

**LIVELIHOOD DIVERSIFICATION AMONG RURAL
HOUSEHOLDS IN OIL POLLUTED AREAS OF DELTA
STATE, NIGERIA**

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ABSTRACT: - *The coming of Oil exploration into the Niger Delta to complement farming – the mainstay of the economy of the people of the region was a welcome development. This euphoria of petrodollar was short-lived as farmlands which were hitherto productive later became polluted lands courtesy of oil spillage and other oil exploration activities. Farmers in their quest to live amidst these polluted lands went into different non-farm activities to increase their total income as the yield from farming was gradually falling down. This study was carried out to determine the various livelihood strategies adopted by farmers in the region most especially Delta State. The different livelihood strategies adopted by farming household were Okada riding, trading, Weaving Palm wine tapping, Snailry and hunting. The Herfindahl index of 0.5 shows a high level of diversification into nonfarm jobs among the farming household heads. The livelihood diversifications in the study area were positively influenced by age and number of non-farm activities and negatively influenced by farm income, access to extension agents and costs of credit. In the light of the above, the study recommends that there should be skills acquisition centers to train farmers and their young ones in vocational jobs to help boost their income.*

KEY WORDS: *Livelihood diversification, oil exploration, oil pollution, Rural households and Welfare*

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1. INTRODUCTION

Delta State belongs to the South-South geopolitical zone of Nigeria. It is the one of the most endowed deltas in the world in terms of both human and material resources. Before the discovery of crude oil, agriculture was the dominant occupation of the people. Crude oil was discovered in commercial quantity in the region specifically in the present Bayelsa State in 1956. Since then, oil exploration has continued resulting in what is termed environmental destruction due to neglect and negative attitude of the multinational companies in environmental management in the area. The world today recognizes the significance of environmental sustainability of the development of the nations. In fact, one of the cardinal objectives of the Millennium Development Goals is to ensure environmental sustainability. It then implies that there should be a reduction in environmental pollution (Eregba & Irughe, 2009).

Delta State is dominated by rural communities that depend solely on the natural environment for sustenance living and non-living livelihood (UNDP, 2006). Environmental degradation issues are of topical concern to communities in the Niger Delta as it is a major cause of productivity losses (Opukri & Ibaba, 2008). This is the main reason why oil and gas extraction impact on the States of the Niger-Delta has consequences for the declining productivity of the region which is predominantly based on fisheries and other agricultural activities as farming and timber businesses. Oil production has definitely worsened environmental disaster in the region (Worgu, 2000).

A thorough review of the environmental impacts of the oil industry in Nigeria would take up an entire book! This is because, virtually, every aspect of oil exploration and exploitation has deleterious effects on ecosystem stability and local biodiversity – which the peoples' livelihoods depend upon (Zabbey, 2005). Thus, UNEP (2006), summed the impacts of Oil spill in the Niger Delta as follows: High mortality of aquatic animals; Impairment of human health; Loss of biodiversity in breeding grounds; Vegetation hazards; Loss of portable and industrial water resources Reduction in fishing and farming activity; Poverty, rural underdevelopment and bitterness. Based on this, it is envisaged that the available means of improving the livelihood of rural farmers is by engaging in off- farm activities to boost income. Similarly, expansion of non-farm activities may enhance growth and promote a more equitable distribution of income among households (Lanjouw and Lanjouw, 2001). In other words, their living standards still largely depend on the

performance of the agricultural sector, but also increasingly on non-farm enterprise activities (Davis and Pearce, 2000).

The interest shown on the environmental impact of operations of multinational enterprises in developing countries has risen significantly recently, and has fuelled a heated public policy debate. In particular, there has been interest in the environmental degradation of host communities and nations resulting from the operations of multinational oil companies in developing countries. (Eweje. G, 2006)

It is expected that countries with an abundance of natural resources should prosper. Yet over many years, it has been observed that nations rich in oil, gas, or mineral resources have been disadvantaged in the drive for economic progress. The concept of resource curse which refers to the observation that nations with rich gifts of natural resources [oil as in the case of Nigeria] often dramatically underperform economically relative to what one would expect will be used in this study.

Agriculture has been the biggest revenue earning source for most Nigerians living in the rural areas and formed more than 80 per cent of the country's population. Even those employed in small businesses such as pottery, weaving, carving and tool making also still supplement their livelihood from farming (Adebola and Oguzor, 2009)

Before the discovery of crude oil, Nigerian economy survived and flourished on agriculture. The present Delta State, where there is a hue and cry of environmental pollution and degradation, and economic loss occasioned by long years of oil exploration and exploitation was historically noted for palm produce. For up to fifty years the region supplied exported palm products more than any other regions in Nigeria. Today, fifty years after the first exploration, petroleum dominates the Nigerian economy. Worst of all the bird that lays the golden egg (the black crude) was pauperized and impoverished through shared neglect, marginalization, and oil spillage. Many remote peasant farming areas experienced a decline in marketing services and the removal of subsidies on agricultural inputs, especially fertilizers, made the production of several peasant crops unviable. Meanwhile cutbacks in public funding for hospitals, schools and other social services as well as consumer inflation led to increased needs for cash. This environment induced a large-

scale search for new, more remunerative activities outside agriculture (Bryceson.D.F.1999). These have resultant total collapse of the agricultural sector leading rural into venturing into non-farm income or means of livelihood. The question then is,

- What are the different livelihood strategies engaged in rural household in their attempt to eke out a living out of their polluted land?
- To what extent has these livelihood diversification or strategies been able to account for their overall income

The primary objective of this study is to examine the factors influencing livelihood diversification of farming households in oil polluted areas of Delta State.

The specific aims of this study are as follows:

- 1) Profile the different livelihood strategies engaged among farming household in the study area.
- 2) Measure the level of livelihood diversifications among the households.
- 3) Examine the determinants of livelihood diversification among the farming families in the contaminated area.

Until recently, there was little known about how much or why farm households in Africa diversify into the nonfarm sector. A widespread view persisted until the late-1970s/early-1980s that rural Africans mainly farmed and undertook a little activity off-farm, except when they left rural areas to migrate (Hill, 1982). Available studies also revealed that there exists a link between loss/decrease in livelihood in agriculture due to disruptions of the ecosystem and poverty level. This loss of livelihood in farming activities has been attributed to intervention, to the destabilizing effects of factors of Crude-oil spills on agricultural land and incursion into fresh water. This has led to a drastic reduction in outputs of crop and fish leading to low income and poverty (Sen, 1984; Olayemi, 1995; Booth, 1998; Malik, 1999 Scherr 1999; Okunmadewa, 1999, Ondo state reports, 2003).

Dercon (2001) in his study examines the income portfolios of households in selected farming households in rural Africa and discovered that farming households are facing very risky environment in farming operations that led most farmers diversifying into non-farm enterprises.

Apata and Rahji (2008) in their study worked on linkages between livelihood activities and intervention of crude oil exploration in relation to poverty. Here in this study, This study focused on the different livelihood strategies engaged by farmers as a fall out of oil exploration and its implication on the total income of rural households in Delta State whose rural livelihood diversification strategies are quite different from those of Ondo State. This gap in knowledge is important because of the growing evidence of the substantial role that nonfarm activity plays in assuring rural food security in Africa. It is expected that result from this study will be necessary for policy intervention in Delta State and the country at large.

Finally, this study will give useful information 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.

11.METHODOLOGY AND EQUATIONS

Study Area: The study was carried out in Delta State in Nigeria. Delta State is located between latitude 5°00' North and latitude 6°30' North and longitude 5° East and longitude 6°45' East. Delta State is located in the southern portion of Nigeria. The southern portion of the State is essentially riverine with numerous rivers and creeks, marshy terrain and mangrove swamps. The topography barely lies above the sea level, resulting in the incidences of floods in the rainy season. However, the northern part of the country is a tropical rain forest belt. The state is bounded in the north by Edo State, Ondo State to the North-West, and Anambra to the East, Rivers to the South-East and to the South by the Bight of Benin, which covers approximately 160 kilometers of the state coastline. It has 25 Local Government Areas (Fig.1) below. The state has its capital at Asaba. It has a population of 4098391 (NPC 2006).

Delta State is primarily an agrarian State with about 75% of its population still depending on agriculture for their livelihood. The State has a total land area of 17698 square kilometers made up of 1770 square kilometers of fresh water swamps, 5840sq km of mangrove swamps and 10,088sq km of rain forest. The broad coastline together with the Niger Delta and the various rivers, streams and creeks, enrich and state with abundant water and fertile alluvial deposits of

her flood plains. The crop production in the State includes cassava, yam, plantain, oil palm, rubber, tomato, pineapple, rice, maize, okra, raffia palm and citrus, etc.

Livestock production is mainly poultry and piggery while goats and sheep are in traditionally free range. The populace along the coastal areas are involved in artisanal fisheries while aquaculture is carried out throughout the state (Ministry of Agriculture, 2012).

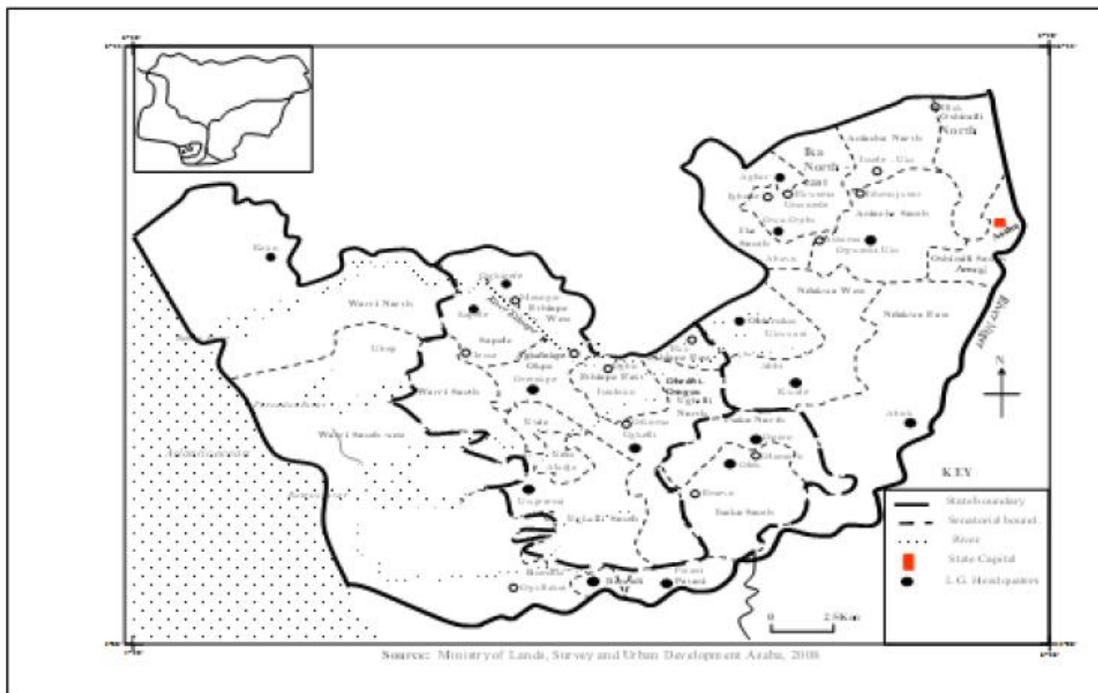


Figure 1. Delta State: Location of Study Area

Data collection and Sampling Procedure

Primary data were collected for the study. The primary data were obtained through structured questionnaires and were administered on farming household heads in polluted areas of Delta State. The sampling procedure employed was Multi-stage random sampling. The first stage was the purposive selection of the petroleum exploitation areas and also the affected areas of the State (4 local Governments were selected). The second stage was the stratification of the area into where we have oil pollution. The third stage was a random selection of 60 farming household heads proportionate to the size of population in LGAs in the polluted areas. In the selection of the sample size, population in each location was considered. The study therefore, covered farming households that are into cropping activity and non-farm activities.

Analytical Tools and Models: The economic tools employed in the analysis of the surveyed data collected include the following; Descriptive statistics such as percentages. Level of livelihood diversification among rural household were determined using Herfindahl model and multiple regression analysis was used to determine the different factors influencing the choice of livelihood diversification among the farming household's heads using Stata 10.

Computation of Livelihood Diversification Index

This was used to capture the various levels of livelihood activities (cropping activities and Non-Farm Rural Activities NFRA) engaged by the farmer. Hence, the following indexes were computed

The Livelihood diversification index LDI using a Herfindel index to measure the degree of diversification.

$$\text{Herfindel Index given as } LDI_H = \sum_{i=1}^N Ni^2 \dots\dots\dots(1)$$

$$\text{Where } Ni = \frac{Bi}{Ai}$$

Where LDIH = Livelihood Diversification Index.

Ni = Proportion of the cropping income

Bi = Gross income from cropping income.

Ai = Total income from all the activities

If $0 < LDI < 1$. The higher the LDI is close to 1, the higher the degree of diversification and vice versa

Determinants of Livelihood Diversification

In order to examine the determinants of livelihood diversification, the index of livelihood diversification was regressed against selected variables. The variables used were borrowed from the works of Chand (1995), Shiyani and Apata (2008)

The Livelihood Diversification Model is expressed as:

$$LDI = f(X_1, X_2, X_3, \dots, X_n)$$

The estimating equation is represented as:

$$LDI_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots, \beta_{11} X_{11} + \mu$$

Where LDI = Livelihood Diversification Index

β_0 = Constant term

X 1 - X 11 = Independent variables.

U = Error term assumed to have a normal distribution with zero mean, and constant variance i.e $U \sim N(0, 2)$ and $E(U_i, U_j) = 0$ if $i \neq j$.

The following variables are hypothesized as having significant influence on the livelihood diversification index: Sex (X 1), Age (X 2), Years of education (X 3), Household size(X 4), Farming Experience (X 5), Total Input cost (X 6), farm income (X7), No of non farm activity(X8), Cost of credit (X 9), Access to market Facilities (X 10), Access to Explain Agents(X 11)

The selection of these variables is based on economic theory and suggestions of previous/similar studies. The OLS technique was used to estimate the model

111. RESULTS AND DISCUSSION

Table 1: The Different Livelihood Activities Engaged By Farming Households

Livelihood activities	Frequency	Percentage
Trading	9	15
Weaving/Hunting	6	10
Okada riding /Hunting	6	10
Okada riding/Palm wine tapping	6	10
Okada riding/trading/weaving	16	27
Okada riding/weaving/palm wine tapping	11	18
Okada riding/trading/weaving/hunting	1	2
Trading/weaving/hunting	5	8
Total	60	100

Source: Field Survey, 2012

The table above reveals that 15% of the respondents are engaged into one line of job outside farming. The remaining 85% of respondents are engaged in more than one activity outside farming in order to meet up with their social and economic responsibilities.

Econometric analysis: A total of 60 household heads who were farmers in oil polluted areas were used to estimate this model. The result and detailed description of the variables entered in the model are shown below.

Relating to the level of livelihood diversification using the Herfindahl model, the study reveals 0.5 herfindahl index. This therefore suggests that household heads in the study area are highly diversified. By Herfindahl Index (H) which ranges from $1/N$ to one, where N is the number of firms in the market (in this content firm is represented by an activity). An HHI index below 0.01 (or 100) indicates a highly competitive index. An HHI index below 0.15 (or 1,500) indicates a low concentration. An HHI index between 0.15 to 0.25 (or 1,500 to 2,500) indicates moderate concentration. An HHI index above 0.25 (above 2,500) indicates a high concentration [Herfindahl Wikipedia].

Table 2: Determinants of livelihood diversification in the study area

Explanatory Variables	Estimates	T-value
Sex	-0.0332	-0.66
Age	0.0138	2.52**
Years of Education	-0.0022	-0.26
Household size	-0.0036	-0.19
Farming Experience	-0.0051	-1.16
Total Input Cost	-1.52E-07	-0.34
Farm Income	-1.64E-07	-4.94***
No of non-Farm Activity	0.2325	6.65***
Cost of credit	-4.45E-06	-2.36**
Access to Market Facilities	-.0230	-0.64
Access to Extension Agents	-0.1027	-2.02**

Source: Computer Printout of Multiple Regression Analysis based on the field study.

*** = Significant at 1%, ** = Significant at 5%, * = Significant at 10%

Adjusted R Squared = 0.7985

Table 2 above presents the results of the estimated linear equation for the study on farmers livelihood diversification index and factors that influence diversification. The Adjusted R-squared of 79% indicated a good fit for the equation. The result reveals that diversification has a statistical positive significant relationship with age of the farmers. This clearly indicates that diversification truly has an impact on the age of the farmer. As the farmer grows old so also his responsibilities increases thereby requiring the farmer to diversify his income opportunities to meet up his obligations and responsibilities.

Also, the result shows that the number of non-farm activities is positively significant with diversification. Which suggests that the number of non-farm activities increases total income thereby increasing diversification.

Farm income, Cost of credit and Access to extension agents are all negatively significant to diversification. The implication is that, as people diversify from farming into other jobs, farm income keeps reducing. Also diversifications affect the cost of credits in the sense that pulling out of farming reduces application for farm loans and other related credits.

Finally, the result reveals that, diversification influences the use of Extension Agents negatively by reducing their demands. As more people leave farming so also the request for Extension Agents reduces too.

IV. CONCLUSION

With reference to the livelihood diversification strategies in oil polluted areas of the State, it was revealed that farmers have engaged into two or more jobs in order to increase their total income. It is obvious that they have to do this following land degradation and soil infertility with its attendant effect of low productivity and yield. In a multiple regression carried out for the study, it was realized that the following: age and number of non-farm activities are positively significant while farm income, cost of credits and access to extension agents are negatively significant to the livelihood diversification. The implication of this result is that age and the number of non-farm activities increases the total income of the farmer while farm income, cost of credits and access to extension agents are reduced with increased level of diversification into non-farm jobs.

It is realized from the study that Agriculture used to be the bedrock of the Delta State economy in the 60s, 70s and 80s. During this period, the means of livelihood of the people of the State was

farming until the coming of the Oil exploration and Oil exploitation that led to the Oil pollution. With the advent of Oil exploration and Oil pollution, livelihood in Agriculture is no longer a major source of income generation especially in the Oil polluted areas. This accounts for the seeming neglect of Agriculture by both farmers and government in the State. These farmers have to diversify to non-farm livelihood activities to earn a living. It therefore, implies that there should be a partnership arrangement between the Multinational Oil Companies in the State and the farming population in which the Oil companies should assist farmers in area with provisions that enhances agricultural productivity in their area of operations.

Policy of boosting income generation is vital especially in hard-core severe poor income generating areas as discovered in Oil polluted areas of the State. It is therefore exigent to say here that the money realized through derivation funds in the Oil producing areas should be spent in setting up vocations and train up the youth for their future endeavours.

Government should encourage more of non-farm activities by constructing more rural networks of roads as well electricity that gives room for trading and even weaving. Government should set up facilities that will enhance the proficiency of non-farm activities in the area such as Infrastructural development.

Skills Acquisition centres should be introduced all over the State and most especially areas suffering from Oil pollution. Moreover, technical Institutes that improve on manpower should be built in strategic locations of the State. This should be followed with the building of cottage industries that will absorb the manpower trained from this acquisition center. More farmers should embark on more non-farm activities especially the skills acquisition training.

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APPENDIX**Socio –economic characteristics of Farming Household in the Study Area.**

Variable	Frequency	Percentage
Sex		
Male	45	75
Female	15	25
Total	60	100
Age (in years)		
30 – 39	5	8
40 – 49	37	62
50 – 59	13	22
≥60	5	8
Total	60	100
Educational Level		
Primary	6	10
Secondary	48	80
Tertiary	1	2
Vocational	5	8
Total	60	100
Farming Experience (yrs)		
6 – 10	6	10
11 – 15	20	33
16 – 20	16	27
21 – 25	11	18
26 – 30	7	12
Total	60	100
Farm size (acre)		
1.0 – 2.5	22	37
2.6 – 3.5	24	40
≥3.6	14	23
Total	60	100
Household Size		
1 – 5	2	3
6 – 9	58	97
Total	60	100
Years of Education		
1 – 6	5	8
7 – 12	27	45
≥13	28	47
Total	60	100

Field Survey 2012

Descriptive Statistics of Some Selected Socio-Economic Variables

Variable	Minimum	Max.	Mean	Standard Deviation
Age of Farmers (Yrs.)	37	62	48.58	6.84
Yrs of Education	2	15	11.32	3.23
Household Size	3	9	7.0	1.13
Farming Experience (Yrs.)	8	30	17.72	5.70

Field Survey 2012

