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SOCIO-DEMOGRAPHIC FACTORS AS DETERMINANTS OF POVERTY IN CRUDE OIL POLLUTED CROP FARMS IN RIVERS STATE, NIGERIA

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Abstract

This paper focused on use of socio-demographic factors as determinants of poverty using tobit analysis in crude oil polluted crop farms in Rivers State, Nigeria. Multistage sampling was used to obtain data from 17 local government areas. A total of 296 questionnaires were used for analysis. The results showed that dependency ratio, household size, mean adult equivalent expenditure, ratio of food expenditure to total expenditure were factors that significantly decreased incidence of poverty, while marital type, age and occupation marginally increased poverty. Increase in mean adult equivalent expenditure reduced probability of poverty by 8.66% and 6.70%; intensity of poverty by 4.31% and 4.56% in crude oil polluted and non-polluted farm-households respectively. Decrease in ratio of food expenditure to total expenditure reduced probability of poverty by 5.02% and 0.85%; intensity of poverty by 2.50% and 0.58% in crude oil polluted and non-polluted farm-households. Poverty was higher in crude oil polluted farm-households.

Keywords: *Tobit regression analysis; socio-demographic factors; crude oil polluted crop farms; incidence of poverty; probability of poverty; intensity of poverty; Rivers State Nigeria.*

1. Introduction

An oil spill occurrence in an environment can affect it in numerous ways. The magnitude of the impact could be dependent on the type of accident (blowouts, explosions, pipeline ruptures), the region of the spill and the clean up and control of techniques (Iturbe, 2007). Therefore, the knowledge of oil spill behaviour is of the utmost importance for the evaluation and risk assessment of mineral oil contamination and its effects (Seitinger, Baumgartner and Schindlbauer, 1994). Conflicts between local communities and private and public developers over the ownership and use of natural resources particularly related to oil and gas activities are continuously increasing and have resulted in outbreaks of violence (Cohen, 2008; Ogbu, 2008; Lenning and Brightman, 2009).

Advanced technology not withstanding, accidents in the form of blow-out of production wells and pipeline leaks have continued to occur, causing serious damages to crop, fish and livestock production in the Niger Delta area (Efe, 2010; Ndimele, Jenyo – Oni and Jibuike, 2010; Nkwocha and Pat-Mbano, 2010; Otitoloju and Dan-Patrick, 2010). Seriously contaminated also are streams, rivers and ponds, thereby causing untold hardship to the residents of these areas, as their sources of drinking water and means of livelihood had been severely affected by the spillages (Nwaichi and Uzazobona, 2011). These damages that occurred to agricultural production had increased the rate of poverty in crude oil polluted areas (Onyenekenwa, 2011).

The World Bank (1990) defined poverty as the inability to attain a minimal standard of living. The poor are defined as those individuals whose income, expenditure or consumption, is less than the value of the poverty line (Gottlieb and Manor, 2005; Amdt and Simler, 2007). According to Ravnborg (2003); Dasgupta, Deichmann, Meisner and Wheeler (2005) and Singh (2009), a number of causality in relationships exists between poverty and environmental degradation (pollution). But poverty itself pollutes the environment, creating environmental stress in a different way (Swinton, Escobar and Reardon, 2003). Those who are poor and hungry will often destroy their immediate environment in order to survive, including vandalization of oil pipelines in oil producing communities of Rivers State, Nigeria.

2. The problem of the study

The transportation, exploration and refining of oil and gas had led inadvertently to the spillage (and general pollution) of oil and gas in to the Niger Delta environment. The communities in the Niger Delta region (farmers inclusive) are apparently the worst hit judging by the dearth of marine and terrestrial organisms often associated with oil spill incidents (Edino, Nsofor and Bombom, 2010; Okonwu, Amakiri, Etukudo, Osim and Mofunanya, 2010; Patrick-Iwuanyanwu, Onyemaenu, Wegwu and Ayalogu, 2011). With distortion in the major livelihood activities of the people in Rivers State due to crude oil pollution, the question, this paper asks is: what effects does crude oil pollution have on crop farmers welfare in Rivers State using the socio-demographic factors as determinants of poverty?

3. The need and justification of the study

There is a paucity of scientific data on crude oil pollution on crops and its effects on the economic welfare of farmers in Rivers State, Nigeria. Anugwom (2005) examined the contentious nature of resources control and distribution in Nigeria, which has led to the grievance of the people of the Niger Delta and violence over resources control, attacks and vandalization over oil installations in Rivers State in particular and the Niger Delta in general. These attacks and vandalizations of oil pipelines and other installations have led to the increased pollution of the environment (crop farms inclusive) with crude oil and oil products.

In support, Cohen (2008) in its report stated that the residents of the Niger Delta region of Nigeria have been expressing deep grievance for over two decades, because their air has been polluted by the flaring of gas associated with crude oil pollution, while their wetlands, streams and farmland have been polluted by oil spills and pipelines leaks. Edino et al. (2010) studied the perceptions and attitudes of residents towards gas flaring in their communities in the Niger Delta. The study observed that gas flaring process is usually very close to communities and their farmland and had been implicated in serious environmental, health and poor agricultural yield problems. Okonwu et al. (2010) in the study of performance of maize in crude oil treatment observed that percentage of germination decreased with increase in concentration of crude oil. Their results showed that crude oil pollution has adverse effects on germination and development of maize.

Literature exist on crop production and the effects of socio-demographic factors in determining the level of poverty among farms using tobit analysis (Omonona, 2001; Dhungana, Nuthall and Nartea, 2004). The authors who had studied these variables in relation to poverty include Bigsten, Kebede, Shimeles and Taddesse (2003); Kurosaki

(2009); Hanjra, Ferede and Gutta (2009); Maertens and Swinnen (2009); Lanjouw and Murgai (2009); Gasparini, Alejo, Haimovich, Olivieri and Tomarolli (2010). None of these authors listed above had dealt with the current topic.

4.The objectives of the study

The main objective of this study was to estimate the effects of socio-demographic factors on the poverty levels of crop farmers in crude oil polluted areas in Rivers State, Nigeria. The specific objectives were:

- Analyze the effects of socio-demographic variables on poverty levels of crop farmers in crude oil polluted and non-polluted areas in Rivers State, Nigeria.
- Estimate the elasticity of the socio-demographic factors as determinants of poverty in crude oil polluted and non-polluted crop farms in Rivers State, Nigeria.
- Make policy recommendations on ways to ameliorate the negative effects of crude oil pollution on crop farmers' welfare in Rivers State.

5. Literature Review

In investigating the impact of growth on poverty in Ethiopia, Bigsten et al. (2003) observed that some socio-demographic variables such as education, occupation, dependency ratio and location were important determinants of increase or reduction in poverty in the country. Kurosaki (2009) in the study of what kind of households are vulnerable and how are they vulnerable to poverty in Pakistan, observed that physical assets including durable goods are poverty vulnerability reducing while education was weakly associated with higher vulnerability. Households with more dependant members were less poverty vulnerable, suggesting the existence of an informal social support or implicit contract for households with more children.

Hanjra et al. (2009) examined linkages and complementarities between agricultural water, education, markets and rural poverty through an empirical study using households level data from selected villages in southern Ethiopia. Their study showed that literacy of the household head and years of education of adults among other variables were significant determinants of household welfare and thus potential pathways for reducing poverty. Maertens and Swinnen (2009) in their analysis found out that there was substantial differences in farmers human, physical and social capital uses in Senegal. The socio-demographic variables used in the study include age of the household head, number of labourers provided by the households, dependency ratio, female headed households, household heads with primary education, membership of a farmers union, ethnicity and location. They observed that participating in the agro-industry contributed to increase in their income which led to poverty reduction.

Lanjouw and Murgai (2009) studied poverty decline, agricultural wages and non-farm employment in rural Indian from 1983-2004. Their results showed that they used variables such as agricultural labour employment, non-farm employment, education and social status. Gasparini et al. (2010) provided evidence on the incidence of poverty among older people in Latin America and Caribbean based on household survey microdata from 20 countries. The situation of the older people, they observed, was characterized in terms of income, education, health and access to services vis-à-vis the rest of the population.

Using tobit regression analysis, Omonona (2001) revealed that a unit increase in child dependency ratio, adult dependency ratio, household size, ratio of food to total expenditure, experience in farming and distance to health clinic increased the level of poverty in rural farming households in Kwara State, Nigeria. However, cooperative membership of head of households, access to remittance, off – farm income, extension services and modern farming equipment, asset ownership, presence of other working members, having at least primary education and female headship of households decreased the likelihood of poverty. Dhungana et al. (2004) in measuring the economic inefficiency of Nepalese rice farms used tobit regression analysis to show that significant variation in the levels of inefficiency across sampled farms were attributed to the variations in the use intensities of resources, farmers' level of risk attitude, the farm manager's gender, age, education and family labour endowment.

6.Methodology

6.1. Data collection

This study was conducted in Rivers State of Nigeria. Data were collected from both the primary and secondary sources. The primary data were collected through personal interviews and observations with the farmers, and structured questionnaires were distributed among farmers in crude oil polluted and non-polluted farms of an affected community in the state from August, 2002 – April, 2003.

A multistage sampling procedure was used to obtain data for this study. The first stage involved the selection of seventeen (17) local government areas (LGAs) out of the existing 23 LGAs in Rivers State. These 17 LGAs were selected based on the fact that they were more crop farming inclined than others. The LGAs include Abua/Odual, Ahoada East, Ahoada West, Andoni, Asaritoru, Degema, Eleme, Emohua, Etche, Gokana, Ikwerre, Khana, Obio/Akpor, Ogba/Egbema/Ndoni, Omuma, Oyigbo and Tai.

The second stage involved the stratification of farmland in a given LGA into two sampling units, namely crude oil polluted and non- crude oil polluted. This stratification of the farmland into two sampling units was based on the fact that information was needed from both crude oil polluted and non-crude oil polluted farms. The third stage involves the random sampling of 10 farms from crude oil polluted areas in a selected LGA and a corresponding number of 10 farms from non-polluted farmland in the same locality (community) in the given LGA. This summed to 20 farmers interviewed per selected LGA in the state, giving a total of 340 questionnaires administered. Out of these only a total of 296 questionnaires were suitable for analysis.

6.2. Tobit regression analysis

Of the quantitative response models on welfare economics the tobit regression model, a hybrid of the discrete and continous models, is one of the analytical tools favoured in this study because of its dual purpose of measuring the elasticity of the probability that the farmer whose farmland is affected by crude oil pollution could become poor, as well as the intensity among these crop farmers as stated in the objectives 1 and 2.

Following the earlier studies of McDonald and Moffitt (1980), and Omonona (2001), the tobit model, which has a functional form as expressed in eq. (1) was used.

$$
\begin{aligned}
Y_i &= x_i \beta, \text{ if } i^* = x_i \beta + u_i > T \\
&= 0; \text{ if } i^* = x_i \beta + u_i \le T \\
& i = 1,2,\ldots\ldots,296 \qquad (1)
\end{aligned}
$$

where,

Y_i = the dependent variable measuring the probability of crop farmers being poor and the intensity of poverty among the farmers.

$$Y_i \begin{cases} 1 \text{ if } i^* > T, \text{ if the farmer is poor} \\ \end{cases}$$

0 if ¡* ≤ T, if the farmer is not poor

¡* = non – observable latent variable (poverty gap) defined as z - y¡/z for poor households expenditure (y¡) (T = 0). The value is z-y = 0 if z = y¡ for non-poor households. If the non-observed latent variable i* is greater than T, the observed qualitative variable yi that indexes poverty becomes a continuous function of the explanatory variable, and 0 otherwise (i.e. no poverty).

X¡ = a vector of explanatory variables which consists of the socio-demographic characteristics of the farmers in this study.

β = vector of parameters to be determined.

u¡ = an independently, normally distributed error term with zero means and constant variance,

The explanatory variables (X¡) specified as socio-demographic determinants of the level of poverty and used in the analysis are as follows:

X_1 = Sex of the farmer (Dummy = 1, if male; 0 if female).

X_2 = Age of the farmer in years.

X_3 = Marital status of the farmer (Dummy = 1, If married; 0 if otherwise).

X_4 = Marital type (Dummy =1, if household is monogamous; 0 if otherwise)

X_5 = Dependency ratio in farmer's household. This is sum of children and adult dependants.

X_6 = Household size of farmer (number of people in the household).

X_7 = Level of education attained by farmer (Dummy = 1, If illiterate; 0 if otherwise)

X_8 = Occupational status of farmer (Dummy = 1, if crop farmer; 0 if otherwise)

X_9 = Mean adult equivalent expenditure per household.

X_{10} = Ratio of food expenditure to total household expenditure.

X_{11} = Membership of farmer to cooperative society (Dummy = 1, if member; 0 if otherwise).

6.3. Tobit decomposition framework

Following a tobit decomposition framework suggested by McDonald and Moffitt (1980), it can be shown that

$$E\ (Y_¡) = F\ (z) * E\ (p \qquad (2)$$

where, E(p) is the expected value for Y¡ for those poor farmers, and F is the cumulative normal distribution at z, where z is x β / δ

Differentiating with respect to any element of X gives.

$$\delta E(Y_¡) / \delta X_¡ = F\ (z)\ [\delta E\ (p) / \delta X_¡] + E\ (p)\ [\delta F\ (z) / \delta X_¡] \qquad (3)$$

Multiplying through by X¡ / E (Y) the relation in eq. (3) can be converted into elasticity forms:

$$\delta E(Y_¡) / \delta Xi]\ Xi / E\ (Y_¡) = F(z)\ [\ \delta E\ (p) / \delta X_¡]\ X_¡ / E(Y_¡) + E(p)\ [\ \delta F\ (z) / X_¡]\ X_¡/E(Y_¡) \qquad (4)$$

Rearranging eq. (4) by using eq. (2)

$$[\delta E\ (Yi) /\delta Xi]\ Xi/ E\ (Yi) = [\delta E\ (p) /\delta Xi]\ Xi / E\ (p) + (\delta F\ (z) /\delta Xi)\ Xi / F\ (z) \qquad (5)$$

The total elasticity consists of two effects (i) the change in the probability of the expected level of intensity of poverty among the farmers and (ii) the change in the elasticity of the probability of being poor.

7. Results And Discussion

In estimating the determinants of poverty among the farming households, the maximum likelihood estimates (MLE) of tobit censored regression model consisting of 13 regressors were estimated as in eq. (1). Table 1 shows the MLE of the tobit regressions for the determinants of poverty in crude oil polluted and non-polluted farms respectively. The results show that 76. 9% and 84.6% of analyzed variables were statistically significant at least at 10%, sigma and intercept (constant) inclusive in the crude oil polluted and non-polluted farms respectively. This indicates that the model had a good fit to the set of data used.

Table 1: Maximum likelihood estimate of the tobit censored regression model using socio-demographic factors as determinants of farmers' poverty in Rivers State.

Variable	X_i	Crude oil polluted farms		Non-polluted farms	
		Coefficient value	Standard Error	Coefficient value	Standard Error
Constant	α	0.8202***	0.49E -01	0.3977***	0.53E-01
Sex of farmer (dummy)	X_1	0.36E-01***	0.54E -02	-0.41E-02***	0.80E-03
Age of farmer	X_2	0.35E-03**	0.18E -03	0.67E -03**	0.31E-03
Marital status of farmer (dummy)	X_3	0.49E-02	0.56E-02	-0.10E-01	0.78E-02
Marital type (dummy)	X_4	0.15E-01***	0.38E -02	0.14E -01**	0.60E-02
Dependency ratio	X_5	-0.53E-01***	0.16E -01	-0.38E-01*	0.22E-01
Household size of farmer	X_6	-0.47E-01***	0.75E -03	-0.75E-02***	0.14E-02
Education attained by farmer (dummy)	X_7	0.79E-03	0.51E – 02	-0.71E -02	0.10E-01
Occupational status of farmer (dummy)	X_8	0.70E-02*	0.43E -02	0.17-01**	0.70E-02
Mean adult equivalent expenditure per household	X_9	-0.11E-03***	0.30E-05	-0.91E-04***	0.49E-05
Ratio of food expenditure to total expenditure	X_{10}	-0.4102***	0.51E -01	-0.72E -01*	0.42E-01
Membership of cooperative society (dummy)	X_{11}	-0.41E-02	0.56E -02	0.55E -01***	0.74E-02
Log-likelihood function		803.8120		559.2115	-
Sigma (δ)		0.50E-01***	-0.88E -02	0.62E -01***	0.13E-01

Source: Field Survey, 2003. Asterisks indicated significance level: ***1 %, **5%; *10%

8. Socio-demographic variables as determinants of poverty.

Sex of farmer (X_1): The variable had the coefficient of 0.36E – 01 for the crude oil polluted farms and -0.41E-02 as coefficient of non-polluted farms, and was statistically significant at 1%. The result revealed that the sex of the household head had the likelihood of increasing poverty level by 3.6% if the household head is a female in crude oil polluted farms. In non-polluted farms, gender could reduce poverty by 0.4% only. These coefficients show that the possibility of incidence of poverty being increased by gender was highest in the crude oil polluted farms. This result is similar to the result obtained by Dhungana et al., (2004) on sex of household-head.

Age of farmer (X_2): The variable had estimated coefficients of 0.35E -03 for the crude oil polluted farms and 0.67E -03 for non polluted farms which were statistically significant at 5% respectively. This shows that an increase in the age of farmer is strongly associated with increase in incidence of poverty though marginally in both crude oil polluted and non-polluted farm households
(Dhungana et al., 2004; Gasparini et al., 2010).

Marital type of the farmer (X_4): This is a dummy variable with a coefficient value of 0.15E-01 in crude oil polluted farms and 0.14E -01 in non-polluted farms, statistically significant at 1% and 5% levels respectively. This indicates that poverty was likely to increase in households that were polygamous as compared to the monogamous households in all categories of farms under consideration though marginally.

Dependency ratio (X_5): The variable was calculated as the number of dependants i.e. children below the age of 15, students and those not able to work divided by the total household size. The regression coefficient of the dependency ratio for crude oil polluted farms was – 0.053 (-0.53E-01) and was -0.038 (-0.38E-01) in non-polluted farms, which were statistically significant at 1% and 10% respectively. This indicates that dependency ratio can affect the level of poverty in a household negatively, especially where the dependants, children and adult were useful in various farm operations, harvesting and processing, thereby contributing to an increase in family labour and consequently farm income. Therefore, dependency ratio reduced the incidence of poverty in household level in the crude oil polluted farms by 5.3% and in non-polluted farms by 3.8%. These results are similar to the results obtained by Maertens and Swinnen (2009) and Kurosaki (2009)

Household size of the farmer (X_6): The coefficient value of this variable in crude oil polluted farms was -0.047 (-0.47E-01) and -0.0075 (-0.75E-02) in non polluted farms, both were statistically significant at 1%. This indicates that for a 100% decrease in the household size of the farmer, incidence of poverty reduced by 4.7% in crude oil polluted farms and marginally by 0.8% in non-polluted farms. These results obtained in this study are not in line with Omonona (2001), who was of the view that an increase in the household size could increase poverty in the farm-households.

Occupational status of the farmer (X_8): This variable was dummy and had an estimated coefficient of 0.70E-02 (0.007) in crude oil polluted farms and in non-polluted farms the coefficient was 0.17E-01(0.017) which were statistically significant at 10% and 5% levels respectively. These results indicated that occupational status of the household head could affect the poverty level of the farmers positively, i.e., if the occupational status of the household head is based on farming alone or farming combined with fishing especially if the farmer is located in crude oil pollution prone areas of the state. These results were contrary to expectation because a household head that is employed usually lead to decrease in poverty in the farm-households as observed by Maertens and Swinnen, (2009); Lanjouw and Murgai (2009).

Mean adult equivalent expenditure per household (X_9): This variable was calculated by dividing the total adult equivalent household expenditure by mean number of adults per household. The variable had a regression coefficient of -0.11E-03 (-0.00011) in crude oil polluted and -0.91E-04 (-0.000091), which were statistically significant at 1% level. This signifies that if there is a 100% increase in the mean adult equivalent expenditure per household, incidence of poverty reduces by 0.01% in crude oil polluted farms and 0.009% in non-polluted farms respectively. This could be because the more income is available to household to spend, the less poor the household will be (Omonona, 2001).

Ratio of food expenditure to total household expenditure (X_{10}): In crude oil polluted farms, the calculated regression coefficient -0.4102 was significant at 1% and in non-polluted farms, the estimated coefficient value was -0.72E-01 (-0.072), statistically significant at 10%. This revealed that a 100% decrease in the ratio of food expenditure to total household expenditure reduced poverty level elastically in crude oil polluted farm-households by 41.02% and in non-polluted farm-households by 7.2% (inelastic). This could be because when small proportion of an income is spent on food, enough income is left to meet other requirements.

Membership of co-operative society (X_{11}): This variable had coefficient of –0.41E–02 and 0.55E–01 which was not statistically significant in crude oil polluted farms but was statistically significant at 1% in non-polluted farms. The negative value in crude oil polluted farms showed that the variable could reduce the incidence of poverty in the farm-households, while the positive value in the non-polluted farms indicated that the variable could increase poverty. This is a surprising result, as membership of co-operative societies had been reported to reduce poverty in farm-households (Omonona, 2001).

The results obtained above clearly show that there was poverty among Rivers State crop farmers during the period of survey, and poverty was more evident in crude oil polluted farms than in non-polluted farms. This shows the negative effects of crude oil pollution, on crop production using the analyzed socio-demographic variables in tobit regression analysis.

9. Elasticity of poverty among farm-households

Following the tobit decomposition framework suggested by McDonald and Moffitt (1980), the effect of changes in the explanatory variables (X_i) on the probability of being poor and the intensity of poverty were obtained as in eq. (2). Table 2 shows the elasticity coefficients of the probability of a farming household being poor and the intensity of poverty among the households in crude oil polluted and non-polluted farms respectively. Elasticity coefficients of probability and intensity of poverty were computed for only the contributory factors, which include dependency ratio, household size, age of farmer, mean adult equivalent expenditures and ratio of food expenditure to total expenditure. The remaining factors were dummies; therefore their elasticity coefficients were not estimated.

Age of farmer: The elasticity for the age of a farmer showed that for a 10% increase in the age, the probability of poverty occurring decreased by 3.3% in crude oil polluted farms and rose by 5.9% in non-polluted farms. The coefficients of elasticity also signified that the intensity of poverty reduced by 1.7% and rose by 4.0% in crude oil polluted and non-polluted farms respectively. The total elasticity signified that there was an increase in poverty of about 10% in non-polluted farms (unitary elasticity), while in crude oil polluted farms there was a reduction in poverty by 5.0% (inelastic). An increase in the age of the farmer could lead to a decrease in the probability and intensity of poverty in households in crude oil polluted farms. This could be because of their experiences in handling crude oil pollution on their crop farms or simply moving to other farm plots not polluted. This result is similar to the result of Dhungana et al. (2004).

Dependency ratio: The coefficients of this variable showed that if the dependency ratio of a household increases by 10%, the probability of poverty increases by 8.1% in crude oil polluted farms and 5.2% in non-polluted farms respectively. An increase in dependency ratio means more persons to feed in the household especially where these are children below the age of 15 years and older persons above the age of 70 years. The results of the elasticity of intensity of poverty signified that intensity of poverty increased by 4.1% in crude oil polluted farm-households and by 3.6% in non-polluted farm-households. These results confirmed that the probability and intensity of poverty were higher in crude oil polluted farm-households than in the non-polluted farm-households. These results were similar to the result of Omonona (2001). However, Kurosaki (2009) results, showed that households with more dependent members were less vulnerable to poverty and is contrary to the results obtained in this study.

Household size of farmer: The coefficient of this variable shows that if the household size of a farmer increased by 10% the probability of poverty increased by 9.0% in crude oil polluted farms and by 1.1% in non-polluted farm-households, while the intensity of poverty increased by 4.5% in crude oil polluted farms and 0.8% in non-polluted farms. Level of poverty is expected to rise, if the household size is large, especially if the household is a polygamous family made up mainly by none working members and children below the age of 15 years.

Table 2: Tobit total elasticity decompositions for changes in socio-demographic factors as determinants of poverty among crop farmers in Rivers State

Variable	Elasticity of		Total elasticity
	Probability of poverty	Intensity of poverty	
Crude oil polluted farms			
Age of farmer	-0.3336	-0.1659	-0.4994
Dependency ratio	0.8147	0.4053	1.2199
Household size of farmer	0.9034	0.4494	1.3529
Mean adult equivalent expenditure per household	-8.6624	-4.3091	-12.9715
Ratio of food expenditure to total expenditure.	-5.0233	-2.4988	-7.5221
Non polluted farms			
Age of farmer	0.5917	0.4029	0.9946
Dependency ratio	0.5226	0.3558	0.8784
Household size of farmer	0.1134	0.0772	0.1906
Mean adult equivalent expenditure per household	-6.6977	-4.5603	-11.2580
Ratio of food expenditure to total expenditure.	-0.8517	-0.5799	-1.4316

Source: Estimated from the results of tobit censured regression (Table 1) as suggested by McDonald and Moffitt (1980).

This factor also showed that poverty was higher in crude oil polluted farms than in non-polluted farms. Omonona (2001) had similar results that a higher number of household size increased poverty, which is opposite of Kurosaki (2009) view.

Mean adult equivalent expenditure per household: The elasticity of probability of poverty of this factor had coefficients of -8.6624 and -6.6977 in crude oil polluted and non-polluted farms respectively. This discloses that for a 10% increase in mean adult-equivalent expenditure per household, the probability of poverty reduced drastically by 86.6% and 67.0% in crude oil polluted and non-polluted farms respectively. This means that if every adult in the household had enough income to spend, poverty will reduce drastically. The coefficients of elasticity of intensity of poverty estimated for the mean adult equivalent expenditure per household were -4.3091 for crude oil polluted farms and -4.5603 for non-polluted farms. This implies that the intensity of poverty could reduced by 43.1% in crude oil polluted farm-households and by 45.6% in non-polluted farm-households if the income of household members increases. Omonona (2001) obtained similar results.

Ratio of food expenditure to total household expenditure: The elasticity coefficients of probability of poverty of this factor indicated that for a 10% decrease in the ratio of food expenditure to total household expenditure, probability of poverty reduced by 50.2% (elastic) and 8.5% (inelastic) in crude oil polluted and non-polluted farms respectively. For the intensity of poverty the coefficients signified that the decrease in intensity of poverty was 25.0% in crude oil polluted farms and 5.8% in non-polluted farms. If the ratio is reduced, there will be more income to spend on other household demands than when the ratio is higher.

The results obtained in this paper show that there was more poverty in crude oil polluted farms than in non-polluted farms, during the survey period of 2002-2003. The socio-demographic factors used as determinants of poverty using the tobit censored regression analysis had shown that poverty existed in the two categories of farms though those in crude oil polluted farms suffered higher levels of poverty in the state. Some of the determinants showed that an increase or a decrease in quantity or amount led to decrease in the incidence, probability and intensity of poverty in the households studied. Examples of such factors are mean adult equivalent expenditure per household and ratio of food expenditure to total household expenditure, while factors such as dependency ratio and household size led to increase in the incidence, probability and intensity of poverty. The results of intensity of poverty were generally lower than those of the probability of poverty in all estimated coefficients, which means that because of the crude oil pollution on crop farms, there is the tendency that the probability of poverty will increase more sharply though the likelihood of poverty being intensified in all farm-households is possible.

10. Conclusion And Recommendations

In conclusion, crude oil and gas pollution on crop farms increase poverty in affected farmlands. This study observed that poverty was higher in crude oil polluted farms than in non-polluted farms in Rivers State of Nigeria during the period under survey. This was as a result of the negative effects of crude oil pollution on crop production (Okonwu et al. 2010; Onyenekenwa, 2011). This study further clearly observed that socio-demographic factors used were actual determinants of poverty as indicated by the use of tobit regression analysis. This study further concludes that because of the negative effects of crude oil pollution on crop farms, there is the probability that poverty will spread more amongst the farm-households though its being intensified among the farm-households cannot be ignored in totality.

This study observed from the results obtained from the study that living in crude oil pollution prone environment, the Rivers State farmers should strived hard to eke out their living, having suffered from all kinds of crude oil pollution incidents without proper ideas of how to ameliorate the negative effects of oil pollution on their farmland (Edino et al., 2010). To this effect the paper therefore recommends that:

- There is the need to intensify the dissemination of information on benefits accruable from adopting the best socio-demographic factors to reduce poverty among farmers in crude oil polluted farms. Such factors include the increase in mean adult equivalent expenditure per household and the reduction in ratio of food expenditure to total expenditure, dependency ratio and household size. This could be done using private and public organizations such as oil companies operating in such localities, Niger Delta Development Commission (NDDC) and the various extension services available in Rivers State, Nigeria.
- Farmers in crude oil pollution prone areas should seek additional means of livelihood by diversifying their sources of income or take farming as a secondary occupation as this will help reduce poverty in the farm-households, reduce tension in the host communities where oil and gas is produced, and allow land to be allocated for its best alternative uses (in this case, oil and gas exploration and production). They could relocate to areas that are less prone to crude oil pollution in the village, community, local government area(s) or state in general.

References

Amdt, C., & Simler, K.R. (2007). Consistent poverty comparisons and inference. *Agricultural Economics, 37* (2 – 3), 133 – 139.

Anugwom, E.E. (2005). Oil minorities and the politics of resource control in Nigeria. *African Development, 30* (4), 87 – 120.

Bigsten, A., Kebede, B. Shimeles, A., & Taddesse, M. (2003). Growth and poverty reduction in Ethiopia: Evidence from household panel surveys. *World Development, 31* (11), 87 – 106.

Cohen, H. (2008). Nigeria: A well-oiled federation. *Peace Ops*. JIPO *4* (2), Sept October. (Accessed 14/08/2009).

Dasgupta, S., Deichmann, U., Meisner, C., & Wheeler, D. (2005). Where is the poverty environment nexus? Evidence from Cambodia, Lao PDR and Vietnam. *World Development, 33* (4), 617 – 638.

Dhungana, B.R., Nuthall, P.L., & Nartea, G.V. (2004). Measuring the economic inefficiency of Nepalese rice farms using data envelopment analysis. *Australian Journal of Agricultural and Resource Economics,. 48* (2), 347 – 369.

Edino, M. O., Nsofor, G. N., & Bombom, L. S. (2010). Perception and attitudes towards gas flaring in the Niger Delta. *The Environmentalist 30* (1), 67 – 75. DOI: 10.1007/s10669-009-9244-z.

Efe, S. I. (2010). Spatial variation in acid and some heavy metal composition of rainwater harvesting in the oil producing region of Nigeria. *Natural Hazards, . 55* (2), 307 – 319. DOI: 10:1007/s11069-010-9529-2.

Gasparini, L., Alejo, J., Haimovich, F.; Olivieri, S. & Tomarolli, L. (2010). Poverty among older people in Latin America and the Caribbean. *Journal of International Development, 22* (2), 176 – 207.

Gottlieb, D. & Manor, R. (2005). On the choice of a policy – oriented poverty measure: The case of Israel 1997 – 2002. *Munich Personal RePEC Achive (MPRA).* Paper No 3842. University Library of Munich, Germany. (Accessed 07/07/2009).

Hanjra, M.A., Ferede, T., & Gutta, D.G. (2009). Pathways in breaking the poverty trap in Ethiopia: Investments in agricultural water, education and markets. *Agricultural Water Management, 96* (11), 1596 – 1604.

Iturbe, R., Flores, C., Castro, A.& Torres, L. G. (2007). Subsoil contamination due to oil spills in zones surrounding oil pipeline-pump stations and oil pipeline right-of-ways in south west Mexico. *Environmental Monitoring and Assessment, 133,* 387 – 398. DOI: 10.1007/s10661-006-9593-y.

Kurosaki, T. (2009). Vulnerability in Pakistan, 2001 – 2004. Institute of Economic Research (IER), Hitotsubashi University, Tokyo, Japan. March, 2009.

Lanjouw, P., & Murgai, R. (2009). Poverty decline, agricultural wages, and non-farm employment in rural India: 1983 – 2004. *Agricultural Economics, 40* (2), 243 – 263.

Lenning, E. & Brightman, S. (2009). Oil, rape and state crime in Nigeria. *Critical Criminology, 17* (1), 35 – 48, DOI: 10.1007/s10612-008-9068-z.

Maertens, M.& Swinnen, J.F.M. (2009). Trade, standards, and poverty: Evidence from Senegal. *World Development,. 37*(1), 161 – 178.

McDonald, J.F., & Moffitt, R.A. (1980). The uses of tobit analysis. *Review of Economics and Statistics*, *62,* 318 – 321.

Ndimele, P. E., Jenyo-Oni, E. A., & Jibuike, C. C. (2010). Comparative toxicity of crude oil, dispersant and crude oil-plus-dispersant to Tilapia guineensis. *Research Journal of Environmental Toxicology. 4* (1), 13 – 22. DOI: 10.3923/rjet.2010. 13.22.; http://scialert.net/abstract/?doi=rjet.2010.13.22.

Nkwocha, E. E., & Pat-Mbano, E. C. (2010). Effect of gas flaring on buildings in the oil producing rural communities of Rivers State, Nigeria. *African Research Review. 4* (2). URL: http://ajol.info/index.php/afrrev/article/view/58293/46643.

Nwaichi, E. O., & Uzazobona, M. A. (2011). Estimating of the CO_2 level due to gas flaring in the Niger Delta. *Research Journal of Environmental Sciences. 5* (6), 565 – 572. DOI: 10.3923/rjes.2011.565.572; URL: /?doi=rjes.2011. 565.572.

Ogbu, A. (2008). Nigeria: Militants hit pipelines again. This Day (Lagos). 22nd April, 2008. World Prout Assembly. (Accessed 14/08/2009).

Okonwu, K., Amakiri, J. O., Etukudo, M. M., Osim, S. M.& Mofunanya, A. A. J. (2010). Performance of maize (Zea mays L.) in crude oil treatment. *Global Journal of Pure and Applied Sciences, 16* (2), 173 – 176.

Omonona, B.T. (2001). Poverty and its correlates among rural farming households in Kogi State, Nigeria. An unpublished Ph.D. Thesis. Department of Agricultural Economics, University of Ibadan, Ibadan, Nigeria.

Onyenekenwa, C. E. (2011). Crippling poverty amidst corporate social action: A critique of peripheral corporate community involvement in the Niger Delta region of Nigeria. *Asian Journal of Rural Development, 1* (1), 1 – 20. DOI: 10.3923/ ajrd.2011.1.20.

Otitoloju, A. & Dan-Patrick, J. (2010). Effects of gas flaring on blood parameters and respiratory system of laboratory mice, Musmusculus. *The Environmentalist, 30* (4), 340 – 346. DOI: 10.1007/s10669-010-9288-3.

Patrick-Iwuanyanwu, K. C., Onyemaenu, C. C., Wegwu, M. O. & Ayalogu, E. O. (2011). Hepatotoxic and nephrotoxic effects of kerosene and petrol- contaminated diets in Wister Albino rats. *Research Journal of Environmental Toxicology, 5* (1), 49–57. DOI: 10.3923/rjet.2011.49.57.; URL: http://scialert.net /abstract /?doi=rjet.2011.49.57.

Ravnborg, H.M. (2003). Poverty and environmental degradation in the Nicaraguan hillsides. *World Development, 31* (11), 1933 – 1946.

Seitinger, P.; Baumgartner, A., & Schindlbauer, H. (1994). The behaviour of oil spills in soils and groundwater. *Natural Resources and Development, 40,* 69 – 84.

Singh, K. (2009), Environmental degradation and measures for its mitigation with special reference to India's agricultural sector. *Indian Journal of Agricultural Economics. 64* (1), 40 – 61.

Swinton, S.M,, Escobar, G., & Reardon, T. (2003). Poverty and environment in Latin America: Concepts, evidence and policy implications. *World Development, 31* (11), 1865 – 1872.

World Bank (1990). Poverty. *World Development Report 1990.* New York. Oxford University Press.