IMPACT OF *FADAMA*- II PROJECT ON INCOME INEQUALITY AND POVERTY REDUCTION OF RURAL HOUSEHOLDS IN NIGERIA

By

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A THESIS IN THE DEPARTMENT OF AGRICULTURAL ECONOMICS SUBMITTED TO THE FACULTY OF AGRICULTURE AND FORESTRY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY UNIVERSITY OF IBADAN

DEDICATION

This thesis is dedicated to the Almighty God; The Fountain of wisdom; The Alpha and Omega. God's name be praised for the opportunity He has given me to go through this programme.

ABSTRACT

Efforts to reduce rural inequality and poverty in Nigeria have no appreciable impact partly due to their supply-driven approach. In recent times emphasis is shifting to demand driven approach through Community Driven Development (CDD) projects with focus on bottom-up development. *Fadama*-II (2004 and 2009), one of the CDD projects invested mainly in agricultural assets to increase the income of the users. However, the impact of the project on Income Inequality (IE) and poverty has not been fully established. Therefore, the impact of *Fadama*-II on IE and poverty reduction of rural households in Nigeria was investigated.

Secondary data collected by the International Food Policy Research Institute from twelve World Bank supported *Fadama*-II states in 2006/2007 farming year were used. These states lie in three agroecological zones; three in Humid Forest (HF), three in Moist Savanna (MS) and six in Dry Savanna (DS). A sample of 3,750 households comprising: *Fadama*-II Beneficiaries (FB)-34%; *Fadama*-II non-beneficiaries within *Fadama* Local Government Areas (LGAs)-33%; and *Fadama*-II non-beneficiaries outside *Fadama* LGAs-33% was used for the study. Information used was on socio-economic characteristics, major assets and major components of household income and expenditure. The data were analysed using propensity score matching, descriptive statistics, double difference estimator, Gini-coefficient, Foster-Greer-Thorbecke weighted poverty index, and Poverty Equivalent Growth Rate (PEGR) at p=0.05

There were 1738 households with similar characteristics across the strata. Mean age (42.7 ± 11.8years) and household size (9.0 ± 6.4) of FB were not significantly different from those of the non-beneficiaries. The Per Capita Expenditure (PCE) of FB before the project was ₦52,703.4 ± 91,730.3. Annual PCE increased by 13.8%, 17.1% and 29.1% for HF, MS and DS zones respectively. Income inequality of FB before the project was 0.547. *Fadama*- II decreased IE nationwide by 21.2% with female FB having higher reduction of 27.2% compared with male of 14.1%. Income inequality of FB engaged in Up- stream Farming Activities (UFA) decreased by 19.6%, while those in Down-stream Farming Activities (DFA) decreased by 10.1%. The IE reduced by 28.4%, 12.9% and 11.7% in HF, MS and DS respectively. At a poverty line of ₦35,299.0 per annum, 52.2% of FB were poor before the project. Poverty Incidence (PI) reduced by 34.0% for

female FB compared with 7.8% for male. The poverty incidence of FB in UFA reduced by 14.2% compared with 7.1% for those in DFA. The PI reduced by 31.8%, 7.9% and 5.6% for HF, MS and DS zones respectively. The annual growth rate of PCE of 27.7% was less than the PEGR of 45.3% for FB nationwide. The PCE growth rate of 13.8%, 17.1% and 29.1% in HF, MS and DS respectively was less than their PEGR at 48.7%, 41.0%, and 39.3% respectively.

Fadama-II significantly increased income and reduced both income inequality and poverty of beneficiaries especially among females across the three agroecological zones. The project benefited a larger percentage of the poor. Hence, Economic Community Driven Development projects should be encouraged to reduce income inequality and poverty in rural Nigeria.

Keywords: *Fadama*-II project, Income inequality, Poverty reduction, Rural Nigeria, Agroecological zones

Wordcount: 493

ACKNOWLEDGEMENT

My sincere gratitude goes to my supervisor Dr. S. A. Yusuf for his mentorship, generosity and patience. I also thank him for his intellectual simulation and thoroughness. His commitment to academic excellence and hard work has left indelible marks on me. Thank you for this and may you always enjoy the lifting of God in your life and family. My special thanks also go to the other members of the supervisory committee, Dr. B.T. Omonona and Dr. A.S. Oyekale for their enormous contributions. I appreciate their patience, guidance and support during the course of this work. In the same vein my gratitude goes to the HOD- Prof V. O. Okoruwa and all other lecturers in the Department of Agricultural Economics for their contributions toward the success of this project. God bless you all for making this thesis a reality.

My special gratitude further goes to Professor A.O. Falusi and Professor F.S. Idachaba for their fatherly advice and financial support. May God bless you. I appreciate International Food Policy Research Institute for giving me access to the matched data used in this study. You have contributed to the success of this program.

I also want to use this opportunity to appreciate Mr. & Mrs. Sina Dairo for the encouragement given me to start this programme and for their financial support throughout the programme. May the good God reward you and grant you help always. My gratitude also goes to my parents Elder & Deaconess J. A. Akinlade and all my siblings for their encouragement and support. May God bless you all in Jesus name (amen). My regard also goes to Mrs. Ronke Omifare, Mrs.Funmi Kolawole, Rev.Kunle Akinyode, The Adetokis, Okuwas and other families and friends too numerous to mention that contributed in one way or the other toward the success of this Ph.D programme. May you never lack help when you need it in Jesus name. My thanks also go to my Pastors, Pastor and Pastor (Mrs.) Kayode Ojo and every member of Kingdom Glory Prayer Ministries (KGPM), Ibadan, I say thank you all for your prayers and moral support. May God bless you all.

Specially, I appreciate Mrs. Gbemisola Adeyonu and Mrs. Ife Amao who are not only my colleagues but also my sisters and friends. Your prayers and moral support were a great boost.

I will not but appreciate some of my colleagues for their contributions towards the success of this thesis. They are Dr. Bunmi Balogun, Dr.Paul Dontsop, Mrs. Bola Awotide, Mr. Wole Ogunyemi, Dr. Abimbola Adepoju, Mr.Waheed Ashagidigbi, Mrs. Kemi Obisesan, Miss Yemi Fajimi, Mr. Abayomi Emmanuel, Mrs.Mary Durojaye, Mrs.Adeola Carim-Sanni, Mrs. Bosede Fatiregun and

Mr. Sheu Salawu. I want to use this medium to appreciate my brother and friend Kayode Oluwatoyin for his encouragement towards the completion of this write-up. May the counsel of God stand in our lives in Jesus Name. Thanks a lot.

Finally, my sincere gratitude goes to God who has been faithful throughout the course of this programme. Indeed He has been my father and everything to me. I praise Him.

CERTIFICATION

I certify that this work was carried out by Roseline Jumoke AKINLADE under my supervision in the Department of Agricultural Economics, University of Ibadan, Nigeria.

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ACRONYMS

ADF	African Development Fund
ADP	Agricultural Development Programme
AfDB	African Development Bank
ANFB	All non *Fadama*-II beneficiaries
ATT	Average of the Treatment on the Treated
CDD	Community Driven Development
CDPs	Community Development Plans
CPRP	Community based Poverty Reduction Programme
CSDP	Community and Social Development Project
DD	Double Difference
DFRRI	Directorate of Food, Roads, and Rural Infrastructure,
EIG	Economic Interest Group
FAO	Food and Agriculture Organisation
FB	*Fadama*-II beneficiaries
FCAs	*Fadama* Community Associations
FCT	Federal Capital Territory
FEAP	Family Advancement Economic Programme
FGT	Foster-Greer-Thorbecke
FRN	Federal Republic of Nigeria
FRUGs	*Fadama* Resource User Groups
FSP	Family Support Programme
F2S	*Fadama*-II States
IDA	International Development Association
IFAD	International Fund for Agricultural Development

LDPs	Local Development Plans
LEEMP	Local Empowerment and Environmental Management Programme
LGA	Local Government Area
NAFPP	National Accelerated Food Production Project
NALDA	National Land Agricultural Development Agency
NAPEP	National Poverty Eradication Programme
NDE	Establishment of the National Directorate of Employment
NEEDS	National Economic Empowerment and Development Scheme
NFBO	Non- Fadama II beneficiaries outside Fadama LGA
NFBW	Non- *Fadama*-II beneficiaries within *Fadama* LGA
NFDO	National Fadama Development Office
NGOs	Non Governmental Organizations
OECD	Organization of Economic Co-operation and Development
PCU	Project Coordinating Unit
PEGR	Poverty Equivalent Growth Rate
PS	Propensity Score
PSM	Propensity Score Matching
SAP	Structural Adjustment Programme
SFDT	State *Fadama* Development Team

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Poverty and income inequalities are critical limiting factors on the way to development in developing countries**.** Poverty and income inequality are closely related and it has been argued that income inequality is a manifestation as well as a strong cause of poverty (UNU/WIDER, 2000). Kolenikov and Shorrocks (2003) submit that the high level of poverty in the late 1990s in Russia was due more to the rise in income inequality than to decline in average income. When income inequality increases, the incidence of poverty also increases. Rising inequality threatens growth and poverty reduction targets. This in part explains the Millennium Development Goals (MDGs) agreed by world leaders in 2000, to reduce income poverty. The first goal is directly concerned with halving absolute poverty, but many of the other goals are also essentially about poverty reduction in a wider sense (Olaniyan and Awoyemi, 2005).

Poverty reduction is at the center of the policy discussion in every national government, international organizations and non-political institutions (Ricardo, 2005). This poverty reduction is about improving human well-being (the life people live, what they can or cannot do) in particular that of the poor people (Kakwani and Pernia, 2000). In the context of tackling poverty, the Overseas Development Institute (ODI) sees poverty reduction as a *twin* function of the rate of growth, and changes in income distribution. Additional key factors to reducing poverty will be the reduction in inequality and the reduction in income differences (IFAD, 2011). Several approaches have been used by national governments in both developed and developing countries to alleviate poverty. These are economic approach (human and capital formation); basic needs approach; rural development approach, employment orientation approach and target approach (Mansuri and Rao, 2004).

Despite massive progress in reducing poverty in some parts of the world in the past couple of decades – notably in East Asia – there are still about 1.4 billion people living on less than US$1.25 a day, and approximately 1 billion poor people, at least 70 per cent of the world's very poor people are rural. Levels of poverty vary considerably however, not just across regions and countries, but also within countries. Poverty in Africa is a rural phenomenon, a situation that is also true of other world regions (Bigsten, 1986; Ravallion, 1994; World Bank, 2000; IFAD, 2001). In Africa, the share of rural areas in overall poverty is around 90% in many countries. In

sub-Sahara Africa, the bulk of the rural poor comprise small –holder farmers, artisanal fishermen, wage labourers, and the landless (Nafziger, 1996; Ghai, 2000). Sub-Saharan Africa's rural poverty decline is also slow, where more than 60% of the rural population lives on less than US$1.25 a day, and almost 90% lives on less than US$2/day. Rural poverty results from lack of assets, limited economic opportunities and poor education and capabilities, as well as disadvantages rooted in social and political inequalities. However, large numbers of households move in and out of poverty repeatedly, sometimes within a matter of years (IFAD, 2011).

Regardless of some poverty reduction, inequality is quite high in many regions around the world. Poverty alleviation is important, so too is tackling inequality (Anup, 2011). African inequality is among the highest in the world and a defining feature of inequality in Africa has always been the huge rural-urban gap. Inequality is a broader concept than poverty in that it is defined over the whole distribution, not only the censored distribution of individuals or households below a certain poverty line (Mugerwa, 2000). Gary 1997, in his review of poverty studies in Africa, reports that sub-Sahara Africa has the second-highest income inequality in the world, after Latin America. The reality unfortunately is that the gap between the rich and poor is quite wide in most places. For example about 0.13% of the world's population controlled 25% of the world's assets in 2004. Certain groups – particularly rural women, youth, indigenous peoples and ethnic minorities – are often disproportionately held back by disadvantages rooted in inequalities. Addressing these disadvantages requires building people's assets and strengthening their capabilities – both individual and collective, while creating locally available opportunities and mitigating or helping them to better manage the risks they face (Anup, 2011).

Promoting pro-poor growth requires a strategy that is deliberately biased in favour of the poor to ensure the poor benefit proportionally more than the rich. Such an outcome would rapidly reduce the incidence of poverty so that those at the bottom end of the distribution curve of consumption would have the resources to meet their minimum basic needs. A pro-poor growth strategy entails the removal of institutional and policy-induced biases against the poor, as well as the adoption of direct pro-poor policies. Direct pro-poor policies include adequate public spending for basic education, health and family planning services, improved access to credit, and the promotion of small and medium enterprises (Kakwani & Penia, 2000).

The concern over increasing income inequality and poverty levels especially in the developing countries and the need for its alleviation as a means of improving the standard of

living of the people has led to the conceptualization and implementation of various Community Driven Development (CDD) programmes. Since targeting the poor has been one of the challenges of development and emergency response programmes (Farrington and Salter, 2006), it is argued that using CDD could improve targeting because CDD programmes use better local knowledge to define and identify the targeted groups (Mansuri and Rao, 2004).

Community-Driven Development recognizes that poor people are prime actors in the development process, not targets of externally designed poverty reduction efforts. In CDD, control of decisions and resources rests with community groups, who may often work in partnership with demand-responsive support organizations and service providers, including elected local governments, the private sector, Non-Governmental Organizations (NGOs), and central government agencies. Experience has shown that, given clear rules of the game, access to information, and appropriate support, poor men and women can effectively organize to provide goods and services that meet their immediate priorities. Not only do poor communities have greater capacity than generally recognized, they also have the most to gain from making good use of resources targeted at poverty reduction (Alkire *et al*, 2001). The CDD's potential is increasingly recognized as individual studies have shown that CDD can increase the effectiveness, efficiency, and sustainability of projects or programmes, making them more pro-poor and responsive to local priorities. Other objectives include developing capacity, building social and human capital, facilitating community and individual empowerment, deepening democracy, improving governance, and strengthening human rights (Mansuri and Rao 2004).

In Nigeria, a developing country has also instituted and implemented some CDD projects. These are Community -Based Poverty Reduction Project (CPRP), Local Empowerment and Environmental Management Project (LEEMP), Community and Social Development Project (CSDP), Community Based Agricultural and Rural Development Project, Community Based Natural Resources Management Project, *Fadama*-II and now *Fadama*-III.

The *Fadama* development project is one of Nigeria's agricultural policies designed to increase food production for her teeming and growing population. The first phase of the project, named *Fadama*-I started in 1990 through the collaboration of the Federal Government of Nigeria and the World Bank. This was in realization of the fact that *Fadama* potentials had a high capacity of reducing the negative effect of rudimentary and small holder rain-fed agriculture on the teeming population in rural Nigeria (Agwu and Abah, 2009). According to the Project

Coordinating Unit – National Fadama Development Office (PCU-NFDO) (2005) and the World Bank (2003a) *Fadama* is a Hausa derivative which refers to irrigable land, flood plains and low lying areas underlined by shallow aquifers found along Nigeria water system. The *Fadama* system of agriculture is not new in Nigeria's as it has been a major pre-occupation of the peasant farmers in the northern part of Nigeria who grow mainly vegetables, sugar-cane and fruits during dry seasons through irrigation. There was however a low utilization of the Fadama resources which has been observed to account partly for the poor performance of Nigeria's agricultural sector (World Bank, 2003a).

Success stories have been achieved using CDD approach in some countries -India, Pakistan, Argentina and Kenya (World Bank, 2003b). However, in Nigeria, even though the *Fadama*-I project recorded some measure of success, certain limitations and its restriction to crop production only, brought about some problems of conflicts (Onoja, 2004). These conflicts which were mainly between the farmers and other *Fadama* users such as pastoralists and fishermen over stock routes, crop destruction and encroachment led to the initiative of *Fadama*- II. The *Fadama*-II project is implemented using the Community Driven Development approach which strongly emphasizes stakeholders' participation at the community level to develop participatory and socially inclusive Local Development Plans (LDPs) which provide the basis for support and funding under the project (PCU-NFDO, 2005). This paradigm shift from the traditional public sector dominated/supply led development approaches of the past to a private sector-led, demand-driven strategy ensures full guidance of participating farmers through several institutional structures. The various *Fadama* resource users, including crop farmers, pastoralists, fishermen and women as well as on and off farm entrepreneurs, operating through their respective *Fadama* Resource User Groups (FRUGs) and their apex bodies, the *Fadama* Community Associations (FCAs), agree by consensus on how to use the common resources for their mutual advantage. Through this process, communities decide on the advisory services and infrastructures they need to enable them attain development goals they set for themselves based on their efforts. The consensus so reached are articulated Local Development Plans (LDPs) drawn at the level of the *Fadama* Community Associations (FCAs). The major functions of the *Fadama* development offices at federal, state and local government area levels include planning, advisory, monitoring, management and supervision. However, facilitators are hired by the State *Fadama* Development Team (SFDT) to organize the *Fadama* user groups and guide them through the intensive

processes of decision-making using a wide range of participative techniques (World Bank, 2003b). The labour, materials available and other resources of the farmers are monetized into the 10% paid by the farmers during the cost-sharing arrangement and agreement.

The *Fadama*-II project fosters participation of all the other areas of farming with long term project development objectives as outlined by the World Bank (2003a). These include to: sustainably increase the income of *Fadama* users; empower communities to take charge of their development agenda and reduce conflict between *Fadama* users. It covers eighteen states including the Federal Capital Territory (FCT). Out of the participating states, 12 (Adamawa, Bauchi, Gombe, FCT, Imo, Kaduna, Kebbi, Lagos, Niger, Ogun, Oyo and Taraba) were assisted by the World Bank. The African Development Bank (AfDB) sponsored are Borno, Jigawa, Kastina, Kwara, Plateau and Kogi states which are referred to as non-core *Fadama*-I states except Jigawa. The success of *Fadama*-II has led to extension of the project called *Fadama*-III to other states of the country in 2010.

Considering the fact that poverty and inequality are often measured to assess the impact of economic and social policies and programmes on standard of living of the people (Okunmadewa, 1999), this study assesses the impact of *Fadama*-II on income inequality and poverty reduction of rural households in Nigeria.

1.2 Problem Statement

In developing countries, several policies and programmes have been implemented to alleviate poverty. Despite these policies and programmes, poverty level as well as income inequality is still high in rural areas although there has been high growth rate (Osinubi and Gafaar, 2005). The new poverty estimates published by the World Bank (2010) revealed that in the developing countries poverty has been declining at the rate of about one percentage point a year, from the 52 per cent of world population in 1981 to 25 percent in 2005. Yet even at that rate, about one billion people will still live on less than $1.25 a day in 2015. In absolute terms the number of poor people in Africa has nearly doubled, from 200 million in 1981 to 390 million in 2005 (World Bank, 2010). In the same vein, in Nigeria, the rural areas and vulnerable groups, especially women, were affected more by the worsening poverty situation experienced in the 1980s and 1990s, when the incidence of poverty rose from 28.1% in 1980, to 46.3% of the population in 1985 and to 65.5% in 1996 due to the introduction of Structural Adjustment Programme (SAP) in 1986 but decreased in 2004 to 54.4%. The disaggregation by sector showed

a sharper decline in the urban areas between 1996 and 2004. In the urban areas, it declined from 58.2 per cent in 1996 to 43.2 per cent in 2004, representing a decline of 15.0 percentage points. In the rural areas, it declined from 69.8 per cent in 1996 to 63.3 per cent, representing only 6.5 percentage points (NBS, 2004).

The rapid economic growth that occurred between 1965 and 1974 created a serious income disparity in Nigeria, which is believed to have widened substantially in recent times (Aigbokhan, 1997; Ipinnaiye, 2001; Oyekale *et.al*, 2006). In addition, levels of inequalities have been aggravated in Nigeria as a result of the new causes associated with technology changes, lack of good governance, corruption, weak democratic institutions and past military rule which did not allow free discussion of issues or formulation of truly representative governance organs in the society (Aigbokhan, 1997; Aigbokhan, 1999). Studies have confirmed that income inequality is still on the increase in Nigeria. Canagarajah *et al* (1997) reports increased income inequality over the period spanning 1985 and 1992. This was established by an increase in the Gini coefficient from 0.381 in 1985 to 0.449 in 1992. In 1996, the Gini index for Nigeria was 0.506, while it was 0.613 in 1998 (World Bank, 2003). However, using 2004 household data, the Gini coefficient reduced to 0.58 (Oyekale *et al*, 2006). It was also established that Gini index was higher in the rural areas than urban areas. In 1998, Gini index was 0.4799 in rural areas while it was 0.4132 in urban areas. In the same vein, in 2004 the Gini index of rural areas was 0.5808 while in the urban areas it was 0.5278 (Oyekale *et al*, 2006).

The problem of income inequality and poverty has for a long time been a cause of concern to the Nigerian government. Initial attention focused on rural development in addition to town and country planning as a practical means of dealing with the problem. Thus, the second and fourth National Development Plans contain both direct and indirect allusions to, as well as objectives of policies and programmes aimed at minimizing the causes of poverty (Obi, 2007).

Some of the policies and programmes that have been designed at one time or another, if not to meet the special needs of the poor, at least to reach them include: the establishment of the National Accelerated Food Production Project (NAFPP), Green Revolution, Agricultural Development Programme (ADP), National Directorate of Employment (NDE), People's Bank, Community Bank and Small-scale Industries Credit Scheme, the Family Support Programme (FSP), Presidential Initiatives on cocoa, cassava, rice, livestock, fisheries and vegetables, the National Land Agricultural Development Agency (NALDA), Directorate of Food, Roads, and

Rural Infrastructure (DFRRI), Family Advancement Economic Programme (FEAP), National Poverty Eradication Programme (NAPEP), National Economic Empowerment and Development Scheme (NEEDS) and its counterparts at the state and Local Government levels (Nuhu, 2007; Federal Ministry of Agriculture and Water Resources (2008).

However, the fact that the incidence of poverty remains very high, the existence of the various poverty alleviation programmes notwithstanding points to the ineffectiveness of the strategies and programmes. Also the impact of these policies on alleviating poverty has been contentious. Some studies in the past have argued that the poor have benefited more from these policies while some found that there was positive real growth yet poverty and inequality still worsened. For instance Osinubi and Gafaar (2005) found that growth in Nigeria has been slightly pro-poor but the very poor have not really enjoyed the benefit of the growth. This can be traced to the nature of growth pursued and the macro-economic policies that underlined it.

Recently there has been a reorientation of the government's focus towards developing Community-based Poverty Reduction using Community Driven Development approach. This Community Driven Development (CDD) has potential to develop projects and programmes that are sustainable, responsive to local priorities, empower local communities to manage and govern their own development programmes, and are better targeted toward poor and vulnerable groups (Dongier *et al*, 2001; Gillespie, 2004). In Nigeria, under this approach, several programmes have been implemented and some are still on. Local Empowerment and Environmental Management Programme (LEEMP); Community-Based Poverty Reduction Project (CPRP) and Community and Social Development Project (CSDP) are social CDD projects while National *Fadama* Development Project (*Fadama* - II and III) is economic CDD project

Fadama-II project, one of these CDD, is an economic CDD with focus on project activities which centered on *Fadama* User Groups (FUGs) having common interest termed Economic Interest Groups (EIG). The main thrust of the FUGs is collective action which can help to overcome many problems faced by poor farmers in production and marketing (Ostrom, 2004). On the contrary, other CDD project activities centered on community level and invested mainly in social infrastructure (Federal Project Supporting Unit, 2008). *Fadama*-II project has its main objective to increase the average real income of *Fadama* users by at least 20% compared to the baseline. The project has five components with the bulk of resources in assets acquisition. The project operated for six years (2004-2010) and was co-financed by the World Bank and African

Development Bank (AfDB). Although *Fadama*-II has ended, it success stories were reported by Nkonya *et al* (2007) and Oni *et al* (2007) that it increased income and productive assets acquisition (such as agro processing and small-scale irrigation equipment) of the beneficiaries. Also project beneficiaries had benefited from reduced time to the nearest town. However, the impact of the project on income inequality and poverty has not been fully established. Arising from the foregoing, this study assesses the impact of *Fadama*- II on income inequality and poverty of the users. Therefore, the following research questions were answered by this study:

(1) Has *Fadama*-II project reduced income inequality of beneficiaries?

(2) How far has the project been able to reduce poverty of beneficiaries?

(3) Is *Fadama*-II project a pro- poor project?

1.3 Objectives of the Study

The main objective of the study is to determine the impact of *Fadama*-II project on income inequality and poverty reduction of the rural households in Nigeria.

The specific objectives of the study are to:

1 examine the level of income inequality of *Fadama*-II and Non-*Fadama*-II households;

2 analyse changes in poverty of *Fadama*-II and Non-*Fadama* II households; and

3 determine the pro-poorness of *Fadama*-II Project.

1.4 Research Hypothesis

Null Hypothesis (H0): There is no significant difference between the level of income of *Fadama*-II beneficiaries and Non-beneficiaries after one year of project implementation.

Alternative Hypothesis (H1): There is significant difference between the level of income of *Fadama*-II beneficiaries and Non-beneficiaries after one year of project implementation.

1.5 Analysis of the Objective

The analysis of objective is presented in Table1

Table 1: Analysis of Objectives

S/No	Objective	Meaning	Data requirement	Proposed Tools of analysis
1	To examine the level of income inequality of *Fadama*-II and Non-*Fadama*-II households.	-Determine and compare level of income of *Fadama* and Non-Fadama households before and after *Fadama* II. - Determine and compare the level of inequality of *Fadama* and Non-*Fadama* households - Determine the impact of *Fadama*- II on income and income inequality	Information on expenditure before and after the *Fadama*-II will be used. Socio-economic characteristic like: age, sex, level of education, assets, Household size, land area and agroecological zones.	Propensity Score Matching (PSM), Double Difference (DD), Percentage, Standard deviation, Mean, Gini coefficient, Average Treatment Effect for the Treated (ATT).
2	To analyse changes in poverty of *Fadama*-II and Non-*Fadama* II households.	- Determine and compare the level of poverty status of *Fadama* and Non-*Fadama* households before and after the project -Analyse changes in poverty status of *Fadama* II and Non *Fadama*-II households. - Determine the impact of *Fadama*-II project on poverty level of beneficiaries	Information on expenditure before and after the *Fadama*-II will be used. Socio-economic characteristic like: age, sex, level of education, assets, Household size, land area and agroecological zones.	Foster –Greer – Thorbeck (FGT) Class of poverty measures, Double Difference (DD), Average Treatment Effect for the Treated (ATT).
3	To determine the pro-poorness of *Fadama*-II Project	Determine whether *Fadama*-II project benefited the poor more than the non-poor	Information on expenditure before and after the *Fadama*-II will be used.	Poverty Equivalent Growth Rate (PEGR)

Source: Author's compilation

1.6 Justification of the Study

Attempts to eradicate or alleviate poverty are not new; legislation and community efforts to assist the poor have been reported at least as far back as biblical times. Poverty exists and has existed in every country, and the struggle against poverty has been just as widespread (Lander, 1993). The alleviation of poverty is an important development agenda for developing countries for the improvement of overall social and economic conditions. Without social and economic programmes to alleviate poverty, society will continue to be caught in a vicious cycle of underdevelopment. The growth in income per capita is the main source of reduction in poverty in most countries. This has been supported by the work of Ravallion and Datt (1996), Tendulkar (1998), Bhagawati (2001), Datt and Ravalion (2002) and Dollar and Kray (2002). Therefore, this study assesses the impact of one of the economic programmes (Fadama-II project) on poverty reduction of rural households in Nigeria.

A number of studies have attempted to analyze the relationship between income growth, income inequality and poverty incidence across countries and time periods (Kuznets, 1955; Ravallion and Chen, 1997; Bruno, Ravallion and Squire, 1998; Deininger and squire, 1998; Adams, 2003; Bourguignon, 2004 and Nallari and Griffith, 2006. Also some researchers (de Janvry and Sadoulet, 1999; Kakwani and Pernia, 2000; Kakwani *et al*, 2004; Ravallion and Chen, 2003; Kakwani and Son, 2005; Son, 2007; and Agrawal, 2008) have considered this relationship under pro-poor growth in the developing countries. In Nigeria some researchers have also considered one of these concepts or the relationship among these three elements- income growth, income inequality and poverty (Aigbokhan, 2000; Awoyemi and Adeoti, 2004; Osinubi and Gafaar, 2005; Oyekale *et al*, 2006; Obi, 2007; Adewusi, 2009). These studies are useful because they help to show the patterns in inequality as well as the incidence of poverty. They also show the state of poverty reduction programmes in the country and their impact on the poverty reduction. However, they have not been able to explore the relationship that exists among the three elements under pro-poor growth. To date, only Osinubi and Gafaar (2005) have considered macro-economic policies and pro-poor growth. But this study assesses the impact of a particular poverty alleviation programme (*Fadama*-II) and gives specific information about the new approach- CDD adopted by government to alleviate poverty.

Although, several studies have worked on *Fadama* project in the country (Ayanwale and Alimi, 2004; Alimi and Ayanwale, 2004; Adesoji *et al*, 2006; Nwachukwu and Onyenweaku

2007; Adeoti *et al*, 2008; Kudi *et al*, 2008; Babatunde *et al*, 2008; Nkonya *et al*, 2007; Oni *et al*, 2007; Olaniran, 2010; and Adeoye, 2010) none has exploited the question of whether the project is pro-poor or anti poor. Answer to this pertinent question would serve as an effective tool for policy makers to determine if the intended beneficiaries benefited most from the project. Also these studies either limit their scope to Local Government Areas or State except Nkonya *et al*, 2007 that makes use of the national survey data

Furthermore, some of these studies have addressed evaluation problems using cross section estimator as well as before and after estimators. Cross-section estimator uses post-programmes data for non-participants as counterfactual outcomes (the outcomes of the participant if he had not participated in the project) while before and after estimator uses pre-programme data of the participants as counterfactual outcomes. However, these two estimators could not net out effect of other factors that influenced the outcome, hence, their results were biased. Also, a few among these studies use only Double Difference (DD) or Propensity Score Matching (PSM) (Oni *et al*, 2007; Olaniran, 2010) to reduce the bias estimates. But this study makes use of both PSM and DD that were employed by Nkonya *et al*, 2007 to address the evaluation problem and uses the counterfactual outcome framework to show the impact of the project on the outcome which is defined in the modern policy evaluation literature as the Average of the Treatment on the Treated (ATT). This was used to address the problem of selection on observable -PSM and unobservable characteristics-DD. These net out the effects of other factors which could have influenced the outcome of the beneficiaries. Also counterfactual outcome framework (ATT) helps to further reduce bias estimates. This study further distinguishes itself from other past studies in terms of objectives. Since increase in income inequality threatens growth and poverty reduction, therefore this study examines contributions of *Fadama*- II project to income inequality and poverty.

In departure from Nkonya *et al* (2007) which used poverty tercile, this study uses Foster-Greer-Thorbecke (FGT) class of poverty measures to determine poverty status of the beneficiaries. Analysis of poverty should not be restricted to assessing the number of the poor but it is crucial to see the poverty gap and its severity which are indices useful to analyze policies aimed at reaching the poorest. Further household per capita expenditure which is a better approximation of income especially in developing countries has been used in this study to overcome the possibility of overstated or understated income. Also Osinubi and Gafaar (2005)

used pro-poor growth index proposed by Kakwani and Pernia (2000) but this study uses Poverty Equivalent Growth Rate (PEGR) to determine if *Fadama*-II project was pro-poor or not. This PEGR is able to capture both the actual level of the growth and the distribution of growth benefits and satisfies axiom of monotonicity (it implies that the magnitude of poverty reduction should be a monotonically increasing function of the pro-poor growth rate) which other indices of pro-poor growth could not satisfy (Kakwani *et al*, 2004). The scope of this study is not limited to national, agro-ecological zones but also extended to the state level. These are some gaps that this study helped to address.

The study is significant in that it helps to know the structure of income inequality in the *Fadama*- II benefiting States. It also assists in understanding poverty change caused by *Fadama*-II across the three agro-ecological zones which are important for effective targeting of the programme in the states where this type of CDD project will be extended.

Finally, this study would serve as a guide to policy makers, donor agencies and Non-Governmental Organizations (NGO), on how to tackle poverty and inequality in Nigeria and add to the existing literature in the field, which is now receiving utmost attention from academia, administrators and the general public alike.

1.7 Plan of the Report

The rest of the report comprises four chapters. Chapter two comprises the theoretical, conceptual framework and literature review. This addresses the theoretical perspectives of income inequality and poverty reduction, concept of inequality, poverty and pro-poor growth, general approaches to poverty reduction, past efforts of reducing poverty in Nigeria and conceptual framework for the study. Analytical/methodological framework comprises the impact assessment, counterfactual framework, measurement of inequality, poverty and pro-poor growth. In the sub-section on literature review, studies on income inequality, poverty and pro-poor growth as well as studies on *Fadama* Project are discussed. In chapter three, the focus is on the methodology adopted for the study. This chapter comprises areas of study, nature of data and data analysis. Chapter four is devoted to results of the thesis. Chapter four addresses distribution of socio-economic characteristics of respondents, level of income, income inequality and poverty status of respondents and the pro-poorness of *Fadama*-II project. The last chapter contains the summary, conclusions and policy recommendations emanating from this study.

CHAPTER TWO

THEORETICAL /CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

2.1 Theoretical and Conceptual Framework

2.1.1 Theoretical Perspective of Income Inequality and Poverty Reduction

Inequality in income distribution has been a subject of controversy in the literature with the Kuznet hypothesis being the focal point. The hypothesis has suggested that as development proceeds, inequality of income will increase at the very early stages and then decline. Kuznet's seminal works of 1955 and 1963 on the relationship between economic development and income distribution arouses interest on the sources of inequality in developing countries. This relationship has been studied in two directions. The traditional line of research is how growth and development affect income distributions. At the core of this debate was the Kuznets (1955) hypothesis that income inequality first increases and then decreases in relation to economic development, that is, there is an inverted U-shaped relationship between income inequality and the level of economic development. The hypothesis was supported by a number of studies including Kravis (1960); Oshima (1962); Adelman and Morris (1971); Paukert (1973); Ahluwalia (1974, 1976); Robinson (1976); and Ram (1988). Many researchers have doubted the hypothesized relationship, among which include Person and Tabellini (1980); Anand and Kanbur (1984); Field (1989); Oshima (1994); Person and Tabellini (1996); Deininger and Squire (1998). For instance, Person and Tabellini (1980) find a strong negative relationship between initial income inequality and future growth and poverty reduction in both developing and developed countries. Alesina and Perroti (1996) also argue that political instability in a highly heterogeneous and polarized society will enhance unequal income distribution and a low increase in economic well-being. Deininger and Squire (1998) provide the most comprehensive attempt so far to test the Kuznets hypothesis. They also carefully examine the income changes in the bottom quintiles, that is, among the poor. The result for their sample was that there was no evidence of an inverted-U pattern. They also investigate how initial inequality and contemporaneous changes in inequality influence the evolution of poverty. The poor (bottom 20%) were most clearly found to suffer from growth reducing effects of inequality, and also to benefit from measures that stimulate growth. According to Goudie and Ladd (1999), the effect of income growth on inequality can thus be summarized as follows: first, the effect can go either way, contingent on a number of factors, but there is little convincing evidence that growth alters

distribution in a systematic way. Second, in the absence of a clear relationship, there is a case for pursuing a policy aimed at rapid growth as possible. Ravallion and Chen (1997) also find a very strong relation between growth and reduction in poverty. They distributed their observations into four quadrants, according to the direction of changes in mean consumption and in the poverty rate. Virtually all observations fell either in the quadrants with rising poverty and falling mean-income or in the quadrant with falling poverty and rising mean incomes. Empirically, there is thus a very strong relationship between per capita income growth and poverty reduction. The findings of Kraay (2003) and Lopez (2004) suggest that in the long run, growth reduces poverty. Kraay (2003) finds that a high rate of average income growth results in reduction of poverty. He argues that in the short run the widespread growth associated with increasing average incomes can account for up to half of the reduction in the poverty headcount.

The theoretical perspective of income inequality and poverty reduction revealed that there is a strong direct relationship between income inequality and poverty reduction.

2.1.2 Concept of Income Inequality and Poverty

Inequality is the dispersion of a distribution, whether income, consumption or some other welfare indicator or attribute of a population (Litchfield, 1999). Inequality can have many dimensions. Economists are concerned specifically with the economics or monetarily measurable dimension related to individual or household income and consumption. However, this is just one perspective and inequality can be linked to inequality in skills, education, opportunities, happiness, health, life expectancy, welfare, assets and social mobility. According to Kolo (1999) income inequality relates to the unequal distribution of income and wealth between the various members of the society. It also refers to the inequality of the distribution of individuals, household or some per capita measure of income (Heshmati, 2004). Marx (1868) and Truetts (1987) identify the following causes of income inequality: Natural abilities, education and training, health and physical capability, industriousness, inherited wealth; and market or population power. Income inequality could be vertical or horizontal. The vertical inequality refers to the degree of difference between the top income earners and the lower income earners. On the other hand, horizontal inequality refers to a situation where people, groups or countries in similar circumstances receive different incomes or have to pay similar amounts. For instance, there may be issues of why males with a similar job and qualifications earn more than females;

there may be issues as to why a country like Russia, with a vast array of resources, is so much poorer than the US in terms of GDP.

Poverty is a form of deprivation. It exists when there is lack of the means to satisfy critical needs (Ogwumike, 1996). A family is poor, if it spends a very high percentage of its income on basic needs such as food, clothing, housing, health care and transport with very little left for a rainy day (Ali, 1992). Poverty may be absolute or relative. The definition of absolute poverty focuses on the inability of an individual or household to consume a certain minimum of basic needs, while that of the relative poverty compares the welfare of those with the lowest amount of resources with others in the society (Ogwumike, 1996). According to the World Bank (2001), poverty is defined as a state of long-term deprivation of well-being, a situation considered inadequate for decent living. There are, however, much debates on how well-being should be measured and what indicators should be used. There are two broad approaches to defining well-being following Ravallion (1994). These are the 'welfarist' approach and the 'non-welfarist' approach.

The 'welfarist' approach defines well-being in terms of the level of utility attained by an individual. The approach attaches great importance to the individual's perception of what is useful to him or her. It tends to concentrate in practice mainly on comparisons of "economic well-being", which is also called standard of living or "income". This approach has strongly anchored in classical micro-economics, where, in the language of economists, "welfare" or "utility" are generally key in accounting for the behaviour and well-being of individuals. Classical economics usually postulates that individuals are rational and that they can be presumed to be the best judges of the sort of life and activities which maximize their utility and happiness. It is widely used by economists in the operation research work of organizations such as the World Bank, the international monetary fund, and ministries of finance and planning of developed and developing countries.

The 'non-welfarist' approach defines well-being independently of the individual's perception of it. The approach relies on what planners consider desirable from a social point of view. There are two major non-welfarist approach, the basic-needs approach and the capability approach. The first approach focuses on the need to attain some basic multidimensional outcomes that can be observed and monitored relatively easily. These outcomes are usually linked with the concept of functioning. Functionings approach is closely linked with well known basic needs

approach and the two are often difficult to distinguish in their practical application. Functionings are not synonymous with basic needs. Basic needs can be understood as the physical inputs that are usually required for individuals to achieve some functionings hence, basic needs are usually defined in terms of means rather than outcomes. Unlike functionings which can be commonly defined for all individuals, the specification of basic needs depends on the characteristics of individuals and of the societies in which they live. The second approach, that is, capability approach is defined by the capacity to achieve functionings. In Sen's words (1997) the capability to function represents the various combinations of functionings that the person can achieve. Capability is thus, a set of vectors of functionings, reflecting the person's freedom to live one type of life or another. What matters for the capability approach is the ability of an individual to function well in society; it is not the functionings actually attained by the person hence, having the capability to achieve "basic functionings is the source of freedom to live well and is thereby sufficient in the capability approach for one not to be poor or deprived.

The difference between the capability and functioning or basic needs is that in the basic needs and functionings approach, deprivation comes from a lack of direct consumption or functionings experience while in the capability approach, poverty arises from the lack of incomes and capabilities, which are imperfectly related to the actual functioning achieved. Non-welfarist (capability and basic needs) approaches to poverty measurement suffer from some comparability problems because they typically generate multi-dimensional qualitative poverty criteria: their fulfillment takes a simple dichotomic yes/no form. They also translate into greater implementation difficulties than for the usual proxy indicators of the welfarist approach. Welfarist approach will not impose multi-dimensional thresholds. For instance, the welfarist approach will usually not require for one not to be poor that both food and non-food expenditure be larger than their respective food and non-food poverty lines. This simplifies the identification of the poor and the analysis of poverty.

Poverty can be regarded as the status, objective or subjective, of an individual or a population. Poverty will have an objective definition once observable and measurable indicators exist that are used to approach the material or other aspects of the lives of individuals. This is sometimes referred to as the welfare approach. On the other hand, the subjective definition of poverty is when judgment (including value judgment) of individuals is taken into consideration in order to investigate their welfare (Boccanfuso, 2004). Poverty measurement has traditionally

been dominated by the objective approach. Only recently has international community been interested in measuring subjective poverty because of the limitations associated with objective indicators and the value of understanding the perspective of the poor in shaping policies and programmes. As a result, participatory poverty assessment methodologies have been gaining ground.

2.1.3 Concept of Pro-poor Growth

A number of studies have attempted to define pro-poor growth. These studies include: McCulloch and Baulch (2000), Kakwani and Pernia (2000); Ravallion and Chen (2003); Son (2004); Kakwani *et al* (2004); and Kakwani and Son (2007). The definitions could fall under these three broad headings: (i) the general or strict approach; the relative or absolute approach under the strict approach; (ii) specific poverty line and poverty measure (i.e., partial or a full approach); and (iii) satisfy an axiom called monotonicity.

A. General or Strict Approach

Poverty reduction depends on two factors: (i) growth and (ii) how the benefits of growth are distributed across the poor and non-poor. One major stream and indeed general definition of pro-poor growth is growth where poverty declines, irrespective of (i) or (ii) or both. Using this definition, growth will always be pro-poor whenever poverty falls. Ravallion and Chen's (2003) approach tends to fall under this definition. On the other hand, the strict definition of pro-poor growth emphasises how the benefits of growth are distributed among the poor and non-poor in society. This stream focuses on growth that leads to poverty reduction whereby the benefits of growth accrue largely to the poor. Studies conducted by McCulloch and Baulch (2000), Kakwani and Pernia (2000), Kakwani and Son (2007), and Son (2004) are based on the strict definition of pro-poor growth. Literally, the term "pro-poor" means in favour of the poor. In this regard, the concept and measure of pro-poor growth should be examined from a distributional perspective.

The four studies that use the strict approach to defining pro-poor growth can be further categorized into relative or absolute approach. The relative concept pertains to economic growth that benefits the poor proportionally more than the non-poor. This implies that while growth reduces poverty, it also improves inequality. This is referred to as a relative approach that looks into the relation between growth and poverty reduction because it implies a reduction in relative inequality. Similarly, a measure of pro-poor growth is absolute if after comparing the absolute

benefits from growth, the poor gains more than the non-poor. Under this definition, absolute inequality would fall during the course of growth. In fact, this lays out the strongest requirement for achieving pro-poor growth, making it consequently more difficult to achieve absolute pro-poor growth than relative pro-poor growth (Kakwani *et al*, 2004; Kakwani and Son 2007).

B. Partial or Full Approach

(i) Partial approach classifies growth to be pro-poor or anti-poor without specifying a poverty line and poverty measure. A measure suggested by Ravallion and Chen (2003) falls into this classification in the sense that pro-poor growth is partly defined based on what is called the First-Order Dominance (FOD) condition. Similarly, Son's (2004) pro-poor growth measure can also be categorized as partial because a growth process is primarily determined to be pro-poor (or not pro-poor) using stochastic dominance curves. The greatest advantage of using this partial approach is that it is valid for all poverty lines and poverty measures. On the other hand, one limitation of this approach is that if the dominance conditions are not met, then one cannot infer whether a growth process is pro-poor or not pro-poor. On this ground, the approach derived from the dominance conditions may be referred to as "partial." Moreover, under this approach, there are certain circumstances where it is impossible to draw conclusive results on the pattern of growth. Another limitation is that the partial approach does not ascertain the degree of pro-poor growth, i.e., by how much one growth process is more pro-poor than the other.

(ii) The full approach, on the other hand, is always able to provide a conclusive result as to whether or not growth is pro-poor. Studies including McCulloch and Baulch (2000), Kakwani and Pernia (2000), Ravallion and Chen (2003), Kakwani *et al* (2004) and Kakwani and Son (2007) are based on the full approach. This approach gives a complete ranking of growth processes, because unlike the partial approach, a growth process is judged from a rate or an index of pro-poor growth, not from a curve. To implement this full approach, though, a poverty line as well as a poverty measure needs to be specified. This in turn demands an inevitable value judgment in choosing the poverty line and poverty measures.

C. Monotonicity Criterion: The monotonicity criterion implies that the magnitude of poverty reduction should be a monotonically increasing function of the pro-poor growth rate. Maximizing

growth alone is a necessary but not sufficient condition for poverty reduction. The monotonicity criterion calls for a measure of pro-poor growth that captures a direct linkage (or monotonic relation) with poverty reduction, which means that poverty reduction takes into account not only growth but also how the benefits of growth are shared by individuals in society. In this way, a pro-poor growth measure that satisfies the monotonicity criterion provides a necessary and sufficient condition for the reduction of poverty.

The concept of pro-poor growth attempts to capture the way in which income growth improves the welfare of society's poor given the accompanying changes in income inequality. Thus, assessing whether growth is pro-poor requires knowledge of the distributional changes in income and the extent to which this has impacted the welfare of the poor (Kakwani *et al*, 2004)

This study adopts a definition proposed by Kakwani *et al* (2004) which defines growth as pro-poor if it benefits the poor proportionally more than the non-poor. Under this definition, a pro-poor growth scenario will reduce poverty more rapidly than an anti-poor growth scenario. The pattern of growth is determined by its linkage with changes in poverty and inequality.

2.1.4 Approaches to Poverty Alleviation

Various strategies have been advocated in the literature to address poverty challenges. Prominent among these are economic growth strategy, basic needs approach, rural development approach, employment-oriented approach and targeting approach.

2.1.4.1 Economic Growth Approach which goes back to the 1950s and 1960s development policy literature emphasizes growth as central to any policy on poverty reduction. As already pointed out above, studies have found that growth accounts for income growth for the poor in a large number of countries. However, because of the reliance on the 'trickle down' effect and on the pace of growth, which may be driven by capital intensive production process, the traditional growth approach has been found to produce less progress in poverty reduction. This has, therefore, led to a shift in emphasis from the "pace of growth" to the "structure of growth" strategy.

2.1.4.2 Basic Needs Approach – This calls for the provision of basic needs such as food, shelter, water, sanitation, health care, basic education and transportation. The approach is concerned with improving first the income earning opportunities for the poor, second, the public services that

reach the poor, third, the flow of goods and services to meet the needs of all members of households, and fourth, the participation of the poor in the ways in which their needs are met. Unless there is proper targeting, this approach may not directly impact on the poor because of their inherent disadvantage in terms of political power and the ability to influence the choice and location of government programmes and projects.

2.1.4.3 Rural Development Approach – This approach sees the rural sector as a unique sector in terms of poverty reduction. This is because majority of the poor in developing countries live in this sector. In addition, the level of paid employment in this sector is very minimal, hence, traditional measures of alleviating poverty may not easily work in the rural sector without radical changes in the assets ownership structure, credit structure, etc. Emphasis in this approach to development has focused on the integrated approach to rural development. This approach recognizes that poverty is multi – dimensional and therefore, requires a multi – pronged approach. The approach aims at the provision of basic necessities of life such as food, shelter, safe drinking water, education, health care, employment and income generating opportunities to the rural dwellers in general and the poor in particular. One basic problem with this approach to poverty reduction is that it is difficult to focus attention on the real poor given that poverty in the rural area is pervasive. In other words it makes targeting of poverty reduction programmes very difficult.

2.1.4.4 The employment- oriented approach- This approach emphasises employment promotion as the principal means of spreading the benefits of economic development more evenly throughout the economy. The "pace of growth" objective was modified so as to maximize not only output but also the rate of labour absorption. This is to be complemented with credit facilities to integrate the trained unemployed persons into the labour market on a sustainable basis.

2.1.4.5 Target Approach – This approach favours the directing of poverty alleviation programme to specific groups within the country. This approach includes such programmes as Social Safety Nets, Micro Credits, and School Meal programme. This approach requires proper identification of the target group so as to minimize leakages.

Globally, in recent times the concern over increasing income inequality and poverty levels especially in the developing countries and the need for its alleviation as a means of improving the standard of living of the people has led to shifting from Supply Driven Approach to Demand Driven approach through the conceptualization and implementation of various Community Driven Development (CDD) programmes.

2.1.4.5.1 Community Driven Development approach: the CDD is broadly defined as giving control of decisions and resources to community groups. Community Driven Development approaches, by contrast, treat poor people and their institutions as initiators, as collaborators and as resources on which to build. World Bank (2003) defines CDD as an effective mechanism for poverty reduction, complementing market-and state- run activity by achieving immediate and lasting results at the grass roots level. Community Driven Development can enhance sustainability and make poverty reduction effort more responsive to demand. It has also been shown to increase the efficiency and effectiveness of poverty reduction efforts; it has the potential to occur simultaneously in a very large number of communities, thus achieving far-reaching poverty impact.

The Community-Driven Development approach has become one of the key development strategies used by both government and development assistance programmes (Mansuri and Rao, 2004; Platteau, 2004; Gillespie, 2004). The CDD popularity has been propelled by its potential to develop projects and programmes that are sustainable, responsive to local priorities, empower local communities to manage and govern their own development programs, and are better targeted toward the poor and vulnerable groups (Dongier *et al*, 2001; Gillespie, 2004).

Khwaja (2001) observes that projects managed by communities are more sustainable than those managed by local governments because of better maintenance. However, Cleaver (1999), Kleimeer (2000) and Mosse (1997) find that CDD projects that lack external institutional, financial, and technical support are not sustainable. Targeting the poor has been one of the challenges of development and emergency response programmes (Farrington and Slater, 2006). One argument in favour of CDD asserts that it can improve targeting because CDD projects make better use of local knowledge to define and identify the targeted groups (Mansuri and Rao, 2004). However, there has been mixed empirical evidence concerning the effectiveness of targeting using the CDD approach. A review concluded that in heterogeneous communities with high

social inequality, the performance of CDD projects in targeting has been worse than that of externally managed programmes (Conning and Kevane, 2002). However, the review also revealed that in egalitarian communities with open and transparent systems of decision-making, targeting was better with CDD than with development approaches using external project management.

Alkire *et al* (2001) also define CDD as a demand driven approach which recognizes that poor people are prime actors in the development process, not targets of externally designed poverty reduction efforts. In CDD, control of decisions and resources rests with community groups, who may often work in partnership with demand-responsive support organizations and service providers, including elected local governments, the private sector, NGOs, and central government agencies. Experience has shown that, given clear rules of the game, access to information, and appropriate support, poor men and women can effectively organize to provide goods and services that meet their immediate priorities. Not only do poor communities have greater capacity than generally recognized, they also have the most to gain from making good use of resources targeted at poverty reduction (Alkire *et al*, 2001). Community Driven Development's potential is increasingly recognized. Individual studies have shown that CDD can increase the effectiveness, efficiency, and sustainability of projects or programmes, making them more pro-poor and responsive to local priorities. Other objectives include developing capacity, building social and human capital, facilitating community and individual empowerment, deepening democracy, improving governance, and strengthening human rights (Mansuri and Rao 2004).

2.1.5 Poverty Alleviation Programmes and Strategies in Nigeria

In Nigeria, the poverty alleviation measures implemented so far have focused more on economic growth, basic needs, rural development approaches and employment generation. It is important to note that most of the poverty alleviation strategies adopted in Nigeria were well focused on rural areas and on the agricultural sector. This is because poverty in Nigeria is largely a rural phenomenon with agriculture accounting for the highest incidence over the years. Besides, poverty reduction depends to a large extent on the agricultural sector, because the sector not only provides food for consumption as well as raw materials for manufacturing activities, it is the

main employer of labour especially in the rural areas (Ogwumike, 2003). There are three periods that can be identified: Pre SAP era, SAP era and Democratic era.

2.1.5.1 Pre-SAP Era

Poverty reduction was never the direct focus of development planning and management during Pre- SAP era, Government only showed concern for poverty reduction indirectly. During this era, Nigeria had prepared and executed four national development plans as follows; First National Development Plan (1962 – 68), Second National Development Plan (1970 – 74), Third National development Plan (1975 – 80) and the Fourth National Development Plan (1981 – 85). During this era, many of the programmes which were put in place in Nigeria by the government (either wholly or in association with international agencies) had positive effects on poverty reduction although the target population for some of the programmes was not specified explicitly as poor people or communities. Some of these programmes are farm production enhancement programmes which tend to facilitate and support farmers in their production.

One of the first such programmes was the Farm Settlement Scheme (FSS) of the old Western Region of Nigeria established in 1959. The FSS was intended to put more lands under farming by engaging young school leavers in farming communities where they were expected to live together and share facilities and responsibilities. Also after the civil war in 1970, the Federal Military Government of Nigeria became more involved in initiating these programmes. Some of these programmes were fully funded by Nigerian Government while some were supported by the World Bank. These programmes include: the National Accelerated Food production Programme (NAFPP); the Operation Feed the Nation (OFN) and the Green Revolution Programme (GRP). These were intended to improve the food situation in the country after the debilitating civil war. National Accelerated Food Production Project was a general-purpose food production programme, which was intended to make more resources available to farmers on their turfs through mobilization of extension workers. Operation Feed the Nation was an awareness of programme intended to educate people generally to engage in food production around their homes, schools and on any available piece of land. Green Revolution Programme was initiated as a comprehensive development programme designed to revolutionise not only food production but also export tree crops production. Several instruments were considered in implementing GRP, but the most significant in terms of scope and financial commitment was harnessing of the water of

Nigeria's river basin for food production (Anthonio and Akinyosoye, 1986). This led to Nigeria's River Basin Development Authorities (RBDAs) in 1977. In addition to the activities of RBDAs, the Agricultural Development Project (ADPs) became a major initiative for supporting the agricultural sector and rural economy of the nation in the 1980s. ADPs were to provide extension services, technical input support and rural infrastructure services. They also provide temporary role in providing advisory services.

The most serious intervention in developing a modern agricultural marketing system in Nigeria was the establishment of the marketing boards for the major crops of the country between 1947 and 1986 to serve as buyer of last resort, at fixed prices and hold strategic or buffer stock. The marketing boards functioned as para-public sector organizations, otherwise known as parastatals. They enjoyed a certain level of administrative autonomy but were still under close Government supervision. Marketing boards in Nigeria were characterized by many ills generally associated with government business concerns. They suffered from bureaucratic nuisances, very large staff size, most of them not qualified for the positions they held and poorly-paid. Excessive intervention in their management, relative insecurity of tenure and high operating costs contributed to the low level of efficiency in the boards. Other programmes during this era include the Agricultural Credit Guarantee Scheme (ACGS), the Rural Electrification Scheme (RES), the Rural Banking Scheme (RBS), Free and Compulsory Primary Education (FCPE) set up also in 1977, Green Revolution established in 1979, and Low Cost Housing Scheme. Most of these programmes were designed to take care of such objectives as employment generation, enhancing agricultural output and income, and stemming the tide of rural – urban migration. These programmes made some laudable impact; they enhanced the quality of life of many Nigerians. Despite this they could not be sustained due to lack of political will and commitment, policy instability and insufficient involvement of the beneficiaries in these programmes (Ogwumike, 1987, 1995, and 1998; CBN, 1998; Akinyosoye, 2005).

2.1.5.2 SAP Era

Conscious policy effort by government towards poverty alleviation began in Nigeria during the era of Structural Adjustment Programme (SAP). The severe economic crisis in Nigeria in the early 1980s worsened the quality of life of most Nigerians. The government made determined effort to check the crisis through the adoption of SAP. However, the implementation

of SAP further worsened the living conditions of many Nigerians especially the poor who were the most vulnerable group. This made the government to design and implement many poverty alleviation programmes between 1986 and 1993. Also under the guided deregulation that spanned the period 1993 to 1998, more poverty reduction programmes were put in place by government. Some of the programmes under this era are Directorate of Food, Roads and Rural Infrastructure (DFRRI), National Directorate of Employment (NDE), Better Life Programme (BLP), People's Bank of Nigeria (PBN), Community Banks (CB), Family Support Programme (FSP), Family Economic Advancement Programme (FEAP), National Agricultural Land Development Authority (NALDA), the Agricultural Development Programmes (ADP), and the Strategic Grains Reserves Programmes (SGRP), the Primary Health Care Scheme (PHCS) and the Guinea Worm Eradication Programme.

The Directorate for Food, Roads and Rural Infrastructures (DFRRI) was the first rural infrastructural development initiative in the country which was created in 1986 to act as catalyst for rural development by providing rural areas with various items of infrastructural services from the construction, rehabilitation and maintenance of rural feeder roads, rural market places, rural electricity installations and rural potable water installations for rain water catchments and ground water exploitation. The Directorate for Food, Roads and Rural Infrastructures programme only touched the lives of very few rural dwellers and people saw it as largely political as they did not internalise the ideas of self-development embedded into this seemingly revolutionary concept in rural transformation. In the early 1990s, the National Agricultural Land Development Authority (NALDA) was initiated with the mandate to expand land under cultivation by creating large farm communities similar, in concept to the old Western Region FSS. Other programmes that were initiated in the 1990s included Agricultural Land Resource Management Programme. The objectives of the programme are the selection of suitable lands for the production of specific crops through soil surveys and land evaluation; monitoring and improvement of their qualities through soil fertility management; and ensuring the conservation of the fertility of the lands through rehabilitation. The project was not implemented due to limited financial resources and lack of technical personnel. Rural Water Supply and Sanitation Programme (RUWASSAN) took off in1995; the aim was to assist states to attain at least 50 percent national coverage for rural water supply by 2000. The problem with RUWASSAN is similar to that of other rural programmes that are executed without regard to existing organizations. Rural Water Supply and

Sanitation Programme provided services that the State Water Supply Agencies and Health institutions were established to perform.

During the SAP era some rural household empowerment programmes were also implemented. One of such programmes was Better Life for Rural Women Programme (BLP) which was established to alleviate poverty and eliminate ignorance among rural people, particularly women. The programme metamorphosed into the Family Support Programme (FSP) in 1994 under a military Government. By 1997, another variant of the BLP and FSP had been designed by the Federal Government and called the Family Economic Advancement Programme (FEAP). This is an empowerment programme designed specially for locally based producers of goods and services and potential entrepreneurs in the cottage industries. The programme is aimed at improving the standard of living of the low-income groups by stimulating appropriate economic activities in the various wards of each local government area in the country. By 1999, all these previously established programmes were consolidated into the Poverty Alleviation Programmes (PAPs). All these old and new programmes follow the same approach of micro credit and promotion of rural-based Small-Scale Enterprises (SSEs). The programmes were not well thought out and the various programme activities not planned for. They were long on propaganda (if not noise-making) but short on substance. Sustainability was not built into their planning; hence programme names changed anytime a new Government came on board. Institutions created to manage the programme only benefited the managers of the programme. The programmes were deceptive rather than empower rural households to develop self-sustaining enterprise. They thrust on them a dependency syndrome with a "beggar" mentality that did not prepare the rural people to have the needed market and political power to demand for and get their entitlements from Government (Akinyosoye, 2005).

2.1.5.3 Democratic Era

During the democratic era, governments also designed and implemented various programmes and strategies to alleviate poverty. In 1999, the Poverty Alleviation Programme (PAP) that was established, with the objective of creating 200,000 jobs annually, failed to have any appreciable impact on poverty reduction in the country, due to "state capture" and leakages, among other reasons. It was replaced in 2003 by the National Poverty Eradication Programme (NAPEP), with five main programme areas. It is estimated that since inception, NAPEP has been able to train

130,000 youths and engaged 216, 000 persons who are attached to various establishments. However, like the PAP, beneficiaries are largely non-poor (Olaniyan *et al*, 2005; Aigbokhan, 1999). Similarly, National Economic Empowerment and Development Strategy (NEEDS) and Seven Point Agenda were the strategies initiated during this era. The National Economic Empowerment and Development Strategy (NEEDS) was Nigeria's home- grown poverty reduction strategy (PRSP). NEEDS was a medium term strategy (2003- 07) but which derives from the country's long-term goals of poverty reduction, wealth creation, employment generation and value re-orientation. NEEDS was a nationally coordinated framework of action in close collaboration with the State and Local governments (with their State Economic Empowerment and Development Strategy, SEEDS) and other stakeholders to consolidate on the achievements of the 1999- 2003 democratic dispensation. NEEDS has four key strategies: reforming the way government works and its institutions; growing the private sector; implementing a social charter for the people; and re-orientation of the people with an enduring African value system.

Reforming Government and Institutions: The goal is to restructure, right-size, re-professionalize and strengthen government and public institutions to deliver effective services to the people. It also aims at eliminating waste and inefficiency, and free up resources for investment in infrastructure and social services by Government. Growing the Private Sector: NEEDS is a development strategy anchored on the private sector as the engine of growth--- for wealth creation, employment generation and poverty reduction. The government is the enabler, the facilitator, and the regulator. The private sector is the executor, the direct investor and manager of businesses. The key elements of this strategy include the renewed privatization, de-regulation and liberalization programme. Implementing a Social Charter: NEEDS was about people: it was about their welfare, their health, education, employment, poverty-reduction, empowerment, security and participation. This is the overarching goal of NEEDS.

The National Economic Empowerment and Development Strategy (NEEDS), the economic development blueprint, developed by Obasanjo regime, influenced the creation of President Umaru Musa Yar'Adua's 7-Point Agenda; an articulation of Policy Priorities to strengthen the reforms and build the economy, so that the gains of the reforms are felt widely by citizens across the country. The Seven Points Agenda are the following:

1. Power and Energy – The infrastructural reforms in this critical sector through the development of sufficient and adequate power supply will be to ensure Nigeria's ability to develop as a modern economy and an industrial nation by the year 2015.
2. Food Security – This reform is primarily agrarian based. The emphasis on the development of modern technology, research, financial injection into research, production and development of agricultural inputs will revolutionalise the agricultural sector leading to a 5 – 10 fold increase in yield and production. This will result in massive domestic and commercial outputs and technological knowledge transfer to farmers.
3. Wealth Creation – By virtue of its reliance on revenue from non-renewal oil, Nigeria is yet to develop industrially. This reform is focused on wealth creation through diversified production especially in the agricultural and solid mineral sector. This requires Nigerians to choose to work, as hard work by all is required to achieve this reform.
4. Transport Sector – The transportation sector in Nigeria with its poor road networks is an inefficient means of mass transit of people and goods. With a goal of a modernized industrialized Nigeria, it is mandatory that Nigeria develops its transport sector. However, the reforms might take some time to take effect; it is a need that must be addressed.
5. Land Reforms – While hundreds of billions of dollars have been lost through unused government-owned landed asset, changes in the land laws and the emergence of land reforms will optimize Nigeria's growth through the release of lands for commercialized farming and other large scale businesses by the private sector. The final result will ensure improvement and a boost to the production and wealth creation initiatives.
6. Security – An unfriendly security climate precludes both external and internal investment into the nation. Thus, security will be seen as not only a constitutional requirement but also as a necessary infrastructure for the development of a modern Nigerian economy. With its particular needs, the Niger Delta security issue will be the primary focus, marshaled not with physical policing or military security, but through honest and accurate dialogue between the people and the Federal Government.
7. Education – The two-fold reforms in the educational sector will ensure firstly the minimum acceptable international standards of education for all. With that achieved, a strategic educational development plan which will ensure excellence in both the tutoring

and learning of skills in science and technology by students who will be seen as the future innovators and industrialists of Nigeria will also be achieved.

All of these agenda just appeared on the pages of newspapers; however, they were not fully realized**.**

Failures of Some Poverty Programmes and Strategies

The major reasons for the failure of poverty reduction related programmes in Nigeria include programme inconsistency, poor implementation, corruption of government officials and public servants, political instability and interference, poor targeting mechanisms, ineffectiveness of the policies, and nature of growth and strategies (Supply Driven Approach), failure to focus directly on the poor, unintended beneficiaries benefiting more than the intended ones (Kankwenda *et al*, 2000; Ogwumike, 1998; Egware, 1997; and Maduagwu, 2009). Some of these programmes with their weaknesses are summarized in the Table 2.

Table 2: Agricultural Development Initiatives Implemented by Past Government, 1935 –2007

No	Programme/ Program	Year established	Nature of intervention	Weaknesses
1	Cooperatives	1935 to date	To regulate cooperative activities in the country.	Policy inconsistency and administrative dislocations of the federal department in charge of cooperatives.
2	Commodity Boards	1947 to 1986	Served as buyers of last resort, at fixed prices and held strategic or buffer stock.	Inability to pay farmers the subsisting market prices at that time. Scrapped in 1986 under Structural Adjustment Programme.
3	Agricultural Research Institutes	1964 to date	To conduct research in various crops, livestock and fisheries.	Instability of the research institutes as a result of constant movement of the agricultural research institutes from one Ministry to another. There was also a major problem with funding of these institutes.
4	National Accelerated Food Production Project (NAFPP)	1970s	To increase the yields of seed varieties and enhanced fertilizers use and promoted extension and credit services as well as adaptive research and staff training.	Started very well but the wheat programme was affected by a basic withdrawal of political support and lifting of the ban on wheat import.
5	Agricultural Development Projects (ADPs)	1975 to date	To provide extension services, technical input support and rural infrastructure services. Also to provide temporary role in providing advisory services.	The decline in oil prices that started in 1982 had a substantial fiscal effect in Nigeria and led to shortages of counterpart funds for these projects.
6	River Basin Development Authorities (RBDAs)	1977 to date	To develop and take advantage of available water bodies in the country for agriculture, fishing and other purposes.	Unnecessary political interference and managerial problems. Lack of qualified manpower to provide effective leadership at the departmental levels.
7	Operation Feed the Nation (OFN).	1976 to 1979	Improve agricultural production and general performance of the agricultural sector.	The lack of continuity and shift in approach by successive governments were the reasons for the failure of the programmes.
8	Green Revolution	1979 to 1983	Improve agricultural production and general performance of the agricultural sector.	The lack of continuity and shift in approach by successive governments were the reasons for the failure of the programmes.
9	Directorate for Food, Roads and Rural Infrastructures (DFRRI)	1986 to 1993	Feeder Roads, rural Water supply and rural electrification.	The lack of funds and commitment limited the extent of rural areas. The government rural infrastructural programmes were embarked upon without effective programme of action and appropriate institutional arrangements for their execution.
10	National Agricultural Land Development Authority (NALDA)	1991 to 1999	Providing strategic public support for land development, promoting and supporting optimum utilization of Nigeria's rural land resources, providing gainful employment opportunities for rural people as well as raising incomes and improving general living standard in rural areas.	The NALDA approach increased rather than reduce the direct public provision of goods and services, which could be produced by the private sector instead.
11	Presidential Initiatives on Cocoa, Cassava, Rice, Livestock, Fisheries and Vegetables	1999 to 2007	To improve Nigeria's food production in line with vision 2020.	Poor funding and lack of institutional arrangements for implementation.

Source: Federal Ministry of Agriculture and Water Resources, 2008.

2.1.5.4 Community-Driven Development Programmes in Nigeria

During this democratic era, several CDD projects have been implemented and some are still on or about to be implemented. These include Local Empowerment and Environmental Management Project (LEEMP), Community based Poverty Reduction Project (CPRP), Community and Social Development Project (CSDP), Community Based Agricultural and Rural Development Project, Community Based Natural Resources Management Project, *Fadama*-II and now *Fadama*-III

2.1.5.4.1 Local Empowerment and Environmental Management Project (LEEMP)

Local Empowerment and Environmental Management Project (LEEMP), a Community Driven Development Project that became effective in 2004 was being implemented for five years in nine states. The participating states were Adamawa, Bauchi, Bayelsa, Benue, Enugu, Imo, Katsina, Niger and Oyo. LEEMP was designed to establish an institutional mechanism for transferring investment resource to communities, so that they can finance their own investment priorities. In addition, it emphasized the management of the environment as a prerequisite to sustainable livelihoods and development. It was financed by the International Development Association (IDA), state governments and participating beneficiary communities. It sought to reduce poverty, stimulate growth and empower people using a Community Driven Development (CDD) approach, which emphasizes social, natural resources and environmental management. Local Empowerment and Environmental Management Project engenders social inclusion through gender equality and people's participation. It creates job opportunities and wealth through the provision of support for various income-generating activities. It provides support for policy and legislative reforms in the environmental sector and for communities to engage in sustainable agricultural practices, improve access to market, and mainstreaming the environment (NISER, 2007).

2.1.5.4.2 Community –Based Poverty Reduction Project (CPRP)

The Community –Based Poverty Reduction Project was initiated in 2001 with financial aid from the International Development Association (IDA). Twelve states benefited from the project; eight of these states were funded by the World Bank and the remaining four states funded by AfDB. The CPRP used community driven development approach to support the financing of

social infrastructure and environmental management practices and engaging communities and local level governments in tackling poverty. The development objectives of this project are: the improvement of access of the poor to social and economic infrastructure, to increase the availability and management of development resources at the community level. The output of the project was to have improved services and infrastructure in poor beneficiary communities; increased capacity of Federal government to support, monitor and evaluate poverty reduction activities; increased capacity at State level for implementing community-driven projects (Federal Ministry of Finance, 2008).

2.1.5.4.3 Community and Social Development Project (CSDP)

This is a Community Driven Development project that was initiated in July 2008 to end on December, 2013. CSDP is a five-year Sector Investment Loan (SIL) to allow for (i) the scaling up of the CDD approach from the CPRP and LEEMP states, to other states in Nigeria, (ii) the institutionalization of the CDD approach in the planning approaches adopted by the three levels of government, (iii) response to the challenge of human development at the grassroots level in a sustainable and participatory manner and (iv) improved sustainable natural resource management. The project aims at sustainably increasing the access of poor people to social and natural resource infrastructure services through supporting (i) the empowerment of communities to develop, implement and monitor micro social infrastructure projects (public and common pool goods) including natural resource management interventions and (ii) strengthening the skills and capacity of local government authorities and sectoral public agencies to support communities and build a partnership between them.

The CSDP has three major components These are;

1 Federal level- Coordination and Program Support - $10m: At the Federal level, this component is supervised by the Federal Ministry of Finance, while the direct responsibility for implementation rests with the Federal Project Support Unit. This is a result of changes in the mandate of federal agencies managing CPRP and LEEMP. A multisectoral Programme Advisory Committee chaired by the Federal Ministry of Finance and serviced by the FPSU supports the FPSU to implement the following subcomponents: Technical Support to State Agencies and Activities; CSDP Monitoring and Evaluation; and Poverty and CDD Policy Design and Dissemination.

2 LGA/Sectoral Ministries Capacity and Partnership building Component. - $20m: This component being implemented by the State Agency in all participating States and provides funding for capacity building, skills training and hardware types of investments. The objective of this component is to establish and strengthen a partnership between LGAs and communities.

3 Community-Driven Investment Component - $170m: State Agencies are managing this component. Funding will be provided for Community Development Plans CDPs - based on specific selection criteria, including broad-based community participation in plans formulation, micro-project identification and preparation, and a matching contribution from communities.

Possible micro-projects that may be contained in eligible CDPs are rehabilitation, extension or construction of primary schools, health centres, rural electrification, water points, water reservoirs; rehabilitation or construction of feeder road, small bridges, culverts, drifts and stock routes, boreholes and other basic transport infrastructures. Small socio-economic infrastructure for community use (public goods) are markets and storage; vocational training centers (skill development centers); and natural resource management facilities such as community reforestation, woodlots or community-managed measures for firewood utilization or planting of windbreaks, physical and biological measures for lowering soil erosion and environmental degradation, community sanitation, including treatment of human and livestock waste, agro-forestry, water catchments systems, drainage systems or local management of solid wastes; and community energy efficiency, including promotion of equitable access to energy-efficient stoves or biogas pits (Federal Project Supporting Uint, 2008).

2.1.5.4.4 *Fadama* Project

Fadama is a Hausa word for low-lying flood plains; usually with easily accessible shallow groundwater. *Fadama* is typically waterlogged during the rainy season but retain moisture during the dry season. *Fadama* also refers to a seasonally flooded area used for farming during the dry season. It is defined as alluvial, lowland formed by erosional and depositional actions of the rivers and streams (Qureshi, 1989). They encompass land and water resources that could easily be developed for irrigation agriculture (World Bank, 1994). These areas are considered to be of high potential for economic development through appropriate investments in

infrastructure, household assets, and technical assistance. When Fadama spread out over a large area, they are often called 'Wetlands' (Nkonya *et al*, 2008; Blench and Ingawa, 2004). Wetlands are recognized by the Ramsar convention (Ramsar is a place in Iran where the convention was signed) and it is of worldwide significance because of the biodiversity they support. Nigeria is a signatory to this convention. The Ramsar convention of 1971 defines wetlands as areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters. In addition, there are human-made wetlands such as fish and shrimp ponds, farm ponds, irrigated agricultural lands, saltpans, reservoirs, gravel pits, sewage farms and canals (Anon, 2004).

The desire to realize the full potential of *Fadama* resources in Nigeria led to the design of the National *Fadama* Development Project, mainly funded by the World Bank, with counterpart funding by the Federal and benefiting state governments. *Fadama*-I Project was implemented during the 1993-99 period. *Fadama*-I focused mainly on crop production and largely neglected downstream activities such as processing, preservation, and marketing. The emphasis of *Fadama*-I was on provision of wash bores to crop farmers through simple credit arrangements aimed at boosting aggregate crop output (NFDO, 2005). The *Fadama* expansion programme is considered to be an instrument for technical transformation in agriculture which would empower the smallholder farmers to get out of the poverty trap. On the evaluation of success of *Fadama*-I, it was learnt that this phase failed to attend to some key sectors of the economy as explained below:

1. *Fadama*-I project helped producers increase output, but not to store, preserve and market their surpluses. As a result, much of the output was either not sold at all or sold at low prices due to supply glut, that is, the design of *Fadama*-I did not allow for rural infrastructure to ensure the efficient transportation of farm output to markets (World Bank, 2003).
2. It did not involve and empower key stakeholders such as producer organizations, local government organizations, the private sector and civil society organizations in designing and implementing projects and in providing advisory services. It thus raised concern about project ownership and sustainability.
3. *Fadama*-I did not address mechanisms for conflict resolution in the *Fadama* project areas. It failed to adequately consider the needs of other users of *Fadama* resources (such as livestock producers, fisher folks, pastoralists, hunters, etc) other than sedentary farmers. As a result,

conflict sometimes broke out between the sedentary farmers and pastoralists who found their traditional routes to water and pasture blocked. These confrontations resulted in physical injury and destruction of properties.

4. *Fadama*-I gave little support to the establishment of rural non-farm enterprises. It narrowly focused on crop production neglecting opportunities of values addition through processing and other activities. The drawbacks identified in the Fadama I project led to the emergence of *Fadama*- II.

The Second National *Fadama* Development Project (NFDP-II) is a follow-up on the first phase (1992-1998). The main objective of NFDP-II is to sustainably increase the incomes of *Fadama* users through expansion of farm and non-farm activities with high value added output. The project, which was declared disbursement effective on May 27, 2004, was funded by the World Bank and the African Development Bank (AfDB) to the tune of US$ 100 million and US $ 30 million respectively. It covered eighteen states including the Federal Capital Territory (FCT). Out of the 18 participating states, twelve were assisted by the World Bank. The states included Adamawa, Bauchi, Gombe, FCT, Imo, Kaduna, Kebbi, Lagos, Niger, Ogun, Oyo and Taraba (NFDO, 2007). The remaining states were Borno, Jigawa, Kastina, Kwara, Kogi and Plateau. The project was also designed to assist project – contracted facilitators and participating Local Government Areas to undertake project – related activities at the level of *Fadama* Community Associations (FCAs) and other beneficiary groups of *Fadama* User Groups (FUGs). *Fadama*-II was operated for six years (2004–2010) with a goal of contributing to poverty reduction in Nigeria. However, actual implementation did not begin until September 2005.

The direct beneficiaries are the 2 million rural families living in the participating states who are now pursuing their livelihoods in the *Fadama* lands. These are not only farmers, as a significant aim of the project design was to ensure that the various *Fadama* User Groups (FUGs) learn to accept each other's rights to a common resource pool which they share as well as take individual decisions. Thus, keeping in mind the impact such actions may have on others and on the *Fadama* environment at large. In the past, *Fadama* use has been dominated by sedentary farmers who are the majority group and also the most vocal and influential. The primary aim of this project was to ensure that other less dominant *Fadama* Users (Fisher folks, Pastoralists) and even marginal Users (hunters, gatherers) were recognized as *Fadama* Users and that their role in maintaining these lands are acknowledged and respected. Moreover, vulnerable sub – groups

such as widows, elderly, etc were targeted to ensure that they are beneficiaries of project – funded activities. Such an approach was aimed at avoiding situations of elite capture and conflict (formal and informal) - a primary obstacle to the success of the first *Fadama* Development Project (Ingawa *et al*, 2004).

Moreover, the basic strategy of the project was that of a Community Driven Development (CDD) approach with strong emphasis on stakeholder participation, especially at the community level. Facilitators supported under the project helped in organizing the *Fadama* Community Associations (FCAs) and guided them through an intensive process of group decision - making using a range of participating techniques, resulting in Local Development Plans (LDPs). In this manner, the project ensured that every activity funded by the project was conceived after informed discussion by the whole community, which resulted from consensus building and social inclusiveness (Ingawa *et al*, 2004).

The project set targets to achieve the following outcomes at the end of its six year period:

i) 50% of male and female *Fadama* resource users who benefit from the project supported activities should increase their average real income by at least 20% compared to the baseline.

ii) At least 60% of *Fadama* Community Associations (FCA) should successfully implement their LDPs and other project supported activities.

iii) Conflict among *Fadama* users should be reduced by at least 50% compared to the baseline.

In order to achieve these outcomes, the project had five components namely: Capacity Building, Rural Infrastructure Investment, Pilot Productive Asset, Demand-Responsive Advisory Services, and Project Management, Monitoring and Evaluation (NFDO, 2005).

(i) Capacity Building: This aims at increasing the ability of its beneficiaries to assess their needs, participate in planning, and implement and manage economic activities, and at increasing the capacity of the project coordinators to conduct monitoring and evaluation. *Fadama*-II provided capacity building through trained facilitators. In addition, *Fadama* User Groups (FUGs) members were trained to negotiate and manage contracts and to conduct basic financial analysis. Apart from capacity building support to *Fadama* Community Associations (FCAs) and FUGs, the

component inculcated skills and know-how in them to enable them to take charge of their development agenda.

(ii) Rural Infrastructure Investments: The Rural Infrastructure Component was responsible for the creation of economic infrastructure and local production methods in order to improve the productivity of *Fadama* User households. It financed the construction or rehabilitation of eligible small – scale infrastructural projects specified as priorities in Local Development Plans (LDPs) and also larger subprojects that cut across development plans which are considered priorities by the *Fadama* Community Associations. Such infrastructure were: Feeder roads, culvert, drift stock routes, grazing reserve and service centres. Others were market infrastructure such as VIP latrine, drainages, boreholes, cold rooms, cooling sheds, rice processing, post - harvesting and maize processing equipment.

(iii) Pilot Productive Asset Acquisition Support: The overall objective of this component is to enhance the improvement in *Fadama* Users' productivity and income by facilitating the acquisition of productive assets by individuals or *Fadama* User Groups (FUGs) to mobilize their own funds and by providing matching grants for Income Generating Activities (IGAs) to *Fadama* User Groups. The pilot Scheme promoted the acquisition of productive assets, and reduced the impact of market failures in rural finance sector on the poor *Fadama* User Groups through matching grants. A matching grant of seventy percent (70%) supplemented the beneficiaries' financing share of thirty percent (30%) of the cost of the assets.

(iv) Demand Responsive Advisory Services: This component supported advisory services that enabled *Fadama* Users to adopt output enhancing technologies and more profitable marketing practices in their *Fadama* enterprises. The project financed (a) advisory services that were required for new investment activities in *Fadama* area on request by the User groups (b) advisory services that supported ongoing activities by *Fadama* Users (NFDO, 2007).

(v) Project Management, Monitoring and Evaluation: This lent support to new or existing entities and mechanisms at the state and local government levels for overall project coordination and supervision and helped to strengthen the effectiveness and quality of project operations. The monitoring and evaluation sub-component measured performance at various project milestones and had two components: Management Information Systems (MIS) and Impact Evaluations and Beneficiary Assessment. The project financed consultant services to develop and implement studies to evaluate the impact of the sub–projects and provided feed back to improve project

implementation performance including an impact assessment at the mid–term and end of the project.

Tools in National *Fadama* Development Project

(a) Logical Framework (Logframe): This is a set of interlocking concepts which must be used together in a dynamic way for the planning and implementation of a successful project. The approach allows project planners, monitors and evaluators to specify the components of their activities, state project and identify the logical linkages between a set of means and a set of ends. The local development plan of the *Fadama*-II project is all based on the logical framework demand from the need analysis or the problem tree. The log – frame provides a format for organizing information in order to highlight the relation between ends and means in the project design. It clarifies the project design by bringing out the targets and the indicators of success which form the basis for designing monitoring and evaluation systems (Idefor, 2005; Arene, 2002).

(b) Participatory Rural Appraisal (PRA): This is a contemporary approach used to understand rural needs from the perspectives of community members and the group themselves. The information generated on these needs are analysed by the community and the community goes further to prioritise these needs and design solutions to these needs in the light of available and potential community resources. PRA therefore becomes a potential tool for community and rural development because of its ability to involve rural communities in needs assessment, prioritization, project formulation, design and implementation. It is participatory because the exercises on activities involved are largely community led. PRA techniques are varied and include semi - structured interviews, direct (systematic), observation, diagramming, mapping, transects, ranking, scoring etc. (Okafor, 2004).

(c) Local Development Plan (LDP): The project adopted a demand – driven approach whereby all users of *Fadama* resources are encouraged to develop participatory and socially – inclusive Local Development Plans (LDPs). The various economic interest groups, which include crop farmers, pastoralists, fisher folks, hunters, gatherers, women, youths, other vulnerable groups (widow, elderly, physically impaired and people suffering from ill health), non – farm rural businesses, are expected to participate actively in the development of the LDPs and in their implementation to ensure sustainable increase in the groups' incomes. The LDPs comprise:

a. An agreed list of priority public infrastructure subprojects that are technically and economically feasible, environmentally sustainable, consistent with the existing development plans of local and state government authorities.

b. Opportunity for procurement of eligible productive assets through own funds and matching grants.

c. A list of advisory needs in terms of production and marketing constraints and opportunities

d. An agreed mechanism to manage and resolve conflicts, especially, those concerning *Fadama* Users.

e. Agreed mechanisms for financing the operations and maintenance of subproject investments

f. A plan for training and building the capacity of FCAs in financial management, community – based procurement, social and environmental impact screening of subprojects, and other aspects of organization and management of the associations.

2.1.6 Conceptual Framework for the Study

The conceptual framework for this study is shown in the Figure 2.1 which summaries the link among the various concepts used. Any poverty alleviation programme should lead to changes in average income, changes in income inequality and changes in poverty. There are two scenarios:

(i) Alleviating poverty by changes in average income and (ii) Alleviating poverty by changes in income inequality (Ali and Thorbecke, 1998).

First scenario: The effect of the poverty alleviation programme on the beneficiaries could either decrease (low) or increase (high) their average income. High average income could lead to decrease or increase in income inequality which could also lead to changes in poverty. If high average income leads to decrease in income inequality, the growth is pro-poor and definitely poverty will reduce. But if high average income leads to increase in income inequality, the growth is anti-poor which could lead to increase, decrease or no change in poverty. Similarly, low average income leads to increase in income inequality which could lead to increase in poverty. The growth here is anti-poor.

Second scenario: The effect of poverty alleviation programme on the beneficiaries could either increase or decrease their income inequality. Decrease in income inequality leads to high average income which means the growth is pro-poor and thereby leads to reduction in poverty but if the

effect of the programme on the beneficiaries increases income inequality, the average income would be low which could lead to increase in poverty. The growth here is anti-poor.

Note: A pro-poor growth will reduce poverty more rapidly than an anti-poor growth.

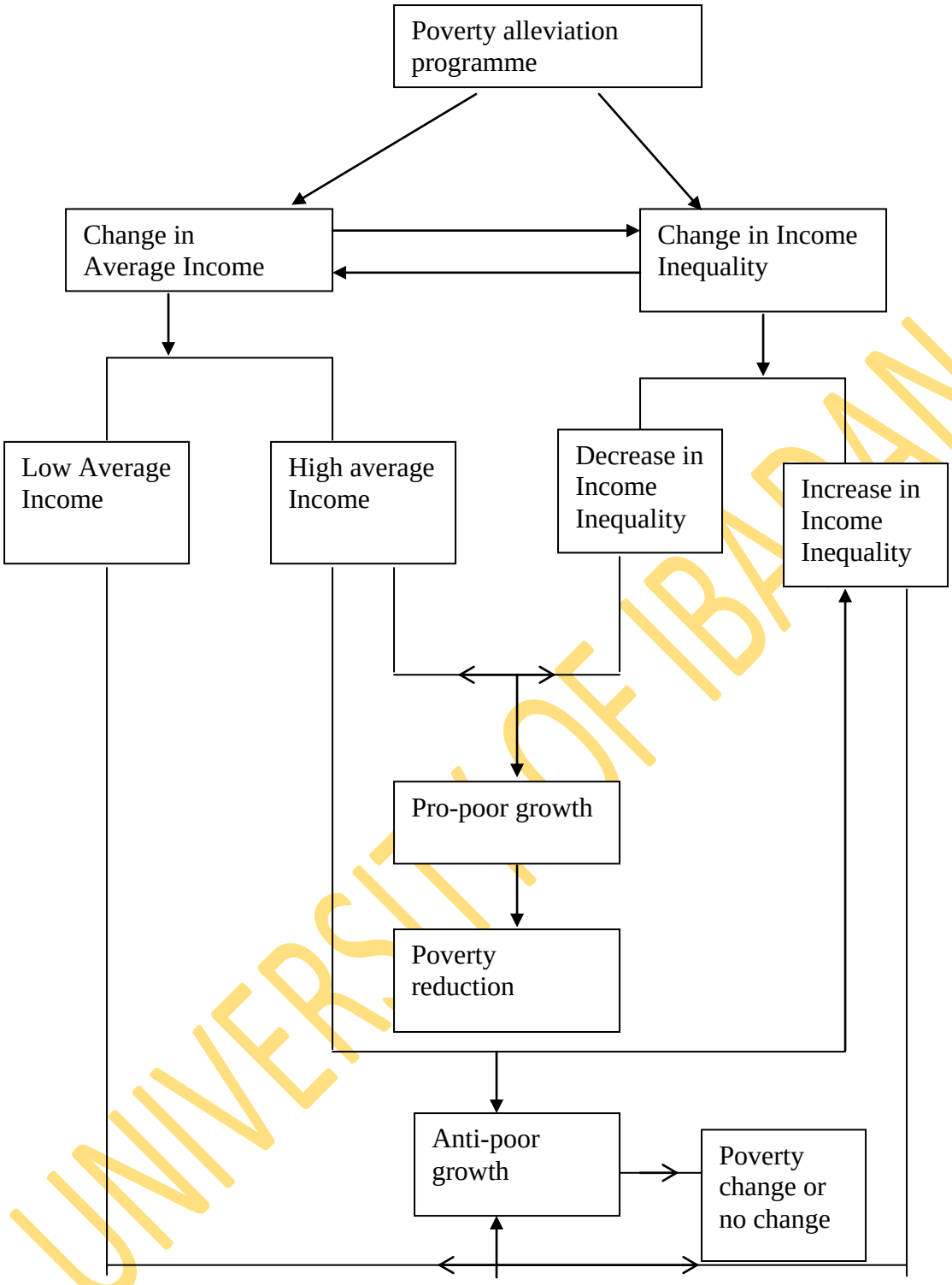

Figure 2.1: Conceptual Framework for the Study
Source: Adapted from (i) Ravallion and Chen (1997), (ii) Goudies and Ladd (1999)

2.2 Analytical / Methodological Review

2.2.1 Impact Assessment

Impact assessment is the process of identifying the consequences of an intervention. It is a means of measuring the effectiveness of organizational activities and judging the significance of changes brought about by those activities. It is used to ensure that projects, programmes and policies are economically viable, socially equitable and environmentally sustainable. Impact assessment could be conducted ex-ante or ex-post. Ex-ante impact assessment is the assessment and monitoring of economic policies and programs before they are enacted or implemented. It involves quantitative techniques that try to predict the various effects of policies while ex-post assessment is carried out after the program or policy has been in place. It is done to observe and precisely identify the direct and indirect effect of a policy to see whether the actual effects were those expected (Bourguignon and Pereira Da Silva, 2003; Todd, 2006).

Impact evaluation can also explore unintended consequences, whether positive or negative on beneficiaries. Of a particular interest is the extent to which project benefits reach the poor and the impact that these benefits have on their welfare. There are three interrelated challenges that impact assessment studies face – establishing a viable counterfactual (the predicted outcome in the absence of the intervention – that is, what would have happened to the beneficiaries had they not participated in the project); attributing the impact to an intervention; and coping with long and unpredictable time lag (Alston and Pardey, 2001; Salter and Martin, 2001). The crucial feature of the evaluation problem for an existing program is that the same person is not observed in both states (hypothetical and counterfactual). This is called the problem of causal inference by some statisticians (Holland, 1986). Therefore, to ensure methodological rigour, measuring programme impact on beneficiaries requires a strategy to estimate the counterfactual state of participants which is by definition unobservable, or what would have happened had the intervention not taken place. Due to the fact that the counterfactual is not observable, impact evaluations must include some form of appropriate comparison or control group (sourcebook2, 2009). To determine the counterfactual, it is necessary to net out the effect of the intervention from other factors, a somewhat complex task. This can be solved using the experimental and non-experimental (Quasi-experimental) approaches.

2.2.1.1 Experimental Approach

Random assignment (or 'experiments') is generally viewed as the most robust evaluation approach (Burtless, 1995). Random assignment operates by creating a control group of individuals who are randomly denied access to a programme. Properly carried out, random assignment creates a control group comprising individuals with identical distributions of observable and unobservable characteristics to those in the treatment group (within sampling variation). Hence, the selection problem is overcome because participation is randomly determined. The mean outcome for those participating in the programme relative to that for those in the control group provides an estimate of the Treatment on the Treated (TT). While this is the parameter most commonly examined using random assignment, it is possible to design experiments in such a way as to derive estimates of Average Treatment Effect (ATE) (White and Lakey, 1992). Newman *et al* (1994) emphasize that "whenever a project is of sufficient interest to policymakers to warrant an impact evaluation, program designers ought to consider randomized control design because this methodology yields the most robust results." Randomization protects internal validity by ensuring that participation is completely exogenous and thus uncorrelated with other pertinent variables or the error term in a regression (Bryson *et al*, 2002).

At the practical level, experiments are often costly and require close monitoring to ensure that they are effectively administered. They may also require informing potential participants of the possibility of being denied treatment. The potential for denying treatment can pose ethical questions that are politically sensitive. These may reduce the chances of an experiment being considered as a means of evaluating a programme and may increase the chances of those responsible for delivery of the programme being reluctant to cooperate. There are also practical problems that can bias the estimates. It may be that the implementation of the experiment itself alters the framework within which the programme operates. This is known as 'randomisation bias' and can arise for a number of reasons (Heckman and Smith, 1995). For instance, if random exclusion from a programme demotivates those who have been randomised out, they may perform more poorly than they might otherwise have done, thus artificially boosting the apparent advantages of participation. Furthermore, those receiving treatment may drop out of the programme. In this case, random assignment does not identify treatment on the treated but instead identifies the mean effect of 'intent to treat'. This may or may not be of direct policy

interest. Conversely, those denied treatment may choose to participate in programmes that are effective substitutes for the programme under evaluation. With both programme dropout and comparison group substitution, non-experimental methods can be used to retrieve the desired parameters (Bryson *et al*, 2002).

2.2.1.2 Non-Experimental/Quasi–Experimental Approach: this includes traditional regression estimators, control function, instrumental variables and propensity score matching. They are described as follows:

(A) Traditional Regression Estimators: Before- After Estimators; Cross-section Estimators, Difference in Difference Estimators and Within Estimators. Non experimental estimators of program impact typically use two types of data to impute the missing counterfactual outcomes for program participants: data on participants at a point in time prior to entering the program and data on non- participants. Traditional regression estimators use non-experimental data.

(i) Before- After Estimators: The evaluation problem can be viewed as a missing data problem, and is being addressed by using pre-program data to impute the missing counterfactual outcomes for program participants (Todd, 2006). The essential idea of the before-after estimator is to compare the outcomes of a group of individuals after participating in a program with outcomes of the same or a broadly equivalent group before participating and to view the difference as the estimate of Treatment on the Treated (TT). Before-after estimators concern themselves with selection on unobservable (Bryson *et al*, 2002). The before-after estimator eliminates the individual effects. An advantage of before-after estimator relative to other classes of estimators is that it can be implemented even when data are available only on program participant at a minimum; two cross-sections of data, one pre-program and post-program are required to implement the estimator. A major drawback of before-after estimators is that it is impossible to separate effects of the program from other general time effects on outcome.

(ii) Cross –Section Estimators: This uses data on a comparison group of non-participants to impute counterfactual outcomes for program participants. The data requirements of this estimator are minimal, only post-program cross section data on participants and non-participants.

(iii) Within Estimators: these identify program impact from changes in outcomes within some unit, such as individual, a family, a school or a village. If longitudinal data is used, Before-After and Difference in Difference Estimator (DID) estimators are examples of within estimators.

(iv) Difference in Difference Estimator (DID): It is commonly used in evaluation work. It measures the impact of the program intervention by the difference in the before- after change in outcomes between participants and non-participants, which requires pre-and post-program data on program participants and non-participants. Alternatively, the DID estimator is often implemented using a regression. This operates by comparing a before-after estimate for participants with a before-after estimate for non-participants and regarding the difference as TT. The advantage of the DID estimator is that it also removes the trend effects that is, nets out the effects of any factors (whether observable or unobservable) that have fixed (time-invariant) and additive impacts on the outcome indicator (Ravallion 2005). In principle, this approach can be used to assess program impact without using PSM, and will produce unbiased estimates of impact as long as these assumptions hold. However, if the program has differential impacts on people having different wealth or other observable characteristics, the simple DD estimator will produce biased estimates if participant and non-participant households differ in these characteristics (Heckman *et al*, 1998). DID require pre and post-program data on program participants and non-participants. It could be Longitudinal or repeated cross section data

(B) Control Function Methods: This is also known as generalized residual methods. They are usually defined within the context of an econometric model for the outcome process. They explicitly recognize that non-random selection into the program gives rise to an endogeneity problem in the model and try to obtain unbiased parameter estimates by modeling the source of the endogeneity.

(C) Instrumental Variables: The IV method is possible when a variable can be identified that is related to participation but not outcomes. This variable is known as the 'instrument' and it introduces an element of randomness into the assignment which approximates the effect of an experiment. Where it exists, estimation of the treatment effect can proceed using a standard instrumental variables approach. Where variation in the impact of treatment across people is not correlated with the instrument, the IV approach recovers an estimate of impact of Treatment on

the Treated (TT). However, if the variation in gains is related to the instrument, the parameter estimated is Local Average Treatment Effect (LATE) (Imbens and Angrist, 1994). If the policy under consideration is a marginal increase or decrease in the costs of participation, then LATE is the parameter of interest. The main drawback to the IV approach is that it will often be difficult to find a suitable instrument because, to identify the treatment effect, one needs at least one regressor which determines program participation but is not itself determined by the factors which affect outcomes (Blundell and Costa Dias, 2000; Heckman, 1995).

(D) Propensity Score Matching (PSM): The idea behind matching is simply to select a group of non-beneficiaries in order to make them resemble the beneficiaries in everything. If such resemblance is satisfactory, the outcome observed for the matched group approximates the counterfactual, and the effect of the intervention is estimated as the difference between the average outcomes of the two groups. The fundamental assumption for the validity of matching is that, when observable characteristics are balanced between the two groups, the two groups are balanced with respect to all the characteristics relevant for the outcome. The larger the number of available pre-intervention characteristics, the better the chance that this assumption holds true. The existence of a substantial overlap between the characteristics of beneficiaries and non-beneficiaries (common support) is another requirement for the applicability of this method (sourcebook2, 2009). The method of matching has an intuitive appeal because by constructing a control group and using difference in means, it mimics random assignment. The crucial difference with respect to an experiment is that in the latter the similarity between the two groups covers all characteristics, both observable and unobservable, while even the most sophisticated matching technique must rely on observable characteristics only. The propensity score matching was proposed by Rosenbaum and Rubin (1983), who suggested matching beneficiaries and non-beneficiaries solely on their 'propensity score' – the estimated probability of being a beneficiary given observable characteristics. This reduces the matching from a multi-dimensional problem (where the number of dimensions depends on the number of available variables) to a one-dimensional problem. Intuitively, each beneficiary is matched to the non-beneficiary who is most similar in terms of probability of being a beneficiary, where this probability is calculated on the basis of individual characteristics. Once the two groups are formed, the average effect is estimated for each outcome by simply computing the difference in means between the two

groups. Also PSM has some advantages over econometric regression methods since it compares only the comparables it does not rely on parametric assumptions to identify the impact of projects. However, PSM is subject to the problem of "selection on unobservables", meaning that the beneficiary and comparison groups may differ in unobservable characteristics, even though they are matched in terms of observable characteristics. Econometric regression methods have been devised to address this problem, although these suffer from the problems noted above. It has been reported that the bias resulting from comparing non-comparable observations can be much larger than the bias resulting from selection on unobservables (Heckman *et al*, 1998), although one cannot say whether this conclusion holds in general (Nkonya *et al*, 2007).

2.2.2 Counterfactual Framework

In a counterfactual framework, the quantity of interest is the average treatment effect defined by Rosembaum and Rubin (1983). If a project's outcome indicator is household income, the average impact of a project on the beneficiaries (referred to in the impact assessment literature as the average effect of the treatment on treated (ATT)) is defined as the difference between the expected income earned by project beneficiaries while participating in the project and the expected income they would have received if they had not participated in the project as:

$$ATT = E(Y_1|p = 1) - E(Y_0|p = 1) \text{ ----------(1)}$$

Where,

ATT = average impact of treatment on the treated; p = participation in the project (p = 1 for participation in the project and p = 0 for non-participation in the project)

Y_1 = outcome (household income in this example) of the project beneficiary after participation in the project; and Y_0 = outcome (income) of the same beneficiary if he/she had not participated in the project.

Unfortunately, the counterfactual income of the beneficiaries had they not participated in the project cannot be observed (E (Y_0|p=1). Simply comparing incomes of households that are participating in the project and those that are not can result in serious biases, since these two groups may be quite different and hence likely to have different incomes regardless of their participation in the project. For example, adding and subtracting E (Y_0|p=0) on the right hand side of equation (1), it gives:

$$ATT = [E(Y_1|p = 1) - (E(Y_0|p = 0)] - [E(Y_0|p = 1) - (E(Y_0|p = 0)] \text{----------} (2)$$

The first expression (in the first square bracket) is observable since it is the difference of income of the beneficiaries and non-beneficiaries. The second expression (which is unobservable because E ($Y_0|p = 1$) is unobservable) represents the bias resulting from estimating ATT as the first expression. This bias results because the income that non-beneficiaries receive without the program may not be equal to the income that beneficiaries would have received without the program (that is, E ($Y_0|p = 1$) is not equal to (E ($Y_0|p = 0$)).

Two common sources of bias are program placement or targeting bias, in which the location or target population of the program is not random (e.g., some subprojects of *Fadama*-II are targeted to the poor and vulnerable so that wealthier groups do not have an equal chance of participating); and self-selection bias, in which households choose whether or not to participate, and thus may be different in their experiences, endowments and abilities. The most accepted method to address these problems is to use an experimental approach to construct an estimate of the counterfactual situation by randomly assigning households to treatment (beneficiary) and control (non-beneficiary) groups which is described in sub section 2.2.1.1 above.

Such an approach is not feasible in the present study, since program placement and participation decisions were already made prior to design of this study, and are unlikely to have been random. The notion of random assignment also conflicts with the nature of this CDD program, in which communities and households make their own decisions about whether to participate and what activities they will pursue; thus limiting the ability to use this approach even from the onset.

One of the most commonly used quasi-experimental methods is propensity score matching (PSM), which selects project beneficiaries and non-beneficiaries who are as similar as possible in terms of observable characteristics expected to affect program participation as well as outcomes. The difference in outcomes between the two matched groups can be interpreted as the impact of the project on the beneficiaries (Smith and Todd, 2005). This method was used to estimate the ATT for impact of the Fadama II project on household incomes and poverty.

However, PSM is subject to the problem of "selection on unobservables", meaning that the beneficiary and comparison groups may differ in unobservable characteristics, even though they are matched in terms of observable characteristics (Heckman *et al*, 1998). In this study, the

problem of selection on unobservables was addressed by combining PSM with the use of the double-difference (DD) estimator. By combining PSM with the DD estimator, differences in pre-project observable characteristics can be controlled. There still could be a bias due to heterogeneous or time varying impact of the unobservable differences between participants and non-participants. Such shortcomings are unfortunately inherent in all non-experimental methods of impact assessment. There is no perfect solution to these potential problems, and we believe the method we have used addresses these issues as well as possible in this case.

2.2.3 Measurement of Inequality

There are many ways of measuring inequality, all of which have some intuitive or mathematical appeal (Litchfield, 1999). According to Cavendish (1999), measures of inequality can be broadly classified into normative and positive measures. Normative measures are derived by imposing restrictions on the inequality function derived from explicitly stated ethical beliefs underlying the societies' concern for inequality while in the case of positive measures, the indices summarise features of statistical dispersion in income distribution. However, both measures fail basic ethical criteria for use as inequality indices. Examples of normative measures include the generalized entropy class of inequality index and the Atkinson index while examples of positive measures include relative mean deviation, coefficient of variation, variance of logarithms and Gini coefficients. One of the above examples is elucidated upon in the following paragraphs.

(a) Generalized Entropy class of Inequality Index: The three GE measures- GE(0), GE(1) and GE (2) are distinguished by the different weights attributed to distances between incomes in different parts of the income distributions. GE(0) gives more weight to distances in the lower end of the distribution, GE (1) gives equal weight across the distribution and GE(2) gives more weight to distances in the upper part of the distribution. GE(0) is also known as the mean log deviation, GE(1) as the Theil index and GE(2) as half the squared coefficient of variation. This index does not have a straightforward representation and lacks the appealing interpretation of the Gini coefficient.

(b) Gini Coefficients of Inequality*:* The Gini coefficient can be defined as the average difference between all possible pairs of income in the population, expressed as a proportion of total income"

(Cowell, 2000). This is the most commonly used measure of inequality. The coefficient varies between 0, which reflects complete equality, and 1, indicating complete inequality (one person has all the income or consumption; all others have none).

There are several conditions that an inequality measure has to satisfy. Following Shorrocks (1980) and others, the chosen measure for decomposition should have six basic properties. They are: (1) Pigou-Dalton transfer sensitivity; (2) Income scale independence; (3) Principle of population (4) Symmetry; (5) decomposability and (6) statistical testability.
These axioms are described as follows:

- The Pigou-Dalton Transfer Principle: Pigou (1912) and Dalton (1920) proposed Pigou-Dalton Transfer Principle. This axiom requires the inequality measure to rise (or at least not fall) in response to a mean-preserving spread: an income transfer from a poorer person to a richer person should register as a rise (or at least not as a fall) in inequality and an income transfer from a richer to a poorer person should register as a fall (or at least not as an increase) in inequality. Most measures in the literature, including the Generalized Entropy class, the Atkinson class and the Gini coefficient, satisfy this principle, with the main exception of the logarithmic variance and the variance of logarithms (Litchfield, 1999)
- Income Scale Independence: This requires the inequality measure to be invariant to uniform proportional changes: if each individual's income changes by the same proportion then inequality should not change.
- Principle of Population: This requires inequality measures to be invariant to replications of the population: merging two identical distributions should not alter inequality
- Symmetry: This axiom – sometimes also referred to as 'Anonymity' - requires that the inequality measure be independent of any characteristic of individuals other than their income (or the welfare indicator whose distribution is being measured).
- Decomposability: This requires overall inequality to be related consistently to constituent parts of the distribution, such as population sub-groups. Inequality is decomposed by sub-groups, income sources, causal factors and by other socio - demographic characteristics. Gini Coefficient that was adopted in this study because satisfies all the conditions (World Bank, 1999).

2.2.4 Measurement of Poverty

The poverty measure is a statistical function that translates the comparison of the indicator of household well-being and the chosen poverty line into one aggregate number for the population as a whole or a population subgroup (Coudouel *et al*, 2002). A lot of models have been designed to measure poverty. These are: the Sen Index (Sen 1976), Foster, Greer and Thorbecke-FGT weighted poverty measure (Foster *et al*, 1984), Human Development Index (HDI) UNDP, 1990), the Food Security Index (FSI), Integrated Poverty Index (IPI), Basic Needs Index (BNI), and Relative Welfare Index (IFAD, 1993). The most prominently used poverty measure is the Foster, Greer and Thorbecke (1984) class of poverty measures including the Headcount Index or Incidence of poverty P(0), the Poverty Gap Index P(1), and the severity of Poverty Index P(2). The Foster-Greer-Thorbecke index is a weighted sum of the poverty gap ratios of the poor. In contrast with Sen index, the weights do not depend on the "ordering rank" of the poor but on the poverty gap ratios themselves. In other words, the contribution of an individual to the poverty measure depends only on the distance between his income and the poverty line and not on the number of individuals that lie between him and the poverty line. The Foster-Greer-Thorbecke index satisfies the *monotonicity axiom* (i.e., a reduction in a poor person's income, holding other incomes constant, increases the poverty index), and the *transfer axiom* that is, the index increases whenever a pure transfer is made from a poor person to someone with more income (Aguirregabiria, undated). The three FGT indices can be expressed into one general form and distinguished by the different weights attributed to the distance between income of the poor and the poverty line. They are described below:

(a) Headcount Index P(0)**:** This is the share of the population whose income or consumption is below the poverty line, that is, the share of the population that cannot afford to buy a basic basket of goods.

(b) The Poverty Gap Index P(1): This provides information regarding how far off households are from the poverty line. This measure captures the mean aggregate income or consumption shortfall relative to the poverty line across the whole population. It is obtained by adding up all the shortfalls of the poor (assuming that the non-poor have a shortfall of zero) and dividing the total by the population. In other words, it estimates the total resources needed to bring all the poor to the level of the poverty line (divided by the number of individuals in the population). Poverty gap can also be used as a measure of the minimum amount of resources necessary to

eradicate poverty, that is, the amount that one would have to transfer to the poor under perfect targeting (that is, each poor person getting exactly the amount he/she needs to be lifted out of poverty) to bring them all out of poverty.

(c) Poverty Severity P(2): This takes into account not only the distance separating the poor from the poverty line (the poverty gap), but also the inequality among the poor. That is, a higher weight is placed on those households further away from the poverty line. The measure of depth and severity are important compliments of the incidence of poverty. The poverty depth and severity are particularly important for program evaluation (Coudouel *et al*, 2002; Verme, 2003).

2.2.5 Measurement of Pro-poor Growth

The Measurement of pro-poor growth involves measuring how poverty responds to income growth and to changes in income distribution (Nallari and Griffith, 2006). Some researchers have proposed different measures of pro-poor growth. For instance, McCulloch and Baulch (2000) proposed a measure of pro-poor growth called Poverty Bias of Growth (PBG); Kakwani and Pernia (2000) proposed an index called Pro-poor Growth Index (PPGI); Ravallion and Chen (2003) used a Growth Incidence Curve (GIC); Son (2004) proposed a Poverty Growth Curve (PGC); later Kakwani *et al*, (2004); proposed another pro-poor growth measure called the Poverty Equivalent Growth Rate (PEGR). A brief exposition on each index is presented:

A. Poverty Bias of growth: This measure pays particular focus on reducing inequality. It is derived from the negative of the inequality component obtained from the symmetric poverty decomposition methodology, which was suggested by Kakwani (2000) where the change in poverty was decomposed into growth and distribution effects. The growth effect measures the change in poverty when the distribution of income does not change, whereas the distribution effect captures the change in poverty when inequality changes in the absence of growth. The latter can be either negative or positive depending on whether growth is accompanied by improving or worsening inequality. To evaluate whether growth is pro-poor (or antipoor), the PBG measures the extent to which the observed pattern of growth deviates from a distribution-neutral benchmark.

McCulloch and Baulch (2000) provide a measure of pro-poor growth by comparing the actual distribution of income with the one that would have occurred under the distribution-neutral scenario. In this respect, their measure reflects a relative approach to defining pro-poor growth. A

problem with the PBG is that this measure does not always meet the monotonicity criterion. Higher values of the PBG may not imply greater reduction in poverty because poverty also depends on the growth effect. As such, if it is assumed that the growth effect is constant (which is highly unlikely), then the PBG measure will satisfy the monotonicity criterion.

B. Pro-Poor Growth Index: Like McCulloch and Baulch (2000), Kakwani and Pernia (2000) use the idea of poverty decomposition to show that poverty reduction depends on both the rate of growth and the change in income distribution. They consider that growth is pro-poor when the benefits of growth that accrue to the poor are proportionally more than those received by the non-poor. They also argue that a pro-poor growth scenario would occur if growth reduces poverty, and inequality is decreased concurrently during the course of growth. To measure the degree of being pro-poor, Kakwani and Pernia propose what is known as a Pro-Poor Growth Index (PPGI). This index shows the relation between total poverty reduction and poverty reduction that results from a distribution-neutral growth. This relation is expressed in the ratio of poverty elasticities. When a growth scenario is pro-poor, PPGI is greater than one. The PPGI lies between zero and one in the case of trickle-down. Like the PBG, the PPGI is merely an index that does not address the criterion of monotonicity.

C. Growth Incidence Curve and Poverty Growth Curve: To show whether a growth process is pro-poor, Ravallion and Chen (2003) define a Growth Incidence Curve (GIC) that indicates the growth rates in income at different percentile points. If the curve is positive at all percentile points, then there is an unambiguous reduction in poverty between two periods. It is also implied that as the GIC shifts upward at all points, the reduction of poverty is greater. The GIC has two limitations. First, Ravallion and Chen (2003) define the pro-poor growth rate as the area under the GIC up to the headcount ratio, which is shown to be equal to the change in the Watts Poverty Index (WPI). Hence, GIC (unlike the PEGR) can be defined only for the Watts poverty measure. Second, the GIC violates the monotonicity criterion. This occurs because Ravallion and Chen estimate their pro-poor growth measure using numerical integration up to the headcount ratio in the initial period. Their measure does not utilize the poverty rate in the terminal period.

Kakwani and Son (2007) have proven that Ravallion and Chen's measure satisfies the monotonicity axiom under highly restrictive situations. These situations may occur: (i) when

growth rates are positive or negative at all percentiles below the headcount ratio at initial period; and (ii) when nobody crosses the poverty line between the base and terminal period. Later, Son (2004) proposed a Poverty Growth Curve (PGC). The PGC can be estimated by the growth rate of mean income of the poor up to the pth percentile. Like the GIC suggested by Ravallion and Chen (2003), however, the PGC may be classified as a partial definition of pro-poor growth. As such, the PGC may not always provide conclusive results on the nature of pro-poor growth. Nevertheless, this curve can be computed without knowing a poverty line or poverty measure. Compared to the GIC, moreover, the PGC will always give more stable results: while the latter is derived from cumulative mean incomes, the former estimates income at each percentile. Estimating the mean at each percentile tends to be highly unstable.

D. Poverty Equivalent Growth Rate: While the PPGI captures the distribution of growth benefits among the poor and non-poor, the index does not take into account the level of the actual growth rate. In response to this, Kakwani and Son (2007) proposed another pro-poor growth measure called the Poverty Equivalent Growth Rate (PEGR). The PEGR is defined as the growth rate that will result in the same level of poverty reduction as the present growth rate if the growth process had not been accompanied by any change in inequality (when everyone in the society receives the same proportion of benefits from growth). The PEGR is derived by multiplying PPGI by the growth rate of mean income. Growth is pro-poor (anti-poor) if the PEGR is greater (less) than the mean income growth rate. If the PEGR lies between 0 and the mean income growth rate, then growth is accompanied by an increasing inequality wherein poverty still declines. This situation may be characterized as a trickle-down process when the poor receive proportionally less of the benefits of growth than the non-poor. The difference between the PEGR and the benchmark growth rate (that is, actual growth rate of mean income) captures gains or losses of the growth rate due to changes in the distribution of income. The gains imply pro-poor growth, while the losses imply anti-poor growth. An attractive feature of the PEGR is that it links the changes in inequality with the gains or losses of the growth rate: a decrease (increase) in inequality leads to gain (loss) in growth rate. The PEGR can be calculated separately for the entire class of poverty measures including the headcount ratio, poverty gap ratio, severity of poverty index, and Watts's measure. An advantage of this measure is that it addresses both the magnitude of growth and the benefits of growth the poor receive.

Moreover, the PEGR satisfies the basic monotonicity criterion such that the proportional reduction in poverty is a monotonically increasing function of the PEGR. To accelerate the reduction in poverty, it is suggested that the PEGR be maximized, rather than the growth rate alone. While Kakwani and Son (2007) draw from the earlier study by Kakwani and Pernia (2000), they differ in that the former defines pro-poor growth in both relative and absolute terms while the latter uses only a relative approach. Kakwani and Pernia's definition of pro-poor growth is relative in the sense that the rate of pro-poor growth implies a reduction of relative inequality. In addition to the relative approach, Kakwani and Son take a step further by defining the absolute poverty equivalent growth rate.

This study adopts PEGR to measure the pro-poorness of *Fadama*-II project because it satisfies the axiom of monotonocity which others fail to satisfy. It also takes into account the limitation underlying the PPGI measure (that is, it captures the level of actual growth rate which PPGI fails to capture).

2.3 LITERATURE REVIEW

2.3.1 Empirical Review on Inequality, Growth, Poverty and Pro-poor Growth

De Janvry and Sadoulet (1999) analysed the role of aggregate income growth on changes in urban and rural poverty and inequality using secondary data which covered 1970-94 periods for 12 Latin American countries. The data were analysed using FGT and Gini coefficient. The study found out that income growth is only effective in reducing poverty and inequality if the initial levels of inequality and poverty are not too high and if educational levels are sufficiently high. If these conditions do not hold, the beneficial effects of growth for poverty and inequality reduction are wasted. The study also showed that there is an asymmetry in the effect of income change on poverty and inequality. Finally, it showed that income growth following structural adjustment reforms is more effective in reducing poverty than income growth under import substitution industrialization policies, but that it remains ineffective in reducing inequality. While they see no evidence that growth per se has increased inequality, results indicate that current concerns with high levels of inequality in Latin America cannot be met by simple reliance on aggregate income growth.

Agrawal (2008) empirically examined the relation between economic growth and poverty alleviation in the case of Kazakhstan using province-level data. The study showed that provinces

with higher growth rates achieved faster decline in poverty. This happened largely through growth, which led to increased employment and higher real wages and contributed significantly to poverty reduction. It is also shown empirically that increased government expenditure on social sectors did contribute significantly to poverty alleviation. This suggests that both rapid economic growth and enhanced government support for the social sectors are helpful in reducing poverty.

Oyekale *et al* (2006) examined income inequality in Nigeria using the Gini coefficient and Shapely Gini decomposition approaches. Results showed that in 2004, income inequality was higher in rural areas than in urban areas. The study also noted that income inequality worsened between 1998 and 2004 in most of the States leading to increased poverty incidence and depth. Income growth reduced poverty where growth rates of the real income were positive. The study recommended that development of programmes that will boost the income levels of the poor is desirable for both redistribution and poverty alleviation purposes.

Kakwani and Pernia (2000) used Pro-poor growth index to analyze the nature of economic growth in three countries, namely, Lao PDR, Thailand, and Korea. The results indicate that growth in Korea has generally been highly pro-poor. By comparison, growth in Lao PDR and in Thailand has not been strictly pro-poor, although it has resulted in considerable poverty reduction. As expected, growth in rural areas has been more pro-poor than in urban areas. They note further that economic crisis inflicted proportionally more harm on the poor than on the non-poor in these three countries.

Kakwani *et al* (2004) in their study on pro-poor growth used PEGR to analyze pro-poor growth in three country case studies; in the first country Korea, before her financial crisis PEGRs were higher than the actual growth rate between the periods of 1990-1997. This shows that the growth benefits the poor than the non-poor in the country. However, after the onset of the financial crisis the actual growth rate was greater than the PEGR. This is contrary to the situation before the crisis i.e. the growth was anti-poor. In Thailand the growth was anti-poor between the periods of 1988-1992, while the periods of 1992-1996 showed that PEGR was greater than the actual growth, thus growth is defined as pro-poor between these periods. Also during 1996-2000, Thailand economy was influenced by financial crisis. In the third country Vietnam, during 1992-1997 the PEGRs were consistently higher than the actual growth rate. This shows that the growth

was pro-poor and benefited the poor than the non-poor. This study was able to capture the distribution of growth benefits and the level of actual growth rate in the country.

Nunez and Espinosa (2005) assessed pro-poor growth and pro-poor programs in Columbia using the Poverty Equivalent Growth Rate (*PEGR*) methodology developed by Kakwani *et al* (2004) and Kakwani and Son (2005). The results showed that growth in Colombia has generally been anti-poor, a consequence of high inequality in the urban sector and of low growth rates in the rural sector. Moreover, more than half of Colombia's social programs are also anti-poor, benefiting the non-poor to a larger extent than the poor.

Osinubi and Gafaar (2005) examined the macroeconomic policies and pro-poor growth in Nigeria. The authors empirically evaluate macroeconomic policies vis-à-vis pro-poor growth in Nigeria using secondary data covering the period 1960-2000. Pro-poor growth was analyzed using Pro-poor Growth Index proposed by Kakwani and Pernia 2000. The study found among others that economic growth in Nigeria has been slightly pro-poor. This implied that growth was actually weakly pro-poor. Also, those that are far below the poverty line have not really been enjoying the benefits of growth. Infact, the benefits getting to them were found to be decreasing at an increasing rate. More so, economic growth in rural areas was slightly more pro-poor than in urban areas. Overall, growth in Nigeria is not necessarily always pro-poor. However, they suggested that poverty alleviation in Nigeria should be the highest priority of the government while her poverty alleviating macroeconomic policies should be based on pro-poor growth.

Son (2007) examined the relationships between economic growth, income distribution, and poverty for 17 Asian countries for the period 1981–2001. It deals with two distinct but related issues. First, it investigated how much growth is required to offset the adverse effect of an increase in inequality on poverty. This trade-off between inequality and growth is quantified using a tool called the "inequality-growth trade-off index." The trade-off index measures how much growth in mean income or expenditure will be required to offset a one percent increase in inequality, with poverty remaining unchanged. This is an ex ante analysis based only on one period household survey. Secondly, the paper looked into the issue of pro-poor growth. This is an ex post analysis concerned with whether the growth process in a country has been pro-poor or anti-poor. By using a measure called the "poverty equivalent growth rate", which is a composite index of a level of growth rate and the distribution of benefits of growth, the paper examined both

(i) how growth in mean income or expenditure has fared in Asia, and (ii) how the benefits of growth are distributed between the poor and the non-poor.

The studies under review reveal the relationship among income growth, inequality and poverty in different countries. They also show common methodology used to measure income inequality, poverty and pro-poor growth which are of major interest in this study.

2.3.2 Empirical Review on *Fadama* Project

Several studies have been carried out on Fadama projects but few have assessed their impact on the beneficiaries. These studies are discussed below:

Ayanwale and Alimi (2004) assessed the potential impact of Fadama I project on the participants in terms of their income, access to necessary enabling facilities and general well-being in south-western Nigeria. The study compared the performance of the farmers to the baseline before the project in order to examine their productivity and how the project has affected the income of the participants. Stochastic frontier production function model was utilized to estimate the technical efficiency of the participants, while the income at the baseline was compared to the income after the project. The result of the study revealed that the participants operate at a relatively efficient level of production, that is, they are technically efficient and that the program thus has a potential of alleviating poverty. The study suggested the need to consciously encourage youths into Fadama farming, and that the training, aspect of farming needs to be enhanced to enable the participants tap most of the potential of the farming system. This study only used before and after method to capture the impact of Fadama II project on the participant. It failed to compare with non-participants (counterfactual) to remove problem of evaluation which would have been able to give the impact of the project. Therefore the results of the study are biased because the method used could not separate effect of the program from other general time effect on outcome.

Alimi and Ayanwale (2004) analysed the economic impacts of chemical pesticides use on Fadama crop farming in sudano-sahelian zone, Nigeria. The purpose of the study was to determine the quantity and value of crops saved by chemical pest management and the economic effect of its use in Fadama farming of sudano-sahelian zone of Nigeria. A total of 80 respondents were sampled for the study which is made up of 40 Users and 40 non-users of chemical pesticide through the use of multistage sampling technique. Data were analysed through the use of partial budgeting and marginal analyses, regression technique and sensitivity analysis. The result

indicated that chemical pesticides users obtained higher crop yield and larger output per farmer. Budgetary analysis and regression techniques indicated that chemical pesticides use was economically rational at the present pesticide technology, and relative output prices. The study therefore recommended that the use of chemical pesticide should be encouraged. Although this study compared users and non–users, it failed to compare respondents with similar observable and unobservable characteristics which makes the results to be biased.

Adesoji *et al* (2006) assessed the training needs of *Fadama* farmers for future agricultural extension work development in Osun State. The purpose of the study was to determine the crucial factors affecting the training needs of Fadama farmers. A total of 150 *Fadama* farmers were sampled through a multi-stage random sampling technique from the study. Descriptive statistics and regression analysis were used to analyze the data. All the twenty seven variables were subjected to factor and Principal Component Analysis to isolate the factors. Six factors that were of immense importance to the training needs of *Fadama* farmer were extracted using Kaiser (1958) rule of thumb. Out of the factors isolated, socio-economic factors contributed the highest (21.48%) to the training needs while training related factors had the lowest contribution (5.01%). Other factors are informational factors, credit, resources and culture related factors. Also two important variables or types of education and formal training attended were positively significant to the training needs of the farmers. The study therefore recommended that the extension agents should be encouraged or motivated to train *Fadama* farmers on a regular basis. It also recognized the need for inclusion of *Fadama* farming as a priority area for promotion under Osun State Agricultural Development Policy as a way of keeping the farmers busy throughout the year through diversification of enterprises, improving income generation, employment creation for the unemployed and enhancing food security in the state. This study only examined factors affecting training needs of *Fadama* Farmers and yet made recommendations outside the scope of training needs.

The study of Nwachukwu and Onyenweaku (2007) analysed economic efficiency of *Fadama* Telfairia farmers in Imo State of Nigeria using a Translog Profit Function Approach. The study identified the production systems, estimated the economic efficiency and the determinants. A total of 40 *Fadama* Telfairia farmers were sampled for the study using a multistage random sampling technique. The result showed that majority of the farmers practiced mixed vegetable production while a few adopted sole *Fadama* Telfaria supply system. The profit

level was found to be influenced by fertilizer price, wage rate and farm size, while economic efficiency was found to be influenced by age, farming experience, membership of cooperative societies, farm and household size. The percentage of the frontier farmers is 45.33%, which indicates that they are more or less profit maximisers while the non-frontier farmers represented 48.66% of the sampled farmers. The study recommended the introduction of birth control policies and reviews of Land Use Act of 1990 as a way of improving the efficiency of *Fadama* Talferia farmers. The study only determined the economic efficiency of the beneficiaries but did not assess the impact of the project on the beneficiaries because the sample collected was that of the beneficiaries alone for that year.

Adeoti *et al* (2008) generated optimal farm plans for Fadama farming in the derived savanna zone of Kwara State in Nigeria. The purpose of the study was to generate optimal farm plans that maximize farm income while meeting the objective of the farmer within the resource endowments and economic environment over a period of time. It also seeks to determine the optimum enterprise combination for a representative of farm business; and examine the growth pattern in the whole-farm business over a period of 5 years. A total of 130 farmers were used for the study. The tool of analysis was dynamic programming which is an optimization approach. The study found out that the optimal farm income per 0.45ha is N57,402.76 for the first year and this is expected to increase overtime by 31.06 percent in five years. The study also revealed that the cultivation of non-leafy vegetables like pepper and tomatoes will also increase farm income. The study concludes that *Fadama* farming is profitable with potentials for growth if land is increased and capital reinvested. The study suggested that more land should be made available for *Fadama* farming so as to increase their income. The study only generated optimal plans for *Fadama* farmers and not the impact assessment of the project.

Babatunde *et al* (2008) examined the economics of Fadama maize production in Kwara State, north-central Nigeria. The purpose of the study was to measure the profitability of Fadama maize production using cost-benefit analysis, and to find the determinants of Fadama maize output. A total of 120 Fadama farmers were sampled for the study from Imo local government of ten operating Fadama II project. The result of the gross margin shows that Fadama farming is highly profitable. Analysis of efficiency of resource use shows that purchased input is underutilized by Fadama farmers. Regression estimates show that irrigation water, farm size, capital, purchased inputs and labour have positive relationship with output. The study

recommended that in addition to providing loan for Fadama farmers to procure other necessary inputs, purchased inputs-like seed, agrochemicals and fertilizer, should be given to them to boost their output. Adaptable, simple and low-cost Fadama production technology should be developed for Fadama farmers to reduce the current level of labour inefficiency.

Kudi *et al* (2008) examined the impact of National *Fadama* Development Project II on the socio-economic status and equally assessed the extent to which participation in the programme has enhanced the level of production efficiency of farmers in Giwa Local Government Area of Kaduna State. Primary data collected randomly from 60 *Fadama* farmers were used. The data was analysed using descriptive statistics and stochastic production frontier. The result showed farm size, labour (family and hired) and fertilizer are the most important factors of production. On the average, there is high level of technical efficiency. The study recommended that credit facilities should be made available to more Fadama farmers to acquire water pumps, work skills and other farm implements. The scope of the program should be to incorporate other Fadama communities. The government should also assist the Fadama farmers in covering the high cost of maintain the irrigation facilities. The results of this study are biased because the effect of other project was not net out from the outcome.

Agwu and Abah (2009) investigated attitude of farmers towards cost-sharing in the second National Fadama Development Project (NFDP-II) of Kogi State Nigeria. One hundred respondents were selected through multistage sampling from the Fadama Resource Users Groups (FRUGs) in Lokoja and Idah LGAs of Kogi State. The data were analysed using descriptive statistics such as mean score, percentage, frequency and standard deviation. The findings indicated that the majority (51.5%) of the respondents were in their productive years and that the majority of the farmers had favourable attitude towards cost – sharing of the Fadama II program. However, the level of farmers' participation in the planning, implementation and monitoring activities were very low except in the areas of financial management, maintenance of Fadama investments and proffering conflict mitigation measures. The findings further indicated that late disbursement of funds from the African Development Bank (AfDB), difficulties in collecting money from some farmers/high cost of administration, insufficient credit availability and the tendency of highly placed individuals/politicians to hijack the program by registering personal resource user groups (FRUGs)/Fadama Community Associations (FCAs) were problems militating against the effective implementation of the project. The study recommended the need

to specifically target vulnerable sub-groups such as widows, the elderly, castes and marginal Fadama users through an inclusive participatory planning process to avoid situations of elite capture and conflicts in the on-going *Fadama*-III project.

Adeoye (2010) analysed the impact of rural infrastructure under *Fadama*-II on Agricultural production in Oyo state. Multi-stage sampling was used to collect primary data from 264 farmers. Descriptive statistics, infrastructural index, gross margin and stochastic production function were used to analyse the data. The results showed that gross margin was consistently higher for Fadama II farmers than that of non-*Fadama*-II farmers in both infrastructural developed and under-developed villages. There was a lower technical efficiency for the non *Fadama*-II farmers respectively. Also, regression result shows that infrastructural index, gender and extension contact were negatively related to agricultural production in Oyo State. The study recommended that there was need to improve and intensify extension services for the on-coming *Fadama*-III and any other developmental project. Also infrastructural facilities should be provided to aid development most especially in non-*Fadama* areas. The results of this study were biased in the sense that they failed to address the problem of evaluation.

Olaniran (2010) assessed poverty status of *Fadama*-II and non- *Fadama*- II beneficiaries in Oyo State. A multi-stage random sampling was used to select 427 respondents. Descriptive statistics, FGT poverty decomposition model, Propensity Score Matching technique and probit regression analysis were used in the analysis. Propensity Score Matching was used to select 412 matched sample used for all the analyses. The distribution of income across the three groups revealed that *Fadama*-II beneficiaries earns more than the other groups as the mean monthly income of *Fadama*-II beneficiaries was ₦72,337.5 compared with the mean income of the non-beneficiaries within Fadama (₦ 32,504.6) and the mean income for non-beneficiaries outside *Fadama* (₦48,967.00). The study also noted that *Fadama*-II beneficiaries acquired more productive asset (₦ 170, 021.23) than other respondents in the sample. In terms of poverty profile, the results show general reduction in poverty level among the *Fadama*-II beneficiaries especially among the widow than that of the non-beneficiaries. The study also revealed that poverty decreased as years of education increase. The Probit model result shows that for the pooled respondents, sex, household size, main occupation and Credit significantly affects the probability of being poor. The Probit regression for the non-beneficiaries also revealed that sex, main occupation and assets significantly affect the probability of being poor. The study suggested

that those that are illiterate need to be effectively targeted with adult education and *Fadama* project should be extended to the non-benefiting communities. Despite that the study used Propensity Score Matching to address problem of selection on observable characteristics it has failed to further analyse the impact of this project on the poverty status of the beneficiaries using the counterfactual framework which gives robust estimates.

Oni *et al* (2007) evaluated the impact of *Fadama*-II project on the beneficiaries in Oyo state. Three hundred *Fadama* user households were sampled for two periods (2005 and 2006). Descriptive, double difference estimator and Forster, Greer and Thorbecke poverty analysis were used in analyzing the data. The result of FGT showed that *Fadama*-II beneficiaries as at 2005 and 2006 had the least poverty headcount, poverty depth and poverty severity estimates as compared with the poverty estimates of Fadama II non beneficiaries living within and outside *Fadama*-II LGAs. Also poverty was more severe among *Fadama* users during 2006 than 2005. The result of Gini coefficient reveled that *Fadama*-II beneficiaries had the same level of income inequality as at 2005 and 2006. The income inequality level of Fadama II beneficiaries though high at 0.56 is however lower than those of the non-beneficiaries living within and outside *Fadama*-II LGAs. The study suggested the need for the project in the next phase (that is *Fadama*-III) to put more effort in targeting the right set of beneficiaries. The study used double difference estimators to address the problem of selection on unobservable characteristics but failed to address the problem of selection on observable characteristics hence, the likelihood of biasness in the result. It also failed to assess the impact of the project on the beneficiaries using the counterfactual framework.

Nkonya *et al* (2007) assessed the impact of *Fadama*-II project on beneficiaries in Nigeria. This study used Propensity Score Matching (PSM) to select 1728 comparable project beneficiaries and non-beneficiaries. The study also used double difference (DD) method to compare the impact indicators. The results showed that *Fadama*-II project succeeded in targeting the poor and women farmers in its productive asset acquisition component. Participation in the project also increased the income of beneficiaries by about 60 per cent. Regarding rural infrastructure investments, the study found out that *Fadama*-II project had positive mid-term impacts on beneficiaries' access to markets and transportation costs, although there are surprising effects on beneficiaries' commercial behavior and statistically insignificant impact on non-farm activities. Also observed that *Fadama*-II increased the demand for post-harvest handling

technologies but did not have a significant impact on the demand for financial management and market information. *Fadama*-II reduced the demand for soil fertility management technologies. The study suggested the need for the government and donors to pool resources and initiate multi-pronged CDD projects rather than many isolated projects. Although this study addressed the issue of biasness using both PSM and DD methods, it used income to capture welfare of the respondents and used tercile to determining the poverty status of respondents which prevented the study from determining poverty gap and severity, an effective tool for policy. The study addressed the evaluation problem and used the counterfactual outcome framework to show the impact of the project on the outcome which is defined in the modern policy evaluation literature as the Average of the Treatment on the Treated (ATT). This enabled it address problem of selection on observable -PSM and unobservable characteristics-DD. Also counterfactual outcome framework (ATT) helps to further reduce bias estimates. However, the study failed to disaggregate into states level and did not use FGT measure of poverty to assess the impact of the project on the poverty status

Majority of the studies under review except Nkonya *et al* (2007) and Olaniran (2010) did not address evaluation problems which make their results to be biased. They also failed to make use of counterfactual framework to address the issue of impact of the project on the beneficiaries and give a robust estimate. Therefore, this study makes use of both PSM and DD to address evaluation problems and counterfactual framework to determine the impact of the project which gives robust estimates.

CHAPTER THREE

METHODOLOGY

This chapter presents the methodological framework adopted for the study. The sub-sections deal with area of study, nature and sources of data, the scope of data, and analytical procedure.

3.1 Area of Study

Nigeria is a country in West Africa that has a population of about 140 million with an average population growth rate of about 2.7%. It occupies a land area of 923,768 square kilometers situated between longitude 3^o and 15^o east, and latitude 4^o and 14^o north. The country is bounded on the West by the Republic of Benin; on the East by the Cameroon Republic; on the North by Niger and Chad Republics and on the South by a vast coastline of the Atlantic Ocean. The 1999 Federal constitution decentralized and distributed power among the federal, 36 states and 774 local governments (Nigeria- National Report, 2006). Rural living and agriculture-dependent livelihoods are strongly associated with poverty in Nigeria. While oil dominates the Nigerian economy (generating 70% of fiscal revenues and earning 90% of its foreign exchange), the agriculture sector employs the vast majority (over 70%) of the Nigerian workforce (Bird, 2005). Farms are the main livelihood asset (Hillhorst and Ogwumike, 2003).

Eighteen states of the federation including the federal capital territory were part of NFDP II project but in this study World Bank supported *Fadama*-II benefiting States were considered. They include Lagos, Ogun, Imo, Adamawa, FCT, Oyo, Taraba, Bauchi, Gombe, Kaduna, Kebbi, Niger and the six states funded by the African Development Bank are Borno, Jigawa, Katsina, Kwara, Kogi and Plateau. The World Bank supported states were considered in this study because of data availability and extent of implementation compared with AfDB states (Figure 3.1).

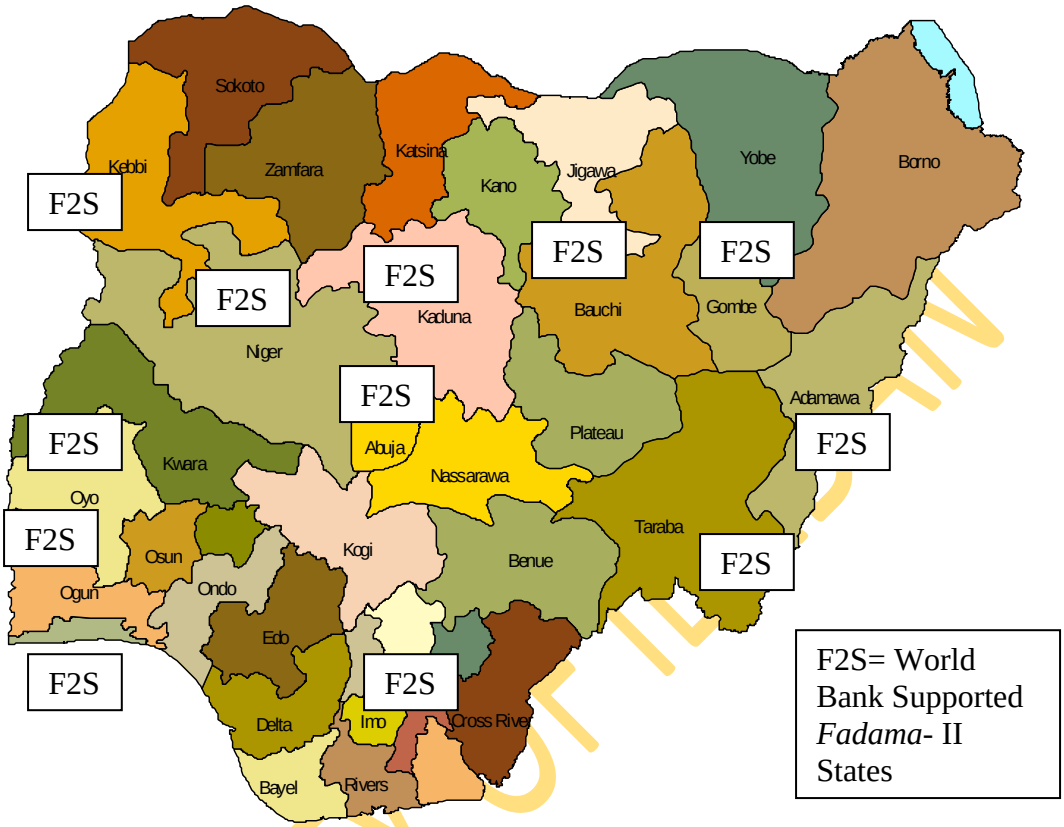

Figure 3.1: Map of Nigeria Showing World Bank Supported *Fadama*-II States

Source: Nkonya *et al*, 2007

3.2 Nature of Data

Secondary data collected by the International Food Policy Research Institute from the twelve World Bank supported *Fadama*-II States in 2006/2007 farming year were used in the study. These States lie in three major agroecological zones; the humid forest (Lagos, Ogun and Imo); moist savannah (FCT, Oyo, and Taraba) and dry savannah (Adamawa, Bauchi, Gombe, Kaduna, Kebbi, and Niger) zones. In each of the 12 benefiting states, the project was implemented in 10 selected Local Government Areas (LGAs).

The sample design was multi-stage sampling. This involved stratification of the sampling frame into three strata: (i) *Fadama*-II project participants; (ii) respondents who live in *Fadama*-II project communities but did not participate directly in the project (but who may benefit indirectly); and (iii) respondents who live in areas outside the *Fadama*-II local government areas (LGAs) but with socio-economic and biophysical characteristics comparable to the *Fadama*-II project communities and in the same state. In developing the sampling frame for the *Fadama*-II FCA, efforts were made to ensure that all 14 Fadama user groups (FUGs) supported by the project were included in the list. The sampling frame of the household survey also considered the gender of the respondents, ensuring that a quarter of the respondents from each FCA were female. The sampling procedure involved listing the Fadama II LGAs in each state and then randomly picking four *Fadama*-II LGAs. One *Fadama* Community Association (FCA) was randomly selected from each of the 4 LGAs and then 25 households were randomly selected from each FCA, summing up to 3,600 household in all. However, some field teams sampled more than 25 households per FCA, summing up to 3750. This is shown in table 3.

A structured survey instrument (questionnaire) was used for the household survey. This survey consisted of baseline data (2005) which were collected using recall information. Because implementation of the project started only a little over a year (September 2005) before the survey was conducted, respondents were expected to remember the baseline data required for two years prior to the survey (i.e., for the crop years October 2004 to September 2005 and October 2005 to September 2006). The data collected include household composition and size, major assets and major components of household income and expenditure (Nkonya *et al*, 2007).

Table 3: Summary of Planned and Realized Household Sampling of Respondents

Type of Respondents	Sample size Planned	Sample size Realized
Fadama II beneficiaries	1200	1281
Fadama II Non-beneficiaries/ within Fadama II LGAs	1200	1240
Fadama II Non-beneficiaries/ outside Fadama II LGAs	1200	1229
Total	3600	3750

Source: Nkonya *et al*, 2007

3.3 Data Analysis

3.3.1 Application of Statistical Matching To Impact Evaluation

The most accepted method to address evaluation problems is to use an experimental approach to construct an estimate of the counterfactual situation by randomly assigning households to treatment (beneficiary) and control (non-beneficiary) groups. Random assignment assures that both groups are statistically similar (i.e., drawn from the same distribution) in both observable and unobservable characteristics, thus avoiding program placement and self selection biases. Such an approach is not feasible in this study, since program placement and participation decisions were already made prior to design of this study, and are unlikely to have been random. The notion of random assignment also conflicts with the nature of this CDD program, in which communities and households make their own decisions about whether to participate and what activities they will pursue; thus limiting the ability to use this approach even from the onset. Propensity Score Matching one of the most commonly used quasi-experimental methods was used to address the evaluation problem (Nkonya *et al*, 2007).

Main steps involved in the application of statistical matching to impact evaluation

i Estimating the propensity score

ii Matching the unit using the propensity score

iii Assessing the quality of the match

iv Estimating the impact and its standard error

The first three steps have been done by Nkonya *et al* (2007) to select the matched sample size of 1738 used in this study. The sample collected was matched using Propensity Score Matching (PSM); the aim of PSM is to find the comparison group from a sample of non-participants that is closest to the sample of program participants so as to get the impact of the project on the beneficiaries. The procedure is enunciated below.

3.3.1.1 Estimating the Propensity Score (PS)

The propensity score is defined as the conditional probability of receiving a treatment given pre-treatment characteristics (Rosenbaum and Rubin, 1983). The propensity scores were computed using binary Probit regression models given as:

$$P(X) \equiv Pr\{D=1/X\} = E\{D/X\} \quad (3)$$

where,

D= {0, 1} is the indicator of exposure to treatment characteristics (dependent variable)

That is, D=1, if exposed to treatment and D=0 if not exposed to treatment.

The three Probit Regression models used are as follows:

(a) *Fadama*-II beneficiaries (FB) compared with Non- *Fadama*- II beneficiaries within *Fadama* LGA (NFBW). That is D=1, represents FB; D=0 represents NFBW.

(b) *Fadama*-II beneficiaries (FB) compared to Non *Fadama*-II beneficiaries outside *Fadama* LGA (NFBO). That is D=1, represents FB; D=0 represents NFBO.

(c) *Fadama*-II beneficiaries (FB) compared with All non *Fadama*-II beneficiaries (ANFB). That is D=1, represents FB; D=0 represents ANFB

X is the multidimensional vector of pre-treatment characteristics (explanatory variables). These explanatory variables are those which are expected to jointly determine the probability to participate in the project and the outcome. The explanatory variables include:

X_1 = Gender (female=1, 0=male)

X_2 = Years of education of respondent

X_3 = Household size (number)

X_4 = Age of the respondents (years)

X_5 = Area of rainfed land (hectares)

X_6 = Distance to nearest all-weather road before the project (Kilometer),

X_7 = distance to nearest town before the project (Kilometer),

X_8 = Value of livestock assets before the project (Naira; ₦)

X_9 = Value of productive assets before the project (₦).

Agroecological zones (cf humid forest);

X_{10} = Dummy for moist savannah (1 for moist savannah, 0 otherwise)

X_{11} = Dummy for Dry savannah (1 for dry savannah, 0 otherwise)

The *apriori* expectations of these variables are summarized in Table 4.

Table 4: Variables used to compute Propensity Scores and their Expected Signs

Variable	Expected impact on participation in Fadama II	Reason or Explanation	Expected sign on income & wealth	Reason or Explanation
Gender of respondent (female = 1)	+	Fadama II had special subprojects targeted to women groups	-	Women are always poorer than men
Household size	+	Larger families could be associated with poverty or other vulnerability that qualify for Fadama II support	-	The larger the family the poorer
Age of respondent	+/-	Project supported both the elderly and the youth	+	Older respondents likely to be better off than young ones
Years of formal education	+	Some project requirements need certain level of education[1]	+	Education increases the income opportunities such as on-farm activities
Land area (ha)	+/-	Wealthier households more likely to join *Fadama* project due to their ability to pay the beneficiary contribution. However, the project also supported the poor	+	More land enables households to invest more and get higher income and more assets
Agroecological zones (cf humid forests)		Unknown	-	Humid forest zone closer to major cities and has higher agroecological potential
Moist Savannah				
Dry Savannah		Unknown	-	As above
Distance to nearest town (km) before project	+	Requirement for bank account gives advantage to those closer to roads and towns where banks always operate	+	Access to market increases income opportunities and reduces transaction costs
Distance to nearest all-weather road (km) before the project	+	Requirement for bank account gives advantage to those closer to roads and towns where banks always operate	+	Requirement for bank account gives advantage to those closer to roads and towns where banks always operate
Value of productive assets (Naira) before project	+	Wealthier households more likely to join *Fadama* project due to their ability to pay the beneficiary contribution. However, the project also supported the poor	+	Wealthier households more likely to join *Fadama* project due to their ability to pay the beneficiary contribution. However, the project also supported the poor
Value of livestock before project	+	Wealthier households more likely to join *Fadama* project due to their ability to pay the beneficiary contribution. However, the project also supported the poor	+	Wealthier households more likely to join *Fadama* project due to their ability to pay the beneficiary contribution. However, the project also supported the poor

+: positive

- : Negative

Source: Nkonya *et al*, 2007

3.3.1.2 Matching the unit using the Propensity Score

After the propensity score was estimated and the score computed for each unit, the next step was the actual matching. Kernel matching method was used to match. Kernel matching uses weighted averages of all individuals in the control group to construct the counterfactual outcome. One major advantage of this approach is the lower variance which is achieved because more information is used. The Kernel matching estimator is given as:

$$\tau^k = \frac{1}{N^T}\sum_{i\in T}\left\{Y_i^T - \frac{\sum_{j\in c} Y_j^c G\left(\frac{p_j - p_i}{h_n}\right)}{\sum_{k\in c} G\left(\frac{p_k - p_i}{h_n}\right)}\right\} \quad (4)$$

where G(.) is a kernel function and h_n is a bandwidth parameter. Under standard conditions on the bandwidth and kernel, $\frac{\sum_{j\in c} Y_j^c G\left(\frac{p_j - p_i}{h_n}\right)}{\sum_{k\in c} G\left(\frac{p_k - p_i}{h_n}\right)}$ is a consistent estimator of the counterfactual outcome Y_{0i}.

The advantage of using a weighted average as opposed to the nearest neighbor method is that it improves the efficiency of the estimator (Smith and Todd 2005).

3.3.1.3 Assessing the Quality of the Match

The quality of the match was assessed by checking the common support between treatment and non-treatment using the minima and maxima criterion. All observations whose propensity score is smaller than the minimum and larger than the maximum in the opposite group were deleted (the range between minima PS of the treated and maxima PS of the non- treated). Observations which lie outside the region were discarded (dropped) from the analysis. Imposing the common support condition in the estimation improves the quality of the match. Out of 3750 only 1738 beneficiaries and non- beneficiaries that had comparable Propensity scores were matched (Table 5).

Table 5: Summary of Matched Respondents

Agroecological zones/States	FB Frequency	ANFB Frequency	NFBW Frequency	NFBO Frequency	Total
HF Zone	**204**	**434**	**197**	**237**	**638**
Lagos	81	163	81	82	244
Ogun	45	80	36	44	125
Imo	78	191	80	111	269
MS Zone	**214**	**355**	**175**	**180**	**569**
Adamawa	53	78	36	42	131
FCT	36	80	47	33	116
OYO	54	86	42	44	140
DS Zone	**155**	**376**	**167**	**209**	**531**
Taraba	71	111	50	61	182
Bauchi	29	77	37	40	106
Gombe	21	73	46	27	94
Kaduna	30	44	12	32	74
Kebbi	54	100	42	58	154
Niger	21	82	30	52	103
Total	**573**	**1165**	**539**	**626**	**1738**

Source: IFPRI, 2007

Further testing of the comparability of the selected groups was done using a "balancing test" (Dehejia and Wahba, 2002), which tests for statistically significant differences in the means of the explanatory variables used in the probit models between the matched groups of Fadama II participants and non-participants. In all cases this test showed statistically insignificant differences in observable characteristics between the matched groups (but not between the unmatched samples), supporting the contention that the PSM is assuring comparability of the comparison groups (at least in terms of observable characteristics).

These 1738 respondents were used for different analyses in this study. However, PSM is subject to the problem of "selection on unobservable", that is the beneficiary and control groups may differ in unobservable characteristics, even though they are matched in terms of observable characteristics. Therefore the Double Difference (DD) estimator was used to compliment Propensity Score Matching (PSM) in order to address the problem of selection on unobservable. The DD estimator compares changes in outcome measures (i.e. changes from before and after the project) between program participants and non- participants. The advantage of this is that it nets out the effect of other factors on outcome indicator (Ravallion, 2005).

3.3.1.4 Difference in Difference Estimator (Double Difference)

Explicit exploration of Difference in difference estimator is presented below

Difference in Difference Estimator = $E\left[(Y_{p_1} - Y_{p_0}) - (Y_{np_1} - Y_{np_0}\right]$ (5)

Where, Y_{p_1} = income of beneficiary after project; Y_{p_0} = income of beneficiary before project

Y_{np_1} = income of non-beneficiary after project; Y_{np_0} = income of non-beneficiary before project

and E = expected value.

3.3.1.4 Estimating the Impact

Since the match has been deemed of good quality, this study then used the matched sample to compute the Average Treatment Effect for the Treated (ATT) to determine impact of the project. This is defined by Rosembaum and Rubin (1983) as follows:

$$E\left(Y^1 - Y^0 / D = 1\right) = E\left(Y^1 / D = 1\right) - E\left(Y^0 / D = 1\right) \quad (6)$$

where, $E\left(Y^1 / D=1\right)$ is the observed outcome of the treated, that is, the expected income earned by project beneficiaries while participating in the project and $E\left(Y^0 / D=1\right)$ is the counterfactual outcome - the expected income they would have received if they had not participated in the project. The counterfactual outcome here represents outcome of the non-beneficiaries since they have similar characteristics with beneficiaries. Standard errors were computed using bootstrapping method suggested by Lechner (2002) to generate robust standard errors in light of the fact that the matching procedure matches control households to treatment households 'with replacement'. This method is popularly used to estimate standard errors in case analytical estimates are biased or unavailable.

3.3.2 Descriptive Statistics

Level of income of *Fadama*-II and Non- *Fadama*-II households and their socio economic characteristics were analysed using descriptive statistics; frequency distribution and percentage. Per capita household consumption expenditure was used as a proxy for per capita household income in this study. This is to overcome the problem of overstated or understated household income.

$$\text{Annual per capita expenditure} = \frac{\text{Annual expenditure of household (respondent)}}{\text{Household size}} \quad (7)$$

Also since beneficiaries and non-beneficiaries have similar observable and unobservable characteristics, the impact of *Fadama*-II on income was analysed using ATT described in equation (6)

3.3.3 Measurement of Income Inequality

Income inequality of *Fadama*-II and Non- *Fadama*-II households was achieved by using Gini Coefficient and Double Difference Estimator (DD).

To calculate Gini –coefficient, Morduch and Sicular (2002) noted that where incomes are considered so that $Y_1 \leq Y_2 \leq Y_3 \leq \ldots \leq Y_n$.

The Gini coefficient is given by: $I_{Gini}\left(Y\right) = \sum_{i=1}^{n} a_i\left(Y\right) Y_i$ and $a_i\left(Y\right) = \frac{2}{n^2 \mu}\left(i - \frac{n+1}{2}\right)$

therefore, $I_{Gini}(Y) = \frac{2}{n^2 \mu} \sum_{i=1}^{n} \left(i - \frac{n+1}{2} \right) Y_i$ (8)

where

n = the number of observations

μ = the mean of the distribution

Y_i = the income of the ith household

$a_i(Y)$ = the weight

i = the corresponding rank of total income.

The impact of *Fadama*-II on income inequality was determined using equation (9) below adapted from equation (5) since it is not possible to generate Gini Index for each respondent so as to incorporate it into the counterfactual framework. It is stated as follows:

$$\text{Impact (\%)} = \frac{(Gini_{p_1} - Gini_{p_0}) - (Gini_{np_1} - Gini_{np_0})}{Gini_{p_0}} * 100\% \quad (9)$$

Where,

$Gini_{p_0}$ and $Gini_{p_1}$ - Gini coefficient of beneficiaries before and after the project respectively

$Gini_{np_0}$ and $Gini_{np_1}$ - Gini coefficient of non -beneficiaries before and after the project respectively

3.3.4 Measurement of Poverty

Changes in poverty of *Fadama*-II and Non- *Fadama*-II households were achieved by using the Foster- Greer- Thorbecke (1984) class of poverty measures (FGT) including the Headcount Index (P_0), the Poverty Gap Index (P_1), and the severity of Poverty Index (P_2). The three indices can be expressed into one general form and distinguish themselves for the different weights attributed to the distance between income of the poor and the poverty line. P_0 attributes equal weight to all income of the poor while P_1 and P_2 attribute increasingly more weight to distance of incomes of the poor from the poverty line. They are widely used because they are consistent and additively decomposable (Verme, 2003).

The FGT is presented below:

$$P_{\alpha} = \frac{1}{n}\sum_{i=1}^{q}\left[\frac{Z-y}{Z}\right]^{\alpha} \qquad (10)$$

Where,

Z = the poverty line defined as 2/3 of Mean annual per capita expenditure

Y = the annual per capita expenditure –poverty indicator/welfare index per capita

q = the number of poor households in the population of size n,

α = the degree of poverty aversion; α=0; is the Headcount index (P_0) measuring the incidence of poverty (proportion of the total population of a given group that is poor, based on poverty line). α=1; is the poverty gap index measuring the depth of poverty that is on average how far the poor is from the poverty line; α=2; is the squared poverty gap measuring the severity of poverty among households that is the depth of poverty and inequality among the poor.

Impact of *Fadama*-II on poverty gap and its severity was determined using ATT described above in equation (6) while impact of *Fadama*-II on poverty incidence was determined using equation (11) adapted from equation (5) since it cannot be incorporated into the counterfactual framework. It is stated as follows:

$$\text{Impact on } P_0(\%) = \frac{\left(P_{0B_1} - P_{0B_0}\right) - \left(P_{0NB_1} - P_{0NB_0}\right)}{P_{0B_0}} * 100 \qquad (11)$$

$$\text{Impact on } P_1 \text{ and } P_2 = \frac{\text{ATT}}{\text{Value of beneficiary before project}} * 100$$

P_{0B_0} and P_{0B_1} - poverty incidence of beneficiaries before and after the project respectively

P_{0NB_0} and P_{0NB_1} - poverty incidence of non- beneficiaries before and after the project respectively

3.3.5 POVERTY EQUIVALENT GROWTH RATE (PEGR)

Pro-poorness of *Fadama*-II and non- *Fadama*-II beneficiaries was determined using PEGR proposed by Kakwani *et al*, 2004. As poverty reduction depends on both growth and the

distribution of its benefits among the poor and non- poor, growth alone is a necessary – but not sufficient condition for poverty reduction. This suggests there is no monotonic relation between growth and poverty reduction. The PEGR is a measure of pro-poor growth that captures a direct linkage (or monotonic relation) with poverty reduction, indicating that poverty reduction takes into account not only growth but also how benefits of growth are shared by individuals (poor and non- poor) in the society. However, PEGR is derived from the multiplication of the Pro -Poor Growth Index (PPGI) and the growth rate of mean income.

The PEGR ($\hat{\gamma}^*$) can be written as:

$$\hat{\gamma}^* = \left(\hat{\partial}/\hat{\eta}\right)\hat{\gamma} = \hat{\phi}\hat{\gamma} \quad (12)$$

Where $\hat{\phi} = \left(\hat{\partial}/\hat{\eta}\right)$, (13)

$$\hat{\partial} = \left(Ln\left[\theta\left(z, \mu_2, L_2(p)\right)\right] - Ln\left[\theta\left(z, \mu_1, L_1(p)\right)\right]\right)/\hat{\gamma} \quad (14)$$

and, $\hat{\gamma} = Ln\left(\mu_2\right) - Ln\left(\mu_1\right)$ (15)

Since $\hat{\partial} = \hat{\eta} + \hat{\zeta}$ (16)

Where

$\hat{\phi}$ = the pro-poor index which was developed by Kakwani and Pernia (2000)

$\hat{\eta}$ = an estimate of the growth elasticity of poverty

$\hat{\zeta}$ = an estimate of the inequality effect of poverty reduction

$\hat{\partial}$ = the estimate of total poverty elasticity

$\hat{\gamma}$ = an estimate of growth rate of mean income

μ_1 = the mean of the distribution before the project

μ_2 = the mean of the distribution after the project

Therefore,

$$\hat{\eta} = \frac{1}{2}\left[\ln\left(\theta\left(z, \mu_2, L_1(p)\right)\right) - \ln\left(\theta\left(z, \mu_1, L_1(p)\right)\right) + \ln\left(\theta\left(z, \mu_2, L_2(p)\right)\right) - \ln\left(\theta\left(z, \mu_1, L_2(p)\right)\right)\right]/\hat{\gamma}$$

(17)

Note that $\hat{\eta}$ is always negative unless $\mu_1 = \mu_2$.

$$\hat{\zeta} = \frac{1}{2}\left[\ln\left(\theta\left(z,\mu_1,L_2(p)\right)\right) - \ln\left(\theta\left(z,\mu_1,L_1(p)\right)\right) + \ln\left(\theta\left(z,\mu_2,L_2(p)\right)\right) - \ln\left(\theta\left(z,\mu_2,L_1(p)\right)\right)\right] / \hat{\gamma}$$

(18)

Equation (12) implies that growth is pro-poor (anti-poor) if $\hat{\gamma}^*$ is greater (less) than $\hat{\gamma}$. The larger the PEGR ($\hat{\gamma}^*$) the greater the percentage reduction in poverty between the two periods. If PEGR is greater than the actual growth rate then the growth is said to be pro-poor but if PEGR is equal or less than the actual growth rate then the growth is said to be anti-poor.

CHAPTER FOUR

SOCIO-ECONOMIC CHARACTERISTICS, LEVEL OF INCOME, INCOME INEQUALITY AND POVERTY STATUS OF RESPONDENTS

This chapter describes the socio-economic characteristics of respondents and shows the level and impact of *Fadama*-II project on income and income inequality of respondents nationwide, across the three agroecological zones as well as in all the twelve benefiting states. The socio-economic characteristics considered in this study are gender, age, household size, years of education, type of activity, land size, value of productive assets, expenditure and membership of cooperative societies. It also presents the results of poverty status of respondents and the impact of *Fadama*-II project on poverty status of respondents nationwide, across the three agro-ecological zones as well as across the twelve benefiting states. The last section determines the pro-poorness of *Fadama*-II project.

4.1 Distribution of Respondents by Socio-economic Characteristics

4.1.1 Distribution of Respondents by Socio-economic Characteristics Nationwide

Table 6 shows the distribution of socio-economic characteristics of the respondents across the three types of respondents considered. The average values of their socio-economic characteristics are the same due to PSM used in selecting the respondents with similar observable characteristics. The male respondents constitute the larger percentage across the three types of respondents with *Fadama*-II Beneficiaries (FB) having the largest percentage of about 76% which shows that more males were involved in the project. The average household size is 9.0, 10.0, 9.0 and 10.0 for FB, All Non *Fadama*-II Beneficiaries (ANFB), Non-*Fadama*-II Beneficiaries living within *Fadama* LGA (NFBW) and Non *Fadama*-II Beneficiaries living outside *Fadama* LGA (NFBO) respectively. Majority of the respondents have their household sizes falling within the range of 5 to 10 people, with the average age of the respondents being 43years for the beneficiaries and non- beneficiaries. Implicit in these findings is that a large proportion of the respondents was middle age and able- bodied and can therefore, be regarded as active, agile and physically disposed to pursue economic activities. The average year of educational attainment of the respondents is about 10 years for the beneficiaries and non-beneficiaries indicating that most of the respondents were educated. Up-stream farming activities

(crop production, livestock production and fisheries) are the major primary activities of the respondents. This shows the main target of *Fadama*-II project which provides support for agricultural projects.

Table 6: Distribution of Respondents by Socio-economic Characteristics Nationwide

Characteristics	Statistics	FB Percentage	ANFB Percentage	NFBW Percentage	NFBO Percentage
Gender	**Male**	76.3	70.6	72.4	69.0
	Female	23.7	29.4	27.6	31.0
	Total	100	100	100	100
Housed size	**0-4**	15.9	12.8	12.8	12.8
	5-9	47.6	45.7	49.4	42.5
	10-14	22.3	26.4	24.9	27.6
	≥ 15	14.1	15.2	12.9	17.1
	Total	100	100	100	100
	Mean	9.0	10.0	9.0	10.0
	Standdev	6.4	6.9	5.7	7.9
Age	**≤30**	16.6	17.2	18.6	16.0
	31-40	32.5	33.6	31.7	35.1
	41-50	27.9	26.1	24.5	27.5
	>50	23.0	23.2	25.2	21.4
	Total	100	100	100	100
	Mean	42.7	42.6	42.7	42.5
	Standdev	11.8	11.9	11.7	11.5
Year of education	**0-6**	44.0	40.3	40.8	39.8
	7-12	34.9	35.4	35.4	35.3
	13-19	20.4	23.6	23.0	24.1
	≥20	0.7	0.8	0.74	0.8
	total	100	100	100	100
	Mean	9.6	9.7	9.6	9.7
	Standdev	4.4	4.4	4.4	4.4
Primary activities	**Up stream farm**	79.4	71.5	70.1	72.7
	Down stream Farm	11.6	13.9	13.7	14.1
	others	8.9	14.6	16.1	13.3
	Total	100	100	100	100

Source: Computed from IFPRI, 2007

4.1.2 Distribution of Socio-economic Characteristics of Respondents across Agro-ecological Zones

Tables 7, 8 and 9 show the distribution of some socio-economic characteristics of the respondents across the three agro-ecological zones. Across the zones, the male respondents constitute the larger percentage across the three types of respondents with dry savanna constituting the largest percentage of about 85% and 81% for both FB and ANFB respectively. The female proportion was highest in HF zone with 35% and 33% for FB and ANFB respectively. In the DS zone respondents had highest average household size of 10 members. Majority of the respondents have their household sizes falling within the range of 5 to 10 people, across the zones. The highest average age (48.2) was in the HF zone. Implicit in this finding is that a large proportion of the respondents in both MS and DS were middle age and able- bodied and can therefore, be regarded as active, agile and physically disposed to pursue economic activities while most of the respondents in the HF were elderly (about 41.2% of the respondents having age above 50years). Respondents in the HF zone had the highest average year of educational attainment of about 10 years while those respondents in the DS zone had the least (8years). Up-stream farm activities are the major primary activities of the respondents across the zones with HF having the least percentage of respondents that engaged in up-stream farming activities when compared with other zones.

Table 7: Distribution of Respondents by Socio-economic Characteristics in the Humid Forest Zone

Characteristics	Statistics	FB Percentage	ANFB Percentage	NFBW Percentage	NFBO Percentage
Gender	**Male**	64.7	66.6	72.1	61.2
	Female	35.3	33.4	26.9	38.8
	Total	100	100	100	100
Housed size	**0-4**	10.8	11.3	12.7	10.1
	5-9	47.7	53.9	55.8	52.3
	10-14	22.3	28.3	26.9	29.5
	≥ 15	14.2	6.45	4.6	8.01
	Total	100	100	100	100
	Mean	8	8	8	9
	Standdev	6.1	3.7	3.4	3.9
Age	**≤30**	3.9	5.9	9.6	2.9
	31-40	25.0	26.3	23.4	28.7
	41-50	29.9	30.0	27.4	32.1
	>50	41.2	37.8	39.6	36.3
	Total	100	100	100	100
	Mean	48.2	47.0	46.7	47.3
	Standdev	11.5	11.3	11.5	11.1
Year of education	**0-6**	36.3	35.7	37.1	34.6
	7-12	39.7	38.5	38.6	38.4
	13-19	24.0	25.4	23.9	26.6
	≥20	0	0.5	0.5	0.4
	total	100	100	100	100
	Mean	9.5	9.6	9.7	9.9
	Standdev	4.2	4.1	5.7	4.7
Primary activities	**Up stream farm**	75.5	73.0	79.2	68.8
	Down stream Farm	16.7	12.9	7.1	17.7
	others	7.8	14.1	13.7	13.5
	Total	100	100	100	100

Source: Computed from IFPRI, 2007

Table 8: Distribution of Respondents by Socio-economic Characteristics in the Moist Savanna Zone

Characteristics	Statistics	FB Percentage	ANFB Percentage	NFBW Percentage	NFBO Percentage
Gender	**Male**	80.8	64.5	57.71	71.11
	Female	19.2	35.5	42.29	28.89
	Total	100	100	100	100
Housed size	**0-4**	19.6	15.8	11.4	20.0
	5-9	39.7	48.5	49.7	47.2
	10-14	23.4	20.9	19.4	22.2
	≥ 15	17.3	14.8	19.4	10.6
	Total	100	100	100	100
	Mean	9	9	10	9
	Standdev	6.5	6.7	7.1	6.0
Age	**≤30**	19.2	23.4	21.7	25.0
	31-40	39.7	37.2	34.3	40.0
	41-50	25.2	22.5	23.4	21.7
	>50	15.9	16.9	20.6	13.3
	Total	100	100	100	100
	Mean	40.5	40.0	41.6	38.5
	Standdev	10.6	11.6	12.1	10.9
Year of education	**0-6**	43.5	37.5	36.0	38.9
	7-12	33.6	38.0	40.6	35.6
	13-19	21.0	23.1	22.3	23.9
	≥20	1.9	1.4	1.1	1.7
	total	100	100	100	100
	Mean	9.3	9.4	9.4	9.4
	Standdev	4.8	4.6	4.6	4.6
Primary activities	**Up stream farm**	81.3	70.1	63.4	76.7
	Down stream Farm	10.8	18.6	25.1	12.2
	others	7.9	11.3	11.5	11.1
	Total	100	100	100	100

Source: Computed from IFPRI, 2007

Table 9: Distribution of Respondents by Socio-economic Characteristics in the Dry Savannah Zone

Characteristics	Statistics	FB Percentage	ANFB Percentage	NFBW Percentage	NFBO Percentage
Gender	**Male**	85.2	80.8	57.7	71.1
	Female	14.8	19.2	42.3	28.9
	Total	100	100	100	100
Housed size	**0-4**	17.4	11.7	11.4	20
	5-9	38.7	33.5	49.7	47.2
	10-14	25.8	29.3	19.4	22.2
	≥ 15	18.1	25.5	19.4	10.6
	Total	100	100	100	100
	Mean	10	10	10	10
	Standdev	6.8	7.3	5.7	8.0
Age	**≤30**	29.7	24.2	21.7	25.0
	31-40	32.3	38.6	34.3	40.0
	41-50	29.1	25.0	23.4	21.7
	>50	9.1	12.2	20.6	13.3
	Total	100	100	100	100
	Mean	37.8	39.5	39.3	39.7
	Standdev	9.9	10.6	10.9	10.3
Year of education	**0-6**	54.8	48.1	36.0	38.9
	7-12	30.3	29.3	40.6	35.6
	13-19	14.8	22.1	22.3	23.9
	≥20	0	0.5	1.1	1.7
	total	100	100	100	100
	Mean	8.4	8.4	8.3	8.4
	Standdev	4.2	4.8	5.7	4.7
Primary activities	**Up stream farm**	81.9	71.0	63.4	76.7
	Down stream Farm	6.5	10.6	25.1	12.2
	others	11.6	18.4	11.4	11.1
	Total	100	100	100	100

Source: Computed from IFPRI, 2007

4.1.3 Distribution of Respondents by their land size before and after the project

Table 10 shows that the average land size before the project for all the three types of respondents was 2.9 hectares nationwide. This is an indication that majority of the respondents are subsistence farmers. But after one year of project implementation, the land size of FB has increased to 3.74 hectares at the rate of about 29.9% compared to increment of 15.4%, 17.1% and 11.8% for ANFB, NFBW and NFBO respectively. This implies that FB have tendency to increase their production (through land assets acquisition one of Fadama-II project's components-Pilot Productive Asset Acquisition support) which invariably will affect their incomes. Across the three agro-ecological zones, the average land size before the project implementation for FB was 2.5ha, 2.6ha and 3.0ha for HF, MS and DS zones respectively. But after the project implementation the average land size increased with DS zone having the highest land size of 2.9ha with percentage change of 35.2% followed by 29.0% for MS zone and the least 20.7% for HF zone. In the same vein across the three types of respondents the percentage change in land size was highest in the DS with that of FB having the highest change of 35.2% followed by NFBW with 24.1% and the least was NFBO with 13.8%. This could be due to the fact that in DS zones majority of the beneficiaries engaged in farming as their main occupation. Also, most of them were involved in irrigation which required a large land mass.

In the other zones (HF and MS) there is a lot of pressure on land for other activities which could have accounted for lower change in their land size after the project implementation.

Table 10: Distribution of Respondents by their Land Size before and after the Project

	Statistics	FB before project percentage	after project percentage	% change	AN FB before project Percentage	after project percentage	% change	N FBW before project percentage	after project percentage	% change	NFBO before project percentage	after project percentage	% change
All	**Mean**	2.9	3.7	29.9	2.9	3.3	15.43	2.9	3.4	17.13	2.9	3.2	11.8
	SD	1.3	2.51		1.2	2.1		1.2	2.3		1.4	2.1	
	<2	81.2	78.5	-2.4	77.3	76.6	-0.9	82.4	81.4	-1.1	79.7	79.1	-1.2
	2-4	12.7	14.3	3.8	15.3	15.5	1.1	12.6	13.2	4.4	16.6	16.9	4.3
	≥4	6.2	7.2	17.1	17.4	7.9	6.9	5.0	5.4	7.4	3.7	3.9	8.7
	Total	100	100		100	100		100	100		100	100	
HF	**Mean**	2.5	3.0	20.7	2.4	2.7	9.9	2.4	2.7	11.6	2.4	2.6	8.6
	SD	1.2	1.4		1.1	1.4		1.1	1.26		0.9	0.9	
	<2	94.1	92.6	-1.6	86.6	84.8	-2.1	93.4	91.4	-2.2	81.0	79.3	-2.1
	2-4	3.4	4.9	42.9	8.8	10.1	15.8	5.1	6.6	30.0	11.8	13.1	10.7
	≥4	2.5	2.5	0	4.6	5.1	10	1.5	2.0	33.3	7.2	7.6	5.9
	Total	100	100		100	100		100	100		100	100	
MS	**Mean**	2.6	3.3	29.0	2.5	3.0	17.3	2.5	3.1	21.51	2.9	3.2	10.3
	SD	1.2	2.1		1.3	2.05		1.3	2.2		1.5	1.4	
	<2	67.3	64.5	-4.2	67.6	63.1	-6.7	67.4	62.9	-6.8	67.8	63.3	-6.6
	2-4	18.2	19.6	7.7	19.4	22.3	14.5	18.3	21.7	18.8	20.6	22.8	10.8
	≥4	14.5	15.9	9.7	13.0	14.6	13.0	14.3	15.4	8	11.7	13.9	19.1
	Total	100	100		100	100		100	100				
DS													
	Mean	3.0	4.0	35.2	2.8	3.3	17.9	2.9	3.6	24.1	2.9	3.3	13.8
	SD	1.5	2.7		1.2	2.2		1.6	2.7		1.8	2.0	
	<2	67.1	56.1	-16.4	68.9	65.4	-5.0	68.3	62.9	-7.9	69.4	67.5	-2.8
	2-4	21.3	26.5	24.2	18.9	22.3	18.3	24.5	28.7	17.1	14.4	17.2	20.0
	≥4	11.6	17.4	50.0	12.2	12.2	0	7.2	8.4	16.7	16.3	15.3	-5.9
	Total	100	100		100	100		100	100		100	100	

Source: Computed from IFPRI, 2007

4.1.4 Distribution of Respondents by their total value of productive assets before and after the project

The value of total productive assests before the project across the three types of respondents were N66148.3, ₦66602.3 and ₦66185.0 for FB, NFBO and NFBW showing that *Fadama*-II targeted people that had low productive assets. However, after the project implementation the value of total productive assests increased across the three types of respondents with FB having the highest percentage change of 23.2% followed by 9% for NFBW and the least change of 4% NFBO. Majority of the respondents have their average value of productive assets less than ₦ 10,000 before and after the project. This is also an indication that FB have the tendency of increasing their own income since their productive assets have increased. Similarly, across the three agro-ecological zones, HF zone had the highest value of total productive assets before the project with FB having the least (₦71519.0) when compared to ₦72521.2 of NFBO and ₦71940.3 of NFBW. Meanwhile, after the project implementation HF zone had the least percentage change in the value of productive assets with that of FB having the highest change of 13.0% followed by NFBW with 6.0% and NFBO had the least change of 2.8%. Also DS zone had the highest percentage change in the value of productive assets with that of FB having the highest change of 36.1% followed by NFBW with 27.32% and NFBO had the least change of 21.2% (Table 11). This could be due to the fact that in DS zone after the project, majority of the farmers were having higher land size as one of the productive assets as shown in Table 10. However, there are changes in the value of productive assets of non beneficiaries but the changes were minimal when compared with that of FB. This is an indication that *Fadama*-II project has helped in assets acquisition. Also due to spill over effect of the project, the value of total productive assets of NFBW increased more than that of NFBO across the three agro-ecological zones. Value assets of NFBO also increased after the project implementation which could be that they might have also benefited from other projects apart from Fadama-II project.

Table 11: Distribution of Respondents by their total value of Productive Assets before and after the Project across Agroecological Zones

	statistic	FB before project Frequency	after project Frequency	% change	AN FB before project Frequency	after project Frequency	% change	N FBW before project Frequency	after project Frequency	% change	NFBO before project Frequency	after project Frequency	% change
All	**Mean**	66148.3	81491.1	23.2	66393.6	71058.8	7.0	66185	72800.6	9.9	66602.27	69316.95	4.1
	SD	68162	96775		79576.1	957413		75716.1	99566.13		7576.13	85576.13	
	< 10000	83.6	50.9	-39.0	50.9	68.3	34.2	50.6	77.6	53.1	51.1	60.4	18.1
	10000-100000	11.5	18.2	57.6	29.9	15.0	-49.7	31.5	81.2	-74.1	28.4	20.9	-26.4
	>100000	4.9	30.9	532.1	19.2	16.7	-13.4	17.8	14.3	-19.8	20.5	18.7	-8.6
	Total	100	100		100	100		100	100		100	100	
HF	Mean	71519	80821.5	13.0	72230.8	75390.3	4.4	71940.3	76224.0	6.0	72521.23	74556.6	2.8
	SD	97245	996822.8		95235.2	97777		95582	97592.6		95122	96412	
	< 10000	87.2	57.4	-34.3	74.7	75.1	0.6	89.8	87.8	-2.3	62.0	62.9	1.4
	10000-100000	6.4	24.5	284.6	16.1	16.4	1.4	8.1	9.1	12.5	22.8	23.2	1.9
	>100000	6.4	18.1	184.6	9.2	8.5	-7.5	2.0	3.0	50	15.2	13.9	-8.3
	Total	100	100		100	100		100	100	100	100	100	100
MS	Mean	55022.1	74355.8	35.1	55511.1	65402.4	17.8	55396.1	67117.2	21.2	55626.2	63687.5	14.5
	SD	77236.27	98115		75113	91521		79214.7	90158		74922	92222	
	< 10000	85.0	54.2	-36.3	75.8	77.5	2.2	56.6	74.9	32.3	72.2	80.0	10.8
	10000-100000	9.8	29.9	204.8	9.0	8.4	-6.3	24.0	6.3	-73.8	16.7	10.6	-36.7
	>100000	5.1	15.9	209.1	15.2	14.1	-7.4	19.4	18.9	-2.9	11.1	9.4	-15.0
	Total	100	100		100	100		100	100		100	100	
DS	Mean	60063.7	82143.3	36.8	60145.4	74726.5	24.2	60138.9	76566.5	27.3	60152	72886.5	21.2
	SD	77158.11	98172		72115.13	83192.12		72174	86154		72001	88219	
	< 10000	76.8	38.1	-50.4	54.5	61.2	12.2	63.5	74.3	17.0	47.4	50.7	7.1
	10000-100000	20.6	40.6	96.9	26.3	25.5	-3.0	25.7	16.8	-34.9	26.8	32.5	21.4
	>100000	2.6	21.3	725.0	19.1	13.3	-30.6	10.8	8.9	-16.7	25.8	16.7	-35.2
	Total	100	100		100	100		100	100		100	100	

Source: Computed from IFPRI, 2007

4.1.5 Distribution of Respondents by their Membership of Cooperative Societies

Table 12 shows the distribution of respondents by their membership of cooperative societies. The membership of cooperative society among the three types of respondents indicates an increase in the number of people that belongs to cooperative society after project implementation. The number of respondents that belongs to cooperative society before the project was 62.3% for FB, 68.3% for NFBW and 64.5% for NFBO. FB were least involved in cooperative societies before the project while after the project their number increased by 43.4% followed by 19.6% for NFBW, 15.7% for ANFB and 12.1% for NFBO. This shows that Fadama II had contributed to formation of new local institutions since one of its components (group formation, that is, FUG and FCA) was to support new and existing institutions.

In addition, percentage change in the number of people that belongs to cooperative society increased across the three agro-ecological zones. This was highest in DS across all the three types of respondents with FB having the highest change of 61.2%, followed by 35.5% (NFBW) and 22.5% (NFBO). However, due to spillover effect of *Fadama*-II project the number of NFBW that was in cooperative societies also increased more than that of NFBO nationwide and across the three agro-ecological zones.

Table 12: Distribution of Respondents by their Membership of Cooperative Societies

Membership of cooperative Societies	FB before project percentage	after project percentage	% change	AN FB before project percentage	after project percentage	% change	N FBW before project percentage	after project percentage	% change	NFBO before project percentage	after project percentage	% change
All												
Yes	62.3	89.4	43.4	66.3	76.7	15.7	68.3	81.6	19.6	64.5	72.4	12.1
HF												
Yes	61.8	82.8	34.1	72.6	76.0	4.8	62.4	67.0	7.3	81.0	83.5	3.1
MS												
Yes	68.2	96.3	41.1	64.8	76.3	17.8	78.9	93.1	18.1	51.1	60	17.4
DS												
Yes	54.8	88.4	61.2	60.4	77.7	28.6	64.1	86.8	35.5	57.4	70.3	22.5

Source: Computed from IFPRI, 2007

4.2 Level of Income of *Fadama*- II and Non-*Fadama*-II Households

4.2.1 Level of Income by Type of Respondents

The real value was computed using the Consumer Price Index (CPI) with base year of 2003. The CPI was 158 and 153 for before (2005) and after (2006) the project respectively (Nkonya *et al*, 2007). Per capita consumption expenditure was used as the proxy for household annual income. Table 13 presents the level of income by type of respondents. As shown in the Table, the mean income of all the three types of respondents before the project was N52703.4 for *Fadama*-II Beneficiaries (FB), N54798.5 for Non-*Fadama*-II Beneficiaries living within *Fadama* LGA (NFBW) and N54813.6 for Non-*Fadama*-II Beneficiaries living outside Fadama LGA (NFBO). Although the mean income of FB was less than that of NFBW and NFBO before the project implementation, after the project implementation it increased. Also, across the three types of respondents the mean income increased with *Fadama*-II beneficiaries having the highest percentage change. The percentage change in mean income of FB was 30.9% and 6.2% for all Non *Fadama* II beneficiaries (ANFB). The percentage change in mean income of NFBW which was 8.3% is higher than that of NFBO which is 4.5%. It is evident that income growth rate for all the three types of respondents are positive with FB having the highest growth rate followed by NFBW. This could be as a result of spillover effect of the project. This implies that *Fadama*-II affects income of the beneficiaries and NFBW positively by increasing it after one year of project implementation.

The impact of the project on the income of the beneficiaries due to participation in the project is shown using ATT. The result in the table should not be taken as mean income of the corresponding groups of non-beneficiaries but that of FB due to participation in the project when compared with the corresponding group of non-beneficiaries. The result shows that the average increase of real income of FB due to participation in the project is 27.7% and significant at 5% when compared with ANFB. This is above the goal of 20% increase that *Fadama*-II sets to achieve for 50% of beneficiaries after six years of operation. The result was in line with Nkoya *et al* (2007) findings that average increase of income of beneficiaries was above the goal of 20% increase set to be achieved after the project implementation. Also the result of Olaniran (2010) confirms that FB income was better than that of non-beneficiaries. Examining the spillover effect of the project by comparing FB with NFBW the results shows 10% significant difference in change of income by 20.78% while when compared with NFBO there was 5% significant

difference in change of income by 32.4%. These results suggest that it is possible that the Fadama II non-beneficiaries could have benefited from spillover of the project. For example, non-beneficiaries used roads, culverts and other public facilities funded by *Fadama*-II. Non-beneficiaries could also benefit from services offered by beneficiaries. For example, beneficiaries who acquired milling machines could offer milling services and employment to non-beneficiaries.

Table 13: Level of Income by Type of Respondents

Type of respondent	Statistics	Before Project	After Project	% change Before & after project	ATT	% Change due to participation
FB	Mean	52703.4	68986.4	30.9		
	SD	91730.3	65771.7			
ANFB	Mean	54801.5	58895.9	7.5	14585.6**	27.7
	SD	5607.9	66337.6		(6592.4)	
NFBW	Mean	54798.5	60130.9	9.7	10952.1*	20.8
	SD	49345.2	50603.6		(6603.8)	
NFBO	Mean	54813.6	58173.5	6.1	17047.4**	32.4
	SD	58455.5	77447.6		(7723.6)	

Source: Computed from IFPRI, 2007

*, **, *** are significant levels at 10%, 5% and 1% respectively. The values in parenthesis are standard errors

4.2.2 Level of Income by Gender

The mean income of female FB was N46547.5 and N54619.2 for male FB before the project implementation. Although the mean income of female FB was less than that of their male counterparts before the project but after the project implementation it increased more than that of their male counterparts with female FB having percentage change in mean income of 43.2% compared to that of male FB of about 27.6% after one year of project implementation (Table 14). Similarly, the mean income of female NFBW increased more than that of their male counterparts with female NFBW having 11.6% compared with that of the male NFBW of about 8.7%. This result could be due to spillover effect of the project. In contrast, the mean income of male ANFB (6.6%) and male NFBO (4.7%) increased more than that of their female counterparts. When the female beneficiaries and non-beneficiaries were compared with one another the result showed that the mean income of FB increased more than that of the ANFB, NFBO and NFBW after one year of project implementation.

The impact of the project was not statistically significant on income of both female and male beneficiaries but positive. The increase was more in female FB than that of the male when compared with ANFB, NFBW, and NFBO with income changes due to participation by 46%, 43.4% and 49.6% respectively. The result confirms that of Nkonya *et al* (2007) that the impact of the project was not statistically significant on income of female beneficiaries when compared with non-beneficiaries.

Table 14: Level of Income by Gender

Type of respondent	Statistics	Before Project	After Project	% change Before & after project	ATT	% Change due to participation
Fadama						
Female	Mean	46547.5	66650.8	43.2		
	SD	127728.3	73880.7			
Male	Mean	54619.2	69713.3	27.6		
	SD	77279.5	63110.8			
ANFB						
	Mean	49813.3	52435.9	5.3	21392.28	46.0
Female	SD	46645.1	50848.3		(22492.27)	
	Mean	53793.3	57338.9	6.6	9836.73	18.0
Male	SD	57323.2	71796.5		(6167.65)	
NFBW						
Female	Mean	48756.9	53195.4	11.6	20202.91	43.4
	SD	41942.4	39379.9		(24600.01)	
Male	Mean	53789.7	58463.7	8.7	7555.45	13.8
	SD	51877.7	54227.9		(6032.24)	
NFBO						
Female	Mean	50624.7	52621.5	4.0	23075.44	49.6
	SD	50049.7	58280.1		(20837.4)	
Male	Mean	53796.6	56318.9	4.7	12761.11	23.4
	SD	61889.2	84688.9		(8503.89)	

Source: Computed from IFPRI, 2007
The values in parenthesis are standard errors

4.2.3 Level of Income by Primary Activity of Respondents

Table 15 reveals the level of income of respondents by primary activity. The mean income (N42260.4) of FB that engaged in up-stream farming activities was less than those that engaged in down-stream farming activities (N44539.2) before the project implementation. Also the mean income (N43621.6) of ANFB that engaged in up-stream farming activities was less than those that engaged in down-stream farming activities (N44783.5) before the project implementation but was greater than that of FB. In addition, from the results, changes in mean income varied among all types of respondents by their primary activities after the project implementation. Respondents that engaged in up-stream farming activities had the highest change in mean income with FB having the highest percentage change of 29.6%. The up-stream farming activities consist of crop production, livestock and fishery activities with respondents that engaged in crop production activities having the highest percentage change in their mean income by 52.9%, 20.6%, 20.8% and 20.4% for FB, ANFB, NFBW and NFBO respectively.

The Table also presents the impact of *Fadama*-II project on income of the beneficiaries by their primary activities. The impact of *Fadama*- II project on the income of the beneficiaries varied by their primary activities when compared to ANFB, NFBW and NFBO. The impact was significantly felt at 1% with changes in mean incomes of 32.8%, 33.1%, and 33.4% among FB that engaged in up-stream farming activities when compared with ANFB, NFBW and NFBO respectively. This impact was felt most on the beneficiaries that engaged in crop and livestock production. The difference in the mean income of FB and NFBW was less than that of FB and NFBO. This could be as a result of the spillover effect of the project. The impact of the project was not significantly felt on the beneficiaries that engaged in down-stream farming activities but the mean incomes are positive.

Table 15: Level of Income of Respondents by Primary Activity

Primary Activity of respondent	Statistics	Before Project (N)	After Project (N)	% change Before & after project	ATT (N)	% Change due to participation
FB						
Fishery	Mean	41745.9	47883.4	14.7		
	SD	53560.0	51416.2			
Livestock	Mean	43924.1	57319.6	30.5		
	SD	41561.6	45197.3			
Crop	Mean	44100.4	67432.1	52.9		
	SD	70002.3	113761.4			
Down stream	Mean	44539.2	45673.1	2.5		
Farm	SD	61852.9	58948.1			
Other	Mean	36093.4	42096.7	16.6		
	SD	36046.7	35198.8			
Up stream	Mean	42260.4	54746.6	29.6		
Farm	SD	54498.5	63344.9			
ANFB						
Fishery	Mean	37695.1	44195.8	17.3	2228.1	5.3
	SD	39447.2	74065.3			
Livestock	Mean	62749.9	69779.2	11.2	20977.3*	47.8
	SD	69629.3	78448.1			
Crop	Mean	51278.1	61828.3	20.6	22431.9***	50.9
	SD	73656.1	91253.5			
Down stream	Mean	44783.5	51654.5	15.3	3852.6	8.6
Farm	SD	51409.8	63487.9			
Others	Mean	48297.1	51381.7	6.4	5950.2	16.5
	SD	45549.1	46593.7			
Up stream	Mean	43621.6	50742.1	16.3	13994.2***	33.1
Farm	SD	51872.2	77840.6			
NFBW						
Fishery	Mean	38772.0	47089.2	21.5	3100.8	7.4
	SD	41505.47	91091.1			
Livestock	Mean	61792.59	69436.9	12.4	25941.4*	59.1
	SD	67446.2	76242.9			
Crop	Mean	45348.23	54772.4	20.8	18354.8*	44.3
	SD	51374.53	54354.9			
Down stream	Mean	51761.9	61778.2	19.4	3010.9	6.8
Farm	SD	36926.56	66876.5			
Others	Mean	54284.59	57951.5	6.8	4651.9	18.1
	SD	48924.63	51553.0			
Up stream	Mean	42698.74	48011.9	19.4	13845.5***	32.8
Farm	SD	48376.18	54255.7			
NFBO						
Fishery	Mean	36270.66	40368.6	11.3	5269.7**	12.6
	SD	36580.41	41938.2			
Livestock	Mean	63666.27	70106.8	10.1	17730.5*	40.4
	SD	72131.88	81051.5			
Crop	Mean	57317.83	69014.9	20.4	24354.07*	55.2
	SD	91062.37	117703.6			
Down stream	Mean	36047.59	39752.4	10.3	5010.9	11.3
Farm	SD	63648.57	57443.8			
Other	Mean	41687.44	44129.3	5.9	4651.9	12.9
	SD	40806.78	39496.7			
Up stream	Mean	42698.74	48011.9	12.4	14097.5***	33.4
Farm	SD	48376.18	54255.7			

Source: Computed from IFPRI, 2007
*, **, *** are significant levels at 10%, 5% and 1% respectively.

4.2.4 Level of Income across Agro-ecological Zones

The mean income of FB varied across the three agro-ecological zones before the project with HF zone having the highest mean income of N56585.5 followed by N50695.7 of DS zone and the least mean income of N50456.9 for MS zone. The pattern was the same for the other types of respondents (ANFB, NFBW and NFBO) where the mean income was also highest in HF zone before project implementation. The mean income of *Fadama*-II beneficiaries and Fadama-II non-beneficiaries increased across the three agro-ecological zones after one year of project implementation (Table16). The mean income of FB across the three agroecological zones increased after one year of project implementation with Dry Savannah (DS) having the highest percentage change in mean income of about 38.6% followed by that of Moist Savannah (MS) 30.6% and the least in the Humid Forest (HF) 26.0%. Also, the mean income of NFBW increased with percentage change in mean income of 13.3% in the DS zone followed by that of MS zone at 8.1%. Comparing Fadama-II beneficiaries and non- beneficiaries across the three agroecological zones; the growth rate of FB in the three zones increased more than that of ANFB, NFBO and NFBW. In the same vein due to likely spillover effect of the project, the mean income of the NFBW increased more than that of the NFBO after one year of project implementation.

Moreover, Table 16 presents the impact of the project on the beneficiaries due to participation in the project compared with the corresponding groups. Across the three agro-ecological zones the impact of the project varied. *Fadama*-II had a significant impact (at p = 0.01) in DS zone where net participation led to an increase in income by 29.1%, 28.5 % and 46.1% when compared with ANFB NFBW and NFBO respectively. In the MS zone, the mean income was significant at p=0.05 due to participation in the project (17.1%) when compared with ANFB and at p=0.01 when compared with NFBO but was not significant when compared with NFBW. In contrast, *Fadama*-II had no significant impact (at p = 0.01) on mean income in HF zone when compared with ANFB NFBW and NFBO but positive and increased by 13.8% , 9.9% and 16.1% when compares with ANFB, NFBW and NFBO respectively. This confirms the result of Nkoya *et al* (2007) that the impact on mean income varied across the three agro-ecological zones with DS zone having the highest impact. This is an indication that *Fadama*-II project had impact across the three agroecological zones except HF.

Table 16: Level of Income across Agroecological Zones

Type of respondent	Statistics	Before Project	After project	% change Before & after project	ATT	% Change due to participation
FB						
HF	Mean	56585.5	71269.6	26.0		
	SD	129109.0	56683.3			
MS	Mean	50456.9	65892.6	30.6		
	SD	62084.6	71056.5			
DS	Mean	50695.7	70252.9	38.6		
	SD	62597.42	69477.9			
ANFB						
HF	Mean	56994.7	58919.1	3.4	7800.2	13.8
	SD	62022.4	65450.5		(20573.8)	
MS	Mean	48611.7	51703.9	6.4	8602.8**	17.1
	SD	53145.9	60665.8		(4704.4)	
DS	Mean	51359.6	56330.9	8.7	14762.6***	29.1
	SD	45183.4	72153.8		(3655.1)	
NFBW						
HF	Mean	56322.1	58869.8	4.5	5601.8	9.9
	SD	57172.2	53181.5		(23943.8)	
MS	Mean	48505.1	52414.1	8.1	5778.6	11.5
	SD	45694.3	51373.7		(10395.4)	
DS	Mean	51849.8	58731.5	13.3	14450.1***	28.5
	SD	42532.8	46521.7		(1665.1)	
NFBO						
HF	Mean	57553.8	58959.9	2.4	9088.5	16.1
	SD	65897.7	74234.3		(21967.6)	
MS	Mean	48715.3	51001.7	4.7	9384.5***	18.6
	SD	59633.8	68771.5		(2043.2)	
DS	Mean	50967.9	54412.7	6.8	23359.4***	46.1
	SD	47292.3	87467.4		(3785.9)	

Source: Computed from IFPRI, 2007

*, **, *** are significant levels at 10%, 5% and 1% respectively. The values in parenthesis are standard errors

4.2.5 Level of Income across *Fadama*-II Benefiting States

The mean income of all the respondents varied across the states before the project implementation with that of the non-beneficiaries varying more than that of beneficiaries in almost all the states. Although the growth rate of all the states were positive across the three types of respondents but the mean income of FB across the twelve benefiting states increased more than that of the non-beneficiaries after one year of project implementation with Kebbi State having the highest change in mean income of about 44.6% while the least is Oyo State (14.7%). Also due to spillover effect of the project the mean income of NFBW for all the states increased more than that of NFBO. This implies that *Fadama*-II project has improved the income of the beneficiaries even after one year of project implementation (Table 17).

Furthermore, Table 17 presents the impact of *Fadama*-II project on the income of the beneficiaries due to participation in the project compared to the corresponding groups. The result of ATT shows that there is significant difference in the mean income of FB in four benefiting states (Adamawa, Gombe, Kebbi and Kaduna) when compared with ANFB, since the impact was felt most in the dry savanna zone. Although the mean incomes were positive in Lagos and Oyo states they were not significantly different. The impact of the project on the other states using ATT could not be estimated due to small sample size. This is however, not an indication that *Fadama*-II project did not have impact in those states.

Table 17: Level of Income across Fadama II Benefiting States

States	*Statistics*	*FB Before (N)*	*After (N)*	*Income change %)*	*ANFB Before(N)*	*After(N)*	*Income change %)*	% change due to participation	*NFBW Before(N)*	*After(N)*	*Income change %)*	% change due to participation	NFBO Before (N)	After(N)	*Income change %)*	% change due to participation
Adamawa	Mean	46623.8	63526.5	36.3	43225.3	48381.5	11.9	19.3*	44177.8	49927.8	13.0	19.1*	42408.9	46954.1	10.7	19.6*
	SD	67965.8	85943.9		34628.3	42140.1			20578.7	22944.7			43462.7	54487.3		
Bauchi	Mean	49673.8	68286.4	37.5	51112.7	55492.7	8.6		50573.9	57317.5	13.3		51611.1	53804.7	4.3	
	SD	35068.0	41643.8		42453.7	34108.6			33663.8	35974.9			49654.7	32656.0		
FCT	Mean	51337.8	67894.6	32.3	48230.0	50387.2	4.5		48404.1	56072.5	15.8		47982.1	49885.4	3.9	
	SD	58925.4	58508.6		57961.9	57919.5			50739.4	56816.2			61434.5	60340.8		
Gombe	Mean	51334.6	69399.3	35.2	54615.7	57840.1	5.9	32.3**	54679.0	57904.3	5.9	35.1**	54507.8	57730.7	5.9	36.6**
	SD	30452.2	33818.9		55003.6	50977.5			57120.7	59293.1			52257.8	33340.2		
Imo	Mean	61715.6	77165.5	25.0	63011.9	64755.2	2.8		62489.8	64854.5	3.8		63388.3	64683.6	2.0	
	SD	40865.1	43322.7		48468.2	56250.2			54074.9	58490.6			44241.2	54847.3		
Kaduna	Mean	54908.9	71095.8	29.5	53657.9	56895.0	6.0	21.3**	55668.4	59451.7	6.8		52904.1	55936.2	5.7	12.9
	SD	30621.4	34063.1		37648.0	41228.3			35357.6	33547.3			38990.8	44214.5		
Kebbi	Mean	47835.6	69172.6	44.6	48177.7	55232.5	14.6	56.4***	48487.4	58150.1	19.9	34.4***	47953.3	53119.8	10.8	87.6***
	SD	96077.7	105557.1		45675.6	120172.9			38128.5	45605.6			50770.8	153544.2		
Lagos	Mean	53496.3	66562.2	24.4	52110.8	53063.3	1.8	4.7	52086.9	53504.8	2.7	-26.6	52134.2	52627.3	0.9	10.1
	SD	200198.7	75047.8		78576.3	76752.0			63962.7	43449.1			91146.9	99583.3		
Niger	Mean	52804.1	75396.5	42.8	51340.0	56811.0	10.7		52804.1	65396.5	23.9		50806.1	53661.9	5.6	
	SD	40571.8	48474.4		41761.3	46296.3			40571.8	48474.4			44936.8	47668.2		
Ogun	Mean	53253.8	69523.2	30.6	52579.5	56916.3	8.3		52144.8	57641.8	10.5		52935.2	54873.2	3.7	
	SD	32178.8	34543.4		51153.9	60269.3			46974.9	60425.4			54873.2	60833.6		
Oyo	Mean	60279.1	69124.9	14.7	58958.9	60047.6	1.9	15.9	58179.3	59549.4	2.4	16.3	59703.1	60523.2	1.4	14.8
	SD	64972.8	62587.2		65336.2	80266.0			42062.7	41927.7			82159.7	105161.4		
Taraba	Mean	45401.2	64185.4	41.4	44655.0	48433.2	8.5		43589.5	49784.8	14.2		45528.4	47325.4	3.9	
	SD	57034.6	71983.8		49180.6	55563.6			50608.8	66608.6			48383.3	45099.8		

Source: Computed from IFPRI, 2007

*, **, *** are significant levels at 10%, 5% and 1% respectively.

4.3 Income Inequality of *Fadama*-II and Non *Fadama*-II Households

4.3.1 Income Inequality of Respondents by Type and Gender

Income inequality of *Fadama*-II Beneficiaries (FB) before the project was 0.5473 and after one year of the project it reduced to 0.4547 (16.9% decline). There was an increase of about 4.9% and 14.0% in income inequality of all Non-*Fadama* Beneficiaries and that of Non-*Fadama* Beneficiaries living outside Fadama LGAs (NFBO) respectively (Table 18). Due to spillover effect, there was a decrease of about 4.9% in income inequality of Non-Fadama Beneficiaries living within *Fadama* LGAs. This implies that Fadama II project reduces income inequality of the beneficiaries. The table also shows the impact of the project on income inequality. Due to participation in the project, income inequality of beneficiaries reduced by 21.2%, 12.5% and 28.4% when compared with ANFB, NFBW and NFBO respectively. However, the lower reduction in the income inequality of Beneficiaries when compared with NFBW could be due to spillover effect of the project after one year of project implementation.

Also, from Table 18, income inequalities of female and male *Fadama* beneficiaries decreased but that of female (25.65%) decreased much more than that of male beneficiaries (8.72%). However, the percentage change in income inequality of all female non *Fadama* beneficiaries as well as that of non-*Fadama* Beneficiaries living outside *Fadama* LGAs was not as high as that of their male counterparts. Also due to spillover effect, percentage change in income inequality of female non-*Fadama* Beneficiaries living within *Fadama* LGAs decreased at a higher rate when compared with the male counterparts. Generally, percentage change in income inequality of the female *Fadama*-II beneficiaries decreased at the highest rate followed by that of NFBW while that of NFBO and ANFB increased. The table also shows the impact of the project on income inequality. Due to participation in the project, income inequality of female beneficiaries reduced by 27.23%, 22.03% and 30.84% when compared with their counterparts ANFB, NFBW and NFBO. Similarly, the income inequality of male beneficiaries reduced by 14.1%, 4.0% and 23.2% when compared to their colleagues- ANFB, NFBW and NFBO. The lower reduction in the income inequality of beneficiaries when compared with NFBW could be due to spillover effect of the project after one year of project implementation. This implies that *Fadama*-II project reduces gender inequality which is one of the goals of the project.

Table 18: Level of Income Inequality of Respondents by Type and Gender

Type of Respondent	*Gini Before*	*Gini After*	*Percentage Change*	*Impact (%)*
FB	0.5473	0.4547	-16.9	
Female	0.6070	0.4513	-25.7	
Male	0.5286	0.4825	-8.7	
ANFB	0.4699	0.4931	4.9	-21.2
Female	0.4431	0.4527	2.2	-27.2
Male	0.4805	0.5087	5.9	-14.1
NFBW	0.4936	0.4693	-4.9	-12.5
Female	0.4391	0.4171	-5.0	-22.0
Male	0.5117	0.4867	-4.9	-4.0
NFBO	0.4485	0.5114	14.0	-28.4
Female	0.4438	0.4753	7.10	-30.8
Male	0.4502	0.5265	16.9	-23.2

Source: Computed from IFPRI, 2007

4.3.2 Level of Income Inequality of Respondents by Primary Activities

Income Inequality of FB varied across primary activities before the project with that of beneficiaries that engaged in crop production activities having the highest Gini index of 0.6932 while the least Gini index was 0.4748 for FB that engaged in other activities (retired, schooling and unemployed). Also, income inequality (0.5549) of FB that engaged in up-stream farming was more than those that engaged in down-stream farming activities (0.5343) before the project implementation. Income inequality of FB across primary activities declined but the decline was highest among the respondents that engaged in up-stream farming activities with crop production having the highest percentage change of 25.8% after one year of project implementation (Table 19). This could be as a result of *Fadama*-II investment in agricultural infrastructure. On the contrary, income inequality of ANFB increased with the respondents that engage in up-stream farming and down-stream farming activities but the increase is higher among respondents that engage in up-stream farming activities. However, the income inequality of respondents that engage in crop production declined. Due to spillover effect, income inequality of NFBW declined across the different primary activities however, the decline was higher among respondents that engage in crop production while income inequality increased across the different primary activities of NFBO after one year of project implementation.

The table also presents the impact of *Fadama*-II project on income inequality of respondents. Income inequality of beneficiaries decreased across the different types of primary activities and the decline was higher for fishery (24.9%) activities when compared with ANFB. When compared with NFBW and NFBO, income inequality of beneficiaries declined across the different type of primary activities except among the NFBW that engaged in down-stream farming activities where their income inequality increased. The decline in income inequality of beneficiaries was higher when compared with NFBO than when compared with NFBW (Table 19). This implies that the distance between the incomes of FB and NFBO was initially higher than that obtained when compared with NFBW.

Table 19: Level of Income Inequality of Respondents by Primary Activity

Primary activity of Respondent	*Gini Before*	*Gini After*	*Percentage Change*	*Impact (%)*
FB				
Fishery	0.5364	0.4562	-14.9	
Livestock	0.4357	0.3871	-11.2	
Crop production	0.6932	0.5143	-25.8	
Up stream Farm	0.5549	0.4755	-14.3	
Down stream Farm	0.5343	0.4999	-6.4	
other	0.4748	0.4132	-12.9	
ANFB				
Fishery	0.4525	0.5057	11.8	-24.9
Livestock	0.4734	0.4692	-0.9	-10.2
Crop production	0.4944	0.4648	-5.9	-21.5
Up stream Farm	0.4753	0.5047	6.2	-19.6
Down stream Farm	0.4895	0.5093	4.0	-10.1
Others	0.4172	0.4078	-2.3	-10.9
NFBW				
Fishery	0.4509	0.4426	-1.8	-13.4
Livestock	0.4722	0.4567	-3.3	-7.6
Crop production	0.5153	0.4296	-16.6	-13.5
Up stream Farm	0.4824	0.4614	-4.4	-10.5
Down stream Farm	0.6177	0.5723	-7.4	2.1
Others	0.4209	0.4044	-3.9	-9.5
NFBO				
Fishery	0.4528	0.5453	20.4	-32.2
Livestock	0.4695	0.4779	1.8	-13.1
Crop production	0.4658	0.4893	5.1	-29.2
Up stream Farm	0.4682	0.5360	14.5	-26.5
Down stream Farm	0.3727	0.4481	20.2	-20.6
other	0.3948	0.3981	0.8	-13.7

Source: Computed from IFPRI, 2007

4.3.3 Level of Income Inequality of the Respondents across Agro-ecological Zones

Table 20 presents the level of income inequality of respondents across the three agro-ecological zones. The level of income inequality varied across the three agro-ecological zones and the three types of respondents before the project. In HF zone, the level of income inequality of FB was the highest with Gini index of 0.5640 and the least Gini index was for NFBO (0.4069). Also, in DS zone the level of income inequality of FB was the highest with Gini index of 0.4410 and the least Gini index was for NFBO (0.4217). In addition, the table reveals that income inequality of Fadama-II beneficiaries across the three zones reduced after one year of the project implementation. This reduction indicates that, on the average, the distance between the incomes of FB have declined by 32.6%, 3.9% and 1.8% across the three agroecological zones- HF, MS and DS respectively. While income inequality of ANFB at HF decreased that of MS and DS increased after one year of the project implementation. Due to spill-over effect, income inequality of NFBW in HF and DS decreased after one year of project implementation. However, income inequality of NFBW increased in MS but when compared with that of NFBO, the rate was lower than that of NFBO. The Table also shows the impact of the project on income inequality of beneficiaries across the agro-ecological zones. The result reveals that income inequality of beneficiaries decreased across the three agroecological zones and the decline was highest for the HF zone (28.4%) when compared with ANFB. Similarly, comparing income inequality of FB with NFBW and NFBO Gini index decreased and the decrease was also highest for HF zone with 20.0% and 35.4% change in Gini index respectively. The decrease was also shown to be higher for NFBO in all the agro-ecological zones which reveals the spillover effect of the project on NFBW. This implies that the distance between the income of FB and NFBW was initially lower than that obtained when compared with NFBO.

Table 20: Level of Income Inequality of the Respondents across Agroecological Zones

Agroecological zone	Type of respondent	Gini Before	Gini After	Percentage Change	Impact (%)
Humid Forest	FB	0.5640	0.3799	-32.6	
	ANFB	0.4351	0.4109	-5.6	-28.4
	NFBW	0.4666	0.3952	-15.3	-20.0
	NFBO	0.4069	0.4225	3.8	-35.4
Moist	FB	0.5141	0.4940	-3.9	
Savannah	ANFB	0.5238	0.5698	8.8	-12.9
	NFBW	0.5492	0.5541	0.9	-4.9
	NFBO	0.4948	0.5782	16.9	-20.1
	FB	0.4410	0.4333	-1.8	
Dry Savannah	ANFB	0.4242	0.4679	10.3	-11.7
	NFBW	0.4270	0.4207	-1.5	-0.3
	NFBO	0.4217	0.5040	19.5	-20.4

Source: Computed from IFPRI, 2007

4.3.4 Level of Income Inequality of Respondents across Benefiting States

Table 21 presents level of income inequality of respondents across the twelve World Bank supported *Fadama*-II Benefiting states. The result reveals that income inequalities of FB fall in all the twelve benefiting states after the project implementation. There is an average decrease of about 7.1% in all the states with Lagos State having the highest percentage change of about 49.4%, with the least reduction in Adamawa (0.5%). Kaduna actually recorded an increase in income inequality. Income inequality of ANFB increased in all the states except in Lagos with a decrease of 18%. Also, the income inequalities of NFBO increased in all the states except Ogun State where it reduced by 1.1%. Due to spillover effect, income inequality of NFBW reduced in eight states with Lagos State having the highest percentage change of about 35.1% and Gombe State with the least reduction of 0.3%.

The impact of *Fadama*-II project on income inequality of beneficiaries shows that FB income inequality decreased across the twelve benefiting states and across the types of respondents except in Bauchi and Niger states where it increased by 0.6% and 0.2% respectively when compared to NFBW. Although income inequality reduced when compared to NFBW but the decline was lower when compared to NFBO. This implies that the distance between incomes of FB and NFBW was not as wide as that of NFBO. This could be due to the spillover effect of *Fadama*-II. This implies that Fadama- II had reduced the income inequality of target beneficiaries in all the benefiting states since when compared with ANFB, their income inequality decreased.

Table 21: Level of Income Inequality of Respondents across Benefiting State

State	Type of respondent	Gini Before	Gini After	Percentage change	Impact (%)
Adamawa	FB	0.5466	0.5437	-0.5	
	ANFB	0.5064	0.5203	2.7	-3.1
	NFBW	0.5373	0.5350	-0.4	-0.1
	NFBO	0.4496	0.4924	9.5	-8.4
Bauchi	FB	0.3825	0.3738	-2.3	
	ANFB	0.3121	0.3157	1.2	-3.2
	NFBW	0.3352	0.3244	-3.2	0.6
	NFBO	0.3243	0.3351	3.3	-5.1
FCT	FB	0.4897	0.4488	-8.4	
	ANFB	0.5231	0.5258	0.5	-8.9
	NFBW	0.5014	0.4876	-2.8	-5.5
	NFBO	0.5391	0.5474	1.5	-10.1
Gombe	FB	0.3195	0.3041	-4.8	
	ANFB	0.4395	0.4467	1.6	-7.1
	NFBW	0.4653	0.4638	-0.3	-4.4
	NFBO	0.3208	0.3239	1.0	-5.8
Imo	FB	0.3394	0.3228	-4.9	
	ANFB	0.3480	0.3643	4.7	-9.7
	NFBW	0.3434	0.3488	1.6	-6.5
	NFBO	0.3482	0.3741	7.4	-12.5
Kaduna	FB	0.2957	0.3008	1.7	
	ANFB	0.3144	0.3531	12.3	-11.4
	NFBW	0.2958	0.3009	1.7	0.0
	NFBO	0.3078	0.3470	12.7	-11.5
Kebbi	FB	0.5609	0.5394	-3.8	
	ANFB	0.4142	0.5564	34.3	-29.2
	NFBW	0.4074	0.4042	-0.8	-3.3
	NFBO	0.4151	0.6276	51.2	-41.7
Lagos	FB	0.9263	0.4691	-49.4	
	ANFB	0.5334	0.4369	-18.1	-38.9
	NFBW	0.6077	0.3944	-35.1	-26.3
	NFBO	0.4499	0.4688	4.2	-51.4
Niger	FB	0.4219	0.4132	-2.1	
	ANFB	0.3982	0.4042	1.5	-3.5
	NFBW	0.4321	0.4224	-2.2	0.2
	NFBO	0.4254	0.4291	0.9	-2.9
Ogun	FB	0.2940	0.2859	-2.8	
	ANFB	0.3342	0.3539	1.4	-9.5
	NFBW	0.3342	0.3437	2.8	-6.0
	NFBO	0.3582	0.3543	-1.1	-1.4
Oyo	FB	0.4882	0.4701	-3.7	
	ANFB	0.4730	0.5582	18.0	-21.2
	NFBW	0.3794	0.3672	-3.2	-1.2
	NFBO	0.5289	0.6199	17.2	-22.4
Taraba	FB	0.5178	0.4950	-4.4	
	ANFB	0.4970	0.5218	5.0	-9.2
	NFBW	0.4012	0.4100	2.2	-6.1
	NFBO	0.5986	0.6498	8.6	-14.3

Source: Computed from IFPRI, 2007

4.4 Poverty Status of *Fadama*-II and Non *Fadama*-II Households

4.4.1 Poverty Status by Type of Respondents

The poverty lines were computed for respondents using the two-thirds mean per capita household expenditure before and after the project. The poverty lines are ₦35, 299.0 and N40,146.1 per annum before and after the project respectively. Based on these 52.2% of FB live below the poverty line (poor) before the project while after the project, it declined to 44.3%. Therefore there was 15.1 percentage point reduction in poverty after one year of project implementation. Although the proportion of the poor that participated in the project was a little bit more than that of the non-poor but it is still low since *Fadama*–II's aim was to alleviate poverty of the poor and poverty does not exist among non-poor. Thus, their involvement in the project should not be pronounced. Also the fact that proportion of poor FB reduced after project shows that *Fadama*-II has potential to reduce poverty (Table 23).

Table 23 also presents the poverty status by type of respondents. The poverty incidence of FB before the project was higher than that of non-beneficiaries. It was 0.5218 for FB and 0.4334 for ANFB. The table reveals that the FGT poverty indices of *Fadama* beneficiaries have all declined after one year of project implementation and the decline has been deeper the "deeper" the poverty measure used. The Headcount index has decreased by 15.1% as compared with the Poverty Gap and the Severity of Poverty indices which have declined by 40.7% and 54.5% respectively. Similarly, FGT poverty indices of NFBW have also declined after one year of project implementation. The Headcount index has decreased by 9.2% as compared to the Poverty Gap and the Severity of Poverty indices which have declined by13.8 % and 18.1% respectively. The result also shows that FGT poverty indices of ANFB have inclined after one year of project implementation. The Headcount index increased by 0.6% as compared to the Poverty Gap and the Severity of Poverty indices which inclined by 2.3% and 0.4% respectively. Likewise FGT poverty indices of NFBO have increased after one year of project implementation. The Headcount index has increased by 8.7% as compared to the Poverty Gap and the Severity of Poverty indices which have inclined by 19.2% and 24.4%. This is an indication that poverty increased after one year of project implementation among non-beneficiaries and reduced among the beneficiaries.

Finally, the table presents the impact of the project on the poverty incidence, depth and severity of beneficiaries. The poverty incidence reduced by 15.7%, 5.8% and 23.7% when

compared with ANFB, NFBW and NFBO respectively. The result also shows that Poverty Gap and the Severity of Poverty indices fell but there is no significant impact of the project on these indices when compared with non-beneficiaries. Although *Fadama*-II project targets to increase income of 50% of the beneficiaries by 20% at the end of six years, if at the end of one year of implementation population of beneficiaries in poverty reduced by 15.7% this shows that Fadama-II project was poverty decreasing and being able to meet its target.

Table 22: Average Annual Expenditure of Respondents

Statistics	Before Project (N)	After Project (N)
Mean	305,505.1	348,040.9
Mean per capita expenditure	52948.5	60219.2
Poverty line	35,299.0	40,146.1

Source: Computed from IFPRI, 2007

Table 23: Poverty Status by Type of Respondents

Type of respondents/ Gender	Statistics	Before the project	After the project	% change	ATT	Impact (%)
FB	P0	0.5218	0.4432	-15.1		
	P1	0.2981	0.1769	-40.7		
	P2	0.2240	0.1020	-54.5		
ANFB	P0	0.4334	0.4360	0.6	---------	-15.7
	P1	0.1890	0.1934	2.3	-0.1532	-51.4
	P2	0.1237	0.1242	0.4	-6.9637	-3108.8
NFBW	P0	0.4230	0.3840	-9.2	--------	-5.8
	P1	0.2089	0.1801	-13.8	-0.0542	-18.2
	P2	0.1508	0.1235	-18.1	-7.0489	-3146.8
NFBO	P0	0.4424	0.4808	8.7	--------	-23.7
	P1	0.1718	0.2048	19.2	-0.2311	-77.5
	P2	0.1003	0.1248	24.4	-6.9111	-3085.3

Source: Computed from IFPRI, 2007
*, **, *** are significant levels at 10%, 5% and 1% respectively.

4.4.2 Poverty Status of Respondents by Gender

Table 24 also reveals that the FGT poverty indices of female FB were higher than that of the male FB before and after the project. The headcount of female FB was 0.6397 and 0.4851 for male FB before the project. The headcount index of female FB decreased by 32.2%, the Poverty Gap decreased by 57.2% and the Severity of Poverty index declined by 67.3%. While the Headcount index of male FB has decreased by 8.0%, the Poverty Gap decreased by 32.3% and the Severity of Poverty index declined by 46.8%. This shows that the FGT poverty indices of female and male *Fadama* beneficiaries have all declined after one year of project implementation and the decline has been deeper in female compared with the male. However, due to spill-over effect of the project, the FGT poverty indices of female and male NFBW reduced but that of male reduced more than that of the female. The table reveals that FGT poverty indices of male ANFB reduced while that of the female counterparts increased with the exception of poverty gap index of male counterpart of the ANFB which increased by 0.3%.

Similarly, the table shows the impact of the project on the poverty incidence, depth and severity of beneficiaries. The poverty incidence of FB was reduced by 34.0% and 7.8% for female and male respectively when compared with ANFB. In the same vein poverty incidence of female reduced more than that of male when compared with both NFBW and NFBO but that of NFBO reduced more than that of NFBW. This reveals spillover effect of the project. There is no statistical impact of the project on poverty gap and its severity for both male and female but poverty gap and severity of female reduced more than that of the male when compared with ANFB, NFBW and NFBO.

Table 24: Poverty Status by Gender

Type of respondents/ Gender	Statistics	Before the project	After the project	% change	ATT	Impact (%)
FB						
Female	P0	0.6397	0.4338	-32.19		
	P1	0.4228	0.1808	-57.24		
	P2	0.3553	0.1161	-67.32		
Male	P0	0.4851	0.4462	-8.02		
	P1	0.2592	0.1756	-32.25		
	P2	0.1832	0.0975	-46.78		
ANFB						
Female	P0	0.4548	0.4665	2.57	-------	-34.0
	P1	0.1935	0.2070	6.98	-0.3217	-76.1
	P2	0.1253	0.1321	5.43	-17.5878	-4950.1
Male	P0	0.4245	0.4233	-0.28	---------	-7.8
	P1	0.1871	0.1877	0.32	0.0276	-10.7
	P2	0.1230	0.1209	-1.71	-4.3804	-2391.1
NFBW						
Female	P0	0.4295	0.4094	-4.68	---------	-27.5
	P1	0.2155	0.1934	-10.26	-0.3413	-80.7
	P2	0.1532	0.1343	-12.34	-18.1911	-5119.9
Male	P0	0.4205	0.3743	-10.99	--------	-4.2
	P1	0.2065	0.1750	-15.25	0.0437	16.9
	P2	0.1499	0.1194	-20.35	-4.1428	-2261.4
NFBO						
Female	P0	0.4742	0.5103	7.61	---------	-39.8
	P1	0.1765	0.2174	23.17	-0.3370	-79.7
	P2	0.1039	0.1304	25.51	-17.4096	-4899.9
Male	P0	0.4282	0.4675	9.18	--------	-17.2
	P1	0.1697	0.1992	17.38	-0.1250	-48.2
	P2	0.0987	0.1222	23.81	-4.2066	-2296.2

Source: Computed from IFPRI, 2007

4.4.3 Poverty Status of Respondents by Primary Activity

Table 25 and 26 present poverty status of respondents by primary activities. The FGT indices of FB that engaged in up-stream farming activities are higher (especially those that engaged in crop production) than those that engaged in down-stream farming activities before the project but decline more than that of those that engaged in down-stream farming activities after project implementation. Also the FGT poverty indices of FB by their primary activity have all declined after one year of project implementation. The poverty incidence of FB that engaged in up-stream farming activities declined by 13.4% on the average while those that engaged in down-stream farming activities declined by 5.7% on the average. The FGT poverty indices of FB that engaged in crop production declined more than other up-stream farming activities by 33.7%, 68.7% and 77.9%. In the same vein FGT indices of NFBW that engaged in up-stream farming activities and down-stream farming activities declined but the decline was deeper for those that engaged in up-stream farming activities. In contrast, the poverty incidence increased among NFBO that engaged in up-stream farming activities and down- stream farming activities.

Finally, Tables 25 and 26 also reveal the impact of *Fadama*-II project on the poverty status. The poverty incidence of FB reduced by 14.4% and 7.1% for those that engaged in up-stream farming activities and down-stream farming activities respectively when compared with ANFB. In the same vein when compared with NFBW and NFBO poverty incidence of FB that engaged in up-stream farming activities reduced more than those that engaged in down-stream farming activities. However, there was no significant difference in poverty gap and severity of FB when compared with ANFB, NFBW and NFBO across different primary activities. Nonetheless, poverty gap was significant among respondents that engaged in up-stream farming activities when compared with ANFB and NFBO. This suggests that *Fadama*-II project had reduced the average gap between poor households' standard of living (those that engage in up-stream farming activities) and poverty line.

Table 25: Poverty Incidence by Primary Activity of Respondents

Type of respondents	Primary Activity of Respondent	Before the project	After the project	% change	Impact (%)
FB	Fishery	0.5185	0.4630	-10.7	
	Livestock	0.4897	0.3877	-20.8	
	Crop production	0.5527	0.3662	-33.7	
	Up-stream Farm	0.5487	0.4751	-13.4	
	Down-stream farm	0.5222	0.4923	-5.7	
	Others	0.5098	0.4117	-19.2	
	Fishery	0.4820	0.4735	-1.8	-8.9
ANFB	Livestock	0.4229	0.4309	7.3	-25.1
	Crop production	0.4611	0.4486	5.3	-31.0
	Up-stream Farm	0.4897	0.4933	0.7	-14.2
	Down-stream farm	0.4506	0.4567	1.4	-7.1
	Others	0.4752	0.4094	-13.8	-5.4
NFBW	Fishery	0.4523	0.4207	-7.0	-3.7
	Livestock	0.4535	0.4435	-2.2	-18.6
	Crop production	0.4536	0.4272	-5.8	-27.9
	Up-stream Farm	0.4821	0.4824	-0.1	-13.5
	Down-stream farm	0.4610	0.4535	-1.6	-4.1
	Others	0.4793	0.4078	-14.9	-4.3
NFBO	Fishery	0.5045	0.5285	4.8	-15.5
	Livestock	0.4182	0.4384	4.8	-25.7
	Crop production	0.4777	0.4703	-1.6	-32.2
	Up-stream Farm	0.4927	0.5053	2.6	-15.5
	Down-stream farm	0.4409	0.4599	4.3	-10.0
	Others	0.4639	0.4139	-10.8	-8.5

Source: Computed from IFPRI, 2007

Table 26: Poverty Status of Respondents by Primary Activity

Type of respondents	Primary Activity of respondent	Statistics	Before Project (N)	After Project (N)	% change Before & after project	ATT (N)	% Change due to participation
FB	Fishery	P1	0.2894	0.1868	-35.5		
		P2	0.2106	0.1061	-49.6		
	Livestock	P1	0.2910	0.1348	-53.7		
		P2	0.2254	0.0687	-69.5		
	Crop	P1	0.4450	0.1391	-68.7		
	production	P2	0.4205	0.0930	-77.9		
		P1	0.3080	0.1755	-43.0		
	Up-stream	P2	0.2371	0.1005	-57.6		
	Farm	P1	0.2640	0.2025	-23.3		
	Down-stream	P2	0.1783	0.1239	-30.5		
	farm	P1	0.2538	0.1545	-39.1		
	Others	P2	0.1678	0.0853	-49.2		
ANFB	Fishery	P1	0.1999	0.2105	5.3	-0.0726	-25.1
		P2	0.1213	0.1305	7.6	-5.0248	-2385.9
	Livestock	P1	0.1204	0.1459	21.2	-0.4124*	-141.7
		P2	0.0788	0.0924	17.3	-2.8574	-1267.7
	Crop	P1	0.1804	0.1376	-23.7	-0.5545*	-124.6
	production	P2	0.1398	0.0910	-34.9	-0.1647	-39.2
		P1	0.1841	0.1902	3.3	-0.2642*	-85.8
	Up-stream	P2	0.1166	0.1189	2.0	-3.1938	-1347.0
	Farm	P1	0.2174	0.2152	-1.0	-0.0277	-10.5
	Down-stream	P2	0.1585	0.1509	-4.8	-.2209	-123.9
	farm	P1	0.1860	0.1882	1.2	1.0939	431.0
	others	P2	0.1250	0.1243	-0.6	57.6658	34365.8
NFBW	Fishery	P1	0.1954	0.1727	-11.6	0.0421	8.1
		P2	0.1274	0.1087	-14.7	-4.8796	-1686.1
	Livestock	P1	0.1315	0.1327	0.9	-.3023	-61.7
		P2	0.0985	0.0960	-2.5	-3.6263	-1246.2
	Crop	P1	0.2578	0.1600	-37.9	-0.3492	-63.2
	production	P2	0.2331	0.1207	-48.2	0.7558	169.8
	Up-stream	P1	0.1925	0.1633	-15.2	-0.1475	-26.9
	Farm	P2	0.1374	0.1080	-21.4	-3.4340	-1114.9
	Down-stream	P1	0.3483	0.3049	-12.5	0.0373	7.1
	farm	P2	0.2814	0.2432	-13.6	0.00843	3.2
	others	P1	0.1617	0.1467	-9.3	1.8119	355.4
		P2	0.0983	0.0888	-9.7	-83.20	-32781.7
NFBO	Fishery	P1	0.2034	0.2392	17.6	-.1656	-31.9
		P2	0.1167	0.1470	25.9	-5.0345	-1739.6
	Livestock	P1	0.1088	0.1597	46.8	-0.7050	-143.9
		P2	0.0581	0.0887	52.7	-2.8847	-991.3
	Crop	P1	0.1015	0.1148	13.1	-0.6299	-113.9
	production	P2	0.0448	0.0607	35.5	-.3361	-75.5
		P1	0.1771	0.2125	19.9	-0.3791*	-69.1
	Up-stream	P2	0.0994	0.1280	28.8	-2.6767	-869.1
	Farm	P1	0.1072	0.1397	30.3	0.3701	70.9
	Down-stream	P2	0.0551	0.0733	33.0	-5.1588	-1954.1
	farm	P1	0.2114	0.2318	9.7	0.9897	194.1
	others	P2	0.1531	0.1616	5.6	-53.500	-21079.6

Source: Computed from IFPRI, 2007

*, is significant levels at 10%,.

4.4.4 Poverty Status of Respondents across Agroecological Zones

Table 27 presents poverty status of respondents across agro-ecological zones. About 59.8%, 50.9% and 43.2% of the respondents that participated in the project were poor in the MS, HF and DS before the project respectively. It is shown from the table that FGT poverty indices of FB across the three agro-ecological zones have all declined. This decline was mostly felt in the HF followed by MS and DS after one year of project implementation. On the average, the FGT poverty indices of FB declined by 60.1%, 16.7% and 12.6% in HF, MS and DS zones respectively. Similarly, due to spill-over effect of *Fadama*-II project, FGT poverty indices of NFBW across the three agro-ecological zones have declined except in the MS zone where their poverty gap and severity increased after one year of project implementation. The result further shows that FGT poverty indices of ANFB and NFBO across the three agro-ecological zones have increased except in the humid forest zone of ANFB where their FGT poverty indices declined after one year of project implementation. This is an indication that *Fadama*-II project had reduced poverty in all the three agro-ecological zones.

The impact of the project on poverty status showed that the poverty incidence of FB reduced by 31.8%, 7.9% and 5.6% for HF, MS, and DS zones respectively when compared with ANFB. The poverty incidence of FB reduced in HF zone more than other zones when compared with NFBW and NFBO. This could be attributed to the fact that their income inequality also reduced more than other zones even though their income growth was the least. This implies that for poverty to be reduced income inequality must also be reduced since they are closely related. There was however, no significant difference between the poverty gap of FB and that of ANFB, NFBW and NFBO across the three agro-ecological zones except when compared with NFBW and NFBO where net poverty gaps were negative and statistically significant at 5% (MS) and 1% (DS) respectively. In the same vein, there was no significant difference between the poverty severity of FB and that of ANFB, NFBO and NFBW.

Table 27: Poverty Status across Agroecological Zones

Type of respondents	*Gender*	Statistics	Before the project	After the project	% change	ATT	Impact (%)
FB	HF	P0	0.5098	0.3382	-33.7		
		P1	0.3895	0.1250	-67.9		
		P2	0.3620	0.0773	-78.7		
	MS	P0	0.5981	0.5654	-5.5		
		P1	0.2805	0.2279	-18.8		
		P2	0.1664	0.1281	-23.0		
	DS	P0	0.4322	0.4129	-4.5		
		P1	0.2020	0.1745	-13.6		
		P2	0.1222	0.0981	-19.7		
ANFB	HF	P0	0.3663	0.3594	-1.9	----------	-31.8
		P1	0.1677	0.1372	-18.2	-0.797	-204.6
		P2	0.1257	0.0873	-30.6	-26.309	-7267.7
	MS	P0	0.4308	0.4414	2.5	---------	-7.9
		P1	0.1621	0.1845	13.8	-0.1295	-46.2
		P2	0.0880	0.1094	24.3	-1.4748	-88.6
	DS	P0	0.5183	0.5239	1.1	--------	-5.6
		P1	0.2435	0.2715	11.5	-0.1098	-54.4
		P2	0.1591	0.1849	16.2	-0.1954	-159.9
NFBW	HF	P0	0.3908	0.3147	-19.5	--------	-14.2
		P1	0.2259	0.1331	-41.1	0.4367	112.1
		P2	0.1919	0.0945	-50.8	0.6929	191.4
	MS	P0	0.4011	0.3892	-3.0	--------	-2.5
		P1	0.1496	0.1422	-5.0	-0.0782	-27.9
		P2	0.0789	0.0748	-5.2	-26.4376	-15888
	DS	P0	0.4800	0.4631	-3.5	---------	-1.0
		P1	0.2464	0.2691	9.2	-0.1159**	-57.4
		P2	0.1733	0.2025	16.9	-0.2960	-242.2
NFBO	HF	P0	0.3459	0.3966	14.7	---------	-48.3
		P1	0.1194	0.1407	17.8	-0.782	-200.8
		P2	0.0706	0.0813	15.2	-26.437	-7303.0
	MS	P0	0.5555	0.5888	6.0	-------	-11.5
		P1	0.2407	0.2737	13.7	-0.0820	-29.2
		P2	0.1452	0.1678	15.6	-1.6266	-977.5
	DS	P0	0.4545	0.4832	6.3	--------	-10.8
		P1	0.1721	0.2183	26.9	-0.362***	-179.1
		P2	0.0952	0.1370	43.9	-1.4431	-1180.9

Source: Computed from IFPRI, 2007

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

5.1.5 Poverty Status of Respondents across *Fadama*-II Benefiting States

Table 28 presents Poverty status of respondents across the *Fadama*-II Benefiting States. It is shown that FGT poverty indices of FB in all the benefiting states have all declined after one year of project implementation. On the average, the FGT poverty indices of *Fadama* beneficiaries declined by as much as 67.5%, in Lagos to as low as 3.3% in Oyo while it increased in Bauchi and Kaduna states by 20.8% and 9.9% after one year of project implementation. Although FGT indices declined in Adamawa but its poverty incidence remain unchanged. This indicates that percentage of beneficiaries that were non-poor increased in only nine states after one year of project implementation and the percentage was minimal in some of the states (Oyo, Ogun, Gombe, and Kebbi). Contrariwise, FGT poverty indices of ANFB, NFBW and NFBO inclined in all the states except in Lagos, Ogun, Adamawa and Gombe states where it declined. It is shown from the result that poverty reduced among the FB in eight states and in the other states it remained either unchanged or increased. On the other hand, among the non-beneficiaries poverty decreased in only three states and increased in nine states among non-beneficiaries.

Table 29 reveals the impact of the project on the poverty status. The impact of the project was felt on the poverty incidence of nine states with Lagos State having the highest impact in the reduction in poverty incidence by 34.4% when compared with ANFB. The poverty incidence increased in three states (Adamawa, Bauchi and Kaduna) which could have contributed to the low reduction in poverty in DS zone. The impact of the project was only statistically felt on the poverty gap in Kebbi State where net poverty gap was negative and significant at 1% when compared with ANFB. In few states, the net poverty gap was not significant but negative (Adamawa, Oyo Gombe and Kaduna) when compared with ANFB. On the other hand, net poverty severity was positive and not significant in Adamawa, Kaduna, Gombe and Niger States.

Table 28: Poverty Status of Respondents across the *Fadama*-II Benefiting States

State	Statistics	*FB* Before	After	% change	*ANFB* Before	After	% change	*NFBW* Before	After	% change	*NFBO* Before	After	% Change
Lagos	P0	0.8641	0.4814	-44.3	0.4907	0.4417	-9.9	0.5185	0.3580	-30.9	0.5634	0.6243	10.8
	P1	0.8494	0.2079	-75.5	0.3154	0.2182	-30.8	0.4398	0.2165	-50.8	0.1924	0.2199	14.3
	P2	0.8407	0.1445	-82.8	0.2728	0.1649	-39.6	0.4217	0.1798	-57.4	0.1256	0.1501	19.5
Ogun	P0	0.7666	0.7444	-8.3	0.4125	0.3875	-6.1	0.4166	0.3611	-13.3	0.4090	0.4090	0.0
	P1	0.0834	0.0721	-13.6	0.0860	0.0829	-3.6	0.0721	0.0645	-10.5	0.0973	0.0979	0.6
	P2	0.0487	0.0415	-14.8	0.0274	0.0276	0.7	0.0200	0.0205	2.5	0.0334	0.0334	0.0
Imo	P0	0.3820	0.3435	-10.1	0.3408	0.3774	10.7	0.3500	0.3500	0.0	0.3342	0.3972	18.9
	P1	0.0883	0.0694	-21.4	0.0759	0.0909	19.8	0.0785	0.0795	1.3	0.0741	0.0992	33.9
	P2	0.0455	0.0281	-38.2	0.0413	0.0461	11.6	0.0364	0.0415	14.0	0.0448	0.0495	10.5
Adamawa	P0	0.6981	0.6981	0.0	0.6641	0.5871	-11.6	0.6166	0.5055	-18.0	0.6904	0.6428	-6.9
	P1	0.3281	0.2721	-17.1	0.2072	0.1871	-9.7	0.1017	0.0861	-15.3	0.2975	0.2736	-8.0
	P2	0.1893	0.1475	-22.1	0.1184	0.0954	-19.4	0.0369	0.0281	-23.9	0.1884	0.1530	-18.8
FCT	P0	0.5277	0.4444	-15.8	0.5500	0.5625	2.3	0.5319	0.5531	3.9	0.5757	0.5757	0.0
	P1	0.2531	0.1932	-23.7	0.2881	0.3054	6.0	0.2596	0.2727	5.1	0.3286	0.3521	7.2
	P2	0.1493	0.1086	-27.3	0.1771	0.1974	11.5	0.1504	0.1660	10.4	0.2152	0.2421	12.5
OYO	P0	0.4629	0.4259	-7.9	0.3953	0.4500	13.8	0.4095	0.4095	0.0	0.4772	0.5818	10.5
	P1	0.2161	0.2155	-0.3	0.1720	0.2351	36.7	0.1376	0.1442	4.8	0.2049	0.2518	22.9
	P2	0.1344	0.1322	-1.6	0.1004	0.1448	44.2	0.0766	0.0801	4.6	0.1231	0.1665	35.3
Taraba	P0	0.6901	0.6056	-12.3	0.5585	0.5405	-3.2	0.6200	0.6000	-3.2	0.5081	0.4918	-3.2
	P1	0.3079	0.2219	-27.9	0.2922	0.3344	14.4	0.4295	0.5026	17.0	0.1797	0.1966	9.4
	P2	0.1822	0.1205	-33.9	0.2201	0.2700	22.7	0.3743	0.4652	24.3	0.0937	0.1099	17.3
Bauchi	P0	0.3793	0.4137	9.1	0.4025	0.3506	-12.9	0.3513	0.3243	-7.7	0.4000	0.3250	-18.8
	P1	0.1763	0.2020	14.6	0.1214	0.1131	-6.8	0.0874	0.0777	-11.1	0.1528	0.1458	-4.6
	P2	0.0825	0.1145	38.8	0.0555	0.0578	4.1	0.0355	0.0298	-16.1	0.0739	0.0837	13.3
Gombe	P0	0.4857	0.4380	-9.8	0.4794	0.4657	-2.9	0.5000	0.5652	13.0	0.4444	0.2962	-33.4
	P1	0.1368	0.1208	-11.7	0.1860	0.1766	-5.1	0.1906	0.1995	4.7	0.1782	0.1376	-22.8
	P2	0.0875	0.0785	-10.3	0.0903	0.0976	8.1	0.0924	0.0959	3.8	0.0867	0.1006	16.0
Kaduna	P0	0.3333	0.3666	9.9	0.3181	0.3181	0.0	0.4166	0.3333	-20.0	0.2812	0.3125	11.1
	P1	0.0639	0.0709	10.9	0.0978	0.1157	18.3	0.1320	0.1101	-16.6	0.0850	0.1177	38.5
	P2	0.0208	0.0228	8.8	0.0430	0.0494	14.9	0.0602	0.0446	-25.9	0.0366	0.0512	39.9
Kebbi	P0	0.6481	0.5925	-8.6	0.4500	0.4800	6.7	0.3809	0.3333	-12.5	0.5000	0.5368	7.4
	P1	0.2942	0.2381	-19.1	0.1923	0.2236	16.3	0.1919	0.1731	-9.8	0.1926	0.2664	38.3
	P2	0.1703	0.1267	-25.6	0.1150	0.1588	38.1	0.1236	0.1118	-9.6	0.1088	0.1873	72.2
Niger	P0	0.3809	0.3333	-12.5	0.4512	0.4390	-2.7	0.3333	0.3000	-9.9	0.3692	0.3692	0.0
	P1	0.2272	0.2102	-7.5	0.1768	0.1869	5.71	0.1113	0.1035	-7.0	0.2146	0.2351	9.6
	P2	0.1856	0.1766	-4.9	0.1077	0.1158	7.52	0.0567	0.0584	3.0	0.1371	0.1490	8.7

Source: Computed from IFPRI, 2007

Table 29: Impact of *Fadama* –II Project on Poverty Status of Respondents Across the Benefiting States

State	Statistics	FB Before	ANFB ATT	% change
Lagos	P0	0.8641	----------	-34.4
	P1	0.8494	-0.2280	-26.84
	P2	0.8407	-28.1435	-3347.63
Ogun	P0	0.2666	----------	-2.2
	P1	0.0834	----------	---------
	P2	0.0487	----------	----------
Imo	P0	0.3820	----------	-20.8
	P1	0.0883	----------	--------
	P2	0.0455	----------	--------
Adamawa	P0	0.6981	----------	11.6
	P1	0.3281	0.0595	18.13
	P2	0.1893	0.1115	58.90
FCT	P0	0.5277	---------	-18.1
	P1	0.2531	---------	--------
	P2	0.1493	---------	--------
OYO	P0	0.4259	--------	-21.7
	P1	0.2161	-.0072	-3.33
	P2	0.1344	-1.6537	-1230.43
Taraba	P0	0.6901	----------	-9.1
	P1	0.3079	----------	--------
	P2	0.1822	----------	--------
Bauchi	P0	0.3793	----------	22.0
	P1	0.2020	----------	----------
	P2	0.1145	----------	----------
Gombe	P0	0.4857	---------	-6.9
	P1	0.1368	-0.1432	-104.68
	P2	0.0875	-0.4289	-490.17
Kaduna	P0	0.3333	--------	9.9
	P1	0.0639	0.1098	171.83
	P2	0.0228	0.2438	1069.30
Kebbi	P0	0.6481	----------	-15.3
	P1	0.2942	-0.4282***	-145.55
	P2	0.1703	-1.0714	-629.13
Niger	P0	0.3809	----------	-9.8
	P1	0.2272	----------	--------
	P2	0.1856	----------	--------

Source: Computed from IFPRI, 2007

*** is significant level at 1% .

4.5 Pro-poorness of *Fadama*-II Project

4.5.1 Poverty Equivalent Growth Rate of Respondents by Type and Gender

Results for the Poverty Equivalent Growth Rates (PEGR) are presented in Tables 30, 31 and 32. A higher PEGR relative to the actual growth rate indicates that growth has been pro-poor, also the higher the PEGR the higher the poverty reduction. As presented in Table 30, the Poverty Equivalent Growth Rate of all *Fadama*-II beneficiaries is higher for all the three FGT measures than the actual growth rate of about 30.9% after one year of project implementation. This is an indication that the poor benefited proportionally much more than the non- poor and that *Fadama*-II was pro-poor. Also the proportional benefit flowing to the very poor was less than that flowing to the poor. The pro-poor growth resulted from the positive effects of both high growth rate and reduction in inequality as discussed earlier. This is contrary to the result of Osinubi and Gafaar (2005) that the very poor have not been benefited in the growth. Poverty Equivalent Growth Rate of all Non- *Fadama*-II beneficiaries is higher only for poverty incidence than the actual growth rate and lower for the other two FGT poverty measures after one year of project implementation. This implies that although the poor benefited more than the non-poor but the growth was not for the very poor (core-poor). In addition, PEGR of NFBO is lower for all the three FGT measures than the actual growth rate of about 4.5% after one year of project implementation. This implies that the growth here is anti-poor, that is the non-poor benefited more than the poor. However, due to spillover effect, the Poverty Equivalent Growth Rate of Non- Fadama II beneficiaries within *Fadama* LGA (NFBW) is higher for all the three FGT measures than the actual growth rate of about 8.3% after one year of project implementation meaning that the growth is pro-poor. This pro-poorness could be as a result of NFBW who benefited indirectly from some of *Fadama*-II projects. Non-beneficiaries could also benefit from services offered by beneficiaries. For example, beneficiaries who acquired milling machines could offer milling services and employment to non-beneficiaries. Although the growth of non-beneficiaries is pro- poor it is not for the very poor while that of the beneficiaries is for the very poor due to its demand driven approach.

The Table also shows that poverty Equivalent Growth Rate of both female and male *Fadama*-II beneficiaries are higher for all the three FGT measures than their actual growth rates. This indicates pro-poorness of the project for both male and female beneficiaries. Nonetheless, PEGRs of female beneficiaries were more than that of male which shows greater reduction in

female poverty. On the other hand, Poverty Equivalent Growth Rate of female and male *Fadama*-II non-beneficiaries is higher only for Poverty incidence than the actual growth rate and lower for the other two FGT poverty measures after one year of project implementation. This implies that although the poor benefited more than the non-poor, the growth was not for the very poor (core-poor). In addition, Poverty Equivalent Growth Rates of female and male Non-Fadama II beneficiaries outside *Fadama* LGAs (NFBO) were lower for all the three FGT measures than the actual growth rate after one year of project implementation. This implies that the growth here is anti-poor, that is the non-poor benefited more than the poor. But due to spillover effect, Poverty Equivalent Growth Rate of female Non- *Fadama*-II beneficiaries within *Fadama* LGA (NFBW) was higher than that of their male counterparts.

Table 30: Poverty Equivalent Growth Rate of Respondents by Type and Gender

Type of respondent/ Agroecological zones	Actual growth rate	Poverty Equivalent Growth Rate		
		P_0	P_1	P_2
FB	0.3089	0.4527	0.4380	0.3921
Female	0.4319	0.5734	0.4927	0.4474
Male	0.2764	0.3757	0.2802	0.2782
ANFB	0.0622	0.0638	0.0341	0.0241
Female	0.0527	0.0633	0.0166	0.0080
Male	0.0659	0.0687	0.0424	0.0312
NFBW	0.0827	0.1575	0.1139	0.0947
Female	0.1157	0.2259	0.1224	0.0724
Male	0.0869	0.1234	0.0925	0.1037
NFBO	0.0447	0.0000	-0.0276	-0.0419
Female	0.0395	-0.0497	-0.0341	-0.0455
Male	0.0469	0.0065	-0.0242	-0.0402

Source: Computed from IFPRI, 2007

4.5.2 Poverty Equivalent Growth Rate of Respondents across Agro-ecological Zones

Across the three agro-ecological zones, PEGRs of *Fadama* Beneficiaries are higher in all the three FGT measures than the actual growth rate, meaning that the poor benefited more than the non-poor. Also the PEGRs decreased across the FGT measures meaning that the proportional benefit flowing to the very poor was much less than that flowing to the poor: the magnitude of PEGRs becomes smaller because the poverty measure is more sensitive to the well being of the poorest person. In the same vein, PEGRs of ANFB and NFBW are only higher at HF zone in all the three FGT measures than the actual growth rate except for NFBW in MS where poverty incidence was higher than the actual growth rate. This could be due to spillover effect of *Fadama* -II project on the growth of NFBW. Also PEGRs of NFBO are lower in all the three FGT measures than the actual growth rate which implies that the growth across the three agro-ecological zones is anti-poor (Table 31). This is an indication that *Fadama*-II was a poverty reduction project and it cuts across all the three agro-ecological zones.

Table 31: Poverty Equivalent Growth Rate of Respondents across Agro-ecological Zones

Type of respondent/ Agroecological zones	Actual growth rate	Poverty Equivalent Growth Rate		
		P_0	P_1	P_2
FB				
HF	0.2595	0.4872	0.4796	0.4699
MS	0.3059	0.4099	0.3981	0.3960
DS	0.3858	0.3925	0.3919	0.3901
ANFB				
HF	0.0337	0.1125	0.1159	0.1253
MS	0.0546	0.0363	-0.0210	-0.0374
DS	0.0967	0.0524	0.0061	-0.0209
NFBW				
HF	0.0452	0.1317	0.1555	0.1248
MS	0.0805	0.1212	0.0004	-0.0302
DS	0.1327	0.1021	0.0645	0.0793
NFBO				
HF	0.0244	0.0098	-0.0014	-0.0046
MS	0.0294	-0.0067	-0.0377	-0.0445
DS	0.0675	0.0253	-0.0434	-0.0736

Source: Computed from IFPRI, 2007

4.5.3 Poverty Equivalent Growth Rate of Respondents across *Fadama*- II Benefiting States

Out of the twelve benefiting states only two states (Bauchi and Kaduna states) have PEGRs that were lower in all the three FGT measures than the actual growth rate after one year of project implementation among Fadama beneficiaries. Although there was average income increase in these two states as well as decline in income inequality in Bauchi yet the growth was still not for the poor. In the remaining states, however, growth was pro-poor except in Adamawa State where the PEGR (FGT-poverty incidence measure) were the same as their actual growth rate meaning that poor and non-poor benefited equally. On the other hand, among non-beneficiaries, PEGR of poverty incidence was higher than their actual growth rate but less in other two FGT measures (Table 32). This still justifies the result obtained in the nationwide analysis, that though their growth was pro-poor, it is not for the very poor.

Table 32: Poverty Equivalent Growth Rate of Respondents across the Benefiting States

State	*Type of respondent*	*Actual Growth rate*	*Poverty Equivalent Growth Rate*		
			P0	***P1***	***P2***
Lagos	FB	0.2442	0.4928	0.4864	0.4783
	ANFB	0.0182	0.0792	0.2239	0.1808
	NFBW	0.0272	0.4082	0.4417	0.2863
	NFBO	0.0095	0.0094	-0.0101	-0.0290
Ogun	FB	0.3055	0.3350	0.3289	0.3114
	ANFB	0.0825	0.1649	0.0784	0.0623
	NFBW	0.1054	0.2108	0.0956	0.0691
	NFBO	0.0366	0.1279	0.0654	0.0580
Imo	FB	0.2503	0.3007	0.2882	0.2738
	ANFB	0.0277	0.0345	0.0040	0.0106
	NFBW	0.0378	0.0378	0.0349	0.0162
	NFBO	0.0204	0.0204	-0.0287	0.0065
Adamawa	FB	0.3625	0.3625	0.3585	0.3556
	ANFB	0.1193	0.7258	0.0273	0.0061
	NFBW	0.1302	0.5206	0.1223	0.1107
	NFBO	0.1072	0.0000	-0.0277	-0.0396
FCT	FB	0.3225	0.3525	0.3306	0.3240
	ANFB	0.0447	0.0000	0.0083	-0.0020
	NFBW	0.1584	0.0000	0.0190	0.0064
	NFBO	0.0397	0.0000	-0.0060	-0.0116
OYO	FB	0.1467	0.2535	0.2317	0.2151
	ANFB	0.0185	-0.0738	-0.0965	-0.0851
	NFBW	0.0236	0.0229	0.0204	0.0148
	NFBO	0.0137	-0.0824	-0.1755	-0.1538
Taraba	FB	0.4137	0.4368	0.4241	0.4155
	ANFB	0.0846	0.1410	-0.0371	-0.0682
	NFBW	0.1421	0.1640	-0.1061	-0.1138
	NFBO	0.0395	0.1578	0.0223	-0.0013
Bauchi	FB	0.3747	0.1873	0.1960	0.1527
	ANFB	0.0857	0.2570	0.0841	0.0417
	NFBW	0.1333	0.2666	0.1019	0.1002
	NFBO	0.0425	0.2500	0.0708	0.0140
Gombe	FB	0.3519	0.3819	0.3647	0.3520
	ANFB	0.0590	0.0737	0.0733	0.0257
	NFBW	0.0589	-0.0294	0.0347	0.0364
	NFBO	0.0591	0.1773	0.1454	0.0061
Kaduna	FB	0.2948	0.2775	0.2509	0.2284
	ANFB	0.0603	0.0603	0.0028	0.0181
	NFBW	0.0679	0.1359	0.1129	0.1077
	NFBO	0.0573	0.0000	-0.0591	-0.0323
Kebbi	FB	0.4461	0.4504	0.4482	0.4470
	ANFB	0.1464	-0.0650	-0.1430	-0.1542
	NFBW	0.1993	0.1992	0.1171	0.0814
	NFBO	0.1077	-0.3232	-0.2790	-0.2957
Niger	FB	0.4279	0.4418	0.4151	0.3989
	ANFB	0.1066	0.1598	0.0312	0.0140
	NFBW	0.2385	0.1914	0.0940	0.0486
	NFBO	0.0562	0.0562	0.0100	0.0053

Source: Computed from IFPRI, 2007

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of the Major Findings

The study has assessed the impact of *Fadama*-II project on income inequality and poverty reduction. The data were obtained from secondary source through a survey conducted in twelve World Bank supported *Fadama*-II states by International Food Policy Research Institute in 2006/2007 farming year. These states lie in three agro-ecological zones; three in Humid Forest (HF), three in Moist Savanna (MS) and six in Dry Savanna (DS). A sample of 3,750 households was selected based on these strata: *Fadama*-II Beneficiaries (FB)-34%; *Fadama*-II non-beneficiaries within *Fadama* Local Government Areas (LGAs)-33%; and *Fadama*-II non-beneficiaries outside *Fadama* LGAs-33%. The data were analysed using Propensity Score Matching, descriptive statistics, Double Difference estimator, Gini-coefficient, Foster-Greer-Thorbecke weighted poverty index, and Poverty Equivalent Growth Rate (PEGR). Out of 3,750 households, 1,738 with similar characteristics were selected for different analysis in this study. The following are major findings for the study:

- The mean income of FB increased nationwide, across the three agro-ecological zones and across the twelve benefiting states after one year of project implementation.
- The result of the impact of *Fadama*-II project on the beneficiaries using ATT shows that the average increase in income of FB due to participation in the project was 27.7% and significant at 5% when compared with ANFB. This is above the goal of 20% increase that *Fadama*-II set to achieve for 50% of beneficiaries after six years of operation. The average increase in income of FB due to participation in the project was 20.8% and significant at 10% when compared with NFBW while it was 32.4 % when compared with NFBO.
- Also the mean income of female FB increased more than that of the male counterparts with female FB having the growth rate of 43.2% compared with 27.6% for male FB after one year of project implementation. The impact of the project was not statistically significant on income of both male and female beneficiaries
- Respondents that engaged in up-stream farming activities have the highest change in mean income in all the three types of respondents with FB having the highest percentage

change of 29.6% followed by that of NFBW. The impact was significantly felt among respondents that engaged in up-stream farming activities especially those that engaged in crop and livestock activities due to participation in the project when compared with ANFB, NFBW and NFBO.

- The mean income of FB across the three agro-ecological zones increased after one year of project implementation with Dry Savannah (DS) having the highest percentage change in mean income of about 38.6% followed by that of Moist Savannah (MS) 30.6% and the least in the Humid Forest (HF) 26.1%.
- *Fadama*-II project had a significant impact on income of FB in both DS and MS zones but not in HF when compared with ANFB and NFBO.
- At the state level, the mean income of FB across the twelve benefiting states increased after one year of project implementation with Kebbi State having the highest change in mean income of about 44.6% while the least was Oyo State (14.7%). The impact of *Fadama*-II on income of the beneficiaries could not be estimated in some states (Bauchi, FCT, Imo, Niger, Ogun and Taraba) due to small sample size.
- The result of income inequality using Gini coefficient shows that *Fadama*-II project reduced income inequality of the beneficiaries, nationwide, across the three agro-ecological zones and in all the benefiting states. Income inequality of female beneficiaries reduced more than that of the male counterparts. In contrast, the income inequality of non-beneficiaries increased nationwide, in almost all the states (except Lagos) and across the three agro-ecological zones except in humid forest zone.
- Due to spill over effect, income inequality of NFBW reduced nationwide, in almost all the states and across the three agro-ecological zones except in MS zone where it increased as well as in Kaduna State.
- The proportion of FB living below poverty line (poor) before the project was 52.2% while after the project proportion of FB living below poverty line was reduced to 44.3%. Although the proportion of the poor that participated in the project was a little bit more than that of the non-poor, it was still low since the aim of *Fadama*-II was to alleviate poverty of the poor. Also that the proportion of poor FB reduced after the project shows that *Fadama*-II has a potential to reduce poverty.

- The FGT class of poverty measure shows that the FGT poverty indices of *Fadama* beneficiaries have all declined after one year of project implementation. FGT poverty indices of ANFB and NFBO increased after one year of project implementation.
- The FGT poverty indices of *Fadama* beneficiaries across the three agro-ecological zones have all declined and the decline was much in HF followed by MS and DS after one year of project implementation. There was no significant difference between the poverty gap of FB and that of ANFB, NFBW and NFBO across the three agro-ecological zones except when FB is compared with NFBW and NFBO where net poverty gaps were negative and statistically significant at 5% (MS) and 1% (DS) respectively. There was also no significant difference between the poverty severity of FB and that of ANFB, NFBO and NFBW.
- FGT poverty indices of ANFB, NFBO and NFBW across the three agro-ecological zones all increased except in the humid forest zone of ANFB and NFBW where their FGT poverty indices declined after one year of project implementation.
- At the state level, poverty reduced among the FB in nine states and in two states (Kaduna and Bauchi) it increased while in Adamawa it remained unchanged after one year of project implementation. The impact of the project was felt on the poverty incidence of nine states with Lagos State having the highest impact in the reduction in poverty incidence by 34.4% when compared with ANFB. The poverty incidence increased in three states (Adamawa, Bauchi and Kaduna). However, the impact of the project was only statistically felt on the poverty gap in Kebbi State where net poverty gap was negative and significant at 1% when compared with ANFB.
- Also the FGT poverty indices of female and male *Fadama* beneficiaries have all declined after one year of project implementation and the decline has been deeper in female than male.
- The FB that engaged in up-stream farming activities have higher FGT indices (especially those that engage in crop production) than those that engaged in down-stream farming activities before the project but declined more than those who engaged in down-stream farming activities after project implementation. There was no significant difference in poverty gap and severity of FB when compared with ANFB, NFBW and NFBO across

their different primary activities but declined, except among respondents that engaged in farming activities which was significant at 10% when compared with ANFB and NFBO.

- The result of PEGRs shows that Fadama-II was pro-poor in the nation generally and across the three agro-ecological zones. Also PEGRs of female beneficiaries were more than that of male which shows greater reduction in female poverty. While PEGRs of ANFB and NFBW are only higher at HF zone in all the three FGT measures than the actual growth rate.
- At the state level, out of the twelve states only two states (Bauchi and Kaduna states) have PEGRs that were lower in all the three FGT measures than the actual growth rate after one year of project implementation among Fadama beneficiaries. However, in Adamawa State, the PEGR (FGT-poverty incidence measure) was the same as their actual growth rate. Although in eight states, PEGRs (FGT-poverty incidence measure) were greater than their actual growth rate but less in other two FGT measures among non-beneficiaries.

5.2 Conclusion of the Study

This study examines the impact of *Fadama*-II project on income, income inequality and poverty reduction of the rural households in Nigeria. Based on the empirical evidence emanating from this study, *Fadama*-II project contributed significantly to income of the beneficiaries, nationwide, across the three agro-ecological zones and in almost all the benefiting states. In the same vein, *Fadama*-II project contributed significantly to income of the non-beneficiaries living within the *Fadama*-II LGAs areas due to spillover effect. The income of female beneficiaries increased more than that of the male beneficiaries which implies a significant impact of *Fadama*-II on the female beneficiaries.

Moreover, *Fadama*-II project is income inequality decreasing, that is, income inequality declined in the nation, across the three agro-ecological zones and in all the states. *Fadama*-II also reduced income inequality of female beneficiaries than that of male. This implies that *Fadama*-II project is gender sensitive.

Further, nationwide and across the three agro-ecological zones, poverty status of *Fadama*-II beneficiaries reduced after one year of project implementation. Poverty reduced among the FB in nine states and in the other states it increased except in Adamawa where it

remained unchanged. *Fadama*-II project was pro-poor in the nation generally, across the three agro-ecological zones and in nine benefiting states (Lagos, Imo, Ogun, FCT, Oyo, Taraba, Kebbi, Gombe and Niger States), while in the remaining three states it was anti-poor.

5.3 Policy Implications and Recommendations

Based on the findings of this study and conclusion drawn, the following are recommended.

1. The mean income of FB increased nationwide, across the three agro-ecological zones and across the twelve benefiting states after one year of project implementation. This implies that Fadama-II project an economic CDD was impacting. Therefore, there is need to promote this type of Economic Community Driven Development project in the nation.
2. *Fadama*-II is income inequality and poverty decreasing. Since *Fadama*-II had significant impact on the income, income inequality and poverty of respondents that engaged in up-stream farming activities (especially that of crop and livestock production) than down-stream farming activities, this implies that down-stream activities have not fully come out, hence priority should be given to down-stream farming activities in the subsequent project. Also there is need to promote enterprises that are agricultural based that is, agricultural activities focusing on livestock activities and crop activities.
3. Although FGT poverty indices of female and male *Fadama* beneficiaries have all declined after one year of project implementation and the decline has been deeper in female counterparts compared with male counterparts, the impact was not felt among the poorest of both male and female. As a result of this, a recommendation viewing *Fadama*-II as gender equalizer will be paramount. It implies given equal access to economic resources, female can do better. So need to encourage more female participation.
4. The study reveals that *Fadama* II was pro-poor in the nation generally, across the three agro-ecological zones and in eight states out of the twelve benefiting states which suggests elite capture in the remaining four states. This suggests elite capture; there should be prevention of elite capture through proper targeting in the subsequent phase (s) of *Fadama* or any CDD project.

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