

**Full Length Research Paper**

Effects of Oil Spillage (Pollution) on Agricultural Production in Delta Central Agricultural Zone of Delta State Nigeria

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Abstract

The work analyzed the effects of oil spillage/pollution on agricultural production in Delta Central Agricultural Zone of Delta State, Nigeria. The specific objective of this study are to “describe the socio - economic characteristics of the respondents, to identify agricultural production activities of the respondents, to identify causes of oil spillage/pollution of the area, and to describe the effects of oil spillage on agricultural production activities of its respondents. A simple random sampling technique was used to select a sample of 115 respondents for the study. Data collected through questionnaire were analyzed using percentage presented in tables. Result shows that oil spillage /pollution occurred as a result of corrosion of oil pipelines and explosion of oil wells/terminal/stations, giving rise to unproductive soil, reducing the people interest in agricultural activities. However, some recommendation were made, the first recommendation “a permanent disaster management institution should be established in this area the second recommendation was “oil companies should engage in preventative measure to mitigate the risk of oil spillage /pollution as well as ensuring transparency with regard to payment of compensation, contract to affected communities.

Keywords: Oil Spillage, Pollution, Agricultural Production, Farming

Introduction

The exploration and exploitation of crude oil has brought with it several cases of oil pollution, leading to depletion of natural resources. Nigeria, the most populous country in Africa, is also one of the best endowed in terms of natural resources. Since 1974, only 14 years after her independence, oil production for export has been by far the main source of revenue for the government. Today, oil sales account for more than 40 percent of GDP, 80 percent of the government’s budgetary revenue, and more than 95 percent of exports. With an average production of approximately 2 million barrels per day, Nigeria is one of the world’s largest oil producers (Oyinlola and Olamiju, 2013). The Niger Delta Region belongs to the South-South geo-political zone of Nigeria. It is the most endowed delta 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 into what is termed environmental destruction due to neglect and negative attitude of the multinational companies in environmental management in the area.

Crude oil and gas production is the main stay of the Nigeria economy contributing about 90% of the nation’s foreign exchange, 80% of total government revenue earning and 25% of the gross domestic product (GDP) (Niger Delta Development Commission, 2006). Crude oil and gas pollution is the major environmental hazard caused by crude oil and gas exploration, exploitation and production in the Niger Delta region of Nigeria and many parts of the world (Ward et al., 2003; Benson and Etesin, 2008; Kuhad and Gupta, 2009; Rashid et al., 2010; Wang et al., 2010). Crude oil and gas pollution can occur in form of spillages due to oil well blowout, corrosion of pipelines, accidental discharges and vandalism. These oil spillages can lead to underground leakages which have impacts on the environment in the form of underground water pollution , soil pollution (Ikhajiagbe and Anoliefo, 2011), health effect (Chukwu and Lawal, 2010; Jain et al., 2011; Shrivastava, 2011) and destruction of vegetation (Alam et al., 2010).

The world today recognizes the significance of environmental sustainability to 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 reduction in environmental pollution (Eregha and Irughe, 2009). The Niger Delta region is Nigeria’s only productive region for petroleum. The region consists entirely of nine states of Rivers, Bayelsa, Cross Rivers, Akwa Ibom, Delta, Edo, Ondo, Abia, and Imo. As is the case with many oil-rich developing countries, oil reserves have proved a mixed blessing for Nigeria. This is so because of the environmental and social impacts exploration and exploitation of this important natural resource (Amu, 2006). The Niger Delta region

is dominated by rural communities that depend solely on the natural environment for sustenance living and non-living livelihood (UNDP Report, 2006). Environmental degradation issues are of topical concern to communities in the Niger Delta as it is a major cause of productivity losses (Opukri and Ibaba, 2008). This is the main reason why oil and gas extraction impact on 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). Delta State which is one of the nine (9) States in the Niger Delta region of Nigeria is greatly endowed with abundant natural resources and a weather which supports all year round agricultural production.

According to FOS (1995), about 50 percent of the active labour force is engaged in one form of agricultural activity or another, with yam, cassava, plantain, maize, cocoyam and vegetables as the predominant food crops in the area. However, owing to the hydrographic conditions of the State only a fraction of the land size is cultivated with crops. Cropping patterns are mainly sole cropping, mixed cropping and intercropping, while farming practices are traditional, and the use of crude implements such as hoe and cutlasses predominate. Agricultural production is on a small and subsistence scale, with small farm holdings. Mechanization is on a very low scale and the use of modern farming inputs such as fertilizers and pesticides is limited because farmers hardly have access to it, since it is nationally distributed by the Federal Government. Delta State is the largest crude oil producing State in Nigeria located in the Niger delta region, the base of the Nigerian oil and gas industry which generates over 90 percent of the nation's foreign exchange earnings.

Paradoxically, in spite of the increasing revenue from crude oil exploitation, the communities from which this resource flows in the Niger Delta continue to live in conditions of social deprivation and abject poverty. All stages of oil exploitation impact negatively on the environment, and the greatest single intractable environmental problem caused by crude oil exploration in the Niger Delta region is oil spillage. According to the DPR, (1997) over 6000 spills had been recorded in the 40 years of oil exploitation in Nigeria, with an average of 150 spills per annum. In the period 1976 – 1996, 647 incidents occurred resulting in the spillage of 2,369,407.04 barrels of crude oil. With only 549,060.38 barrels recovered, 1,820,410.50 barrels of oil were lost to the ecosystem.

The people of Delta region, prior to the discovery of oil, made their living from exploitation of the resources of the land, water and forest as farmers, fishermen and hunters conscious of the critical position of the environment to their sustenance and their future generations, the people of the zone were very attached to their environment. The discovery of oil understandably raised the hopes of the people for development in their innocence; they believed that the Nigerian state and the oil companies were equally interested. In and committed to their development they soon found out that this was not the case and that the two shared a common interest in the maximization of profit and the accumulation of capital at any cost hardly their welfare or development (Owugah 2009) therefore with the discovery of oil in the area all activities including agricultural pursuit became peripheral and subservient to oil exploration activities as has been extensively mentioned above.

In the zone, community oil spills are a direct consequence of crude oil production and therefore manmade they may also result in changes to both the landscape and the socio-economic activities in the area, spills may also result because of faults at any stage of the production and movement of crude as products involve many mechanical processes, the continued efficiency of which may not be guaranteed, Jike (2007) has argued rather trenchantly that although oil companies have made enormous profit in the country, these companies have contributed minimally to the country's development.

In the same vein, communities oil spills have posed a major threat to the environment which has led to total annihilation of the ecosystem thus life in this area is becoming increasingly unbearable due to the ugly effects of oil spills (Oyem 2011). Intermittent oil spillage has rendered vast stretch of indigenous farmlands useless therefore as important as oil might seem to the nation's economy; the people perceive the discovery of oil as threat to their life support system (the land). This particular oil spill has a serious impact on the vegetation and wildlife to the extent that plants could no longer bear its traditional faults and those making a living from the sea resources were stranded, thus in most cases such damage is temporary and is caused primarily by the physical properties of oil creating nuisance and hazardous conditions. the impact of this oil spills has also led to situation where the people who have been known to be friends of their environment used raffia palms bamboo and other forest resources to make their houses, now they are forced to use cement and corrugated iron sheets for their houses, this is because there are no longer healthy forest and swamp resources for building their conventional and convenient houses, many of the plants and the tree spices have died off which others are largely dwarfed as a result of the highly toxic ecosystem in which they now find themselves.

The broad objective of this study is to “analyze the effects of oil spillage/pollution on agricultural production in Delta Central Agricultural Zone, of Delta State”. The specific objectives are to: a) Describe the socio – economic characteristics of the respondents. b) Identify agricultural production activities of the respondents. c) Identify causes of oil spillage/pollution of the area. d) Describe the effect of oil spillage/pollution in agricultural production activities of its respondents.

Methodology

The study was conducted in Delta State, which lies in the south-south part of Nigeria. Delta ADP (DADP) for administrative convenience divided the state into three agricultural zones- Delta North Agricultural zone with 9 extension blocks, Delta central zone with 10 extension blocks and Delta South Zone with 6 extension blocks. A multi-staged random sampling technique was used for the study because the sampling units occur in strata of blocks and cells. Delta-central, which has its headquarters in Effurun has ten local governments under it with most of them Urohobos by tribe. This area of the state suffers from spillover of militant activities from the highly volatile delta-south zone. This is where the amnesty camp for the rehabilitation of the militants is located. The first stage was the purposive selection of Delta Central zone being oil spill area and has the largest extension blocks - 10 extension blocks of the total 25 extension blocks and with the largest concentration of food crop farmers. This was followed by a random selection of five blocks (Ughelli North, Sapele, Ethiope East, Isoko North and Udu blocks respectively) from the ten blocks in the Delta central zone. The third stage was the random selection of two cells from eight cells in each block to make a total of ten cells sampled. The last stage was the random selection of 12 farmers from each cell, which are mainly ADP, registered farmers. A total of 120 farmers formed the sample name but only 115 copies of respondents' questionnaires were useful for analysis. The two main sources of data used for this study was primary and secondary data. The primary data was collected from the field survey using questionnaire. Simple statistical tool such as mean, percentage, frequency distribution was used to analyze objective 1,2,3,4.

Results and Discussion

Socio Economic Characteristics of the Respondents

Table 1 shows that 43.5% of the respondents are between the age brackets of 51 – 60 years. They are followed by 29.6% of the respondents who are between the ages of 41- 50 years, while 17.4% and 14.8% of the respondents are over 60years and between 31-40 years. The mean age from the distribution is 41.8 years this implies that the respondents had been in agricultural production for a long time and must have had experiences on the effects of oil spillage/pollution. Table 1 also shows that 65.2% are males, while 34.8% of the respondents are females. This implies that majority of males in the study area are involve in agricultural production than the female because they are heads of families. Furthermore, 73.9% of the respondents are married, 15.6% are divorced, while 10.4% are widows. This implies that majority of people who are involved in agricultural production are married. The table shows that 53.9% of the respondents have secondary education, followed by 33.0% that have primary education, 10.4% has tertiary education, while 2.6% of the respondent have no formal education. This result revealed that majority had formal education, hence could read and write. The table revealed that 38.3% of the respondents have a household size of 4-6, followed by 33.9% of respondents with household size of 7-9, 24.3% of respondents with household size of 1 -3 while 3.5% of the respondents have a household size of above 10. The mean household size of the respondents in the study area is 4.8 persons. This implies that greater numbers of people who are involved in agricultural production serve as labour. Majority (47%) of the respondents have been in farming business between 11 – 20years, 28.7% of the respondents have been in farming practices above 21years and the mean farm experience was 11.4years. This implies that the respondents had engaged on agricultural production for longer time and must have had several experiences on the effects of oil spillage/pollution on agricultural production in the study area. On farm size, 55.7% of the respondents have between 0.5- 1 hectares of land followed by 31. 3% that has between 1.5 -2 hectares, 10.4% have between 2.5-3 hectares, while 2.6% of the respondents have 3.5 hectares and above.

Agricultural Production Activities of the Respondents

Table 2 shows the agricultural production activities of the respondents, the table shows that 94.0% of the respondents engage in cassava production, followed by 88.7% engaged in fish production, 85.2% engage in yam production, 39.1% engage in cocoyam production, 30.4% are engaged in agric business, 26.1% are both engaged in poultry production and Goat rearing and while, 22.6% of the respondents are engage in sheep rearing. The meaning is that the respondents are farmers.

Causes of Oil Spillage/ Pollution in the Study Area

Table 3 shows the causes of oil spillage/pollution on agricultural production by the respondents. It shows that 94.0% of respondents agree to both explosion of oil wells/terminal/stations and corrosion of oil pipelines as causes to oil spillage/pollution on agricultural production, followed by 87.0% of the respondents agree to drilling of oil wells as cause, 82.6% of the respondents agree for spills from vandalized oil pipelines, leakage from oil tanks/faulty facility and spills from loading oil vessels as causes, 80.0% of the respondents agree to maintenance activities of oil companies as cause, 74.8% of the respondents agree to natural gas flaring as cause while 67.8% of the respondents agree to sabotage as one of the causes of oil spillage/pollution on agricultural production. The above is in line with Oyem (2011) who posited that thousand of barrel of oil have been let loose into the environment through corrosion of oil pipeline and explosion of oil well in the country. This loss is basically as a result of lack of maintenance of pipelines, storage tanks, most pipelines from the flow stations are obsolete according to the international standard, oil pipes ought to be replaced after 15 to 20 years, but most pipelines in use are 20 to 25 years old, making them subject to corrosion and leakage, some of these pipes are laid above ground level without adequate surveillance exposing them to wear and tear and other dangers.

Badejo and Nwilo (2004) noted that illegal fuel siphoning as a result of the thriving black market for fuel products has increased the number of oil pipelines explosion in recent years.

Table 1: Socio- Economic Characteristics of the Respondents

Characteristics	Frequency	Percentage
Age		
31-40	17	14.4
41-50	34	29.6
51-60	50	43.5
61 and above	20	17.4
Marital Status		
Married	85	73
Divorced	18	15.6
Widow	12	10.4
Household size		
1-3	28	24.3
4-6	44	38.3
7-9	39	33.9
10 and above		
Educational Level		
No formal Education	3	2.6
Primary	38	33
Secondary	62	53.8
Tertiary	12	10.4
Farm size		
0.5-1	64	55.7
1.5-2	36	31.3
2.5-3	12	10.4
3.5 and above	3	2.6
Farming Experience		
1-10 years	33	28.7
11-20 years	54	47
21 and above	28	24.3
Sex		
Male	75	65.2
Female	40	34.8

Table 2: Agricultural Activities of Respondents

Activities	*Frequency	Percentage (%)
Yam production	98	85.2
Cocoyam processing	45	39.1
Agric business	35	30.4
Poultry production	30	26.1
Cassava production	108	94.0
Sheep rearing	26	22.6
Fish production	26	88.7
Goat rearing	30	26.1

*Multiple responses were recorded

Effects of Oil Spillage/Pollution on the Agricultural Production Activities

Table 4 show the effect of oil spillage/pollution on agricultural production by the respondents. From the table, 95.7% of the respondents agreed that reduction of soil fertility, increased soil temperature/toxicity, low land productivity, poor yield and death of fishes are effects of oil spillage/pollution on agricultural production. Again, 92.2% of the respondents agreed that destruction of soil micro-organism, stunted growth of crop and failure, wilting of crop, toxicity water available for livestock and outbreak of crop disease 85.2%, degradation of farm land, destruction of soil structure, bad taste of produce and death of livestock are effects if oil pollution. Other effects are contamination of water/river sources, crop leaves appear burnt, poor soil aeration of farm land, yellowing of crop leaves and rotting of yam and cassava tubers.

Table 3: Causes of Oil spillage/pollution on agricultural production

Causes	Frequency	Percentage (%)
Explosion of oil wells/terminal stations	108	94.0
Spills from vandalized oil pipelines	95	82.6
Leakages from oil tanks/faulty facility	95	82.6
Corrosion of oil pipelines	108	94.0
Spills from loading oil vessels	95	82.6
Maintenance activities of oil companies	92	80.0
Natural gas flaring	92	80.0
Sabotage	86	74.8

The above findings are in line with Irhivben and Omonona (2013) who said that the effect of oil in aquatic system is perilous, it distorts the beach aesthetics and depletes fishery potentials, it also impact on water productivity and human health like in terrestrial oil pollution, the initial impact of oil on aquatic system manifest in the suffocation of native biotic communities due to the body of the oil covering water surfaces in such a way that primary producer and higher species in the food chain become impacted. Regarding livestock production in the state, oil exploration has impacted negatively as vegetation in most land of the state suffered poor growth due to oil spillage effect. The resultant effect of this implication is that there are few grazing lands that could account for the feeding of animals in the state apart, vegetations available are loaded with chemicals and poisonous substances that are both detrimental to animal health and human lives.

Table 4: Effects of oil spillage/pollution on the agricultural production

Effects	Frequency	Percentages (%)
Poor soil aeration of farm land	94	81.7
Degradation of farm land	98	85.2
Increased soil temperature/toxicity	110	95.7
Destruction of soil micro-organisms	106	92.2
Destruction of soil structure	98	85.2
Low land productivity	110	95.7
Yellowing of crop leaves	94	81.7
Stunted growth of crop	106	92.2
Crop failure	106	92.2
Poor yield of crop	110	95.7
Rotting tubers	94	81.7
Wilting of crops	104	90.4
Toxicity water available for livestock	102	88.7
Death of fishes and aquatic life	110	95.7
Contamination of water/river sources	96	83.5
Crop leaves appear burnt	96	83.5
Bad taste of produce	98	85.2
Outbreak of crop disease	102	88.7
Death of livestock	98	85.2

Conclusion

The causes of the oil spillage/pollution are drilling of oil wells, explosion of oil wells/terminals/station, spills from vandalized oil pipelines, leakages from oil tanks/faulty facility, corrosion of oil pipelines, spills from loading oil vessels, maintenance activities of oil companies, natural causes, flaring, sabotage. The effects of oil spills / pollution includes reduction of soil fertility, poor soil creation of farm land, degradation of farm land, increased soil temperature/toxicity, destruction of soil micro-organisms, destruction of soil structure, low land productivity, yellowing of crop leaves, stunted growth of crop, crop failure poor yield of crop, rotting tubers wilting of crop, toxicity water available for livestock, deaths of fishes, contamination of water/river sources, crop leaves appear burnt, bad taste of produce, outbreak of crop disease death of livestock. Government should establish a permanent disaster management institution in this area as none has existed there previously. The oil companies should engage in preventative measures to mitigate or minimize the risk of oil spillage like investing the adequate and regular maintenances of their oil installations and the replacing of old pipes, as well as improving the security agencies guarding their various installations (to prevent the vandalization of pipelines). Government must play a leading role by enacting and enforcing environment law which include the load use act, EIA decree and the petroleum and Distribution act that will protect the oil producing communities as well as guarantee the affected communities of a better livelihood.

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