Journal of Resources Development and Management
ISSN 2422-8397 An International Peer-reviewed Journal
Vol.23, 2016

Farm Level Soil Water Conservation Techniques and Poverty among Farmers in Akwa Ibom State, Nigeria

Okoro, Udeme S[1] Awoyemi, Timothy T[2].
1.Department of Agricultural Economics, Akwa Ibom State University, Obio Akpa Campus, P. M.B. 1167, Uyo, Nigeria
2.Department of Agricultural Economics, University of Ibadan, Nigeria

Abstract
This study examines soil water conservation techniques adoption as a means towards increased food production, income generation and poverty reduction among farming households in Akwa Ibom State. 90 farmers/respondents were randomly selected from the three Senatorial Districts of Uyo, Ikot Ekpene and Eket that make up the study area. Frequency counts, means and percentages were the tools of analysis using tables to summarize the results. Other analytical tools included the Gross Margin, Profit, Regression models and the Foster, Greer and Thorbecke (FGT) weighted index model to ascertain the performance of the various soil water conservation techniques in terms of income generation, level of adoption and poverty reduction among farmers in the study area. Findings reveal that most of the farmers have adopted one form of soil water conservation or the other since the inception of their farming business especially in erosion and drought prune locations having ₦7, 549,670 and ₦7, 297,640 gross margin and profit respectively as returns. A very negligible percentage (8.89%) of the farmers that have not used any conservation method attributed it to their cultural belief, no erosion problem and operating on few and less than 1 hectare of farmland on subsistence level to feed the family. 57.78% of the farmers lived above poverty line while a negligible percentage (14.44%) are the extreme poor. The results also reveal that apart from marital status and farming system all other explanatory variables specified in the models were significant determinants to soil water conservation techniques adoption. More extension contacts, increased micro credit and effective marketing systems are recommended.
Keywords: Adoption, Farmers, Poverty, Income, conservation techniques.

BACKGROUND INFORMATION

Man existence on earth is seriously threatened by series of factors including environmental degradation, population explosion, food in-security and above all poverty especially in developing countries of the world. The situation has become so critical that the farming environment in all its ramifications has become vulnerable to many hazards such as soil erosion, flooding, deforestation, gas flaring, oil spillage, climate change etc. which are brought about by human activities in an attempt at meeting their basic needs of life and general well being. Findings from previous studies have shown that households do not have enough income to support and sustain a reasonable standard of living. Farmers complained of food shortages, seasonal fluctuations and general decline in production levels.

Nigeria with a population of over 140 million people (NPC; 2006) has most of the areas densely populated where people compete for few or non-existing agricultural production resources with serious pressure and other multiplier effects on the environment including agricultural land and water resources.

The underlying cause of the present food crises and low agricultural productivity in developing nations of the world are environmental degradation and increasing population pressure. Economic growth performance in these countries has been dismal (Christiaensen and Tollens, 1989). Central to all these problems enumerated above is poverty. Nigeria's poverty situation has been described as a rural phenomenon affecting the people who are predominantly farmers with frightening dimensions. As published by the National Bureau of Statistics (2005), the poverty incidence in the rural areas were 46%, 69.3% and 63.3 as at 1992, 1996 and 2004 respectively while the urban areas had 37.5%, 58.2% and 43.2% the same period.

Man inability to attend to, checkmate or having what it takes to acquire increased agricultural productivity and a comfortable living is because he or she is poor. In the words of Adegboye (1996); that there will be food for tomorrow is a possibility to some people, certainty for others and a miracle for the poor. When it comes to food people in developing countries are highly disorganized. They have neither the land to grow their food nor the income to ensure themselves of adequate meals and they are at the mercy of the job market, adequate weather and natural disasters. They work harder and longer for poor outputs, die young and pass on the misery. The people are vulnerable to food insecurity because of poverty which is rooted in the land where their food should grow. The vulnerability faced by poor people includes that brought about by uncertainties in climate, politics, markets and potential conflict situations.

Agricultural production lags below expectation due to a degrading environment, inefficient and low productive capacity. Inefficient use of production resources has been the bane of agricultural development in sub-Saharan Africa (Nweke, 1996); and this has been the greatest concern to policy makers in addressing the

present food crises in Africa (Hamidu et al., 2003). However, there are many intervention programmes put in place by individuals, the government, NGO's, corporate bodies and International organizations towards making the environment sound and productive again vis-a-vis eradicating poverty. These could be witnessed in the various land reclamation projects, irrigation schemes, use of organic manure/fertilizer instead of the inorganic which destroys the soil structure, afforestation, landscaping, crop rotation, planting of wind breaks, cover crops and efficient and effective resource management among other strategies. The question is how far how well?

Since the introduction of these innovations (past and present) in many parts of Nigeria including Akwa Ibom State, little or no effort/study has been undertaken to know their status in many farming systems and their spread or whether they are still confined to the initial original adopters. This is important as one of the ways of assessing the success, acceptability and adaptability of any technology(ies) or innovation(s) in an area to know the rate and extent of spread among the target group. This is a clear indication of the viability of such innovation which is one of the foremost conditions for adoption (Arnon, 1989).

Most of the farming systems especially in the study location lacks adequate information on the various conservation techniques in terms of farmland and water use toward improved food security, generate more income, increased well-being, reduced vulnerability and encourage sustainable use of the natural resource base. Of course a household decision to invest in soil-water conservation is based on anticipated benefits (Boyd and Turton; 2000, Carney; 1998). One may therefore ask are the economic benefits enough to justify the huge investments by the farmers? Again, what is the rate or level of adoption of the various conservation measures among the farmers. Finally, what are the factors and constraints to effective conservation techniques?. Scoones (1998); Hailu and Runge - Metzger (1993), had that the adoption of soil water conservation practices represents a decision by households to intensify agricultural production, improve output per unit area through capital investments or increased labour inputs, generate returns in the long run and as a risk reduction strategy.

Increased agricultural productivity can reduce poverty by increasing farmers' income, reduce food prices and enhance increased consumption pattern (Diagne et al; 2009). According to the Department of International Development of the United States of America (2003) a 1% increase in agricultural productivity reduces the percentage of poor people living on less than1 dollar a day by between 0.6 and 2%.

The performance of the above programmes and the various land and water conservation techniques towards increased agricultural productivity and poverty eradication in many locations in Nigeria is not enough to create the needed impacts to achieve the above objectives. Again research efforts on impact assessment of public and private projects especially in resource and environmental economics in terms of agricultural productivity and poverty eradication are scanty in Nigeria. This will determine strategic plan of actions and priorities in the economic programmes of the people especially the rural dwellers.

This study seeks to address and uncover the various socioeconomic parameters and determinants to effective farmland and water conservation measures towards poverty reduction. Specifically the study will determine the socio-economic attributes of the farmers, assess the various soil and water conservation measures in the study area, assess the performance of the conservation methods in terms of income generation (profitability), rate of adoption and poverty reduction in the study area, determine the constraints to effective conservation measures and Offer some policy recommendations.

Study methodology

The study location and data collection procedures: Akwa Ibom State is located in the South South geopolitical zone of Nigeria. With a population of 3.92 million people (NPC; 2006), which are predominantly farmers especially in the rural areas producing rain fed crops, both in small and large scales. Livestock rearing and fishing are other farming activities in the area. The state is distinct and contiguous covering an estimated Area of 8,421 square kilometers with two ecological seasons - the wet and the dry seasons. Rain is evenly distributed and it decreases from above 3,000mm in the south to about 2700mm in the North (Udofia and Inyang 1987). The soil is generally sandy; the south has a swampy coasts and creeks with salt and fresh water mangrove and up North is the rain forest belt. These suggest why the area is susceptible to flooding and easily drained soils with high water absorption capacity. A multistage sampling approach was applied in data collection. To actually achieve the objectives of this study Thirty (30) farmers were randomly selected from each of the three (3) Senatorial districts that make up Akwa Ibom State. A total of ninety(90) farmers/respondents were finally selected and a pre-tested structured questionnaire was used in gathering the primary data which include information on the socio-economic attributes of the farmers, input and output, soil and water conservation techniques adopted, revenue generation and other benefits then the constraints the farmers are having towards achieving effective conservation measure in their farming business. Previous studies in Journals, Print media, textbooks and farm records with group discussion were also consulted for the secondary data.

Statistical Models and Analytical Techniques

i. Descriptive and inferential statistical models such as the means, frequency counts and percentages were

used in analyzing the data and tables in presenting the results.

ii. The performance of the various conservation methods in the study area using one of the budgeting techniques, the Gross Margin to look at the profitability/returns to investments.

The Gross Margin (GM) = Total Revenue - Total Variable Cost

i.e GM = TR – TVR

The total Revenue is the Unit Price of output in Naira (P_1) and quantity of output (q_1) in kg. i.e. T.R. = P_1q.

Then the total variable cost is the unit price of the variable inputs PXI in Naira and quantity of the variable input ($1X_1$) in kg.

This implies that

GM $=\sum px_1qx_1$

iv. To ascertain the poverty status of the farmers/respondents in the study area the Foster Greer and Thorbecke FGT (1984) weighted poverty index was used such that:

$$P\alpha = {}^{1}/_{N} \sum_{i=1}^{n} q \left[\frac{Z-YPi}{Z} \right] \alpha$$

Z	=	Poverty line
q	=	Number of farmers below poverty line
n	=	Number of farmers/respondents in the reference population
Ypi	=	Per capita expenditure of the farmers
α	=	The degree of aversion or FGT index which takes values 0,1,2.
$P\alpha$	=	The weighted poverty index
Z-Ypi	=	Poverty gap of the ith household
$\frac{Z-Ypi}{Z}$	=	Poverty gap ratio

The FGT measure of poverty involves the ranking of income in ascending order of magnitude. The α is a policy parameter that varies to reflect poverty aversion. When the $\alpha = 0$, which is the head count index (P_0), it measures the prevalence of poverty or number of people in a population who are poor. When it is = 1, the poverty measure becomes the poverty gap index (i.e. P_1), which measures the total amount of income necessary to raise every one who used below the poverty line up to that line and when it is 2, it becomes the squared poverty gap index (P_2), which is a standard poverty measure. The incidence is measured by the number of people in a population living below the poverty line while poverty intensity reflects the extent to which the incomes of the poor fall below the poverty line.

The poverty line used in this research is based on expenditure of the farmers in the study location. Two thirds of the mean per capita expenditure (MPCHE) is used as the moderate poverty 'line while one third of the mean is used as the line for extreme poverty. Those that spend less than ${}^{1}/_{3}$ of MPCHE and less than ${}^{2}/_{3}$ of MPCHE are considered to be extremely poor and moderately poor respectively, while those spending more than ${}^{2}/_{3}$ of MPCHE are non poor farmers.

The above model is increasingly used as standard measure of poverty by the World Bank, African Development Bank, United Nations Agencies etc. Its use is not unconnected with its sensitivity to the depth and severity of poverty and it is decomposable by population subgroups.

Previous studies by Asa et al (2007), Kabubo - Mariara et al (2006), Atkinson (1991) and World Bank (1996) had a successful empirical studies using the FGT model.

RESULTS AND DISCUSSION

Socio-economic attributes of the farmers/respondents

The socio-economic attributes of the respondents as presented in table 1 gives a clear picture of the calibre of farmers in the study location. Males (80%) who are mostly educated with many years of experience (96.67%) within the age bracket of 20 and 49 years are the majority involved in farming operations. This implies that most of the respondents/farmers are literate and experienced, engaging virile and energetic man power in their economic active years. The high level of literacy agrees with FERT (2001) that Akwa Ibom is an educationally advantaged state. 35.56% of the farmers are married having household sizes of more than 1 to above 10 persons with reasonable monthly generated income of between N10,000.00 to N30,000.OO (11%) and between N15,000.00 to above N71,000.00 by 57.77% of the respondents/farmers. It is unfortunate to find out that most of the farmers in the study location did not have access to extension and credit services as 68% and 72% of them respectively indicated which would have gone a long way to create the needed awareness and more investments in their business. This disagrees with past research efforts by AKADEP (2007) and Etim (2006) that Akwa Ibom State has high accessibility to Extension Services.

Majority of the farmers are outright owners (through inheritance and outright purchase) of their farmlands with large hectares of farm sizes where 48.89% of the farmers have farm plots between 6 and above 10 hectares and 36.67% of them with plots ranging from 1 to 5 hectares which are very suitable for commercial and long run benefits of soil water practices. Total land area has a positive impact on productivity, implying that farmers with larger land holdings are likely to report higher productivity than their smallholdings counterparts (Kabubo - Mariara et al 2006). They said that an increase in land holding by 1% increases productivity by 0.25%.

TABLE I. Socio-economic attributes of respondents/farmers in the study location

Attributes	No. of Respondents	Percentage
Gender		
Male	72	80.00
Female	18	20.00
Age grouping (years)		
Less than 20	-	-
20-29	11	12.22
30-39	22	24.44
40-49	41	45.56
50 and above	16	17.78
Marital Status		
Single	12	13.33
Married	32	35.56
Divorced	18	20.00
Separated	16	17.78
Widowed	12	13.33
Household size		
1-5 persons	30	33.33
6-10	48	53.33
Above 10	12	13.33
Educational Status		
No formal education Primary	14	15.56
Education Secondary	16	17.78
Education Tertiary	34	37.78
Education	26	28.89
Farming System		
Mixed farming	30	33.33
Mixed cropping	48	53.33
Sole cropping	12	13.34
Farm size (ha)		
1-5	13	14.44
6-10	33	36.67
Above 10	14	15.56
Years of farming experience		
Less than 5	10	11.11
5-10	28	31.11
11-15	32	35.56
16 and above	20	22.22
Monthly income (N)		
10,000 - 30,000	10	11.11
31,000 - 50,000	28	31.12
51,000 - 70,000	39	43.33
71,000 and above	13	14.44
Access to credit		
Yes	22	24.44
No	68	75.56

Available evidence from previous studies have shown that farmers are more willing to invest in soil conservation when they have security of land tenure (Brasselle 2002; Besley 1995). 53.33% of the farmers have household sizes of between 6 and 10 persons while 33.34% has sizes raging from 1-5 persons. High Household sizes have a positive impact on productivity and adoption as farmers are paying less for labour. A study by Kebede (2003) has declared that increasing family labour by 1% would increase productivity by 0.77%.

However, the scarcity of family labour may not be unconnected with the present compulsory and free

education programme of the state government. Institutional factors such as farmers' membership of cooperative groups, attendance at agricultural workshops, training and market availability also influence adoption.

Performance of farming operations in the study location

Whatever farming system ranging from mixed farming, mixed cropping and sole cropping most of the farmers adopted one form of soil water conservation or the other in their farming business. The study revealed that 91.11% of the farmers were using some conservation methods to preserve their soil and water resources for increased production. Only about 8% claimed they have not applied any conservation technique due to their cultural beliefs and that they had no erosion problem couple with the small sizes of their farm plots which were meant for production of food strictly for their various households.

Table 2 gives an analysis of the various conservation practices adopted by farmers in the area. It showed that most of the farmers (82%) adopted drought and pests/diseases resistant crop varieties, early maturing and bulking crops and blocking of erosion channels and runoffs. 50% had fallowing and crop rotation with 70% using contour bonds, terracing and planting across slopes while, 68%, 60% and 56% had the use of manure, mineralization, legumes/cover crops, and mulching with raised broad beds and mounds in their farms.

Irrigation facilities were found only among 18 of the farmers. The farmers attributed it to high cost of the facilities. Across all locations cassava was the dominant crop intercropped with maize, yam species, vegetables and plantain. Cassava's dominance in the cropping system of this study area is not too far from what Nweke (1996) postulated that cassava has the adaptability to relatively marginal soil and erratic rainfall conditions, its high productivity per unit of land and labour, the certainty of obtaining some yields even under the most adverse conditions, its flexible harvesting characteristics and the possibility of maintaining continuity of supply throughout the year make this root crop a basic component of the farming system in many areas south of the Sahara.

Table 2. Distribution of respondents by conservation method adopted in their cropping system

Conservation Technique	Frequency	Percentage
Mulching	60	66.67
Use of tree crops, ornamental plants, or alleys	38	42.22
Irrigation for rivers, streams, ponds and boreholes	18	20.00
Contour bonds, terracing and planting across stages	70	77.78
Deep tillage	26	28.89
Fallowing/crop rotation	80	88.89
Raised broad beds and mounds	56	62.22
Drought and pest/diseases resistant crop inmates	82	91.11
Manure, mineralization, legumes and other cover crops	68	75.56
Early maturing and bulking crop varieties	82	91.11
Blocking of erosion channels and runoffs	82	80.00
No use of any conservation method	8	8.89

A gross margin of ₦7,579,670.00 and a profit of ₦7,297,640 .00 were revealed from the study (see tables 3, 4 and 5 below) implying that the conservation methods paid off in addressing increased food production generating enough income to cater for basic needs and alleviating if not eradicating poverty among most of the farming households.

This is consistent with Ahuja (1998) and Lopez (1998) that all farm level conservation practices exert strong positive effects on farm productivity Which translates to improving the welfare of the farming households and reducing poverty.

Table 3. Fixed and average costs of production by farm size (ha) in the study area

Farm size (ha)	No of resp.	Total fixed cost ₦	Average fixed cost ₦	Percentage of		Total variable cost ₦	Average variable cost ₦	Percentage	
				TFC	AFC			TVC	AVC
<1	13	29,640.00	2280.00	11.76	21.40	1,280,100.00	98,469.23	15.47	24.75
1-5	33	98,408.24	2982.06	39.05	27.99	2,642,300.00	80,069.70	31.94	20.12
6-10	30	90,880.00	3029.33	36.06	28.43	2,400,450.00	80,015.00	29.01	20.11
>10	14	33,102.00	2364.43	13.13	22.19	1,950,500.00	139,321.43	23.58	35.02
Total	**90**	**252,030.00**	**10,655.82**	**100**	**100**	**8,273,350.00**	**397,875.36**	**100**	**100**

Table 4. Total and Average Revenue by farm size (ha) in the study area.

Farm size (ha)	No of resp.	Total revenue (₦)	Average revenue (₦)	Percentage of total revenue (₦)	Percentage of average revenue (₦)
<1	13	1,920,500.00	147,730.77	12.14	20.09
1-5	33	5,220,420.00	158,194.55	32.99	21.51
6-10	30	5,001,780.00	166,726.00	31.62	22.67
>10	14	3,680,320.00	262,880.00	23.25	35.74
Total	**90**	**15,823,020.00**	**735,531.32**	**100**	**100**

Table 5. Gross Margin and profit Analysis by farm size (ha)

Farm size (ha)	Total Revenue (₦)	Total cost (₦)	Total variable cost (₦)	Gross margin (₦)	Profit (₦)
<1	1,920,500	1,309,740.00	1,280,100	640,400.00	610,760
1-5	5,220,420	2,740,708.00	2,642,300	2,578,120.00	2,479,712
6-10	5,001,780	2,491,330	2,400,450	2,601,330.00	2,510,450
>10	3,680,320	1,983,602	1,950,500	1,729,820.00	1,696,718
Total	**15,823,020**	**8,525,380**	**8,273,350**	**7,549,690.00**	**7,297,640**

Poverty status and classification of farmers in the study area

Determining the mean per capita expenditure (MPCHE) of the farmers on basic needs of life was used in estimating the poverty line. Table 7 displays the average monthly amount of money in Naira spent on the basic needs of the farmers. It is obvious that food and drinks took the highest percentage of the expenses (i.e. 33.48%) followed by education 23.47%, farm operational expenses 9.64%. income spent on leisure/social events, transportation, medication, clothing, exigencies and housing had 6.18%, 6.02%, 6.01%, 4.47 and 4.19% respectively on the average monthly.

Based on the estimated poverty line analysis, N9, 320.75 was defined as the moderate poverty line, while ₦4, 660.38 was the extreme poverty threshold. A poverty classification of the farmers as shown by table 8 indicates that a significant percentage of about 57.78% of the farmers with a mean per adult expenditure of more than ₦9, 320.75 are not poor. 27.7.8°/6 are moderately poor while an insignificant percentage of 14.44% are extremely poor. In summary 57.78% of the farmers are non poor while 42.22% are poor in the study Area.

Table 7. Mean per capita expenditure (MPCHE) of the respondents on basic needs of life in the study area

Variable	MPCHE Per Month (₦)	Percentage of total expenditure (₦)
Housing	585.20	4.19
Clothing	840.05	6.01
Food and Drinks	4,680.34	33.48
Education	3,281.43	23.47
Medication	842.25	6.02
Farm operational expenses	1348.01	9.64
Transportation	863.50	6.18
Leisure/social events	915.15	6.55
Exigencies	625.20	4.47
Total MPCHE	**13,981.13**	
$^2/_3$ MPCHE	**9320.75**	
$^1/_3$ MPCHE	**4660.38**	

Table 8. Poverty classification of the respondents/farmers

Class	MPCHE(₦)	Frequency	Percentage
Extreme poor	<4,660.38	13	14.44
Moderately poor	4660.38≤ or < 9320.75	25	27.78
Non Poor	≥9320.75	52	57.78
Total		**90**	**100**

However this result is the other way round and inconsistent with previous findings by Asa et al (2007) and FERT (2001) that 42% of the people in Akwa Ibom State are non-poor while 57% are poor.

Constraints to soil water conservation adoption my farmers in the area

Farmers are facing some problems in an attempt to effectively conserve their soil and water resources for

increased and sustainable production. 100% of the farmers complained of additional and high cost of using and maintaining the conservation techniques they are using. 86% referred to inadequate finance/credit, 84% said it is the low market prices of their farm output. Lack of infrastructures and lack of awareness on contemporary conservation methods were also some of the major constraints in the study area.

Table 9. Distribution of respondents by constraints to adoption of soil water conservation techniques

Constraints	Frequency	Percentage
High costs	90	100.00
Ineffective Government policies	52	57.78
Inadequate finance/credit	86	95.56
Lack of awareness	78	86.67
Low output prices	84	93.33
Lack of infrastructures	80	88.89

Conclusion

The performance and level of adoption of soil water conservation practices in the study area, are encouraging as could be witnessed in the amount of revenue generated and the number or percentage of the farmers involved. Almost all the explanatory variables were major determinants or factors influencing adoption. This study recommend that more extension contacts, increased micro credit facilities and effective marketing systems be put in place.

References

Adegboye, R.O. (1996). *Advanced Resource Economics memeograph*, Department of Agricultural Economics, University of Ibadan, Nigeria.

Ahuja, V. (1998). Land degradation, agricultural productivity and common property evidence from Cote d'ivoire. Environmentand Development Economics 3:7- 34.

AKADEP, (2007). Akwa Ibom Agricultural Development Programme Annual Report, Nigeria.

Ali, M. and Byerlee, D. (1991). Economic Efficiency of Small Farmers in a changing World. A survey of recent evidence. Journal of International Development 4:1-27.

Amaza, P. S., Adejobi, A.O. and Kwaghe, P.V. (2008). Poverty and its determinants among farming Households in West Africa: Empirical evidence from Borno State, Nigeria. Journal of food, Agriculture and environment. Vol. 6 (3&4): 406-411.

Amaza, P. S. and Olayemi, J.K. (2000). The influence of Education and extension contact on food crop production in Gombe State Nigeria. Nigerian Journal of Agriculture, business and Rural Development (1) 80- 92.

Appleton, S. and Balihuta, A. (1996). Education and Agricultural productivity. Evidence from Uganda. Journal of International Development vol. 8: 15-20.

Arnon, I. (1989). Agricultural Research and Technology Transfer. Elsevier Science Publication Ltd., England: 746-780.

Asa, U. A., Ekumankama, O.O., Ebong, E.O. and Uwem, C.A. (2007). Estimating the determinants of poverty among women farmers in Akwa Ibom State. Nigerian Journal of Agriculture, Food and Environment 4 (1-4) : 22 - 26.

Atkinson, A. B.(1991) comparing poverty rates internationally: Lessons from recent studies in developing countries. The World bank Economic Review 8(1):3-21

Baba, K.M. and Etuk, E.G. (1991). Resource use Efficiency and Constraints in Irrigated Agriculture. Empirical Evidence from Bauchi State. Nigerian Journal of Agricultural Technology. Vol. 3: 10-21.

Besley, T. (1995). Property rights and investment incentives theory and evidence from Ghana. Journal of Political economy 103(5): 903-937

Boyd, C. and Turton, C. (2000). The Contribution of Soil and Water Conservation to Sustainable Livelihoods in Semi-arid Areas of Sub-Saharan Africa. Journal of Agricultural Research and Extension Network No. 102:1-15.

Brasselle, A. S., Gaspart, F. and Plateau, J. (2002). Land tenure security and investments incentives. Puzzling evidence from Burkina Faso. Journal of Development Economics 67: 373 - 418

Carney D. (1998). Sustainable rural livelihoods: what contribution can we make? London: DFID

Christiaensen, S. and Tollens, C. (1989). Food Security and Population Pressure in Nigeria. Resource and Crop Management Division Report. International Institute of Tropical Agricultural (IITA) Ibadan, Nigeria

Diagne, A. S., Adekambi, A., Simtowe, F.P. and Biaou, G. (2009). The impact of Agricultural Technology Adoption on Poverty: The case of Nerica Rice varieties in Benin. A contributing paper at the 27th conference of International Association of Agricultural Economists. Beijing, China.

Etim, N. A. (2006). Analysis of Poverty status of rural farm households in Akwa Ibom State, Nigeria.

Unpublished Ph. D. Thesis, Department of Agricultural Economics, Michael Okpara University of Agriculture, Umudike, Nigeria.

Etim, N. A., Udo, E.J. and Awoyemi, T.T. (2005). Measuring technical efficiency of urban farms in Uyo metropolis. Global journal of Agricultural Sciences 4(1): 91-95.

FERT (2001). Foundation for Economic Research and Training. Poverty profile of Akwa Ibom State: 120.

Foster, J. J., Greer and Thorbecke, E. (1984). A class of decomposable poverty measures. Econometrica 52: 761 – 765.

Hailu, Z. and Runge - Metzger (1993). Sustainability of land use systems. The potentials of indigenous measures for the maintenance of soil productivity in sub-sahara agriculture. A review of methodologies and research weikiersheim, Margraf.

Hamidu, B.M., Bivan, G.M., Garba, A. and Iro, I. (2003). Resource use Efficiency, in dry season wheat production in Dustin Ma Local Government Area of Katsina State. Nigerian Journal of Agricultural Technology. Vol. II:74-78 .

Helfand S.M. (2003). Farm size and Determinants of Production Efficiency in the Brazilian Centre. Proceedings of the 25th International Conference of Agricultural Economics, Durban, South Africa: 605-612.

Kabubo- Mariara, J., Mwabu, G. and Kimuyu, P. (2006). Farm productivity and poverty in Kenya. The effect of soil conservation. Journal of Food, Agriculture and Environment 4(2) ,291 -297

Kebede, B. (2003). Decomposition of Household expenditure and child welfare in rural Ethiopia. AERC Research paper. Nairobi.

Lopez, R. (1998). The tragedy of the commons in Cote d'iviore Agriculture. Empirical evidence and implications for evaluating trade policies. World Bank Economic Review 12: 101 - 131.

Mailumo, S. S., Nyam, T. and Torgballa, H.H. (2005). Analysis of Resource use Efficiency in the small scale Tomato Production under Irrigation in Panskin Local Government Area of Plateau State. Nigerian Journal of Agriculture Food and Environment 2(2):1-4.

Maurice, D.C. (2004). Resource Productivity and Cereal Crop Production among Fadama farmers in Adamawa State, Nigeria. M. Sc. Thesis Department of Agricultural Economics and Extension, University of Maiduguri, Nigeria.

NBS (2005). National Bureau of Statistics. Poverty profile of Nigeria:24-43.

NPC (2006). National Population Commission. Nigerian National Census Report.

Onyenweaku, C. E., Igwe, K.C. and Mbanasor, J.A. (2005). Application of a stochastic frontier Production function to the measurement of Technical Efficiency in yam production in Nassarawa State, Nigeria. Journal of sustainable Tropical Agricultural Research 13: 20-25

Onu, J.K., Amaza, P.S. and Okunmadewa, F. (2000). Determinants of Cotton Production and Economic Efficiency. African Journal of Business and Economic Research (2): 34-40.

Scoones, I. (1998). Sustainable rural livelihoods: A framework for analysis. IDS working paper No. 72. Sussex Institute of Development Studies.

Udofia, W.E. and Inyang, J.B. (1987). Land and People of Akwa Ibom and Cross River States In: M.B. Abasiattai (ed.); Akwa Ibom and Cross River States: the land, people and their culture. WUSEN Press Ltd, Calabar, Nigeria: 110.

World Bank (1996). Nigeria: poverty in the midst of plenty. Oxford University press, Washington DC, United States of America.