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Social Impact Assessment of Crude Oil Pollution on Small Scale Farmers in Oil Producing Communities of the Central Agricultural Zone of Delta State, Nigeria

Ofuoku, A. O. U.
Department of Agricultural Economics and Extension, Delta State University, Asaba Campus, P.M.B 95074 Asaba, Nigeria

Emuh, F. N.
Department of Agronomy, Delta State University, Asaba Campus, P.M.B 95074 Asaba, Nigeria

Ezeonu, O.
Medical Microbiology Department, Rivers State University of Science and Technology, Port Harcourt, Nigeria

Abstract

The study assessed the social impact of oil production on small holder farmers in oil-producing communities of the Central zone of Delta State, Nigeria. Data were collected from 120 respondents by the use of questionnaires. Soil erosion (96.6%), noise pollution (98.3%), bush burning (93.3%), land degradation/pollution (87.5%), water pollution (80.3%), air pollution (62.5%), massive deforestation (62.5%) and acid rain (52.5%) were seen as the major environmental problems experienced in the study area. The respondents reported that oil pollution impacted negatively on their income (83.3%), agricultural production (98.3%) and land availability (85.8%). None of the socio-economic characteristics of the respondents such as age, gender, Educational level, religion, marital status, type of farming, family size, Farming experience, farm size, income, housing, tenure, membership of organization, land tenure and source of labour were found to determine the social impact of oil pollution on small-scale farmers. Recommendations given dwelt on making the environment conducive for the communities, agricultural activities and it sustenance for future generations.

Keywords: Agricultural activities, crude oil pollution, farmers, socio-economic activities

Introduction

The significance of the agricultural sector as a source of food in Nigeria took a downward trend soon after the discovery of crude oil and subsequent exploration and exploitation of crude oil in the 1970s as a major foreign exchange earner (Adesina, 2012; Babatunde, 2012). The exploration and exploitation of crude oil in commercial quantities led to the massive drift of farmers from the rural settlements to urban areas in search for white collar jobs, enhanced employment and improved standard of living. This resulted in

Corresponding author's
Name: Emuh, F. N.
Email address: *fnemuh@yahoo.com*

almost total neglect of the agricultural sector. The aim of agricultural development is to raise the production level of selected crops and livestock through the adoption of innovations developed from researches. However, since the later part of the last century, the focus shifted to environmental issues. UNDP (2006) reported that more than 70% of the inhabitants of crude oil producing communities depend on environment for their livelihood. Thus, the emphasis arose based on ecological damage to resource base, the health and social hazards to which farmers are exposed (Adinna, 1994). Abah (2004) posited that crude oil spillage and pollution led to socio-economic and social insecurity and public health. In recent years, the negative effect of environmental impact of crude oil pollution in agriculture and the environment with attendant effects which are based on farming, fishing and lumbering has been increasingly obvious (Opukri and Ibaba, 2008). Similarly, Emuh (2009; 2010) reported that crude oil pollution affects physical and chemical properties of the soil and as well as seed germination, plant growth and subsequent yield. Iyoha (2002) noted that, environmental effects arose from land degradation, air pollution, water pollution, deforestation and ecosystem degradation. It became so serious that many affected communities of small holder farmers have no option than to exploit the resources available to them so intensely that environmental degradation is on the increase (Ashimolowo and Busari, 2006).

Various literature defined Environmental impact Assessment (EIA) in different ways. According to Arthur (2001), it an activity designed to identify and predict the impact on the bio-geophysical environment on man's health. Similarly, Holder (2004), Jay *et al.* (2007), noted that EIA is used as a decision making tool to account for environmental values after detailed environmental studies. It is an action designed to ascertain and predict the effect of any activity or action on the social economic and health aspects of man's life. Therefore, the purpose of the exercise is to enthrone a sustainable development process whereby environmental considerations are effectively integrated into the developmental process before commitments are made. Man's environment is very important as it influences directly or indirectly the quality of his/her life. EIA is one of the tools used to control possible environmental damage, especially as a result exploitative interventions.

EPA (1987) opined that the quality of life of man depends ultimately on the quality of his environment and the ability of his environment to provide food, shelter and natural resources needed to generate employment and a well secured life. Without good condition of health and environmental safety, there can be no meaningful economic development. These factors have to be ensured by appropriate environmental impact assessment, setting up of relevant coherent standard and control as well as building necessary capacities at various levels of civil society. Therefore, the solutions to environmental problems in this country is the building of capacities to provide the appropriate and effective integrated approach to the conservation and management of the natural resources as well as managing the environment (Ashimolowo and Busari, 2006).

FORMECU (1990) suggested that water, air and noise form environmental pollution. Air pollution can be experienced as smoke, dust, odour and it can still be experienced as a result fossils fuels, chemical, metallurgical industry, vehicles and gas flaring. It can also be derived from acidic rain (rain water is slightly acidic). When rainwater absorb carbon dioxide, as it passes through the atmosphere it forms a weak acid-carbonic acid. Acid rains occurs during exploration, exploitation and gas flaring which acidifies the environment causing loss of soil fertility, damage crops and corrodes corrugated aluminium roofs (Orimoogunje *et al.,* 2010). Carbonic acid affects many forms of plant and animal life. FORMECU (1990) posited that it damages leaves, affected growth of roots and inhibits germination in plants.

Man has changed the nature of the Nigerian environment consciously and unconsciously through his/her economic and social activities and each of these activities has effect on agricultural systems in Nigeria (Ibe, 1988). According to Adejuyigbe (1995), Nigeria is endowed with abundant natural and human resources which has attracted many manufacturing industries such as petrochemical industries, iron and steel industries and cement factories. Nortcliff (2011), reported that emission released from Agriculture, industry and traffic vehicles are the major sources of atmospheric pollution and deposition of air borne pollutants releases organic compounds (such as PAHs, dioxins, PCBs), metals (such as arsenic, cadmium, lead) and soil acidifying contaminants (NO_2, SO_2) into the environment. The resultant effect is that the country's land, water and animals are exposed to toxic matters arising daily from individual effluents, and the occurrence of acid rain (Ashimolowo and Busari, 2006). This, as suggested by Awoniyi *et al.* (1995) is evidenced in communities like Ewekoro, Ogun state, Nigeria where domestic livestock species, have been reported to suffer from diseases such as skin irritation, carcinogenic cancer and respiratory problems. Green Peace (1993), Aghalino (1998) reported that crude oil polluted waters in Niger Delta caused illness such as cough, catarrh; diarrhea and cholera were most prevalent with school children. Similarly, EPA (1987) reported that ingestion of organic and inorganic waste from petro-chemicals damages kidney, liver and leads to neurological and blood disorder and thus life threatening. In the oil flow station in Erhoike, in Ethiope East Local Government Area of Delta State, oil spillage is known as an almost regular occurrence and this has led to destruction of cassava plants in the small farm holdings of the various inhabitants of the community. Aghalino and Eyinola (2009) reported that a spilled site in Niger Delta, the fish taste was altered to kerosene taste which indicated the taste of hydrocarbon. Similarly, Idodo-Umeh and Ogbeibu (2010) reported bioaccumulation of heavy metals in cassava tubers and plantain fruits in areas of petroleum activities while Lecoultre (2001) reported that toxicity of ingested heavy metals has been an important health issue for decades. Moreover, this finding is in consonance with Peterson (1997) who stated that a lot of hazards are associated with pollution.

It is of great importance to analyze the impact of these hazards and its influence on the environment of oil producing areas with regards to its effect on the populace of the Central Agro-ecological zone of Delta State, Nigeria. This study was therefore embarked upon to access the social impact of oil (petroleum) production on small-holder farmers in Central Agro-ecological zone of Delta State, Nigeria.

Hypothesis: The following hypothesis was tested:

Ho_1: There is no significant relationship between the socio-economic characteristics of farmers in the study area and the social impact of the oil industry.

Methodology

The study area consists of the ten oil producing communities in the Central Zone of Delta State which consists of Afiesere, Erhioike, Agbarho, Elume, Ekakpamre, Jesse, Oghara, Orogun, Out-Jeremi, Ekakpamre, Ododegho, Eruemukohwarie, Evwreni, Awirhe, Erhobaro, Ughweru, Deghele, Oteri, Olomu and Uduovwori. The main cash crops grown in the area include oil palm and rubber. The food crops are cassava, maize, yam, plantain/banana and cocoyam. Livestock such as birds, goat sheep are raised. Capture and culture fisheries activities are carried out in the study area.

In the Central zone of Delta State, the most important of the oil exploration companies is Shell Petroleum Development Company (SPDC).

The population of the study included men and women in the selected oil producing communities or villages. Using the simple lottery system, 50% of the total oil producing

communities in central zone of Delta State was selected, totalling 10 communities. From every selected community 12 respondents of 25-80 years were randomly selected. The total numbers of 120 respondents were interviewed for the study. Descriptive statistics such as frequency distribution and percentages were used to analyze the variables of the study while Chi-square was employed to test the hypothesis.

Results and discussion

Socio-economic characteristics of the respondents

The result showed that 31% of the respondents were between the age brackets of 30-49 years, while 10% were below the age of 30 years. This indicates that a handful of the people engaged in farming were in their middle age would have enough energy and relevant knowledge and experience in farming.

Majority (52.50%) of the respondents were males, while 47.5% were females. The implication was that though males were more into farming while females were measuring up with them in the study area.

Most (53.3%) of the respondents had no formal education. This may be attributed to poverty. The analysis further revealed that 24.2% of them had primary education; 29.2% had one form or the other of secondary education; while 7.5% had tertiary education.

Majority (46.7%) of the respondents had family size of 6-10 members. This was due to lack of awareness of family planning and the quest for more farm lands.

A large population (59.2%) of the respondents was Christians. This is as a result of missionary influence in the area especially those of them that attended mission schools; who once worked for the missionaries are the ones who got converted as a result of the aggressive evangelism by the missionaries.

Most (74.2%) of the respondents were married. As for the farming status, 45.4% were full-time farmers, while 51.7% were part-time farmers. The results also showed that 43.3% of the farmers had over 15 years of farming experience; 30% had 6-10 years experience; 17.5% had less than 5 years experience and 5% had 11-16 years experience. Majority (51.7%) of the respondents had farm size of between 2.6-4.5 hectares. Most (40%) of them were land occupiers. Similarly, 40% lived in their own houses; 38.3% occupied relations houses. As for membership of organization, 5.0% subscribe to various cooperative societies; 2.5%, farmers' union; 4.2%, association of marketers; while 5.0%, village age group.

Agricultural activities practiced in the study area

Table 1 indicates that some of the agricultural activities were rarely practiced by the small-holder farmers. The activities that were widely practiced included maize production (100%), yam production (56.6%) cassava cultivation (100%), vegetable production (61.6%), plantain production (88.3%), poultry farming (57.3%), fish farming (43.3%), cassava milling (53.3%), frying of garri (53.3%), and fufu making (49.2%). Soyabean and cowpea cultivation, sheep and goat rearing had little attention. But the small-scale farmers were into poultry and fish farming. This is in consonance with a similar study carried out by Ashimolowo and Busari (2006) in cement producing areas of Ogun State. The low level of goat and sheep production could be attributed to damages caused to the vegetation by oil pollution. The low rate of involvement in processing activities could be owing to low input emanating from environmental related problems.

Table 1: Types of agricultural activities practiced (n=120)

Agricultural activities	Yes		No	
	Frequency	%	Frequency	%
Maize cultivation	120	100	-	-
Soyabean cultivation	2	1.7	118	98.3
Cowpea cultivation	9	7.5	111	92.5
Yam cultivation	68	56.6	52	43.3
Cassava cultivation	120	100	-	-
Cocoyam cultivation	39	32.6	81	67.5
Vegetable production	74	61.6	46	38.3
Melon cultivation	40	33.2	80	66.6
Rubber cultivation	-	-	120	100
Oil Palm cultivation	-	-	120	100
Plantain production	106	88.3	14	11.6
Goat rearing	20	16.6	100	83.4
Sheep raising	6	5	114	95
Cattle rearing	-	-	120	100
Poultry farming	69	57.3	51	42.5
Fish farming	25	43.3	68	56.6
Cassava milling	64	53.3	56	46.7
Garri frying	64	53.3	56	46.7
Fufu making	59	49.2	61	50.8
Palm oil processing	20	16.6	100	83.4
Rubber processing	9	7.5	111	92.5

Source: Field survey, 2011

Environmental problems encountered

The most important environmental problems (Table 2) were soil erosion (96.6%), bush burning (93.3%), noise pollution (98.3%), land degradation/pollution 87.5%, water pollution (80.3%) and air pollution (62.5%). Most of the respondents believed that regular oil exploration and exploitation activities caused soil erosion and land degradation/pollution in their localities and the noise of flow stations vibrate on their buildings and created cracks on the walls. In another study, Iyoha (2002), Nortcliff (2011) found noise, air water and soil pollution as problems caused by oil exploration activities. They also were of the opinion that gas flaring caused acid rains that corroded their roofs and caused much heat in the environment. Orimoogunje *et al.* (2010) supports this view. Their waters were polluted as a result of spillage which they believed was also responsible for the inferno that affected their bushes. The air and water pollution caused health hazards in the area. Peterson (1997), Agbogidi *et al.* (2005) also discovered this in a similar study as they attributed the high occurrence of health hazards to oil industry activities.

Table 2*:* Distribution of respondents in oil producing communities of central agro-ecological zone of Delta State according to types environmental problems faced (n =120)

Environmental problems	Frequency	%	Rank
Land degradation/pollution	105	87.5	4
Soil erosion	116	96.6	1
Water pollution	100	80.3	5
Air pollution	75	62.5	6
Bush burning	112	93.3	3
Massive deforestation	75	62.5	6

Acid rain	63	52.5	8
Noise	118	98.3	2

Source: Field survey, 2011

Factors responsible for diversification into other generating activities in oil producing communities

Table 3 reveals that 83.3%, 85.8% and 98.3% of the respondents opined that oil pollution had a great negative impact on their income, land availability and agricultural production respectively. The waters were polluted and the fishes were lost to death. This implies that many farmers had abandoned farming and land to take up new jobs and considered farming as a part-time job. Oil exploration activities have significance reductions in crop output Emuh, (2009; 2010). Baker (1970) also observed that the presence of crude oil in farmlands renders the land unproductive and has serious adverse effects on plant growth and consequently a decrease in their income earning capacity. These problems have subjected the inhabitants of host communities to economic and social hardship (Stanley, 1990).

Table 3: **Impact of oil pollution on socio-economic activities** **(n=120)**

Social Indicator	Degree of Impact				
	Greatly Positive f (%)	Slightly positive f (%)	No impact f (%)	Slightly negative f (%)	Greatly negative f (%)
Income	-	4(3.3)	7(5.8)	-	100(83.3)
Living standard	43(35.5)	15(12.5)	15(12.5)	-	47(39.2)
Infrastructure	16(13.3)	-	57(42.5)	-	39(32.5)
Quality of heat	47(39.2)	-	23(19.2)	-	58(48.3)
Price of commodities bought	25(20.8)	17(14.2)	31(25.8)	-	24(20.0)
Immigration	37(30.8)	19(15.8)	40(33.3)	-	24(20.0)
Emigration	44(36.7)	19(15.8)	33(22.5)		-
Agricultural production	-	-	2(1.7)	-	118(98.3)
Other income generating activities	13(10.8)	-	60(50.0)	-	47(39.2)
Gender relationship	-	-	73(60.8)	-	47(39.2)
Conflict	27(22.5)	4(3.3)	50(41.7)	-	47(39.2)
Educational facilities	4(3.3)	-	69(57.5)	-	47(39.2)
Employment opportunities	8(6.7)	-	65(54.2)	-	47(39.2)
Rural development	23(19.2)	-	50(41.7)	-	47(39.2)
Land availability	47(39.2)	-	9(7.5)	8(6.7)	103(85.8)
Community interaction	9(7.5)	15(12.5)	-	-	47(39.2)

Source: Field survey, 2011.

Test of hypothesis

Table 4 shows that all the socio-economic characteristics such as age (X^2 = 3.07,P = 0.69), gender (X^2 = 2.79, P = 0.24), Education (X^2 = 1.78, P = 0.77), religion (X^2 = 3.51, P= 0.32), marital status (X^2 = 4.56, P = 0.21) type of farming (X^2 = 1.37, P = 0.50), family size (X^2 = 2.97, P = 039), Farming experience (X^2 = 3.99, P = 0.41), farm size (X^2 = 3.77, P= 0.58), income (X^2 =6.89, P = 0.14), Housing tenure (X^2 = 3.61, P = 0.16), membership of organization (X^2l = 3.72, P = 0.59), land tenure (X^2 = 2.21, P =0.33), and source of labour (X^2 = 4.43, P = 0.48) are not significantly related to social impact. Thus, the null hypothesis is accepted for the socio-economic characteristics listed above. Therefore, there are no significant relationships between socio-economic characteristics and the social impact of oil exploration companies in the study area. This means that age for example does not determine the impact of oil pollution.

Table 4: Test of chi-square analysis of relationship between social impact and socio-economic characteristics of farmers in the study area (n=20)

Variable	X^2Cal	X^2tab	d.f	*ά*	Remark
Age	3.07	11.070	5	0.05	NS
Gender	2.79	3.841	1	0.05	NS
Educational level	1.78	9.488	4	0.05	NS
Religion	3.51	7.815	3	0.05	NS
Marital status	4.56	7.815	3	0.05	NS
Type of farming	1.37	5.991	2	0.05	NS
Family size	2.97	7.815	3	0.05	NS
Farming experience	3.99	9.488	4	0.05	NS
Farm size	3.77	11.070	5	0.05	NS
Income	6.89	9.488	4	0.05	NS
Housing tenure	3.61	5.991	2	0.05	NS
Membership of organization	3.72	11.070	5	0.05	NS
Land tenure	2.21	5.991	2	0.05	NS
Source of labour	4.43	11.070	5	0.05	NS

Conclusion and recommendations

The study was conducted to examine the social impact of oil pollution on small-scale farmers' oil producing communities of the Central zone of Delta State, Nigeria. Agricultural activities practiced in the study area ranged from crop and animal/fish production to crop product processing. The environmental problems they contended with ranged from land degradation to noise pollution. The problems caused by oil pollution greatly affected their socio-economic activities (Abah, 2004). Oil exploration and exploitation caused a lot of ecological damage to soil resources, human health, the environment and social problems in the oil producing communities (Iyoha, 2002). It is therefore concluded that there is an urgent need for the enactment and enforcement of a comprehensive and effective environmental protection law and education to protect and preserve oil producing communities' environment for sustainability of the present and future generations (Awoniyi, *et al.*, 1995).

Based on the findings, it was recommended that

- Communities should be enlightened on how to control the exploit of their resources
- Oil companies should compensate their host communities with health facilities, youth employment and other amenities development.
- Oil companies should make provision for proper clearing of

polluted water and remediation of affected soil.

- ❖ Improved farm inputs should be supplied to farmers in order to cope with devastation of the environment
- ❖ Oil companies should be made to dispose their wastes properly and carry out constant maintenance of their facilities, especially pipelines.

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