive buffer to subdue this problem.

Pagiola *et al.,*(2005) submitted that PES was originally designed and used as a mechanism to improve the efficiency of natural resource conservation and not as a mechanism for poverty reduction. The PES approach to land resource conservation is based on the theory of give and take. According to Pagiola and Platais (2000) as cited by Suyanto *et al.,* (2007) opined that PES approach is based on principle that environmental services providers should be adequately compensated and those who benefited from the services provided should pay for such services. For example, conversion of forest to agricultural land will cause imposition of costs on the downstream population that will no longer enjoy the benefits of natural ecosystem such as water filtration (Suyanto *et al.,* 2007). To make the upstream population provide the services of conservation of the water shield, for the provision of clean water for the downstream users, payment for such

service is needful. The opportunity cost of such service for the environmental service providers, must be higher than the gain from the alternative non-conserved land use. Also the opportunity cost should also be less than the value,of the gain the environmental service beneficiaries will realize from the service; these are the conditionality of PES, which must be met by the players in PES scheme.

Going by the cause and effect of poverty and land degradation in this study as figure 1.2 depicts. The poor farmers in the quest for survival, are engaged in sort of environmentally unfriendly practices, such as burning of crop residue, deforestation, bush burning, etc. all these led to declining in the cultivable land and pasture land for crop growing and animal grazing, since the incentive to invest in the land as to conserve soil fertility is conspicuously absent. Hence farmers have no option than to make do with the available marginal lands. While the remaining few livestock are contending with the humans for crop residues, which could have served as a good source of fertilizer for the soil nutrients replenishment and rejuvenation. Since the whole scenario is a chain of reaction, less manure is expected, as the stock of animals that defecate as they are grazing are small. The resultant effect of all these, is that it gives way for erosion to set in and soil degradation eventually causes low productivity, hence low income and poverty as the end product. Payment for environmental resources (PES) that is intentionally designed to address the two major players; poverty and land degradation could be the antidote in this type of nexus. Consequently, hypothesis formulated on the perspective of the respondents on PES ability to reduce rural poverty and agricultural land conservation is:

$H_{0:}$ There is no significant relationship between payment for environmental service (PES) and rural poverty reduction / agricultural land conservation as was perceived by respondents in the study area.

3.5 Measurement of Multidimensional Poverty

The following methods for the measurement of poverty in multidimensional manner are discussed below

3.5.1 The Alkire Foster Method

This study, take into cognizance the multifaceted nature of poverty and deprivation.The methodology developed by Alkire and Foster (2010) and recently used in Alkire and Santos (2011) to obtain multidimensional poverty indices (MPI) for developing countries was employed in this study. This methodology is similar to the FGT (Foster, Greer, Thorbecke, 1984). Alkire and Foster (AF) approach used dual cutoff point approach, for the measurement of poverty (Ataguba, Ichoku & Fonta, 2013).The first cutoff is dimension specific, while the second is the minimum number of dimensions for deprived people to be called multidimensional poor.The AF method for determining multidimensional poverty has been shown to satisfy various axioms such as decomposability (useful in targeting) and dimensional Monotocity (Alkire & Foster, 2011). It permits the usage of both generalized as well as equal weights in aggregating dimensions (Sen, 2004). It is with this background that this study uses Alkire and Foster methodology to derive deprivation headcount (H_0) and the dimension-adjusted headcount ratio (M_0). M_0 is the suitable measure to be employed whenever one or more of the

dimensions under consideration are of ordinal nature, meaning that their value has no cardinal significant (Alkire & Santos,2011). The dimension adjusted headcount M_0 is obtained as follows MPI=H*A=percentage of people who are poor (it shows the proportion of people who are in poverty);A is the average deprivations share people suffer at the same time (It shows the *intensity* of people's poverty).The MPI can be broken down in different ways- by dimension; showing how people are poor, by headcount, showing how many people are poor; by intensity; showing how great the poverty is and by sub-group; showing group variations (in headcount, intensity, and composition).

In the multidimensional poverty measurement, two major steps are involved –the identification and aggregation step. In the identification step, two processes are also involved-identification of the deprived and the poor (the details steps are in the appendix). However, in the multidimensional poverty measurement, where multiple variables are considered the process of identification is more tasking.

3.5.2 The Basic Elements of Dual Cutoff Identification Approach

Dual cutoff refers to the sequential use of deprivation and poverty cutoffs to identify poor.

1. Deprivation Cutoffs

This is employed in determining, if a person is deprived or not and is denoted by z_j a person is said to be deprived in a particular dimensions if a person's level of achievement in that particular dimension, falls below the respective deprivation cutoff z_j.

2. Deprivation Count

Is represented by c_i, this reflects the breadth (extent) of each person's deprivation. The i^{th} person deprivation count c_i is the number of deprivations experienced by i (in the case of equal weights) or the summation of the values of the deprivations experienced by i (in the case of general weights).

3. Weights

Weight is denoted by w_i, which is defined as the deprivation values to indicate the importance of different deprivation relatively. If each deprivation is adjudged to have equal importance all weights are equal to one and sum to the number of dimension d. If the deprivations are viewed to have differential importance, then the vector entries will be summed to dimension *d* but can vary from one, higher weights attached to the deprivation level connoting greater importance. However, deprivation value could affect the identification of the poor as well as its aggregation–in that alteration in the relative contributions of each deprivation to overall poverty is possible.

4. Poverty Cutoff

Poverty cutoff *K*; this is used to determine the sufficiency of deprivation value before a person could be termed to be poor. If the deprivation count c_i of an individual falls below k the person in question is considered not to be poor. But if the deprivation count c_i is equal to *k* or greater than *k*th person is said to be poor. Both *poverty cutoff and deprivation count* could be expressed as percentage of *d.*

3.5.3 Identification step

As mentioned earlier, two procedures involved; identification of deprived/poor persons.

Identification of deprived person: here *achievement matrix* (Y) will be constructed which shows the achievements of *n* persons in each of d dimensions. This is followed by *deprivation matrix* (g^o), which shows who is deprived and in which dimension and how weighty the deprivation is.

Identification of poor; The censored matrix $g^{o(k)}$ is constructed, it then follows that if the person is poor the row containing the deprivation information of the person is unchanged, but if otherwise the information of the person is censored and replaced with zero.

3.5.4 The Aggregation Step

The aggregation step was basically built upon the FGT technique and likewise generates a parametric class of measures (Alkire & Foster, 2011). Alike and Foster (2011) posit that, each of the FGT measures can be conceptualized as the mean of an appropriate vector built from original data and censored using the poverty line. The two main measures that are corresponding to the FGT measures are considered in this study; i.e. the Adjusted Head Count Ratio and the Adjusted Poverty Gap.

(i) *Adjusted Head count Ratio:* The Adjusted Head count ratio could be expressed as $M_o=\mu\ (g^o(k))$, M_o could be viewed in two ways (i) as the mean of the censored deprivation (that is the sum of the g0 (k) divided by the number of the elements in the matrix (ii) in term of partial indices-Multidimensional headcount ratio H (the percentage of the population that is poor).

Consequently M_o= HA, for Unidimensional poverty, P1= HI, where I is the income–gap ratio (measures the average depth of poverty among the poor and as usual H stand for Unidimensional headcount.

Interestingly by combining both H and A, *Mo* has satisfied the condition of dimensional *monotonicity*. If a poor person becomes deprived in an additional dimension (this will be reflected in A, but not H) *Mo* will thus increase accordingly.

(ii) Adjusted Poverty Gap: This is the mean of censored normalized gap and could be defined as $M_1 = \mu (g^1 (k)$.

3.5.5 Selection of Dimensions and Indicators

There are different emerging approaches, as well as disagreements among the advocates of the capability approach over the process of the choice of valuable dimensions (Neveed & Islam, 2012). Landerchi *et al*,(2003), proposed capability, social exclusion and participatory approaches, also, Nussbaum (2000) proposed a universal list of capabilities. Sen (2004) strongly advocated for the choice of dimensions that are of (i) a special importance to the society or people in question and (ii) social influence ability; that is, an appropriate focus for public policy rather than private good (Alkire & Santo, 2011). Since MPI is flexible, the choice of weight, dimensions, indicators and cutoff is centered on the contexts in question. Studies on multidimensional assessment/ measurement in Nigeria by Ataguba *et al.,* (2013), employed the following dimensions: Consumption, housing characteristics, health, education, employment quality, physical safety, employment, shame/humiliation, psychological well being. While Alkire and Santos (2011) used three

dimensions: education, health and standard of living. However, Alkire and Santos (2011) suggested the following criteria in selection of dimensions.

(i) Parsimony(ii) consensus (iii) interpretability (iv) data existence (v) data adequacy (vi) inclusivity (vii) participatory exercises/public discussions (viii) enduring consensus (ix) theory base.

On the basis of the above discussion the dimensions of this study were based on criteria iii, iv, v, and vi respectively. Three dimensions and thirteen indicators were employed for this study (table 3.1). The three dimensions are education, consumption and housing/living standard dimensions. Education dimension has two indicators: i. A farm household member with at least primary six education and ii. schooling attendance of school age child, consumption dimension has adult equivalent consumption per day and per capita income per day at both $1.00 and $1.25 per day, respectively, while housing/living standard dimension has 10 indicators: i. own at least a decent house ii. improved flooring, iii.improved/cemented-wall, iv. decent roofing, v. improved drinking water source, vi. improved sanitation vii. improved cooking material, viii. or has television, ix. motor bike and x. radio. With some degree of modifications, studies on multidimensional poverty measurement have employed similar dimensions and indicators, examples of such studies are Ataguba *et al.* (2013) in Nigeria; Batana (2009) in Sub Saharan Africa. Neveed and Islam (2012) in Pakistan; Alkire and Foster (2010) in some selected developing countries; Alkire and Seth (2009) in India; and Battiston *et al.*, (2009), in Latin America. In this study, relatively equal *weights* are used, this is in accordance with the recommendation of Atkinson (2002), the Millennium Development

Goals (MDGs) indicators and more recently Alkire and Santos (2011) study of multidimensional poverty measurement also follows suit. This study adapted the following dimensions/indicators from OPHI (2013); education dimension: has (i) years of schooling (i.e. six years education) and (ii) school age-child as the indicators. Housing/living standard dimension: has (i) drinking water (ii) sanitation (iii) fuel for cooking (iv) floor type and (iv) ownership of television, radio motor bike. The other four indicators for housing/living standard was chosen based on Alike and Santo (2011), Hallerod, (1994) criteria of choosing dimensions and indicators.

Table3.1*: Dimensions, Indicator Measurements and Weights*

Dimension (weight)	Indicated weight	Measurement
*Education (1/3)	Household head with at least six years education (1/6)	At least Primary six years education completed.
	If any school-age child is attending school(1/6)	School age child is enrolled in the school
Consumption (1/3)	Per adult equivalent(1/3)	Consumption per adult below $1.25 per day
Living standard(1/3)		
i. * Owing house	Indicator(1/30)	Ownership of at least a house
ii.* Drinking water	Indicator (1/30)	A decent source of drinking water
iii.*Sanitation	Indicator (1/30)	An improved sanitation condition
iv.*Fuel for cooking	Indicator(1/30)	Good coking materials
v. *Flooring material	Indicator(1/30)	Improved flooring material
vi. Wall material	Indicator(1/30)	Improved wall material
vii. Roofing material	Indicator(1/30)	Improved roofing material
viii.*Owing motor bike	Indicator (1/30)	Owing at least a bike
ix. *Owing television	Indicator (1/30)	Owing at least a television
x. *Owing radio	Indicator (1/30)	Owing at least a radio

Source: Adapted from OPHI, 2013. N.B * Adapted from OPHI (2013).

3.5.6 Choice of Poverty Cutoffs

A household is said to be deprived if no one has at least six years education and also school age child not attending school (Alkire & Santos, 2010). Consumption

deprivation, was determined by consumption per adult equivalent, in order to ascertain consumption poverty. Also per capita household consumption expenditure was used, to determine monetary poverty. Any household, which the adult consumption is below $1.25 per day (N195/day) is considered deprived (this is the poverty line at 2005 PPP) for the developing countries (World Bank, 2010; Baker, 2008;Ravallion *et al.*,2005). Consumption expenditure aggregate includes all household food consumptions (not from the farm), daily needs and miscellaneous household expenditures (Ataguba *et al.*,2013). Ten indicators were used for the Housing/standard of living. Any household with unimproved flooring, wall,roofing, indecent drinking water sources, sanitation, cooking material, or has none of the television, motor bike and radio and not living in a decent house is said to be deprived (MDGs 7,Alike & Santos, 2010). To ascertain dimensional poor household, the criteria for education, poverty: (k=2) that is, if the household is deprived in the two indicators for education. For consumption (k=1), a household is poor in consumption dimension, if its consumption per adult equivalent is less than $1.25 per day (N195). Also for housing and standard of living (=6/10), a household is said to be poor in this dimension if out of 10 indicators is not deprived in 6 of them. However, different cutoffs could be used to determine the deprivation level (Alkire & Santos, 2010).

3.5.7 Choice of Unit of Analysis

This study used farm household as the unit of analysis (house head/adult member of the household as the respondent). This is due to the difficulties associated with some of the chosen indicators, e.g. toilet and sources of drinking water, that an individual cannot lay

claim on, as is jointly owned mostly by each farm household or community in general. Also, studies of Alkire and Santo, (2011); Neveed and Islam, (2012); Ataguba *et al*., (2013), used household as the unit of analysis, this was due to the difficulty that was associated with data availability if the unit of analysis is a person.

3.6 Measurement of Monetary Based Unidimensional Poverty

The study used the official estimate of poverty in the developing country as stipulated by the World Bank. Also Neveed and Islam (2012) used an official poverty line in Pakistan. Ataguba *et al.,* (2013) in the multidimensional poverty study in Nsukka, Nigeria used $1.25/day as the poverty line for the developing countries, which is exclusively based on the consumption/expenditure function of household. This described the minimum amount of resources required to attain a set of level of well being. In furtherance to the above, the studies based their monetary poverty measurement on (i) consumption per adult equivalent and per capita expenditure at both $1.25 and $1.00 per day. The poverty line was established based on the price of a basket of goods and services, also age and household size adjusted adult equivalent per capita consumption was calculated. In consumption per adult equivalent measurement, we counted child under 15 years and above as half an adult equivalent. It therefore means that a household with per adult equivalent consumption below the poverty line is considered poor. In this study the current consumption/expenditure is adopted because; the incomes of the poor do vary often over time, especially in the underdeveloped rural economies, which depends on rain-fed agriculture (which best described the study areas of this research); current consumption reflects more accurately how much resource household control and also

current consumption is a good indicator of long-term, because it will reveal information about incomes at other dates, in the past and future.

3.7 Credit-based PES a Need for Rural Poverty Reduction and Agricultural Land Conservation

Muradian *et al.,* (2010) submitted that, various types of PES programs, which does not strictly follows the original concept of PES exists. In the contexts of original PES concept, the most efficient form of incentive is that of output-based payment (Ferraro & Simpson, 2002). However, this type of incentive can only be efficient if would-be Environmental Service sellers have the capacity to do so.

Nevertheless, where there are market constraints, as it is obtainable in the developing countries and emerging economies, indirect supply-side incentives (i.e. Credit-based PES) is more effective and well preferred by the Environmental service sellers and buyers respectively . Pattanayak *et al.,* (2003); Pagiola *et al.,* (2007) however, argued that in the least developed countries, where PES is being practiced, credit constraints had been found to be a formidable drawback to the uptake of Agriculture-Environmental services.

Studies have shown that a good incentive should be more of a supportive motive than controlling (Vatn, 2010; Frey & Jegen, 2001). This makes farmers to be more responsible as it will enhance a better environmental conservation behavior. "More importantly, micro credit provision to the farmers will boost their entrepreneurship skill". This is

because it could be invested in the expansion of their farming business or for setting up an enterprise, which will serve as another source of income. Hence it increases farmers' capability to function as they desired. Credit-based PES can empower rural farmers tremendously in poverty reduction. From the foregoing discussion, the choice of a Credit-based PES could not be compromised, as a good mechanism through which both environmental conservation and rural poverty reduction could be achieved (Groom & Palmer, 2010).

3.7.1 Conservation and Credit-based PES in the Farm settlement

Anderson *et al.,* (2002); Wild *et al.,* (2008), submitted that, the provision of credit through micro finance/agricultural banks, could be effectively used to finance preservation of the natural environment resources such as agricultural land. In the Nigerian context, ecological funds could be borrowed to the potential farmers through the grass roots financial institutions such as Microfinance/Agricultural banks/Community banks. According to Cranford and Mourato (2012), there are three major ways by which the provision of credit could be linked to the conservation of ecosystem.

i. Selective lending: Here, alternative livelihoods could be made for those that live on the products of ecosystem e.g. forest products. Also, micro credit could be provided to finance activities which will, have a positive impact on the provision of biodiversity or environmental services. This selective lending is better done at the household or even at the community level (Wild *et al.,* 2008).

ii. A Conditional environmental good behavior credit provision: Here the potential credit beneficiaries cannot be privileged to borrow, except a certain environmental behavior is first of all met (Anderson *et al.*, 2002), or such an individual must have previously met an environmental best practices agreement on the previous loans (Mandel *et al.*, 2009). Here the ecosystem resource conservation serves as the collateral for the borrowed microcredit value, this method is referred to as environmental mortgage.

iii. Environmental behavior conditional micro-credit provision: The proportion of the amount that an individual micro credit beneficial farmers payback is a function of the performance of the farmers with respect to a particular environmental conservation. This approach is important in the developing countries, where the poor have limited accessibility to credit facilities (Nickerson & Hand, 2009).

From the table below, 90-100 to 0 percent end of the conditionality: if an individual micro credit beneficiary farmer met all the contractual, environmental service conditions, all the loan will be forgiven, and is therefore converted to PES (Van Ejik & Kumar, 2009). If 70-89% of the contractual agreements are met, 75% of the credit will be waived. If less than 70% of the contractual agreements satisfied, it will attract 0% loan forgiveness. Hence the entire loan will be paid by the farmers, and this will be considered as non-PES.

Table 3.2*:Conceptualized Credit-Based PES (CB-PES)*

Proportion of periodic repayment" waiver" if condition is met	90-100percent ⟵		⟶0 percent
Credit vs. PES	Convertible: Credit or PES	Credit/ PES combined	Credit without PES
Maximum size of the micro credit	Constrained to the amount of money that can be used for 1 ha agroforestry set up and amount ES supplies willing to pay.	Subject to: All environmental practices of 70-89% performance will have a certain amount of credit-waiving. Also will be determined by the amount the ES suppliers are willing to accept the offer of loan.	All environmental conservation Performance less than 70% success with attracts the penalty of the concerned micro credit beneficiary farmers to pay back all the amount.

Source: Adapted from Cranford and Mourato (2014)

3.8 Choice Experiment Design Procedure

Meetings were held with the stakeholders in the Oyo State Ministry of Agriculture and Natural resources, Director of the Oyo State farm settlements, farmers in the farm settlements, the farm managers of the farm settlements, Oyo State Ministry of Environment stakeholders, district heads, Nigerian Agricultural Credit and Rural Development Bank (NACRDB) stakeholders, Microfinance Bank Mangers and Agricultural unit of the Central Bank of Nigeria, Ibadan branch, Oyo State, Nigeria. The reason for contacting the above institutions was to have a good understanding of the relevant attributes and attribute levels for the study. In furtherance of this, the crop department of the Oyo state Ministry of Agriculture was also communicated as to ascertain the type of trees good for agroforestry farming (i.e. those trees that could be

beneficial to the rejuvenation of the agricultural land and could also be combined with the planted crops), and the adequate quantity of land for tree planting per acre. Also the amount of loan, time to pay back period and interest rate regime the interest rates attributes of PES were determined through a well consultation with the Agricultural/ micro finance banks.

Attributes such as provision of guarantors land and labour provision were considered in the study after intensive discussions with the farmers. A substantial proportion of them complained about non-availability of labour. This is due to seeking of the white collar jobs by the youth, hence most of them have migrated to the urban areas, and the available few ones demand high prices for farming work. Also, the farmers demanded that Agricultural /micro finance banks/government agencies to stand for them as guarantor for the PES micro credit facility. Since individual may be reluctant to take up guarantor's ship responsibility. But the respondents agreed that it will be assented to by their district heads. Finally, since most of the farmers occupied land that is belong to the government, the need for more acreages of land is inevitable, especially for those farmers with small farming land holdings, hence the inclusion of land provision in the PES attribute.

In the design of the experiment, the study takes into cognizance the general concepts of conditionality and opportunity cost in the choice of PES attributes. The study used orthogonal design which is one of the frequently employed methods in non-market goods.This was achieved with the aid of the manually constructed design method suggested by Johnson *et al* (2013). A total number of seven attributes, 25 levels and three alternatives were used in the design of the experiment. Amount of loan has 8 levels,

payback period has 2 levels, task to perform has 3 levels, interest has 6 levels, land, labor and guarantor provision have 2 levels each. The levels for the amount of loan, are: N1,000,000, N900,000, N800,000, N700, 000, N600, 000, N500,000, N400,000 and N300, 000, for payback period, the levels are: long time and medium time period, for the task to perform the levels are:1/4,1/2 and 1 acre conversion of land into agroforestry, for the interest rate, the levels are: 3%, 4%, 5%, 6%, 7% and 8%, for land provision, the levels are: ES seller, ES buyer to provide. Labour provision, levels are: ES seller, ES buyer to provide and guarantor provision, levels are ESseller, Microfinance/agricultural bank to provide (table3.2). The given condition is that agroforest of choice by each of the farmers, will be planted and maintained for a period of 5 years. Ten choice cards were given to each of the respondents to choose among three alternatives 1, 2 and 0 (0 is the status quo option).

In designing of choice experiments, there are some important decisions to be made with regards to the number of attributes, the appropriate number of levels for each of the attributes and the right description of the levels and attributes considered in the design. According to Hanley *et al.,* (1998b), a combination of attributes and levels should give rise to alternatives, which respondents were requested to choose from. Aside the alternatives, a status quo option is also included. Hanley *et al.,* (2001), inclusion of status quo option allows the respondents to be at liberty to choose, even from none of the array of packages presented to them. This will aid a better interpretation of the result in a typical welfare economics term. The design ensures (i) orthogonally (ii) balanced design and (iii) efficiency as to check mate correlation and minimize standard errors.

Table 3.3: *Attributes and Levels for Choice Experiment, presented in the PES Hypothetical Contract*

Attribute	Description	Level
1.Amount of loan	Amount of money provided to farmers for conversion of land to Agroforestry	N1,000,000,N900,000 N800,000,N700,000,N600,000 N500,000,400,000, N300,000
2.Payback period	Time period to back back the loan	Medium,long terms
3.Interest(per year)	Amount charged on top of the loan given	3%,4%,5%,6%,7%,8%
4 Task to perform	Conversion of land into agroforestry	1/4, 1/2, 1
5.Land provision	Land provided for the task	ESseller,ESbuyer
6.Labour provision	Labourers to do the task	ESseller, ESbuyer
7.Guarantor provision borrower of loan	The person to stand as a surety	ESseller provide, the Microfinance/Agriculturalbank

In this choice experiment, the hypothetical situation presented was as realistic as possible and involved a conversation between the survey implementer and respondents that covered these key points:

• Credit could be borrowed for any other purpose in addition to participation in PES program.

• The PES organizers would like to see an increase in agroforestry activities.

• That reduction in interest rate, however, is only available if you are able to meet the contractual agreement conditions.

• If you do not meet the conditions, you will have to pay back the loan at the interest rates of your chosen option.

3.8.1 Presentation to the Respondents

Each of the respondents were requested to choose their preferred options from a set of mutually exclusive hypothetical alternatives. It is expected that each of the respondents is

rational in their choices; hence they choose those options with the highest expected utility (Barr & Mourato, 2012). Status quo option (neither nor option) was included in the design, as to follow the standard welfare theory (i.e. it minimizes the possibility of forced and false choices).The attributes presented to the farmers are, (i) amount of credit, (ii) Payback period, (iii) task to perform (iv) interest rate, (v) labour provision, (vi)land provision and (vii) guarantor provision. Each of these attributes takes on a number of levels.

3.8.2 Circumventing Hypothetical and Social Desirability Biases in Choice Experiment

According to (Little & Berrens, 2004), hypothetical bias is the discrepancy between preferences expressed in a hypothetical survey situation and those expressed in a real market situation. In the stated preference method, respondents are not bound by their responses, unlike in the respondents participating in a real market (Bennet & Blamey, 2001; pp.18).

Nevertheless a well thought-off PES design can circumvent this problem. Carlesson *et al.,* (2005) used cheap talk script as a test of validity in choice experiment. His result shows that there was a reduction in the extent of hypothetical bias. On this note this study also used cheap talk script immediately prior to choice experiment questions.

Another source of hypothetical bias is 'yea saying'. According to Bennett and Blamey (2001); 'yea saying' is the tendency to express support for program without a proper considering the tradeoffs. Though CE is often less vulnerable to 'yea saying' than CVM,

but there is a tendency for some respondents to answer in ways which he/she believes will win approval from the interviewer (Maguire, 2009).

Because of the above mentioned problem an inferred valuation was used to solve this problem. This is by asking respondents of how much they believe other people would participate/perceived PES or will want to be willing to accept the program, etc. Here, it is believed that because the questions concern other people and not of the respondent, there should be no motivation to overstate the value (Lusk & Norwood, 2009).

3.9 Sampling Procedure

A multi-stage sampling technique was employed for this study; a multi-stage sample is one in which samplings are done sequentially across two or more hierarchical levels. This sampling technique was employed because of its advantage of cost and speed that normally associated with large/fairly large sample size collection. More importantly, a multi-stage sample is often more precise than a simple random sample of the same cost, and also more accurate than the cluster sampling for the same size sample.

Each of the farm settlement was classified as an Enumerated Area (EA) based on the National Population Commission (NPC); this is the first stage of the sampling. To ensure adequate representation of both rural and semi-rural localities, the farm settlements were stratified into rural and semi-rural. Prior to the second stage selection, complete listing of farming household units (and of household heads within household units) was carried out within each EA. In the determination of the sampling size, the study employed the use of Krejcie and Morgan (1970) sample size determination table. In Ijaye farm settlement, 220 households were randomly drawn from 300 (73%) farming households. In Ilora farm settlement, out of 150 farming households, 105 (70%) farming household heads were

randomly selected and in Akufo out of 97 farming households, 70 (72%) farming household heads were randomly drawn. Total samples of 395 out of 547 (i.e.72%) were drawn cumulatively. Out of 410 Questionnaires distributed, 317 were useable. In Ijaye farm settlement, 181 questionnaires were usable, out of 220 (82%), in Ilora; 87 respondents were used out of 105 (83%) respondents and 49 responses were used out of 70 (70%) respondents in Akufo. The cumulative response rate of the respondents in the three farm settlements is 77.31%. Data on, socioeconomic characteristics of the farmers, education, housing/standard of living, land ownership, asset and consumption were collected.

3.9.1 Data Collection and Instrument of Data Collection

This study used exclusively Primary data. Primary data were collected through the use of a well-structured questionnaires and interview schedule for the literate and non-literate farmers respectively. An adapted version of the Questionnaire used by Ataguba *et al.,* (2013) which was originally developed by a team of experts at the OPHI, was used to obtain the necessary data for the study. This questionnaire had been extensively used in 104 developing countries, for related study. Interview schedule was mostly used as most of the respondents were non-literates.

A total of 410 questionnaires were distributed in all the three farm settlements with the assistance of well-trained enumerators. The nature of this study demands for collection of two main data; data for multidimensional rural poverty and data for the respondents' preferences/perspectives of the set of PES attributes presented to them. Information was elicited from the respondents concerning multidimensional poverty on (i) education, (ii) consumption, (iii) housing/living conditions.

Data were collected between the months of October 2013 to Febuary 2014. This period was chosen intentionally, because it is the dry season time, which is characterized by low volume of agricultural activities. Hence, it prompts involvement of a large number of farmers in the interview exercise. Prior to interview season, information on the market, village and political meeting days and venues were known by the researcher and enumerators through inquiry. This assisted in reaching a good number of farmers for the interview on these days. Before administration of questionnaires and interview schedule exercise, a series of meetings were held with the respondents. This was centered on explanations on the purpose of the study and familiarization with the people.

The data collection execerise was not without obstacles, such as non-cooperative attitude, unwilling to give information, lack of interest, fear of being taxed by the government, tradition and cultural believe problems. However, these problems were resolved in a diplomatic manner between the researcher and respondents. This was achieved, by organizing meetings with any 'perceived' influential leaders and distributed some token gifts when the need arose.

3.9.2 Data Analysis

Both descriptive as well as econometric analysis was employed in the study. In this study the analysis was divided into two - those that involve selection of multidimensional poor, and those that concern the choice of the farmers among different alternative of PES choice sets presented in the study. In the multidimensional poverty aspect Alkire and Foster, (2011) Multidimensional Poverty stepwise methods was employed, for determining the poor. The software that was used for the analysis is stata 11 version.

3.10 Analytical Method

i. Multidimensional poverty

The study used probit model based on the dependent dichotomous variable. Dichotomous dependent variable assumes two values (either, 0 or 1). Thus the factors that are responsible for poverty are estimated using the probit model, for the probability of being poor is estimated for each of the farm settlement. The model is specified thus:

$$P(\text{poor}_i = 1/x_i) = P(\text{poor}_i > 0) = \text{P}(x_i b + u_i > 0/x_j) = \text{P}(u_i > x_i) = 1 - F(x_i) = 1 - F(x_{ib})$$

Where P ($\text{poor}_i = 1/x_i$) = is the probability that a person is poor given vector x_i of the observable characteristics. Consequently, the dependent variable in the above model is the same measure of poverty used in the calculation of the headcount (H_0) for each of the poverty categories(i.e multidimensional poverty, education, consumption and housing/living standard poverty). A household farm deemed deprived is assigned with zero score and otherwise 1.

The above equation could be written as:

$$\text{P}\left(Y_t = \frac{1}{x_i}\right) = \frac{\exp(x_i\beta)}{1+\exp(x_i\beta)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

It could be re-written as,

$$\frac{\exp(x_i{}^b)}{1+\exp(x_i{}^b)} = \frac{1}{1+\exp(x_i{}^b)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(2)$$

This can be expressed thus:

$$r_{it} = bX_i t + e_{it} \quad \text{..……(3)}$$

Where r_{it} = an unobservable latent variable for poor farm households.

X_{it} = Vector of explanatory variables

b = Vector of parameters to be estimated

e_{it} = error term.

Implies

The observed binary (1, 0), for whether a farm household is poor or not is assumed in the usual probit model. Thus, probability that the binary assumes the value 1 implies:

$$\text{Prob}(r_{it} = 1) = \frac{e^{xit} + \beta^{xit}}{1 + e^{xit} + \beta^{xit}} \quad \text{……..…..(4)}$$

ii. Choice experiment

Logit regression model:

With reference to Cameron (1988) as cited in Mohamed *et al* (2012), in the study on willingness to pay for watershed conservation at Hulu Langat, Selangor. The willingness to accept bidding offers in the PES program (if the respondents will participate in the Credit-based PES) is Y_i and variable X_i is the independent variables. μ_j is by assumption logistic random variable. The equation for the maximum likelihood binary logit model is:

$$Y_i = X_i'\beta + \mu_i \quad \text{……..(1)}$$

The explanation here is that Y_i, is assumed to be an unobserved continuous dependent variable, so it is demonstrated through binary dependent variable I_i. Nevertheless, in

Cameron's approach a new form of logistic model was generated by the introduction of a threshold value, t_i. It is therefore assumed that respondents' Yes=1 and No=0 response towards WTA are (i) less than or (ii) greater than t_i. Therefore,

$$I_i = 1 \text{ if } Y_i > t_i = 0 \text{ otherwise} \quad \text{.....(2)}$$

It is therefore implied that the probability of Yes for an answer is:

$$\begin{aligned} \Pr(I_i = 1) &= pr(WTA_i = t_i) \\ &= pr(X_i'\beta + \mu_i = t_i) \\ &= pr(\mu_i = t_i - X_i'\beta) \\ &= pr\{\mu_i / k = (t_i - X_i'\beta)/k\} \\ &= pr\{Z_i = (t_i - X_i'\beta)/k\} \end{aligned} \quad \text{.....(3)}$$

Where Z_{ij} is a standard logistic random variable with mean 0 and standard deviation b . Hence, the log-likelihood function can be written as:

$$\log L = O\{-I_i \log\{1 + \exp[t_i - X_i'\beta)/k]\} + (1 - I_i)$$
$$\log\{1 + \exp[t_i - X_i'\beta)/k]\}/(1 + \exp[(t_i - X_i'\beta)/k] \quad \text{.....(4)}$$

3.11 Operational Definitions of Terms

1. Agro forestry: planting of native trees and high-yielding fruit trees and cover crops for improved farm productivity, reduced runoff/erosion and increased biodiversity.

2. Attribute: attribute is one of the characteristics of an alternative; however, some attributes may be specific to a single alternative while some may be generic to all alternatives, as in the case for choice experiment design for this study.

3. Level: A level is a fixed value of an attribute. Raw designs typically start with levels that are Positive /non-negative integers. Then these levels are reassigned with actual levels, such as brands or Prices.

4.Choice set: A choice set consists of two or more alternatives.Respondents are presented with one or more choice sets to choose their prefer alternatives.

5. Orthogonality: When every pair of levels occurs equally often across all pairs of alternative, the design is said to be orthogonal. Another way in which a design can be orthogonal is when the frequencies of level pairs are proportional instead of equality.

6. Balanced design: A design is said to be balanced when each level occurs equally often within each alternative.

7. Efficient design: efficiency is a scale or measurement of the goodness of an experimental design based on the average of the eigenvalues of the variance matrix.

8. Mixed cropping: is a type of farming practice that involves planting of two or more of plants concurrently on the same land.

9. Permanent cropping: Permanent cropping is the type of agriculture whereby land is cultivated with crops that occupy the land for long periods.

10. Temporary cropping: This is agricultural system, whereby crops are planted, mature within one season and harvested. Examples of temporary crops are beans, maize, rice and yam.

3.12 Summary

This chapter extensively explained research/ conceptual framework with main focus on the property rights as an effective 'tool' for PES program. Discussion of linkages of PES with poverty and environmental conservation also included, this is followed by the formulation of objective-based hypothesis. Monetary and multidimensional poverty measurement relationship was also examined in this chapter. As one of the arguments of the study, identification of the poor as well as its categories were not untouched in this chapter.

Choice experiment design of PES attributes and levels as well as explanations of the attributes were uncovered. A joint sampling procedure for both multidimensional poverty and choice experiment was explained comprehensively in this chapter. Method of data collection and its analytical procedure was given adequate attention in the chapter. Finally, variable measurements and their explanations were discussed.

Ownership rights of land, has been majorly emphasized on as a necessary 'ingredient' for the participation of respondents in environmental resource conservation. Yet in this study design, re-examination of property rights is being investigated. This so, because why it could be a limiting factor in some other environments, it may not necessarily be in all cases. This may be the case of developing countries, where there is little or no access to loan, which this study offers.

CHAPTER FOUR

EMPIRICAL ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter present analysis of multidimensional and dimensional poverty, preferences/perspectives of the respondents in the hypothetical PES program and willingness to accept the bidding offers (WTA), in Oyo State Farm settlements, Nigeria. It presents results on how the respondents perceived the importance of the chosen dimensions for determining of their poverty status. Socioeconomic characteristics of the respondents were also presented. This is followed by the incidences of deprivation across the indicators. Also, this chapter discusses on percentages of respondents in poverty, adjusted headcount ratio, poverty gap, categories of poverty and determinants of multidimensional poverty. The critical research questions this chapter addressed are: i. Who are the poor in the study area?, ii. What are the categories of the poor in the study area? iii. Are property rights a necessary factor in conservation of agricultural land in the study area, iv. What are the preferences of each of the categories of the rural poor with regard to the Credit-based PES attributes of poverty reduction and environmental resource conservation? And

v. What are the perspectives of the poor on the Credit-based PES program?

4.2 Perception of Poverty Dimensions by the Respondents

Table 4.1, presents percentages of how each respondent judged the chosen poverty dimensions. This is on the premise that they are in the best position to understand their poverty state (Hallerod, 1994). This was used as the sample average of the responses of the respondents to assigned generalized weights to each of the dimensions/indicators (Ataguba, *et al.*, 2011). Education has the highest percentage (77.40%), while consumption has the least response (72.46%). Generally; responses for the three dimensions are similar. The Implication of this result is that, the respondents are aware of the state of their need with regards to the dimensions. In the study of Ataguba *et al.*, (2013), a similar results were obtained from the respondent's perspective of the selected dimensions (Housing characteristics=86.24%,education=71.25% and income/expenditure = 71.46%).

Table 4.1*: Aggregated Opinion of Respondents on Importance of each Dimension*

Dimension	% Regarding dimension as important
Education	77.40
Living standard	75.34
Consumption	72.46

4.3. Socioeconomic Characteristic of Respondents

Table 4.2, revealed statistic of the socioeconomic characteristics of the respondent, it showed that mean farm household size in Ilora, Ijaye and Akufo farm settlements is about 10 persons per household. As expected in rural households in Africa settings where extended family ties are in force, big size of household is not uncommon. Another reason

for the big household size is the use of children and other hired labourers for the farming activities. Also, Omonona (2010); Anyawu (2012); Adeoti (2014) confirmed that the large household size is rampant in the Nigerian rural households. One of the reason advance for the large household size is the absence of reliable social security systems as well as little or no savings in Africa countries. This is one of the rationales for parents to increase the number of children so as to serve as a means of economic salvation at their old age. Also, as Schultz (1981) had indicated, high infant mortality rates among the poor tends to provoke excess replacement births to insure against high infant and child mortality, which will increase household size". Both cultural and religious beliefs also play major role in the household size. Many still practices polygamy, as a social or religion obligations, this is common in the rural setting. Some other people do believe that children are gifts from God and therefore is a sacrilege to adopt family planning. Aside the mentioned, traditionally, African belief in male domination, this prompts families to continue given birth until they are satisfied with having male child and also in their desired proportion. Nigeria is still conceived as a high birth, high death society where many people think that they need to have as many children as possible since they do not know which one will survive (Ayanwu, 2012). In rural Nigeria, children are considered as an essential part of the household's workforce to generate household income; this also contributes to making of large family size.

Most of the farm household heads (65.93%) are between ages 20 and 45 years, while the least age groups households are 72years and above (2.84%). The mean average age of all the investigated farm households is 49 years. This is similar to mean age obtained in the

study of Ataguba *et al.*, (2013), where the average age of the respondents was 51.9 years. This is not surprising because of the tasks involved in farming activities required young and energetic individual.

As expected, male respondents are about 90%, since farming, especially in the rural environment is exclusively for male because of social and cultural advantages attached to a male individual in the African society. Most of the farm household families have 3.7 acres of land (about 1.5 ha) on average. This shows that most of the respondents are operating on a small scale, this could be explained based on their non-land ownership rights, little or no asset to credit facilities, usage of poor and out dated technology, lack of ready-made markets for the produce, poor or lack of infrastructure e.g. roads and lack of storage facilities. Majority of the households have 5 children on average, this was corroborated by Omonona (2010), in his quantitative study of rural poverty in Nigeria. A good number of the respondents are married (about 85%) and the least proportion of the respondents are widowers (about 1.6%). Many studies on rural poverty have similar results (Adeoti, 2014; Ataguba *et al.*, 2011; Omonona, 2010; Olaniyan & Abiodun, 2005).

Majority of the respondents are not educated (about 74%), while about 20% have primary education and about 5% are secondary school leavers. The rest of the respondents (about 1.3%) attended one form of tertiary institutions or the other. About 41 % school age children are in the school, while about 57% are not in the school. Anyawu (2011) study on poverty revealed that most of the rural dwellers are uneducated. Most of the household heads (about 91%) engaged in agriculture as their main occupation, with about 26 years

of farming experience on average. The reason is that agriculture is the major occupation in the rural environment, especially in an agrarian society like rural Nigeria.

Spouses who engaged in agriculture and those non-agricultural occupations are about 42% and 40% respectively.

Table: 4.2 *Descriptive Socioeconomics Characteristic Statistics of Respondents*

Variables	
	Mean
Farm household (size)	10.37
Daily consumption per adult equivalent (Naira)	156.37
Daily consumption per capita consumption (Naira)	122.17
Number of dependants	9.37
Number of children	5.00
Number of acre/farm household	3.70
Household heads years of farming experience	25.5
Age (years)	Percentage
20-32	20.50
33-45	45.43
46-58	25.87
59-71	5.36
72-84	2.84
Marital Status of farm household head	Percentage
(i) Bachelor	5.99
(ii) Married	85.17
(iii) Divorced	3.47
(iv) Widow	3.79
(v) Widower	1.58
Household head gender	Percentage
(i) Male	89.59
(ii) Female	10.41
Educational Level	Percentage
(i) None	74.13
(ii) Primary school	19.87
(ii) Secondary	4.73
(iii) Tertiary school	1.27
(iv) School age children in school	41.3
(v) School age children not in school	57.1
Household head main occupation	Percentage
(i) Agriculture	90.85
(ii) Non-Agriculture	9.50
Spouse main occupation	Percentage
(i) No-occupation	18.30
(ii) Agriculture	41.64
(iii) Non-Agriculture	40.06

The statistic in table 4.3, showed that incidence of deprivations is generally high (>70%) for drinking water, sanitation, cooking materials, roofing material and education attainment. High deprivation recorded in education attainment, is not unconnected to lack/low of individual relative autonomy, in choice of attending school (Ataguba *et al.*, 2011).

High deprivation of housing/standard of living indicators (drinkable water, sanitation, cooking materials, roofing material), could be probably traced to high monetary poverty (86.44%) in table 4.5, in the three study areas. However, some of the respondents are house owners, but they are poorly constructed (conspicuously lack decent amenities). Alkire and Santos (2010); Atagubal *et al*, (2013); Nwibo, (2013) submitted that the incidence of deprivations is generally high in the rural settings. The statistics in table 4.3 are revealing, however, it is only showing the percentage of people deprived in each of indicator, and does not signify measure of poverty. Also, there is a moderately high (>50%) deprivations across, for motorbike ownership, floor, wall materials and school age attendance. A lower deprivations were observed (26-42%) for radio, television and house ownerships.

Table: 4.3 *Incidence of Deprivation across Indicators*

Indicator	Incidence%
Educational attainment	74.76
House	36.59
Floor material	64.36
Wall material	63.09
Roof material	71.92
Television	41.64
Radio	25.87
Motorbike	55.21
Drinking water	93.06
Sanitation	91.48
Cooking material	93.69
School age child attendance	57.10

4.4. Multidimensional Poverty

This section presents results of multidimensional poor groups. The study employed three dimensions; education, consumption and housing/standard of living, with thirteen indicators. Unit of analysis is a farm household (Alkire & Foster, 2010). Here we considered a household to be poor dimensionally, if it's not poor in 1 out of 3 dimensions. That is, a household is said not to be poor, if it's poor in at least 1 out of 3 dimensions (i.e. 33.33%). Alkire and Foster (2010), Ataguba *et al.*,(2011) used at least 30% deprivations to determine poor multidimensionaly as the cut off value. However, researchers are allowed to consider the best cut off values (Alkire & Foster, 2011).

Table 4.4, below shows the percentage of the overall respondents that are multidimensional poor. Statistics revealed that out of 317 respondents, 260 (82.2%) respondents are multidimensional poor, while 57 (17.98%) are non-poor multidimensional. This means that 82% of the respondents are identified as being poor in at least two of (education, consumption and housing/standard of living) dimensions in the study areas. This result confirmed the general assertion that poverty is mainly a rural phenomenon (Adepoju & Yusuf, 2012; Aigbokhan, 2012; NBS, 2010; Alayande & Alayande, 2004).

Averagely (see,table,4.4.1), 91% of the perception (opinions) of the respondents,on the state of their poverty status, reflects the multidimentioally poor value (82.2%).This statistical revelation corroborates the submission of Hallerod (1994) on the subjective assessment of the poverty status of the people.

4.4.1. Dimensional Categorization of the Poor

Table 4.4, showed a breakdown of the dimensional poverty, indicating a wide gap between education poverty and consumption poverty (i.e. 29.97%) and a wider gap between education, poverty and living standard poverty (44.48%). Finding showed that 44.79% households are poor in education dimension, whereas those respondents with at least a primary school education or school attendance of the school age child household is 55.21% (i.e. non-poor educationally), in the three study areas. The difference between consumption and housing/living standard poverty is not as wide as that of education and consumption (i.e. 14.51%). Despite the seemingly attractive record of low percentages of education poverty in the study areas, yet many farm households are poor in housing/living standard and consumption. Ordinarily having been educated supposed to empower them to have a meaningful consumption and housing/standard of living. The level of education (mostly six years education) is not enough for them to be able to move out of poverty. The meagre income earned by most of the farmers is not really transformed to adequate consumption. Most of their incomes are spent on ceremonial occasions such as burial, naming, weeding and little are left for daily needs expenditures and decent/improved housing/living standard.

Table 4.4*: Poor and Non-poor Percentages (pooled)*

Poverty (Poor)	Percentage	Poverty (Non-poor)	Percentage
Multidimensional	82.2	Multidimensional	17.98
Education	44.79	Education	55.21
Consumption	74.76	Consumption	25.24
Housing/living standard	89.27	Housing/living standard	10.73

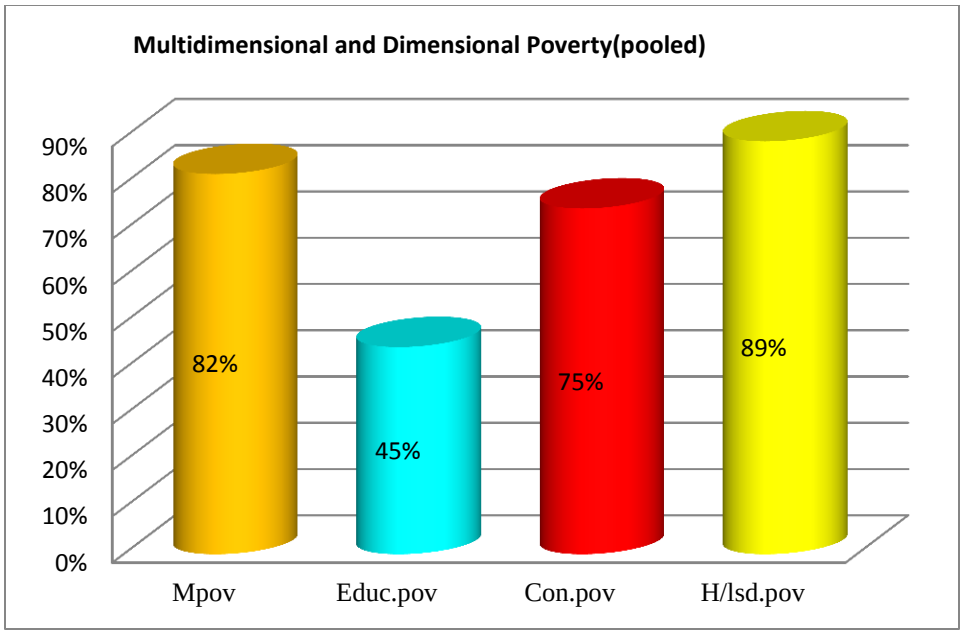


Figure 4.1: *Diagram Showing Multidimensional and Dimensional Poverty*

Table 4.4.1: *Reflection percentage of Respondents' Opinion on Multidimensional poor*

Dimensions	Respondent's opinion (%)	Average Respondent's opinion= (225/3)	Mpov (%)	Reflection %= Average/mpov*100
Education	77.40			
Consumption	72.46	75.06	82.20	91.31
Housing/living standard	75.34			
	225.20 (Total)	75.06 (Average)	82.20(Total poor)	91.31(Reflection)

N.B: Mpov=Multidimensional poor

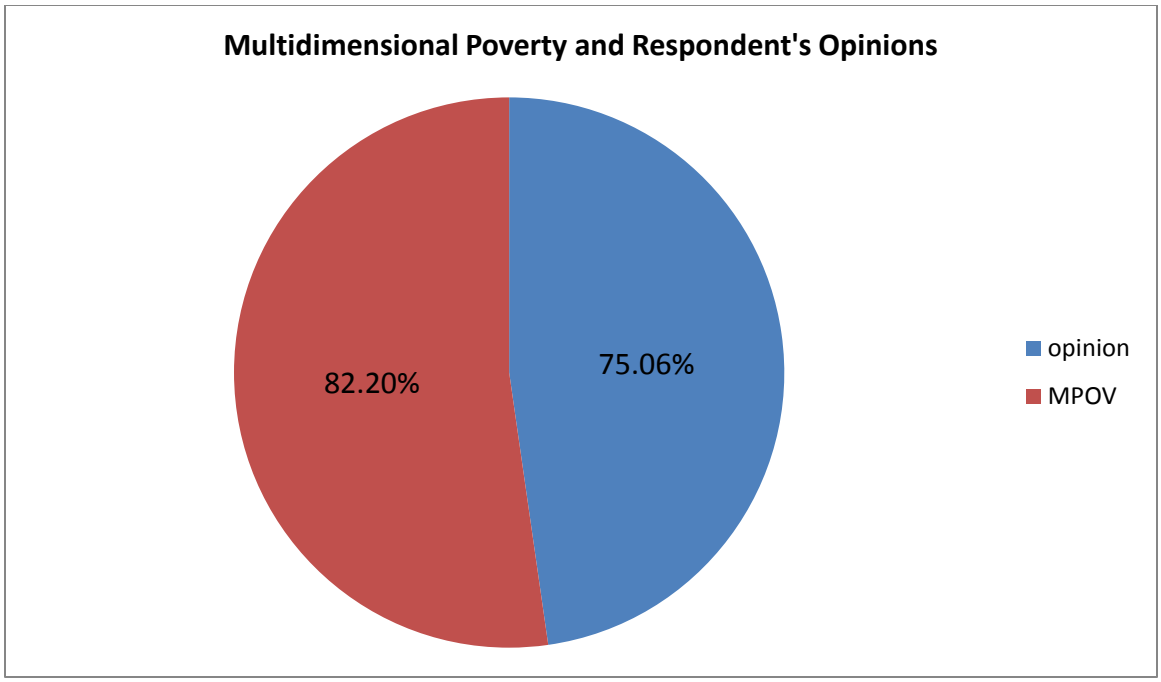


Figure 4.2:*Diagram Showing Reflection percentages of Respondents'Opinion on Multidimensional poor*

The results of aggregated measures of poverty are presented in table 4.5. This includes poverty head counts for both multidimensional and monetary poverty. Based on per capita consumption expenditures, about 86% of the respondents are classified as living below the poverty line of USD1.25/day, this fact was corroborated by OPHI (2014). As shown below, about 82% of respondents are multidimensional poor. The adjusted headcounts (M_0) for the multidimensional poverty is 69%.

Table 4.5: Monetary *and Multidimensional Poverty(pooled)*

Head count (%) Monetary Poverty	H(Headcount Ratio)	A(Average Gap)	M_0 (Adjusted Headcount Poverty)
86.44	0.82 (82%)	0.85	0.69

4.4.2 Variables Employed for the Determinants of Poverty in the Study Area

Explanatory variables for determining factors that predict the multidimensional poverty for the study, are; marital status, respondent age, educational level, household size, main occupation and cropping system (temporary, permanent & mixed cropping).

Ataguba *et al.*, (2011), used marital status, educational level, household size and age in the multidimensional poverty in Nsukka, Nigeria. Adeoti (2014), in his study on trend and determinants of multidimensional poverty in rural Nigeria, employed; age of respondents, marital status, household size, main occupation and educational level among others to determine multidimensional poverty determinants. Neubourg *et al.,* (2010), in the multidimensional poverty study in Senegal, used the following explanatory variables; age of respondents, gender, and household size among others. Kirk and Adokpo-Migan (1994) in the study on the role of land tenure and property rights in sustainable resource use: The case of Benin employed cropping systems for the explanatory variable and sustainability. Farm income was used by Igbalajobi, Fatuase and Ajibefun (2013) as an explanatory variable in the determinants of poverty incidence among rural farmers in Ondo state, Nigeria.

4.4.3 Determinants of Multidimensional Poverty

The study used the probit regression model that was discussed in chapter three. The likelihood ratio statistics for the model is 65.28, while the log likelihood is -116.69874 and it's highly significant at ($P < 0.0000$). It shows that the model has a strong explanatory power. The pseudo R^2 for the probit model is 0.2186, whereas in similar

studies,Adeoti (2014) used a pseudo R^2 of 0.142, also Ataguba *et al.*(2014) used 0.12, 0.24 for the pseudo R^2.

Out of the seven variables employed, age of respondents, marital status, income, household size and household farming experience are significant at 1%, 5% and 10% levels respectively. Only, two variables (i.e. education level and household head main occupation) are not significant. As indicated in table 4.6, the coefficients of marital status, income, household size were positive with the headcount poverty. This means that an increase in the values of these variables may likely increase to the likelihood of being poor. Both age and household size and household farming experience have negative coefficients. This shows that an increase in any of the variable may not likely increase the chance of being poor.

i. Poverty and Marital Status

As indicated in table 4.6, the coefficient of the marital status of the respondents has a positive and significant relationship with poverty in the study area. Anyawu (2012), argued that poverty were high among the polygamous and monogamous households and that the former is more pronounced that later. Evidence of the myriad of benefits of marriage to poverty reduction are abound in literature, that marriage should improve household economic wellbeing (Waite and Gallagher, 2000; Lerman, 2002; Lupton & Smith, 2003; Schoeni, 1995; Waite, 1995; Wilmoth & Koso, 2002; Grinstein-Weiss & Sherraden, 2006). However, Anyawu (2012), noted that monogamy household has a tendency to reduce poverty than the polygamous homes. As tradition, many of the rural dwellers in the South-West of Nigeria married more than one wife; hence there is a

tendency of high poverty rate. This is the reflection of the situation in most of the rural farm households in the study areas.

ii. Poverty and Age

Age group has the probability of decreasing poverty. Since, the bulk of farm household heads is within the age group (20-58 years) i.e middle age. According to the theory of life cycle, poverty is expected to be high at the early stage of life, decreases during middle age and then increases in the old age (Rodriguez, 2002; Gang, Sen & Yun, 2004). This finding is also discussed in Adeoti (2014). The decrease in poverty in the middle age could be explained by the ability of the individual being more energetic and vibrant at this life stage. Intuitively, this virtue helps in farming activities with respect to high productivity. Also at old age, individuals with low savings may not be able to realize high productivity as when in the middle age (Anyawu, 2012).

iii. Poverty and Number of Dependants

This variable has a negative effect on poverty, that is, it has the probability of reducing poverty in the study areas. As it's obtainable in the rural farm households, most of the labour force is hired in addition to the children in a family, with at least a year of agreement to work for their boss. Often, the boss received more outputs when compared to the inputs investments on the hired labour. Hence, there is the possibility of higher number of dependents to affect poverty negatively overall. Also, often rural farm households made use of children and wives as the labour force for most of the agricultural activities which were unaccounted for in the cost of inputs.

iv. Poverty and household head farming experience

The probability of the house head farming experience to contribute to poverty positively is not impossible. In most of the developing countries (Nigeria inclusive), agricultural practices still remain subsistence in nature with the usage of crude implements and little or no conservation of land. In Adesiyan (2014) submitted that that farmers with more years of experience are technically inefficient. There is a possibility of low return to labour, regardless of years of experience in farming, hence low consumption and ultimate poverty.

v. Poverty and Income

Conventionally, poverty and income are significantly related, in reality income serves as a control variable in this probit estimation. Income is positively related to poverty, this further confirms the inadequacy of income alone to adjudge poverty status of an individual. This is supported by the United Nations Development Programme (1997): Unidimensional poverty measurement does not reveal the in depth of inadequacy, but will show part of the picture in terms of many factors that has influence on individuals' level of well-being (e.g. longevity, good health, education, etc.). Sen (1987), submitted that income alone is not enough to generate well being if the individual lack entitlements. Nevertheless, it is recognized that income is an important part of the entitlements. Also the result implies that poverty is not about having high income or endowments. It is how the income used to boost the well-being of an individual.

Table 4.6: *Factors Determining Multidimensional Poverty in the three Study Areas*

Variable	Coefficient	Standard Error	p-value
Age	-0.328	0.147	0.026**
Marital Status	0.418	0.146	0.004***
Income	0.218	0.071	0.002***
No of dependant	-0.192	0.044	0.000***
Household head-Farming experience	0.027	0.013	0.056*
Educational level	-0.017	0.076	0.824
Household head main-Occupation	-0.018	0.295	0.951
Constant	-1.056	0.482	0.028**

* ** *** Significant at 10%, 5% and 1% levels respectively
Number of observations: 260
LR chi^2 (7) = 65.28
Log likelihood= -116.69874
Prob >chi^2 = 0.0000
Pseudo R^2 = 0.2186

4.4.4. Categorization by Farm settlements

The three farm settlements under examination were discussed in this section.

4.4.4.1 Descriptive Statistics of Respondents in Ilora Farm settlement

The descriptive statistics of the respondents in Ilora farm settlement were presented with regards to their socioeconomic characteristics, percentages of the poor households in the education, consumption and housing/living standard poverty dimensions. Also, those households that are poor monetarily were investigated.

4.4.4.1.1 Socioeconomic Characteristics of the Rural Farm Households in Ilora Farm settlement.

Table 4.7, presented the socioeconomic characteristics of the respondents in Ilora farm settlement. More than half of the farm household family heads are male (86.21%), while the rest of the farm household was headed by female (13.79%). Many of the farmers (91.95%) were married, while very few are bachelors, divorcees and widows. About

83% of the respondents are within age range of 22-54, while the rest of them (17.25%) are 55 years and above. A substantial proportion (66%) of the respondents is uneducated, while 10%, 9% and 2% have primary, secondary and tertiary education respectively. Expectedly, almost all respondents are farmers (94.25%), while 5.75% of them have other jobs aside farming. Most of the respondents have 13 years of farming experience, the least years of experience stands at 55years for the few respondents of 80 years and above. Average number of farm household, has acreage of farm land per household of 3acres (1.2ha). About 88% households have 3-7 members while about 13% household size fall between 8-11 members.

Table 4.7*: Socioeconomic Characteristics of the Rural Farm Households in Ilora Farm Settlement*

Category	Frequency	Percentage
Sex		
Male	75.00	86.21
Female	12.00	13.79
Age(years)		
22-32	16.00	18.4
33-43	22.00	25.26
44-54	34.00	39.09
55-65	12.00	13.8
66-76	1.00	1.15
Above 76	2.00	2.30
Marital status		
Bachelor	1.00	1.15
Married	80.00	91.95
Divorced	4.00	4.60
Widow	2.00	2.30
Farm household size		
0-3	49.00	56.32
4-7	27.00	31.04
8-11	11.00	12.65
Education level		
None	66.00	75.86
Primary education	10.00	11.49
Secondary education	9.00	10.35
Tertiary education	2.00	2.30
Occupation type		
Agriculture	82.00	94.25
Non agriculture	5.00	5.75
Year of farming experience		
0-13	46.00	48.90
14-27	32.00	36.15
28-41	2.00	4.60
42-55	3.00	9.20
Above 55	1.00	1.15
Number of farm household acres		
0-2.9	28.00	32.16
3-5.9	59.00	67.84

4.4.5 Percentages of Poor Rural Farm Households in Ilora Farm settlement

From the table, 4.13 below about 83% farm households were multidimensional poor. The breakdown indicated that about 51% are educationally poor, about 69% are poor in consumption dimension and about 91% are below adequate housing/standard of living. Education has the highest non-poor farm households, follow by consumption with a fairly

wide difference to living standard poverty (22% difference). However, there is a slight difference between education, poverty and consumption poverty (18% difference), but a wider percentage between education, poverty and living standard (45.65% difference) was recorded.

In table 4.14, with 0.83 headcount ratio, the adjusted head count is 0.55 when the cut off point of being poor in at least two out of three dimensions was considered. Education dimension statistic revealed that when an individual farm household is not poor in at least 1 out of two indicators for education, its adjusted poverty index is 0.26 with 0.51 head count. While housing/standard of living poverty has the highest value of 0.55 adjusted poverty index when headcount ratio of 0.91 was observed.

Table 4.15 dwells on the statistics for choosing of different cut off points, when k=7. The headcount ratio (H) is 0.224, with the poverty gap (A) of 0.088 and adjusted head count (M_0) of 0.019, when k= 8, H= 0.388, M_0 = 0.034, and A= 0.087; when k=9, H=0. 299, M_0 = 0.021 and A= 0.070. When k = 10. H= 0.090, M_0 = 0.004 and A = 0.047. This shows that the more the cut off k is increasing, the less is the head count (H) and adjusted head count (M_0), from when k =8 to k=10. This was observed by Adeoti (2014) and also supported by Batana (2009). The proportion of respondents that are poor and how they were poor, decreases as the number of dimensions at which they are poor increases. It indicates that most of the respondents are not poor at lower poverty cut off value. Also the poverty intensity is decreasing from k= 7.

Monetary poverty (tables 4.16 & 4.17) of each farm settlement was investigated using $1.00 and $1.25 per day (per adult consumption equivalent and per capita consumption) respectively. Under $1.00 per adult consumption equivalent, about 49.43 % were poor while for $1.25 per adult consumption equivalent about 69% are poor. Also for consumption based on per capita, at $1.00 per day, some 62 % of the farm household families are trapped in the consumption poverty; while a higher percentage (about 84%) were under the scourge of consumption poverty, at $1.25 per day. This result shows that many rural residents are poor in consumption as well as in housing/living standard even at a low poverty line, this was supported by Christiaesen, Demery and Paternostro (2002).They observed that both income /consumption and living standard poverty are on the high side in these countries: Nigeria, Ethiopia, Ghana, Mauritania, Uganda, Madagascar, Zambia, Zimbabwe, in the study of growth, distribution and poverty in Africa.

4.4.6 Determinants of Multidimensional Poverty in Ilora Farm Settlement

The statistic of the probit model shows that likelihood ratio is 37.89 and the log likelihood is -21.04783, are significant ($P < 0.0000$), the model has a good explanatory power. In Ataguba *et al*. (2013), a pseudo R^2 of 0.41 was used. The pseudo R^2 for probit model in this study is 0.4737.

The factors that increase the probability of being poor in this study area are; marital status, consumption and household head years of experience. While the following variables are negatively related and significant with poverty; household size, household head main occupation and permanent cropping as indicated in table 4.8. Marital status as

a predicting variable of poverty could be justified as polygamy is a common practice among rural farming households in Nigeria. Anyawu (2012), maintained that polygamous households have the highest poverty record than the monogamous family, in his study on marital status, household size and poverty in Nigeria. Consumption (per capita consumption) is another factor that significantly contributed to poverty in Ilora farm settlement. Just like income, consumption is a control variable. This result shows that income/consumption as the indicator for measuring poverty, is not enough to judge the poverty status of an individual. Paradoxically, the result showed that the higher the numbers of years of experience the more the poverty. The probable explanation for this statistic is that developing countries' agriculture sector largely depend on crude implements and its subsistence in nature. Therefore, it is possible that a return to unit of labour invested is low, especially at long run, when the carrying capacity of the soil could not support desired yield, coupled with little or no incentives for land conservation.

Having discussed positive relationships of the aforementioned variables. Negative relationship exists between household size and poverty. Instinctively, large household family predicts poverty. This was corroborated by Adeoti (2014), that the larger the size of household the poorer the probability is. Also Omonona (2010) supported the same line of argument for large family. With regards to household size most of the farm families in Ilora farm settlement have a relatively small size household. This reason could explain the negative relationship of household size with poverty.

Among the variable expected to have the probability of poverty reduction is the main occupation of the household head. Being a full time farmer could reduce poverty, as more

of time, energy and resource will be directed toward farming. All else being equal, a bountiful output is abound. In agreement with this study, Anyawu (2010) opined that occupation has relevant and a significant correlation with poverty reduction in Nigeria.

Finally, the cropping system (permanent cropping) has probability of causing poverty to be increased. Since permanent cropping takes at least two years and above to reach gestation period, within the 'waiting period' without much other reasonable source of income, poverty could set in. Also, even at long run due to uncontrollable factors, e.g. drought, flood, fire etc. poverty is not impossible.

Table 4.8*: Determinants of Multidimensional Poverty in Ilora Farm Settlement*

Variable	Coefficient	Standard Error	P.value
Marital Status	1.462	0 .659	0.026**
Household Size	-0.431	0.021	0.040**
Household head main-occupation	-1.690	1.017	0.097*
Consumption	1.731	0.773	0.025**
Household head years of experience	0.080	0 .036	0.026**
Temporary cropping	1.747	1.298	0.178
Permanent cropping	0 .744	0 .354	0.036**
Mixed farming	-0.296	0.215	0.169
Constant	4.361	1.825	0.017**

Number of observations = 87
LR Chi^2 (8) = 37.89
Prob > Chi^2 = 0.0000
Log likelihood = -21.04783
Pseudo R^2 = 0.4737
* ** significant at 10%, 5% respectively.

4.4.7 Descriptive statistics of Ijaye Farm settlement

4.4.7.1 Socioeconomic Characteristics of the Farm Households in Ijaye Farm Settlement

Table 4.9, below presented the socioeconomic characteristics statistics of the respondents in Ijaye farm settlement. Almost all the farm household family heads are male (92.27%), and about 18% are female. This is because farming is a male-dominated occupation; this

was also observed by Igbalajobi, Fatuase and Ajibefun (2013) in the study the determinants of rural poverty in Ondo state, Nigeria. Statistics showed that most of the respondents were married (79.56%). The study indicated that only 5 respondents (2.76%) are widowers, while bachelor, divorcee and widow respondents are 9.39%, 5.52% and 2.76% respectively.

About 92% are within age range of 20-58, while the rest are 59 years and above. High percentage of the (about 75%) are not educated. Expectedly, almost all respondents are farmers (89%), while few of them have other jobs aside farming. In all, 13-27 years of experience in farming has the highest number of respondents, followed by those of the respondents that have 28 years of experience (13.77%). About 89% of respondents have between 6-13 acres of farming land, while a handful of farm households (4.42%) could boost of 14 and above acres of land.

Table 4.9*: Socioeconomic Characteristics of Rural Farm Households in Ijaye Farm Settlement*

Category	Frequency	Percentage
Sex		
Male	167.00	92.27
Female	14.00	7.73
Age(years)		
20-32	20.00	11.03
33-45	85.00	47.04
46-58	61.00	33.67
59-71	8.00	4.41
Above 71	7.00	3.85
Marital status		
Bachelor	17.00	9.39
Married	144.00	79.57
Divorced	5.00	2.76
Widow	10.00	5.52
Widower	5.00	2.76
Farm household size		
0-6	80.00	44.20
7-13	80.00	44.20
14-21	20.00	11.05
Above 21	1.00	0.55
Education level		
None	136.00	75.14
Primary education	42.00	23.20
Secondary education	0.00	0.00
Tertiary education	3.00	1.66
Occupation type		
Agriculture	161.00	88.95
Non agriculture	20.00	11.05
Year of experience		
0-13	83.00	45.85
14-27	73.00	40.30
28-41	21.00	11.57
42-55	3.00	1.65
Above 55	1.00	0.55
Number of farm household acres		
0-2.8	68.00	37.54
3-5.8	106.00	58.60
6-8.8	7.00	3.86

4.4.7.2 Percentages of Poor Farm Households in Ijaye Farm Settlement

From the table 4.13 below, the statistic revealed that, a high proportion of multidimensional poor farm households were recorded in the Ijaye farm settlement.

When each dimension was considered, respondents that are educationally poor are 41.30%, the consumption poor respondents are 77.17% and housing/living standard respondents are 87%. This statistic follows the same trend with the findings in the multidimensional poverty discussed previously.

Table 4.14 indicated that multidimensional poverty index (MPI) is 0.54, education poverty has 0.21, consumption poverty is 0.77 and housing/standard of living is 0.52. The cut-off point observed for being poor multidimensionally is deprivation in at least 2 out of 3 dimensions. Nevertheless, the study considered different cut off points to ascertain the poverty index.

At k=7, M_0 =0.194, H= 0.025 and A= 0.131; when k= 8, M_0=0.020, H=0.156 and A= 0.130; when k= 9, M_0=0. 031, H=0.313 and A= 0.098; and when k= 10, M_0=0.016, H= 0.238, A= 0.061, as indicated in table 4.15. Unlike the findings in Ilora farm settlement. This result shows that, there are inconsistencies with the trend of poverty cut off k, with H and M_0. Nevertheless, it shows that the intensity (A) of poverty among the poor is decreasing. Respondents in Ijaye farm settlement are greatly poor in the chosen indicators.

To have a better knowledge of consumption/income poverty, the study examined consumption under (i) per adult consumption equivalent and (ii) per capita consumption both at $1.00 and $1.25 per day respectively. From table 4.16 and 4.17, the study reports that about 65% and 77% are poor per adult consumption equivalent under $1.00 and $ 1.25. Also, 77.35% and about 88% farm households were unable to meet requirements of

$1.00 and $1.25 consumption/income per day, when the per capita consumption measurement was employed. As observed in other farm settlements respondents are poor in consumption and housing/living standard than in education. This was also argued by Christiaesen *et al*., (2000).

4.4.7.3 Determinants of Multidimensional poverty in Ijaye farm settlement

The likelihood ratio statistic as shown in table 4.10 below, is 90.31, and is highly significant at P< 0.000, suggesting that the explanatory power of the model is strong. Out of the three significant variables only household size has the probability of lessening poverty in Ijaye farm settlement. Marital status has a positive and significant relationship with poverty at different level of confidence intervals. While permanent cropping is significant at 90%, household size and marital status are significant at 95% and 99% respectively. These results are in line with the previous findings discussed in the determinants of poverty in Ilora farm settlement above.

Table 4.10: Factors *that Determine Multidimensional Poverty in Ijaye Farm Settlement*

Variable	Coefficient	Standard Error	P.value
Marital Status	0.590	0.217	0.001***
Household Size	-1.320	0 .589	0.025**
Number of dependants	0.865	0.575	0.133
Temporary cropping	-0.280	0 .402	0.486
Permanent cropping	0 .274	0 .148	0.064*
Mixed farming	0.044	0 .143	0.759
Number of acres	0.021	0 .123	0.866
Constant	1.328	0.929	0.153

Number of observations = 181
LR Chi^2 (7) = 90.31
Prob > Chi^2 = 0.0000
Log likelihood = -51.685129
Pseudo R^2 = 0.4663
*** ** * significant at 1%, 5%, 10% respectively

4.4.8 Descriptive Statistics of Akufo Farm settlement

4.4.8.1 Socioeconomic Characteristics of the Farm Households

As in other farm settlements, male farm household heads are more than the female farm household head, as shown in table 4.11, below. Mostly, respondents fall in the age group 20-45 years (about 94 %), while other respondents are in the age group 46-58 years (about 6.12%). Three categories of respondents were observed in Akufo farm settlement with regards to marital status; bachelor (2.04%), married (93.88%) and divorced respondents (4.08%). More than half of farm households have 4-7 members, while 38.78% have between 8-21 people, the rest of the respondents have between 0-3 (6.21%) members of the household. Households with at least primary education are 22.45%, those with secondary education are 6%, tertiary education is 4.08% and no education is 67.35%. Agriculture as the main occupation has about 90% of respondents, while the rest respondents engaged in non-agriculture enterprises. Most respondents have between 0-13 years of farming experience. About 43% have farm land between 3.0-5.5 acres, follow by those respondents that have between 6-11.5 acres of farm land. About 21% of farm households have 0-2.5 acres for their farming activities.

Table 4.11*: Socioeconomic Characteristics in Akufo Farm settlement*

Category	Frequency	Percentage
Sex		
Male	42.00	85.71
Female	7.00	14.29
Age(years)		
20-32	28.00	57.13
33-45	18.00	36.75
46-58	2.00	4.08
Above 58	1.00	2.04
Marital status		
Bachelor	1.00	2.04
Married	46.00	93.88
Divorced	2.00	4.08
Household size		
0-3	3.00	6.12
4-7	27.00	55.10
8-21	19.00	38.78
Education level		
None	33.00	67.35
Primary education	11.00	22.45
Secondary education	3.00	6.12
Tertiary education	2.00	4.08
Occupation type		
Agriculture	44.00	89.80
Non agriculture	5.00	10.20
Year of experience		
0-13	40.00	81.62
14-27	7.00	14.30
28-41	2.00	4.08.
42-55	3.00	1.65
Above 55	1.00	0.55
Number of farm household acres		
0-2.5	10.00	20.40
3-5.5	21.00	42.87
6-11.5	18.00	36.73

4.4.8.2 Percentages of Poor Farm Households in Akufo Farm settlement

From table 4.13 below, many of the farm households are multidimensional poor (80%), while both education and consumption poverty has 47% each of the population of the poor in these dimensions. 93% are identified been poor in Housing/living standard dimension. The multidimensional Poverty Index is 0.54, when 2 deprivations out of 3 dimensions are applied. A Household is not poor if not deprived in at least 1 out of 2

indicators, with this, education poverty is 0.24 (M_0), consumption and housing/living standard has 0.47 and 0.56 adjusted headcount ratio (M_0) respectively as shown in table 4.14. Also, in table 4.15, when k=7, M_0=0.006, H=0.119, A=0.049, when k=8, M_0=0.023, H=0.429, A=0.054 when k=9, M_0= 0.010,H=0.238,A=0.041 and when k=10, M_0=0.068, H=0.214, A=0.318.

The study further examined consumption under (i) per adult consumption equivalent and (ii) per capita consumption both at $1.00 and $1.25 per day respectively. From table 4.16 and 4.17, about 47% are poor per adult consumption equivalent under $1.00 and $ 1.25. Also about 80% and 86% farm households were unable to meet requirements of $1.00 and $1.25 consumption/income per day, when the per capita consumption measurement was employed.

4.4.8.3 Determinant of Multidimensional Poverty in Akufo Farm settlement

The log likelihood ratio for the model is -14.921068, with likelihood ratio of 13.7 and significant at 0.017 (i.e. 5%). The pseudo R^2 is 0.3158, a similar probit model has pseudo R^2 of 0.3125, in the study of Igbalajobi, Fatuwase and Ajibefun (2013).Table 4.12, indicated that marital status, household head main occupation and temporary cropping are significant at 5% and 1% respectively. While the formal two variables are positively related and later variable is negatively related to poverty. Temporary cropping system has the tendency of reducing poverty; this could mean that there are quick returns from the farm at least in the short run, unlike the case of a permanent cropping system that takes longer time to mature. Marital status also shows a positive relationship in Ilora and Ijaye

farm settlement. Study on poverty by Anyawu (2010) submitted that marital status has the tendency to increase poverty.

Table 4.12*: Determinant of Multidimensional Poverty in Akufo Farm settlement*

Variable	Coefficient	Standard Error	P-value
Marital status	2.410	1.104	0.029**
House hold size	-0.193	0.162	0.232
House head main occupation	0.544	0.347	0.104*
Temporary cropping	-2.125	0.918	0.021**
Permanent cropping	0.346	0.260	0.452
Constant	-3.232	2.272	0.155

Number of observations = 49
LR chi^2 (5) = 13.7
Prob > chi^2 = 0.0171
Log likelihood = -14.921068
Pseudo R^2 = 0.3158
* ** significant at 10%, 5% respectively.

Table 4.13*: Percentages of Poor Farm Households in the three Farm Settlements*

Farm settlement	Multidimensional Poverty	Education Poverty	Consumption Poverty	Housing/ Living standard Poverty
	%	%	%	%
Ijaye	81.00	41.30	77.17	87.00
Ilora	83.00	51.00	69.00	91.00
Akufo	80.00	47.00	47.00	93.00

Table 4.14: *Multidimensional Poverty/ Dimensional Poverty Index with Different Dimension Cutoff Points*

Farm	Mpov(k=2/3)		Educ.pov(K=1/2)		Conspov(k=1)		Hsg/lsd(K=3/5)	
settlement	M_0	H	M_0	H	M_0	H	M_0	H
Ijaye	0.54	0.81	0.21	0.41	0.77	0.77	0.52	0.87
Ilora	0.55	0.83	0.26	0.51	0.69	0.69	0.55	0.91
Akufo	0.54	0.80	0.24	0.47	0.47	0.47	0.56	0.93

Table 4.15 :(MPI) *Adjusted Head count Ratio across Different Cutoff Points*

K	Ijaye			Ilora			Akufo		
	M_0	H	A	M_0	H	A	M_0	H	A
7	0.003	0.025	0.131	0.019	0.224	0.088	0.006	0.119	0.049
8	0.020	0.156	0.130	0.034	0.388	0.087	0.023	0.429	0.054
9	0.031	0.313	0.098	0.021	0.299	0.070	0.010	0.238	0.041
10	0.016	0.238	0.061	0.004	0.090	0.047	0.068	0.318	0.214

i. Monetary poverty in each of the Farm settlement

Table 4.16: *Consumption Poverty (Per adult consumption* equivalent)

	$1.00/day			$1.25/day		
Farm Settlement	Frequency	Percentage	M_0	Frequency	Percentage	M_0
Ijaye	117.00	64.64	0.65	140.00	77.00	0.77
Ilora	43.00	49.43	0.49	60.00	69.00	0.69
Akufo	21.00	47.00	0.47	27.00	55.10	0.47

Table 4.17: *Consumption Poverty (Per capita consumption)*

	$1.00/day			$1.25/day		
Farm Settlement	Frequency	Percentage	M_0	Frequency	Percentage	M_0
Ijaye	140.00	77.35	0.77	160.00	88.40	0.88
Ilora	62.00	71.26	0.71	73.00	83.91	0.84
Akufo	39.00	79.59	0.80	42.00	85.71	0.86

4.4.9 Distributions of Multidimensional poverty

Table 4.18 : *Multidimensional Poverty Distributions*

Distribution	Frequency	Percentage
100	123	47.31
010	35	13.46
001	11	4.23
000	91	35.00
Total	260	100.00

0= poor, 1=non-poor

N.B:

100 = Educationally not poor, but Consumption and Housing/living standard poor(ECH)

010 = Consumptionally not poor, but Education and Housing/living standard poor(CEH)

001 = Living standard not poor, but Education and Consumption poor(HEC)

000 = Educationally, Housing/living standard and Consumptionally Poor(EHC)

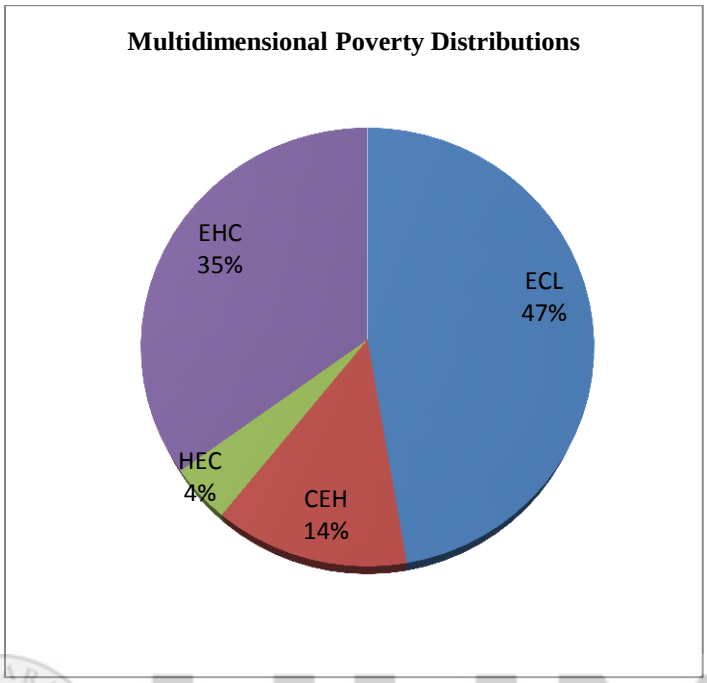


Figure 4.3: *Diagram Showing Distributions of Multidimensional Poverty Components*

In the table 4.19, below, for distributions (i.e. 010,001 and 000) where educational poverty applies, the total contributions to multidimensional poverty are 52.69%. Consumption poverty contributes 86.5% in distributions (i.e.100,001 and 000), while housing/living standard contributes about 96 % in distributions (i.e. 100, 101 and 000). As it could be seen both consumption and housing/living standard poverty have higher percentages of poverty contributions to the multidimensional poverty. This also reflects the proportion of respondents that are poor in each dimension as depicted in table 4.4. Farmers productivity is decreasing due to many factors, includes land degradation, hence low income (Phillip *et al*, 2009). This reason, affects tremendously the consumption of

basic goods and encourages poor living standards, hence a huge proportion of contributions of consumption and housing/living standard to multidimensional poverty.

4.4.9.1 Contributions of Dimensions to Multidimensional Poverty

The statistic below shows the contributions of each dimension of poverty to the multidimensional poverty.

***Table 4.19**: Dimensional Contributions to Multidimensional Poverty*

Poverty dimension	Frequency	Percentage
Education	137	52.7
Consumption	225	86.5
Housing/living standard	249	95.8

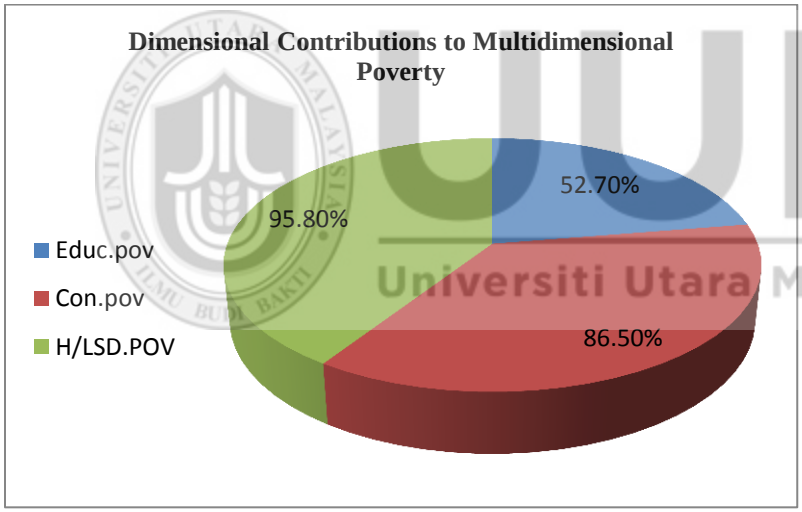


Figure 4.4: *Diagram Showing Dimensional Contributions to Multidimensional Poverty*

4.5 Preferences of the Respondents in Payment for Environmental Services Attributes

4.5.1 Preferences of the Dimensional Poor Respondents on PES Attributes

Table 4.20 below, revealed that in educational poverty dimension, 93 (65.49%) respondents preferred options 1 and 2 while 49 (34.51%) respondents did not opt for either. Those respondents that preferred attributes in option 1 are 46 (32.39%), while 47 (33.10%) decided for attributes in option 2. Consumption poverty statistics showed that 162 (68.35%) farm house heads took options 1 and 2, while 75 (31.65%) respondents are indifferent. Option 1 attributes takers are 77 (32.49%) and option 2 attributes seekers are 85 (35.86%). For housing/ standard of living poverty, 193 (68.20%) showed interest in option 1 and 2 while 90 (31.80%) choose status quo option. The breakdown indicated 98 (34.63%) respondents are for option 1 while 95 (33.57%) respondents are interested in option 2. The results indicated that in all the dimensions, respondents are interested in the PES attributes presented to them.

Table 4.20*: Respondents Choices of Options of PES Attributes*

Educational Poverty

Choice card	Options			
	0	1	2	Total(1&2)
	Freq.	Freq.	Freq.	Freq.
1	4	3	6	9.00
2	4	5	7	12.00
3	7	7	3	10.00
4	7	6	6	12.00
5	7	6	5	11.00
6	4	5	5	10.00
7	2	3	2	5.00
8	8	2	3	5.00
9	2	6	4	10.00
10	4	3	6	9.00
Total	49(34.51%)	46(32.39%)	47(33.10%)	(93)65.49%

Consumption poverty

Choice card	Options			
	0	1	2	Total(1&2)
	Freq.	Freq.	Freq.	Freq.
1	9	9	7	16.00
2	10	9	9	18.00
3	8	10	9	19.00
4	3	7	8	15.00
5	7	9	8	17.00
6	8	7	9	16.00
7	7	6	9	15.00
8	8	6	9	15.00
9	7	7	7	14.00
10	8	7	10	17.00
Total	75(31.65%)	77(32.49%)	85 (35.86%)	162(68.35%)

Housing/Standard of Living

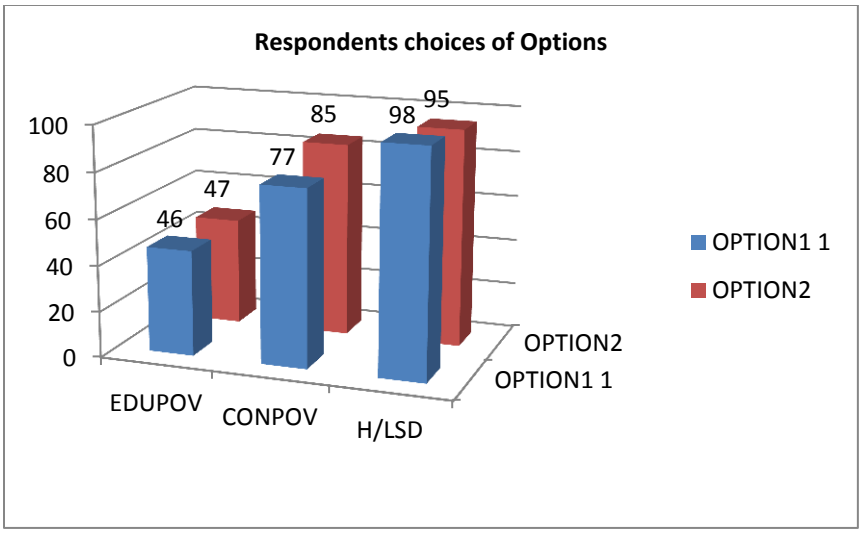
Choice card	Options			
	0	1	2	Total(1&2)
	Freq.	Freq.	Freq.	Freq.
1	10	10	9	19.00
2	10	10	11	21
3	8	11	9	20.00
4	10	10	11	21.00
5	10	11	11	22.00
6	9	10	8	18.00
7	8	7	8	15.00
8	7	10	10	20.00
9	10	10	10	20.00
10	8	9	9	18.00
Total	90(31.86%)	98(34.63%)	95(33.57%)	193(68.20%)

Table 4.21, below revealed that 22 respondents preferred attributes in option 1 and 20 respondents choose attributes in option 2 in the choice card 1. More respondents involved in attributes in option 2 than 1 in choice card 2. Generally, respondents preferred attributes in option 2 to option 1 for all the choice cards. Only choice card 6 shows equal preference for attributes in option 1 and 2. Choice cards 3,5 and 9 have more respondents

preferring attributes in option 1 than two, while choice cards 2,4,7 ,8 and 10 indicated more preference for attributes in option 2 than 1.

Table 4.21*: Preferences of Respondents for Choice Card and Attributes*

	Options 1				Option 2			
Card	Educ. poverty	Consump poverty	Livistd poverty	Total	Educ. Poverty	Consump poverty	Livistd poverty	Total
1	3	9	10	22	6	7	7	20
2	5	9	10	24	7	9	11	27
3	7	10	11	28	3	9	9	21
4	6	7	10	23	6	8	11	25
5	6	9	11	26	5	8	11	24
6	5	7	10	22	5	9	8	22
7	3	6	7	16	2	9	8	19
8	2	6	10	18	3	9	10	22
9	6	7	10	23	4	7	10	21
10	3	7	9	19	6	10	8	24
Total	46	77	98		47	85	95	



N.B: EDUPOV = Education Poverty, CONPOV= Consumption Poverty and H/LSD=Housing/Living standard

Figure 4.5: Diagram Showing Respondents' Choices of Option

4.5.2 Paired T-test for Preference of the Respondents

Table 4.22, below shows the result of paired T-test for the preferences of the multidimensional poor, educational poor, consumption poor and housing/ living standard poor respondents. Paired or dependent T-test (statistics) is used when observations in the sample are dependent on one another. In this study, the same respondents chose options 0,1 and 2 for all the ten choice cards which contains different attributes of PES. Each of the options were paired (option 0 versus option 1, option 1 versus option 2 and option 0 versus option 2 respectively). It is expected to have a relationship between the options chosen by each of the respondents. For each respondent, we are importantly interested in differences in the values of the two options and also testing whether the mean of these differences is zero. In all the paired options for each category of poor, the following were significant:

(i) consumption poverty option 0 versus consumption poverty option 1

(ii) housing/living standard poverty option 0 versus housing/living standard option 1

(iii) multidimensional poverty option 0 versus multidimensional poverty option 1 and

(iv) multidimensional poverty option 0 versus multidimensional poverty option 2.

(i) In the consumption poverty group that chooses option 0 (status quo) and option 2 for all the choice cards (4-13), N=237, p-value = 0.1278, there was a statistical difference between the two options for all the choice cards (4-13),since the corresponding two-tailed p-value is significant at 0.1278 (i.e. at 10%). In the consumption poverty option 0, M=7.5, S.D = 0.582 and consumption poverty option 2, M=8.5, S.D = 0.972, T= -1.677, P≤ 0.1078, CI. 95= 6.183-8.817 and 7.805-9.195.

(ii) For the housing/living standard poverty group, option 0 versus option 1 for all the choice cards, N=283. There was difference in the mean, since the corresponding two-tailed p-value = 0.0868 (i.e. 0.1). Housing/living standard option 0 versus living standard option 1 has, N = 283.

For the housing/ living standard poverty group, option 0, M=9.0, S.D= 0.365 and housing/living standard poverty group 1, M= 9.8, S.D= 0.4013, T= -1.9215 and CI= 8.174 - 9.826 and 8.988-10.612.

(iii) Multidimensional poverty options; N=260. Multidimensional poverty option 0 versus multidimensional option 1 is significant at the 0.01% level, since the p-value is 0.000, which shows there is difference in the mean. Multidimensional poverty option 0 has M=25.8, SD=8.390, while multidimensional poverty option 1 has M= 116.4, SD=21.823.

The pair (i.e. option 0 & 1) have, T= -17.7894, CI.95 = 19.798-31.802 and 100.788-132.012 respectively.

(iv) Also multidimensional poverty option 0 versus multidimensional poverty option 2, has P-value of 0.000, therefore there is statistically significant difference between the mean. Multidimensional poverty option 0 has M= 25.8,SD=8.3905 and multidimensional poverty option 2 has M=117.8, SD=28.878. The values for T= -7.970, $p \leq 0.05$ and CI.95 = 19.798-31.802, 97.141-138.458.

From the statistics above, we, therefore, reject the null hypothesis, that there is no difference in options for consumption poverty option 0 versus consumption option 2, living standard poverty option 0 versus option 1, multidimensional poverty option 0 versus multidimensional poverty option 1 and multidimensional option 0 versus multidimensional option 2. The study, therefore concludes that those respondents that choose options 1 and 2 for the 10 choice cards preferred those attributes for the options, hence they could participate in the PES program if it's implemented.

Table 4.22: *Paired T-Statistics Results for the Respondents Mean Preferences*

Education poverty respondents

1. Option 0 and 1

Variable	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Educ.option 0	10	4.9	.6904105	2.18327	3.338183	6.461817
Educ.option 1	10	4.6	.5416026	1.712698	3.37481	5.82519

t = 0.3734 degrees of freedom = 9 P-value = 0.7175

2. Option 1 and 2

Variable	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Educ.option 1	10	4.6	.5416026	1.712698	3.37481	5.82519
Educ.option 2	10	4.7	.5174725	1.636392	3.529396	5.870604

t = -0.1416 degrees of freedom = 9 P-value = 0.8905

3. Option 0 and 2

Variable	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Educ.option 0	10	4.9	.6904105	2.18327	3.338183	6.461817
Educ.option 2	10	4.7	.5174725	1.636392	3.529396	5.870604

t = 0.2308 degrees of freedom = 9 P-value = 0.8227

Consumption poverty respondents

4. Option 0 and 1

Variable	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Consump. Option 0	10	7.5	.5821416	1.840894	6.183104	8.816896
Consump. Option 1	10	7.7	.4484541	1.418136	6.685526	8.71444

t = -0.3375 degrees of freedom = 9 P-value= 0.7435

5. Option 1 and 2

Variable	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Consump.option 1	10	7.7	.4484541	1.418136	6.685526	8.714474
Consump. option 2	10	8.5	.3073181	.9718253	7.804798	9.195202

t = -1.3501 degrees of freedom = 9 P-value = 0.2100

6. Option 0 and 2

Variable	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Consump.option 0	10	7.5	.5821416	1.840894	6.183104	8.816896
Consump.option 2	10	8.5	.3073181	.9718253	7.804798	9.195202

t = -1.6771 degrees of freedom = 9 P-value= 0.1078 *

Housing/living standard poor respondents

7. Option 0 and 1

Variable	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Livgstd.option 0	10	9.0	.3651484	1.154701	8.173977	9.826023
Livgstd.option 1	10	9.8	.359011	1.135292	8.987861	10.61214

t = -1.9215 degrees of freedom = 9 P-value = 0.0868*

8. Option 1 and 2

Variable	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Livgstd.option 1	10	9.8	.359011	1.135292	8.987861	10.61214
Livgstd.option 2	10	9.5	.4013865	1.269296	8.592001	10.408

t=0.8182 degrees of freedom =9 p-value = 0.4344

9. Option 0 and 2

Variable	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Livgstd.option 0	10	9.0	.3651484	1.154701	8.173977	9.826023
Livgstd.option 2	10	9.5	.4013865	1.269296	8.592001	10.408

t = -1.3416 degrees of freedom = 9 P-value = 0.2126

Multidimensional poor respondents

10. Option 0 and 1

Variable	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Mpov. Option 0	10	25.8	2.6533	8.390471	19.79782	31.80218
Mpov. Option 1	10	116.4	6.901208	21.82353	100.7884	132.0116

t = -17.7894 degrees of freedom = 9 P-value = 0.0000**

11. Option 1 and 2

Variable	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Mpov. Option 1	10	116.4	6.901208	21.82353	100.7884	132.0116
Mpov. Option 2	10	117.8	9.132117	28.87829	97.14172	138.4583

t = -0.0877 degrees of freedom = 9 P-value = 0.9321

12. Option 0 and 2

Variable	Obs.	Mean	Std. Err.	Std. Dev.	[95% Conf.Interval]	
Mpov. Option 0	10	25.8	2.6533	8.390471	19.79782	31.80218
Mpov. Option 2	10	117.8	9.132117	28.87829	97.14172	138.4583

t = -7.9701 degrees of freedom = 9 p-value = 0.0000 **

*** ** * significant at 1%, 5% and 10% respectively

M= mean, T=T-value, SD= standard error, CI=confidence interval

4.5.3 Variables Employed for the Determinants of Preferences of the Respondents

The dependent variable is preference for PES attributes. Explanatory variables used in this study for the determination of factors that predict the respondents' preference for PES attributes, are educational attainment, age of respondents, previous knowledge of PES, land tenure, provision of micro credit, number of dependents, marital status and main occupation. Kobbail (2011) used age of respondents, educational level and main occupation as explanatory variables in a similar study in Sudan, Mohamed *et al.*, (2012), used educational level in the willingness to pay for watershed conservation at Hulu Langat, Selangor. Bagerian *et al* (2009), in study of factor influencing local people's participation in watershed management programs in Iran, used knowledge of watershed management as one of the explanatory variables. Knowledge of the cloud forest reserves

as explanatory variable was also used by Higuera, Martı´n-Lo´pez and Sa´nchez-Jabba (2012). Ojeda (2012) in economic valuation of environmental services sustained by water flows in the Yaqui river Delta, used income, number of children in the household, educational level and occupation as the explanatory variables. Cranford and Mourato (2014), used credit facilities as the explanatory variable in Credit-based Payments for Ecosystem Services study.

4.5.4 Determinants of Respondents' Preference for PES Attributes

From the tables 4.23, below five variables (i.e. Education attainment, previous knowledge of PES, landownership rights, number of the dependants and provision of micro credit were used to determine the preference of the respondents for PES attributes. Out of these variables, previous knowledge of PES and provision of microcredit are significant at 5% each, while land ownership rights are significant at 10% in the educational poverty group. In the consumption poverty group, previous knowledge of PES is significant at 5%, while land ownership rights are significant at 1%, respectively. Housing/living standard poverty group previous knowledge of PES and land ownership rights is significant at 5% each. All the significant variables were positively related to the respondents' choices (preference), except land ownership rights that is negatively related to the respondents' choices (preferences).

The results could be explained thus: previous knowledge of PES influences the choice of PES attributes by the respondents. Respondents claimed to have heard about PES through information media, such as radio and television and even through friends. Also, most of them have an understanding of PES from the preliminary video/projector show, when the

researcher/enumerators explained the concept of PES as it related to poverty and environmental resource conservation, prior to questionnaires distribution .This result is similar to findings of Bagerian *et a.l.,* (2009), where knowledge of water management programs (wmp) influences local people's participation in watershed management programs in Iran. Also, land ownership rights has a negative influence on the respondent choices, this is expected. Mainly, in many African countries and Nigeria in particular, communal land ownership is being practiced, for this reason access to land is a daunting task for individuals who may be interested in engaging in agricultural activities. According to Bassey (2003), land tenure is a crucial factor in resource conservation and management in the rural areas. He noted that the difficulty attached to land tenure system in rural areas in Nigeria, contribute greatly to agricultural land degradation, deforestation, reducing of soil carrying capacities as well as poaching and extinction of wild biotic natural resources. Provision of microcredit for farmers to involve in PES, shows a positive relationship with the choice of PES attributes, only among the educational poverty respondents. Provision of micro credit (especially reduction of the constraints attached to the credit facility presented to the respondents) could be the reason for the preference of the poor for the PES attributes. This finding is similar to empirical results of Cranford and Mourato (2014) in Credit-Based Payments for Ecosystem Services: Evidence from a Choice Experiment in Ecuador, where credit-based PES was found to be preferable by the people. Ataguba *et al*. (2013), recorded pseudo R^2, 0.04, 0.03, in their study. Hence, the pseudo R^2, below are also similar to the above.

***Table 4.23**: Factors that Determine Respondents' Preferences for PES attributes*

Educational Poverty Respondents' Preference

Variable	Coefficient	Std Err.	P-value
Education Attainment	0.135	0.175	0.439
Previous knowledge of PES	0.159	0.168	0.034**
Land Ownership rights	-0.071	0.048	0.101*
Provision of Micro Credits	0.079	0.102	0.044**
No of Dependant	-0.017	0.023	0.469
Constant	0.657	0.315	0.388

Pseudo R^2=0.0219,Logliklihood=-147.22497,LR $chi^2(5)$ = 5.99 Prob>chi^2=0.03073 No. of observation=142

* ** significant at 1%, 5% levels respectively.

Consumption Poverty Respondents' Preference

Variable	Coefficient	Std Err.	P-value
Education attainment	-0.008	0.163	0.962
Previous knowledge of PES	0.195	0.173	0.026**
Land Ownership rights	-0.074	0.053	0.014***
Provision of Micro Credits	0.003	0.008	0.694
No of Dependant	-0.018	0.024	0.445
Constant	0.968	0.513	0.060*

Pseudo R^2=0.0238 ,Log likelihood= -144.00559, LR$chi^2(5)$=5.53, Prob>$chi^2(5)$=0.0354,
No. of observation. =237 * ** *** significant at 1%, 5%, 10% levels respectively.

Housing/Standard of Living Respondents' Poverty Preference

Variable	Coefficient	Std Err.	P-value
Education Attainment	0.041	0.157	0.794
Previous knowledge of PES	0.184	0.164	0.024**
Land Ownership rights	-0.056	0.055	0.030**
Provision of Micro Credits	0.062	0.092	0.500
Constant	0.514	0.251	0.041**

Pseudo R^2 =0.0147, Log likelihood= -178.01828 Prob>chi^2=0.06492, LR$chi^2(4)$= 2.47
No.of observation=283, ** significant at 5%, level respectively.

4.5.5 The Willingness of the Respondents to Accept Bidding Offers

The study revealed that out of 260 multidimensional poor farm households 227 (87.3%) indicated willingness to accept 75% interest reduction to participate in the PES program (i.e. willing to fulfil up to at least 70-89 % contractual agreement), while only about 33(12.69%) are not ready to accept this contractual agreement, as shown in table 4.24. In all the bidding offers, only 192 (73.84%) of the respondents are willing to accept full payment of interest and principal upon fulfillment of less than 70% of the contractual

agreements, if they will participate in the PES program. 251 (96.54) respondents are interested in bidding offer 2 (90% and above contractual agreement) in order to participate in the PES program. Based on the frequencies of the responses for the three bidding offers, it indicated that the respondents are ready to participate in agricultural land conservation.

Table 4.24*: Respondents Responses toward Bidding Offers (WTA)*

Bids	YES		No		Total	
	Frequency	%	Frequency	%	Frequency	%
70-89% contractual agreement	227	87.31	33	12.69	260	100
90% and above contractual agreement	251	96.54	9	3.46	260	100
Less than 70% contractual agreement	192	73.84	68	26.16	260	100

4.5.6 Determinants of Respondent WTA

With regards to the logit regression analysis in table 4.25 the dependent variable is the probability of 'Yes' response for WTA, while explanatory variables are the offer bids, education, and main occupation of respondents. Bid1=75% reduction in the interest rate if at least between 70 to 89% of the contractual agreement is met, bid 2= both interest and principal will be waived, if at least between 90 to 100% of the contractual agreement were fulfilled and bid 3= paying of both interest and principal if only less than 70% of the contractual agreement is satisfied. The revealed results indicated that three explanatory variables (i.e. bidding offer 1, bidding offer 2 and main occupation of respondents) are significant at 5% and 10% respectively. Positive relationship exists between bids 1 and 3, main occupation of respondents, and dependent variable. Hence, 75%, contractual agreement; < 70%, contractual agreement and main occupation of the respondents are the factors that determine respondents' willingness to accep (WTA)t to participate in the PES program.

From the result, it could be inferred that the majority of the respondents embraced bidding offer 1 and 2. However, bidding offers 1 and 3 was significant at 1 and 10% significant level. Hence the willingness to accept the offer bids to participate in the PES

program is within the contractual agreement of bidding offers 1 and 3, as the attached contractual agreements to bidding offers 2 may be too demanding for them to fulfilled. Since bidding offer 2 may request more commitment, which will therefore lead to declines in the respondents' utility as more of their time, energy and finances will be demanded continuously. This fact is being corroborated by the prospect theory; since respondents are risk-averter in gain or benefit situation and otherwise in a loss situation. The risks with regards to contractual agreements in bidding offer 2 may be responsible for its non-significance. Also, as noted by Kornhauser (2007), that the willingness of the individual to take a risk is influenced by the way and manner conditions are framed. This observation could also be a contributing factor for the outcome of the logit regression. The main occupation of the respondents also influenced WTA. Main occupation as an influencing factor in the respondents' willingness to accept PES bidding offers to participate in the PES program could be explained through the rational theory. This could mean that the farmers whose farming is their primary occupation choose to accept the bidding offer since weighing the attributes of PES with the bidding offers will be of utmost benefits. The above results shows that the poor are rational as regards to land conservation, (since it's their productive asset). Therefore incentivized programs that will aid conservation of land could be beneficial to them; hence they decided to accept a less risky bidding offers.

***Table 4.25**:Binary logit estimation result*

Variable	Coefficient	Std Err.	P-value
75%contractual agreement (bid 1)	0.435	0.446	0.030**
95%contractual agreement (bid2)	-0.236	0.548	0.667
Less than 70% contractual agreement (bid3)	0.582	0.329	0.077*
Education level	-0.081	0.209	0.700
Main occupation	0.810	0.526	0.104*
Constant	-1.924	0.859	0.025**

* ** significant at 10% and 5% levels respectively

Number of observation=260

LR $Chi^2(5)$= 8.28

Prob>Chi^2=0.0141

Log likelihood= -163.33284

Pseudo R^2=0.2471

4.5.7 Perspectives of Respondents on Poverty Reduction and Agricultural Land Conservation of PES

Respondent's opinion was categorized into five major classes:

A. Perspective on PES effect on poverty and conservation

   i. POC= Do you think provisions of credit in the PES program could help to reduce poverty?

   ii. PPC= Is PES a promising mechanism for both poverty reduction and conservation of environmental resource?

   iii. PRU= Do you think participation in conservation of land through PES mechanism could reduce unemployment?

B. Incentive provision

   i. ISP= if you will participate in conservation of farm settlement through PES mechanism do you consider input subsidy (seedlings for planting) as a necessary reason for your participation?

C. Conditionalities

i. 75% interest reduction, (will you accept 75% credit reduction, if you fufill between 70% - 89%, contractual agreement)?

ii. Will you accept total debt and interest rate forgiveness if you fulfill at least 90%-100% of the contractual agreement?

iii. < 70%, paying of both principal and interest (paying of both interest and principal if only less than 70% of the contractual agreement is satisfied).

D. Social capital

MOC = Being a member of an organization (e.g. Community development association, conservation association) will enhance my participation.

E. Agreement

TBP= Do you think trust between the parties involved is a necessary factor for the PES program to succeed?

PES associated transaction costs could be an obstacle to my participation in the scheme (PTC).

Do you consider ownership rights of the land as a reason to participate in land conservation (LOR).

4.5.8 Dimensionally Poor Respondents Perceptions about PES

Respondents were asked some range of questions; this enables us to determine their opinions as regards their judgement of the potentials of Credit-based PES in rural poverty reduction and conservation of agricultural land. As shown in table 4.26 below, there exist differences in the interest of educational /consumption poor and educational/living standard poor in respect of the provision of credit (POC). Majority of the respondents in

this group strongly agreed to participate in PES program, if credit is provided. Also, many of the rural households (consumption/living standard poor, educational poor and living standard) agreed that PES could be a good mechanism for the reduction of both rural poverty and environmental resource conservation (PPC). Respondents in the group of educational/consumption poverty and educational/living standard are of opinion that PES mechanism could be used to reduce unemployment (PRU).

However a good number of these respondents are indifferent about it. Question on input subsidy (ISP) as a reason for participation in PES, was only significant among the educational/consumption poor rural household farmers. Quite a large proportion of them favoured provision of input subsidy (such as seedling for planting) as a necessary condition for participation in PES program. The overwhelming majority of the respondents supported the need for the trust (TBP) among environmental services providers and buyers, nevertheless those poor in consumption and living standard have significant opinion. Being a member of an organization/association is viewed by respondents in the group of educational/consumption and educational/living standard poverty as an important factor enhancing participation in PES program. Poor in education, consumption and living standard demand for 75% interest reduction condition (if at least 70%-89% of the contractual agreement are fulfilled by the respondents). Debt forgiveness of both principal and interest (if 90-100%, contractual agreement is met) were supported by those respondents that are poor in education, consumption and living standard respectively. Surprisingly, the same set of respondents supported paying back both principal and interest if they could not fulfill up to 70% of the contractual

agreement, also they are of the view that PES transaction cost (PTC) will be an obstacle to their participation in PES program.

Land ownership as the pre-requisite for participation in PES were not supported by the majority of the respondents. Most of the respondents were neither, agree nor disagree. The reason could be that land ownership may not be seen as a problem in this part of the world. Since, PES could offer the rural farmers additional source of income. Also, most of them have little or no access to credit facilities (Ibrahim & Aliero, 2011) this could prompt them to accept a credit-based PES, hence ownership rights may not pose a barrier to their participation in PES. In all the groups discussed above, there is an association between the categories of the poor respondents as indicated by the Cramer's V statistic, which tests the null hypothesis of no association between the row and column variables (Agresti, 1984). Cramer's V statistic shows how strong the association between the variables is. This is done after the Chi-square value might have indicated whether the relationship between variables is significant or not. The decision criterion is that; if the value of Cramer's V is 1 or very close to 1. It means the association between the variables is strong. If it's 0 or close to 0, it indicates no or weak association between the variables in question.

The results followed findings by Chaminuka *et al.,* (2012), they used Cramer's V statistic on the domestic and international tourist groups with regards to question pertaining to rural development and conservation. The results showed that there were

significant differences between the domestic and international tourist interest on the contributions of tourist to the rural development.

Table 4.26: *Perspectives of Respondents on PES*

	Strongly agree	Agree	Neither agree/disagree	Disagree	Strongly disagree	Chi^2 df(2)	Cramer's V
If credit is being provided (POC), will you participate in PES?							
Educationally poor	54	55	25	6	2	13.7***	0.4***
Consumption poor	93	88	44	9	3		
Consumption poor	93	88	44	9	3	18.2	0.2
Living standard poor	115	104	49	12	3		
Educationally poor	54	55	25	6	2	18.4**	0.3**
Living standard poor	115	104	49	12	3		
Is PES a promising mechanism for both poverty reduction and conservation of environment(PPC)							
Educationally poor	68	37	32	4	1	13.2	0.2
Consumption poor	109	56	63	7	2		
Consumption poor	109	56	63	7	2	8.9**	0.1**
Living standard poor	133	74	65	6	5		
Educationally poor	68	37	32	4	1	10.8**	0.1**
Living standard poor	133	74	65	6	5		
Do you think participation in conservation of land through PES mechanism could reduce unemployment (PRU)							
Educationally poor	57	46	28	7	4	18.4**	0.2**
Consumption poor	96	71	56	11	3		
Consumption poor	96	71	56	11	3	19.0	0.2
Living standard poor	117	83	65	13	5		
Educationally poor	57	46	28	7	4	12.7**	0.2**
Living standard poor	117	83	65	13	5		
If you will participate in conservation of farm settlement through PES mechanism do you consider input subsidy(i.e. seedlings for planting) as a necessary reason for your participation(ISP)							
Educationally poor	55	48	28	10	1	17.9**	0.2*
Consumption poor	92	78	53	11	3		
Consumption poor	92	78	53	11	3	18.5	0.2
Living standard poor	111	91	63	15	3		
Educationally poor	55	48	28	10	1	13.2	0.2
Living standard poor	111	91	63	15	3		
Do you think trust between the parties involved is a necessary factor for PES program to succeed (TBP)							
Educationally poor	88	40	12	1	1	7.4	0.2
Consumption poor	154	67	14	1	1		
Consumption poor	154	67	14	1	1	122.7**	0.7**
Living standard poor	183	76	21	2	1		
Educationally poor	88	40	12	1	1	5.1	0.1
Living standard poor	183	76	21	2	1		
Being a member of an organization (e.g. community development association, conservation association) will enhance my participation(MOC)							
Educationally poor	25	34	51	27	5	22.6**	0.2**
Consumption poor	44	49	97	40	7		
Consumption poor	44	49	97	40	7	39.2**	0.2**
Living standard poor	50	59	118	47	9		

Educationally poor	25	34	51	27	3	8.5	0.1
Living standard poor	50	59	118	47	9		

Table 4.26: (Continue)

	Strongly agree	Agree	Neither agree/disagree	Disagree	Strongly disagree	Chi^2 df(2)	Cramer's V
75% interest reduction= will you accept 75% credit reduction?							
Educationally poor	19	45	50	25	3	19.3	0.2
Consumption poor	27	82	87	36	5		
Consumption poor	27	82	87	36	5	28.3**	0.2**
Living standard poor	37	91	107	43	5		
Educationally poor	19	45	50	25	3	14.4**	0.2**
Living standard poor	37	91	107	43	5		
Total debt relief(if 90-100% contractual agreement is met)							
Educationally poor	58	47	29	4	4	13.7	0.2
Consumption poor	99	86	43	6	3		
Consumption poor	99	86	43	6	3	13.0*	0.1*
Living standard poor	121	101	49	9	3		
Educationally poor	58	47	29	4	4	14.9	0.2
Living standard poor	121	101	49	9	3		
Paying both principal and interest(<70%) contractual aggrement met)							
Educationally poor	24	28	51	17	22	28.4**	0.3**
Consumption poor	36	42	88	39	32		
Consumption poor	36	42	88	39	32	53.9*	0.2*
Living standard poor	52	48	108	43	32		
Educationally poor	24	28	51	17	22	24.7*	0.2*
Living standard poor	52	48	108	43	32		
PES associated transaction costs could be an obstacle for my participation in the scheme(PTC)							
Educationally poor	21	37	49	31	4	13.9	0.2
Consumption poor	36	64	87	45	5		
Consumption poor	36	64	87	45	5	68.7**	0.3**
Living standard poor	50	84	90	53	6		
Educationally poor	21	37	49	31	4	10.9	0.2
Living standard poor	50	84	90	53	6		
Do you consider ownershiprights of the land as a reason to participate in land conservation(LOR)							
Educationally poor	48	5	43	45	1	14.0	0.2
Consumption poor	81	74	12	69	1		
Consumption poor	81	74	12	69	1	34.7**	0.2**
Living standard poor	13	80	88	100	2		
Educationally poor	48	5	43	45	1	12.7	0.2
Living standard poor	13	80	88	100	2		

Significant at *** 1%, **5%,*10% levels respectively.

4.6 Hypothesis Testing

In this study, two hypotheses were tested:

1. $H_{0:}$ There is no significant relationship between land ownership rights of the respondents and their preferences for PES attributes of poverty reduction and agricultural land conservation.
2. $H_{0:}$ There is no significance difference in the perspectives of the poor groups with regards to ability of PES to reduce rural poverty and aid agricultural conservation.

The thrust of this study centers on the first hypothesis. The statistics in tables 4.23, showed that, there is negative relationships between land ownership rights and respondents' preferences (holding other variables constant) in all categories of poverty group.

Consequently, the null hypothesis is rejected in favour of the alternative hypothesis. It explains the independency of respondents preferences or choices of PES attributes of poverty reduction and agricultural land conservation on land ownership rights,since the relationships were negative. The above implies that despite previous research claims on the necessity for land ownership rights as a function for the participation in PES program as it was obtainable in countries like Costa Rica,Nicaragua,Mexico. This study submits that land ownership rights may not be a necessary ingredient for the rural farmers to participate in PES program. This assertion was also argued in Namirembe *et al.,* (2014), that land ownership is not always a condition for participation in co-investment program especially in government controlled land. This finding could mean

that though farmers in the farm settlements are not engaging in any serious land conservation, yet they are interested in participation in PES program, simply because they feel secure (since is a government controlled land). In absolute term land ownership rights may not be the obstacle in participation in the PES program (i.e. in the conservation of the agricultural land) but the security of the tenancy period is important if farmers will participate in the agricultural land conservation.

Hypothesis 2: From the table in 4.26, it could be confirmed that from the Cramers' V statistics perspectives of the consumption / living standard poor and educationally/ living standard poor agreed that PES could be a good mechanism for rural poverty reduction and agricultural land conservation, since their perspective/opinion are statistically significant and strong. This negates the opinions of some previous authors, that PES may not have the ability to mitigate against poverty. Therefore the null hypothesis which states that, there is no significance difference in the perspectives of the poor with regards to ability of PES to reduce rural poverty and agricultural conservation, is rejected since there is no enough evidence to accept it.

4.7 Summary

The study shows that high, moderate and low deprivations cut across the indicators of the chosen dimensions. Majority of the respondents are poor multidimensionally (82.20%), housing/living standard, recorded the highest poverty rate (about 89%), few (about 45%) percentage of respondents are entrapped in education poverty followed by consumption poverty (74.76%). Household size, marital status and permanent cropping predict multidimensional poverty in the study areas.

Preference statistics of the respondents indicated that the consumption poverty group preferred option 2 than the two other poverty groups. Land ownership rights, previous knowledge of the PES and the provision of micro credit are the factors that determine the preference of the respondents. Perspective analysis shows a widely acceptance of PES as a 'salvaging' incentive mechanism for rural poverty reduction and environmental resource degradation (PPC). Respondents opined that participation in the PES program can be influenced by the provision of micro credit (POC). The willingness To Accept (WTA) to participate in the PES program is predicted by bidding offers 1,3 and main occupation of the respondents.

Hypotheses tested signifies that absolute land ownership rights is not necessarily determines participation of the poor in the conservation of agricultural land. It also revealed that PES was seen by the respondents as a good incentive to reduce rural poverty and agricultural land degradation in the study.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 Introduction

This chapter presents the summary of the argument of the study, methodology, main findings, conclusion, implications, recommendations and limitations of the study and future studies. The motivation for this study was prompted by the fact that poverty and environmental resource degradation are intertwined (Andrew and Masozera, 2010). Hence it should be solved simultaneously (Obayelu, 2013).

5.1 The argument of the Study

Having recognized that poverty and environmental degradation need to be addressed simultaneously. The study, therefore, put up the following arguments;

(i) That the 'real poor' are supposed to be identified if any anti-poverty incentive will achieve its objectives. This argument was bore out of the past observations of most of the anti-poverty programs in which the non-poor enjoyed the benefits of the program. The reason for the non-effective of these programs on the poor was that the poor are either not identified or poorly identified. Therefore, for the poor to benefit from the PES program, they must be identified, with the use of a multidimensional poverty assessment method.

(ii) That aside the identification of the poor, there is a need to identify the categories of the poor. The study contended that since different groups of the poor are peculiar, the

anti-poverty measure for each of the categories should also follow same. This was observed that rural poverty reduction seems to be a daunting task, because general anti-poverty measures were used for different classes of the poor.

(iii) That the need of property rights (land ownership rights) to be given to the poor, in order to participate in environmental resource conservation, as opined by previous authors, may not be necessary. This study observed that, while in most of the places, where property rights posed as a problem to participation of poor in environmental conservation. The poor (the rural farmers) have access to credit facilities and even formal social security. These are conspicuously lacking in the rural settings in Nigeria. Hence, with the micro credit provison in the PES attributes, the farmers may still be interested in participation in the environmental resource conservation, with little or no provison of property rights.

(iv) That with the introduction of PES both rural poverty and environmental degradation could be reduced. This assertion was based on the successes of PES in terms of poverty reduction and environmental conservation. If PES is purposely design to carter for rural poverty reduction as well as environmental resources conservation, it is not impossible for PES to accomplish this twin objective.

The fundamental question is that; can credit-based PES be used as an incentive mechanism to achieve both rural poverty reduction and agricultural land conservation with regards to property rights? The argument advanced is that, it is not impossible for the poor to participate in conservation of agricultural land, despite land ownership rights

constraint. In the light of the above, the study specifically addressed the following questions:

(i) Who are the poor in the study area: this aim to identify the poor in the multidimensional sense.(ii) What are the categories of the poor: this intends to identify the classes of the poor in the study area, (iii) What are the preferences/perspectives of the farmers with respect to the choice of hypothetical credit-based PES attributes: this question intend to capture various opinions of the respondents with regards to PES attributes of rural poverty reduction and agricultural land conservation,and (iv) Are property rights a necessary factor in the agricultural land conservation in the study area: the reason is to investigate if property rights will be a barrier for the farmers' participation in agricultural land conservation.

Based on the above, the main objective of this study is to investigate if credit-based PES can be used to reduce rural poverty and agricultural land degradation, with regards to property rights. This leads to the following objectives:

(i) To identify the poor in the study area.

(ii) To establish the categories of the poor in the study area.

(iii) To determine the preferences / perspectives of farmers with respect to the choice of hypothetical credit-based PES attributes.

(iv) To determine if property rights is a necessary factor in the conservation of agricultural land in the study area.

5.2 The Methodology of the Study

To investigate the questions raised as well as to achieve the objectives of the study. Methods of Alkire and Foster (2010) and Alkire and Santos (2011) were used for the assessing multidimensional indices (MPI), head count (H_0) and poverty gap (A) of the respondents in Akufo, Afijio and Ijaye farm settlements respectively. This method was preferred to other poverty measurement approach, because of its decomposability (which is useful for targeting) attribute into different categories of the poor. It also allows the usage of both generalized and equal weights in dimensional aggregation. The study used farm household as the unit of analysis. This is because some of the indicators used, e.g. toilet, source of drinking water are jointly owned mostly by the community/farm household. It is therefore difficult to obtain data of such indicators if an individual is used as the unit of analysis. The choice of dimensions for categorization of the poor, was based on the judgments of the respondents on the nature of poverty, they are experiencing (Hallerod, 1994), as well as choice of dimensional guidelines proposed by Alkire and Foster (2010). Consequently, four categories of poverty were identified; (i) multidimensional (i) education (ii) consumption (iii) housing/living standard. The following indicators with equal weights were selected based on Alkire and Foster (2010) proposed indicators for dimensional poverty (1) education dimension: (i) farm household with at least six years education and (ii)if school-age child is attending school (2) consumption dimension: (i) per adult equivalent and (3) housing/living standard dimension:(i) owing house (ii) source of drinking water (iii) type of sanitation (iv) type of

fuel for cooking (v) type of flooring materials (vi) type of wall materials (vii) roofing materials type (viii) Owing motorbike (ix) owing television and (x) owing radio.

Deprivation cut off point for education dimension is; if a household does not have at least six years education or if a school age child is not attending school. For the consumption dimension; any household where the adult consumption is below $1.25 per day (195/day) is said to be deprived in consumption and for the living standard dimension; any household is adjudged to be deprived if it does not have/live in a decent house, have improved sources of drinking water, have decent toilet, using charcoal/grass and wood for cooking, have no decent flooring material (e.g. un-cemented floor), un-cemented wall and unimproved roofing materials, owing no bike, no television and radio. To ascertain dimensional poor household, the criteria for educational poverty (k=1/2) is if the household is deprived in at least one out of the two indicators for education and otherwise. For consumption (k=1), a household is poor in consumption dimension, if its consumption per adult equivalent is less than $1.25 per day (N195). Also for housing/standard of living dimension (=6/10), a household is said to be poor in this dimension if out of 10 indicators is not deprived in 6 of them (i.e. only deprived in 4/10 indicators). A household is pronounced poor multidimensionally, if it's poor, in at least 2 out of the three dimensions.

In designing of choice experiment, a credit-based PES was employed (access to micro credit was based on participation in PES program). The following attributes with different levels were used (i) amount of loan (ii) payback period (iii) interest rate (iv) task to perform (v) land provision (vi) labour provision and (vii) guarantor provision. A multi-

stage sampling technique was employed for obtaining the sample of the respondents. Probit model was used for the estimation of the factors that determine multidimensional, dimensional poverty and preferences for the PES attributes. Also the study used logit model to ascertain the willingness of the respondents to accept to participate in the Credit-based PES program with regards to the three bidding offers. Cramer's V statistical approach was used to ascertain how strong the relationship of the significance level of the respondents' perspectives on Credit-based PES program.The paired T-statistic method was used to ascertain the difference between the mean for the preferences of the respondents.

5.3 The Main Findings of the Study

The findings of the Study with regards to the objectives (i) of the study, indicates that 260 (82.2%) respondents were identified as being poor in the study areas (i.e. Afijio, Akufo and Ijaye) farm settlements. Monetarily, 86.44% of the respondents are living under $ 1.25 poverty line per day per capita (i.e. those respondents that consumed below $ 1.25 per day per capita). The result shows that 85% of the respondents suffered one form of deprivations or the other in the three study areas. The above statistic presented the respondents who were deprived in at least 2 out of 3 dimensions (i.e. education, and those who are unable to meet up the acceptable threshold level of consumption per day. Overall, the findings confirm that poverty is residing in the rural areas as submitted by various literatures. With these statistical revelations, objective (i) of the study is achieved. The study is able to achieve its objective (ii) by establishing categories of the poor respondents in different poverty dimensions.Three dimensions were identified (i)

education (ii) consumption and (iii) housing/living standard dimensions. The result reveals that about 45% of the respondents are poor educationally; about 75% are in the consumption poor category, while 89% of the respondents fall in the housing/living standard poverty group. Dimensional contributions to the overall poverty were examined; housing/living poverty standard contributed about 96%, followed by consumption poverty, with a contribution of about 67%, while education poverty contributed about 53% in the three farm settlements. Respondents who fall below the deprived cutoff point in education, consumption and housing/living standard indicators are presented above into different dimensions. Hence, categorization of the poor into dimensions is achieved as the objective (ii) of the study. Investigation on the preferences of the respondents, (as objective, iii) for the PES attributes, shows that options 1 and 2 are most preferred by the respondents, irrespective of their poverty dimensions category. Implying, that the respondents are interested in participation in the conservation of agricultural land, else the status quo option would have been chosen. Probit estimations showed that relationship between respondents' preferences for the PES attributes of poverty reduction and agricultural conservation (i.e.dependent variable) and previous knowledge of PES and land ownership rights (i.e. independent variables) are statistically significant. Based on the above givens, objectives iii, of the study is addressed. The study, goes further to investigate objective iv, by estimating probit equation. The estimates depict that a significant negative relationship exists between the dependent variable (i.e. respondents' preferences) and property rights (land ownership rights) in all the categories of the poor. Provision of micro credit has a positive relationship with the preferences of the

educational poor respondents. The negative outcome of property rights (ownership rights), implies that the poor will participate in agricultural land conservation in the absence of property rights (ownership rights). In the light of the above, question about the necessity of property rights (land ownership rights) as a pre-condition for participation in environmental resource conservation is answered. To this end, the study further explored the perspectives of the respondents about PES potentialities. Perspectives of the respondents about PES was stated as part of the components of objective (iii) of the study. A substantial proportion of respondents strongly agreed to participate in the PES program, if micro credit is provided (POC). Also majority of the respondents agreed that PES, could be a promising incentive mechanism to reduce rural poverty and environmental resource degradation (PPC). Statistic from the study indicated that most of the respondents' perspectives on the Trust Between the Parties (TBP) i.e (environmental service providers and consumers) are crucial for the success of PES. The above results, revealed that the respondents are able to assess PES as a veritable incentive for poverty reduction and environmental resource conservation. An attempt was made to seek the willingness of the respondents to accept to participate in the PES program. The bidding offer statistics showed that about 87% are interested in bidding offer 1, while 97% and about 74% settled for bidding offer 2 and 3 respectively. However, the logit estimates indicated that; bidding offers 1 and 3 are significantly related to the willingness To Accept (WTA) to participate in the PES program. Factors that predict WTA responses of the respondents to participate in the PES program with respect to bidding offers are bidding offer 1(i.e75% contractual agreement) and bidding offer 3 (i.e.< 70%contractual).

Other non-bidding offer variable that influenced the respondents' WTA response, is the main occupation of the respondents. Farming as the main occupation prompts their readiness to participate in PES, shows that the farmers (whose farming is their primary occupation) considered the long run utilities that could be derived from participating in the conservation of agricultural land. It further indicates that the farmers are rational and conscience of the necessity to conserve their productive asset (i.e. agricultural land).

5.4 Conclusion of the Study

Previous studies on rural poverty measurement in Nigeria seldom focus on the multidimensional angle of poverty. Even those that assessed poverty in a multidimensional manner often focus on the urban poverty, notwithstanding dimensional categorization of the poor are evidently lacking in most of the poverty studies in Nigeria. This study made a concerted effort to establish four categories (i.e. Multidimensional, education, consumption and housing/living standard poverty) of the poor, based on the non-monetary/monetary indicators.

The statistical evidence on preferences and perspectives of the respondents on PES attributes, on rural poverty reduction and agricultural land conservation gives good reason for optimism. Empirically, the study was able to identify types of bidding offers that will prompt respondents to be interested in participation in PES program. The findings also has shown that those who engaged in farming as their primary (main) occupation may likely participate in the PES program if implemented. With this evidence, it means that the poor farmers are 'rational' as they understood there is a need

to preserve and conserved their land which is the productive asset for their occupation. This submission was supported by Lipton (1997a) and World Bank (1991, 1992); Boyowa (2004), that the poor do not unnecessarily irrational intend to destroy resources that are pertinent to their survival, except when strong reasons forced them to do so.

The result of the analyses in this study; indicates that, it partly agrees with advocates of the land ownership rights provision, in order for the poor to participate in conservation of environmental resources. The study revealed that without full land ownership rights, rural farmers can still participate in conservation of environmental resources, if necessary incentive were provided. Bassely (1995) stated that three linkages of land ownership rights exist with regards to investments in environmental resources (i) freedom from expropriation (ii) A well-defined land ownership that allows selling or transfer of land by the land user (iii) A well-insulated ownership rights to allow the land users to use it as collateral. This study agreed with the proposal (i) only and not a total or absolute ownership rights as suggested by previous literature.

In this study, poor farmers, mostly do not have ownership rights to the land. Nevertheless, the farmers still feel secure from the unnecessary expulsion from the land; and they are willing to conserve the land. The reason was that the farmland belongs to the government; this insulated the farmers from being sent away from it un-catered for. This finding supports the assertion of Namirembe *et al.,* (2014); they argued that Land ownership was not always a prerequisite for participation in co-investment projects. They noted that there is easy access to public or government controlled land. This study, therefore, concludes that what is 'needful' is the security of tenancy of the land for a

considerable time frame, for the land occupying farmers and not absolute ownership rights as affirmed by previous authors. A secured land tenancy could be implemented through a well structured legal and institutional arrangements.

As argued by Hope et al., (2005), Scherr et al., (2007b), Peskett et al., (2008) and Milder et al,. (2010) that if PES could reach the right respondents, the poor will be better off. These authors' submissions were revealed in the perspective of the poor farmers about the ability of the PES program to reduce rural poverty if implemented. Also by the virtue of willingness of respondents to accept bidding offers 1 and 3 to participate in the conservation of agricultural land, it implies that by extension, poverty reduction could be achieved when there is improvement of the soil nutrient status. Since returns to unit of labour will be improved, hence higher productivity and substantial income is abound. This was supported by Zilberman et al., (2008). They claimed that, poor may likely benefits from the returns to ecosystem services and agriculture. Aside the above, rural poverty will be reduced from the relative stable flow of additional income from PES program. According to Milder et al., (2010), additional income earned by these poor households prompts evolution of more profitable and robust land-use pattern, cause a better land tenure system and even consolidating social capital and help local institutions to be more vibrant.

5.5 Implications of the Findings

Research questions as the instrument of data collection, was the basis for the results discussed in this study. Aside for the national policy implications, findings from this

research work have several and important implications practically, theoretically and managerially. Hence, this section is divided into four segments: (i) practical implications (ii) theoretical implications (iii) managerial implications and (iv) suggestions for future study.

5.5.1 Implication for National Policy

The extent of land property rights that the farmers enjoy has a far-reaching influence on their willingness to embrace innovation/incentive ideas, aim to enhance ecosystem preservation. Also the nature of the landholding rights of the farmers determines substantially their productivity and poverty status (all else being equal). Hence the formulation of national policy in this direction remains an obvious task.

To ensure this, the present Land Use Act of 1978, should be reviewed as to accommodate land ownership rights with regards to land acquisition by the 'commoners' (especially the rural farmers) in the society. This could be possible, if a well defined legal and institutional framework is formulated. Both customary and state (statutory) institution apparatus should be components of the legal framework. The institutional framework should be positioned to give adequate attention to landholding rights with regards to an enduring-enhancing environmental/ecosystem resource protection agenda. Hence, a well spell out blueprint to ensure legality of land ownership rights with regard to freedom from eviction from the land (for a considerable time frame of usage) should be formulated. Most importantly, environmental/ecosystem resource preservation /conservation should be given the deserved priority.

The obvious practice relating to land tenancy in Nigeria, is that tenancy agreements, left the tenants unprotected against expropriation and exploitation. Therefore the national policy on land should focus on the following;

i. Land property rights (land ownership rights) should be reformed.

Consequently, legislation on the following tenancy issues is inevitable;

ii. Tenancy security to be conferred on the land cultivator (at least if he/she occupying the land for a reasonable period of years).

iii. Oral tenancies, should be legislated against, hence tenancy agreements should be documented.

iv. In the event of the need to surrender the 'given tenancy'. Such should be with the mutual consents of the parties concern.

v. A fair rental fee should be placed on the tenants by the landowners.

5.5.2 Practical Implications

The practical implication of this study is presented in two folds:

i. Possibility of PES reducing rural poverty and encourages conservation of environmental resources.

Statistics revealed in this study cast no doubt on the potential of Credit-based PES in rural poverty reduction and agricultural land conservation. This was evidently echoed by the preferences and willingness of respondents to participate in the PES program if eventually implemented in the Nigerian rural setting. Perspectives of respondents as

regards to the ability of PES to play the role of "trouble shooter" in rural poverty and agricultural land degradation are obviously favourable. These facts were also documented in relevant environmental/ecological studies (Zilberman *et al.*, 2008; Milder *et al.*, 2010). Many respondents are of the opinion to expand their production frontier if they have the opportunity to participate in PES program. This decision, will transform to higher productivity and higher income. Additionally, a considerable percentage of rural poor intend to partly use the micro credit for other sources of income and the rest for expansion of acreage of land for production. Household income could be augmented from expansion and diversification if the hypothetical PES become reality. Having gained higher opportunity cost from PES program, the farmers are of the opinion to opt for involving in conservation of their agricultural land even with 'minimum' tenancy security on the land. It is therefore sufficed to say that, practically both poverty reduction and environmental resources vis-à-vis agricultural land conservation could be achieved.

ii. The study has sharpened the understanding of the rural dwellers and raised their awareness with regards to the maintenance and sustaining of the environmentally endowed natural resources. This provides the pathways of escaping seemingly unavoidable poverty.

5.5.3 Theoretical Implications

This study was able to discover the role of property rights (land ownership rights) in conservation of environmental resources. Though past studies signified that full property rights is a 'necessary tool' for the participation in environmental resource conservation. In this study, though the farmers have no property rights (land ownership rights), yet they

are willing to participate in the PES program. Whereas previous studies advocated for the provision of a well secured land ownership rights. This study submitted that tenancy security could be enough for the rural farmers to participate in PES program. This is a vital contribution to the existing literature.

5.5.4 Managerial Implications

Managerially, this study is of great significance in Nigeria, in the formulation of vibrant and all-enduring economic and environmental friendly policies. Empirical studies that explained the roles of PES in poverty reduction and environmental resource conservation, is yet to be known in Nigeria, at least to the best of the researcher's knowledge. The study prevent un-necessary spending as the preferences of the poor are sought before the implementation of PES projects, which give room for re-defining of identifying grey areas of the project in question. Hence, prevents financial wastage. Also initial transaction costs may be minimized as PES in this context involved both poverty reduction and environmental resource conservation simultaneously, this enhances reduction in the budgetary allocations which ordinarily would have been for anti-poverty and environmental resource management independently.

Also, since the respondents were carried along with the design of PES packages (through focus groups), it stimulates a sense of belonging, hence their cooperation for the success of the program will be ensured, if it comes to reality.

5.6 Recommendation

The study recommends the following as to ensure a vibrant and a well effective PES program with regards to rural poverty reduction and environmental resource conservation.

i. Institutional approaches

- Targeting the right respondents: the need for the right respondents to be identified is inevitable, this will prevent them from being left out of the benefit of the PES program, as was obtainable in most of the previous PES program.
- Legal and institutional frameworks creation: This ensures the security of land tenancy (at least free from expulsion from the land) and encouragement of the rural poor participation in the conservation of environmental resource.
- Expedite an operational and unprejudiced legal arrangement: to ensure that the potential PES-participants can confidently enter into contractual PES arrangements. To this end, the country's legal and institutional system should recognized PES schemes formally.
- Reduction of the transaction costs: by concentrating service providers into cooperative groups. '*Groups of service providers or consumers have a more effective voice in negotiations than the individuals; they are better able to monitor compliance; and they can easily accept or make payments'.*
- "Establish a strong, independent intermediary between service providers and consumers: '*in order to assist in the resolution of disputes; and, most importantly, provide a mechanism for the regular transfer of payments'.*

- Incorporation of Ecoagricultural programs in state ministries of agriculture and environment, and also agriculture research institutes and colleges of agriculture. This will enhance environmental resource conservation as well as rural poverty reduction.

ii. Technical approaches

- Assess demand as a first step in setting up a PES scheme: There must be sufficient demand for the service, and would-be participants must have the capacity to provide it. "*In parallel with assessing demand, planners can discover which types of incentives (payments, rewards,) are most likely to encourage and sustain the participation of service providers".*
- Technically, monitor and evaluate the likely effects of introducing PES. '*In the planning stages, appropriate measurement, testing and modelling should be used. Moreover, these techniques can help identify which households and communities need to participate in order to achieve the desired results-optimizing rather than maximizing participation'.*
- Monitor schemes independently once they are implemented. '*It is important that agricultural land-use management are independently monitored at regular intervals by an independent intermediary trusted for both buyers and sellers'.*

iii. Investment approaches

- '*Invest in smaller-scale schemes, which are more likely to benefit poor people, being more easily managed and monitored.'*

- Capacity building and investment in education: both are crucial to PES schemes. '*Once ecosystem services are assigned an economic value, both service providers and consumers will assign a market value to these services, which may, in turn, lead to more efficient use of the resource'.*
- Package payments as incentives or rewards, such as credit, vouchers for school fees etc. '*Direct money payments for services rendered may not always be ideal or even desired by service providers'.*
- Provision of start-up investment. '*This is essential to ensure that the pro-poor PES schemes actually work and, in particular, that poor groups and households are able to and will participate'.*
- Provide funding for on-going subsidies and market support. '*Donors and participating agencies must be willing to face the likely need for such support'* (e.g. demand augmentation).

5.6.1 Financing of Payment for Environmental Services in Nigeria

Environmental resource degradation has been a threat in Africa continent recently (IFAD, 2011). Evidently, it has a monumental implications for the ecosystem, social and economic status of the people. One obvious reason that contributes to environmental resource degradation is the lack of accessibility of financing environmental resource conservation program (e.g.PES). This lack of accessibility to finance, is evidently noticed among the small holders rural farmers, whom their livelihood depends on land. It's suffice to note that, participation of the rural dwellers and implementation of incentive-based mechanism for conservation and sustainability of environmental resource will

depend largely on the ability of the rural community dwellers to have access to funds. Creating an environmental resource financing mechanism to enhance poverty reduction and environmental resource conservation, is one of the daunting (Gondo, 2010) task in Africa region.

Conservation of environmental resource in Nigeria could be financed with the aid of both private and public financing mechanisms. Private financing mechanism; such as micro finance institutions, warehouse receipt financing (inventory credits), out-grower schemes (contract farming) and community-based approaches are promising sources of finance. Whilst domestic public financing and international public financing constitute a public financing mechanism sources.

Micro finance institutions have the potential to finance small holder farmers that are interested in participating in the PES program. It can provide micro credit to the lower-income earners farmers who do not have access to loans in the commercial banks. Mostly, micro finance banks give loans within a short term period, with the condition that the client providing a collateral security. Several forestry activities were financed by microfinance institutions in most of the ECOWAS countries (Kamara, Ficini & Zigouri, 2011).

Another promising source of financing PES program in Nigeria is warehouse receipt financing; This is a mechanism aim to provide financial assistance to those that lack collateral security. A non-perishable agriculture/forestry produce, when harvested (e.g. cotton) will be stored in a designated licensed warehouse. Upon this, the receipt is

issued to ascertain that the commodities are received. Sometimes the warehouse may be managed by the authorized financial institution who will provide the loan to the client. The amount of loan given is based on the valuation of the prevailing market price of the commodities received in the warehouse.

Financing of environmental resource programs (such as PES) is not limited to the above mentioned sources. Out-grower schemes (contract farming) have potentials to provide alternative to financial institutions loans. Out-grower is an incorporated value chain financing mechanism. It involves both commodity producers and consumers. The producer produces agro-forestry/agricultural produce for the processing company (i.e. the consumer). At the onset of the negotiation, a contractual agreement is reached between the producers and the buyers. Financing is in the form of loans, cash advance payment and sometimes it could be in-kind loans (with/out interest). These loans are bound to be repaid back when the produce is sold to the consumer as in the contractual agreement.

Community-based approaches are another potential source of financing PES in Nigeria; sometimes small holder farmers may unable to have access to micro credit facilities even in the micro finance institutions. Alternatively, cooperative groups, village associations can play the role of mobilization savings. A good example is the Rotating Savings and Credit Association Schemes, which lend funds at a reasonable interest rate to the members of the community.

Aside private financing sources, domestic public financing source; could also provide fund for PES in Nigeria, as it was done in some countries. The federal government of

Nigeria, States and local governments can finance PES program through the ecological fund. Also international organizations could fund the PES program. The National Forest Programme Facility (NFP) and the Global Environmental Facility (GEF) which Nigeria partnered with, can provide the financial and technical aspects of PES in Nigeria.

5.7 Limitations of the Study and Future Studies

While this study revealed some understandings about the hypothetical PES program with regards to rural poor preferences/participation/perspectives. Yet, there are some conceptual and methodological limitations. Firstly, the study concentrated only on farm settlements of Oyo state, Nigeria, where the ownership rights (land ownership rights) were conspicuously absent. This limits the study, in that those with land ownership rights and not in public controlled farm land are excluded in this study. Consequently, preferences (and perspectives of) for PES attributes in terms of rural poverty reduction and agricultural land conservation could not be sought. Therefore a further study that will be conducted in non-public owned farmland and also with the land ownership rights availability should be encouraged for a better comparison.

Secondly, the study was restricted to only the rural poor; hence the non-poor were left out. Though the rural poor are central respondents in this study, an extension to investigate non-poor with respect to environmental resource degradation would be worthwhile. Also a comprehensive investigation into institutional arrangements for PES implementation is unavoidably necessary in further studies. This is very essential for the

effective PES program, especially in the rural areas, where the communal legal system is mostly in force.

Finally, this study recommends that both quantitative and qualitative techniques should be employed. This will ensure higher confidence in the outcomes of the research. Since weakness of one technique could be taken care by the strength of the other and otherwise. This is necessary especially when information regarding the cognitive process is involved.

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